Global Longevity Governance Landscape

50 Countries Big Data Comparative Analysis of Longevity Progressiveness

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Global Longevity Governance Landscape

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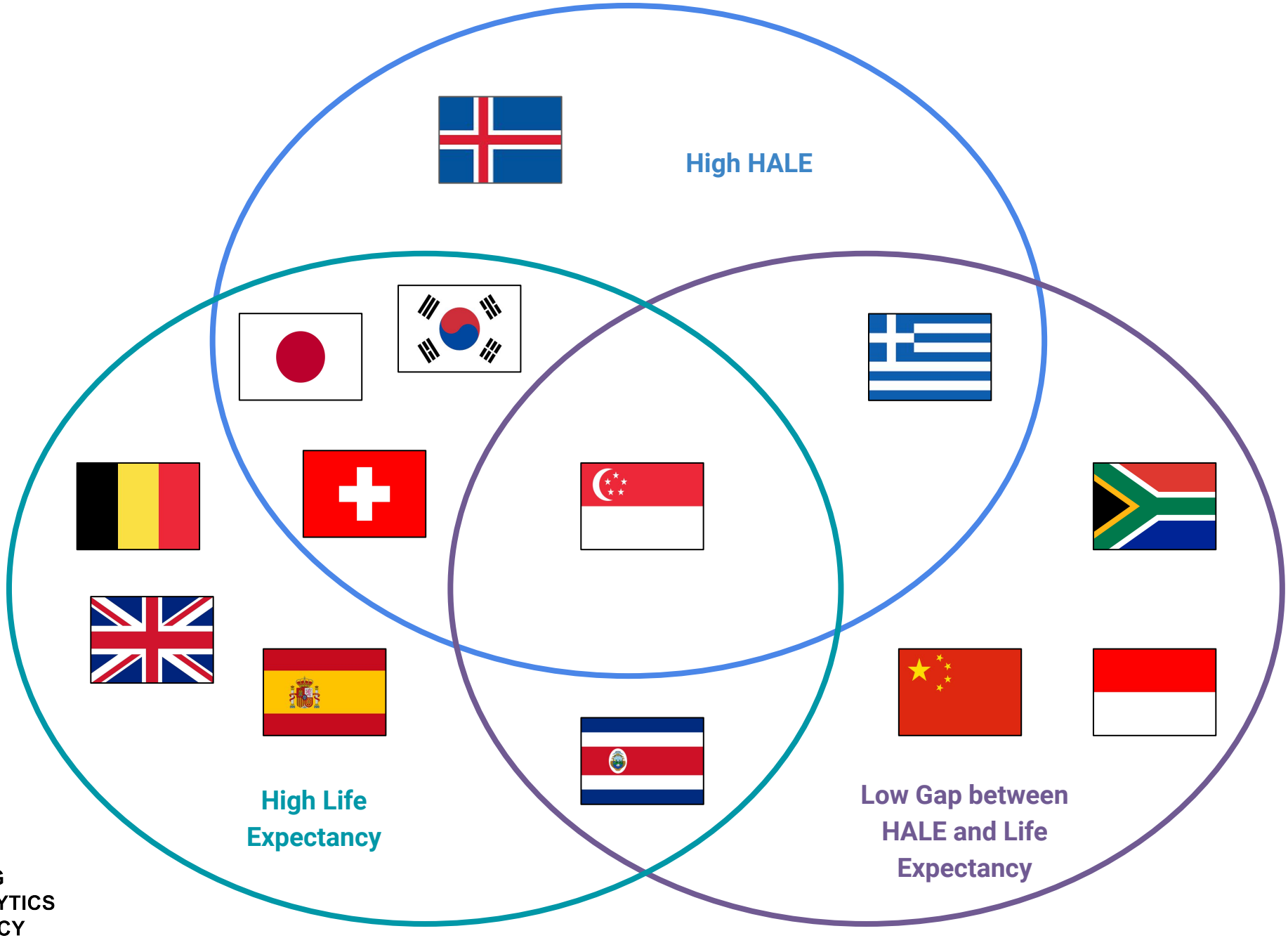
Executive Summary

Health-Adjusted Life Expectancy Specification Framework



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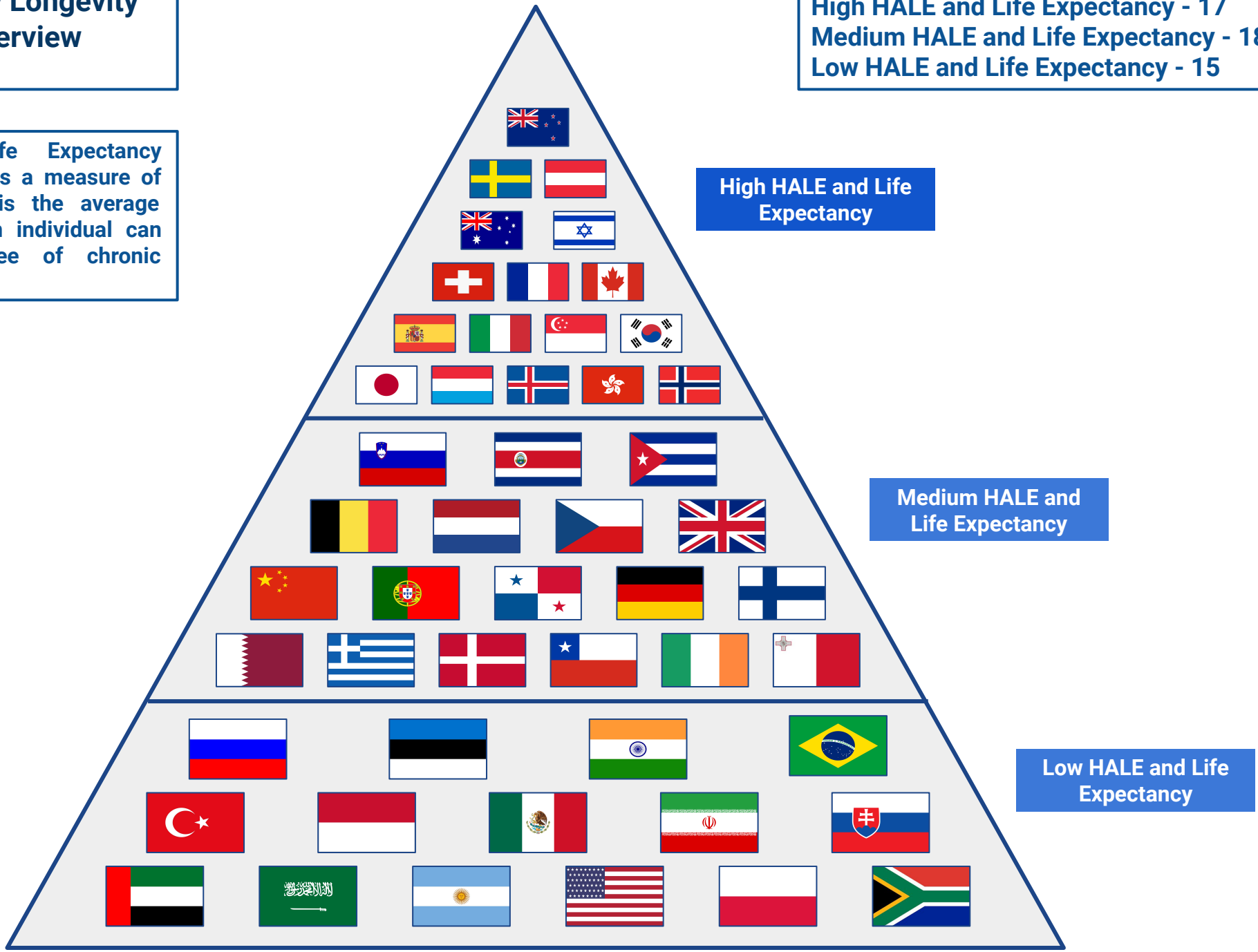
Global Healthy Longevity Landscape Overview

50 Countries:
High HALE and Life Expectancy - 17
Medium HALE and Life Expectancy - 18
Low HALE and Life Expectancy - 15

Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease



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Global Healthy Longevity Landscape Overview

50 Countries:
Big Gap between HALE and LE - 23
Medium Gap between HALE and LE - 18
Small Gap between HALE and LE- 9

Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease

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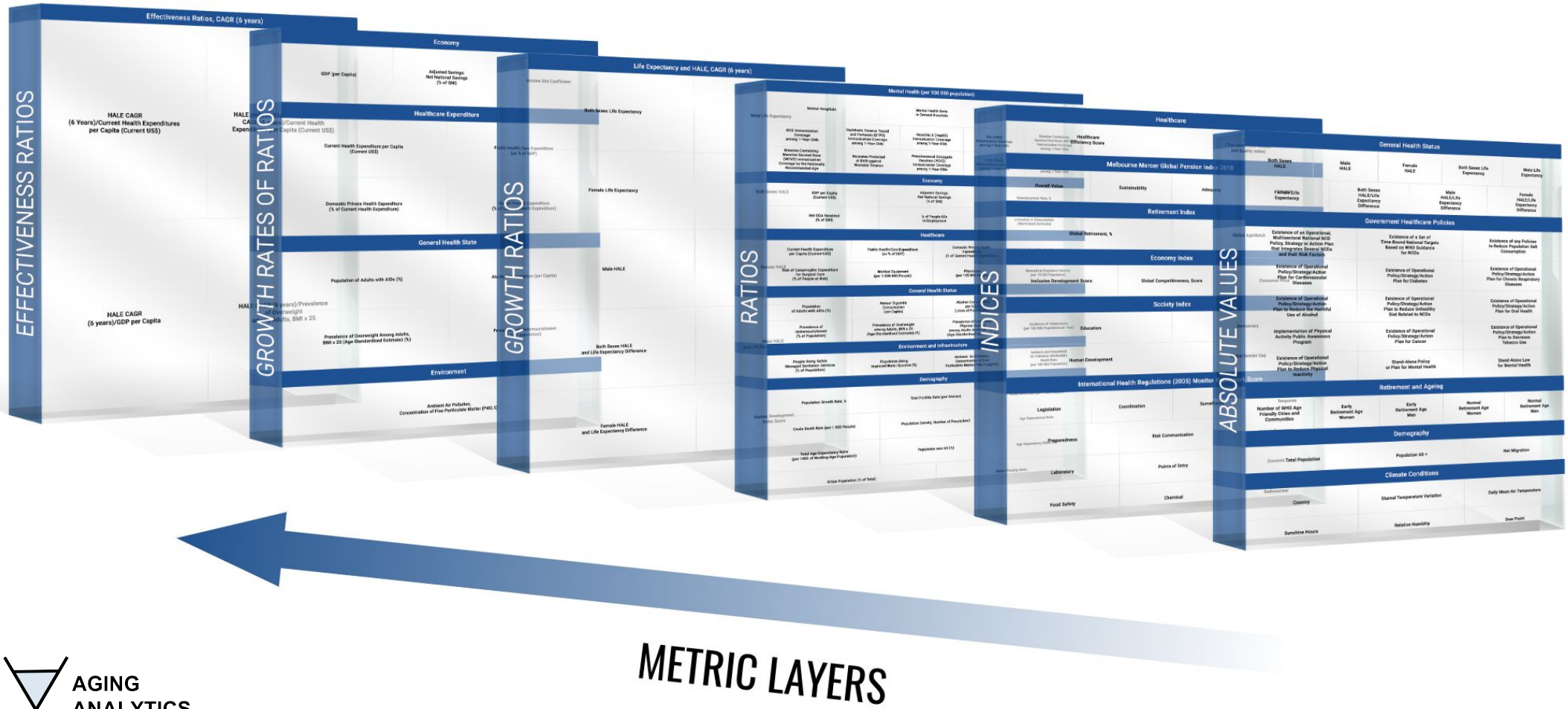
Global Healthy Longevity
6 Layer Analytical Framework

200 analyzed parameters are divided into 6 layers which differ based on the nature of the parameters they consist of. Effectiveness ratios are derived metrics from absolute values and ratios. Effectiveness ratio indicates how effective longevity governance has been in using financial resources to generate an acceptable increase in health-adjusted life expectancy and improvement of the quality of life.



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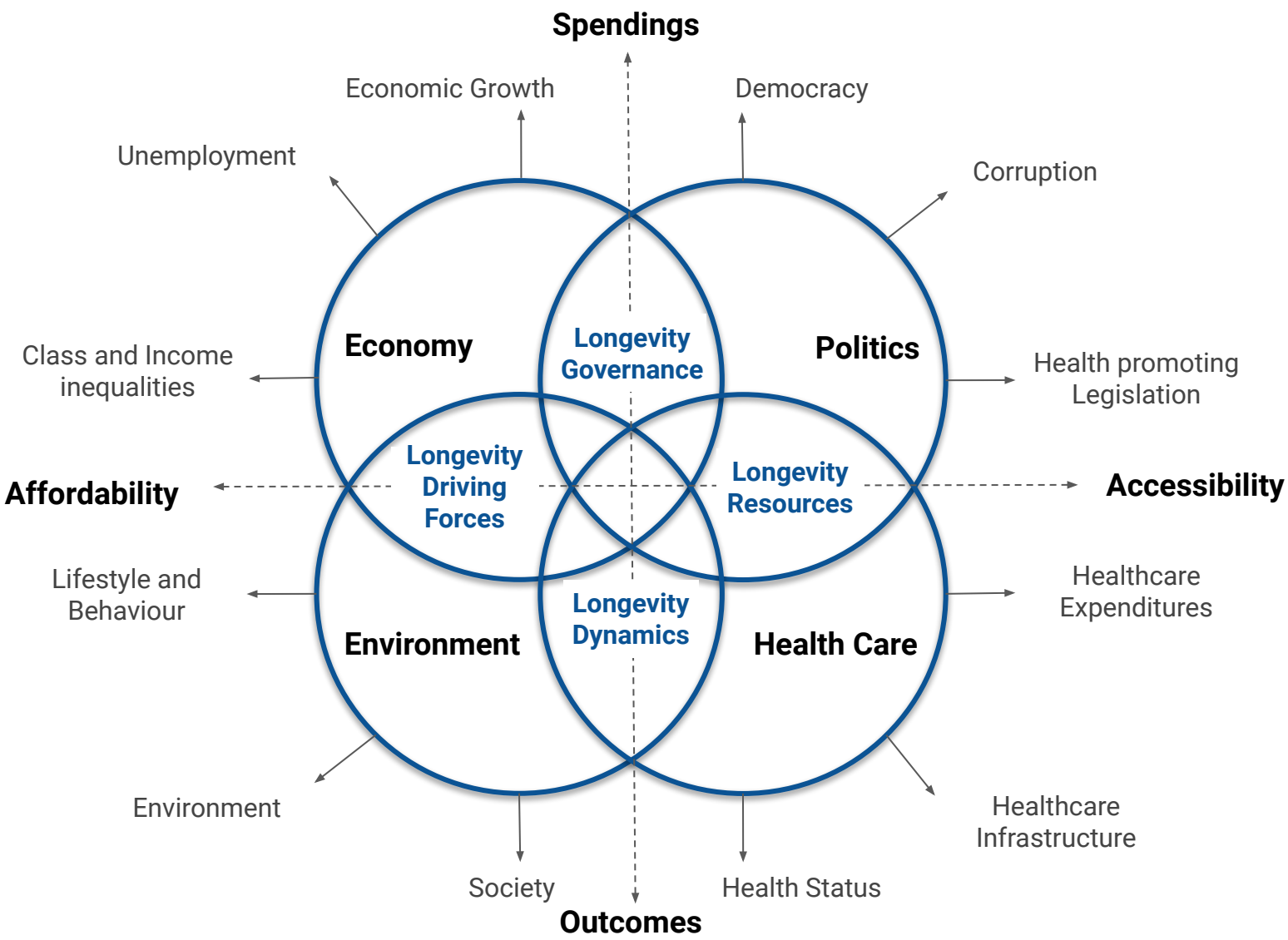
Healthy Longevity Progressiveness



Healthy Longevity progressiveness is important for driving economic progress and competitiveness—both for developed and developing economies. Today longevity is about social inclusiveness, high quality of life, technical innovations in care delivery and medical treatment, and modified business and governmental models.

Key Findings of the Special Case Study

Healthy Longevity is affected by many groups of factors such as: socioeconomic status, demography, income, wellbeing, the quality of the health system and the ability of people to access it, health behaviours such as tobacco and excessive alcohol consumption, poor nutrition and lack of exercise, social factors, genetic factors and environmental factors including overcrowded housing, lack of clean drinking water and adequate sanitation.

This study shows that the major concern that contributes to poor health is the prevalence of non-communicable diseases (NCDs). NCDs are considered to be a "slow motion disaster." Noncommunicable diseases are driven by forces that include unplanned urbanization, globalization of unhealthy lifestyles and population aging. Unhealthy diets and a lack of physical activity may show up in people as raised blood pressure, increased blood glucose, overweight and obesity. These are called "metabolic risk factors" and can lead to cardiovascular disease, the leading NCD with regard to premature deaths. All risk factors of NCDs lie in non-health sectors, requiring collaboration across all of government and all of society to combat them.

It must be noted that the countries that have the highest life expectancy and HALE indicators are generally the most developed countries. **The greater one's income, the lower one's likelihood of disease and premature death.** The relationship between income and health is a gradient: they are connected step-wise at every level of the economic ladder.

Countries with **high HALE and Life Expectancy** and a small gap between this indicators are **Singapore and Hong Kong**. One of the most important factor of life expectancy in this group of countries is high level of economic development, The most important factors are environment, accessibility of healthcare services, living standard and health consciousness.

In countries with **low HALE and Life Expectancy (e.g. Iran, Turkey, Slovakia, India etc)** the combination of factors that contribute to the general health standards of these countries include not only the availability and quality of the healthcare facilities, but food availability, literacy rate, numbers of doctors per 10,000 population, poverty and socioeconomic inequality.

A group with countries which have **medium HALE and Life Expectancy** includes mostly EU members: **Belgium, Denmark, Germany, Portugal** etc. Their HALE and Life Expectancy indicators continue to increase each year. These gains in longevity can be attributed to a number of factors, including improved education, socio-economic conditions and lifestyle, as well as progress in health care.

It is no coincidence that among the 50 countries on the list there is a relatively long life expectancy compared to other countries. Instead, it is precisely because of many common characteristics that the citizens of these countries can achieve a long and healthy life, and the further development of such characteristics may allow developing countries to also increase their HALE and Life Expectancy.

Key Findings of the Special Case Study

Indicators	Effects on Health-adjusted Life Expectancy and Life Expectancy
Gross Domestic Product (GDP) per capita, level of disposable income	Low GDP per capita correlates with low HALE (health-adjusted life expectancy) and LE (life expectancy at birth) and vice versa higher wealth of the country corresponds to higher HALE. The greater one's income, the lower one's likelihood of disease and premature death.
Healthcare expenditure	For countries with lower level of GDP per capita increase in healthcare expenditures correlates with increase in HALE. But for countries with high level of wealth increase in healthcare spendings does not lead to growth of HALE because higher spendings are caused by high medical prices.
Urban Population, age-friendly cities and communities, population density	Countries with high level of urbanisation have high HALE as more people have better access for medical treatment and appropriate infrastructure.
Consumer Price Index	Countries with stable economic conditions have higher HALE. In contrast, economic instability affects negatively on the level of life and HALE.
Mental health and diseases	High level of disease corresponds to decrease in health and decrease in HALE. Non-communicable diseases are considered to be "slow-motion disaster" and prevail among major causes of premature death.
Total fertility rate, crude birth rate	Developing countries have higher birth and fertility rate which corresponds to lower HALE. Developed countries have lower birth and death rate and higher HALE and LE.
Advanced technologies in healthcare	Advances in medicine and medical technology have had a major impact on increased longevity. Development of antibiotics and immunizations, as well as improvements in imaging, surgery, cardiac care and organ transplants all have helped push the average life expectancy higher.

Key Findings of the Special Case Study

Indicators	Effects on Health-adjusted Life Expectancy and Life Expectancy
Obesity	Major developed countries have high level of obesity and bigger gap between life expectancy and HALE. Overweight increases the risk of other diseases and health problems, such as heart disease, diabetes, high blood pressure and certain cancers
Gender	Women live longer than men, on average. They are diagnosed disease later than men.
Poverty and socio-economic inequality	The causes of poor health for millions globally are rooted in political, social and economic injustices. Poverty is both a cause and a consequence of poor health. Poor health, in turn, traps communities in poverty. Infectious and neglected tropical diseases kill and weaken millions of the poorest and most vulnerable people each year.
Genetics	There appears to be a link between genetic factors and mortality rates. The leading causes of death include heart disease, cancer, chronic lower respiratory disease, accidents, stroke or cerebrovascular disease, alzheimer's disease, diabetes, influenza and pneumonia
Socio-economic status	As socio-economic status decreases, so does life expectancy. Among other things, socio-economic status can affect a person's ability to access adequate medical care and their participation in healthier lifestyle habits like exercising more, smoking less and maintaining a healthy weight.
Sanitation facilities and improved water sources	Improved infrastructure correlates with better health and higher health-adjusted life expectancy.
Tobacco use, excessive use of alcohol, risky behaviors, food safety	Historically, lifestyle factors that affect mortality include an unhealthy diet, inadequate exercise, tobacco use, excessive use of alcohol, risky behaviors, food safety.

HALE and Life Expectancy

Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease.

Life expectancy (LE) at birth reflects the overall mortality level of a population. It summarizes the mortality pattern that prevails across all age groups in a given year – children and adolescents, adults and the elderly.

HALE, 2016		HALE/GAP between HALE and LE, 2016
76.2	Singapore	6.7
74.8	Japan	9.4
73.8	Spain	9.3
73.5	Switzerland	9.8
73.0	South Korea	9.7
72.9	Israel	9.4
72.1	Netherlands	9.5
71.9	United Kingdom	9.2
68.7	China	7.4
68.5	USA	10.0

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Source: WHO

HALE and GDP

Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease.

Gross domestic product (GDP) per capita is a measure of a country's economic output that accounts for its number of people. It divides the country's gross domestic product by its total population. That makes it the best measurement of a country's standard of living.

HALE, 2016		GDP per Capita (Thousand $) 2016
76.2	Singapore	56.7
74.8	Japan	38.8
73.8	Spain	26.6
73.5	Switzerland	80.0
73.0	South Korea	26.7
72.9	Israel	37.4
72.1	Netherlands	46.0
71.9	United Kingdom	40.5
68.7	China	8.1
68.5	USA	57.9

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Source: WHO

HALE and Public Health Care Expenditure

Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease.

Public health care expenditure consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds.

HALE, 2016		Public Health Care Expenditure (as % of GDP) 2016
76.2	Singapore	4.5
74.8	Japan	10.9
73.8	Spain	9.0
73.5	Switzerland	12.3
73.0	South Korea	7.3
72.9	Israel	7.3
72.1	Netherlands	10.4
71.9	United Kingdom	9.8
68.7	China	5.0
68.5	USA	17.7

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Source: WHO

HALE and Prevalence of Overweight among Adults

Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease.

Body mass index (BMI) is a value derived from the mass (weight) and height of a person. The BMI is defined as the body mass divided by the square of the body height, and is universally expressed in units of kg/m2, resulting from mass in kilograms and height in metres.

HALE, 2016		Prevalence of Overweight among Adults, BMI ≥ 25 (Age-Standardized Estimate) (%)
76.2	Singapore	31.8
74.8	Japan	27.2
73.8	Spain	61.6
73.5	Switzerland	54.3
73.0	South Korea	30.3
72.9	Israel	64.3
72.1	Netherlands	58.7
71.9	United Kingdom	63.7
68.7	China	32.1
68.5	USA	67.9

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Source: WHO

HALE and Alcohol Consumption

Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease.

Alcohol consumption per capita means an equivalent litres of pure alcohol (ethanol) consumed per individual per year.

HALE, 2016		Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016
76.2	Singapore	2.0
74.8	Japan	8.0
73.8	Spain	10.0
73.5	Switzerland	11.5
73.0	South Korea	10.2
72.9	Israel	3.8
72.1	Netherlands	8.7
71.9	United Kingdom	11.5
68.7	China	7.2
68.5	USA	9.8

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Source: WHO

Current Health Expenditure and Healthcare Efficiency Score

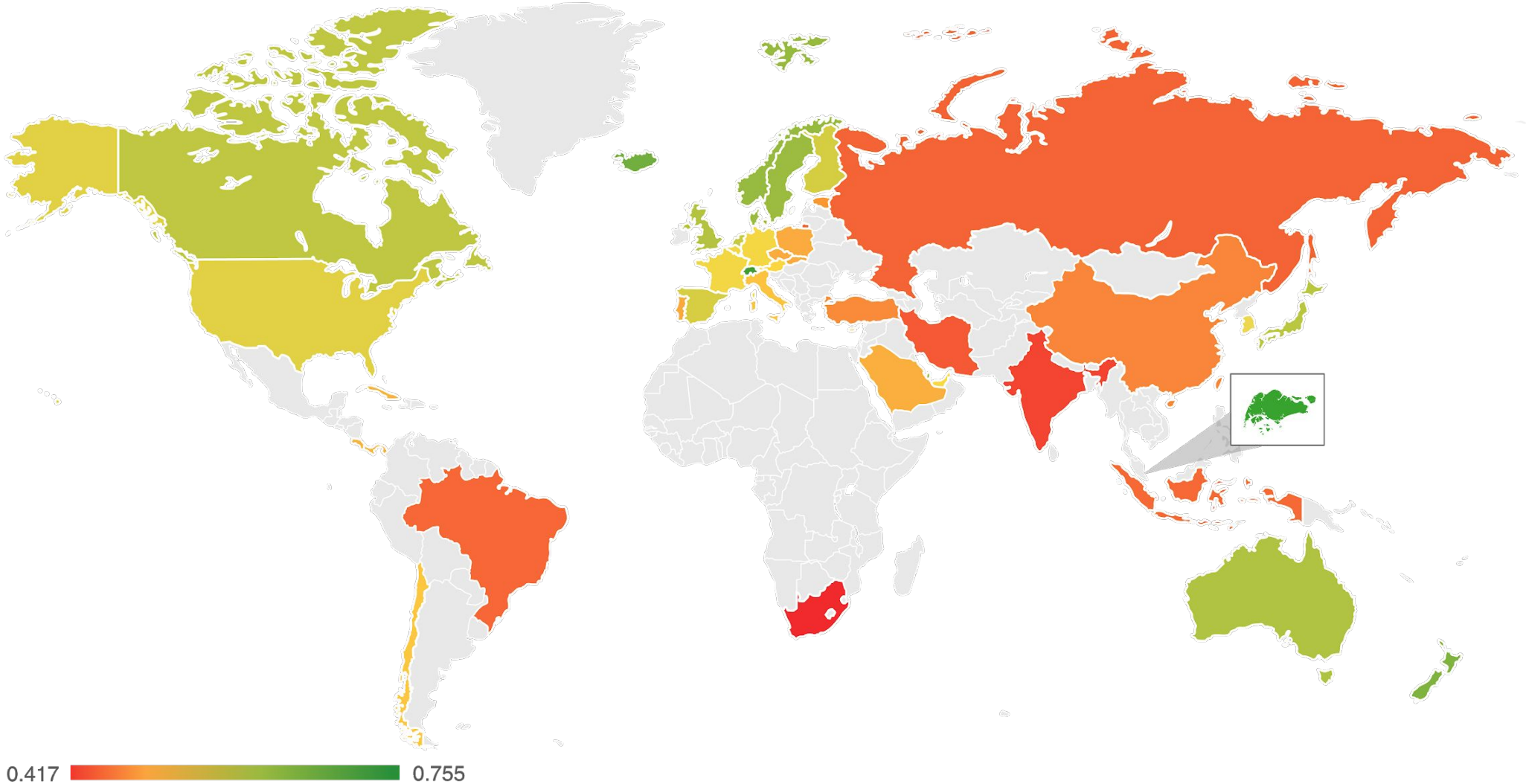
Current health expenditure estimates of current health expenditures include healthcare goods and services consumed during each year.

The Bloomberg index calculates an efficiency score based off a nation's life expectancy along with relative and absolute health expenditures.

Current Health Expenditure per Capita (Thousand $) 2016		Bloomberg Healthcare Efficiency Index, 2016
9.87	USA	29.6
9.84	Switzerland	57.8
4.74	Netherlands	48.3
4.23	Japan	68.2
3.96	United Kingdom	52.9
2.84	Israel	66.8
2.46	Singapore	84.2
2.39	Spain	72.2
2.04	South Korea	71.5
0.4	China	54.3

Source: WHO | Bloomberg

Final Rankings of the Level of HALE and Gap



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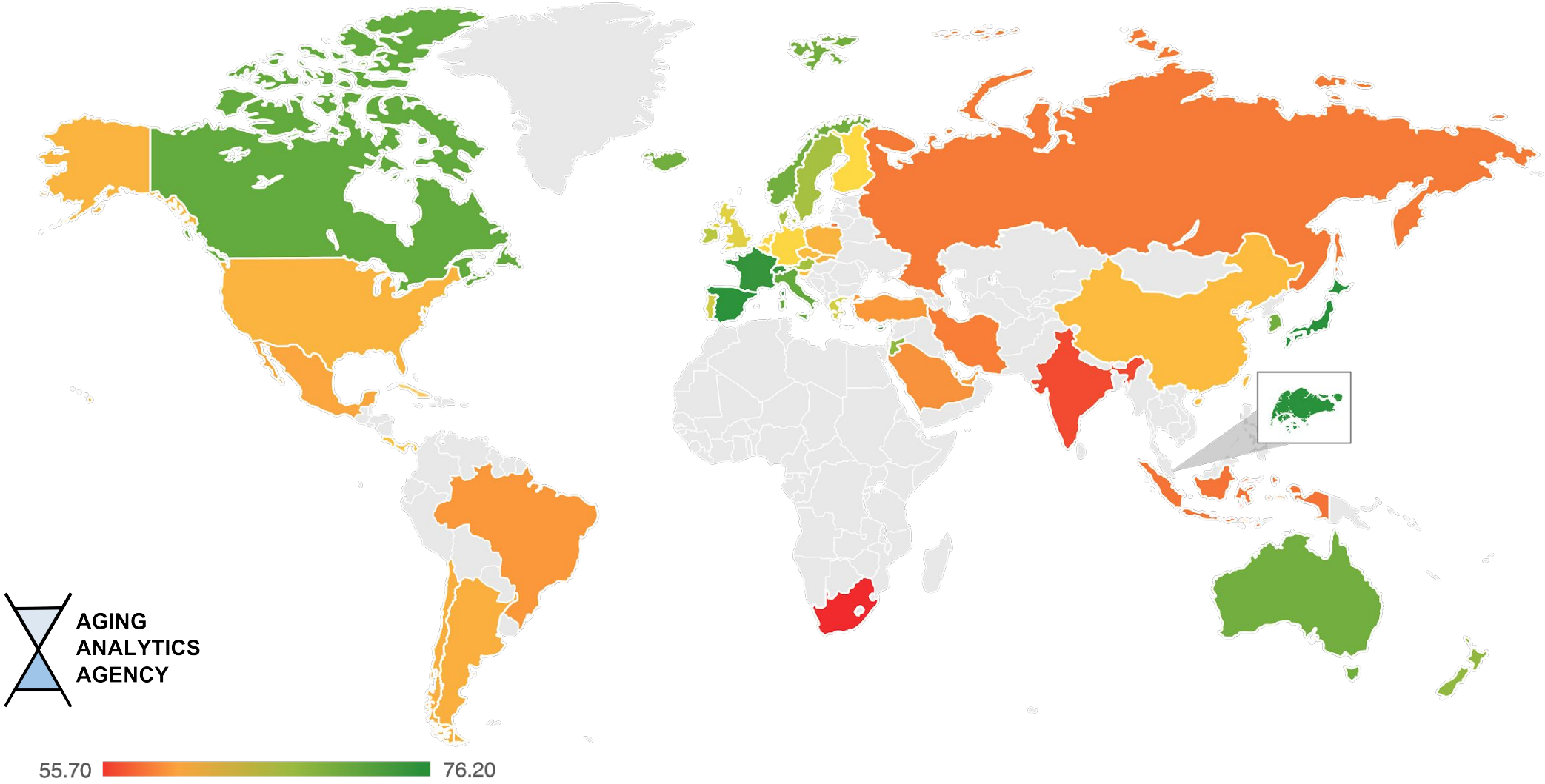
Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease.

Healthy Longevity Heat Map



Healthy Longevity relates here to the number of years that a person live without serious health problems or injuries.

Size of Gap Between Healthy Longevity and Life Expectancy

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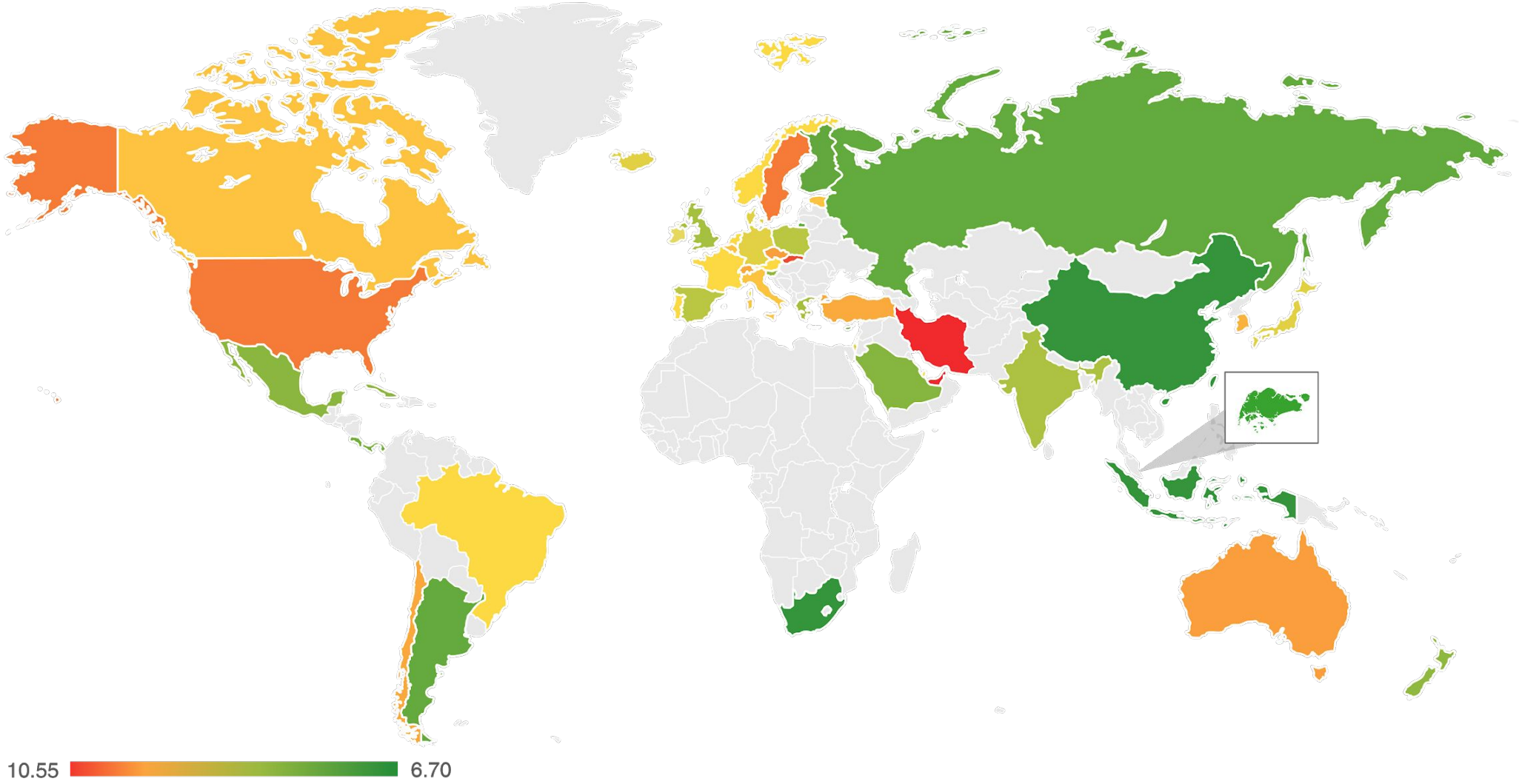

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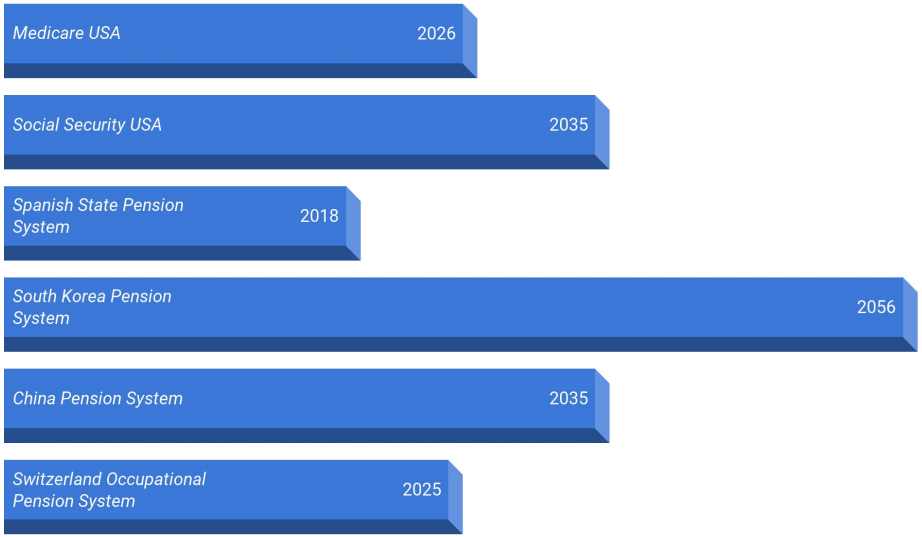
Life expectancy (LE) at birth reflects the overall mortality level of a population. It summarizes the mortality pattern that prevails across all age groups in a given year – children and adolescents, adults and the elderly.

Singapore's Health Care System Beats the United States's in its Efficiency, Affordability and Quality

The United States spends a disproportionate amount on health care, comparing to Singapore, but HALE is relatively low

Singapore	United States
HALE: 76.2	HALE: 68.5
HALE GAP: 6.7	HALE GAP: 10.0
Life Expectancy: 82.9	Life Expectancy: 78.5
Healthcare Efficiency Rank: #2	Healthcare Efficiency Rank: #25
Healthcare Spending: 4.5% GDP	Healthcare Spending: 18% GDP

Insolvency Predictions for Government-Funded Schemes



Singapore spends much less per person on healthcare than the United States, $ 2,462 and $ 10,224 in 2017 respectively. Its citizens also pay more out of pocket comparing to Americans. Out-of-pocket expenditures as % of current health expenditure are 31.17% and 11.09% respectively. But in Singapore health costs are relatively cheap.

There are wasteful spending in healthcare financing in the United States. About one quarter of health care cost is associated with administration, which is far higher than in any other country. Another major difference in health costs between the US and every other developed nation is the cost of drugs. In most countries, the government negotiates drug prices with the drug makers, but when Congress created Medicare Part D, it specifically denied Medicare the right to use its power to negotiate drug prices.

Big gap between life expectancy and health-adjusted life expectancy in the United States is caused by high disparity health status across different socio-economic group. Major diseases share four risk factors: tobacco use, the harmful use of alcohol, unhealthy diets, and physical inactivity. These are called modifiable risk factors that can lead to cardiovascular disease, the leading NCD in terms of premature deaths.

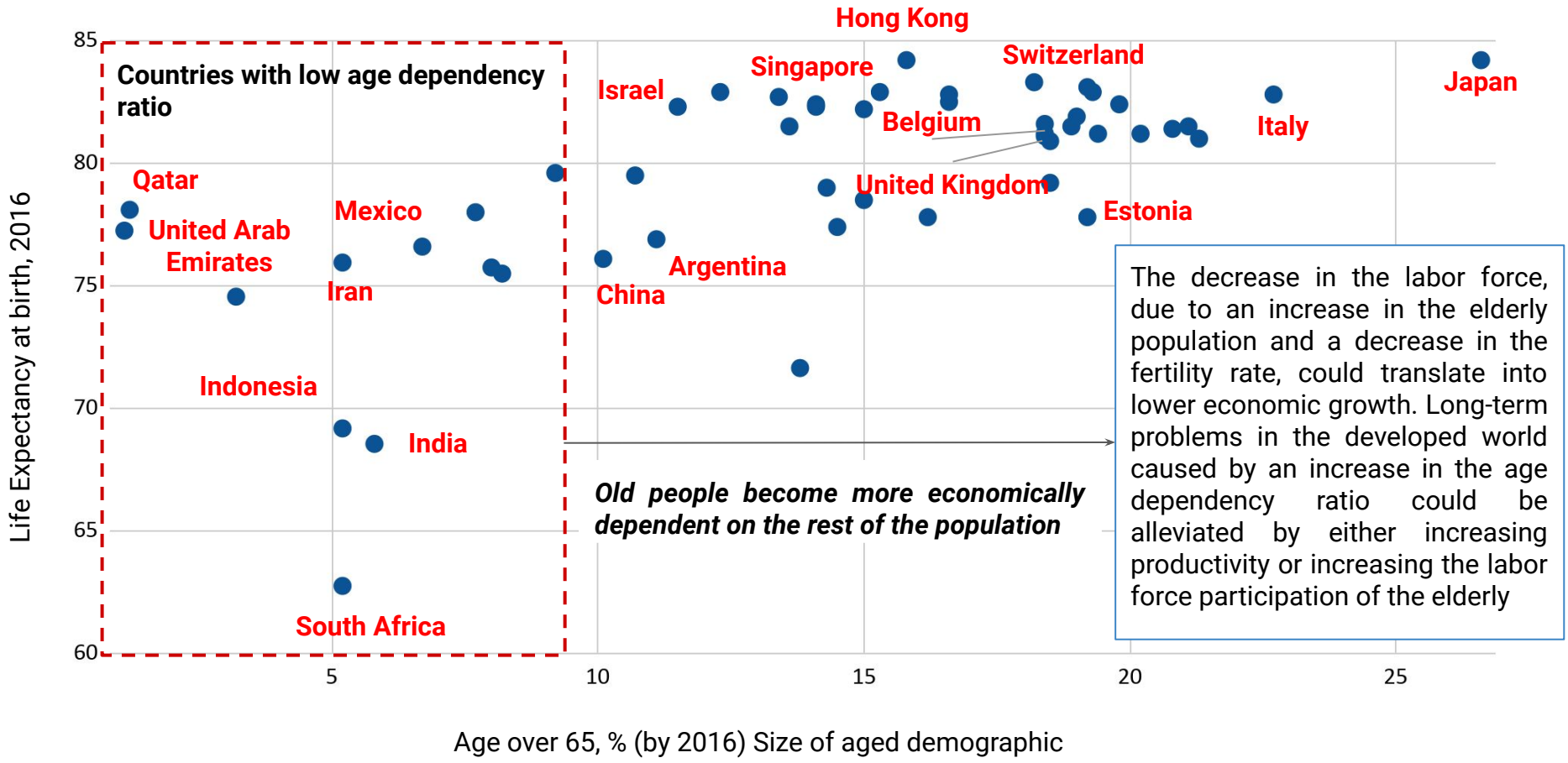
Source: Bloomberg | Reuters | Financial Times

Singapore's Health Care System Beats Hong Kong's in its Efficiency and Affordability

Healthcare Outcomes Metrics (2016)			
Country	**Life Expectancy**	**Infant Mortality per 1 000 population**	**Maternal Mortality per 100 000 population**
Singapore	82.8	2.1	10.0
Hong Kong	84.2	1.5	1.8
Healthcare Spending & Affordability (2016)			
Country	**Government Health Spendings, %**	**Government Health Spendings, as % of Budget**	**Out-of-pocket Expenditure as % of GNI**
Singapore	54	14	1.5
Hong Kong	50	12	1.9
Healthcare Accessibility (2016)			
Country	**Doctors per 10 000 population**	**Nurses per 1 000 population**	**Hospital Beds per 1 000 population**
Singapore	23.1	7.1	2.5
Hong Kong	20.0	7.9	3.7

Both citizens of Singapore and Hong Kong enjoy high-quality healthcare, live long lives with low maternal and infant mortality rates. Singapore is known for having exceptional medical care and an enviable health insurance system. In contrast, Hong Kong has expensive private healthcare that is not affordable for lower socio-economic groups. Singapore has the 5th highest rate of physicians and nurses per capita, suggesting that health services are abundant. Hong Kong has shortage of doctors and other health professionals in public sector. In Hong Kong, the elderly population is particularly vulnerable, facing significant difficulties in accessing primary healthcare services.

Life Expectancy and Ageing Population

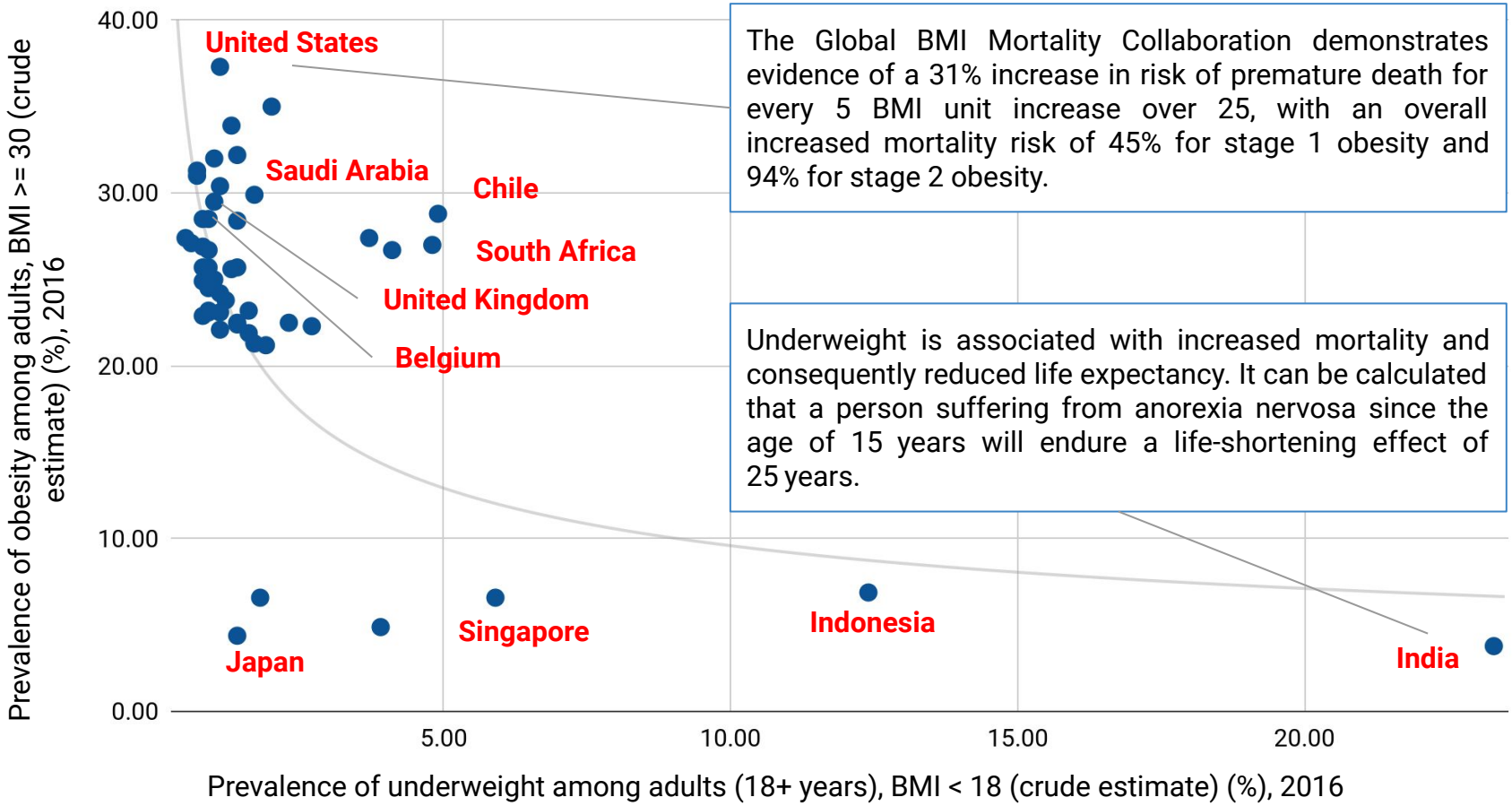


Life expectancy is increasing all around the world. Since around the 1950s, the main factor of steady increase has been reductions in mortality at older ages. This has contributed to the ageing of the population and critical changes in age distribution. Ageing population contributes to high life expectancy and increase in gap between life expectancy and HALE.

The major problem with merely increasing life expectancy is that it also increases morbidity because people live long enough to get more age-related disease, disability, dementia, and other dysfunctions.

Source: WHO

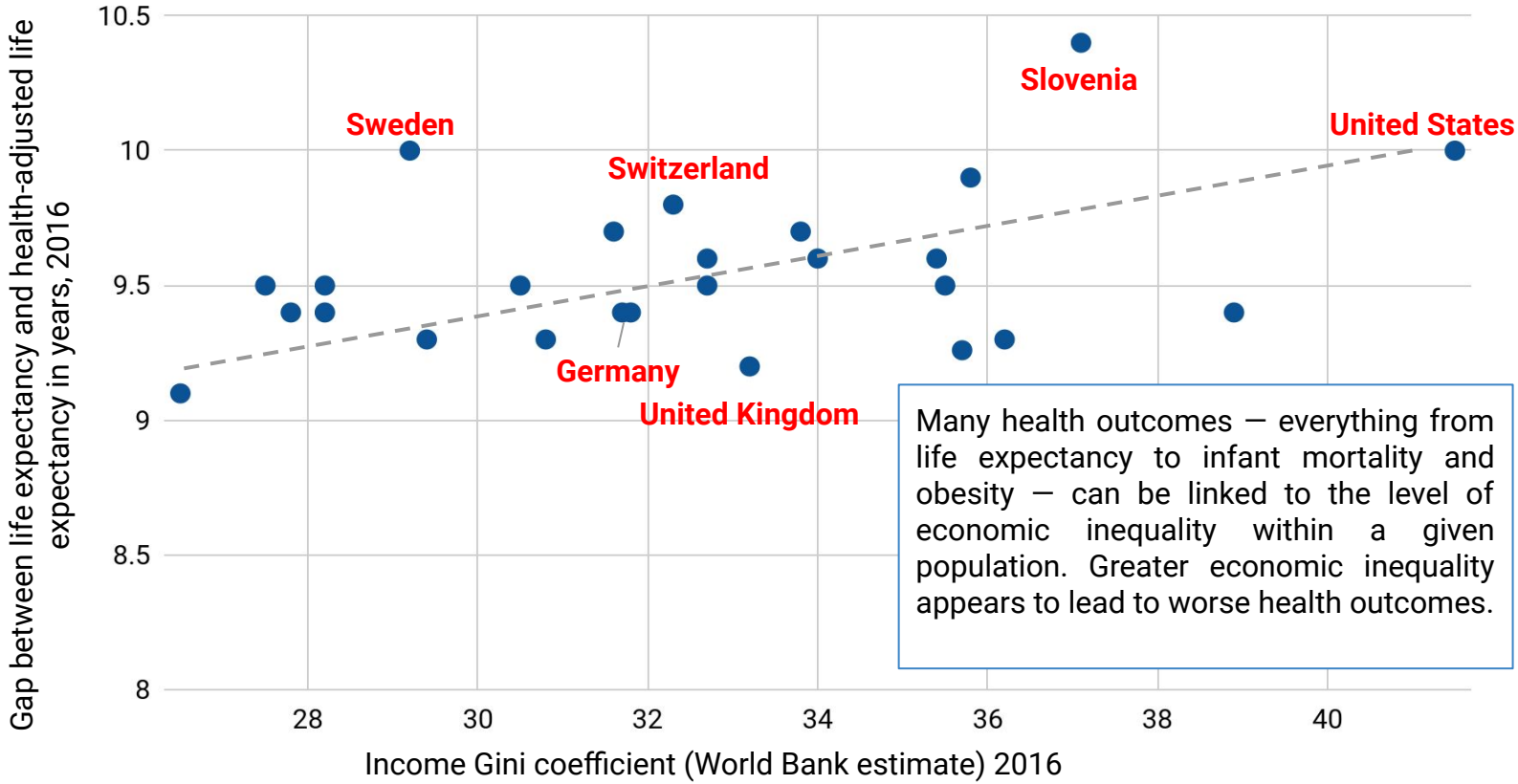
Obesity and Underweight among Adults



Low level of adult obesity does not always correspond to the healthier lifestyle. Low-income countries, such as India and Indonesia have low level of obesity because people suffer from underweight and poor nutrition. Countries with high level of HALE can be also divided into two groups. Major developed countries have high level of obesity and bigger gap between life expectancy and HALE. Overweight increases the risk of other diseases and health problems, such as heart disease, diabetes, high blood pressure and certain cancers. Another group consists of two major players: Japan and Singapore. Developed countries have both low level of underweight and overweight that lead to reduction of behavioral risk factors and burden of non-communicable diseases.

Source: WHO

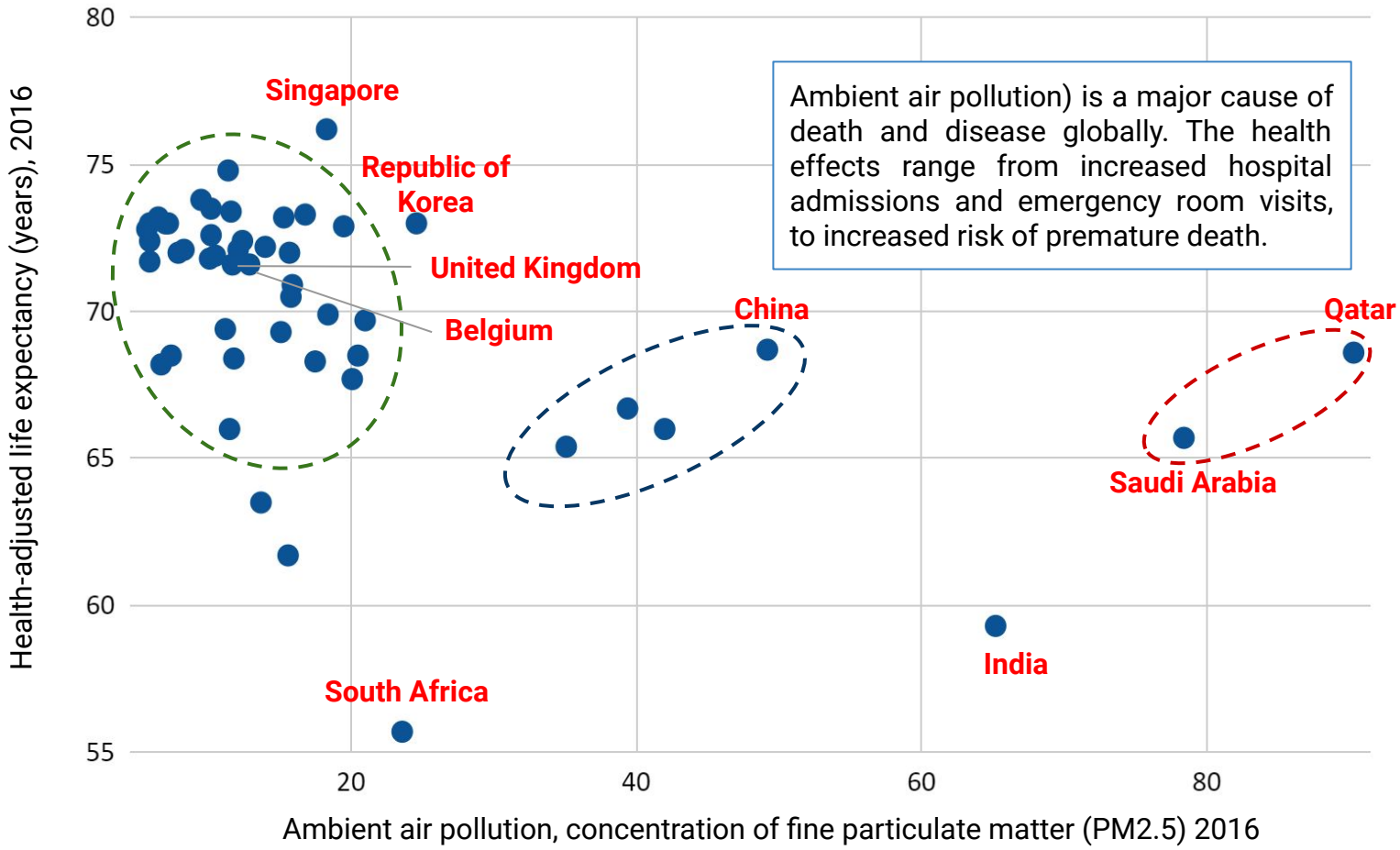
Socio-Economic Inequality and Gap between Life Expectancy and HALE



The populations of comparably sizable and wealthy countries are aging more rapidly, with larger percentages of their populations over the age of 65. Life expectancy can be influenced by a number of factors, including those within the domain of the health system (e.g., quality of care, access to preventive health services) as well economic, behavioral, and environmental factors that may be outside the control of the health system (e.g. poverty, lifestyle, violence, and accidents). Among developed countries the U.S. has a higher degree of income inequality than any comparably wealthy and sizable country. People who are lower income are less likely than people with higher incomes to report being in good health, and there is a growing disparity in the life expectancies of low and high income.

Source: World Bank | WHO

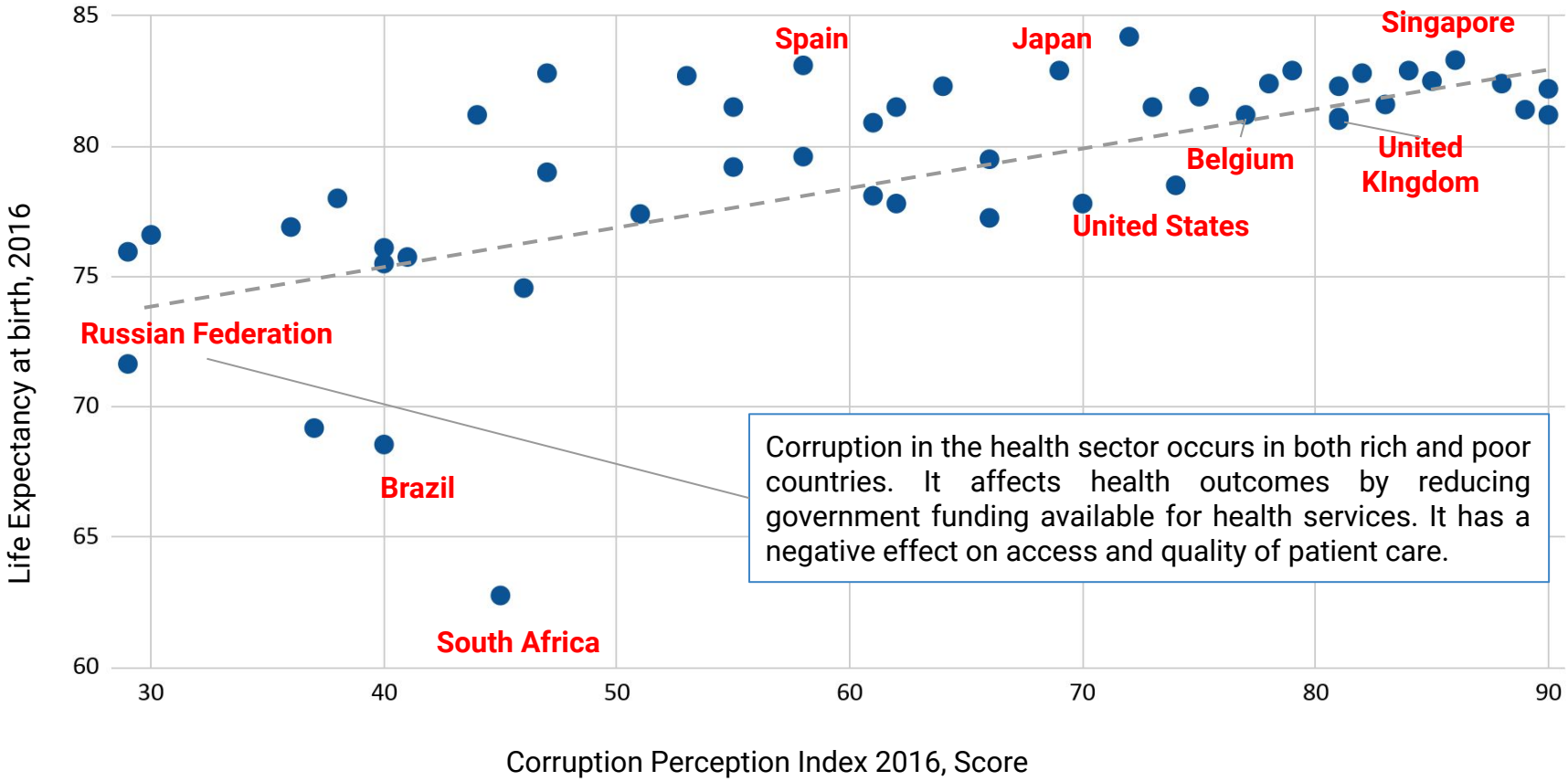
Mortality Attributable to Ambient Air Pollution



In general, countries with higher level of ambient air pollution have lower level of health-adjusted life expectancy. Countries can be divided into several groups. Saudi Arabia and Qatar are world's largest natural gas and oil exports and ones of the richest countries in the world (measured by GDP per capita). The largest exporter in the world China relates to another group with United Arab Emirates, Turkey and Iran. The largest group includes developed countries with high HALE and low level of air pollution. Because industrial policies in high-income countries target Sustainable Development Goals and reduction of harmful human impact on environment.

Source: WHO

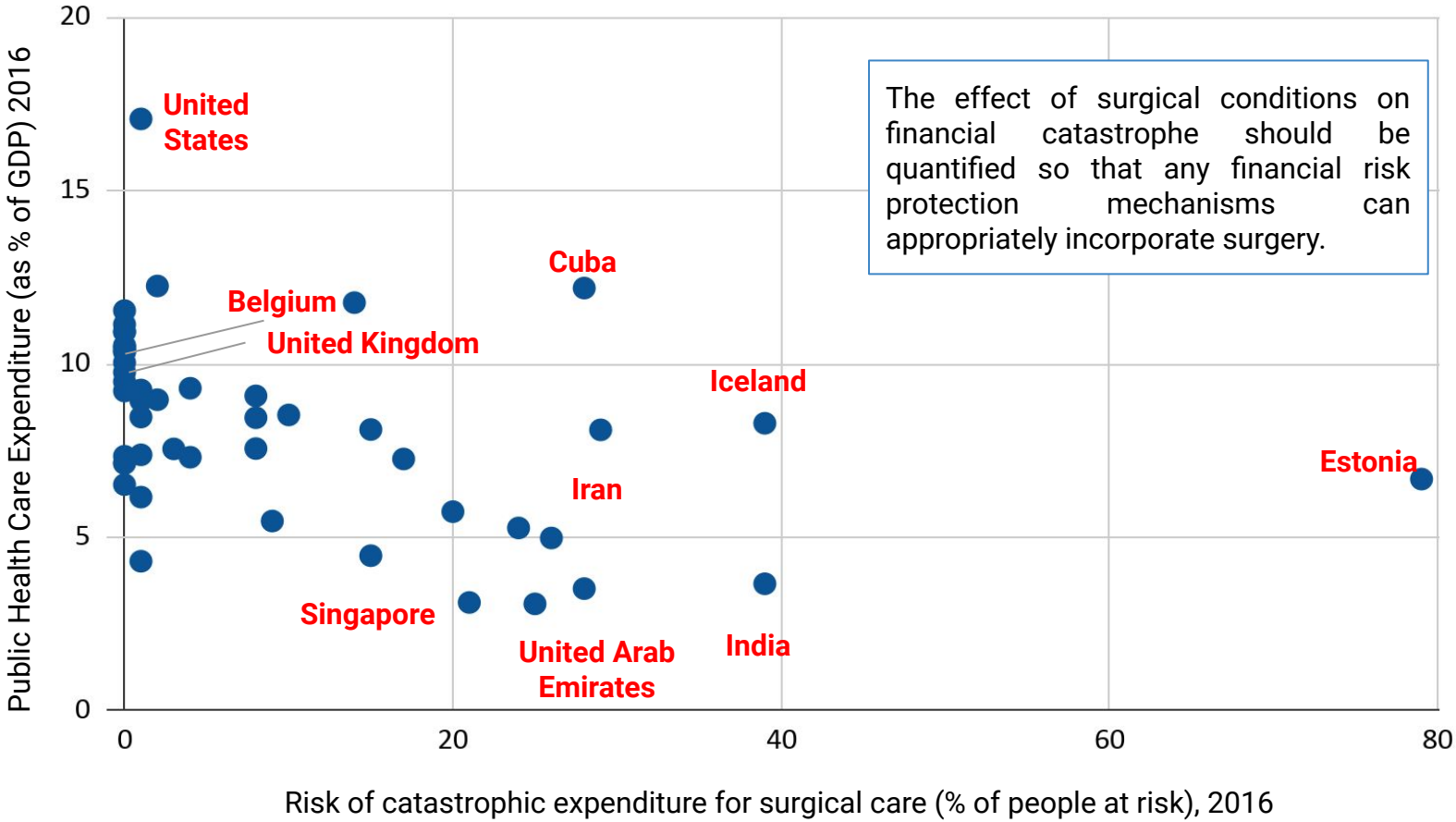
Life Expectancy and Corruption Perception



Life expectancy at birth steady increases with reduction of corruption level across countries. The problem of corruption in healthcare is of a multidimensional nature. Corruption may be involved, for example, in construction of health centres/hospitals, purchase of instruments, supply of medicines and goods, overbilling in insurance claims and even appointment of healthcare professionals. High level of corruption corresponds to wasteful spendings in healthcare, low efficiency and high administrative costs. Corruption leads to large waiting time and unaffordability of preventive services for population.

Source: WHO | Transparency International

Risk of Catastrophic Expenditure for Surgical Care

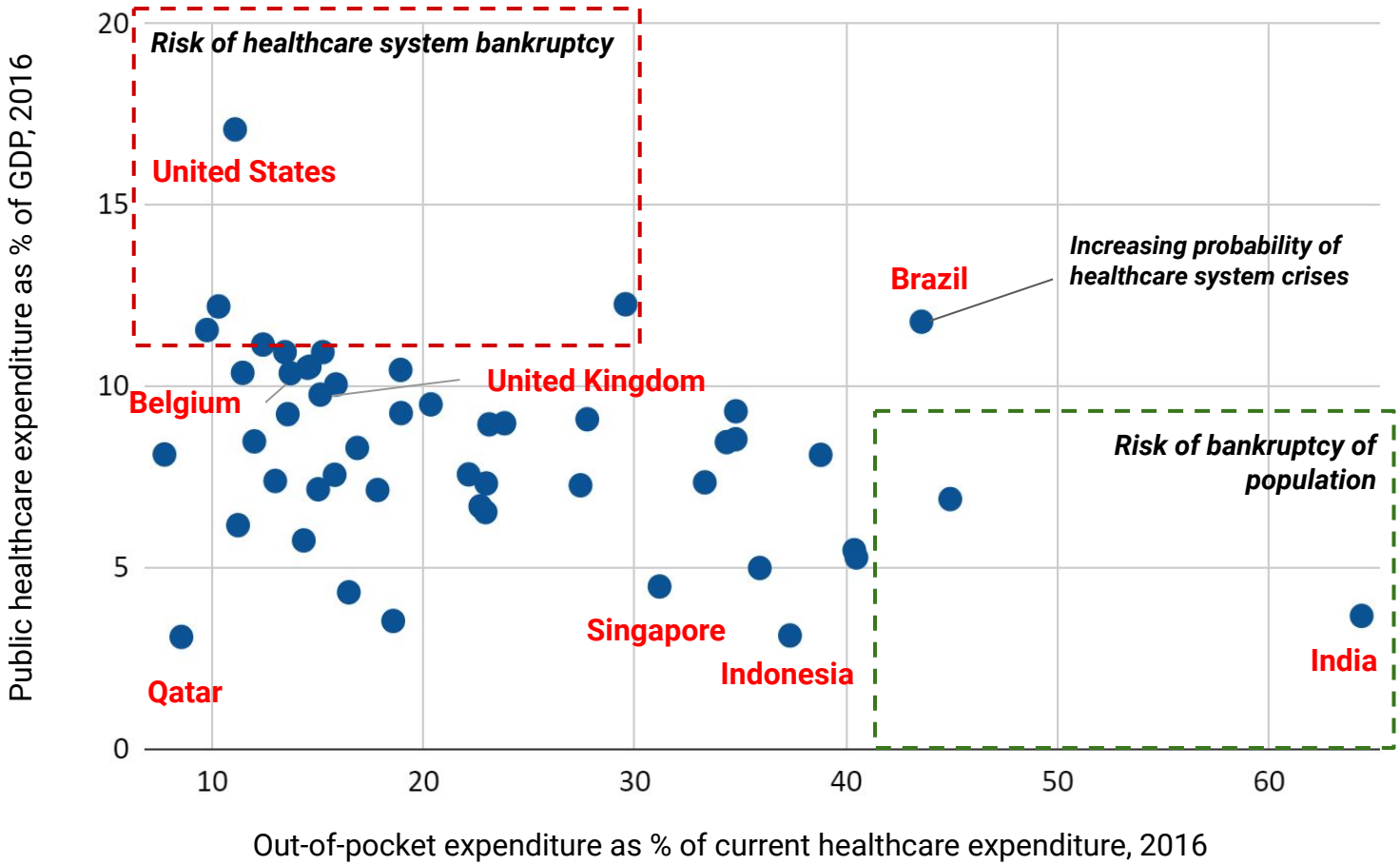


The burden of catastrophic expenditure is highest in low- and middle-income countries; within any country, it falls on the poor. Estimates are sensitive to the definition of catastrophic expenditure and the costs of care.

Such countries as Germany, Finland, France, Norway, New Zealand, Netherlands, United Kingdom have zero risk of catastrophic expenditure for surgical care. Well developed infrastructure, saturated network of healthcare facilities and qualified medical staff provide affordable care for citizens. In addition, universal health coverage policies address the financial catastrophe faced by individuals seeking surgery.

Source: World Bank

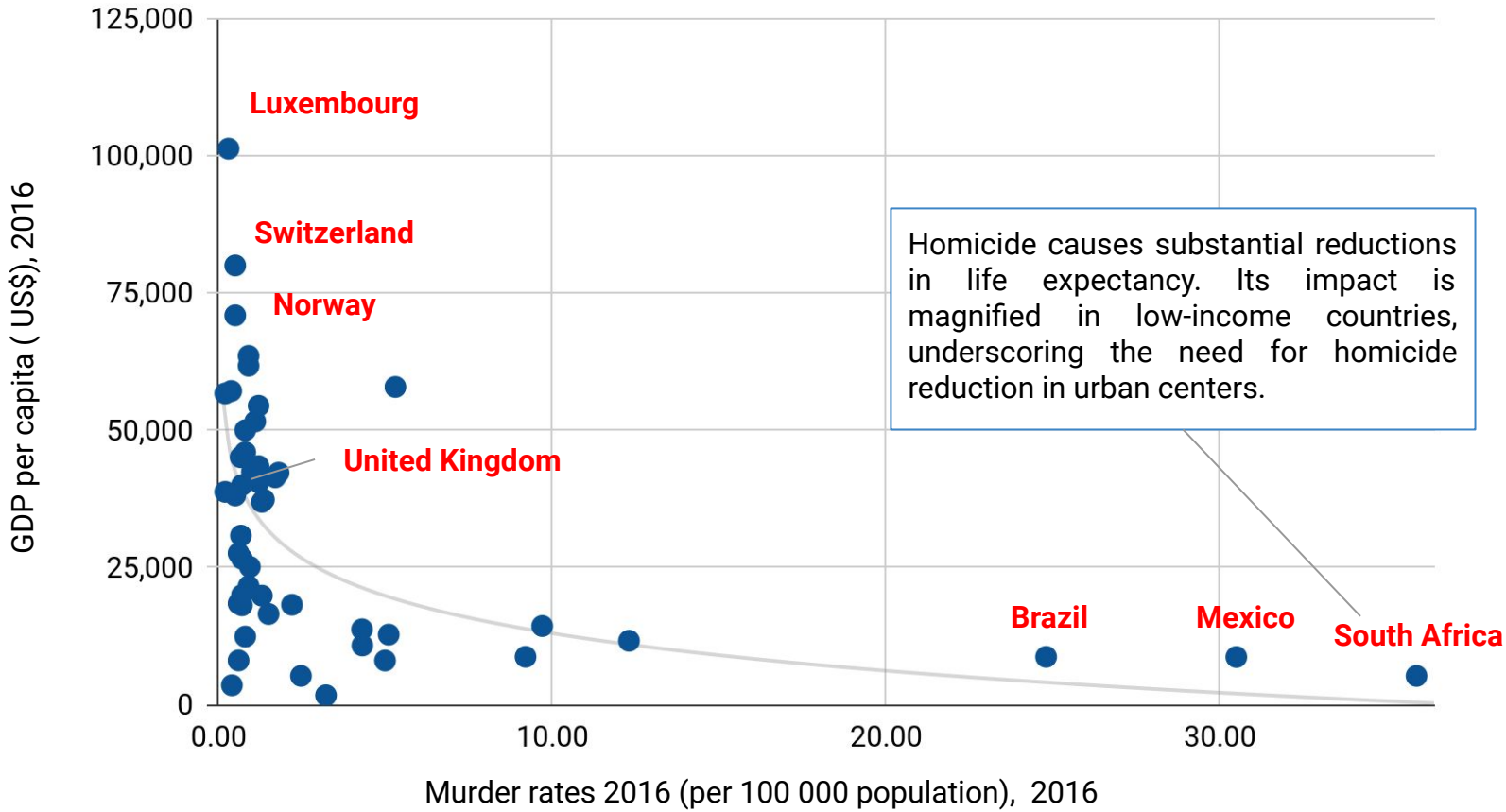
Public Healthcare Expenditure and Out-of-pocket Expenditure



Unregulated direct charges often constitute a major access barrier to needed health care and contribute to high out-of-pocket payments generating problems of financial protection. Out-of-pocket payments absorb household's financial resources and make healthcare unaffordable for low socioeconomic groups as a result large discrepancies appears in healthcare status. In contrast, public spending on health is central to universal health coverage and social protection, but there is no clear trend of. In the United States high healthcare expenditure is a result of high administrative cost and corruption in healthcare.

Source: World Bank

Murder Rate and GDP per capita

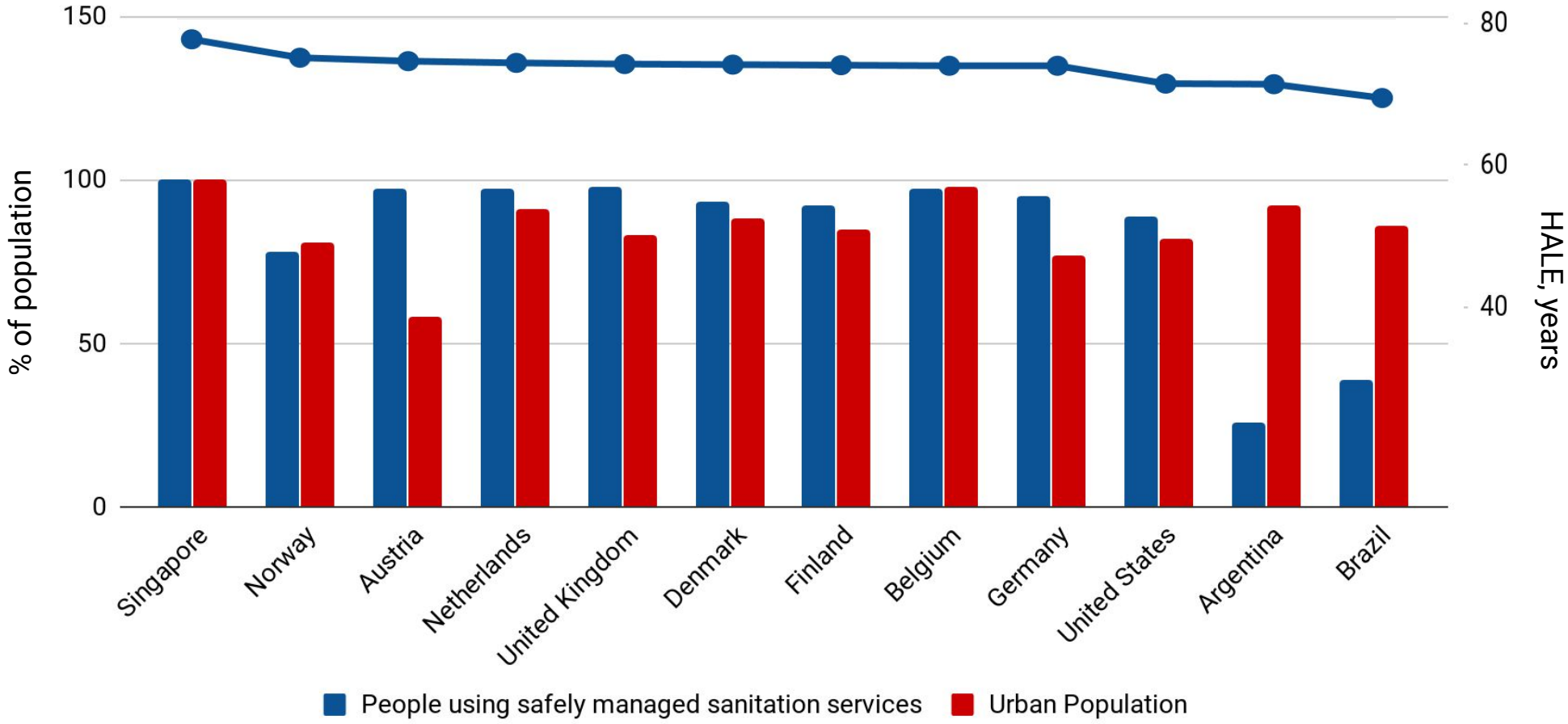


Murder can have a devastating impact on a country's economy. Due to economic inequality, unemployment and unequal development there exists a huge gap in murder rates between 'core' countries with high industrialization level and richness, and 'peripheral' developing and poor countries. Homicide tends to affect young adults and often results in premature death, which is not adequately represented by providing raw numbers or mortality rates.

The existing point of view emphasises that long-term improvement of murder rates in Western Europe countries should be considered in complex with general country modernization and following changes in daily life, such as increasing of domesticity, self-control and consolidation of the rule of law.

Source: World Bank

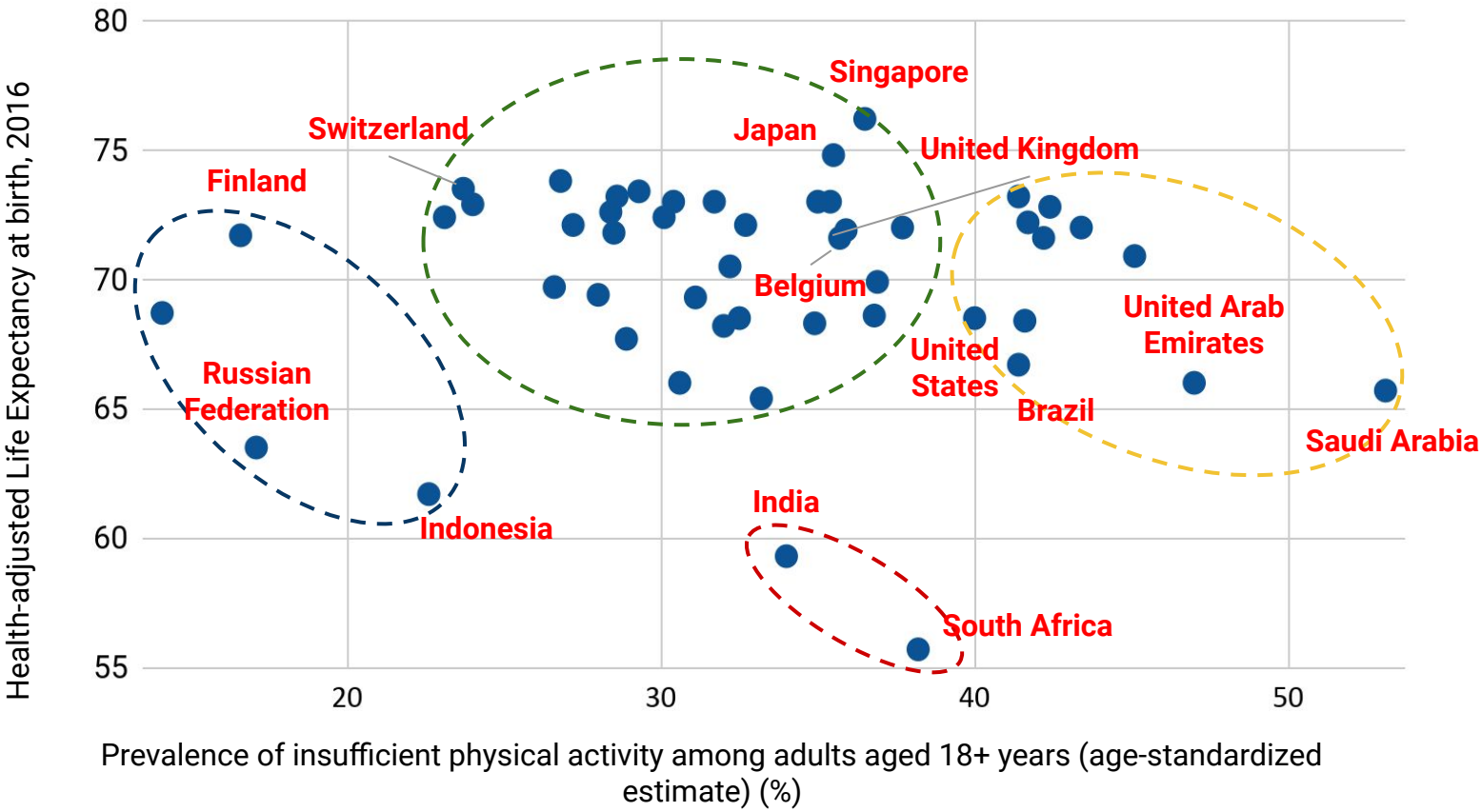
Urbanisation and Sanitation Impact on Healthy Longevity



Level of urbanization, development of medical facilities and access to the big network of safety sanitation services significantly contribute to increasing the average HALE at birth. Inadequate sanitation is a major cause of disease worldwide, and improving sanitation is known to have a significant beneficial impact on people's health. Developing countries have lower level of the usage of safety managed sanitation services, in contrast, population of developed countries, such as Australia, Netherlands, United Kingdom, faces adequate sanitation.

In the case of developed countries, there is not a high positive correlation between urbanization and HALE (e.g. Austria, France) as wealthy countries have developed infrastructure and a good system of care delivery both in cities and remote rural areas.

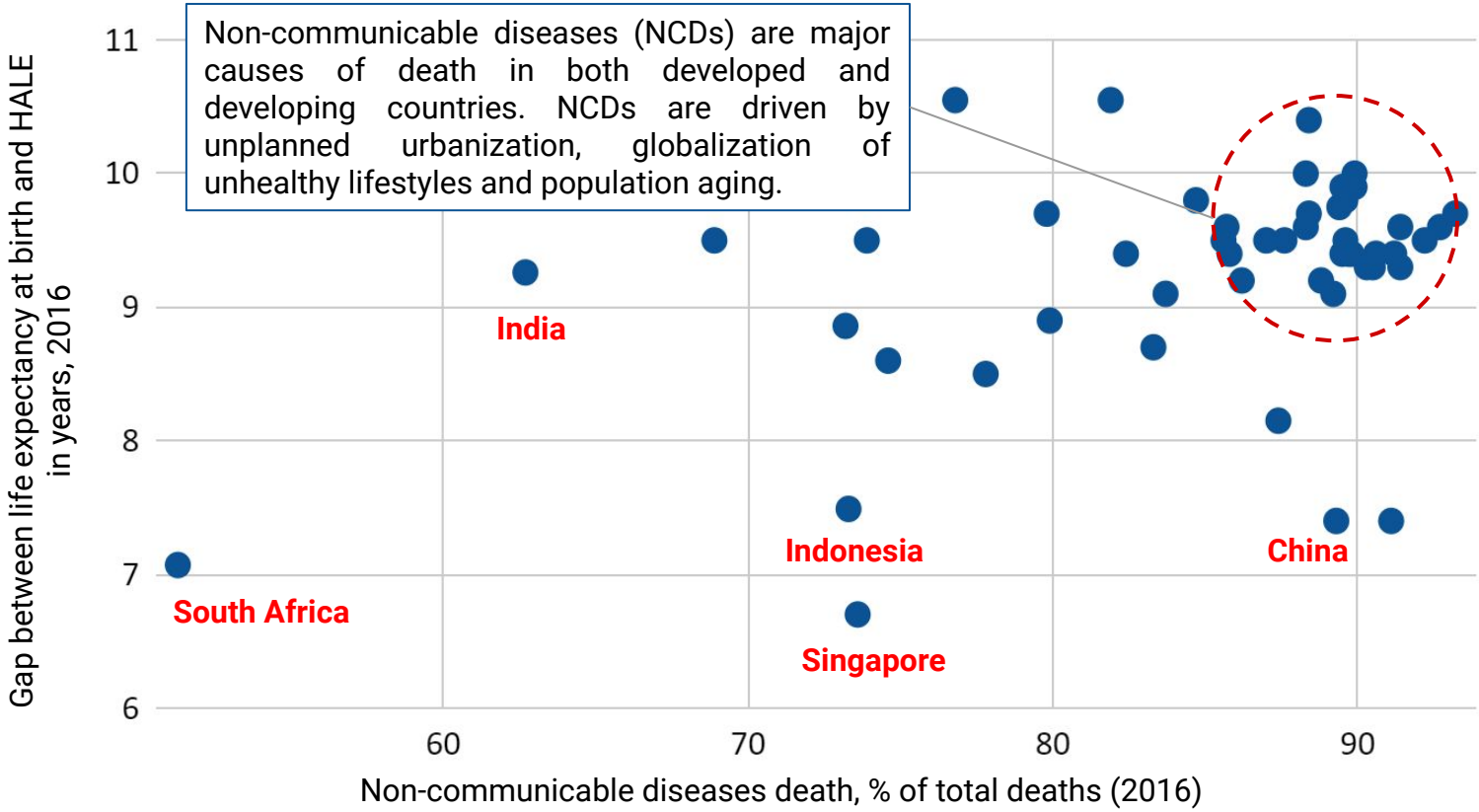
Insufficient Physical Activity and Healthy Longevity



Insufficient activity levels present a risk of adverse health outcomes including obesity. Sedentary lifestyle increases the risk of heart disease, obesity, and other health problems, and is associated with low socioeconomic status. Data from the World Health Organization indicate that 40% of adults in the U.S. have insufficient physical activity in 2016, compared to 33.6% on average in comparable 50 countries. The higher-than average rates of physical inactivity in the U.S. and other countries from the initiated cluster may contribute in some ways to the higher disease burden from cardiovascular conditions.

Other countries have low or middle percentage of adults that do not intake enough exercises but still level of HALE varies significantly. Though rates of disease burden caused by these conditions have improved across other countries, they still cause fairly large negative impact on HALE.

Healthy Longevity and Non-Communicable Diseases

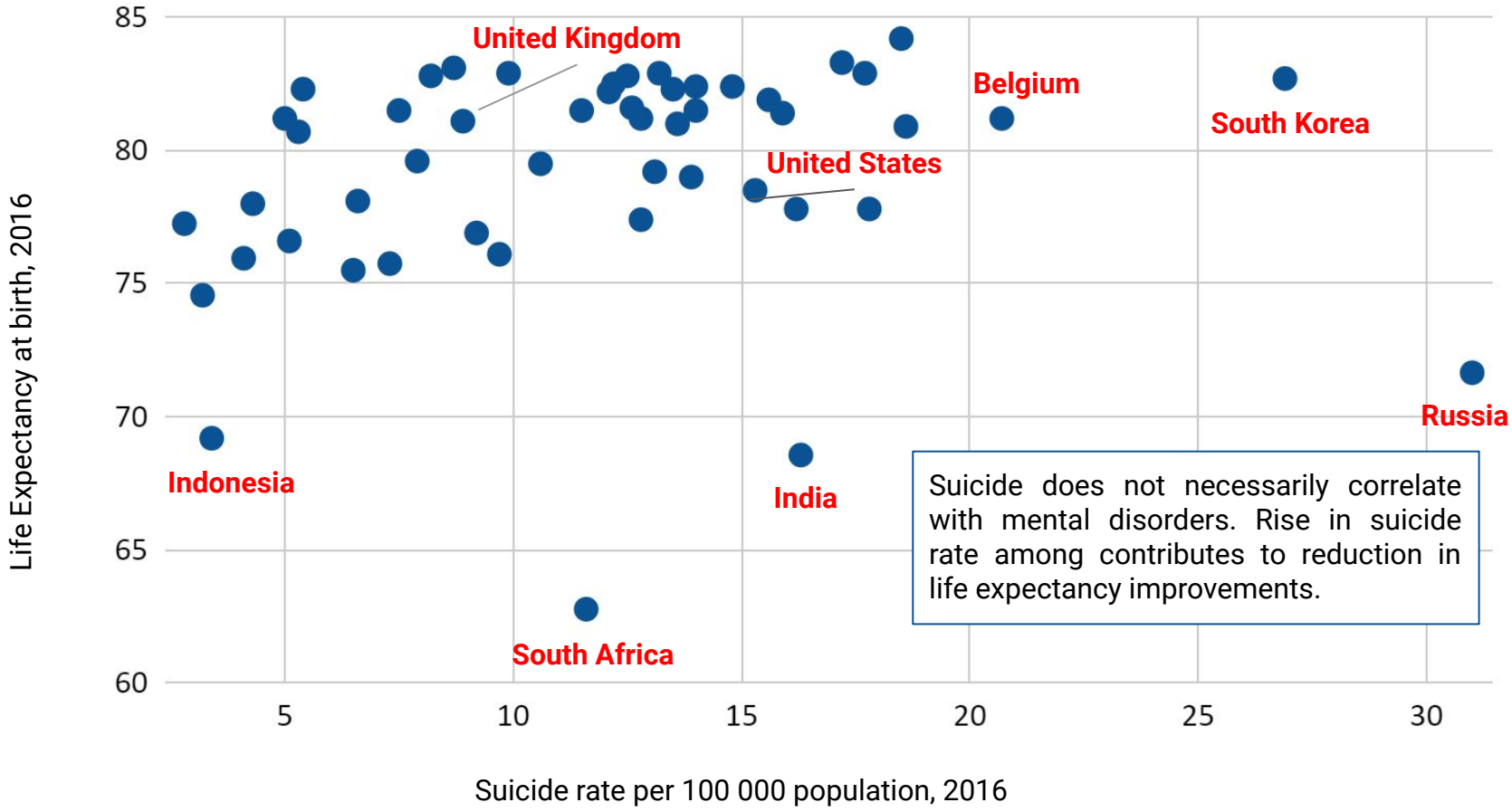


Noncommunicable diseases (NCDs) impose a significant burden on health and development of developed nations with higher levels of Health-adjusted life expectancy and life expectancy at birth, which results in increase in disability years.

The main types of NCDs are cardiovascular diseases (such as heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes. These conditions are often associated with older age groups. Among age-related changes are also dementia and severe memory loss that are considered to be not part of the normal aging process.

Noncommunicable diseases are driven by forces that include unplanned urbanization, globalization of unhealthy lifestyles and population aging.

Suicide Mortality Rate and Life Expectancy



Suicide are one of the main reasons of recent decline in life expectancy across developed and developing countries. For Instance, there is troubling increasing trends in suicides and drug overdose rates as life expectancy in the United States declined.

Gender differences in suicide rates have been shown to be significant. There are different rates of completed suicides and suicidal behavior between males and females.While women more often have suicidal thoughts, men commit suicide more frequently. This is also known as the gender paradox in suicide.

Strategic Consulting of Longevity Governance

In Q2 2019, following the appointment of Eric Kihlstrom (former Director of the **government-led £98 million Healthy Ageing Industrial Strategy Challenge Fund**) as its new Director, and becoming the main source of data and analytics for the UK **All-Party Parliamentary Group for Longevity**, Aging Analytics Agency began expanding the scope and focus of its efforts relating to deep industry analytics on the emerging front of the benchmarking and strategic consulting services relating to **government-led Longevity Industry** development and national policy efforts of various countries.

In early 2019, Aging Analytics Agency began shifting increasingly large proportions of its resources away from open-source landscape overviews and special case studies of the Longevity industries of various nations and towards **benchmarking** and **ranking** of the strength, relevance and proactivity of various entities including companies, investors, financial institutions and government initiatives within the Longevity sphere, leveraging the very broad and deep understanding of the global Longevity industry created through the production of tens of thousands of pages of global and regional landscape overviews from 2013 - 2018. in order to begin conducting **deeper**, more **targeted analytics**. Aging Analytics Agency is currently cooperating with a number of government departments and public sector bodies and authorities in the **UK**, **Singapore**, **Switzerland**, **Israel** and the **US** to create **advanced IT solutions, deep analytics, special case studies and composite sets of tangible recommendations and development plans for national industrial strategies**, science and technology policy, modernization and reforms in healthcare, frontier-technology sectors including Longevity, AI and Precision Health, and financial reforms relating to pension systems and insurance companies looking to transform the problem of ageing population into the opportunity of Healthy Longevity.

As per the example of the Singapore and the USA analysis below, which serves as an example of the scope and depth of our Longevity Policy analytical capabilities, Aging Analytics Agency is open to establishing strategic collaboration and consulting contracts with governments of progressive countries on projects and initiatives related to Longevity.

Longevity Governance	**Recommendation Packs**	**Industrial Strategies**	**Precision Health**
	Advanced IT Solutions	**Analytics & Benchmarking**	**Modernization**

2020: Global Longevity Governance Landscape Third Edition

National Longevity Development Plans Global Landscape Overview
First Edition

- 12 countries in its analysis.
- The broad categories of a government initiative: different orders of magnitude; and the different areas of intervention, from the financial to the biomedical.
- Detailed project and initiative budget data analysis.
- Enhanced comparative analysis of government initiatives focused on ageing and Longevity.

Global Longevity Governance Landscape
Second Edition

- 50 of countries in its analysis.
- 200 metrics (including a precise formulation for sub-metrics, metric categorization and metric weighting) and 10000 data points analyzed.
- Big data analysis of factors that affect gap between HALE and LE across countries .
- Full description of 50 countries' profiles, their strengths and weaknesses.
- Analysis of key problems that impede growth of countries profiled in this report.

Global Longevity Governance Landscape
Third Edition

- 100 countries in its analysis.
- Detailed project and explanatory HALE factors analysis.
- Utilization of machine learning, including unsupervised (countries' clusterization) and supervised techniques (logistic regression).
- Comprehensive and precise understanding of the recent trend of development of Healthcare, and Longevity industries.
- Analysis of key features that increase investment attractiveness, and problems that impede growth of countries profiled in this report.

AGING ANALYTICS AGENCY

Introduction

Establishing a Framework for Healthy Longevity

Life expectancy is increasing all around the world. While there have been obvious fluctuations in the dynamics of this statistically measured demographic indicator, life expectancy at birth overall has been steadily increasing for many years. It has more than doubled in the last two centuries.

This increase was previously driven by reductions in infant mortality. But since around the 1950s, the main factor of steady increase has been reductions in mortality at older ages. This has contributed to the ageing of the population and critical changes in age distribution, which can be described with old-age dependency ratio.

The major problem with merely increasing life expectancy is that it also increases morbidity because people live long enough to get more age-related disease, disability, dementia, and dysfunction. Many serious diseases have increased prevalence with age, including cancer, heart disease, stroke, respiratory disease, kidney disease, dementia, arthritis, and osteoporosis.

Consequently, it is unclear why countries are investing so much money in research focused on reducing death rates in the elderly, if the consequence is advancing ageing, that can be described as the increase in disability years, plus pension, and social and medical costs, in an unsustainable way.

Ageing is caused by many different processes, that is why healthy longevity goes far beyond demographic characteristics and medical research problems on how to increase the quantity of life.

This paper seeks to identify which health system characteristics, socio-economic factors, and environmental conditions are likely to increase health-adjusted life expectancy and improve the quality of life.

The analysis is based on the **200 parameters** that define healthy longevity across the chosen **50 countries** and their impact on the gap between health-adjusted life expectancy and life expectancy at birth.

50 Countries - Analysis of Levels of Longevity Progressiveness

1	Argentina
2	Australia
3	Austria
4	Belgium
5	Brazil
6	Canda
7	Chile
8	China
9	Costa Rica
10	Cuba
11	Czech Republic
12	Denmark
13	Estonia
14	Finland
15	France
16	Germany
17	Greece
18	Hong-Kong, SAR
19	Iceland
20	India
21	Indonesia
22	Iran
23	Ireland
24	Israel
25	Italy
26	Japan
27	Luxembourg
28	Malta
29	Mexico
30	Netherlands
31	New Zealand
32	Norway
33	Panama
34	Poland
35	Portugal
36	Qatar
37	Republic of Korea
38	Russian Federation
39	Saudi Arabia
40	Singapore
41	Slovakia
42	Slovenia
43	South Africa
44	Spain
45	Sweden
46	Switzerland
47	Turkey
48	United Arab Emirates
49	United Kingdom
50	United States of America

200 Analysed Parameters per country

Socio-economic Conditions

1. Adjusted net enrolment rate female, 2016
2. Adjusted net enrolment rate male, 2016
3. Adjusted savings: net national savings (% of GNI), 2010
4. Adjusted savings: net national savings (% of GNI), 2016
5. Average salary (US$), 2016
6. Average salary growth rate, %
7. Balance of trade (US$), 2016
8. Both Sexes HALE, 2016
9. Both Sexes Life Expectancy, 2016
10. Consumer Price Index, 2016
11. Democracy Index, 2016
12. Early retirement age Men
13. Early retirement age Women
14. Easy Doing Business, 2016
15. Education Index, 2016
16. Educational attainment at least Bachelor's female, 2016
17. Educational attainment at least Bachelor's male, 2016
18. Financial institution account female, 2016
19. Financial institution account male, 2016
20. GDP per Capita (current US$), 2010
21. GDP per Capita (current US$), 2016
22. GDP (current US$), 2010
23. GDP (current US$), 2016
24. GDP growth rate, %
25. Global Competitiveness Index Score, 2016-2017
26. Global Gender Gap Index, 2016
27. Human Development Index, 2010
28. Human Development Index, 2016
29. Inclusive Development Index Score, 2017
30. Income Gini coefficient - Inequality in income or consumption 2010 (World Bank estimate)
31. Income Gini coefficient - Inequality in income or consumption 2016 (World Bank estimate)
32. Key interest rate (%), 2016
33. Labor force participation rate, % of male population ages 15-64 (modeled ILO estimate), female
34. Labor force participation rate, % of male population ages 15-64 (modeled ILO estimate), male
35. Labor force with advanced education female, 2016
36. Labor force with advanced education, male, 2016
37. Minimum wage (US$), 2016
38. Net ODA received (% of GNI) % of people 65+ in employment
39. Normal retirement age Men
40. Normal retirement age Women
41. Number of WHO age friendly cities and communities
42. Primary education, 2016
43. Tourism, % of GDP
44. Unemployed persons, 2016
45. Unemployment rate, %

Demography

46. Age Dependency Ratio, 2010
47. Age Dependency Ratio, 2016
48. Age over 65, % (by 2010) Size of aged demographic
49. Age over 65, % (by 2016) Size of aged demographic
50. Crude birth rate (per 1 000 people), 2010
51. Crude birth rate, 2016
52. Crude death rate (per 1 000 people), 2010
53. Crude death rate, 2016
54. Fertility rate, 2016
55. Global Gender Gap Index 2016
56. Life expectancy both sexes, 2000
57. Life expectancy both sexes, 2001
58. Life expectancy both sexes, 2002
59. Life expectancy both sexes, 2003
60. Life expectancy both sexes, 2004
61. Life expectancy both sexes, 2005
62. Life expectancy both sexes, 2006
63. Life expectancy both sexes, 2007
64. Life expectancy both sexes, 2008
65. Life expectancy both sexes, 2009
66. Life expectancy both sexes, 2010
67. Life expectancy both sexes, 2011
68. Life expectancy both sexes, 2012
69. Life expectancy both sexes, 2013
70. Life expectancy both sexes, 2014
71. Life expectancy both sexes, 2015
72. Life expectancy both sexes, 2016
73. Life expectancy female, 2010
74. Life expectancy female, 2016
75. Life expectancy male, 2010
76. Life expectancy male 2016
77. Net migration
78. Total population
79. Population density, number of people/km2
80. Population growth rate, %
81. Population over 65, 2016 (%)
82. Senior Poverty Ratio
83. Total age dependency ratio (per 1000 of working-age population)
84. Total fertility rate (per woman)
85. Urban Population (% of Total)

200 Analysed Parameters per country

Health Care and Health Status

86. Adult mortality rate, 2016
87. Adult mortality rate female, 2016
88. Adult mortality rate male, 2016
89. Alcohol Consumption per Capita (litres of pure alcohol), 2010
90. Alcohol Consumption per Capita (litres of pure alcohol), 2016
91. Anemia pregnant, 2016
92. Anemia reproductive, 2016
93. Annual Cigarette Consumption (per Capita), 2010
94. Annual Cigarette Consumption (per Capita), 2016
95. Biomedical engineers density (per 10 000 population), 2017
96. Cause of death by communicable diseases both sexes, 2016
97. Cause of death by communicable diseases female, 2016
98. Cause of death by communicable diseases male, 2016
99. Cause of death, by injury, ages 35-59, % of relevant age group (2016)
100. Cause of death, by injury, ages 35-59, % of relevant age group female (2016)
101. Cause of death, by injury, ages 35-59, % of relevant age group male (2016)
102. Cause of death by non-communicable diseases both sexes, 2016
103. Cause of death by non-communicable diseases female, 2016
104. Cause of death by non-communicable diseases male, 2016
105. Current health expenditure per capita (current US$), 2010
106. Current health expenditure per capita (current US$), 2016
107. HALE both sexes, 2000
108. HALE both sexes, 2001
109. HALE both sexes, 2002
110. HALE both sexes, 2003
111. HALE both sexes, 2004
112. HALE both sexes, 2005
113. HALE both sexes, 2006
114. HALE both sexes, 2007
115. HALE both sexes, 2008
116. HALE both sexes, 2009
117. HALE both sexes, 2010
118. HALE both sexes, 2011
119. HALE both sexes, 2012
120. HALE both sexes, 2013
121. HALE both sexes, 2014
122. HALE both sexes, 2015
123. HALE both sexes, 2016
124. Healthcare Access and Quality Index), 2016
125. DALY rates per 100 000 population, 2010
126. DALY rates per 100 000 population, 2016
127. Domestic general government health expenditure
128. Domestic private health expenditure (% of current health expenditure), 2010
129. Domestic private health expenditure , 2016
130. Inbound mobility rate, 2016(%)
131. Inbound mobility rate female, 2016 (%)
132. Inbound mobility rate male, 2016 (%)
133. Female HALE, 2016
134. Incidence of tuberculosis (per 100 000 population per year), 2016
135. Medical Equipment (per 1.000.000), 2013
136. Male HALE, 2016
137. Mortality caused by road traffic injury (per 100,000 people)
138. Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70 (%)
139. Mortality rate attributed to household and ambient air pollution, age-standardized (per 100,000 population)
140. Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (per 100,000 population)
141. Out-of-pocket expenditure, 2010
142. Out-of-pocket expenditure (% of current health expenditure), 2016
143. Physicians (per 100.000 People)
144. Population of Adults with AIDs (%), 2010 and 2016
145. Prevalence of anemia among pregnant women (%)
146. Prevalence of anemia among women of reproductive age (% of women ages 15-49)
147. Prevalence of insufficient physical activity among adults aged 18+, 2016
148. Prevalence of obesity (% of population), 2016
149. Prevalence of obesity female (% of population), 2016
150. Prevalence of obesity male (% of population), 2016
151. Prevalence of overweight among adults, BMI ≥ 25 (age-standardized estimate) (%), 2010
152. Prevalence of overweight among adults, BMI ≥ 25 (age-standardized estimate) (%), 2016
153. Prevalence of undernourishment (% of population), 2010
154. Prevalence of undernourishment (% of population), 2016
155. Prevalence of underweight (% of population), 2016
156. Prevalence of underweight female (% of population), 2016
157. Prevalence of underweight male (% of population), 2016

200 Analysed Parameters per country

Health Care and Health Status

158. Public Health Care Expenditure (as % of GDP), 2010
159. Public Health Care Expenditure (as % of GDP), 2016
160. Risk of catastrophic expenditure for surgical care (% of people at risk), 2016
161. Road traffic injury, 2016
162. Smoking prevalence (% of population), 2016
163. Smoking prevalence female (% of female population), 2016
164. Smoking prevalence male (% of male population), 2016
165. Suicide mortality rate both sexes, 2016
166. Suicide mortality rate female, 2016
167. Suicide mortality rate male, 2016
168. Total alcohol consumption both sexes, 2016
169. Total alcohol consumption female, 2016
170. Total alcohol consumption male, 2016

Health Care Policy

171. Existence of a set of time-bound national targets based on WHO guidance for NCDs (Yes - 1 / No - 0), 2016
172. Existence of an operational, multisectoral national NCD policy, strategy or action plan that integrates several NCDs and their risk factors (Yes - 1 / No - 0), 2017
173. Existence of any policies to reduce population salt consumption (Yes - 1 / No - 0), 2017
174. Existence of operational policy/strategy/action plan for cancer (Yes - 1 / No - 0), 2017
175. Existence of operational policy/strategy/action plan for cardiovascular diseases (Yes - 1 / No - 0)
176. Existence of operational policy/strategy/action plan for chronic respiratory diseases (Yes - 1 / No - 0)
177. Existence of operational policy/strategy/action plan to decrease tobacco use (Yes - 1 / No - 0
178. Existence of operational policy/strategy/action plan for diabetes (Yes - 1 / No - 0) Existence of operational policy/strategy/action plan for oral health (Yes - 1 / No - 0)
179. Existence of operational policy/strategy/action plan to reduce the harmful use of alcohol (Yes - 1 / No - 0)
180. Existence of operational policy/strategy/action plan to reduce physical inactivity (Yes - 1 / No - 0)
181. Existence of operational policy/strategy/action plan to reduce unhealthy diet related to NCDs (Yes - 1 / No - 0)
182. Implementation of physical activity public awareness program (Yes - 1 / No - 0), 2017
183. Stand-alone law for mental health (Yes - 1 / No - 0)
184. Stand-alone policy or plan for mental health (Yes - 1 / No - 0)

Environmental Factors

185. Ambient air pollution, concentration of fine particulate matter PM2.5 (ug/m3), 2010
186. Ambient air pollution, concentration of fine particulate matter PM2.5 (ug/m3), 2016
187. Ambient and household air pollution attributable death rate (per 100 000 population), 2010
188. Ambient and household air pollution attributable death rate (per 100 000 population), 2016
189. Daily maximum air temperature, 2016
190. Daily mean air temperature, 2016
191. Daily minimum air temperature, 2016
192. Dew point, 2016
193. Diurnal temperature variation calculations, 2016
194. People using safely managed sanitation services (% of population), 2010
195. People using safely managed sanitation services (% of population), 2015
196. Population Using Improved Water Sources (%)
197. People using at least basic sanitation services (% of population)
198. People using at least basic drinking water services (% of population)
199. Relative humidity, 2016
200. Sunshine hours, 2016

The Framework of Healthy Longevity

HALE, a specific measure of healthy Longevity, is an indispensable metric for Aging Analytics Agency.

Today's increased global Longevity is a "problem of success", an inevitable consequence of sharp increases in sanitation, diet, health care, elderly care, and geriatric medicine, a set of changes which have occurred suddenly within the lifetimes of today's elderly. But this increased Longevity is not a consequence of decreased aging; this life extension is not accompanied by a commensurate extension in health. As a result, increased global Longevity is producing a global aging demographic, an impending crisis frequently referred to as the "silver tsunami".

In order to float rather than sink, Longevity must become an asset. And this means altering the nature of aging entirely, reducing the period of financially and socially inactive decrepitude at the end of life. Specifically, it means utilizing technology to ensure that these longer lives are also healthy, productive, financially active lives, and creating a system of government frameworks and financial incentives to create and sustain this case of affairs.

The most important technical metric for this task is **HALE (health-adjusted life-expectancy)**. It belongs to a set of metrics known as **HALYs** (health-adjusted life-year). It includes HALE, a measure of population health that takes into account mortality and morbidity, **Quality-adjusted life years (QALYs)** and **disability-adjusted life years (DALYs)**, the latter being types of HALY whose original purposes were at variance.

HALE can be estimated at international, national or local levels to:

- Compare population health across communities and over time;
- Provide a full picture of which diseases, injuries, and risk factors contribute the most to poor health in a specific population (this is probably the most common use of summary measures of health);
- Assess which information or sources of information are missing, uncertain, or of low quality;
- Measures of HALE are normally presented by age, sex and geographical region.

The Uses of HALE

Research on healthy ageing encompasses: the biological processes contributing to ageing per se; the socio-economic and environmental exposures across life which modulate ageing and the risk of age-related frailty, disability and disease; and the development of interventions which may modulate the ageing trajectory.

Such research needs measures of health span which, in addition to chronological age, can characterise and quantify important functions which are subject to decline at faster, or slower, rates during individual human ageing. Furthermore, it is impossible to determine whether biotechnologies for aging have been successful if we cannot tell how advanced the aging process is in any given individual

The role of government strategy is of immediate importance in advancing the Longevity industry from its present point, and governments must be able to monitor and describe biomedical progress. Metrics for tangible progress are absolutely essential component of any government strategic agenda. It will be impossible to make concrete claims regarding global progress in biotechnology - and in preventive medicine in particular - without an agreed set of metrics.

HALE serves as a crucial metric type in many Aging Analytics Agency reports and publications, most notably *National Longevity Development Plans: Global Overview 2019 (First Edition)*.

Goals of the Research

This report aims to answer the following questions:

- What specific features of healthcare systems, socio-economic conditions, environmental factors affect public health?
- How does the impact of factors differ across countries?
- What constellation of factors contributes the most to healthy longevity?
- Which factors are the main drivers of disability adjusted years?
- What countries are leaders in longevity governance?
- Why disproportionate healthcare expenditures in the United States contributes to bad health care system performance and reduction in life expectancy in recent years?
- Why the health care system in Singapore is considered to be one of the most efficient in the world?
- What can be done to improve HALE in each country globally?

Global Longevity Governance Landscape is an analytical report that focuses on 50 countries Big Data comparative Analysis of longevity progressiveness. The goal is to find and determine metrics and methods that could better assess the health status and capture effectiveness of healthcare system in terms of rising trend of longevity.

Nowadays such complex indicators as life expectancy and health-adjusted life expectancy goes beyond the traditional measures of demographic potential of a particular countries, major causes of death, and probabilities of premature death (based on life tables).

Report Methodology

The focus of this study was primarily on 6 levels of analysis and aimed at perceptions of actual changes of interconnections between the nearly ***200*** parameters.

Quantitative data analysis in this report include approximately ***10 000 numerical values to indicate trends in Longevity.*** Therefore, the six step approach was used to conduct this systematic search:

1. Providing of statistical analysis for ***absolute values***.
2. ***Indexes*** research.
3. ***Ratios*** estimating.
4. Counting of ***growth rates***.
5. ***Growth rates of ratios*** valuation.
6. Deep analysis of ***effectiveness ratios***.

The Report Methodology is needed to develop health systems performance indicators, data collection strategies and tools for monitoring at national and global levels. Using of key metrics is aimed at evaluation what factors have the greatest influence on HALE and life expectancy in a particular country from the ranking. In some extension, this metrics system is well-defined performance measurement that is used to analyze and optimize all relevant healthcare processes to increase the level of industry effectiveness.

Therefore, metrics which are covered by this report could be applied for the assessment of healthcare system and strategies for health improvement. As well as all above indicators are complex and tangible, this metrics system can be used for deep analysis of current state of a country, its prospects and overall industry optimization. Secondary data sources are reliable and accurate: local health authorities, government, WHO, OECD, The World Bank.

Report Structure

The Introduction begins by defining each of the HALYs, explaining why HALE may be the most useful of the HALY metrics, and the normal difference between HALE and life expectancy, and then lists data sources to be used in the analysis that follows.

Main Patterns identifies the patterns that emerge across the countries, providing healthcare system overviews, healthcare expenditures, eHealth efficiency and air pollution across countries with high medium and low HALE and life expectancies.

Ranking of Countries provides a detailed methodology for ranking countries according to their healthy longevity-determining factors, divided into five groups: Economy, Health and Healthcare, Society, Demography, Environment and Infrastructure and then provides longevity ranking and scores for each of sub-rankings.

Current trends in Life Expectancy and Healthy Longevity examines gap between life expectancy by gender and potential explanations for the slowdown in improvements in recent years across chosen countries.

Public Spendings and Healthcare Efficiency shows that changes in demography and health conditions are putting pressure on public finance. Yet, a considerable part of this health expenditure makes little or no contribution to improving people's health.

Climate and Healthy Longevity briefly analyses the effects of climate on HALE in every world region.

Healthy Longevity and Metabesity discusses the relationship between healthy longevity and non-communicable diseases that have common metabolic roots.

Singapore and USA Healthy Longevity Comparison summarises specific features of healthcare systems and derives factors that affect public health both in Singapore and the United States. The main focus is made on healthcare system efficiency of Singapore and disproportionate healthcare expenditures in the U.S.

Singapore and Hong Kong Healthy Longevity Comparison compares determining factors of healthy longevity between Hong Kong, SAR and Singapore. The emphasis is made on healthcare accessibility and affordability of healthcare provision.

HALE and Supercentenarian Distributions discusses the distribution of centenarians across nations.

Analytical Methodology explains in detail the analytical process behind the report, beginning by illustrating the multiple layers of metrics and then methodologies for ratios, growth rates, growth rates of ratios, meteorological analysis impact and indexes of health status, society, retirement, immunization, economy and mental health.

HALE | QALY | DALY: Definitions

Health Adjusted Life Expectancy (HALE) is a measure of population health that takes into account mortality and morbidity. It adjusts overall life expectancy by the amount of time lived in less than perfect health. Global HALE at birth for females was only 3 years greater than that for males. In comparison, female life expectancy at birth was almost 5 years higher than that for males.

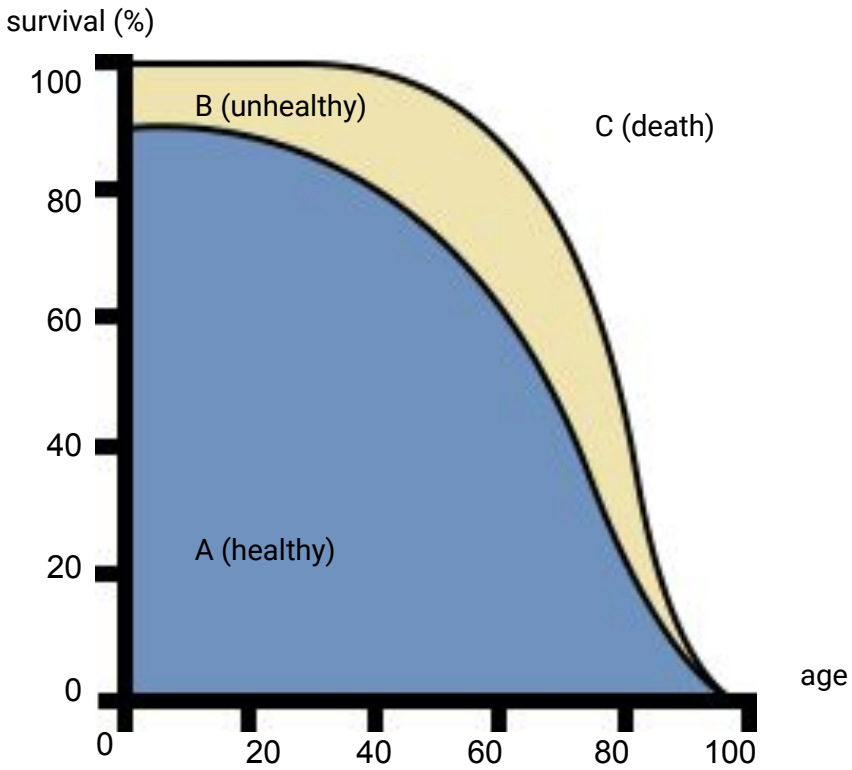
Health-adjusted life years (HALYs) are population health measures permitting morbidity and mortality to be simultaneously described within a single number. They are useful for overall estimates of burden of disease, comparisons of the relative impact of specific illnesses and conditions on communities, and in economic analyses. **Quality-adjusted life years (QALYs)** and **disability-adjusted life years (DALYs)** are types of HALYs whose original purposes were at variance.

QALY is a generic measure of disease burden, including both the quality and the quantity of life lived. It is used in economic evaluation to assess the value for money of medical interventions. One QALY equates to one year in perfect health. If an individual's health is below this maximum, QALYs are accrued at a rate of less than 1 per year. To be dead is associated with 0 QALYs.

DALYs measure the amount of life lost in a population as a result of premature death or disability. They can be used to estimate the burden of disease on populations. DALYs were used in the Global Burden of Disease study to enable mortality and morbidity comparisons to be made across countries. Weightings were applied to conditions by using the time trade off approach, in which people were asked to consider living more years in imperfect health compared with fewer years in perfect health. One DALY can be thought of as one lost year of "healthy" life. The sum of these DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.

Why HALE?

Health-adjusted Life Expectancy Specification



Graph shows:
A = time lived in good health
C = time lost due to premature mortality
Life expectancy = A + B
Health expectancy indicators (e.g. healthy life expectancy and HALE) = A + f(B)
Health gaps indicators (e.g. DALYs) = C + g(B)

Disability-adjusted life expectancy (DALE) integrates data on mortality, long-term institutionalization and activity limitations in the population and represents a comprehensive index of population health status. Thus, the emphasis is not exclusively on the length of life, but also on the quality of life. **Quality-Adjusted Life Year (QALY)** specifically refers to the balance between the length of time someone lives and the quality of life in terms of the absence of disease.

Director of the National Institutes of Health (NIH) Francis Collins, have called **DALYs** and similar metrics like the **QALY (DALY = Lifetime - QALY)** "*only partially successful in providing the kind of information that policy-makers need,*" and urged the NIH to fund the "*development and application of more rigorous models*."

HALE provides a summary of overall health conditions for a population, which are in turn an integral part of development. While communicable diseases such as HIV/AIDS, tuberculosis and malaria continue to cause substantial loss of health and mortality in developing countries, particularly African countries, non-communicable diseases and injuries are responsible for more than half of all lost years of healthy life in developing as well as developed countries. HALE thus provides a more complete picture of the impact of morbidity and mortality on populations, than DALY, QALY or simple Life Expectancy alone.

Health-Adjusted Life Expectancy and Life Expectancy

HALE and Life Expectancy (LE)	Countries	GAP
High HALE and LE	Australia, Austria, Canada, France, Italy, Luxembourg, Norway, Switzerland, Sweden, Republic of Korea	Big GAP between HALE and Life Expectancy
Medium HALE and LE	Belgium, Chile, Czech Republic, Denmark, Finland, Germany, Ireland, Slovenia	
Low HALE and LE	Estonia, United Arab Emirates, United States	
High HALE and LE	Iceland, Israel, Japan, New Zealand, Spain, United Kingdom of Great Britain and Northern Ireland	Medium GAP between HALE and Life Expectancy
Medium HALE and LE	Cuba, Greece, Malta, Netherlands, Portugal, Qatar	
Low HALE and LE	Brazil, India, Mexico, Poland, Slovakia, Saudi Arabia, Iran, Turkey	
High HALE and LE	Hong Kong, Singapore	Small GAP between HALE and Life Expectancy
Medium HALE and LE	China, Costa Rica, Panama	
Low HALE and LE	Argentina, Indonesia, Russia, South Africa	

This table represents the distribution of countries by their Health Adjusted Life Expectancy (HALE) and estimated average life expectancy (LE) and the gap. The gap is measured as absolute difference between life expectancy and HALE in a particular country.

Countries are distributed unevenly, because the major countries are developed countries with approximately the same level of development and welfare.

As can be seen, there are 10 countries in the group that combines a high level of HALE and LE and a big gap between the two indicators, which makes it the biggest group in the sample.

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Data Sources

Data collection is an essential stage of the research. Accurate data collection is essential to maintaining the integrity of research. To answer relevant questions of the working paper and evaluate outcomes, data used for this analysis was collected from credible sources. These include the following:

- World Health Organization
- OECD Data
- World Bank Open Data
- Government Reports
- Peer-Reviewed Scientific Publications
- CIA Database
- E-Government Development Index
- Human Development Index
- UNdata
- Corruption Perceptions Index
- The Observatory of Economic Complexity
- RAND Corporation
- The Economist Intelligence Unit
- Bloomberg Healthiest Country Index

Big Data Comparative Analysis Framework

Global Longevity Governance Landscape Conceptual Framework

Global Longevity Governance Landscape is an analytical report that focuses on 50 countries Big Data comparative Analysis of longevity progressiveness. The goal was to find and determine metrics and methods that could better assess the health status and capture effectiveness of healthcare system in terms of rising trend of longevity.

Nowadays such complex indicators as life expectancy and health-adjusted life expectancy goes beyond the traditional measures of demographic potential of a particular countries, major causes of death, and probabilities of premature death (based on life tables).

First, longevity progressiveness is important for driving economic progress and competitiveness—both for developed and developing economies. Many governments are putting policies on longevity at the center of their growth strategies and budget planning. Second, the definition of longevity has broadened—it is no longer quantitative increase in life expectancy at birth. Longevity could be and is more general and horizontal in nature. Today longevity is about social inclusiveness, high quality of life, technical innovations in care delivery and medical treatment, and modified business and governmental models. Last, but foremost, longevity progressiveness focuses not on increase life span but to reduce number of years in poor health.

This paper seeks to identify which health system characteristics, socio-economic factors, and environmental conditions are likely to increase health-adjusted life expectancy and improve the quality of life.

The analysis is based on the **200 parameters** that define healthy longevity across the chosen **50 countries** and their impact on the gap between health-adjusted life expectancy and life expectancy at birth.

The rich data base, including absolute values, ratios, indexes can be used to monitor performance of longevity progressiveness across countries over time and to benchmark developments against economies within the same region, income group classification or a particular initiated cluster.

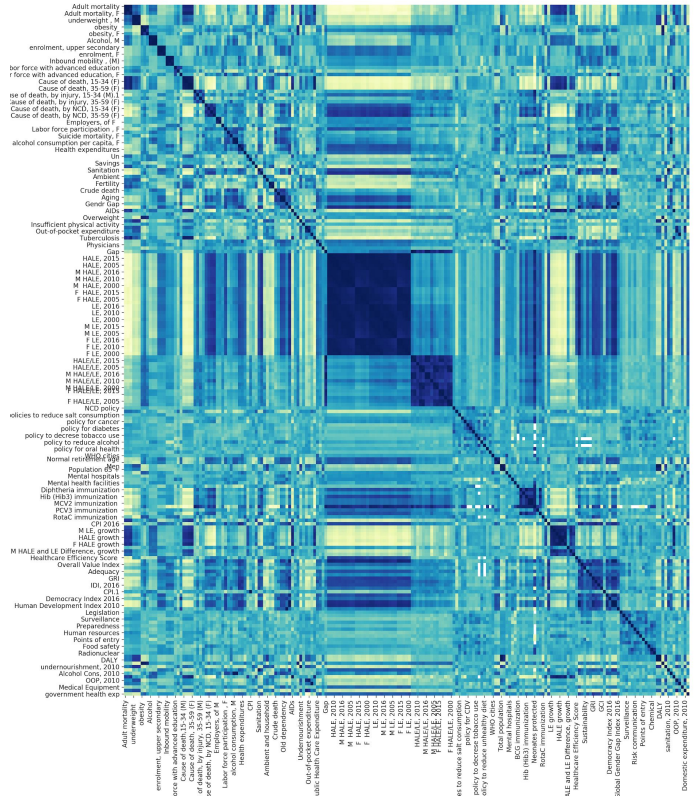
Big Data Comparative Analysis Framework

Big Data comparative analysis is based on the specific nature of parameters and their relationships that determine the development of healthy longevity progressiveness across countries of different levels of economic development and income group.

50 Countries

6 Layers and 200 Parameters

Correlations between Parameters



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Global Longevity Governance Landscape Conceptual Framework

Longevity Ranking

The rankings show how countries compare in terms of health and wellbeing. The values, on which the rankings are based, show how countries are performing. In particular, they show how different countries compare with the best-performing countries and their potential for improvement. The difference in Index values between countries is sometimes minimal, as there several countries with high level of life expectancy and of the same level of development. A difference of 0.1 or more points can be considered statistically significant.

The Ranking has been calculated using the most relevant, reliable data for 2016 from international sources that is comparable across countries. Data from national sources is often more up to date than international data sets because of the time it takes to process, standardise and introduce data into international data sets. This means that the Ranking does not necessarily reflect the current situation, such as the outcomes of policies that have recently been introduced.

Sub-indexes:

- **Economy**

Measured by unemployment rate, poverty rate in old age, living standards using GDP per capita, income Gini coefficient.

- **Health and Healthcare**

Measured by life expectancy at birth, healthy life expectancy at birth, chronicle disease burden, healthcare expenditures and psychological well-being. Good physical and mental health is critical to social and economic engagement of people.

- **Environment and Infrastructure**

Measured by access to safe water sources, physical safety, natural factors. These indicators capture the enabling attributes of the communities in which older people live.

- **Society**

Measured by social connection and development of human capital.

- **Demography**

Measured by major demographic indicators.

Determining Healthy Longevity Factors

The major problem with merely increasing life expectancy is that it also increases morbidity because people live long enough to get more age-related disease, disability, dementia, and dysfunction. Many serious diseases have increased prevalence with age, including cancer, heart disease, stroke, respiratory disease, kidney disease, dementia, arthritis, and osteoporosis.

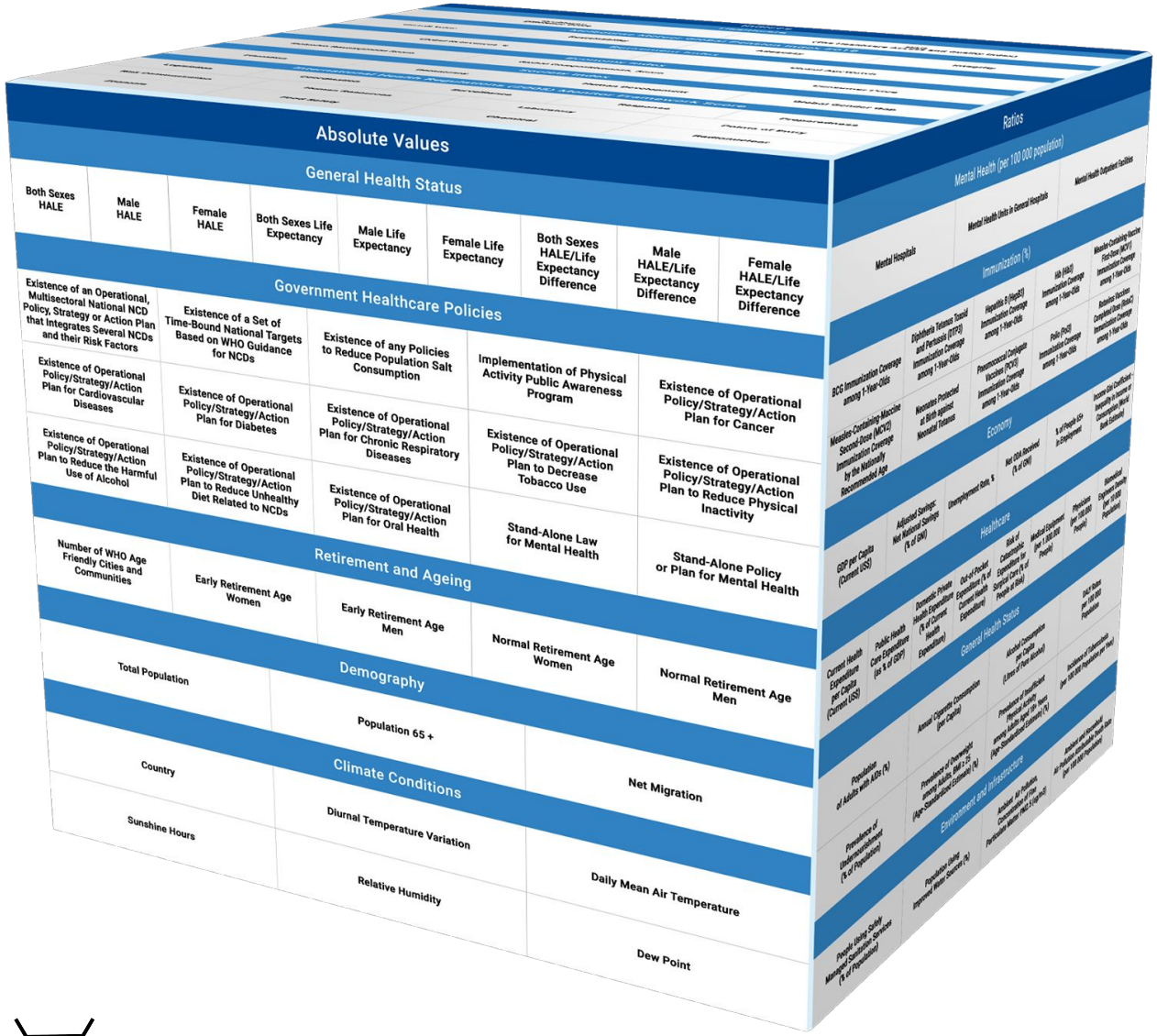
Ageing is caused by many different processes, that is why healthy longevity goes far beyond demographic characteristics and medical research problems on how to increase the quantity of life.

To define major risks and favorable factors and their compound impact on healthy longevity we use multiple linear regression analysis, which is a quantitative method used to test the nature of relationships between a dependent variable and two or more independent variables. Gap between life expectancy and health-adjusted life expectancy was chosen as dependent variable. All independent parameters were divided into six pillars: general economic conditions, mortality rates, lifestyle factors, environment, demography and healthcare. Variables are evaluated by what they add to the prediction of the dependent variable which is different from the predictability afforded by the other predictors in the model.

Consequently, it is unclear why countries are investing so much money in research focused on reducing death rates in the elderly, if the consequence is advancing ageing, that can be described as the increase in disability years, plus pension, and social and medical costs, in an unsustainable way.

To help formulate and prioritize among social and health government expenditures, estimations of relationship between HALE and public spendings for countries that differ solely in their national plans, target programmes can provide valuable information. The estimator of the relationship between HALE and public spending is intraclass correlation coefficient (ICC).

Big Data Analysis
Absolute Values, Indices, Ratios



Overall, there are 6 levels of proprietary metrics, which differ based on the nature of the parameters they consist of. Together, they comprise 200 separate metrics.

Indicators, their growth rates and their ratios are calculated separately and then integrated in the final metrics system.

The whole of the metrics can also be subdivided into 2 categories based on the logic of the parameters, namely:

- Stimulators (variables that favorably affect average life expectancy and health-adjusted life expectancy);
- Destimulators (variables that negatively affect average life expectancy and health-adjusted life expectancy).

Thus, the ranking system reflects both strengths and opportunities of different countries regarding the development of healthcare system and strategies for health improvement. It can be applied for the evaluation of the current state of a country, as well as of its prospects.

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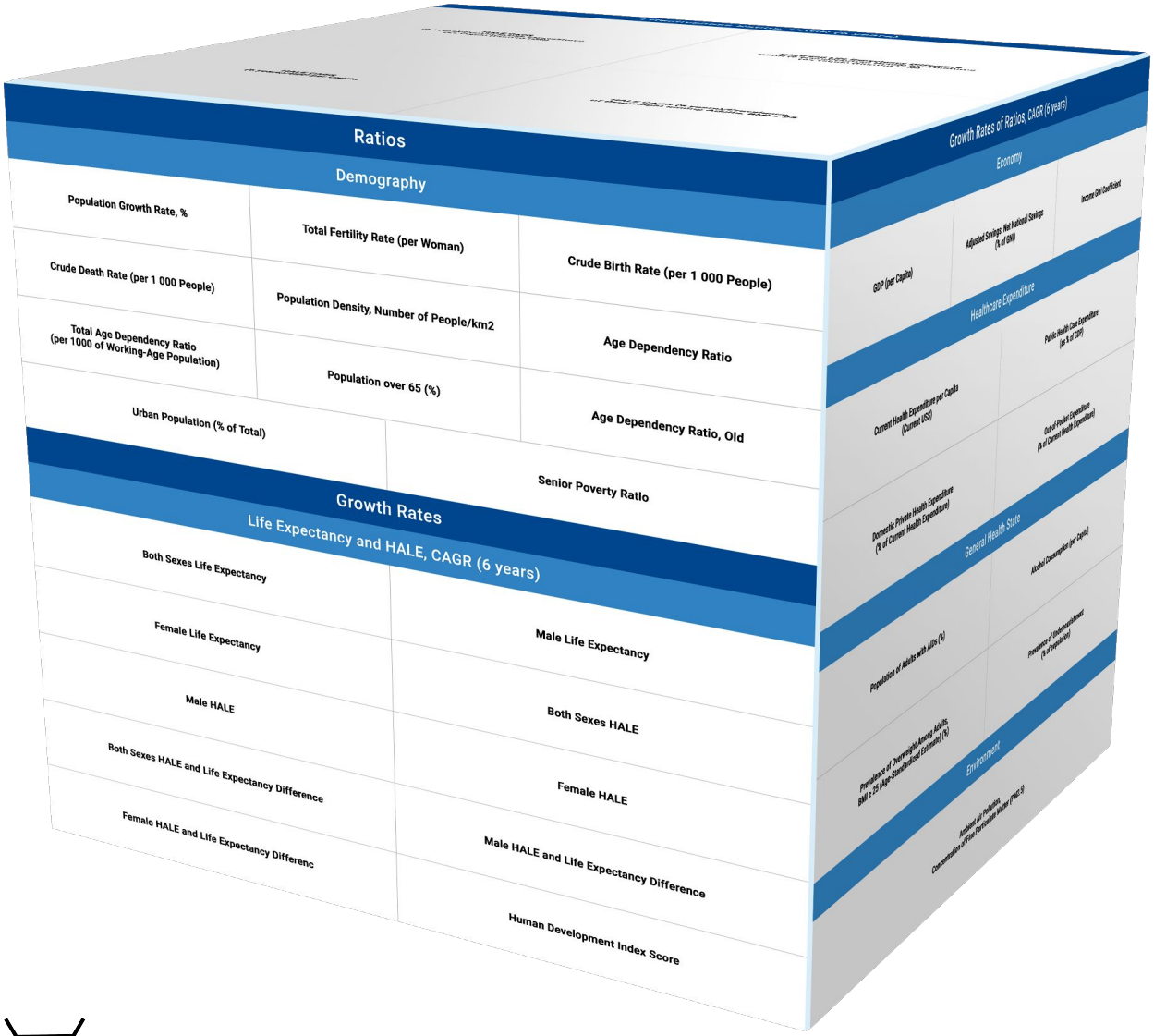
Big Data Analysis

Growth Rates, Growth Rates of Ratios, Effectiveness Ratios



Absolute values are enhanced by relative ones, and the use of both in combination enables a clearer understanding of interconnections between the parameters and provides the opportunity to investigate what factors have the greatest influence on HALE and life expectancy in a particular country.

There is multicollinearity between some metrics. It is caused by use of dummy variables and by the inclusion of a variable which is computed from other variables in the data set.

Each level of metrics is based upon the extension, further subdivision or comparative combination of the metrics in the preceding level, or is derived from insights provided by them.

The research is based on open source data and information given by WHO, OECD, The World Bank, and different institutions of each specific country.

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50 Countries and 200 Parameters

Patterns recognition is based on a comparison of 200 parameters across 50 countries according to their distribution and variation. It aims to derive interconnection between metrics and classify countries into groups.

Big Data Comparative Analysis of Longevity

Data Collection

- 50 countries
- 200 parameters
- 6 levels of metrics

Data Cleaning

Aggregation data by 5 dimensions

- Economic conditions
- Demography
- Health care and healthcare status
- Environment
- Social factors

Model Creation

- Factor analysis of LE-HALE gap determinants (multiple regression)
- Analysis of variance of major longevity parameters across groups of countries (ANOVA)
- Defining leading countries in longevity governance (ranking)
- Estimation of relationships between metrics (intraclass correlation)
- Assessment of effectiveness of healthcare systems

Model Validation

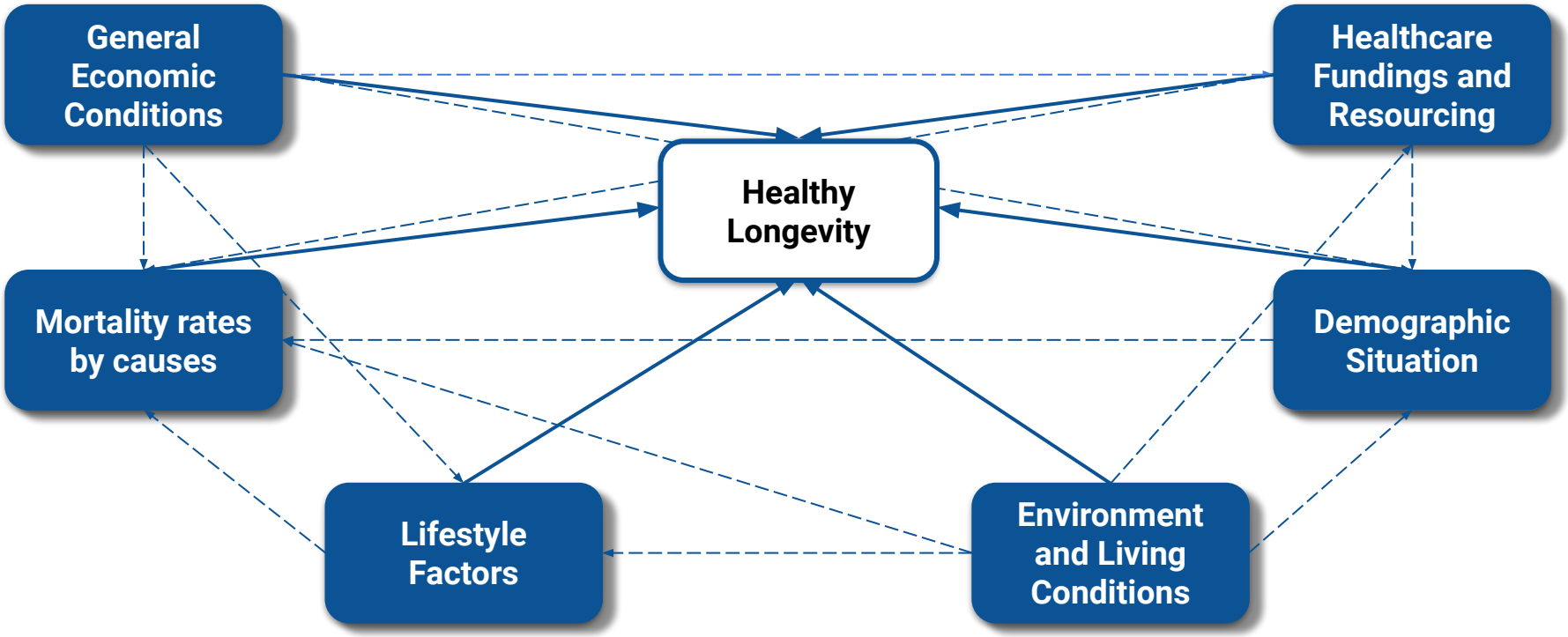
- Hypothesis testing
- Sensitivity analysis

Development of Recommendations

- Incorporation results of research in practical recommendations

Main Patterns Affecting Healthy Longevity Big Data Analysis and Pattern Recognition

Healthy Longevity Determining Factors



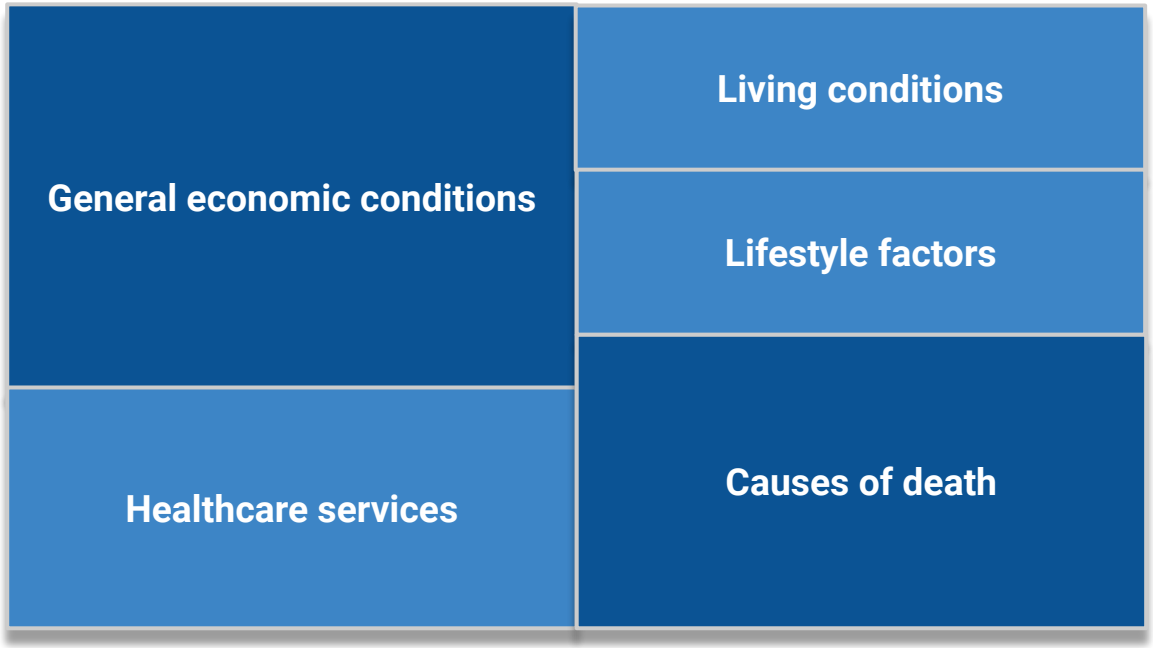
The Network Graph is used to display relations between various factors that determine Longevity. All parameters are divided into six pillars: general economic conditions, mortality rates, lifestyle factors, environment, demography and healthcare.

The graph itself visualizes how metrics are interconnected with each other. The relationship between them are displayed with lines. **Bold arrows** indicate direct impact on health longevity, which is determined as difference between life expectancy at birth and health-adjusted life expectancy. **Dashed lines** reveal **multicollinearity**, a state of very high intercorrelations or inter-associations among the independent variables, factors across different groups.

Comparative Longevity Analysis

	Change of gap, in years	Group parameters
Economy	0.070150	Consumer price index (CPI), %
	-0.037341	Net National Savings as % of GNI
	-0.064837	Unemployment rate, %
	0.000011	Gross domestic product per capita, $US
Public Health	-0.104206	Cause of death by CD and maternal, prenatal and nutrition conditions, % of total
	-0.051370	Cause of death. by non-communicable diseases as a % of total
	-0.046281	Mortality from CVD. cancer. diabetes or CRD between exact ages 30 and 70, %
	0.018968	Suicide mortality rate per 100.000 population
Health Care System	-0.044228	Domestic private health expenditure as a % of current health expenditure
	0.033417	Out-of-pocket expenditure as a % of current health expenditure
	0.074953	Public health care expenditure as a % of GDP
	-0.202128	Biomedical engineers density per 10 000 population
Life Style	-0.085353	Prevalence of undernourishment as a % of population
	-0.022713	Smoking prevalence. total ages 15+
	0.014407	Prevalence of overweight among adults (BMI ≥ 25), %
	0.038373	Total alcohol consumption per capita, liters of pure alcohol
Environment and Infrastructure	0.110444	People using at least basic drinking water services as a % of population
	-0.004795	Ambient and household air pollution attributable death rate
	-0,014788	Ambient air pollution, concentration of fine particulate matter (PM2.5), %
	0.027411	People using at least basic sanitation services, % of population

Conceptual Model of the Gap Determinants



The determinants of the gap between life expectancy and HALE are complex and comprise multiple policy domains. One basic but important conceptual model that can be used to illustrate the breadth of these determinants is shown above. The determinants are presented in a set of boxes, the size of which represents the strength of relationship with gap and the color represents its significance.

The biggest box belongs to general economic conditions that have important long-term health effects. The next box contains society's basic health institution, which can both sustain and impair a healthy existence. The next cell emphasizes the critical role of living conditions. The box below to the living conditions highlights the importance of individual behavioral choices (cigarette smoking, risk-taking behaviors) in the determination of the gap between life expectancy and HALE. The last box but not the least implicates the assessment of causes of death contribution to the gap.

Because of the issue of multicollinearity as all the mentioned factors are interconnected we will build five different models to identify unmixed impact of each individual group of factors on the gap.

Methodology of Multiple Linear Regression Analysis

Multiple linear regression analysis is a quantitative method used to test the nature of relationships between a dependent variable and two or more independent variables.

Dependent and Independent Variables

The variable whose value is to be predicted is known as the dependent variable and the ones whose known values are used for prediction are known independent (exploratory) variables. Sometimes the dependent variable is also called endogenous variable, criterion variable, prognostic variable or regressand. The independent variables are also called exogenous variables, predictor variables or regressors.

Significance and Goodness of Fit

At the center of the multiple linear regression analysis lies the task of fitting a single line through a scatter plot. More specifically, the multiple linear regression fits a line through a multi-dimensional cloud of data points. Variables are evaluated by what they add to the prediction of the dependent variable which is different from the predictability afforded by the other predictors in the model. The **F-test** is used to assess whether the set of independent variables collectively predicts the dependent variable. **R-squared**—the multiple correlation coefficient of determination—is reported and used to determine how much variance in the dependent variable can be accounted for by the set of independent variables. **Beta coefficients** are used to determine the magnitude of prediction for each independent variable. For significant predictors, every one unit increase in the predictor, the dependent variable will increase or decrease by the number of unstandardized beta coefficients. A **standardized beta coefficient** compares the strength of the effect of each individual independent variable to the dependent variable. The higher the absolute value of the beta coefficient, the stronger the effect.

Basic Modeling Assumptions

- Assumption of **linearity**. There is a linear relationship between dependent and independent variables.
- Assumption of **homoscedasticity**. Data values for dependent and independent variables have equal variances.
- Assumption of **absence of collinearity or multicollinearity**. There is no correlation between two or more independent variables.
- Assumption of **normal distribution**. The data for the independent variables and dependent variable are normally distributed.

Gap between HALE and Life Expectancy and Economic Conditions

Significant factors in decreasing order of their power (standardised b-coefficient) with the respective magnitude of prediction

- Consumer price index (CPI) (**0.480**) - 0.070150
- Net national savings as a % of GNI (**-0.368**) - -0.037341
- Unemployment rate, % (**-0.365**) - -0.064837
- Gross domestic product per capita, US$ (**0.289**) - 0.000011

This model estimates the relationship between life expectancy and HALE gap and socioeconomic conditions, which include GDP per capita (US $) as a measurement of a country's standard of living, urbanisation level (%), unemployment rate (%), consumer price index (CPI) as an indicator of the purchasing power of a country's unit of currency and level of net national savings (%).

As an output, we obtained the model where the only factors mentioned above are statistically significant, namely their beta coefficients are non-zero. The highest strength of the effect belongs to CPI. We can interpret it as on average every one unit decrease in purchasing power of a national currency causes a 0.070 year or 25 days shift in the gap. The effect of net national savings differs: every single unit increase, provided the other factors remain constant, leads to 0.037 year or 14 days decrease in the gap.

In general, the variance of socioeconomic conditions explains 33,3 % of the gap variance. According to F-test, p-value and standard error of estimate this model is significant. Therefore, there is enough evidence in the data to suggest that the linear relation between the gap and socioeconomic characteristics exists.

Model Summary Statistics

Adjusted Coefficient of Determination:
33.3 %

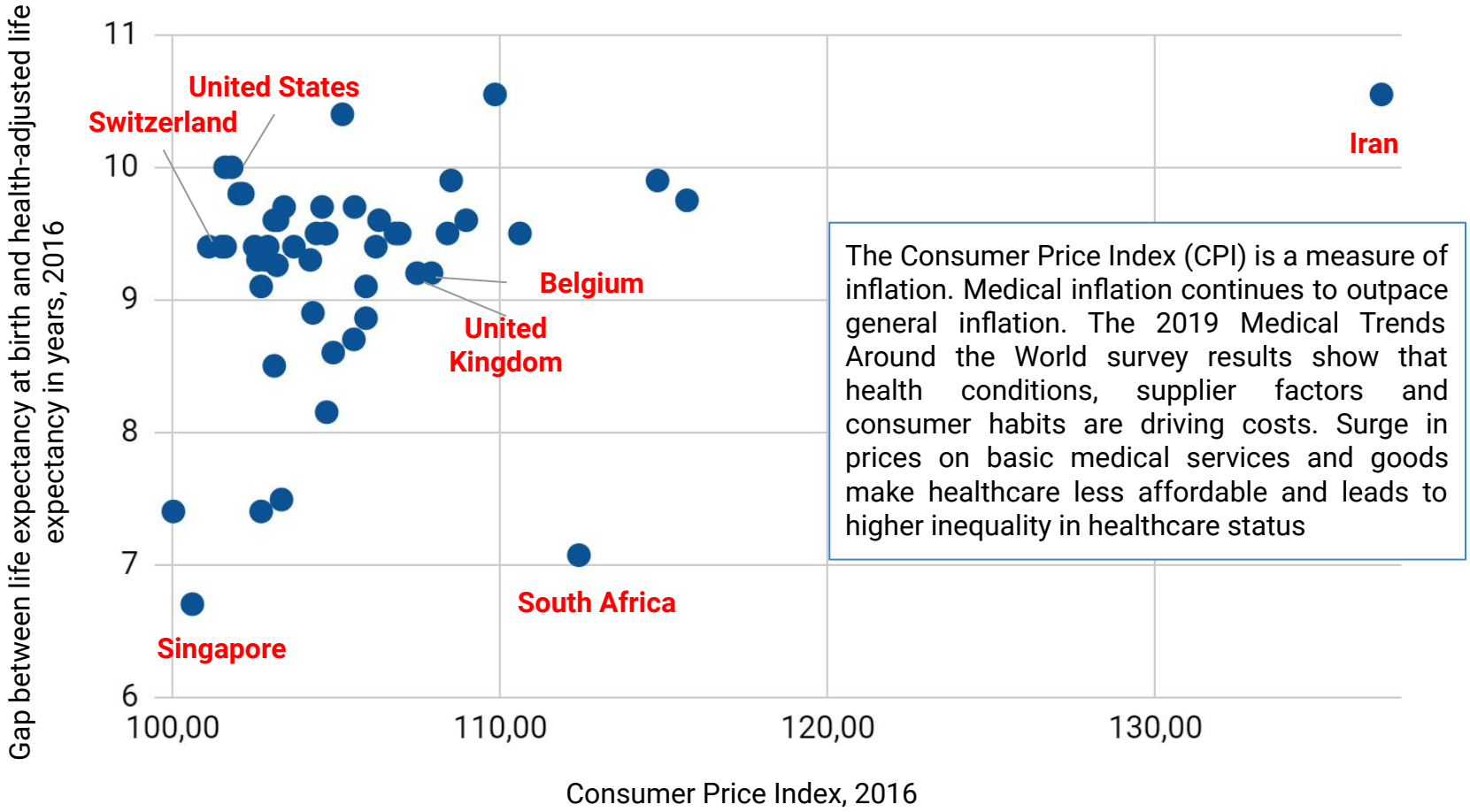
Fisher Exact Test:
7.109

Probability Value of the Model:
<0.005

Standard Error of Estimate:
0.673

The p-value associated with the F is smaller than 0.05, then there is significant impact of independent variables on gap between life expectancy at birth and health-adjusted life expectancy.

Economic Instability and Gap between HALE and Life Expectancy



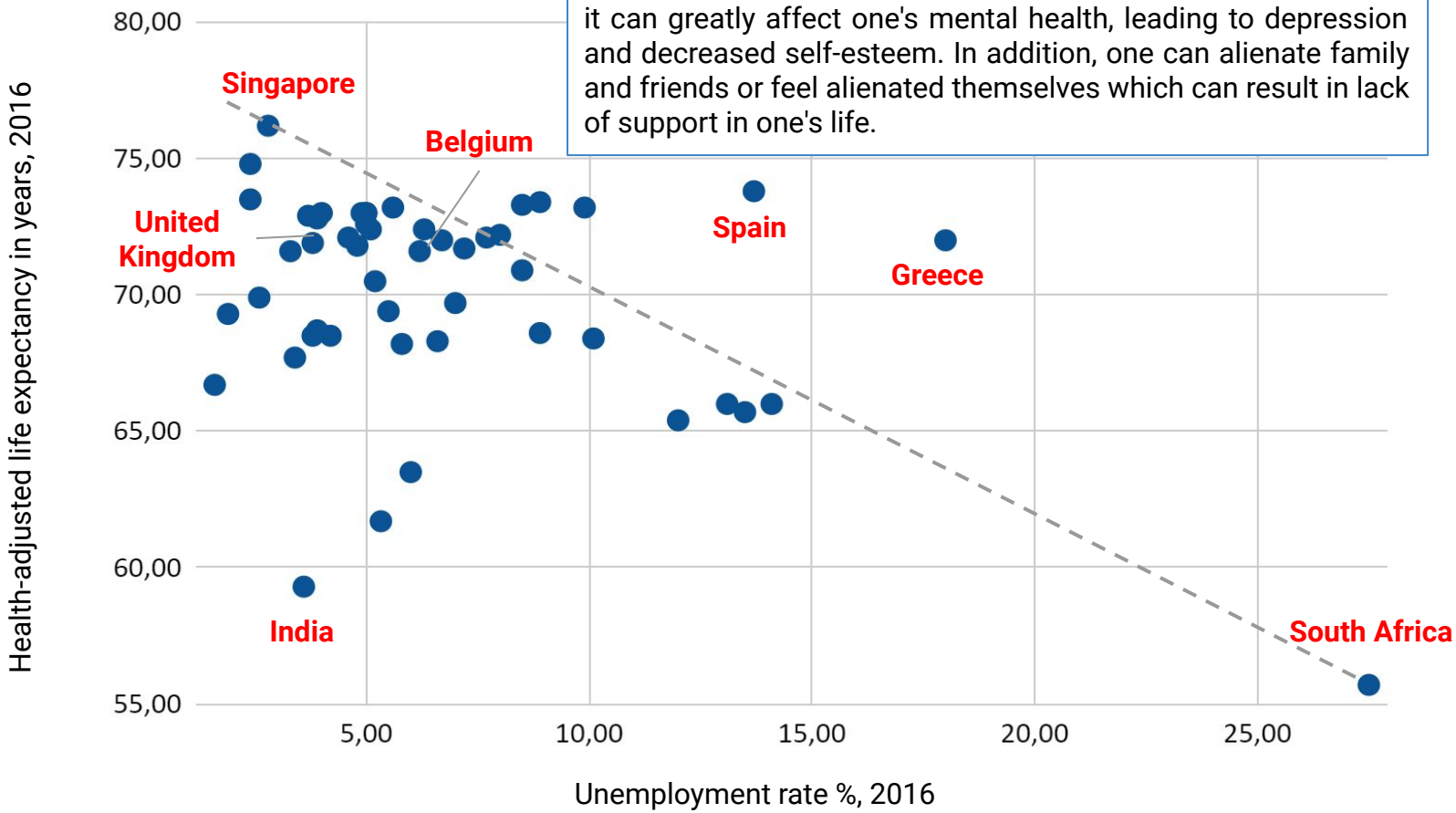
The Consumer Price Index (CPI) is a measure of the average change over time in the prices paid by consumers for a market basket of consumer goods and services. CPI characterises prices instability and economic instability in general as rapid inflation indicates recession or systemic crises.

The graph shows that increase of CPI contributes to increase in gap between life expectancy at birth and HALE. The lowest level of CPI in 2016 was observed in Singapore and the highest was in Iran.

Source: WHO

Unemployment and Healthy Longevity

Unemployment not only increases the likelihood of disease, but it can greatly affect one's mental health, leading to depression and decreased self-esteem. In addition, one can alienate family and friends or feel alienated themselves which can result in lack of support in one's life.

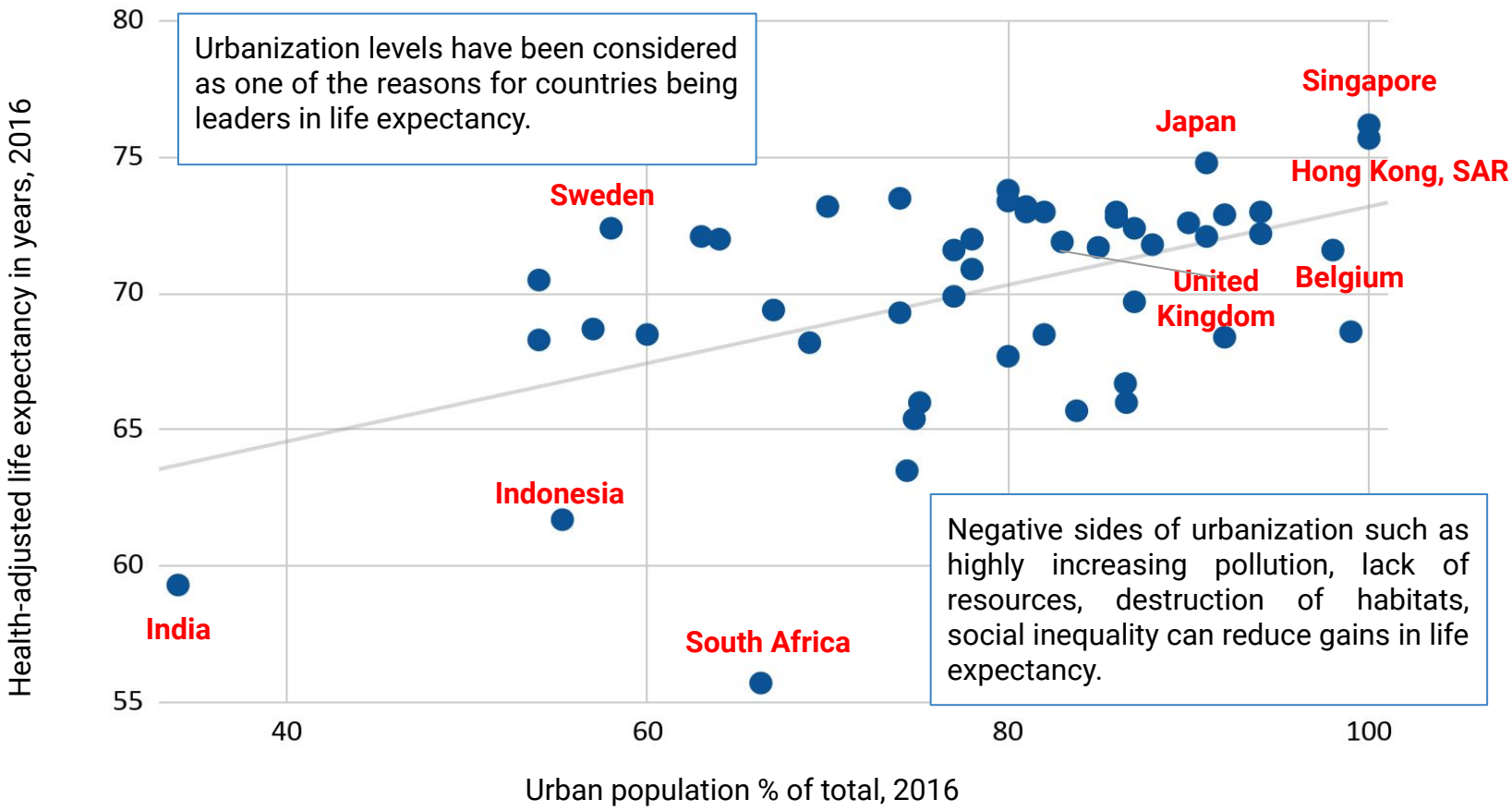


High unemployment leads to reduction of health-adjusted life expectancy. Countries with low unemployment (close to natural level of unemployment) have higher HALE. Hgh unemployment rate leads to social disproportions and unaffordability of basic basket of goods and services.

But calculations also show that increase in unemployment leads to decrease in gap. Such inverse relations can be explained parameters. Both life expectancy and HALE are modeled indicators, but HALE is inertial by nature and has lower elasticity comparing to life expectancy.

Source: WHO

Urbanization and Healthy Longevity



Researchers discovered a significant difference between the life expectancy of those living in the big cities and those in other regions. In such countries as India, Indonesia, South Africa, Russian Federation, Brazil, China, people living in rural and remote areas suffer from lack of medical facilities and effective healthcare provision.

But urbanization leads and to reversal impact on life expectancy and HALE. Different emissions and wastes cause negative have harmful impact on people health. So, developed countries, such as Sweden and France, where level of urbanisation varies from 55-70%, proves that government policies should be focused on all territories to provide equal quality of and access to medical care.

Source: World Bank | WHO

Gap between HALE and Life Expectancy and Healthcare Systems

Significant factors in decreasing order of their power (standardised b-coefficient) with the respective magnitude of prediction

- Domestic private health expenditure as a % of current health expenditure (**-0.748**) - -0.044228
- Out-of-pocket expenditure as a % of current health expenditure (**0.484**) - 0.033417
- Public health care expenditure as a % of GDP (**0.250**) - 0.074953
- Biomedical engineers density per 10 000 population (**-0.223**) - -0.202128

As a result of the study, we found out, that mentioned above dimensions of national healthcare systems have a significant impact on the gap and its change. Every single unit rise of domestic private health expenditures leads to 0.044 years or 16 days decrease in the gap between life expectancy and HALE. It is necessary to pay attention to the sign of the coefficient for “Public health care expenditure” as it shows that increase in the level of public expenditure can cause the gap to increase. This indicates health care system inefficiency.

In general, the variance of healthcare peculiarities explains 24.1 % of the gap variance. According to F-test and p-value, this model is significant. Therefore, there is enough evidence in the data to suggest that the linear relation between the gap and healthcare systems exists. The standard error of estimate measures that on average prediction values of the model and actual values of the gap differ by 0.718 years.

Model Summary Statistics

Adjusted Coefficient of Determination:
24.1 %

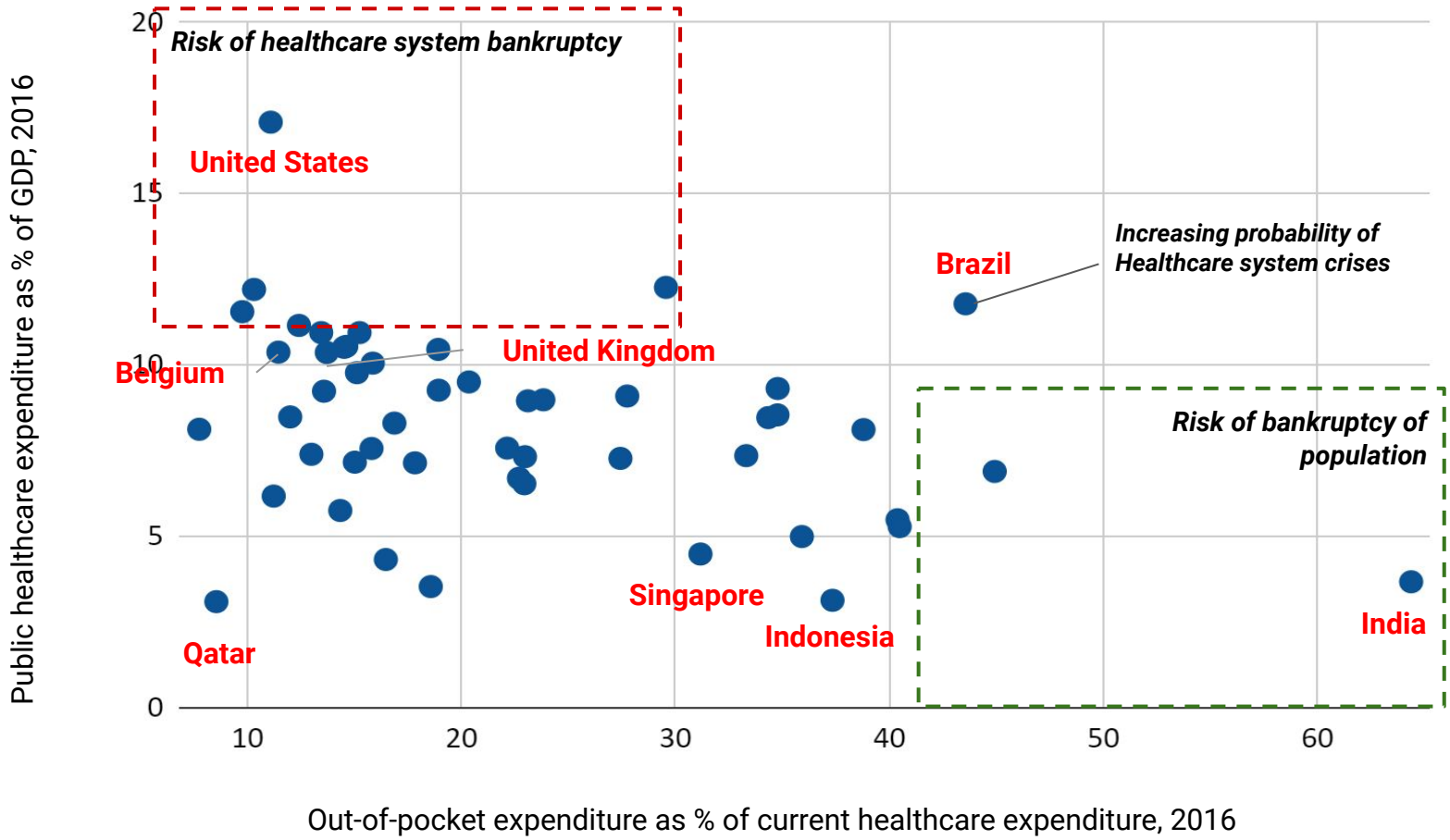
Fisher Exact Test:
4.887

Probability Value of the Model:
<0.005

Standard Error of Estimate:
0.718

The p-value associated with the F is smaller than 0.05, then there is significant impact of independent variables on gap between life expectancy at birth and health-adjusted life expectancy.

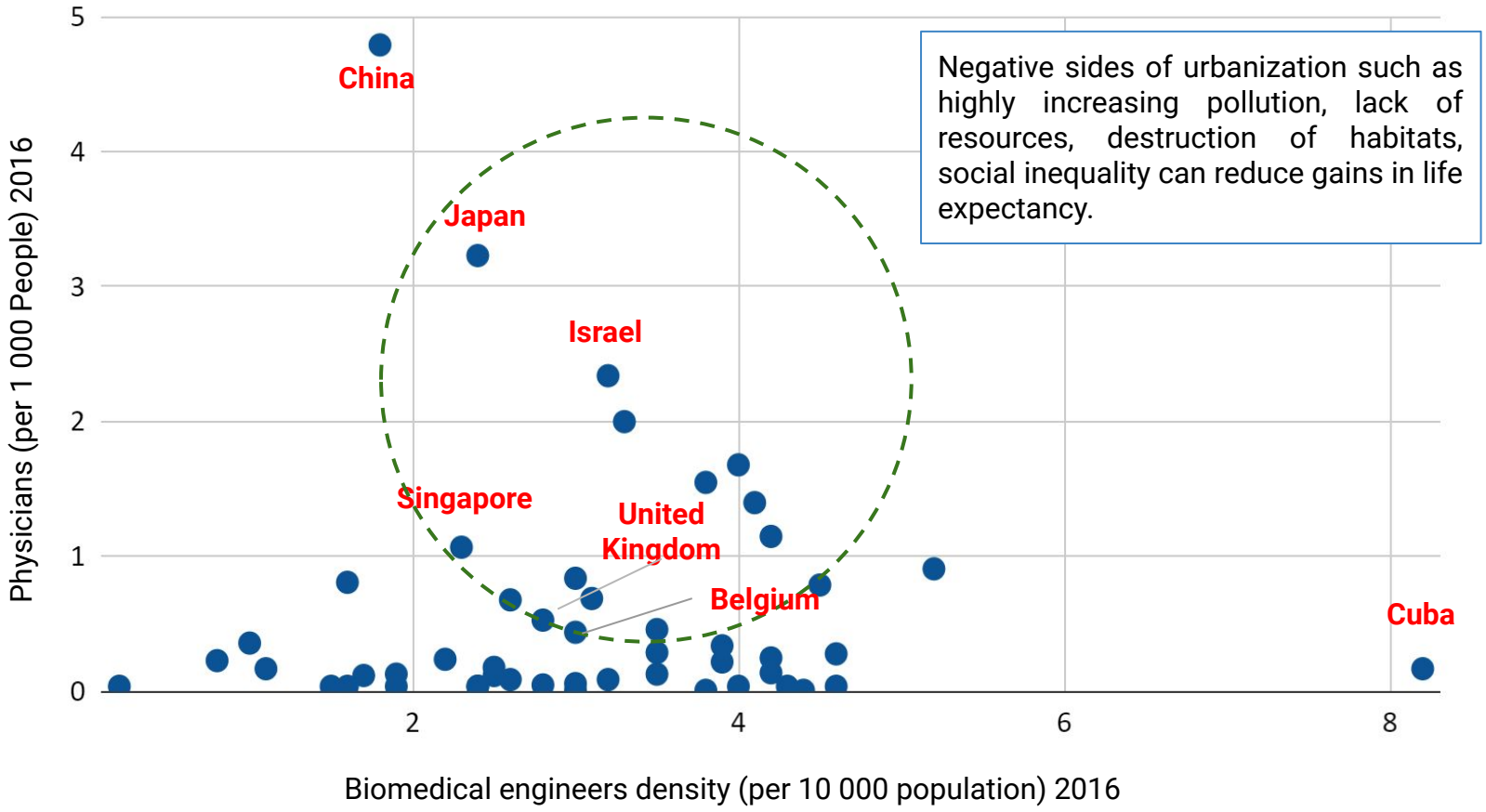
Public Healthcare Expenditure and Out-of-pocket Expenditure



Unregulated direct charges often constitute a major access barrier to needed health care and contribute to high out-of-pocket payments generating problems of financial protection. Out-of-pocket payments absorb household's financial resources and make healthcare unaffordable for low socioeconomic groups as a result large discrepancies appears in healthcare status. In contrast, public spending on health is central to universal health coverage and social protection, but there is no clear trend of. In the United States high healthcare expenditure is a result of high administrative cost and corruption in healthcare.

Source: World Bank

Healthcare Accessibility

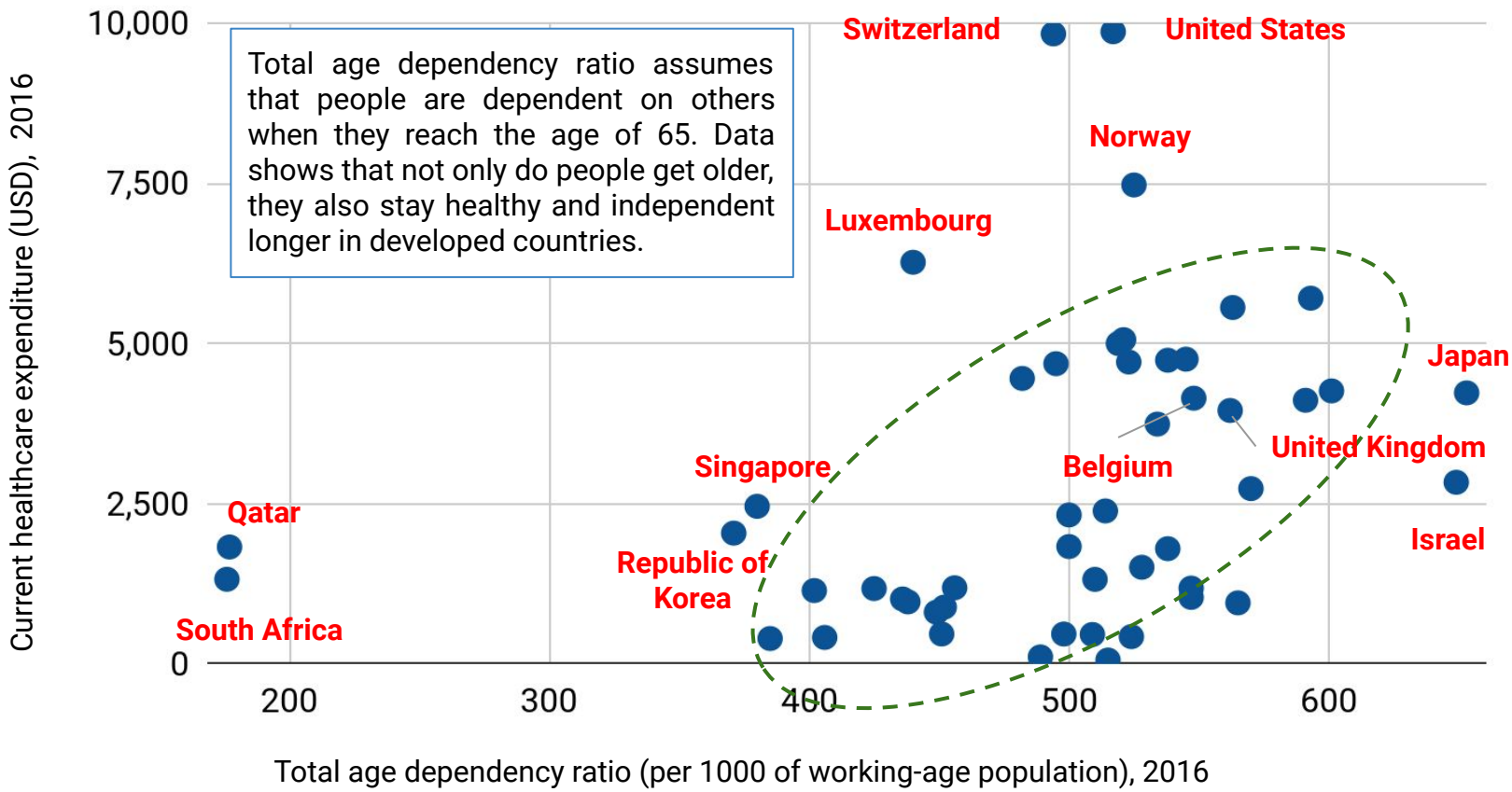


The balance of medical facilities and healthcare professionals is vital to provide high-quality healthcare services. Countries that are below the circle and extreme outliers, such as Cuba and China face problems of staff shortage, long waiting time or both of them.

A key issue is that the supply of doctors has not kept pace with demographic trends and the increasing demands of an ageing population. Timeliness of healthcare services closely relates to staff shortage. These problems hinders governments to focus efforts on care-delivery improvements.

Source: WHO

Ageing Population and Current Healthcare Expenditure



The total-age-dependency ratio is the ratio of the sum of the number of young and the number of elderly people at an age when both groups are generally economically inactive, (i.e. under 15 years of age and aged 65 and over), compared to the number of people of working age (i.e. 15-64 years old). Steady increase in share of old age group in the population leads to increase in financial burden. The youngest population across chosen countries live in South Africa and Qatar. The oldest nations are in Israel and Japan, where the value of age dependency ratio is bigger than 600 elderly people per 1000 of people of working age. High values of current healthcare expenditures in the United States and Switzerland show that healthcare is enough expensive in both countries and private insurance providers set high fees.

Source: World Bank

Gap between HALE and Life Expectancy and Living Conditions

Significant factors in decreasing order of their power (standardised b-coefficient) with the respective magnitude of prediction

- People using at least basic drinking water services as a % of population (**0.340**) - 0.110444
- Ambient and household air pollution attributable death rate per 100 000 population (**-0.164**) - -0.004795

An important factor that determines life expectancy and HALE is a general environmental condition. In particular, we focused on living conditions including the level of using at least basic sanitation services (%), level of using at least basic drinking water services (%), ambient and household air pollution.

According to our research and computed standardised beta coefficients, the highest strength of the effect belongs to the level of using at least basic drinking water. Every single unit increase in the percentage of people using at least basic drinking water services provided the other factors remain constant, leads to 0.110 years or 40 days gap increase. It can be explained by the fact that life expectancy at birth will change at a faster pace that HALE. We can draw the opposite conclusion regarding ambient and household air pollution: here HALE will increase or decrease in faster pace than life expectancy.

Adjusted R-squared shows that 18.0 % variance in the dependent variable can be accounted for by the set of environment condition variables. According to F-test and p-value, this model is significant. Therefore, there is enough evidence in the data to suggest that the linear relation between the gap and general living conditions exists.

Model Summary Statistics

Adjusted Coefficient of Determination:
18.0 %

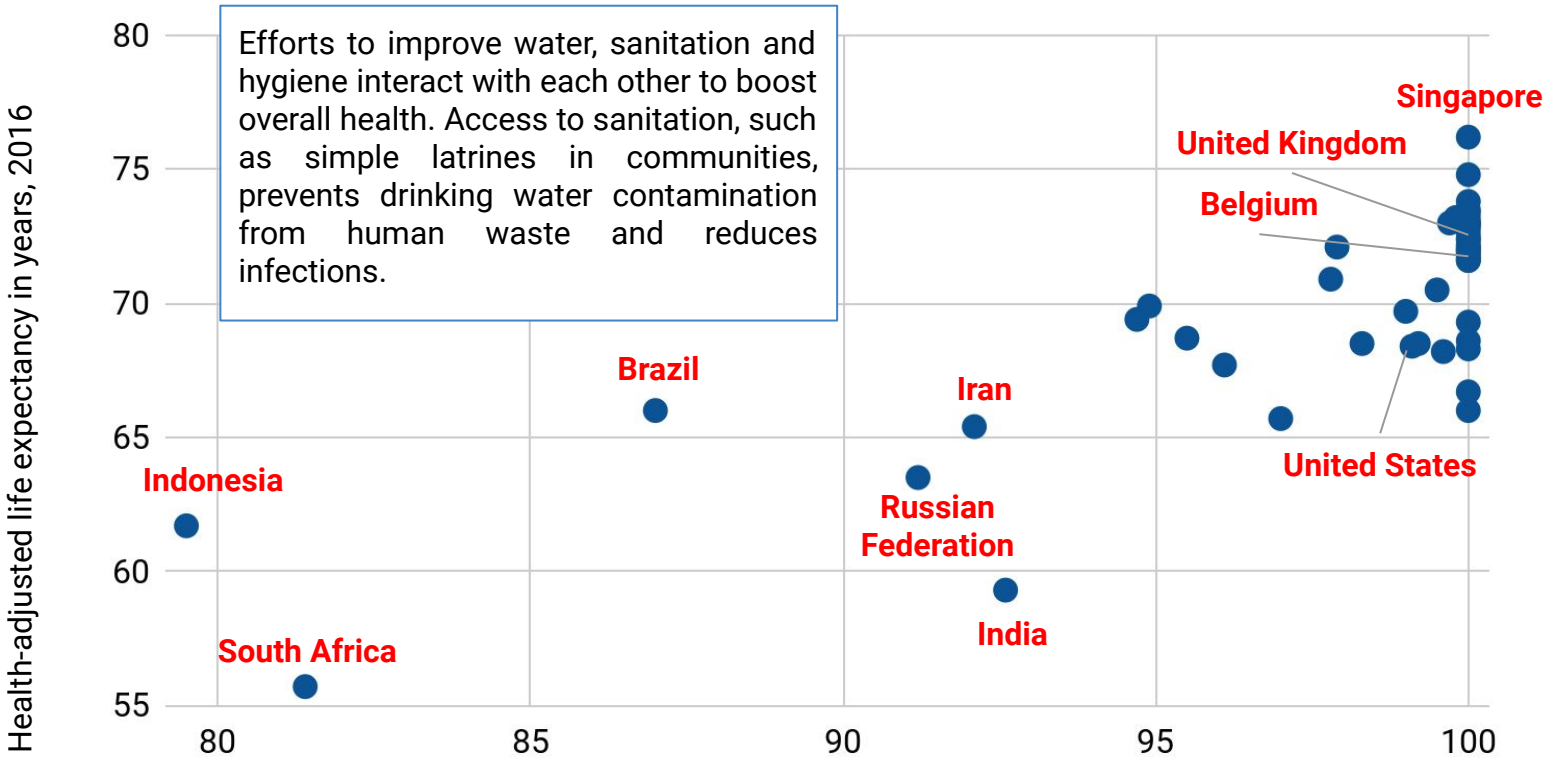
Fisher Exact Test:
6.387

Probability Value of the Model:
<0.005

Standard Error of Estimate:
0.746

The p-value associated with the F is smaller than 0.05, then there is significant impact of independent variables on gap between life expectancy at birth and health-adjusted life expectancy.

Improved Water Sources and Healthy Longevity

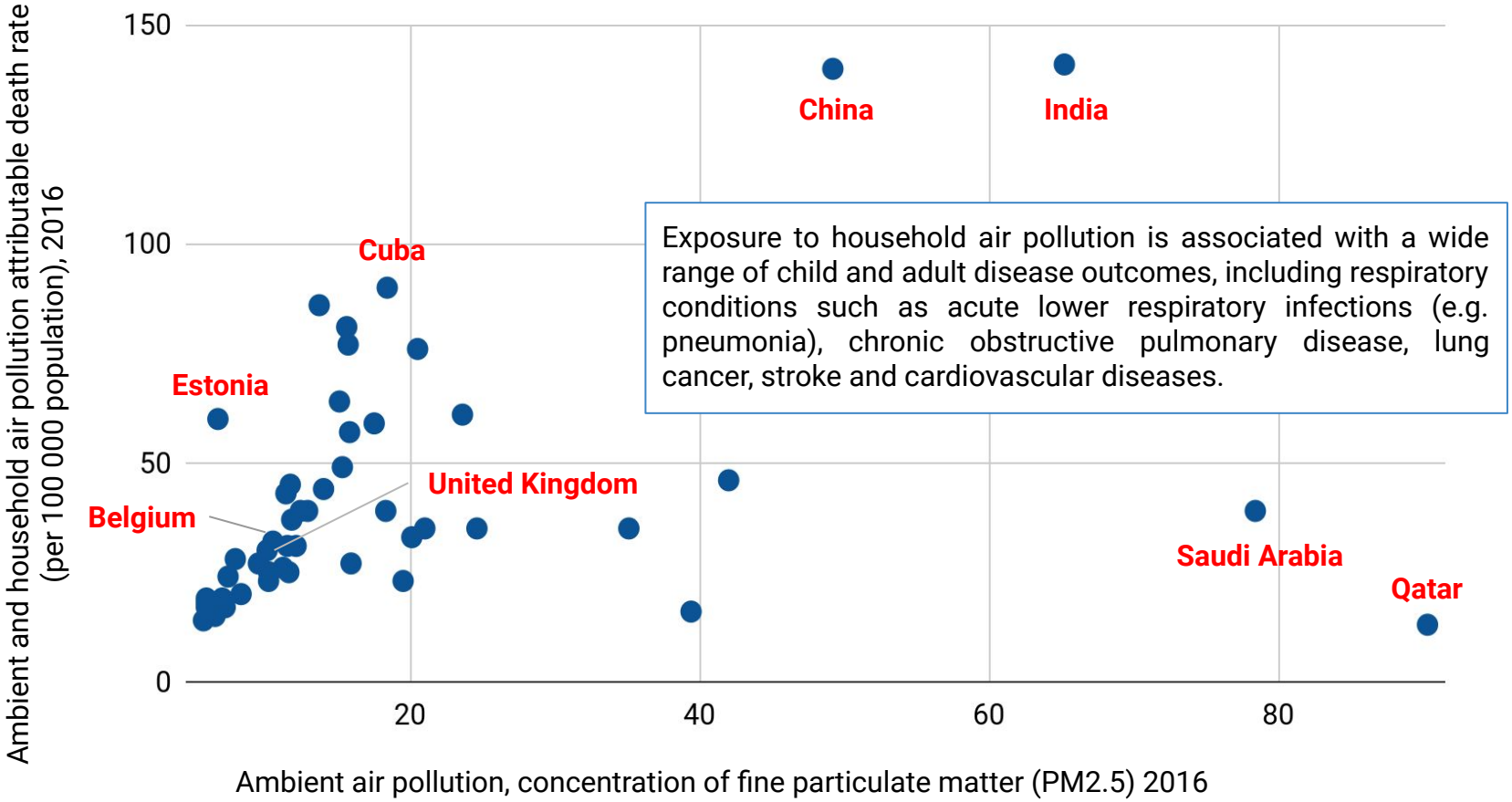


People using improved drinking water source % of total population, 2016

Improved drinking water source is a source that, by nature of its construction, adequately protects the water from outside contamination, in particular from faecal matter. Bad water supply causes the burden of communicable diseases and increases the risk of premature death, such a situation is observed in big cities and remote areas in South Africa, Indonesia, India, Brazil. Waterborne diseases are caused by drinking contaminated or dirty water. Contaminated water can cause many types of diarrheal diseases, including Cholera, and other serious illnesses such as Guinea worm disease, Typhoid, and Dysentery. Water related diseases cause 3.4 million deaths each year.

Source: World Bank

Ambient Air Pollution



Increase in ambient air pollution, concentration of fine particulate matter (PM2.5) contributes to exponential growth of ambient and household air pollution attributable death rate (per 100 000 population). The highest level of death ration is in India and China, the biggest industrial producers in the world. Diseases as a result of the pollution include acute lower respiratory infections, chronic obstructive pulmonary disease, stroke, ischemic heart disease, and lung cancer. The highest level of ambient air pollution across chosen countries is in Qatar. However Qatar's pollution readings are some of the worst in the world, the number of deaths attributed to poor air quality is not as high. So, air pollution has health impacts even at very low concentrations.

Source: WHO | World Bank

Gap between HALE and Life Expectancy and Lifestyle Factors

Significant factors in decreasing order of their power (standardised b-coefficient) with the respective magnitude of prediction

- Prevalence of undernourishment as a % of population (**-0.252**) - -0.085353
- Smoking prevalence, total ages 15+ (**-0.228**) - -0.022713
- Prevalence of overweight among adults (BMI ≥ 25), % (**0.223**) - 0.014407
- Total alcohol consumption per capita, liters of pure alcohol (**0.170**) - 0.038378

The above factors indicating general lifestyle such as the prevalence of undernourishment, smoking, overweight among adults and alcohol consumption have a significant impact on the gap prediction. According to the standardised beta coefficient values, we can not highlight any dimension as the most powerful.

For instance, every single unit rise of overweight prevalence leads to 0.014 years or 5 days decrease in the gap between life expectancy and HALE. The effect of total alcohol consumption is the same: every single unit increase provided the other factors remain constant, leads to 0.038 year or 14 days decrease in the gap.

In general, the variance in lifestyle factors determines 15.5 % variance in the gap between life expectancy and HALE. The overall F-test defines that an assumed linear relationship is statistically significant whereas p-value for the model is less than the accepted significance level.

Model Summary Statistics

Adjusted Coefficient of Determination:
15.5 %

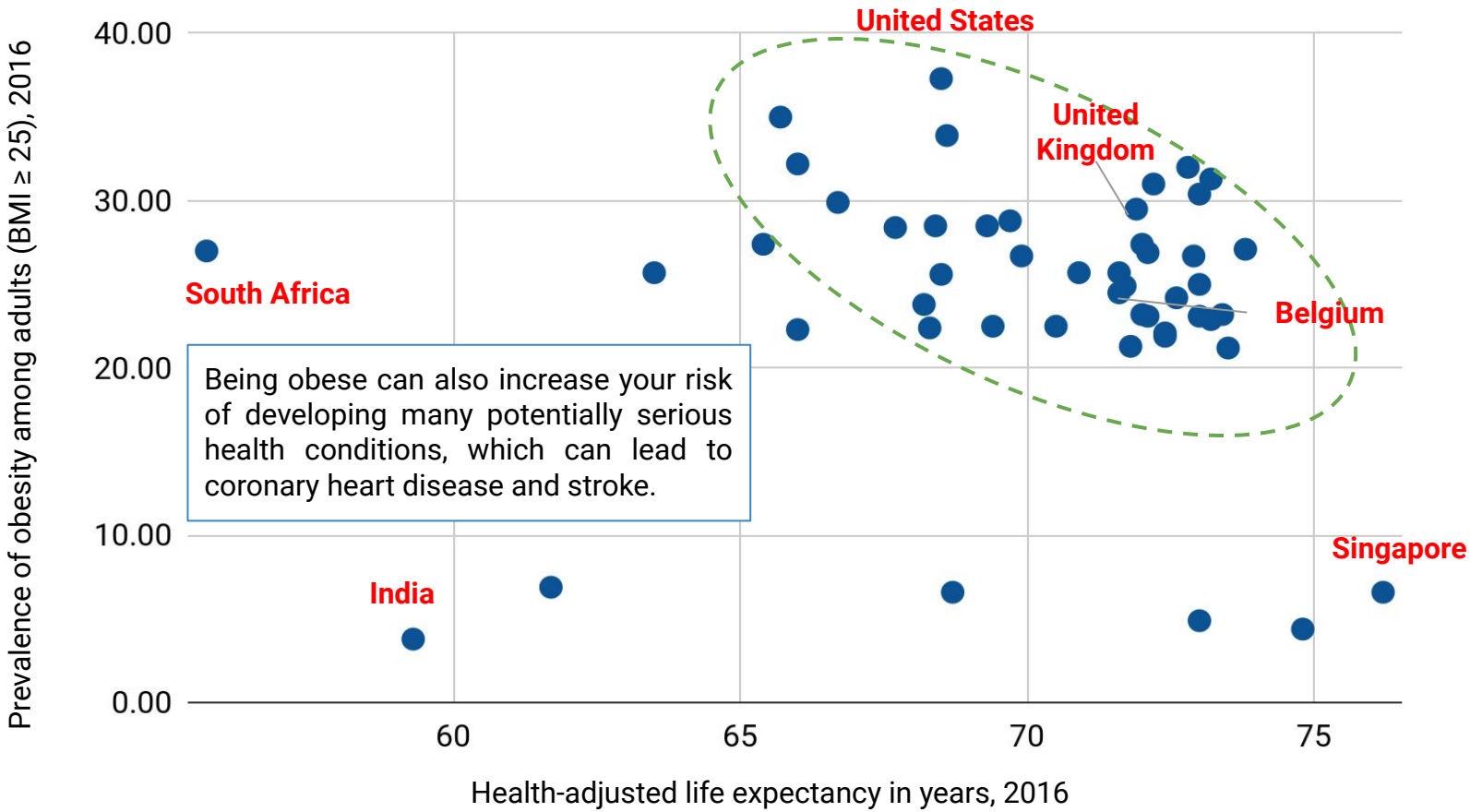
Fisher Exact Test:
3.250

Probability Value of the Model:
<0.050

Standard Error of Estimate:
0.757

The p-value associated with the F is smaller than 0.05, then there is significant impact of independent variables on gap between life expectancy at birth and health-adjusted life expectancy.

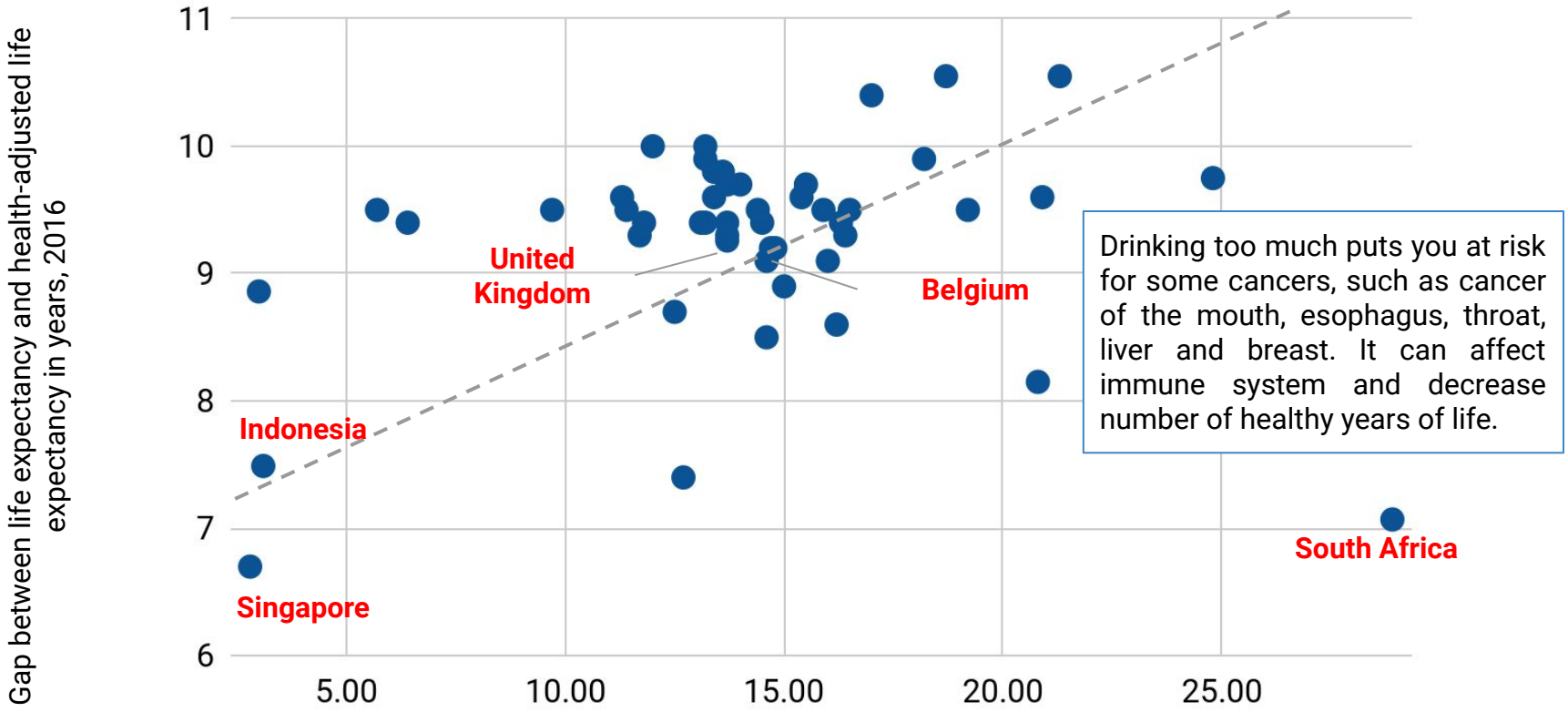
Obesity and Health-adjusted Life Expectancy



There is negative correlation between both HALE and life expectancy and prevalence of obesity. Singapore have the highest level of HALE and one of the lowest obesity rate, which is a result of compound impact of high quality of life, healthier behaviour and effective healthcare policies that tackle the rising burden of non-communicable diseases. The most recently available data from both the OECD and the WHO indicate that the U.S. has the greatest prevalence of obesity among high-income countries. Over a third of the U.S. is obese, compared to just over a fifth on average in comparable countries. The higher-than average rates of obesity across observed countries may contribute in some ways to the higher disease burden from cardiovascular conditions. Though rates of disease burden caused by these conditions have improved across countries, they still cause fairly large negative impact on HALE.

Source: WHO | World Bank

Alcohol Consumption and Gap between Life Expectancy and HALE

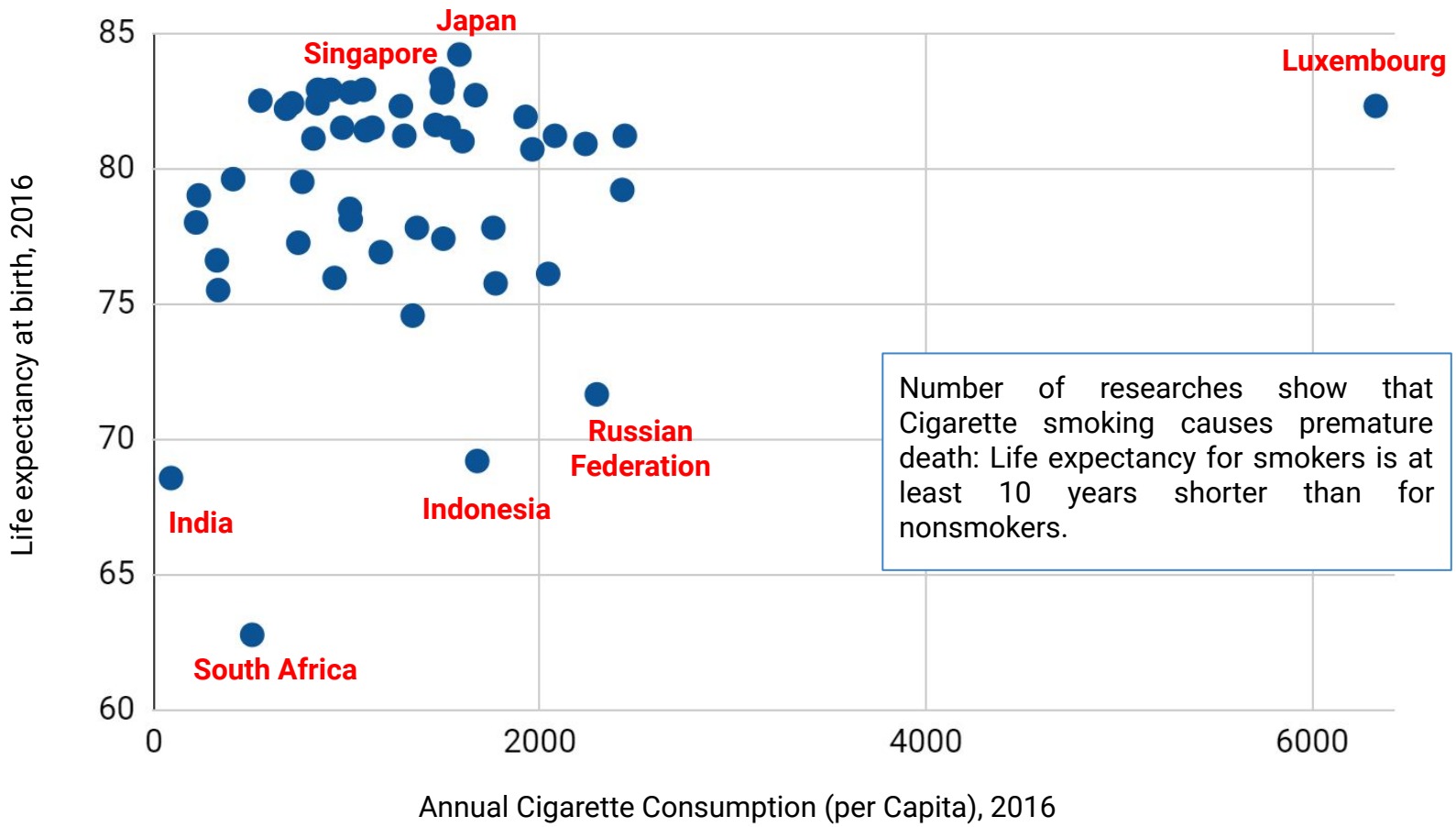


The graph shows that higher alcohol consumption leads to increase in gap between life expectancy at birth and health-adjusted life expectancy. Alcohol abuse cause increase in risk of premature deaths and it prevails among younger population (South Africa is an evidence). Higher alcohol consumption is associated with a greater risk of stroke, heart failure, and fatalities due to high blood pressure or a bulging or ruptured aorta.

Countries that consume less alcohol or more than global average are exposed to disaster of non-communicable diseases. So, any amount of drinking appeared to increase these risks.

Source: WHO

Smoking and Life Expectancy



Smoking is one of the biggest causes of preventable deaths. The poisons from the tar in cigarettes enter your blood. These poisons then make blood thicker, and increase chances of clot formation. Smoking damages heart and blood circulation, increasing the risk of conditions such as coronary heart disease, heart attack, stroke, peripheral vascular disease (damaged blood vessels) and cerebrovascular disease (damaged arteries that supply blood to your brain).

The level of smoking varies significantly across countries. Cigarettes cause harmful impact on health even at very low consumption.

Source: WHO

Gap between HALE and Life Expectancy and Causes of Deaths

Significant factors in decreasing order of their power (standardised b-coefficient) with the respective magnitude of prediction

- Cause of death by communicable diseases and maternal, prenatal and nutrition conditions as a % of total (**-0.855**) - -0.104206
- Cause of death, by non-communicable diseases as a % of total (**-0.523**) - -0,051370
- Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70, % (**-0.253**) - -0,046281
- Suicide mortality rate per 100,000 population (**0.134**) - 0,018968

As a result of our research, the mentioned above reasons of death have a significant impact on the gap and its change. The highest prediction power belongs to communicable diseases and maternal, prenatal and nutrition conditions. The sign of its coefficient emphasizes that increase in a number of deaths caused by illnesses that result from the infection (HIV, hepatitis A, B and C, measles, salmonella) leads to 0.104 year decline in the gap - the fact that life expectancy at birth will decrease at a faster pace than HALE (health-adjusted life expectancy). The same conclusion we can make regarding non-communicable diseases.

In general, the variance in causes of death determines 32.3 % variance in the gap between life expectancy and HALE. The overall F-test defines that an assumed linear relationship is statistically significant whereas p-value for the model is less than the accepted significance level.

Model Summary Statistics

Adjusted Coefficient of Determination:
32.3 %

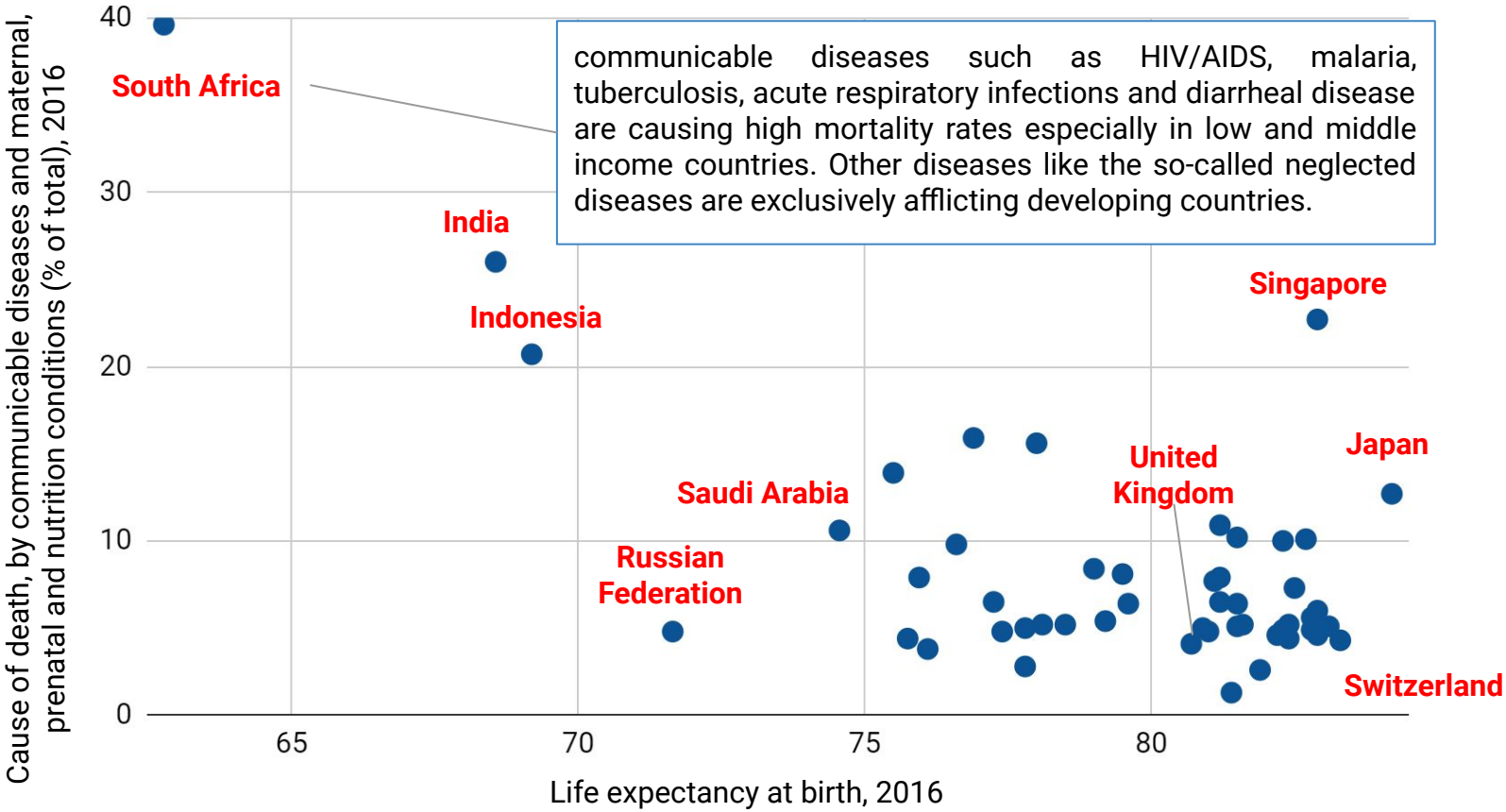
Fisher Exact Test:
6.842

Probability Value of the Model:
<0.005

Standard Error of Estimate:
0.677

The p-value associated with the F is smaller than 0.05, then there is significant impact of independent variables on gap between life expectancy at birth and health-adjusted life expectancy.

Communicable diseases and Life Expectancy

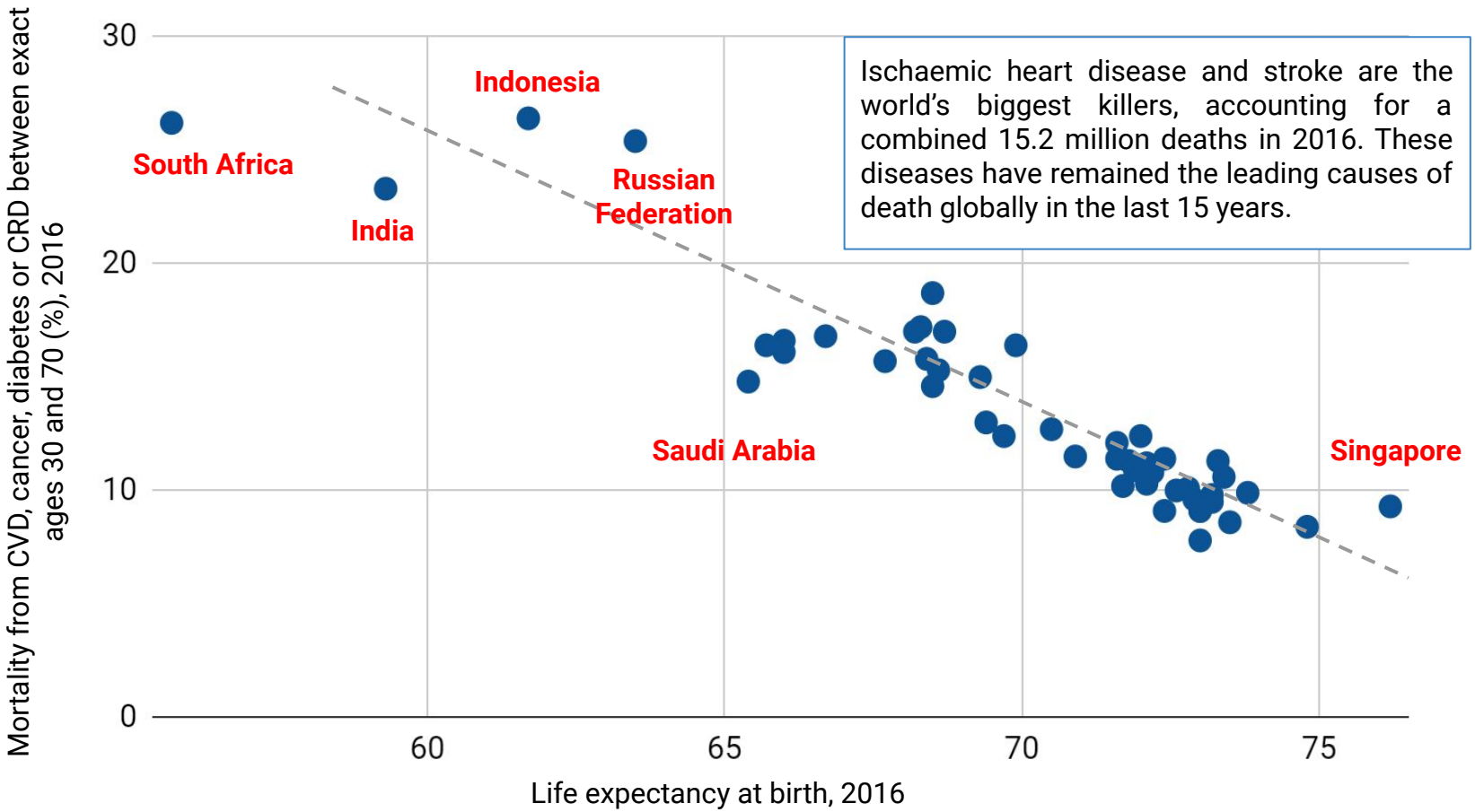


Worldwide, developed and developing countries are facing the double burden of communicable and noncommunicable diseases. However, developing countries are more exposed and more vulnerable due to a multitude of factors, including geographic, demographic and socio-economic factors.

Burden of communicable diseases prevails in developing and low-income countries. South Africa, India and Indonesia face the challenge to reduce deaths from communicable diseases and maternal, prenatal and nutrition conditions in younger age group (15-34 years).

Source: WHO

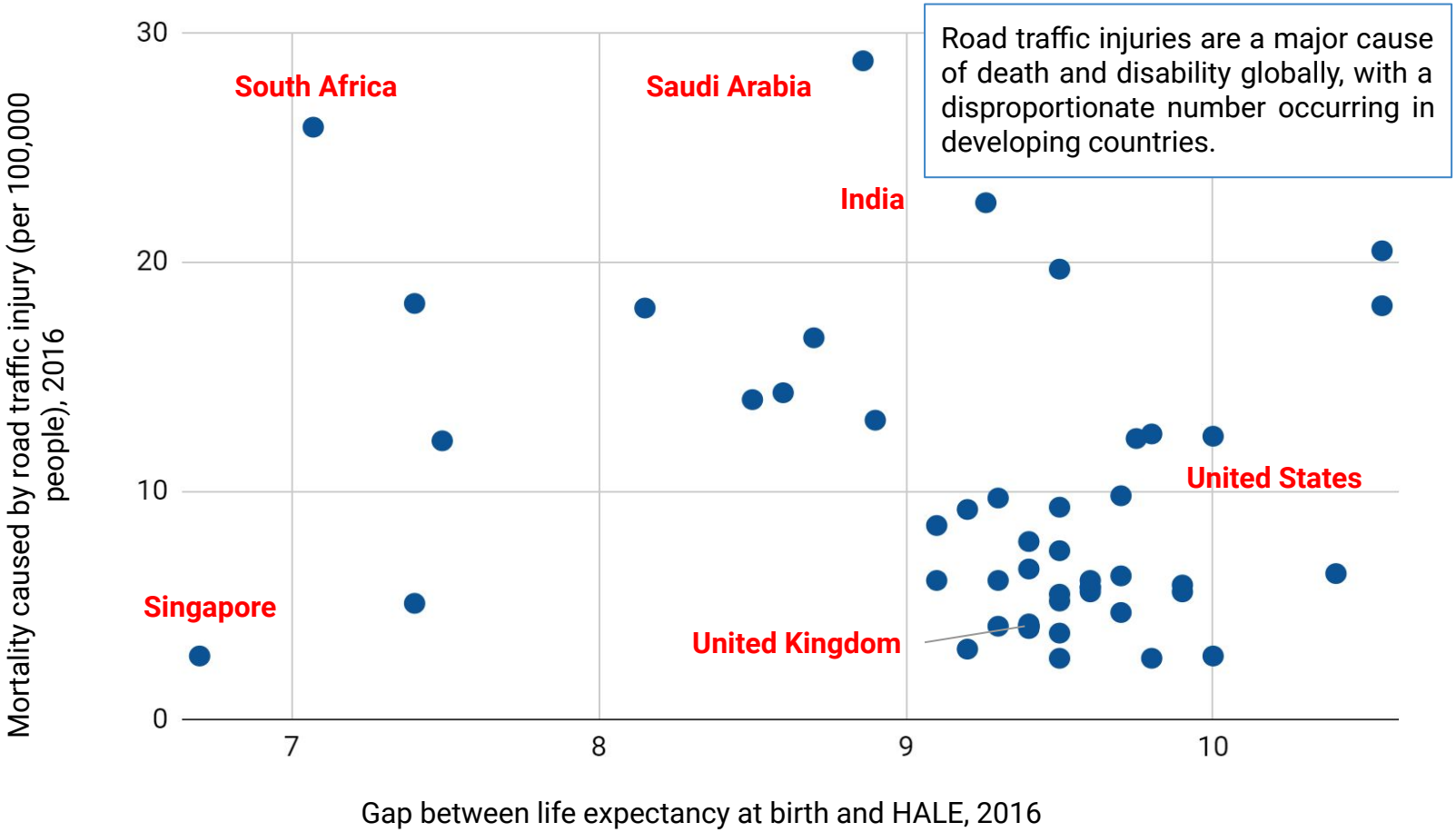
Cardiovascular Diseases, Cancer and Diabetes



Reduction of death ratio attributed to cardiovascular diseases, cancer and diabetes inevitably leads to improvements in life expectancy at birth. Singapore and Japan have the highest level of life expectancy across chosen countries. High burden of diabetes, cancer and CDV is a risen problem in the world. The healthcare policies should focus on the constellation of diseases and not to address them exclusively as separate issues. Over time, high blood glucose from diabetes can damage your blood vessels and the nerves that control your heart and blood vessels. The longer you have diabetes, the higher the chances that you will develop heart disease. People with diabetes tend to develop heart disease at a younger age than people without diabetes.

Source: WHO

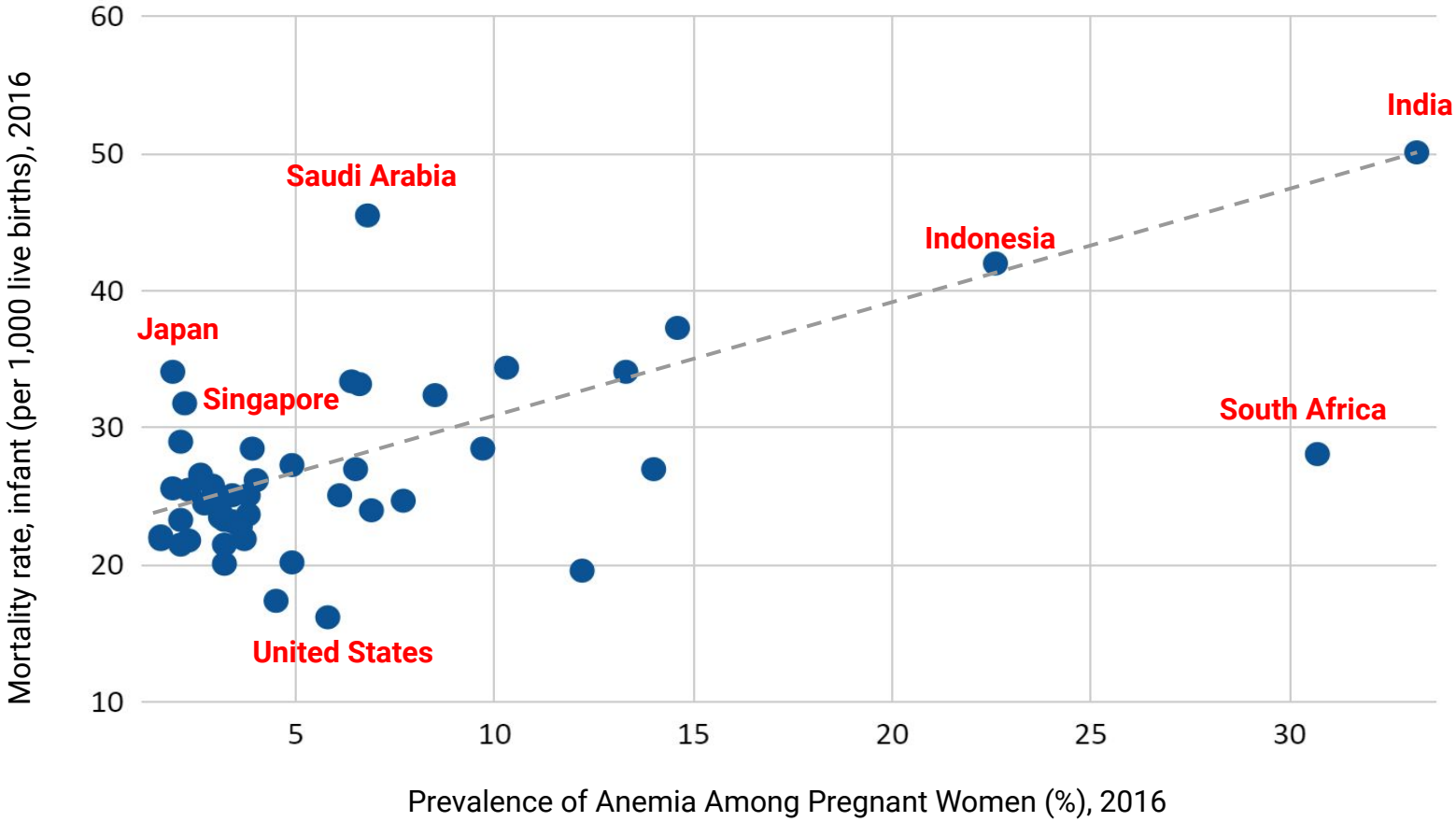
Road Traffic Injuries



Road traffic injuries (RTI) cause a significant number of injuries and deaths in the world every year. The graph shows a great disparity in the rate of deaths attributable to road traffic injuries and related gap between life expectancy and health-adjusted life expectancy across countries. Road traffic injuries are currently ranked ninth globally among the leading causes of disability adjusted life years lost. Several researches showed that reduction in RTI causes the significant gain in life expectancy signals the urgency for public actions to improve road safety; the disparity in the burden across countries indicate a great opportunity for targeted interventions to protect health and save lives.

Source: WHO

Mortality Infant Rate and Prevalence of Anemia Among Pregnant Women



Prevalence of anemia among pregnant women leads to increase in mortality infant rate. Maternal anaemia is an important global health problem that affects about 500 million women of reproductive age. Much is known about the consequences of anaemia during pregnancy, including the increased risks of low birthweight, preterm birth, perinatal mortality, and neonatal mortality.

The infant mortality rate is an important marker of the overall health of a society.The highest rates of infant mortality among chosen countries are in India, Indonesia, South Africa, the lowest was in the United States in 2016.

Source: WHO

Methodology of Analysis of Variance (ANOVA)

Analysis of variance (ANOVA) is a quantitative method used in statistics that splits an observed aggregate variability found inside a data set into two parts: systematic factors and random factors. The systematic factors have a statistical influence on the given data set. while the random factors do not. The ANOVA test used to determine the influence that independent variables have on the dependent variable in a regression study.

Dependent and Independent Variables

The dependent variable must be a continuous (interval or ratio) level of measurement. The independent variables must be categorical (nominal or ordinal) variables. A one-way ANOVA has just one independent and one dependent variable. MANOVA is used when there are two or more dependent variables.

Statistical Significance

The purpose of analysis of variance is to test for significant differences between means in different groups or variables, usually arranged by an experimenter in order to evaluate the effects of different treatments or experimental conditions on one or more outcome measures. The **null hypothesis** for an ANOVA is that there is no significant difference among the groups (the mean is the same). The **alternative hypothesis** assumes that there is at least one significant difference among the groups. To determine whether a set of means are all equal **F-test** is calculated. The test statistic is a measure that allows us to assess whether the differences among the sample means (numerator) are more than would be expected by chance if the null hypothesis is true. In general, if the **p-value** associated with the F is smaller than accepted level of significance (the most common is 0.05), then the null hypothesis is rejected and the alternative hypothesis is supported.

Basic Modeling Assumptions

- The population from which samples are drawn should be **normally distributed**.
- **Independence** of cases: the sample cases should be independent of each other.
- **Homogeneity** of variance: the variance among the groups should be approximately equal.

Research Question the MANOVA Examines

Are there any significant differences in economic, healthcare system, demographic and environmental indicators across the countries by HALE level: low, medium and high.

Variance of Economic Factors across Groups of Countries

Variable	Means according to HALE level			F-test	p-value
	Low	Medium	High		
Gross Domestic Product (per capita), US $	15250.487	30463.167	48354.265	13.367	0.000
Urban population, % of total	71.584	78.556	82.294	3.155	0.041
Income Gini coefficient, %	41.927	35.617	32.471	6.891	0.002

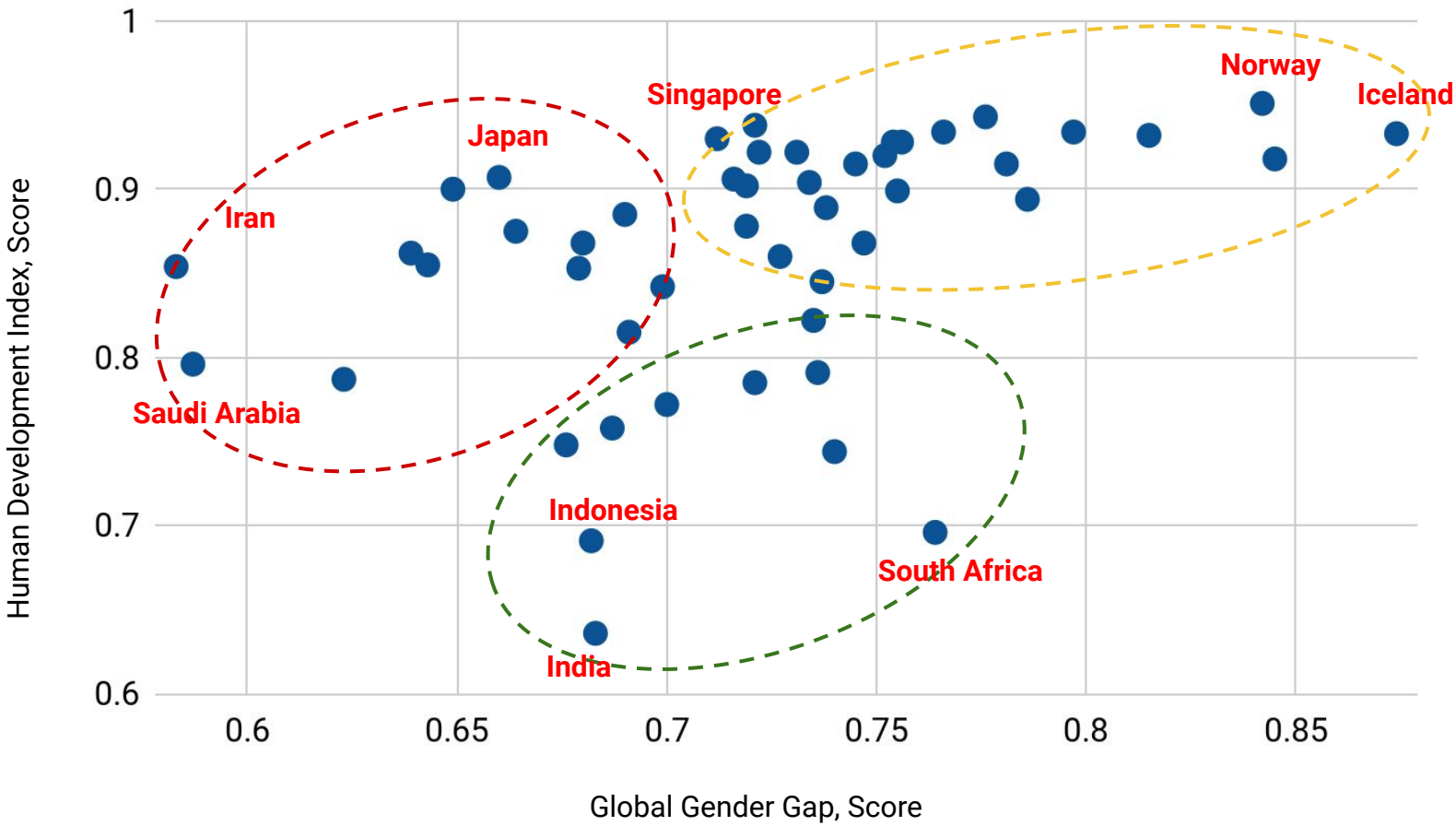
F-test statistic is a measure that allows us to assess whether the differences among the sample means of listed variables (column "Variables") are more than would be expected by chance
The p-value associated with the F is smaller than 0.05, then there is significant difference among the groups divided by the level of health-adjusted life expectancy (HALE).

Multivariate ANOVA (MANOVA) extends the capabilities of analysis of variance by assessing multiple dependent variables simultaneously. This provides studying any interaction between the factors and increases the model's efficiency.

To verify the assumption about the differences in the level of economic development across countries we have included characteristics of general economic conditions into the MANOVA model. The main results are presented in the table. According to our research and computed F-ratios for each indicator statistically significant differences across groups of countries by HALE level can be observed for GDP per capita, urbanisation rate and degree of income inequality (Gini coefficient).

In general, we can determine that high HALE is of developed countries (Austria, France, Norway, Spain, Singapore, Switzerland). The longer health adjusted life expectancy the higher the standard of living and its quality. And this is not a reason but a consequence of developing infrastructure, advanced education system, wider range of services and their availability.

Human Development Index vs Global Gender Gap



The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The Global Gender Gap Report benchmarks countries on their progress towards gender parity across four thematic dimensions: Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment.

All specified dimensions are important to compare countries with the same level of GNI per capita and find out how they can end up with different human development outcomes.

Source: UNDP | World Economic Forum

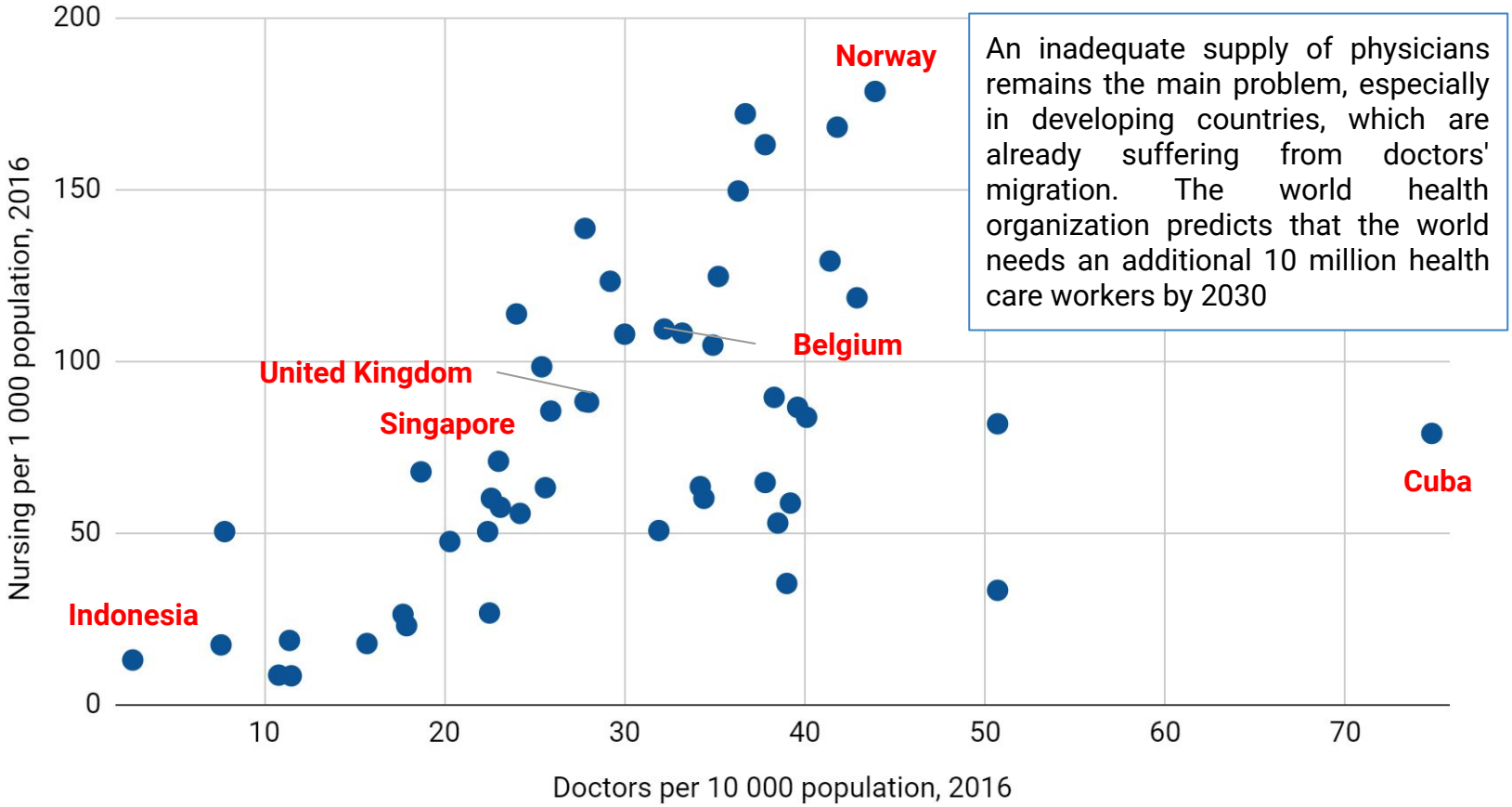
Variance of Health Financing and Service Delivery across Groups of Countries

Variable	Means according to HALE level			F-test	p-value
	Low	Medium	High		
Current health expenditure (per capita), US$	1326.787	2617.574	4403.316	8.981	0.000
Domestic private health expenditure per capita, PPP int $	623.841	776.688	1190.132	7.413	0.002
Domestic general government health expenditure (per capita), PPP int $	1215.053	2522.761	3219.429	9.957	0.000
Medical doctors (per 10 000 population)	22.080	32.739	33.447	4.309	0.019
Nursing and midwifery personnel (per 10 000 population)	47.660	80.561	101.676	7.131	0.002

F-test statistic is a measure that allows us to assess whether the differences among the sample means of listed variables (column "Variables") are more than would be expected by chance
The p-value associated with the F is smaller than 0.05, then there is significant difference among the groups divided by the level of health-adjusted life expectancy (HALE).

Base on the analysis of variance we have proved that healthcare funding and resourcing significantly differ across groups of countries by HALE level. According to our results in the table above, there are wide disparities in both health expenditures per capita between the groups (to a greater extent they are serviced by general government health expenditures) and the number of medical staff.

Density of Doctors and Nurses



An inadequate supply of physicians remains the main problem, especially in developing countries, which are already suffering from doctors' migration. The world health organization predicts that the world needs an additional 10 million health care workers by 2030

The time has come to critically analyze the whole premise of doctor–population ratio and its value. Public health experts and policy makers now need to move forward from the fixation and excuse of scarcity of doctors. There is an urgent need to focus on augmenting the fiscal capacity as well as development of infrastructure both in public and private health sectors toward addressing pressing healthcare needs of the growing population.

It is also an opportunity to call for change in the public health discourse in India, Indonesia, Cuba, Chile, South Africa in the background of aspirations of attaining sustainable development goals by 2030.

Source: WHO

Variance of Demographic Indicators Across Groups of Countries

Variable	Means according to HALE level			F-test	p-value
	Low	Medium	High		
Crude birth rate (per 1000 people)	15.125	11.365	11.034	7.948	0.001
Total fertility rate (per woman)	1.959	1.696	1.641	3.433	0.041
Age dependency ratio, old (per 1000 working-age population)	136.667	237.000	254.882	9.384	0.000
Ageing coefficient (65+ of population), %	9.227	15.594	16.871	10.276	0.000

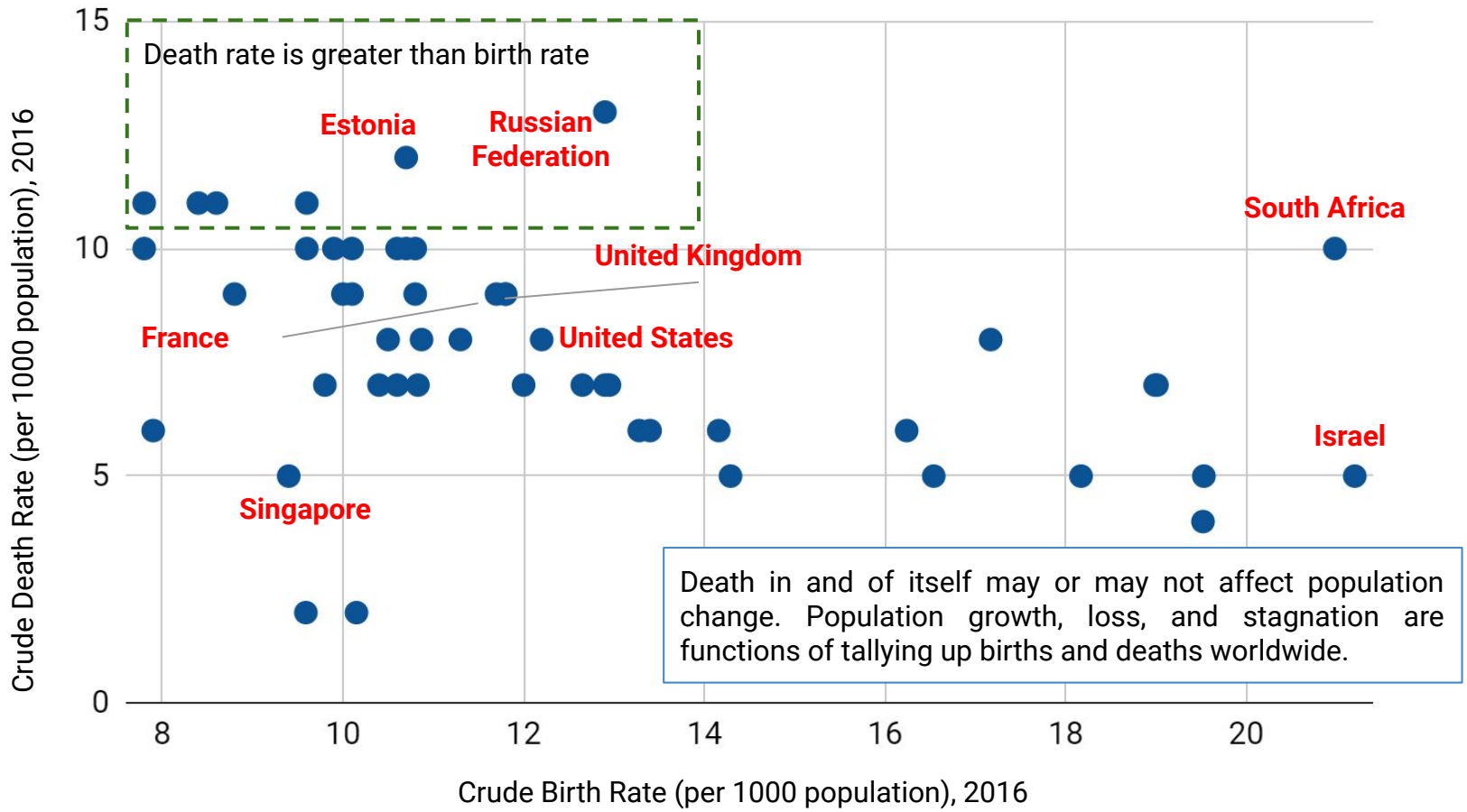
F-test statistic is a measure that allows us to assess whether the differences among the sample means of listed variables (column "Variables") are more than would be expected by chance
The p-value associated with the F is smaller than 0.05, then there is significant difference among the groups divided by the level of health-adjusted life expectancy (HALE).

It is of fundamental importance to examine demographics in the context of health adjusted life expectancy. The main outcome of demographic processes is the distribution of the total population by age and gender which in turn determines features of population survival and reproduction mode.

According to our research and computed F-ratios for each indicator statistically significant differences across groups of countries by HALE level can be observed for crude birth rate and total fertility as measures of reproductive health, old-age dependency ratio and ageing coefficient as indicators of population ageing.

In general, we can define that high HALE is of countries with low birth rate far below the limit of simple reproduction and the oldest population. Fertility rate in developing countries with lower HALE level is on average higher (1.96 child per woman in comparison with 1.64) that slow down ageing process and reduces demographic burden borne by the working-age population.

Crude Birth and Death Rates



Many African countries have a very high crude birth rate, and women in those countries have a high total fertility rate, meaning they give births to many children in their lifetime. Countries with a low fertility rate (and low crude birth rate of 10 to 12 in 2016) include European nations, the United States, and China. Crude death rate has been falling around the world due to longer life spans brought about by a better food supplies and distribution, better nutrition, better and more widely available medical care (and the development of technologies such as immunizations and antibiotics), improvements in sanitation and hygiene, and clean water supplies. Much of the increase in world population over the last century overall has been attributed more to longer life expectancies rather than an increase in births.

Source: World Bank

Variance of Ecological Conditions across Groups of Countries

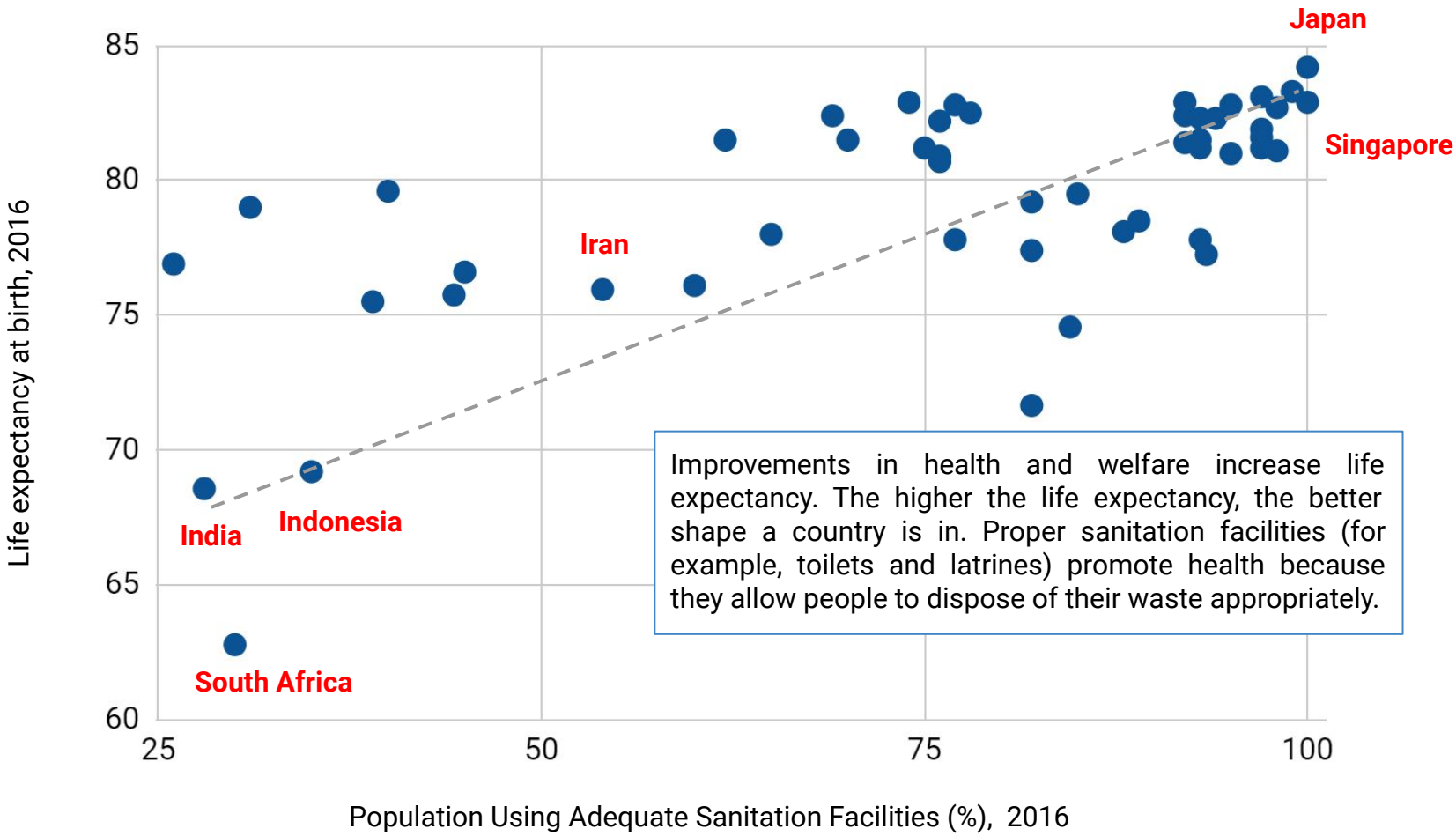
Variable	Means according to HALE level			F-test	p-value
	Low	Medium	High		
People using at least basic sanitation services, % of population	89.646	96.574	99.373	6.670	0.003
People using at least basic drinking water services, % of population	97.004	98.847	99.818	6.055	0.005
Ambient air pollution, concentration of fine particulate matter (PM2.5), %	27.233	19.222	11.647	3.338	0.044

F-test statistic is a measure that allows us to assess whether the differences among the sample means of listed variables (column "Variables") are more than would be expected by chance
The p-value associated with the F is smaller than 0.05, then there is significant difference among the groups divided by the level of health-adjusted life expectancy (HALE).

According to our study and computed p-values for each indicator statistically significant differences across groups of countries by HALE level can be observed for percentage of people using at least basic sanitation, drinking water services and ambient air quality, which estimates the occurrence of pollutants high enough concentrated to affect the environment and population health (it increases the risk of respiratory infections, heart disease, stroke, and lung cancer).

In general, we can determine that low HALE is caused by worse general living conditions in the group of low-income countries where populations are the most impacted. The prevalence of basic sanitation services and clean drinking water as well as anthropogenic climate and ecosystem changes contribute to the health of the population and specify its mortality mode.

Sanitation Facilities and Life Expectancy



Some 827 000 people in low- and middle-income countries die as a result of inadequate water, sanitation, and hygiene each year, representing 60% of total diarrhoeal deaths. Poor sanitation is believed to be the main cause in some 432 000 of these deaths. Diarrhoea remains a major killer but is largely preventable. Better water, sanitation, and hygiene could prevent the deaths of 297 000 children aged under 5 years each year. Open defecation perpetuates a vicious cycle of disease and poverty. The countries where open defection is most widespread have the highest number of deaths of children aged under 5 years as well as the highest levels of malnutrition and poverty, and big disparities of wealth.

Source: WHO

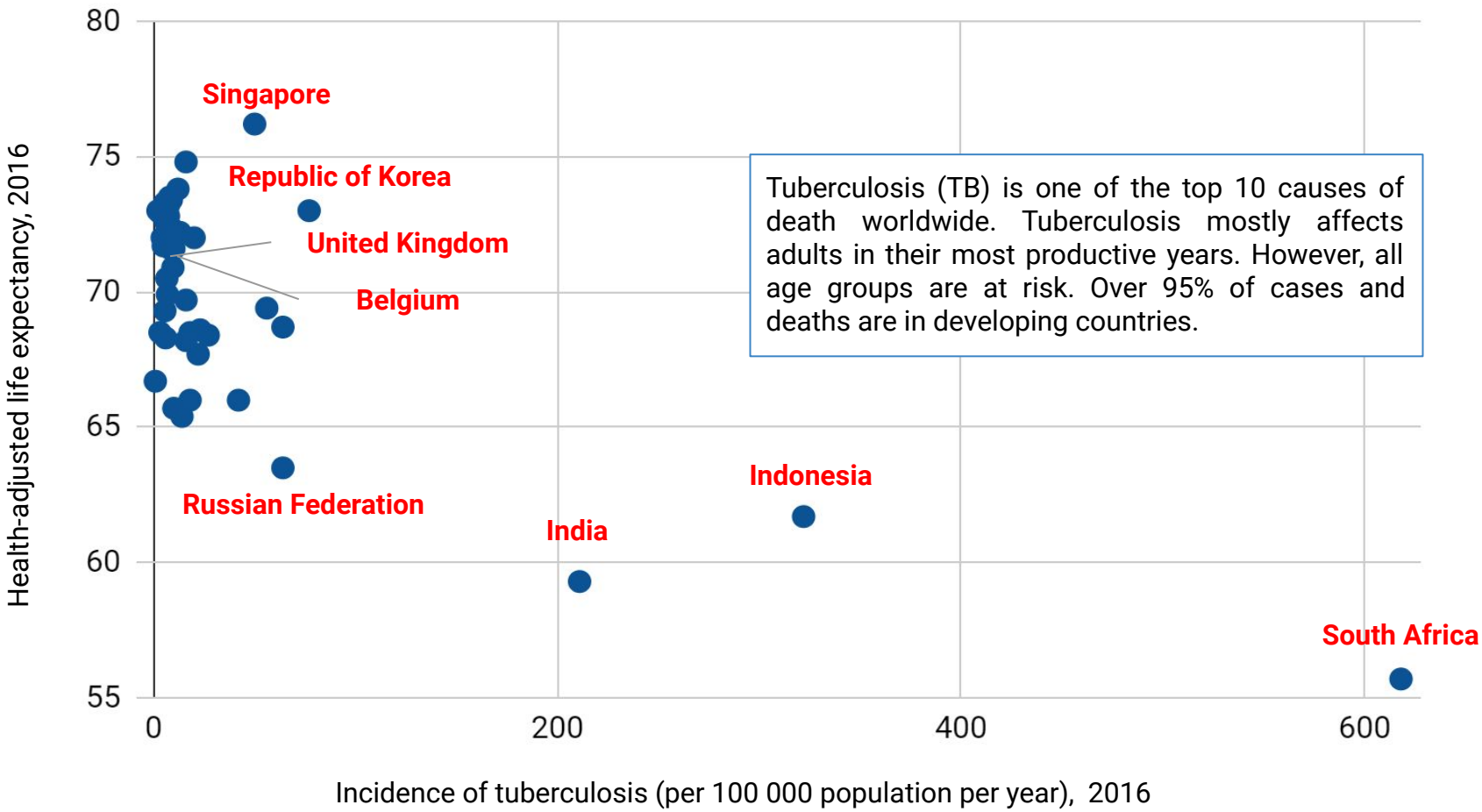
Variance of Mortality Rates by Causes across Groups of Countries

Variable	Means according to HALE level			F-test	p-value
	Low	Medium	High		
Mortality caused by road traffic injury (per 100 000 people)	15.967	8.006	5.100	22.213	0.000
Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70, %	18.733	12.500	9.576	47.193	0.000
Mortality rate attributed to household and ambient air pollution (per 100 000 population)	58.107	26.961	12.500	10.726	0.000
Mortality rate attributed to unsafe water and unsafe sanitation (per 100 000 population)	2.933	0.400	0.271	3.585	0.036

F-test statistic is a measure that allows us to assess whether the differences among the sample means of listed variables (column "Variables") are more than would be expected by chance
The p-value associated with the F is smaller than 0.05, then there is significant difference among the groups divided by the level of health-adjusted life expectancy (HALE).

Base on the analysis of variance we have proved that the number of deaths attributed to road traffic, non-communicable diseases (cancers, cardiovascular and chronic respiratory diseases), household and ambient air pollution, unsafe water and sanitation significantly differ across groups of countries by HALE level. According to our results in the table above, a low HALE level is related to the high mortality rate. That is supported by the previously analysed standard of living and its quality, health funding and resourcing, general ecological conditions.

Incidence of Tuberculosis



Despite a concerted global effort to reduce the burden of tuberculosis, it still causes a large disease burden globally. Strengthening of health systems for early detection of tuberculosis and improvement of the quality of tuberculosis care, including prompt and accurate diagnosis, early initiation of treatment, and regular follow-up, are priorities. Countries with higher than expected tuberculosis rates for their level of sociodemographic development should investigate the reasons for lagging behind and take remedial action. Efforts to prevent smoking, alcohol use, and diabetes could also substantially reduce the burden of tuberculosis.

Source: World Bank | The Lancet

Countries with High HALE and Life Expectancy:
General Summarised Description

Gap / HALE and LE	High Gap between HALE and Life Expectancy	Medium Gap between HALE and Life Expectancy	Low Gap between HALE and Life Expectancy
High HALE and Life Expectancy	Australia, Austria, Canada, France, Italy, Luxembourg, Norway, Republic of Korea, Sweden, Switzerland	Iceland, Israel, Japan, New Zealand, Spain	Hong Kong, SAR, Singapore

Among chosen countries Singapore is the second by life expectancy and has the longest span of living in a good health (HALE) in 2016. Singapore topped the world in life expectancy in 2017 with an expected lifespan at birth of 84.8 years, surging ahead Japan by more than half a year. The average Singaporean also enjoys the longest span of living in good health - 74.2 years - but there has also been a rise in the number of unhealthy years people here live. Among the most important reasons of high HALE in Singapore are relatively young population, effective healthcare system, developed infrastructure and stable economic conditions.

In 2016 Japan has the highest LE. The reason is that government is creating a health- and hygiene-conscious culture. This ranged from childhood vaccination programmes and the introduction of universal health insurance, to campaigns to reduce salt consumption, and the use of medication to reduce blood pressure. Another factor might be the lifestyle that Japan's older population enjoy. Retirees in Japan stay active, and many older people continue working by choice rather than economic necessity. One more factor is eating habits and well-being.

Luxembourg is also among leading countries by average life expectancy and HALE. These figures show high standard of living in Luxembourg based on Luxembourg's unspoilt environment, on its medical coverage and the quality of services provided.

Countries with High HALE and Life Expectancy:
Healthcare System Overview

Australia

Medicare has been Australia's universal health care scheme since 1984:

- medical services
- public hospitals
- medicines

Medicare covers all of the cost of public hospital services. It also covers some or all of the costs of other health services.

The other important part of Medicare is the Pharmaceutical Benefits Scheme (PBS). The PBS makes some prescription medicines cheaper. The PBS lists brand name, generic, biologic and biosimilar medicines. There are over 5,200 products on the PBS.

The Medicare Benefits Schedule (MBS) is a list of all health services that the Government subsidies.

Japan

Japan has universal **public healthcare:** it's a legal requirement for all Japanese citizens to have the health insurance provided by the state.

This coverage is quite thorough and entitles people to choose their own clinics and hospitals from any of the vast majority that are part of the system. International private healthcare is the only option for short-term visitors and other private options are available in Japan to supplement the public coverage. But the system is structured around public healthcare.

Here are the different types of Japanese health insurance that are available: Social Health Insurance (SHI), National Health Insurance (NHI), Nursing insurance, International health insurance.

Italy

Italy has a national health plan **(Servizio Sanitario Nazionale)**, which provides for hospital and medical benefits. In Italy, healthcare is considered a right and the national health plan is designed to provide for all Italian citizens and residents, including U.S. and Canadian citizens who are legal residents of Italy.

The system focuses on both preventative and prescriptive care.

With the Servizio Sanitario Nazionale most care is free or low-cost, including consults with a general physician, hospital visits, lab work, and medications.

The SSN covers the cost of hospitalization and treatment, visits to family doctors and specialists, laboratory services, and emergency ambulance services at 100%.

Source: Australian Government Department of Health | International Living | WHO

Countries with High HALE and Life Expectancy:
Healthcare System Overview

Sweden

Public healthcare in Sweden is known for its high standards and quality. But the following are not included in the basic healthcare that is offered:

- Dental care
- Cancer treatments
- Medical repatriation

Many expats choose to supplement their healthcare in Sweden with private insurance to include the above. They also offer much shorter waiting times for appointments, and surgery in Sweden, Between 2010 and 2015 the number of people with private health insurance in Sweden increased by 50%. Now, around half a million Swedes have private insurance.

Norway

Private health care is provided by two agencies, private not-for-profit and private profit making.

Not-for-profit agencies are usually set up as a trust; for example, some trusts are set up as a diaconal trust owned by the Norwegian church.

Private profit-making agencies were established to complement existing public services. Private health care providers are mainly in urban areas of the country, with the majority offering substance abuse treatment, rehabilitation, dental care, and support services; such, as radiology and laboratory services. Health care in Norway is very expensive, and comprehensive private medical insurance is necessary for all non residents.

Australia

Many Australians have private health insurance cover. There are 2 kinds of cover:

- hospital cover for some (or all) of the costs of hospital treatment as a private patient
- general treatment ('ancillary' or 'extras') cover for some non-medical health services not covered by Medicare — such as dental, physiotherapy and optical services.

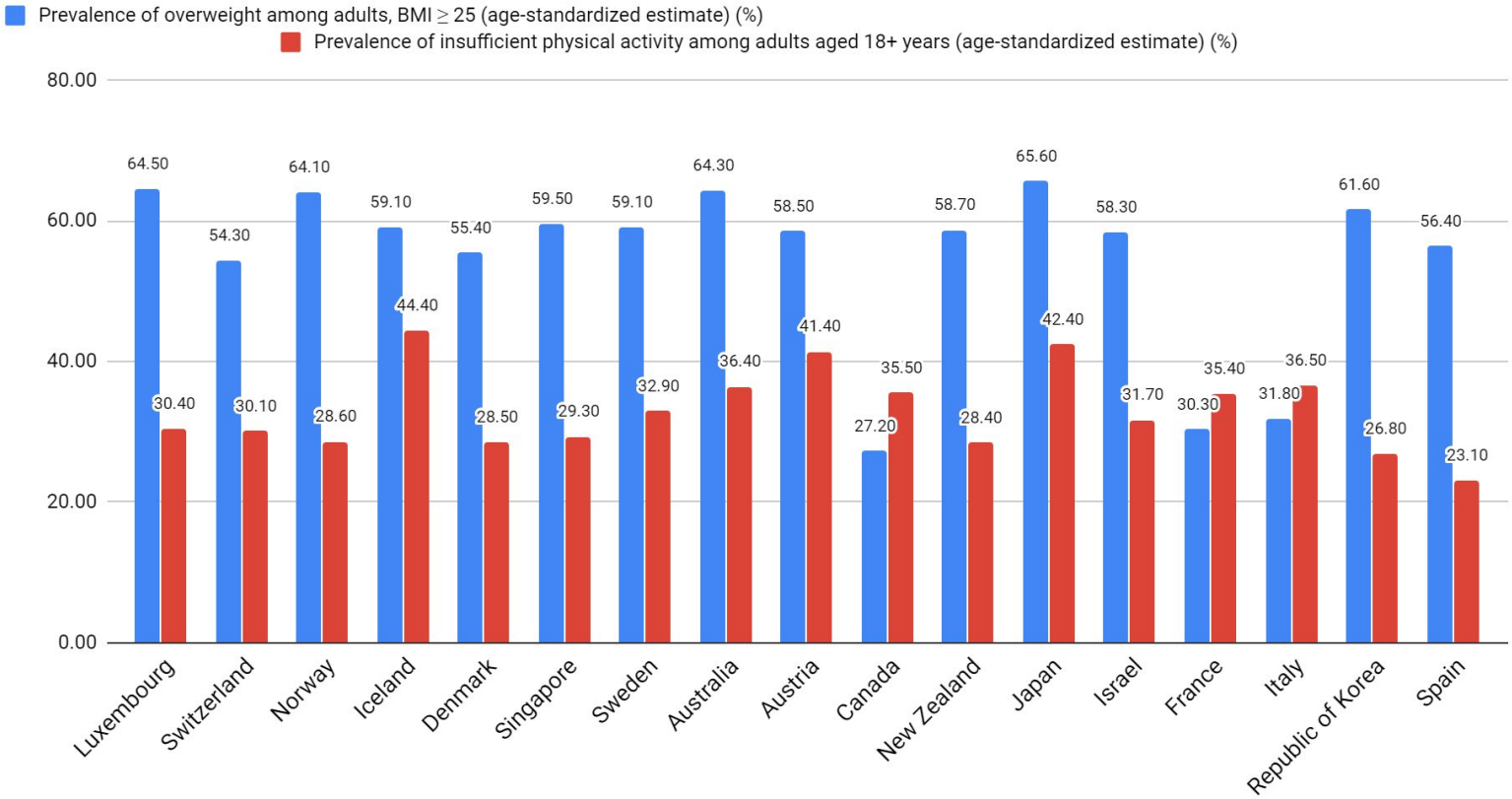
Some people with private health insurance have either hospital cover or extras cover, and some people have both.

The Government provides a means-tested rebate to help you with the cost of your private health insurance.

Source: Australian Government Department of Health | Pacific Prime

Countries with High HALE and Life Expectancy:
Body Weight and Physical Estimates

Overall burden of disease could be attributed to behavioural risk factors including smoking and alcohol use, as well as diet and low physical activity



Data from the World Health Organisation (WHO) estimates that the overall burden of disease in developed countries, such as Luxemburg, Austria, Norway, Sweden, Canada, Switzerland, Japan (measured in terms of DALYs) could be attributed to behavioural risk factors – including smoking, alcohol use, diet, and physical inactivity, with smoking and dietary risks contributing the most.

Source: WHO

Countries with High HALE and Life Expectancy:
eHealth Efficiency

The further development and implementation of information technologies and e-health to improve healthcare delivery and patients' satisfaction

Estonia

The **Electronic Health Record (e-Health Record)** is a nationwide system integrating data from Estonia's different healthcare providers to create a common record every patient can access online.

Functioning very much like a centralized, national database, the e-Health Record actually retrieves data as necessary from various providers, who may be using different systems, and presents it in a standard format via the e-Patient portal. A powerful tool for doctors that allows them to access a patient's records easily from a single electronic file, doctors can read test results as they are entered, including image files such as X-rays even from remote hospitals.

Patients have access to their own records, as well as those of their underaged children and people who have given them authorization for access. By logging into the e-Patient portal with an electronic ID-card, the patient can review doctor visits and current prescriptions, and check which doctors have had access to their files.

Canada

Health Canada's priorities and efforts have focused on addressing policy issues and challenges in mainstreaming eHealth services within Canada's health care system and in measuring progress in the deployment and investment of these services.

A fundamental building block of all these applications is the Electronic Health Record, which allows the sharing of necessary information between care providers across medical disciplines and institutions. Other important uses of eHealth are found in the areas of continuous medical education and public health awareness.

eHealth is an essential element of health care renewal: its application to Canada's health care system will result in benefits to Canadians through improvements in system accessibility, quality and efficiency. The Government of Canada has been making investments in this area since the 1997 Federal Budget, including federal commitments towards First Ministers Agreements (September 2000 and 2003). A key factor in the success of the Government's work is its strong commitment to collaboration.

Source: e-estonia | Government of Canada

Countries with Medium HALE and Life Expectancy:
General Summarised Description

Gap / HALE and LE	High Gap between HALE and Life Expectancy	Medium Gap between HALE and Life Expectancy	Low Gap between HALE and Life Expectancy
Medium HALE and Life Expectancy	Belgium, Chile, Czech Republic, Denmark, Finland, Germany, Ireland, Slovenia	Cuba, Greece, Netherlands, Malta, Portugal, Qatar, United Kingdom of Great Britain and Northern Ireland	China, Costa Rica, Panama

In the above groups Malta is a leading country by average HALE; Netherlands has the highest average life expectancy among chosen countries - 81,6 years. This is 1.3 years less than the previous group leading country. China has the lowest difference between HALE and life expectancy, it overtakes the USA for healthy lifespan by 2,6 years average.

Maltese people spend on average 90% of their lifespan in good health, longer than in any other EU member state. The increase in healthy lifespan was mainly driven by a reduction in premature deaths from cardiovascular diseases, though these remained the leading cause of death for both Maltese men and women. Cancer is the second highest cause of death followed by respiratory diseases and diseases of the nervous system. However, according to numerous studies, prevalence obesity remains the highest in the EU, representing a significant public health challenge.

China is still developing: recently improvements in the provision of public health services, particularly in infant and maternal health, have been the biggest factors in raising life expectancy.

In Netherlands people are living longer than ever before, but according to the World Health Organisation (WHO) they are not living healthier lives - the difference between HALE and life expectancy is comparatively high.

Countries with Medium HALE and Life Expectancy:
Healthcare System Overview

Universal health care schemes

Germany	Netherlands	Costa Rica
Germany has a universal multi-payer health care system scheme for by a combination of: • statutory health insurance (**Gesetzliche Krankenversicherung**); • private health insurance (**Private Krankenversicherung**). Social health insurance system is decentralized with private practice physicians providing ambulatory care, and independent, mostly non-profit hospitals providing the majority of inpatient care. Employers pay for half of their employees' health insurance contributions, while self-employed workers pay the entire contribution themselves. Approximately 90% of the population is covered by a statutory health insurance plan.The rest are covered by private health insurance.	The Netherlands has a dual-level system. All **primary and curative care** is financed from private compulsory insurance. **Long term care** is covered by social insurance funded from taxation. According to the WHO, the health care system in the Netherlands was 62% government funded and 38% privately funded. Hospitals in the Netherlands are also regulated and inspected but are mostly privately run and not for profit, as are many of the insurance companies. Patients can choose where they want to be treated. Insurance companies can offer additional services at extra cost over and above the universal system laid down by the regulator, e.g., for dental care. Persons with low incomes can get assistance from the government if they cannot afford these payments.	Universal healthcare and pensions are run by the **Caja Costarricense de Seguro Social (CCSS)**. By covering all population groups through the same system, Costa Rica has avoided social insurance stratification. CCSS is funded by a 15 percent payroll tax, as well as payments from retiree pensions. Taxes on luxury goods, alcohol, soda, and imported products also help to cover poor households who do otherwise pay into the system. All CCSS funds are merged into a single pool, which is managed by the central financial administration of CCSS. Through the CCSS, health care is essentially free to nearly all Costa Ricans. Private health care is also widely available and INS offers private health insurance plans to supplement CCSS insurance.

Source: WHO: Health system review (Germany) | WHO: Health system review (Netherlands) | Universal Health Coverage Assessment

Countries with Medium HALE and Life Expectancy:
Healthcare System Overview

Private health insurance

Czech Republic	Portugal	China
Private health insurance is available in the Czech Republic. However, it may entail more paperwork on application compared to public health insurance. There is always a possibility that some public hospitals and doctors might not recognise the insurance provider and may require the patient to make payment for any treatment up front. This may create a financial burden for the patient, especially when involving major surgeries. Some private health insurance companies may require medical checks for their insurance. These checks may include blood tests as well as just simple questions about smoking and allergies.	Private healthcare is available in Portugal but it tends to be costly. Private clinics are available especially in the more densely populated tourist areas. Many foreigners or expats choose to opt for private healthcare insurance to cover private medical treatment, as they feel that the Portuguese State healthcare is inadequate to fulfill their needs. The state healthcare service provides free or subsidised medical and dental treatment, including care and treatment by GPs and consultants, hospital care, laboratory services, subsidised prescription medicine, maternity care, surgical appliances and emergency ambulance transportation.	Due to a variety of factors, the quality of medical care is continuously improving in China, especially after the Chinese government started allowing foreign entities to invest in private hospitals in 2012. Expats seeking treatment in China will likely find that the quality of healthcare varies significantly between institutions. This, combined with an imposing language barrier, may make it hard to navigate around the country's public healthcare system. However, fees charged in private and international facilities are often very expensive, and sometimes even more expensive than the fees charged in the US. Expats are advised to secure private medical insurance in China to offset these potentially high costs.

Source: Pacific Prime

Countries with Low HALE and Life Expectancy:
General Summarised Description

Gap / HALE and LE	High Gap between HALE and Life Expectancy	Medium Gap between HALE and Life Expectancy	Low Gap between HALE and Life Expectancy
Low HALE and Life Expectancy	Estonia, Iran, Turkey, United Arab Emirates, United States of America	Brazil, India, Mexico, Poland, Saudi Arabia, Slovakia	Argentina, Indonesia, Russia, South Africa

All countries in these groups are united by a sign of unhealthy behavior of population. Analysis shows that Americans have much higher rates of smoking and obesity than their counterparts in high-income countries, therefore USA belongs to the group of Low HALE and Life Expectancy with a high gap between these indicators.

There are few factors which mostly affect HALE and life expectancy levels in the aforementioned countries:

1) *the opioid epidemic and suicides;*
2) *prevalence for obesity;*
3) *level of healthcare expenditures;*
4) *income disparity across the country;*
5) *living standards.*

World life expectancy continues to increase on the whole, but these countries (except the USA) are still lagging behind. In order to increase the longevity and potential of their citizens' lives, they will require targeted aid and a focus on infrastructure and healthcare.

Countries with Low HALE and Life Expectancy:
Healthcare System Overview

Universal health care schemes

USA	Mexico	Argentina
The United States as a whole does not have a fully implemented universal health care system, but about 92% of its citizens have health insurance coverage as of 2017. **The Patient Protection and Affordable Care Act (PPACA)** as amended by the Health Care and Education Reconciliation Act of 2010, sought to have expanded insurance coverage to legal residents by 2014. Full implementation of the ACA was blocked when some states refused to implement Medicaid expansion that would have increased subsidies of moderately low-income households. From the enactment of the ACA in 2010 until at least 2017, the portion of U.S. residents without health insurance has been decreasing.	Public health care delivery is accomplished via an elaborate provisioning and delivery system instituted by the Mexican Federal Government. Public care is either fully or partially subsidized by the federal government, depending on the person's (Spanish: derechohabiente's) employment status. Employed citizens and their dependents, however, are further eligible to use the health care program administered and operated by the **Mexican Social Security Institute.** The IMSS health care program is a tripartite system funded equally by the employee, its private employer, and the federal government. In August 2012 Mexico achieved universal health care system.	Health care is provided through a combination of employer and labor union-sponsored plans (**Obras Sociales**), government insurance plans, public hospitals and clinics and through private health insurance plans. It costs almost 10% of GDP and is available to anyone regardless of ideology, beliefs, race or nationality. A system of public medical facilities is maintained by the government. The public system is highly decentralized, as it is administered at the provincial level; often primary care will be regulated autonomously by each city. Since 2001, the number of Argentines relying on public services has seen an increase.Currently, about half of the population uses the public system.

Source: Affordable Care Act | Mexican Healthcare System | Making Universal Health Care Effective in Argentina

Countries with Low HALE and Life Expectancy:
Healthcare System Overview

Private health insurance

Estonia	Brazil	Russia
The Estonian health care system incorporates a compulsory insurance system and universal access to medical services that are made available through private health providers. The Ministry of Social Affairs oversees the administration of the system with numerous agencies, public independent bodies, private health care units, hospitals, NGOs and professional associations all coordinating beneath them. Local governments have a minor, voluntary role in organizing and financing medical services. Estonia's integrated system has received international commendation for its ability to act efficiently on health care reform, but considerable challenges still persist regarding accessibility and quality of health care.	One of the biggest social problems in Brazil comes with the nation's healthcare service, or lack thereof. The public Brazil healthcare system is a bureaucratic nightmare and is regulated by Federal, State, and Municipal governments working together. As would be expected of such a system this leads to slow treatment times, overworked medical staff, limited healthcare coverage, and lower quality treatment. Outside of the Brazilian Public healthcare system there are a number of private treatment facilities, however these tend to be much more expensive than any of the country's other medical centers but are able to provide treatment that is of a much higher quality.	The private healthcare system in Russia is able to provide extremely high quality service and treatment options, however these services are much more expensive than others. Due to this high cost for treatments the Russian health insurance industry is starting to become a major force as many people want access to these higher quality services are unable to pay for treatment out of pocket health insurance is being seen as a vital necessity in Russia. This is also true for many expatriates in the country who are not willing to receive treatment at one of the nations many public hospitals, and almost all foreign nationals in Russia are discovering that the only way to truly protect themselves.

Source: Pacific Prime

Longevity Ranking of 50 Countries

Longevity Ranking Methodology

Health-adjusted life expectancy is affected by various factors and their impact varies across countries. For this reason, the Ranking is based on five domains: economy, health and healthcare, environment and infrastructure, society and demography.

These domains consist of 50 indicators derived from international data sources, including the World Bank, the World Health Organization (WHO), the International Labour Organization (ILO), Organization of Economic Cooperation and Development (OECD).

The rankings show how countries compare in terms of health and wellbeing. The values, on which the rankings are based, show how countries are performing. In particular, they show how different countries compare with the best-performing countries and their potential for improvement. The difference in Index values between countries is sometimes minimal, as there several countries with high level of life expectancy and of the same level of development. A difference of 0.1 or more points can be considered statistically significant.

The Ranking has been calculated using the most relevant, reliable data for 2016 from international sources that is comparable across countries. Data from national sources is often more up to date than international data sets because of the time it takes to process, standardise and introduce data into international data sets. This means that the Ranking does not necessarily reflect the current situation, such as the outcomes of policies that have recently been introduced.

- **Economy:**
Measured by unemployment rate, , poverty rate in old age, living standards using GDP per capita, income Gini coefficient.

- **Health and Healthcare:**
Measured by life expectancy at birth, healthy life expectancy at birth, chronicle disease burden, healthcare expenditures and psychological well-being. Good physical and mental health is critical to social and economic engagement of people.

- **Environment and Infrastructure:**
Measured by access to safe water sources, physical safety, natural factors. These indicators capture the enabling attributes of the communities in which older people live.

- **Society:**
Measured by social connection and development of human capital.

- **Demography:**
Measured by major demographic indicators.

Longevity Ranking Methodology

Ranking

Economy	Environment and Infrastructure	Health and Healthcare	Society	Demography
GDP (per Capita) GDP (per Capita), CAGR (6 years) Urban Population (% of Total) , Unemployment rate, Consumer Price, Index Income Gini coefficient - Inequality in income or consumption Senior Poverty Ratio, Global Retirement Index 2016, Global Competitiveness Index 2016-2017	Population Using Adequate Sanitation Facilities (%), Population Using Improved Water Sources (%), Ambient air pollution, concentration of fine particulate matter (PM2.5), Ambient and household air pollution attributable death rate (per 100 000 population), Diurnal temperature variation, Daily mean air temperature, Sunshine hours, Relative humidity, Dew Point	Population of Adults with AIDs, Annual Cigarette Consumption, Alcohol Consumption Prevalence of overweight among adults, Prevalence of undernourishment Prevalence of insufficient physical activity among adults aged 18+ years, Health expenditure per capita, Domestic private health expenditures, Out-of-pocket expenditure, Risk of catastrophic expenditure for surgical care, Incidence of tuberculosis, Public Health Care Expenditure (% of GDP), Physicians (per 1 000 People), Biomedical engineers density (per 10 000 population), Both sexes Life Expectancy, Male Life Expectancy, Female Life Expectancy, Medical Equipment (per 1,000,000 People), DALY rates per 100 000 population, HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)Prevalence of overweight among adults, BMI ≥ 25 (age-standardized estimate) (%), CAGR (6 years), HAQ (The Healthcare Access and Quality Index) -2016	Number of WHO age friendly cities and communities, Global Gender Gap Index, Human Development Index	Population growth rate, Net migration Total fertility rate, Crude birth rate, Crude death rate, Total age dependency ratio, Age over 65, Size of aged demographic, Age dependency ratio, old

Longevity Ranking Methodology

To conduct an in-depth analysis of Global Healthy Longevity, we applied a compound annual growth rate (CAGR) to several metrics from 1-3 levels of key importance. What is CAGR? Compound annual growth rate is a business and investing specific term for the geometric progression ratio that provides a constant rate of return over the time period. It could be calculated using the following formula:

$$CAGR = \frac{V_{end}}{V_{begin}}^{\frac{1}{\#years}} - 1$$

Therefore, we were able to explore different dimensions of countries' performance in some of the crucial indicators. As a result, the following 4-6 levels of metrics have been set up to evaluate countries' HALE and their impact factors (some of them may have been mentioned on the previous page, but it's worth to mention them separately to highlight their importance):

Ranking

Economy	Environment and Society	Health and Healthcare	General Health State
GDP (per Capita), CAGR (6 Years); Adjusted Savings: Net National Savings (% of GNI), CAGR (6 Years); Income Gini Coefficient, CAGR (6 Years)	Ambient Air Pollution, Concentration of Fine Particulate Matter (PM2.5), CAGR (6 Years); Human Development Index Score, CAGR (6 Years)	Both Sexes Life Expectancy, CAGR (6 years); Male Life Expectancy, CAGR (6 years); Female Life Expectancy, CAGR (6 years); Both Sexes HALE CAGR (6 Years); Male HALE CAGR (6 Years); Female HALE CAGR (6 Years); Both Sexes HALE and Life Expectancy Difference, CAGR (6 Years); Male HALE and Life Expectancy Difference, CAGR (6 Years); Female HALE and Life Expectancy Difference, CAGR (6 Years); Public Health Care Expenditure (as % of GDP), CAGR (6 Years); Domestic Private Health Expenditure (% of Current Health Expenditure), CAGR (6 Years); Out-of-Pocket Expenditure (% of Current Health Expenditure), CAGR (6 Years); HALE CAGR (6 Years)/Current Health Expenditures per Capita (Current US$), CAGR (6 Years); HALE and Life Expectancy Difference CAGR (6 Years)/Current Health Expenditures per Capita (Current US$), CAGR (6 Years); HALE CAGR (6 Years)/GDP per Capita CAGR (6 Years); HALE CAGR (6 Years)/Prevalence of Overweight among Adults, BMI ≥ 25 CAGR (6 Years)	Population of Adults with AIDs (%), CAGR (6 Years); Alcohol Consumption (per Capita), CAGR (6 Years;) Prevalence of Overweight among Adults, BMI ≥ 25 (Age-Standardized Estimate) (%), CAGR (6 Years); Prevalence of Undernourishment (% of Population), CAGR (6 Years)

Longevity Ranking of 50 Countries

Rank	Country	Score
1	Singapore	0.755
2	Hong Kong, SAR	0.750
3	Israel	0.744
4	Switzerland	0.731
5	Iceland	0.708
6	Luxembourg	0.707
7	United States	0.704
8	New Zealand	0.702
9	Norway	0.692
10	Sweden	0.690
11	Qatar	0.689
12	Denmark	0.687
13	Ireland	0.683
14	Australia	0.682
15	United Kingdom	0.681
16	Japan	0.678
17	Canada	0.676
18	Netherlands	0.673
19	Finland	0.668
20	Spain	0.667
21	Malta	0.661
22	Republic of Korea	0.659
23	France	0.657
24	Germany	0.657
25	Belgium	0.655

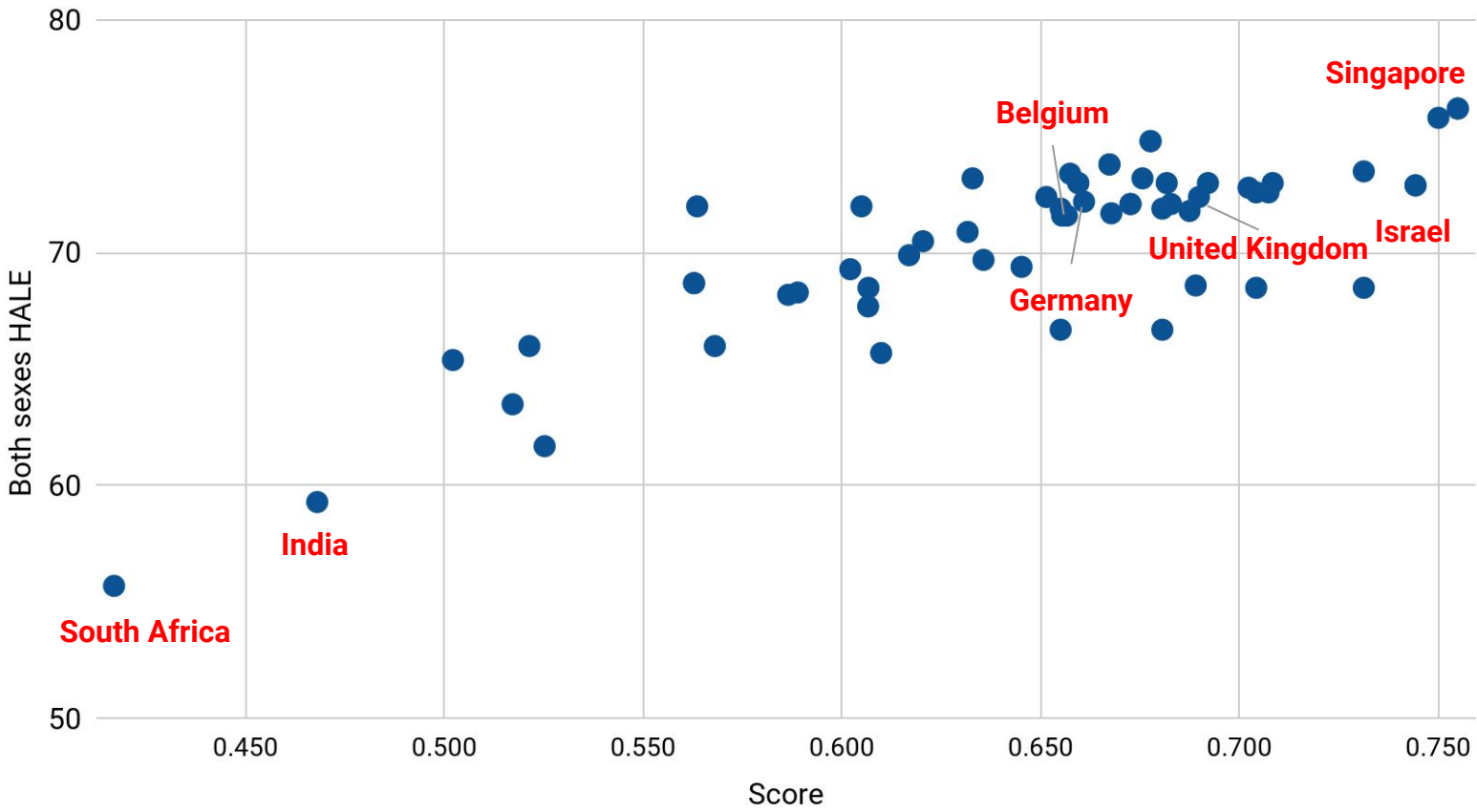
Rank	Country	Score
26	United Arab Emirates	0.655
27	Austria	0.651
28	Panama	0.645
29	Chile	0.636
30	Italy	0.633
31	Costa Rica	0.632
32	Slovenia	0.620
33	Cuba	0.617
34	Saudi Arabia	0.610
35	Poland	0.607
36	Mexico	0.607
37	Portugal	0.605
38	Czech Republic	0.602
39	Argentina	0.594
40	Slovakia	0.589
41	Estonia	0.586
42	Turkey	0.568
43	Greece	0.564
44	China	0.563
45	Indonesia	0.525
46	Brazil	0.521
47	Russia	0.517
48	Iran	0.502
49	India	0.468
50	South Africa	0.417

Inequality in health, education and income levels of population across countries is increasing between top-ranked, high-income countries and bottom-ranked, predominantly low-income countries.

The countries doing best in the Ranking have social and economic policies to improve healthcare systems, and wellbeing, decrease disease burden and engage healthy lifestyle. They have long-standing social welfare policies on better access to healthcare, as well as, minimization of behavioural risk factors including smoking and alcohol use, as well as diet and low physical activity.

At the same time, bottom-rank low-income countries care about their citizens less than countries doing best in the Ranking. It comes out medicine, insurances, policies, dealing with economics issues. This complex is a reason to inequality in health.

Health-adjusted Life Expectancy and Ranking Score



Ranking is correlated with health-adjusted life expectancy (HALE) across observed countries. It means that a combination of macroeconomic indicators influences the span of living in good health . The rankings show how countries compare in terms of health and wellbeing.

Among observed countries Singapore has the highest HALE and topped the ranking with Israel at the second place. It prioritised health and education and established universal health insurance and social pensions. South Africa has the lowest HALE and score. Older people in the country experience many hardships, with few able to access basic services. Family ties remain strong, but traditional support systems are changing and older people are increasingly left with the responsibility of childcare without any formal support. Low quality of healthcares services and poverty contribute to low HALE and high mortality.

Economy

Rank	Country	Economy
1	Luxembourg	0.777
2	Iceland	0.772
3	Switzerland	0.767
4	Singapore	0.756
5	United States of America	0.756
6	New Zealand	0.703
7	Ireland	0.702
8	Hong Kong, SAR	0.701
9	Denmark	0.701
10	Sweden	0.698
11	Norway	0.687
12	Belgium	0.668
13	Japan	0.665
14	Netherlands	0.661
15	Israel	0.660
16	Germany	0.658
17	Finland	0.650
18	United Kingdom	0.642
19	Malta	0.636
20	Republic of Korea	0.635
21	Canada	0.627
22	Australia	0.610
23	Austria	0.601
24	France	0.599
25	Czech Republic	0.581

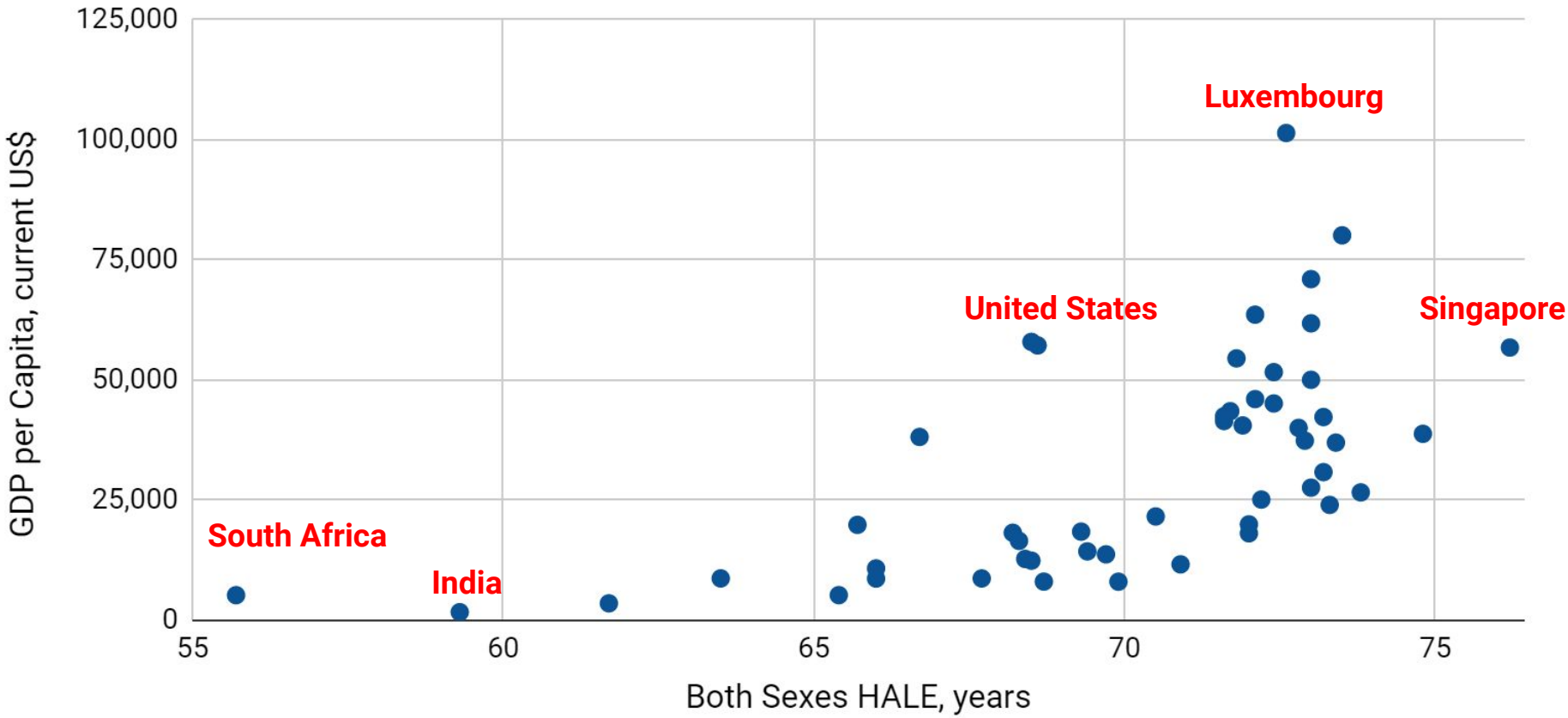
Rank	Country	Score
26	Qatar	0.580
27	Estonia	0.578
28	China	0.563
29	Cuba	0.544
30	Argentina	0.543
31	United Arab Emirates	0.541
32	Slovakia	0.539
33	Panama	0.537
34	Poland	0.534
35	Italy	0.532
36	Chile	0.529
37	Spain	0.519
38	Costa Rica	0.516
39	Portugal	0.509
40	Slovenia	0.498
41	Mexico	0.493
42	Russia	0.480
43	Indonesia	0.469
44	Saudi Arabia	0.460
45	India	0.457
46	Greece	0.416
47	Turkey	0.407
48	Brazil	0.393
49	Iran	0.291
50	South Africa	0.192

By economic factors Luxemburg has the highest score. Luxembourg has the highest level of GDP per capita, which measures the level of living standards. Top 25 countries ranked by economic factors are developed countries with low level of unemployment, low inflation, high level of income and wealth. They are capable of maintaining high living standards and quality of life.

Japan has a higher GDP per capita among other countries from Asia-Pacific region and its ranking reflects progressive economic policies. It prioritese health and education

Developing countries have lower scores as in developing countries level of poverty is higher compared to developed. South Africa has the worst score according the ranking. The highest income inequality, low level of GDP per capita are the major factors that contribute to such results.

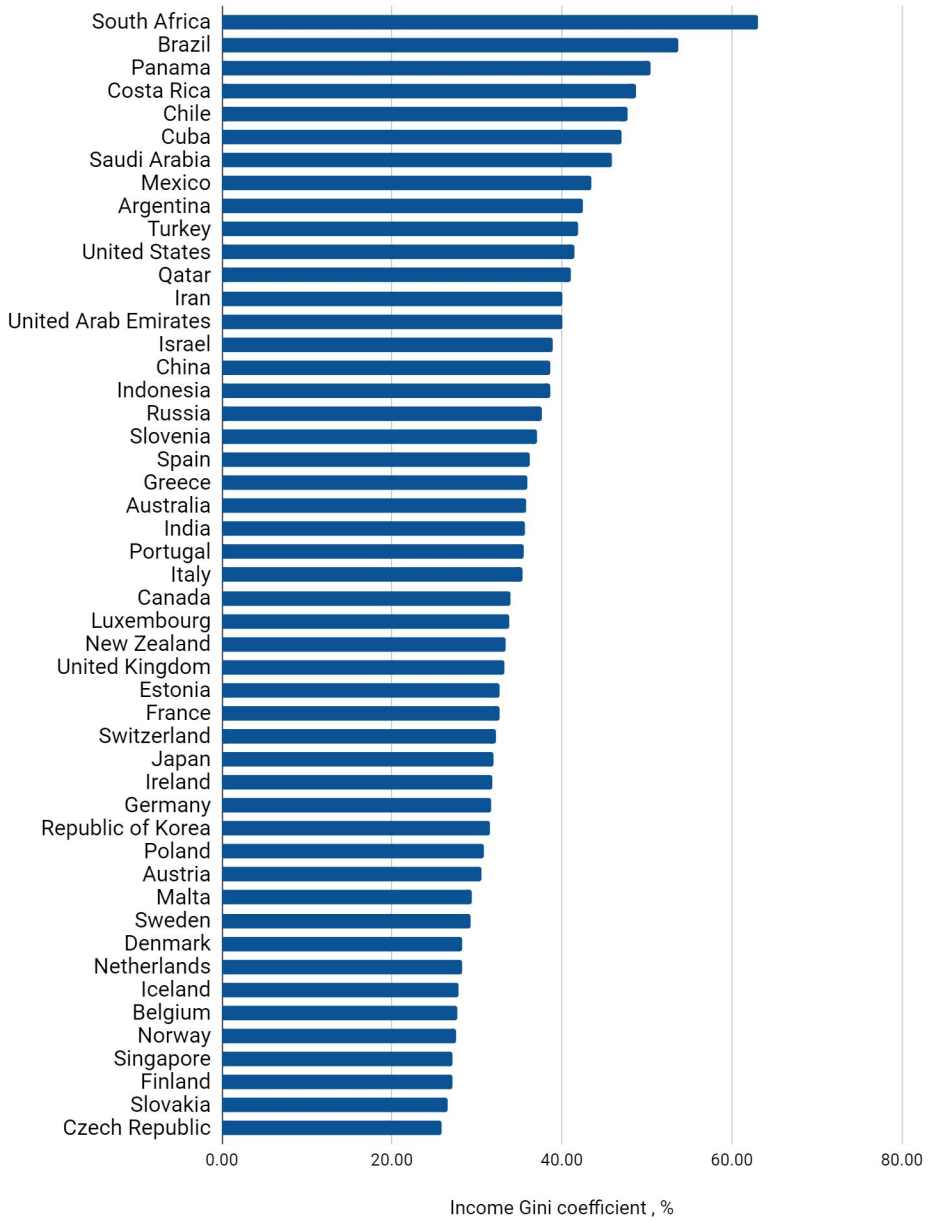
Gross Domestic Product and Healthy Longevity



There is relationship between GDP per capita and health adjusted life expectancy. Economic growth not only through an increase in total GDP, but also through long term gains in human and physical capital that raise productivity leads to better health. Population of wealth nations live longer and healthier life comparing to low-income countries, such as India, Indonesia, South Africa.

There is also inverse relationship. Better health and longer life lead to increase in economy's health, which is measured by gross domestic product. That is why promotion of better health both in developed and developing countries is in priority for their potential economic benefits.

Income Inequality



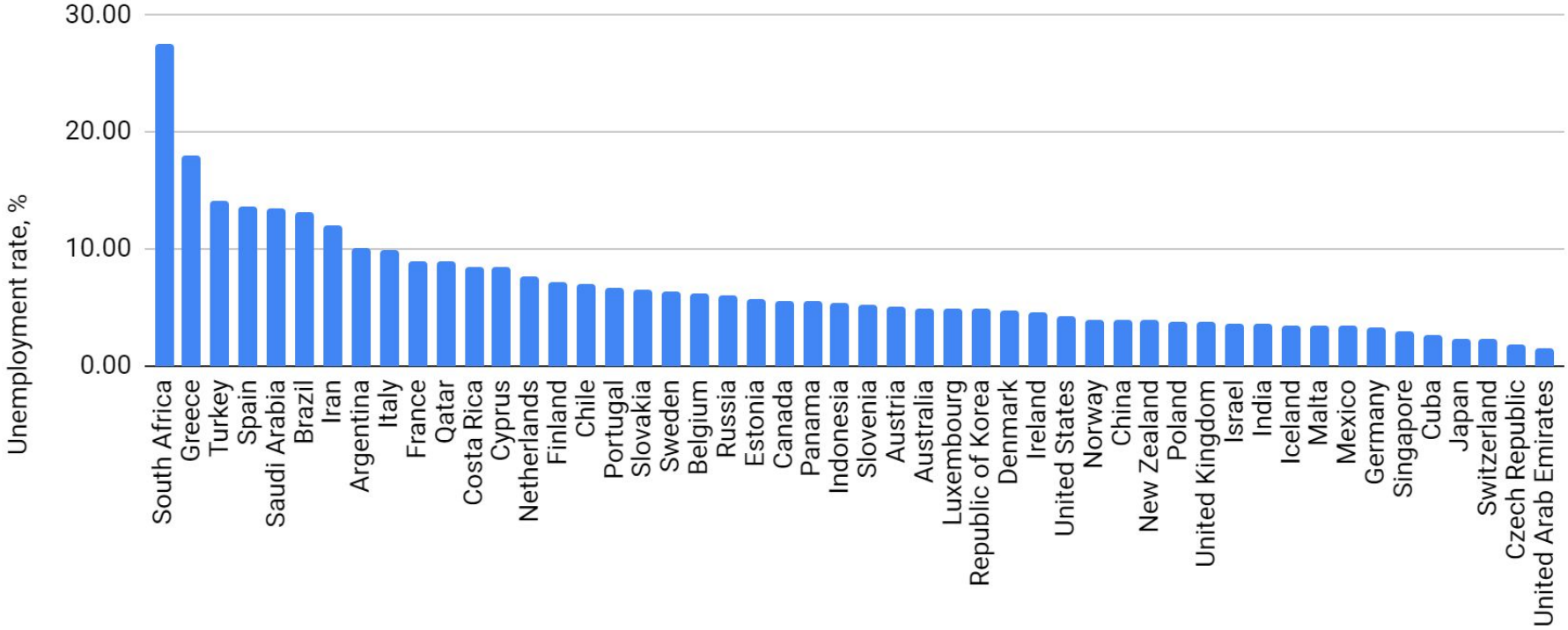
Greater economic inequality appears to lead to worse health outcomes. High levels of inequality negatively affect the health, socio-economic inequality leads to more stress, fear, and insecurity for everyone.

The World Bank's Gini index shows South Africa to be the most unequal society in the world, Gini Coefficient equals 63%. Among observed countries South Africa has also the lowest level of health-adjusted life expectancy. That proves hypothesis of positive correlation between poverty and poor health.

So, the major factor that affects public health and life expectancy is not the level of wealth but how evenly it is distributed. One of the wealthiest nations in the world, the United States, has some of the worst health outcomes because inequality is rife.

Nations, such as Sweden, Belgium, Czech Republic, with the smallest income gaps between households have significantly fewer infant deaths than other nations, higher level of public health and life expectancy, better access for healthcare and medical services among different socio-economic groups.

Unemployment and Health



South Africa has the highest level of unemployment rate among chosen countries. Unemployment creates poverty which is in tum a major cause of ill health. People who are obliged to follow the cheapest diets have little scope for healthy eating. Unemployment also leads to increase in mental health disorders. Populations of developing countries with higher unemployment rate, such as Greece, Turkey, Brazil, Iran, Argentina, are far more likely to be diagnosed with depression and report feelings of sadness and worry.

Developed countries through government initiatives and social programmes maintain financial security, provide proactive health care and retrain for re-employment to reduce the impact of unemployment on health.

Health and Healthcare

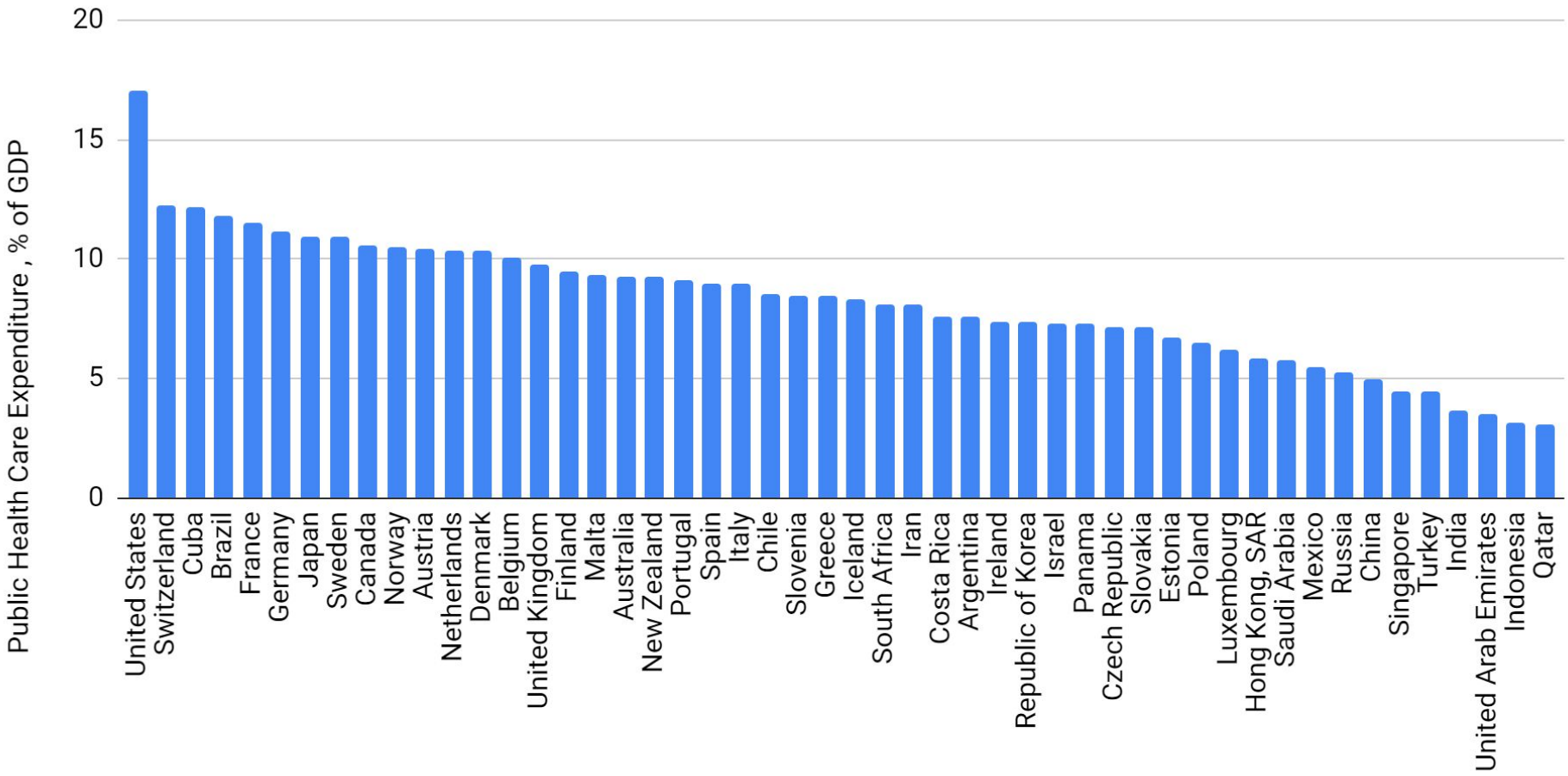
Rank	Country	Score
1	Japan	0.767
2	Singapore	0.727
3	Hong Kong, SAR	0.718
4	Israel	0.688
5	Sweden	0.686
6	Iceland	0.685
7	Slovenia	0.682
8	Norway	0.682
9	Denmark	0.680
10	Finland	0.677
11	Austria	0.675
12	Spain	0.672
13	Netherlands	0.666
14	Italy	0.666
15	France	0.663
16	Canada	0.661
17	United Kingdom	0.659
18	Qatar	0.656
19	Republic of Korea	0.653
20	Switzerland	0.653
21	Ireland	0.646
22	Luxembourg	0.644
23	Australia	0.639
24	New Zealand	0.636
25	Germany	0.631
26	Belgium	0.629
27	Poland	0.628
28	Portugal	0.628
29	Greece	0.627
30	Malta	0.616
31	United Arab Emirates	0.607
32	Turkey	0.607
33	Costa Rica	0.605
34	Czech Republic	0.603
35	Slovakia	0.584
36	Panama	0.582
37	Argentina	0.582
38	United States of America	0.582
39	China	0.578
40	Estonia	0.562
41	Mexico	0.561
42	Chile	0.546
43	Saudi Arabia	0.538
44	Cuba	0.537
45	Iran	0.522
46	Russia	0.495
47	Indonesia	0.481
48	Brazil	0.480
49	India	0.352
50	South Africa	0.310

Japan is the first in health and healthcare ranking with the highest life expectancy in the world. Singapore is the second and Israel is the third. Singapore has developed and effective healthcare system, developed medical facilities and improved access to healthcare infrastructure, relatively low level of chronic disease. Although it is worth noting that the difference in Index values between top-ranked countries is not large.

Panama leads the Latin America and Caribbean region. The relatively high scores are due in large part to the existence and effectiveness of government policies, with an orientation towards social policy in general and policies on ageing in particular.

By health and healthcare assessment India is 49. Good services are scarce in rural areas where most people live.

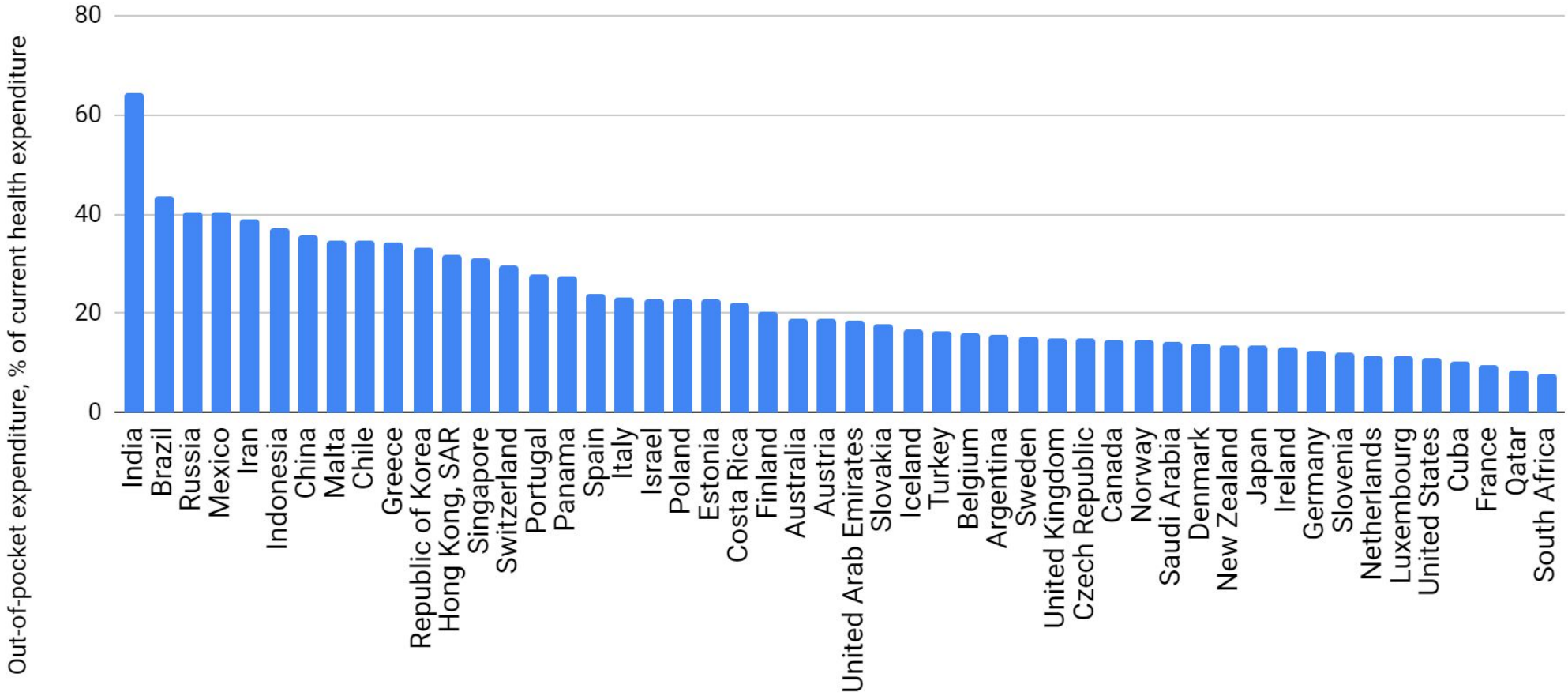
Public Healthcare Expenditures



It is vital for all countries to appropriately invest in their health sector. Evidence shows that investing in health significantly benefits the economy. Bigger share of healthcare expenditures in developing countries will lead to improvement of the health status of the population in the region.

The exception is the United States. Relative to the size of its wealth, the United States spends a disproportionate amount on health care, which leads to financial burden but not to increase in public health.

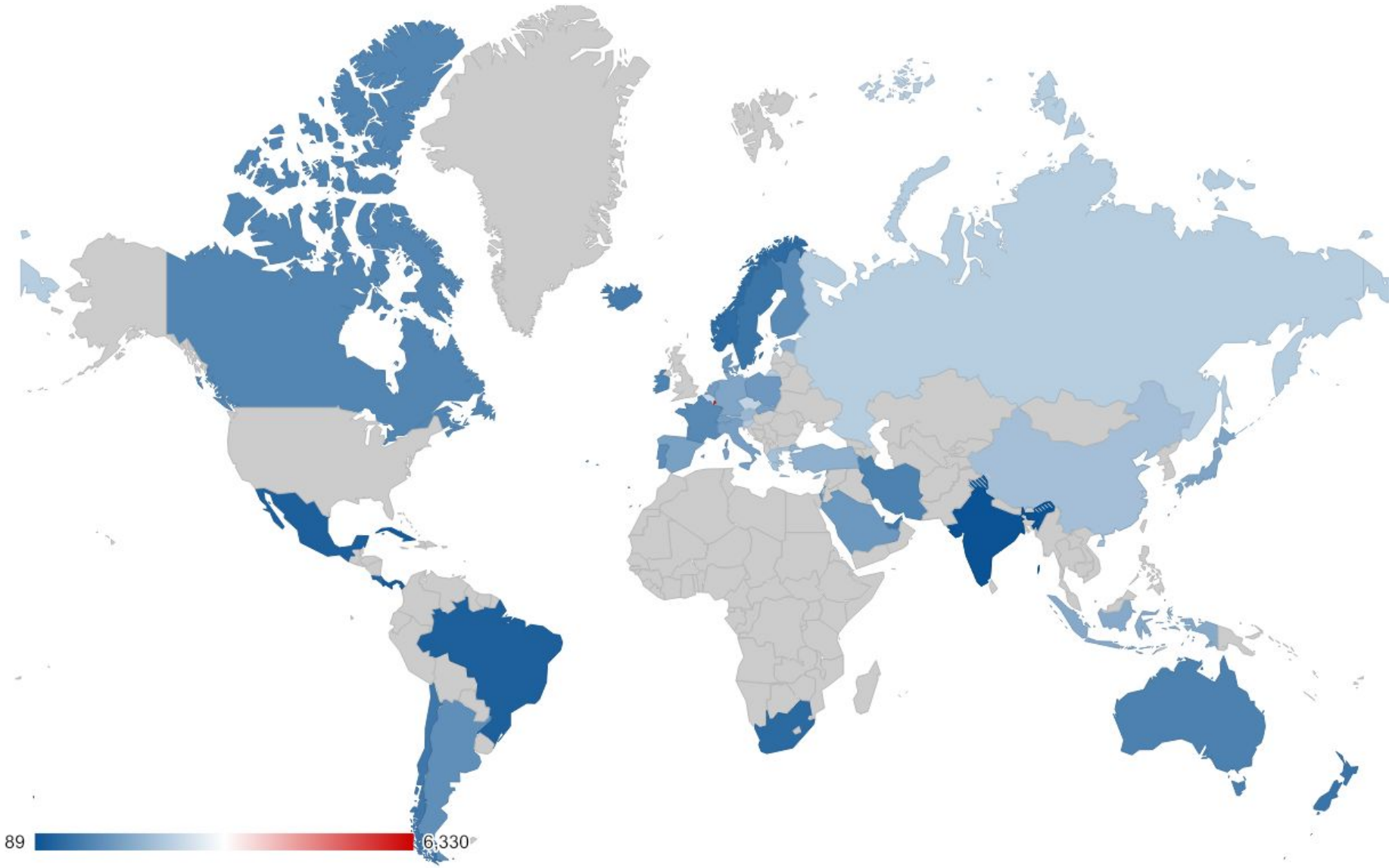
Out-of-pocket Expenditure



Reliance on out-of-pocket payments varies considerably across the globeю It is used to monitor how well a health system is performing in terms of financial protection.

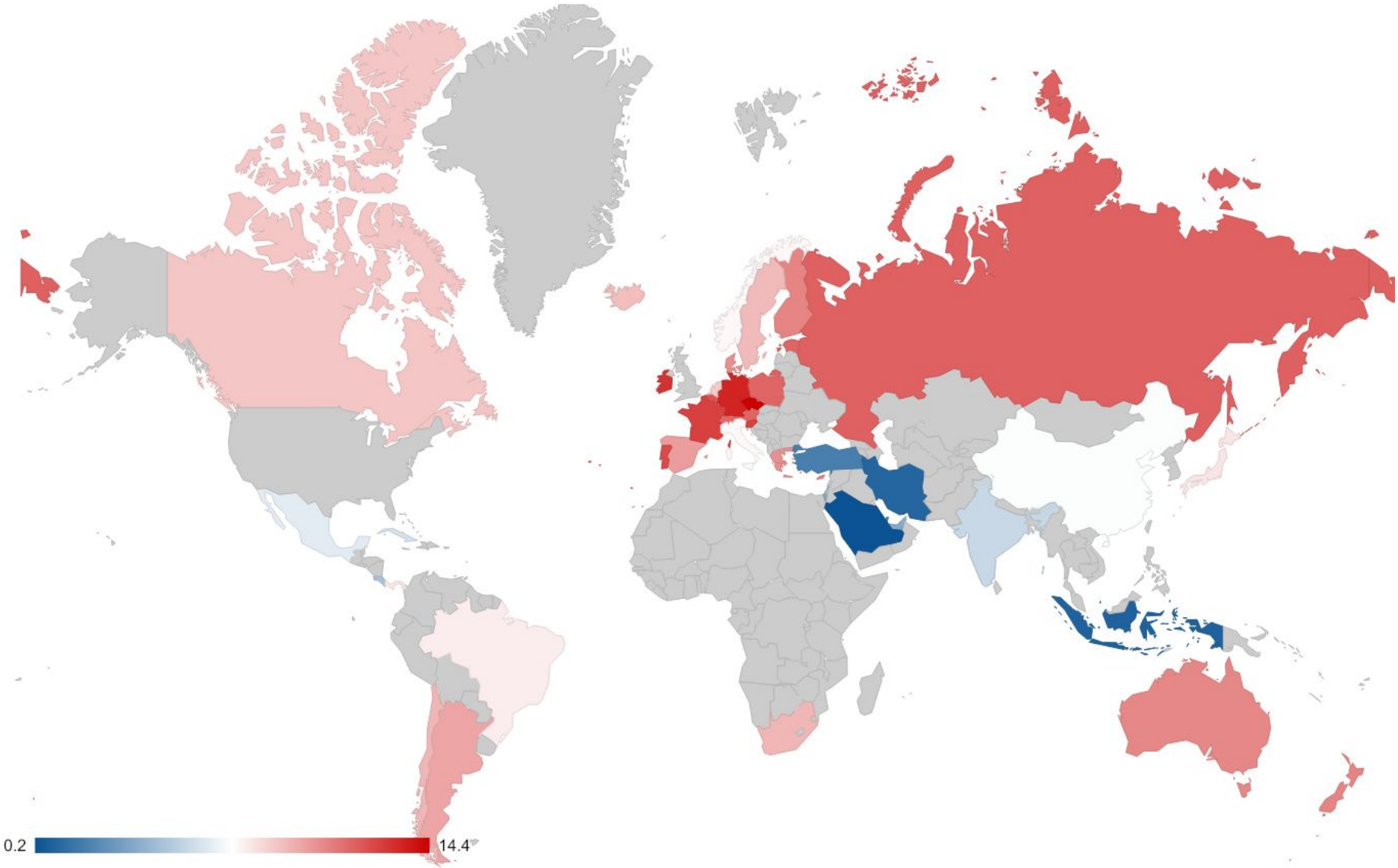
The highest level of out-pocket expenditure across chosen countries is in India. The Indian government is unable to cover the full spectrum of health-care needs because of persistently low public investment in health, a lack of human resources and poor health infrastructure, which increase the cost and the financial burden of care.

Annual Cigarette Consumption



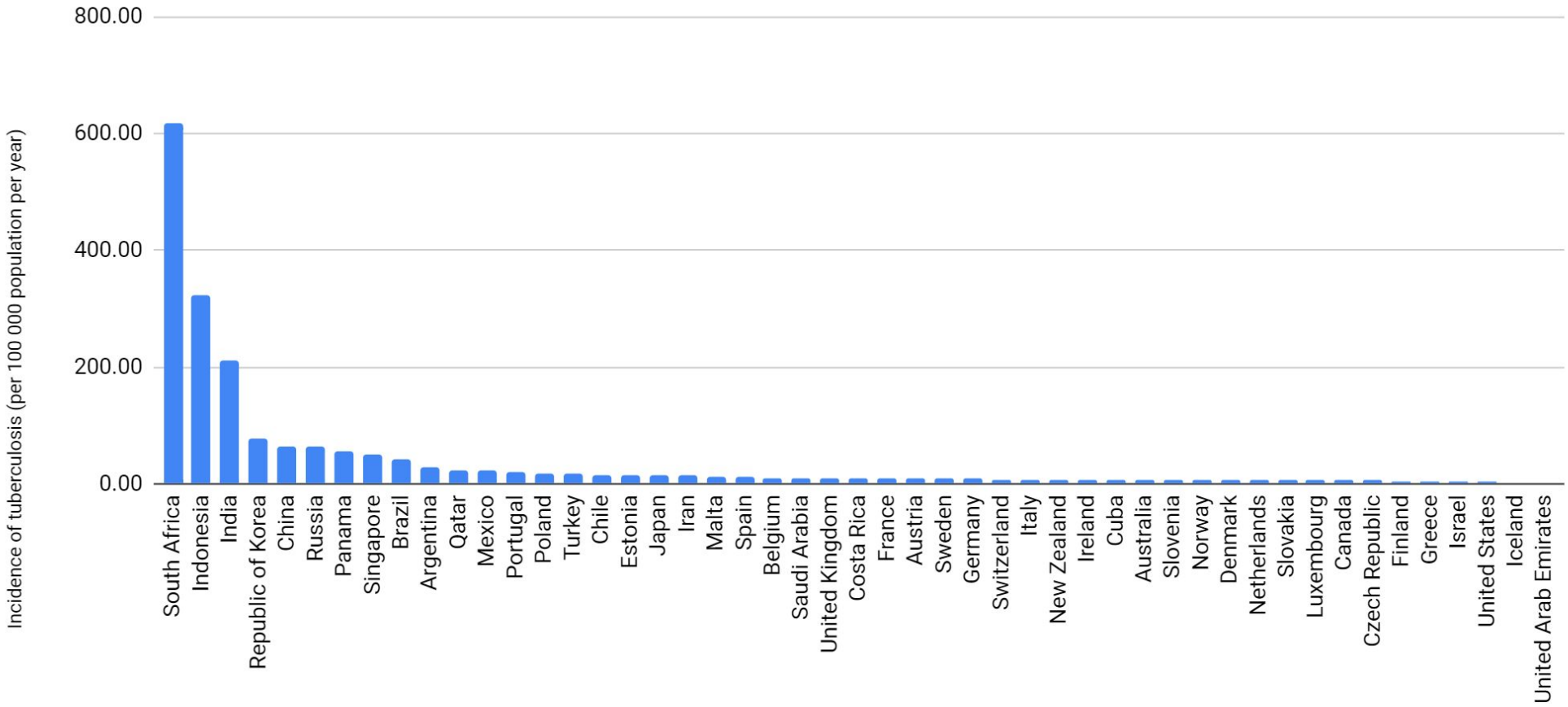
The highest level of annual cigarette consumption per capita is in Luxembourg. There is negative correlation between smoking and HALE across countries. Smoking leads to disease and disability and harms nearly every organ of the body. Smoking causes cancer, heart disease, stroke, lung diseases, diabetes, and chronic obstructive pulmonary disease (COPD), which includes emphysema and chronic bronchitis.

Alcohol Consumption per Capita



Heavy drinking and beer are linked to increased weight gain, while moderate drinking and wine are linked to reduced weight gain or even weight loss. Moderate consumption can benefit health reducing the risk of heart disease, but heavy drinking may increase it. Hard drinking alcohol increases risk of certain cancers, especially mouth and throat cancer.

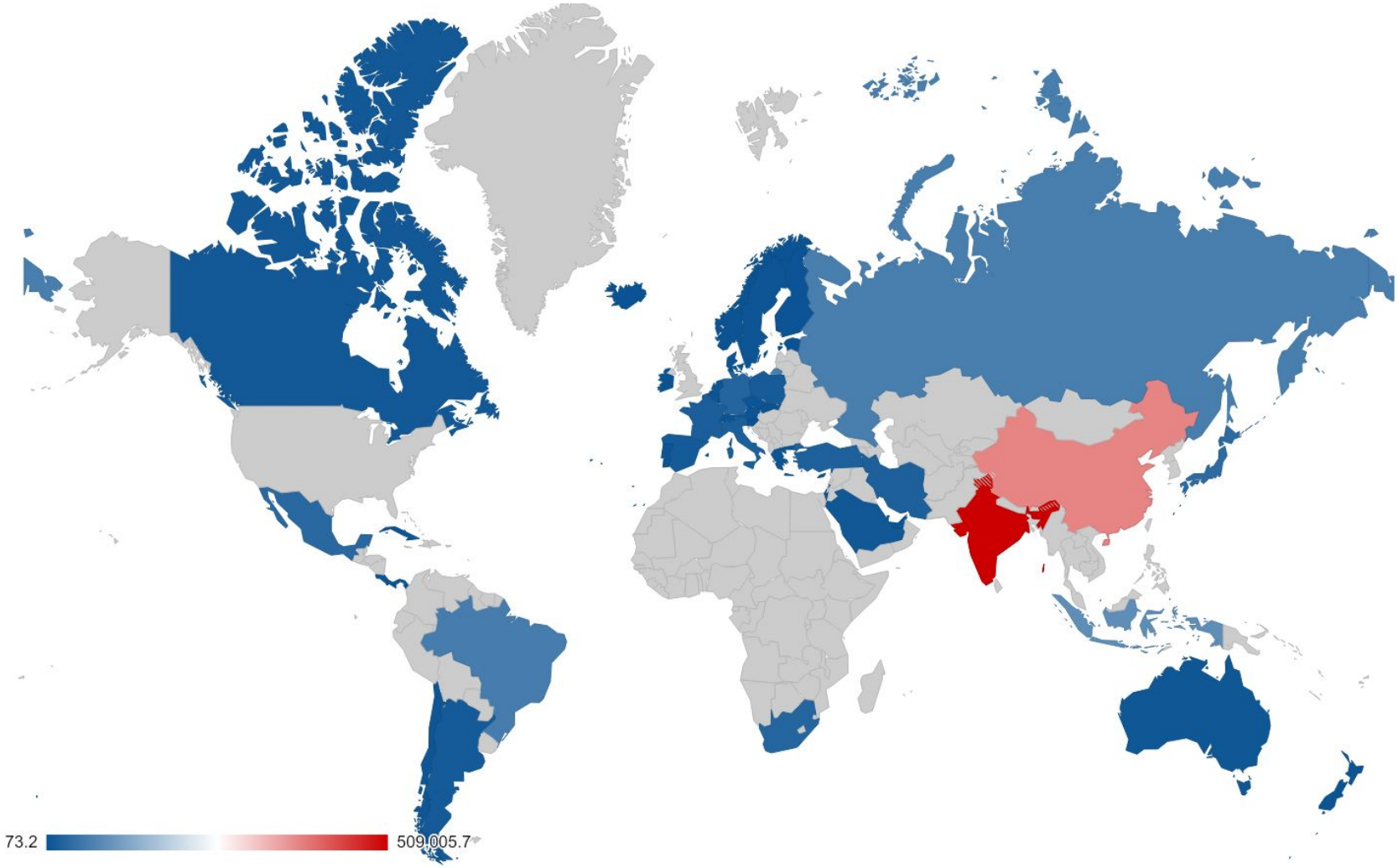
Tuberculosis



Tuberculosis is one of the top 10 causes of death worldwide. It causes ill-health among millions of people each year and ranks alongside the human immunodeficiency virus (HIV) as a leading cause of death.

Tuberculosis occurs in every part of the world. In 2016, the largest number of new tuberculosis cases occurred in the South-East Asia and Western Pacific regions, followed by the African region.

Disability-adjusted Life Years (DALYs)



DALY represents the loss of the equivalent of one year of full health. The highest burden of disease among chosen countries is in India and China. The burden of disease, expressed in DALYs per 1000 population, has decreased in all regions during the period of 2000-2016, with the WHO African region having attained the largest decline (44%). This region, however, still bore the highest burden in 2016, 587 DALYs per 1000 population. This is over two-fold the burden of disease in the region with the lowest DALY rates (270 per 1000 population) in 2016: the WHO Western Pacific region.

Source: WHO

Environment and Infrastructure

Rank	Country	Score
1	Israel	1.203
2	Spain	1.172
3	Singapore	1.121
4	Chile	1.099
5	Italy	1.083
6	Qatar	1.076
7	United Arab Emirates	1.070
8	Saudi Arabia	1.068
9	Australia	1.068
10	Malta	1.067
11	Costa Rica	1.051
12	United States of America	1.025
13	Portugal	1.025
14	New Zealand	1.024
15	Mexico	1.023
16	Panama	1.000
17	Japan	0.993
18	Republic of Korea	0.991
19	Hong Kong, SAR	0.991
20	France	0.980
21	Greece	0.979
22	Canada	0.978
23	Netherlands	0.973
24	Austria	0.970
25	Cuba	0.970

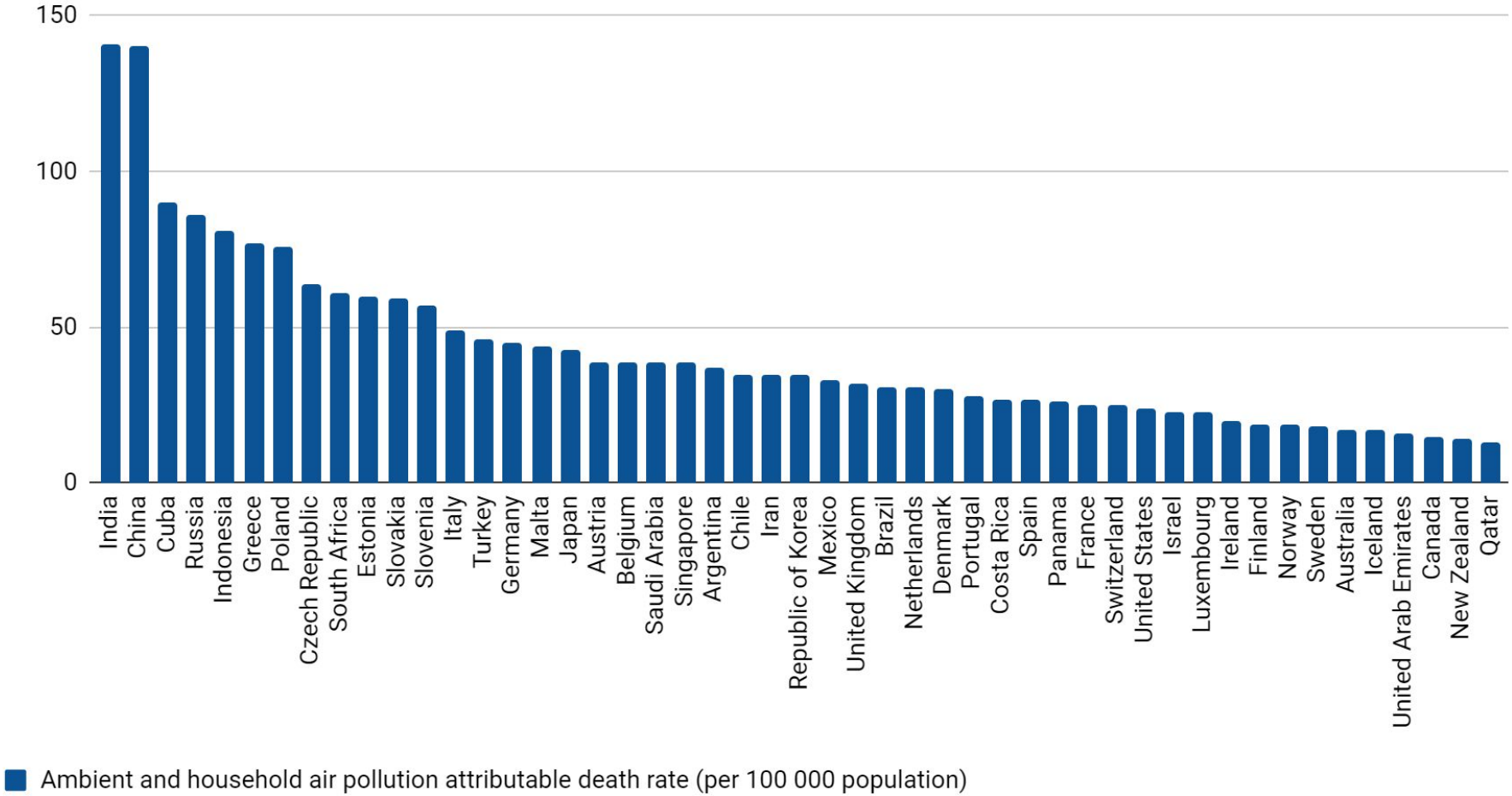
Rank	Country	Score
26	Argentina	0.970
27	Switzerland	0.969
28	Denmark	0.965
29	United Kingdom	0.954
30	Luxembourg	0.950
31	Germany	0.947
32	Belgium	0.943
33	Poland	0.942
34	Finland	0.938
35	Slovenia	0.926
36	Slovakia	0.926
37	Turkey	0.925
38	Sweden	0.923
39	Brazil	0.921
40	Norway	0.916
41	Iran	0.915
42	Czech Republic	0.901
43	South Africa	0.899
44	Estonia	0.890
45	Ireland	0.885
46	Indonesia	0.822
47	Iceland	0.821
48	India	0.801
49	Russia	0.790
50	China	0.765

Israel is the first in Environment and Infrastructure followed by Spain, Singapore and Chile.

All countries in the top of the ranking have high level of usage of adequate sanitation facilities and improved water sources. Favourable climate conditions are major factors that affect subranking.

Israel's location is characterized as a subtropical region. The northern and coastal regions of Israel show Mediterranean climate characterized by hot and dry summers and cool rainy winters. The climate of Spain is temperate with hot summers and cold winters inland and cloudy, cool summers and cool winters along the coast. Italy climate is also considered to be one of the healthiest in the world. The climate is Mediterranean with hot summer and mild relatively rainy winter. In Italy and Spain there are from 300 to 340 sunny days a year.

Mortality Attributable to Ambient Air Pollution



Ambient air pollution results from emissions from industrial activity, households, cars and trucks which are complex mixtures of air pollutants, many of which are harmful to health. Of all of these pollutants, fine particulate matter has the greatest effect on human health. Countries with higher level of environmental pollution have lower public health and health-adjusted life expectancy.

Source: WHO

Society

Rank	Country	Score
1	United States of America	0.795
2	Iceland	0.649
3	Norway	0.633
4	Finland	0.599
5	Spain	0.598
6	Ireland	0.587
7	Sweden	0.584
8	Canada	0.552
9	Switzerland	0.549
10	France	0.529
11	Germany	0.526
12	New Zealand	0.524
13	United Kingdom	0.517
14	Slovenia	0.515
15	Netherlands	0.509
16	Denmark	0.506
17	Australia	0.504
18	Belgium	0.489
19	Hong Kong, SAR	0.460
20	Singapore	0.460
21	Luxembourg	0.457
22	Israel	0.441
23	Austria	0.438
24	Estonia	0.433
25	Italy	0.415

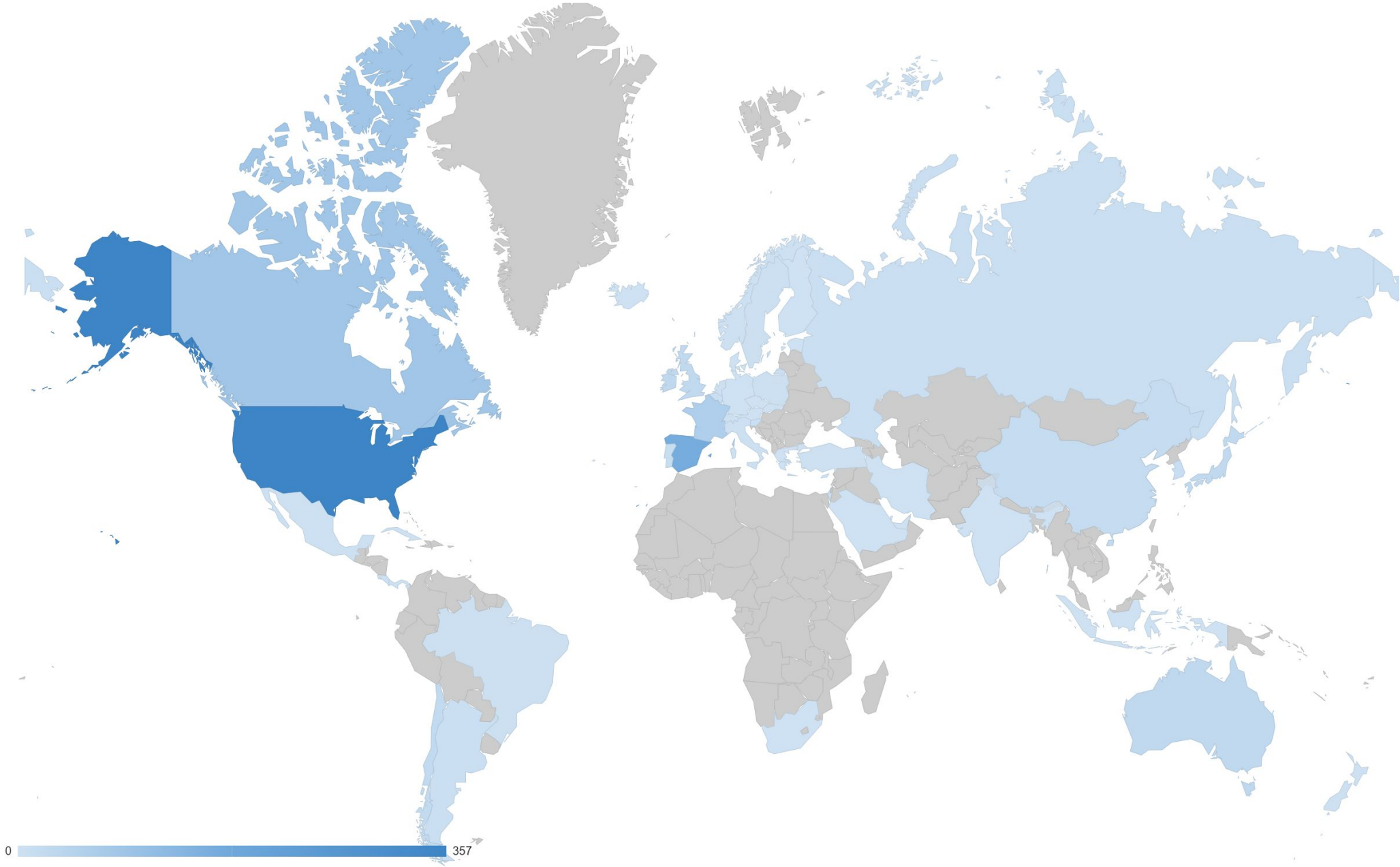
Rank	Country	Score
26	Portugal	0.410
27	Poland	0.408
28	Japan	0.397
29	Czech Republic	0.386
30	Argentina	0.380
31	Chile	0.371
32	Republic of Korea	0.365
33	Greece	0.357
34	Malta	0.346
35	Costa Rica	0.341
36	Slovakia	0.340
37	Russia	0.321
38	Panama	0.316
39	United Arab Emirates	0.304
40	Qatar	0.300
41	Cuba	0.294
42	Mexico	0.280
43	South Africa	0.271
44	Brazil	0.253
45	China	0.243
46	Saudi Arabia	0.231
47	Turkey	0.209
48	Iran	0.175
49	Indonesia	0.172
50	India	0.115

By evaluation of society the first country is the United States. The second and the third are Iceland and Norway respectively.

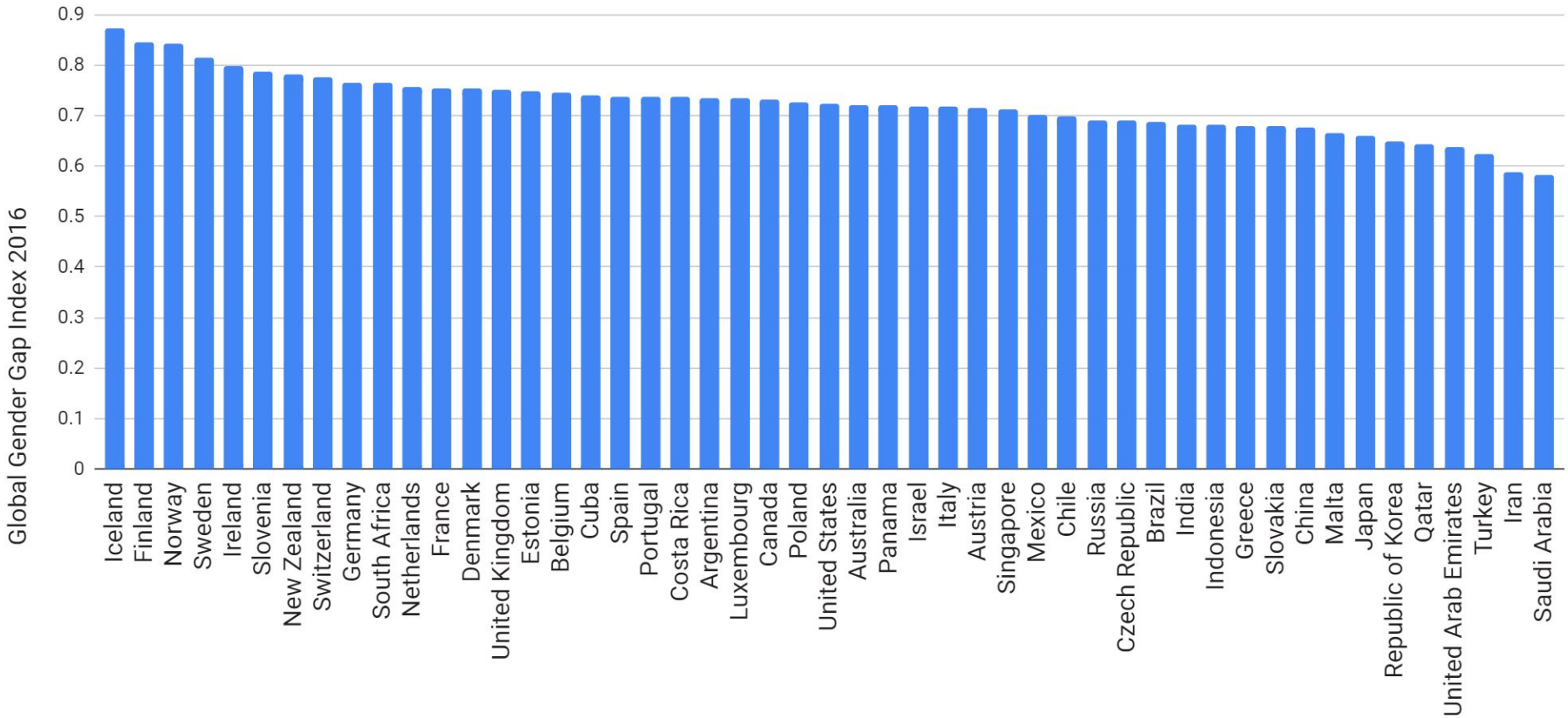
The United States has the largest network of age-friendly cities and communities among chosen countries. There are 357 of them. The main purpose of such public and private initiatives is to create age-friendly environments fostering healthy and active ageing. They enable older people to age safely, continue to develop personally.

Norway and Iceland have small number of age-friendly cities but have relatively high level of gender equality and place higher positions in Human Development Index. These countries have relatively advanced opportunities for development of human potential. They divide well their resources and opportunities among their male and female populations

WHO Age Friendly Cities and Communities



Gender Gap



There are gender-based differences in life expectancy, healthy life years. Women live longer than men but spend fewer years in good health. The gender pay and pension gaps put older women in particular at risk of poverty which creates barriers to health services. This is partly due to the socially roles of men and women, and the relationships between them.

Reduction gender gap in economic opportunities, education, politics leads to increase in public health and population wellbeing.

Demography

Rank	Country	Score
1	Panama	0.741
2	Israel	0.738
3	United Arab Emirates	0.652
4	Turkey	0.615
5	Mexico	0.612
6	South Africa	0.596
7	Indonesia	0.586
8	Qatar	0.579
9	Saudi Arabia	0.579
10	Iran	0.578
11	India	0.538
12	Costa Rica	0.511
13	Brazil	0.501
14	Argentina	0.486
15	Chile	0.485
16	Hong Kong, SAR	0.476
17	United States of America	0.456
18	Singapore	0.440
19	New Zealand	0.436
20	China	0.430
21	Australia	0.429
22	Ireland	0.427
23	Luxembourg	0.423
24	Iceland	0.409
25	Republic of Korea	0.385

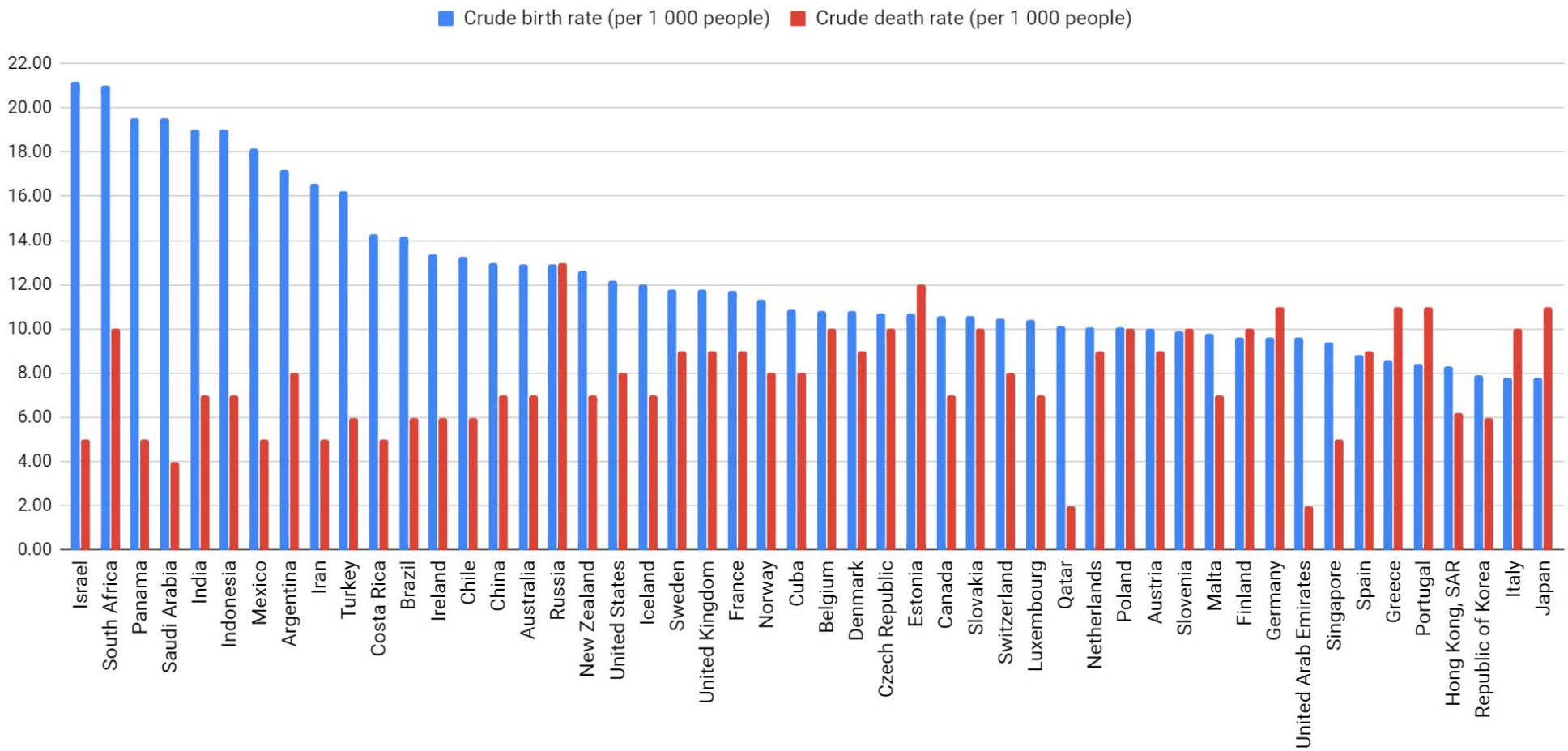
Rank	Country	Score
26	Canada	0.383
27	Cuba	0.365
28	Malta	0.356
29	Norway	0.351
30	Russia	0.349
31	Switzerland	0.336
32	Slovakia	0.329
33	United Kingdom	0.329
34	Sweden	0.314
35	Austria	0.308
36	Denmark	0.297
37	France	0.295
38	Netherlands	0.291
39	Poland	0.289
40	Belgium	0.287
41	Czech Republic	0.280
42	Germany	0.278
43	Slovenia	0.267
44	Spain	0.246
45	Estonia	0.231
46	Finland	0.221
47	Greece	0.191
48	Portugal	0.178
49	Italy	0.168
50	Japan	0.099

Panama is the first by demography situation. The annual growth rate in Panama is very much on track with that of the world at large, with the population growing 1.77% as of 2016. The country has seen reasonable, positive migration since 1995 and the birth rate is also very near to the worldwide average with 2.51 children being born to the average woman in the Panama. This rate of growth is very healthy and sustainable.

Israel has the highest value of crude birth rate among chosen countries, relatively low levels of population over 65 years (11.5% of total population) and age dependency ratio.

In the top of this subranking developing countries, such as Turkey, Qatar, Mexico, dominate. Most developing country populations have a young age distribution with considerable potential for population growth.

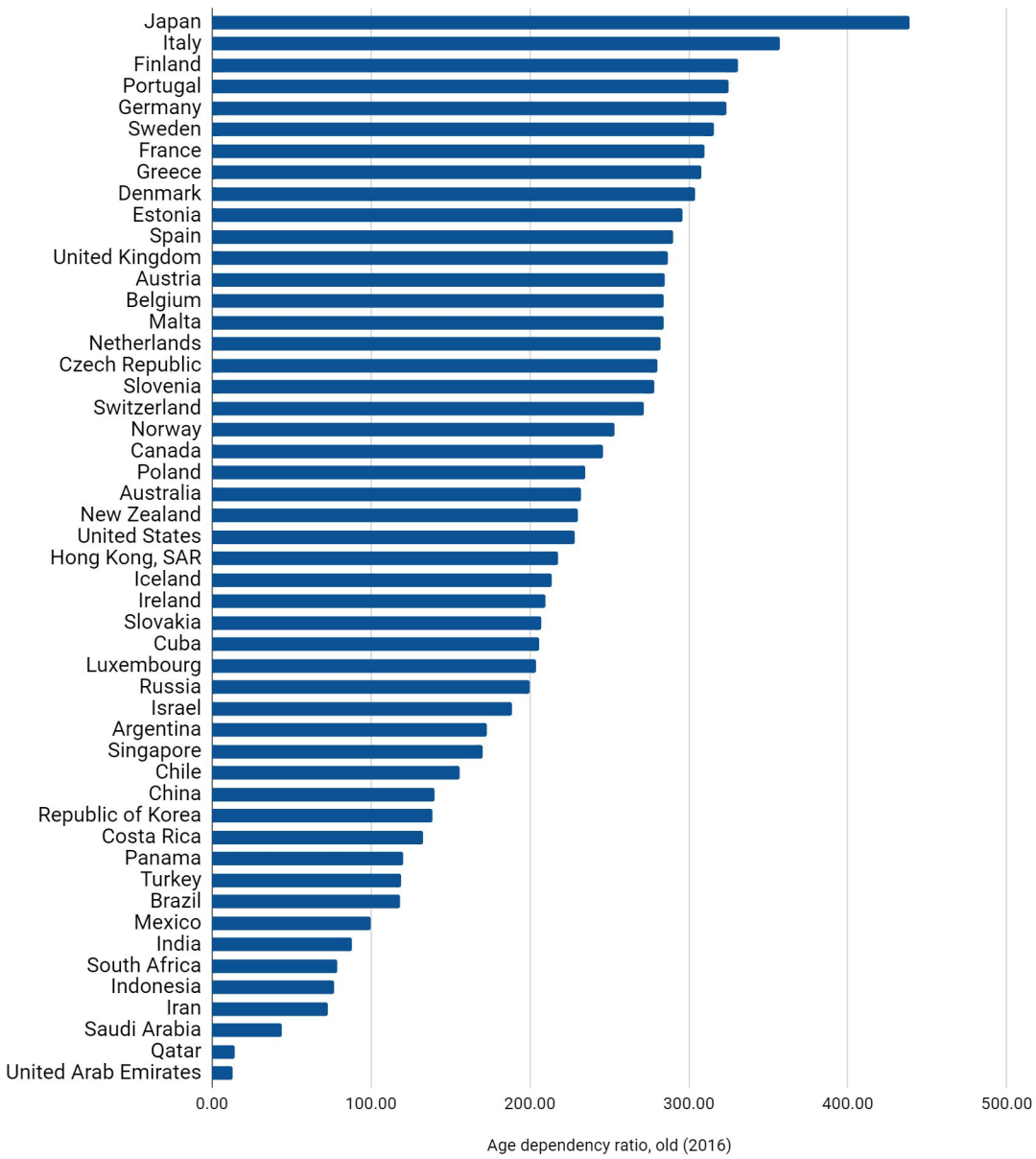
Natural Population Growth



Countries, such as South Africa, India, Indonesia, Iran, Mexico, with higher birth rate have lower life span and healthy years. High birth rates in developing nations correlates with higher death rates and more mortality from infectious diseases, comparing to developed countries.

In case of Japan, death rate is bigger than birth rate, but life expectancy is one of the highest in the world. High life expectancy in Japan is the result of the growing population of older people.

Old-Age Dependency Ratio



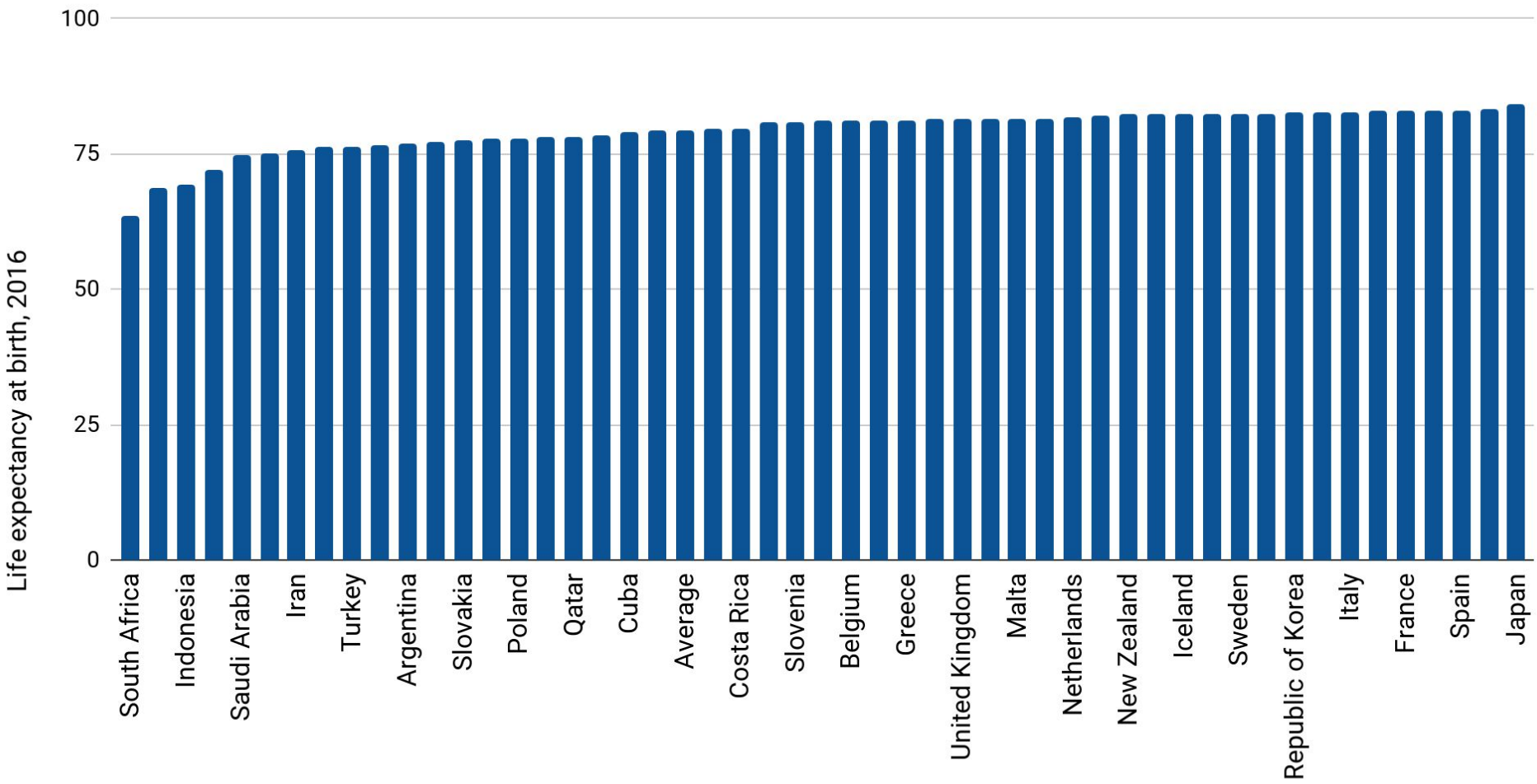
The old-age dependency ratio is the ratio of the number of elderly people at an age when they are generally economically inactive, compared to the number of people of working age. It is an indicator of how many potential retirees a potential worker has to support. It also illustrates ageing populations.

The evolution of dependency ratios depends on mortality rates, fertility rates and migration. Developed countries have seen prolonged increases in life expectancy, which most analysts project to continue, implying an increasing number of older people and most likely of pensioners too. There have also been substantial declines in fertility, which, of course, will eventually diminish the number of workers entering the labour market. Developing countries opposite trend of increase in birth rate and relatively low old-age dependency ratio.

Japan has the highest old-age dependency ratio among chosen countries, it equals 439 in 2016. High old-age dependency ratios in Finland, Italy, Germany, France suggest increases in economic activity at older ages may help to offset the impact of population ageing on the economy in the future.

Current Trends in Life Expectancy and Healthy Longevity

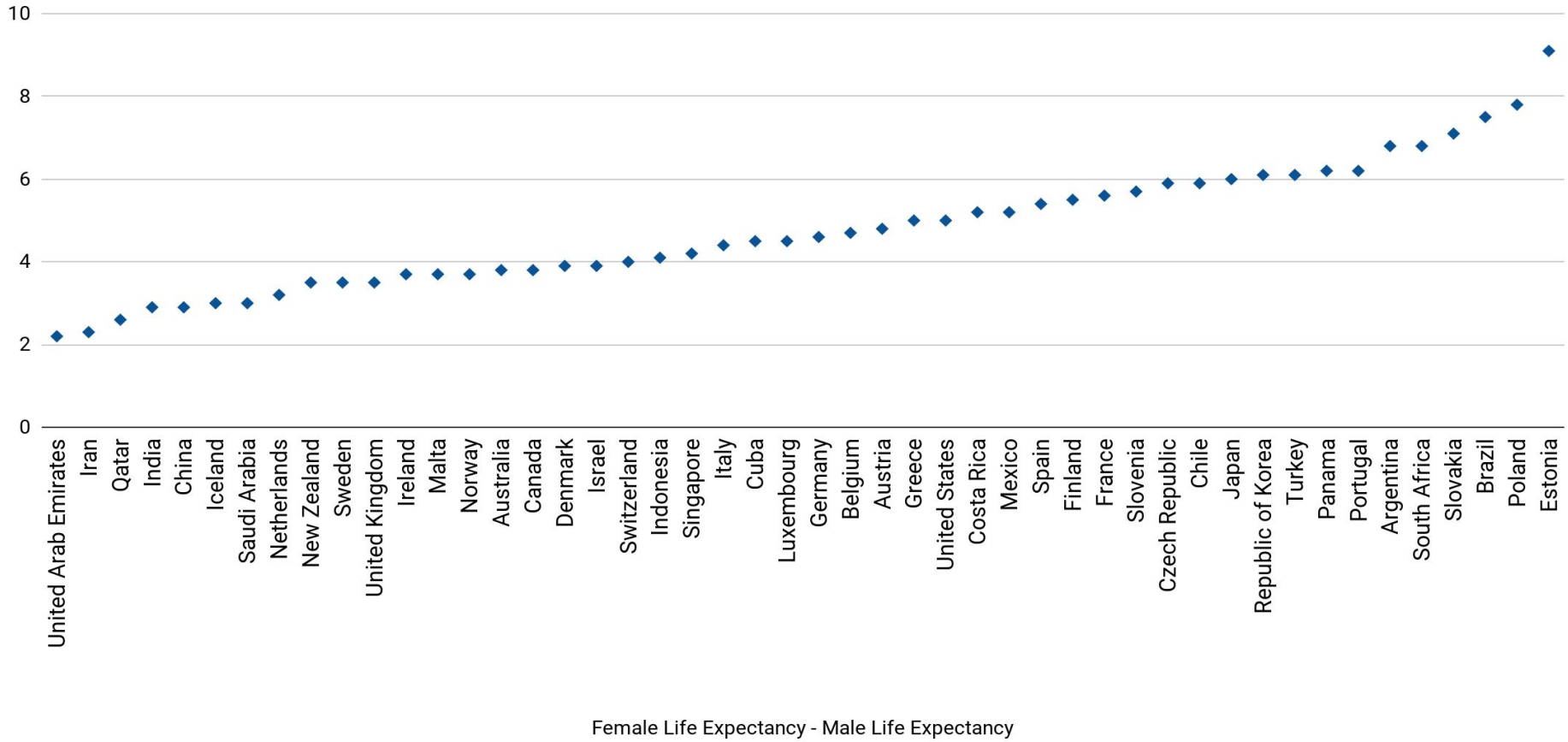
Life Expectancy at birth



Developed countries have higher life expectancy comparing to developing countries. Life expectancy at birth in countries varies significantly. Dut the differences among high-income countries differences in life expectancy have narrowed over time. The highest value is in Japan and the lowest value is in South Africa, they equal 84.2 and 63.6 years accordingly. The United States is the high-income country where life expectancy is marginally low the average level of chosen countries (72.3 years).

Source: WHO

Difference between Female and Male Life Expectancy at birth



Female life expectancy exceeds male life expectancy in all countries. In 2016 in the United States male life expectancy was 76 years for males and 81 years for females, a difference of 5 years, whereas in France it was 5.6 years and in the United Kingdom., 3.5 years. The discrepancy was much greater in some countries, with the difference in Russia reaching more than 10.8 years, but in others, such as India 2.9 or United Arab Emirates (2.2 years) it was much less.

The female advantage in life expectancy used to be very small, but it grew substantially over the last century. These two points also apply to the other countries with available data, Sweden, France and the UK.

Source: WHO

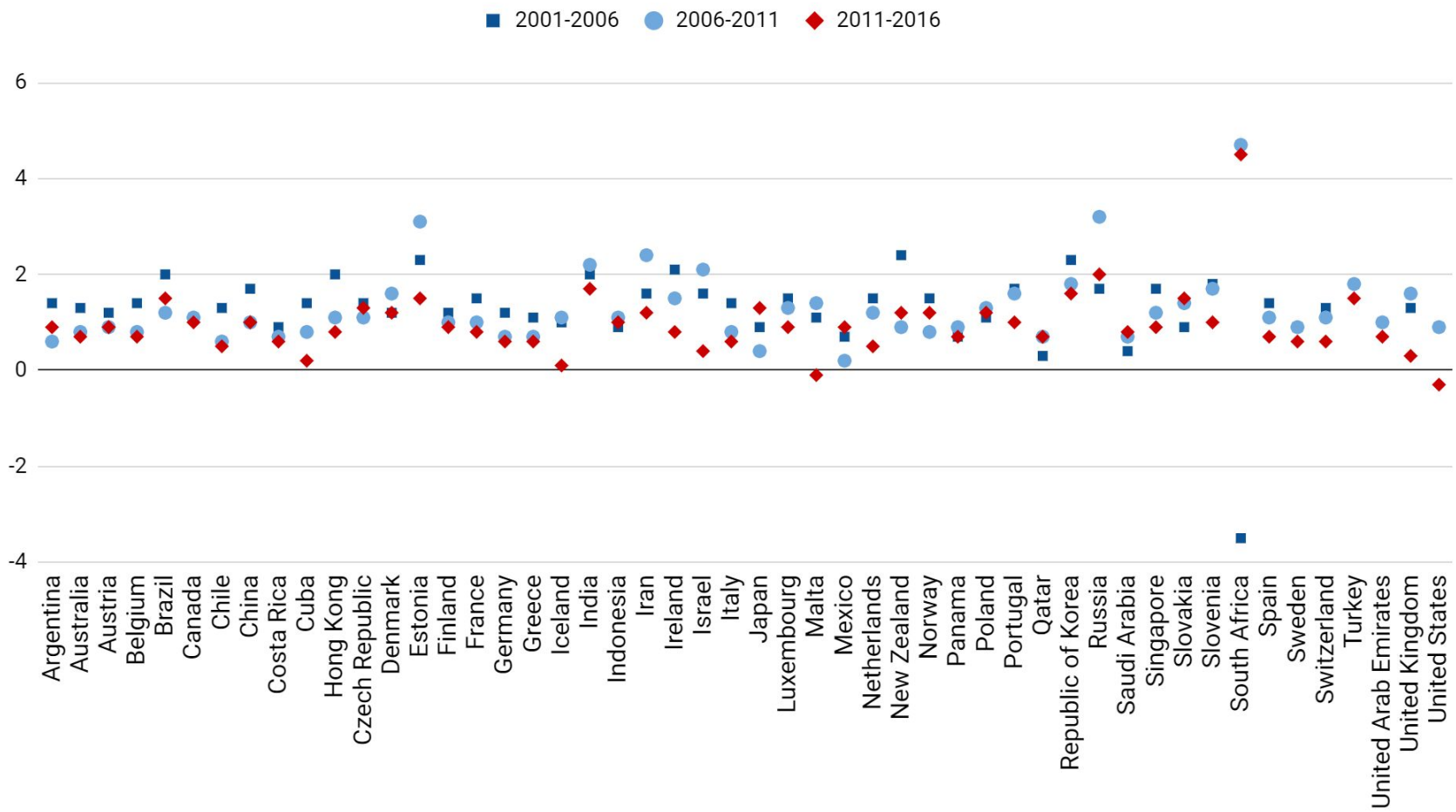
Indicators Dynamics: of Life Expectancy at birth

Country	2001-2006	2006-2011	2011-2016
Argentina	1.4	0.6	0.9
Australia	1.3	0.8	0.7
Austria	1.2	0.9	0.9
Belgium	1.4	0.8	0.7
Brazil	2	1.2	1.5
Canada	1.1	1.1	1
Chile	1.3	0.6	0.5
China	1.7	1	1
Costa Rica	0.9	0.7	0.6
Cuba	1.4	0.8	0.2
Czech Republic	1.4	1.1	1.3
Denmark	1.2	1.6	1.2
Estonia	2.3	3.1	1.5
Finland	1.2	1	0.9
France	1.5	1	0.8
Germany	1.2	0.7	0.6
Greece	1.1	0.7	0.6
Hong Kong, SAR	2.0	1.1	0.8
Iceland	1	1.1	0.1
India	2	2.2	1.7
Indonesia	0.9	1.1	1
Iran	1.6	2.4	1.2
Ireland	2.1	1.5	0.8
Israel	1.6	2.1	0.4
Italy	1.4	0.8	0.6

Country	2001-2006	2006-2011	2011-2016
Japan	0.9	0.4	1.3
Luxembourg	1.5	1.3	0.9
Malta	1.1	1.4	-0.1
Mexico	0.7	0.2	0.9
Netherlands	1.5	1.2	0.5
New Zealand	2.4	0.9	1.2
Norway	1.5	0.8	1.2
Panama	0.7	0.9	0.7
Poland	1.1	1.3	1.2
Portugal	1.7	1.6	1
Qatar	0.3	0.7	0.7
Republic of Korea	2.3	1.8	1.6
Russia	1.7	3.2	2
Saudi Arabia	0.4	0.7	0.8
Singapore	1.7	1.2	0.9
Slovakia	0.9	1.4	1.5
South Africa	-3.5	4.7	4.5
Spain	1.4	1.1	0.7
Sweden	0.9	0.9	0.6
Switzerland	1.3	1.1	0.6
Turkey	1.8	1.8	1.5
United Arab Emirates	1	1	0.7
United Kingdom	1.3	1.6	0.3
United States	0.9	0.9	-0.3

Source: WHO

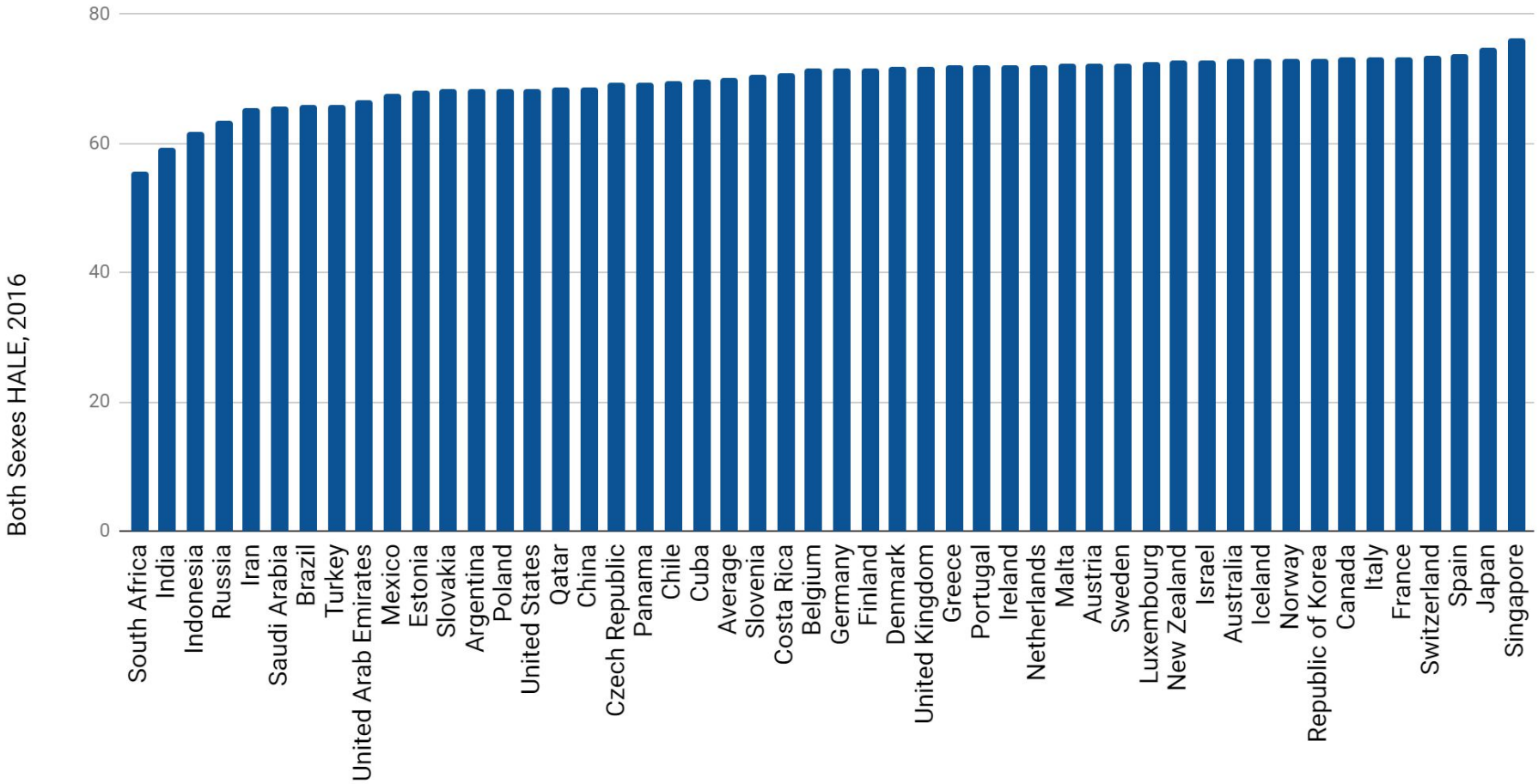
Indicators Dynamics: Life Expectancy at birth



High-income European countries and countries beyond Europe, Canada and Australia experienced a slowdown in life expectancy improvements in recent years. The slowdown in improvement since 2011 has been greatest in the USA, where life expectancy improvements have not just slowed but have reversed in the most recent years. The exception is Japan which experienced increase in life expectancy. Advancing in expectancy improvements is observed in Mexico, Brazil and Argentina.

Source: WHO

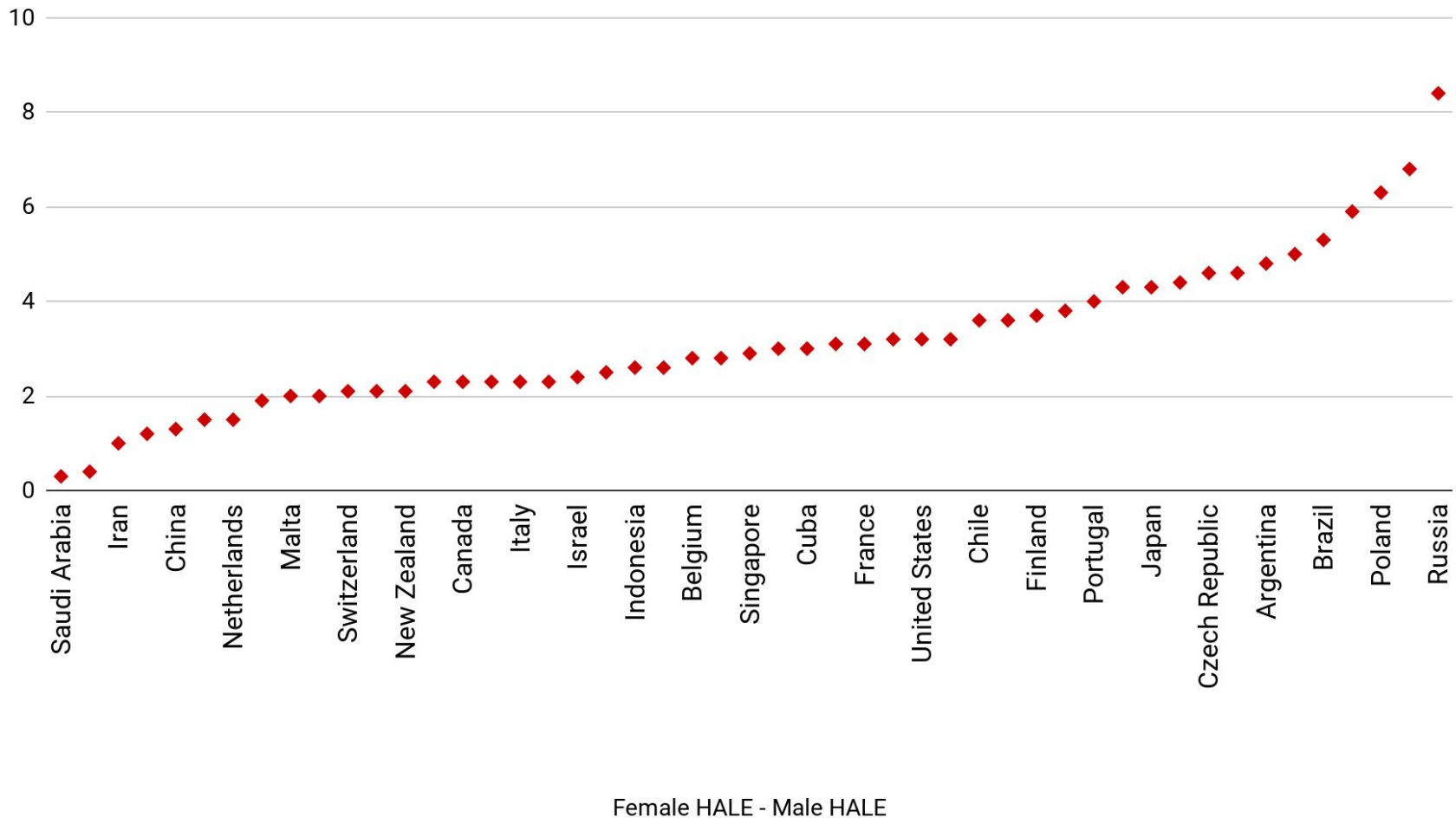
Health-Adjusted Life Expectancy at birth



Developed countries have higher health-adjusted life expectancy comparing to developing countries. HALE at birth in countries varies significantly. The highest value is in Singapore and the lowest value is in South Africa, they equal 76.2 and 55.7 years accordingly. The United States is the high-income country where life expectancy is marginally low the average level of chosen countries (70 years). Poland has the lowest HALE among European Union countries presented in the report.

Source: WHO

Difference between Female and Male HALE at birth



The highest difference between female and male health-adjusted life expectancy among chosen countries is in Russian Federation and it equals 8.4 years. Among high-income countries the highest difference is in Japan. Women tend to engage in fewer behaviors that are bad for health than men do. They also better profit from current advances in health care and living conditions.

Source: WHO

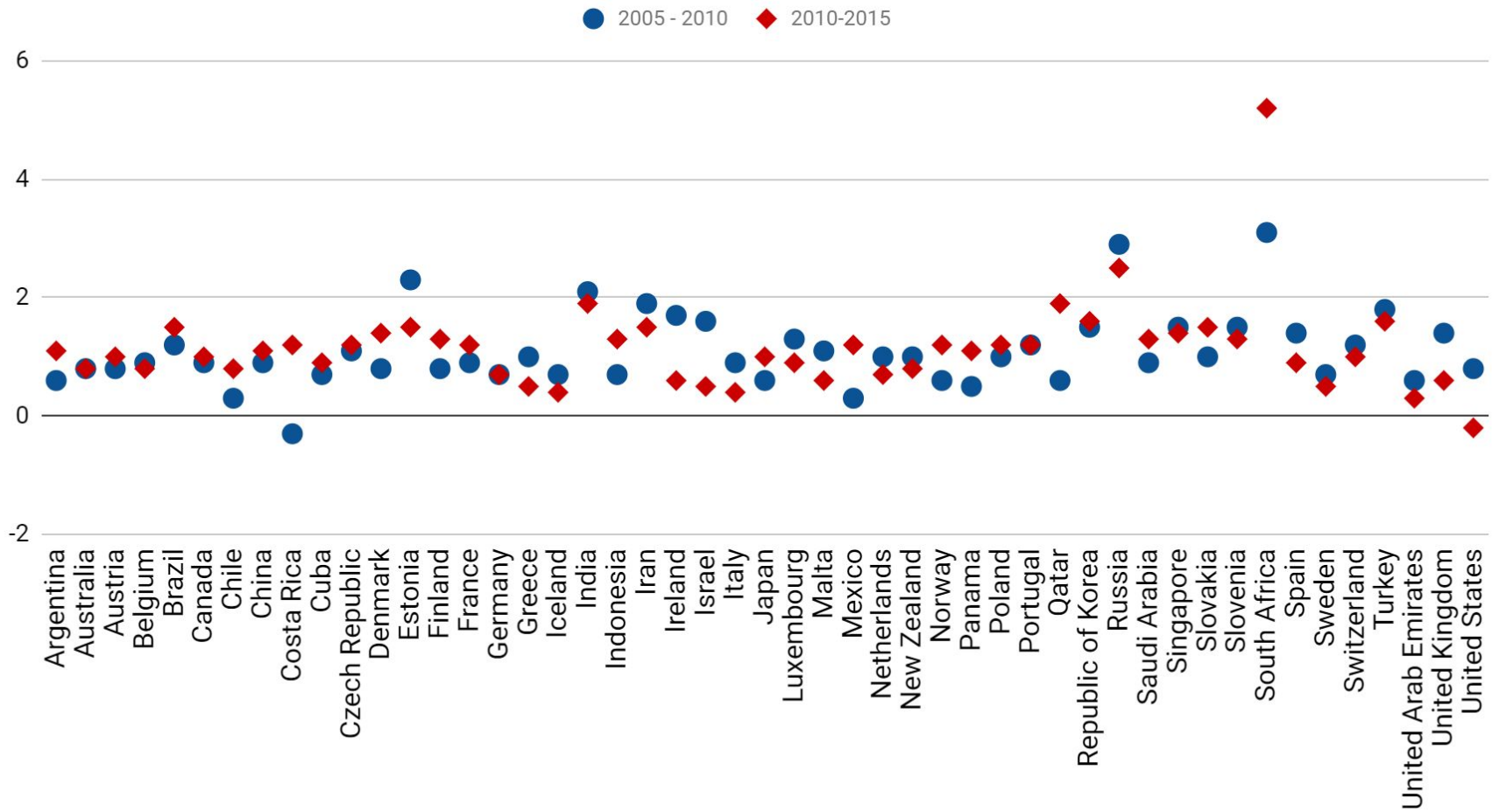
Indicators Dynamics: HALE at birth

Country	2005 - 2010	2010-2015
Argentina	0.6	1.1
Australia	0.8	0.8
Austria	0.8	1
Belgium	0.9	0.8
Brazil	1.2	1.5
Canada	0.9	1
Chile	0.3	0.8
China	0.9	1.1
Costa Rica	-0.3	1.2
Cuba	0.7	0.9
Czech Republic	1.1	1.2
Denmark	0.8	1.4
Estonia	2.3	1.5
Finland	0.8	1.3
France	0.9	1.2
Germany	0.7	0.7
Greece	1	0.5
Hong Kong, SAR	-	-
Iceland	0.7	0.4
India	2.1	1.9
Indonesia	0.7	1.3
Iran	1.9	1.5
Ireland	1.7	0.6
Israel	1.6	0.5
Italy	0.9	0.4

Country	2005 - 2010	2010-2015
Japan	0.6	1
Luxembourg	1.3	0.9
Malta	1.1	0.6
Mexico	0.3	1.2
Netherlands	1	0.7
New Zealand	1	0.8
Norway	0.6	1.2
Panama	0.5	1.1
Poland	1	1.2
Portugal	1.2	1.2
Qatar	0.6	1.9
Republic of Korea	1.5	1.6
Russia	2.9	2.5
Saudi Arabia	0.9	1.3
Singapore	1.5	1.4
Slovakia	1	1.5
Slovenia	1.5	1.3
South Africa	3.1	5.2
Spain	1.4	0.9
Sweden	0.7	0.5
Switzerland	1.2	1
Turkey	1.8	1.6
United Arab Emirates	0.6	0.3
United Kingdom	1.4	0.6
United States	0.8	-0.2

Source: WHO

Indicators Dynamics: HALE at birth



High-income experienced a slowdown in health-adjusted life expectancy improvements in recent years. The slowdown in improvement since 2010 has been greatest in the USA, where life expectancy improvements have not just slowed but have reversed in the most recent years. The exception is Japan which experienced increase in life expectancy. Advancing in expectancy improvements is observed in Mexico, Brazil and Argentina.

Source: WHO

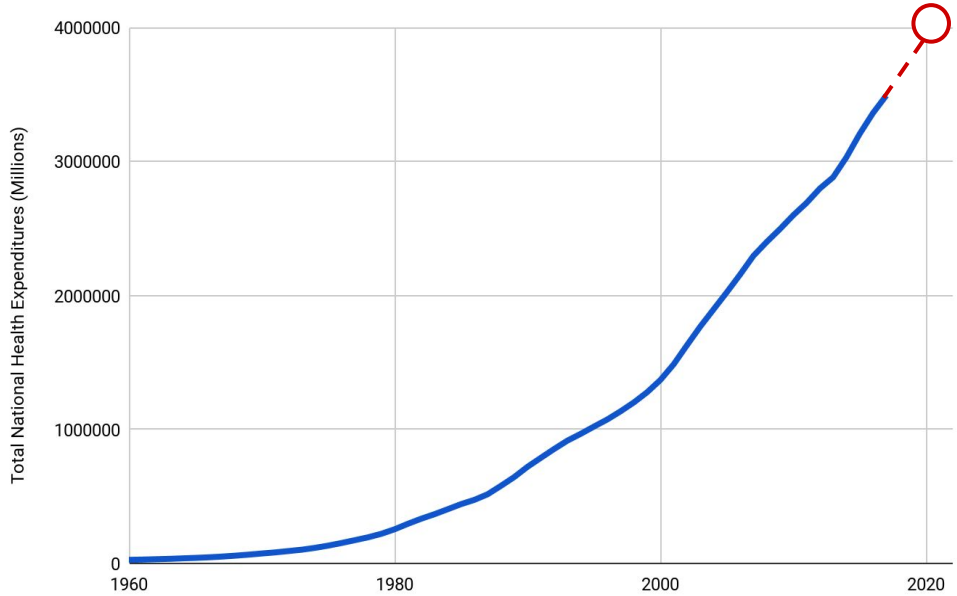
Two Opposite Trends in the United States: Surge in Healthcare Expenditure and Slowdown in Life Expectancy

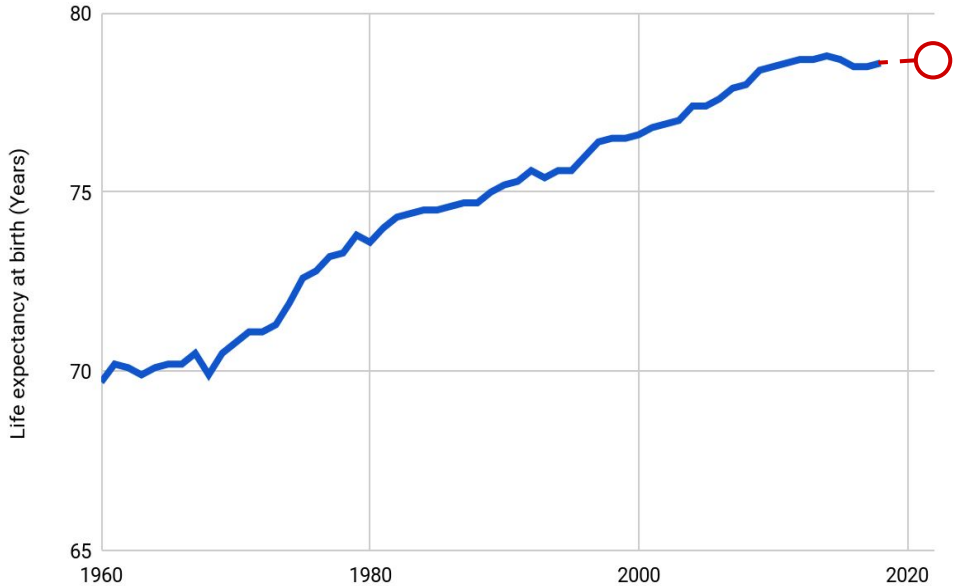
The US currently has a significant gap between its healthy-adjusted life expectancy (HALE) of 70 years and life expectancy at birth of 77 years, compared to a gap of 4 years in Singapore (78 years and 82 years, respectively). Its life expectancy at birth ranks 25th globally, yet its health care expenditures are the highest among all developed countries.

The situation in the US does not stem from the developed state of its science, technology or medicine. Rather, it is rooted in policy. This report seeks to analyze specific policy initiatives that can enable the US to turn its health deficit around.

In the United States, there has been a rapid increase of total national health expenditure (millions $) over time. In 2017, this figure reached an enormous value of almost 3.5 trillion dollars. There is a trend of further expenditure increase in this field.

Despite the increasing total national health expenditure, there is an opposite trend in life expectancy at birth (years). The amount of decrease in life expectancy is less alarming than the fact that addiction and a decline in the emotional wellbeing of Americans have contributed significantly to decrease of the average length of life in the United States.





Source: The World Bank | CMS.gov

Life Expectancy Slowdown in the United States

Indicators	Absolute change (years)		
	2000-2005	2005-2010	2011-2016
Life Expectancy at birth	0.7	1.1	**-0.3**
Healthy life expectancy at birth	0.5	0.8	**-0.4**
Life Expectancy at age 60 years	0.7	0.9	**0**
Healthy life expectancy at age 60 years	1	0.6	**0.1**

US States with Longest *Healthy* Life Expectancy	US States with Shortest *Healthy* Life Expectancy
1. Minnesota - 70.3 healthy years	50. West Virginia - 63.8 healthy years
2. Hawaii - 70.1 healthy years	49. Kentucky - 64.3 healthy years
3. California - 69.9 healthy years	48. Oklahoma - 64.5 healthy years
4. Washington - 69.1 healthy years	47. Alabama - 64.6 healthy years
5. Vermont - 69 healthy years	46. Mississippi - 64.9 healthy years

Source: World Health Organization | Risk Factors

The average life expectancy in the US has been on the decline for three consecutive years since 2014.

A baby born in 2017 is expected to live to 78.6 years, which is down from 78.7 years in 2016, according to data from the Centers for Disease Control and Prevention's National Center for Health Statistics.

The last three years represent the longest consecutive decline in the American lifespan at birth since the period between 1915 and 1918, which included World War I and the Spanish Flu pandemic, events that killed many millions worldwide.

Before the recent decline, life expectancy had been steadily rising in the US — which is to be expected of an advanced nation, particularly one that spends more money per citizen on health care than any other country. But high health care expenditure does not indicate better health care coverage and improved care delivery system. Health care in the US is about twice as expensive as it is in any other developed country. The cost of this financial burden for every household because of lost wages, higher premiums, taxes and additional out-of-pocket expenses is huge.

Even with all this money being spent on health care, the World Health Organization ranked the US 37th in health care systems, and The Commonwealth Fund placed the US last among the top 11 industrialized countries in overall health care.

United States: Life Expectancy (LE), Causes of Death & Disability, Risk Factors – Global Comparison

Country	LE at Birth	Healthy LE at Birth	Health Expenditures per Capita	Top 10 Causes of Death	Top 10 Causes of Disability	Top 10 Risk Factors Driving Death and Disability
Singapore	82.9	76.2	$2,280	**1.** IHD **2.** Lower resp. infections **3.** Alzheimer's **4.** Stroke **5.** Lung cancer **6.** Colorectal cancer **7.** Hypertensive heart disease **8.** Chronic kidney disease **9.** Liver cancer **10.** Self-harm	**1.** Low back pain **2.** Headache disorders **3.** Depression **4.** Falls **5.** Diabetes **6.** Neck pain **7.** Neonatal disorders **8.** Age-related hearing loss **9.** Anxiety disorders **10.** Other musculoskeletal	**1.** Dietary Risks **2.** Tobacco **3.** High blood pressure **4.** High fasting plasma glucose **5. High BMI** **6.** High LDL **7.** Occupational risks **8.** Air pollution **9.** Impaired kidney function **10.** Malnutrition
Japan	84.2	74.8	$3,733	**1.** Alzheimer's **2.** IHD **3.** Stroke **4.** Lower resp. infections **5.** Lung cancer **6.** Colorectal cancer **7.** Stomach cancer **8.** Chronic kidney disease **9.** COPD **10.** Pancreatic cancer	**1.** Low back pain **2.** Age-related hearing loss **3.** Falls **4.** Depression **5.** Headache disorders **6.** Stroke **7.** Diabetes **8.** Neck pain **9.** Alzheimer's **10.** Oral disorders	**1.** Tobacco **2.** Dietary risks **3.** High blood pressure **4.** High fasting plasma glucose **5. High BMI** **6.** Occupational risks **7.** High HDL **8.** Impaired kidney function **9.** Air pollution **10.** Alcohol use
Spain	83.1	73.8	$2,354	**1.** IHD **2.** Alzheimer's **3.** Stroke **4.** COPD **5.** Lung cancer **6.** Colorectal cancer **7.** Lower resp. infections **8.** Chronic kidney disease **9.** Diabetes **10.** Cirrhosis	**1.** Low back pain **2.** Headache disorders **3.** Depression **4.** Diabetes **5.** Neck pain **6.** Age-related hearing loss **7.** Falls **8.** Anxiety disorders **9.** Other musculoskeletal **10.** COPD	**1.** Tobacco **2.** High fasting plasma glucose **3.** High blood pressure **4. High BMI** **5.** Dietary risks **6.** Alcohol use **7.** High HDL **8.** Occupational risks **9.** Air pollution **10.** Impaired kidney function
Switzerland	83.3	73.5	$9,818	**1.** IHD **2.** Alzheimer's **3.** Stroke **4.** Lung cancer **5.** COPD **6.** Falls **7.** Colorectal cancer **8.** Lower resp. infections **9.** Chronic kidney disease **10.** Hypertensive heart disease	**1.** Low back pain **2.** Headache disorders **3.** Diabetes **4.** Neck pain **5.** Depression **6.** Falls **7.** Anxiety disorders **8.** Age-related hearing loss **9.** COPD **10.** Other musculoskeletal	**1.** Tobacco **2.** High fasting plasma glucose **3.** Dietary risks **4. High BMI** **5.** High blood pressure **6.** Occupational risks **7.** Alcohol use **8.** High LDL **9.** Air pollution **10.** Impaired kidney function
France	82.9	73.4	$4,026	**1.** Alzheimer's **2.** IHD **3.** Stroke **4.** Lung cancer **5.** Colorectal cancer **6.** Lower resp. infections **7.** COPD **8.** Falls **9.** Breast cancer **10.** Pancreatic cancer	**1.** Low back pain **2.** Headache disorders **3.** Depression **4.** Falls **5.** Anxiety disorders **6.** Age-related hearing loss **7.** Neck pain **8.** Diabetes **9.** Other musculoskeletal **10.** Oral disorders	**1.** Tobacco **2.** Dietary risks **3.** Alcohol use **4.** High blood pressure **5.** High fasting plasma glucose **6. High BMI** **7.** Occupational risks **8.** High LDL **9.** Air pollution **10.** Impaired kidney function
USA	**78.5**	**68.5**	**$9,536**	**1.** IHD **2.** Alzheimer's **3.** Lung cancer **4.** Stroke **5.** COPD **6.** Lower resp. infections **7.** Chronic kidney disease **8.** Colorectal cancer **9. Diabetes** **10.** Drug use disorders	**1.** Low back pain **2.** Headache disorders **3.** Diabetes **4.** Drug use **5.** Depression **6.** COPD **7.** Anxiety disorders **8.** Neck pain **9.** Other musculoskeletal **10.** Age-related hearing loss	**1. High BMI** **2.** Tobacco **3.** Dietary risks **4.** High fasting plasma glucose **5.** High blood pressure **6.** Drug use **7.** Alcohol use **8.** High LDL **9.** Impaired kidney function **10.** Occupational risks

Main Factors Contributing to the Decline of Life Expectancy in the United States

1. A rise in drug overdoses

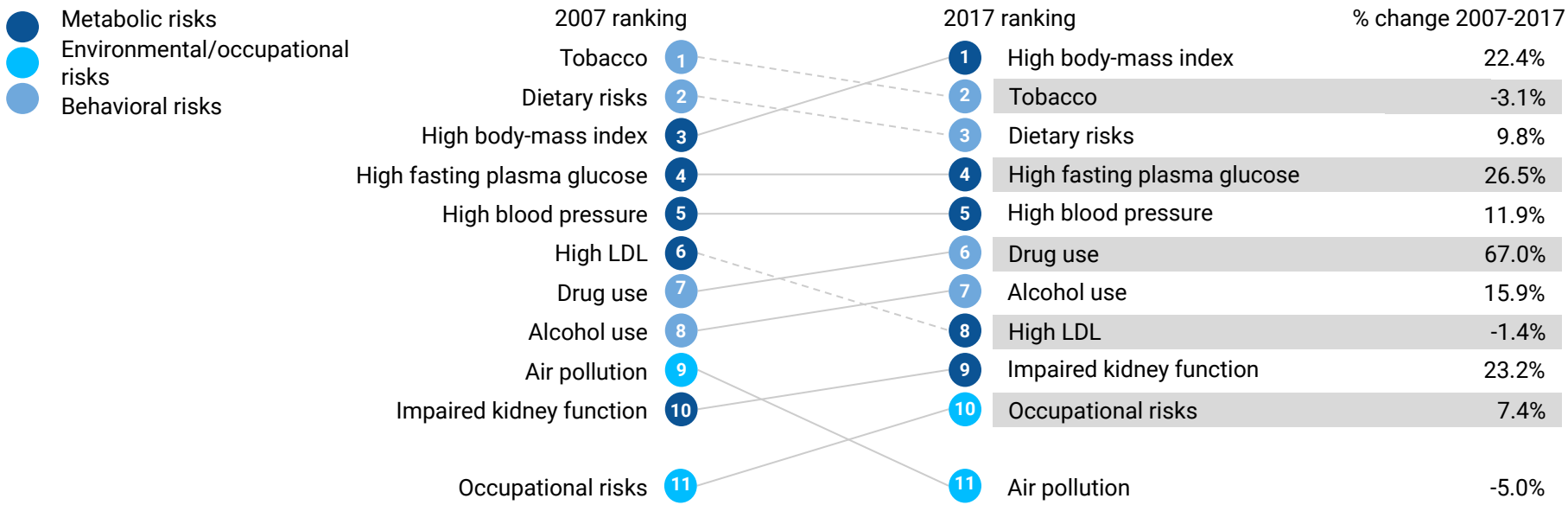
In 2017, more than 70,000 deaths occurred because of drug overdoses. Opioids were involved in more than 47,000 of those. The age-adjusted death rate for drug overdose in the U.S. rose 72% within a decade. Opioids continue to be prescribed at triple the amount they were in 1999, but many are hoping to change that. The federal government has spent more than $2.4 billion in state grants since 2017 in a bid to curb the epidemic.

2. An increase in liver disease

Over a 10-year period, the death rate for chronic liver disease and cirrhosis among men aged 25 to 34 increased by nearly 8% per year, while women in the same age group increased more than 11% per year. The causes of liver disease can vary, from genetics to alcohol consumption and obesity.

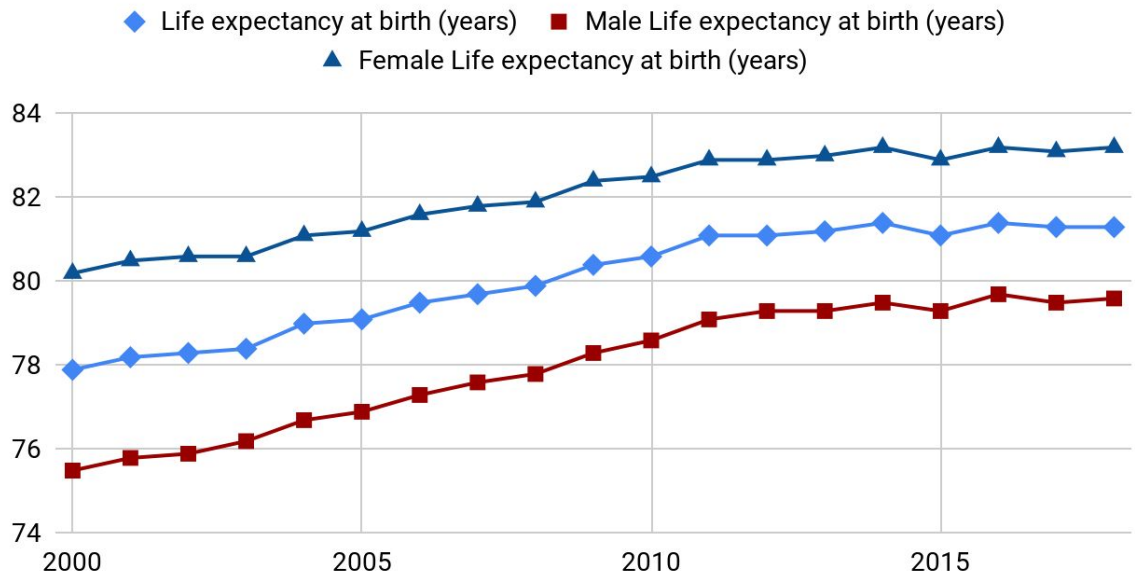
3. A rise in suicide rates

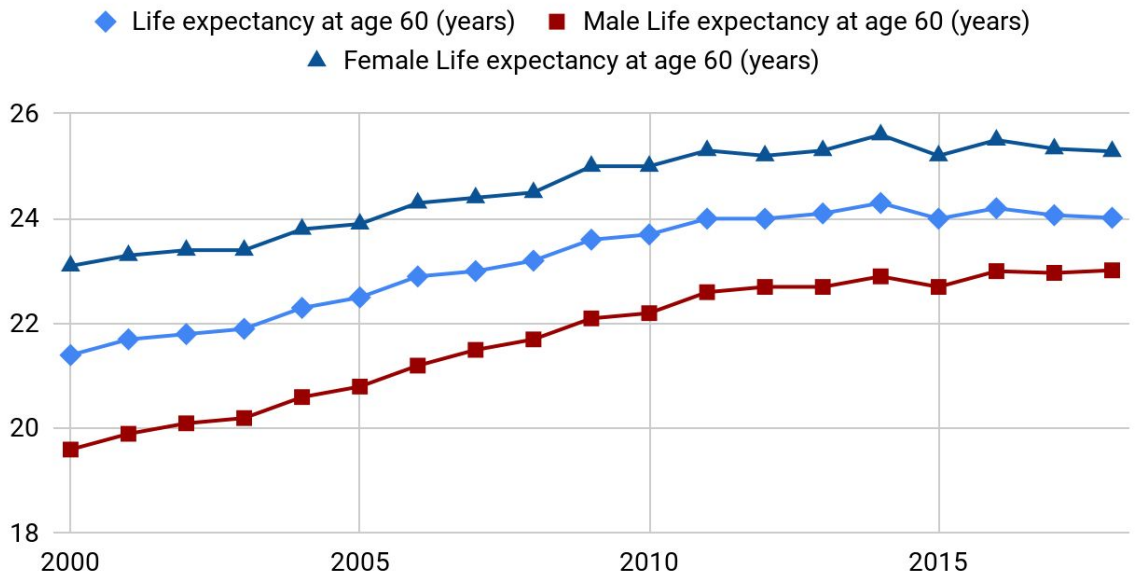
The national suicide rate has increased by 33% since 1999. In 2017 alone, that rate went up by 3.7%. The global suicide rate, meanwhile, has declined by almost 30% since 2000, with the rates in Russia, Japan, South Korea and India falling significantly over the last decade.



Source: IHME

Life Expectancy Slowdown in the United Kingdom





The 20th century saw dramatic improvements in life expectancy resulting from public health measures such as childhood immunisations, the introduction of universal health care, medical advances (such as in treatment of heart disease and cancer) and lifestyle changes, including a decline in smoking. By 2018 life expectancy at birth in England had increased to 79.6 years for males and 83.2 years for females.

The gender gap has narrowed since 2000, with mortality falling faster in males than females as a result of decreases in the high rates of smoking and mortality from cardiovascular diseases among men.

In recent years we observe the slowdown in life expectancy improvements both for male and female population. First of all such a trend is caused by the slowdown in mortality improvements. Stopped improvement in mortality is a result of a constellation of demographic factors such as ageing population and burden of age-related disease. It signals about exhausted demographic potential of the United Kingdom to further quantity improvements in life expectancy.

Source: World Health Organization | Risk Factors

Health Status in the United Kingdom

Rank	Males	% of all deaths	Females	% of all deaths
	Cause		Cause	
1	Heart disease	13.6%	Dementia and Alzheimer's disease	16.6%
2	Dementia and Alzheimer's disease	8.9%	Heart disease	8.1%
3	Lung cancer	6.2%	Stroke	6.7%
4	Chronic lower respiratory diseases	6.1%	Chronic lower respiratory diseases	5.9%
5	Stroke	5.2%	Influenza and pneumonia	5.5%
6	Influenza and pneumonia	4.7%	Lung cancer	5.1%
7	Prostate cancer	4.1%	Breast cancer	3.7%
8	Colorectal and anal cancer	3.1%	Colorectal and anal cancer	2.5%
9	Leukaemia and lymphomas	2.6%	Leukaemia and lymphomas	1.9%
10	Cirrhosis and other diseases of liver	2.0%	Kidney disease and other diseases of the urinary system	1.8%

The leading causes of death for both female and male population are age-related diseases, they are heart diseases and brain dysfunctions, such as dementia and alzheimer's disease.

Among other risks of death are factors that associate with winter and cold weather. There has been a substantial shift in the age structure of the population in recent decades: the number and proportion of people at older ages has increased. There are likely to be more people living with dementia and other long-term conditions that may make them particularly vulnerable to the effects of flu and other winter risk factors, and who may be particularly reliant on health and social care services.

Source: Gov.uk

Main Factors Contributing to the Slowdown in Life Expectancy in the United Kingdom

1. Inequalities in life expectancy

People living in more affluent areas live significantly longer than people living in deprived areas. In 2015–17. Much of this inequality is caused by higher mortality from heart and respiratory disease, and lung cancer, in more deprived areas. The gap in healthy life expectancy at birth is even greater – about 19 years for both males and females, and those living in the most deprived areas spend nearly a third of their lives in poor health, compared with only about a sixth for those in the least deprived areas. Socio-economic inequalities in life expectancy are also widening in both sexes as a result of greater gains in life expectancy in less deprived populations. Between 2012–14 and 2015–17, the difference in life expectancy between the most and least deprived widened by 0.3 years among males and 0.5 years among females. Among females living in the most deprived areas life expectancy fell by 100 days over this period, in contrast to the gain of 84 days among females living in the least deprived areas.

2. A slowdown in improvement in mortality rates for heart disease and stroke

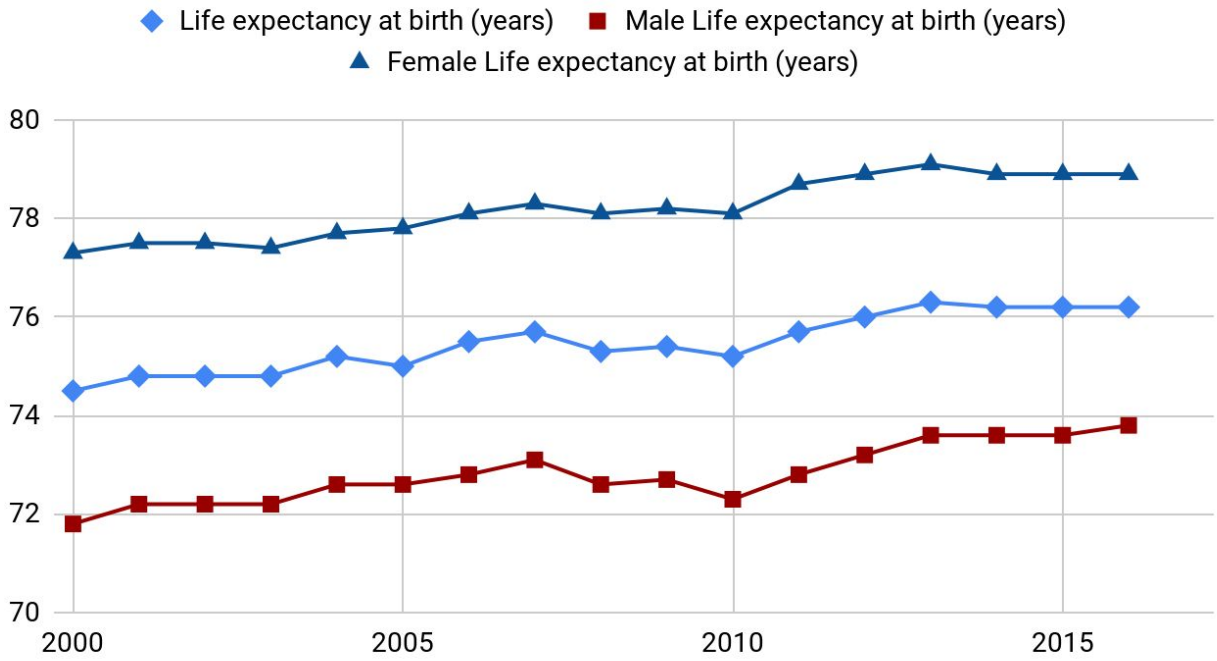
Reductions in mortality from heart disease and stroke, which are leading causes of death, have historically driven improvements in life expectancy. Since 2011, there has been a slowdown in improvement in mortality rates for these causes which has therefore had a large impact on the trend in life expectancy. Up to 80% of these premature heart attacks and strokes are avoidable and this highlights the importance of focusing on preventative interventions such as stopping smoking, getting more physically active and lowering blood pressure and cholesterol levels. Stepping up efforts to reduce the risk of heart disease and stroke will also mean addressing the underlying wider determinants of health.

3. No improvement in death rates in young adults

While flu, heart disease and stroke have partly determined the trend in mortality rates in older adults, other causes of death have influenced the trend in younger people. Mortality rates among younger adults made almost no positive contribution to trends in life expectancy between 2011 and 2016, despite making small positive contributions in earlier years. The cause of death that had the biggest negative impact was accidental poisoning, with 70% of these deaths due to drug misuse and 10% due to alcohol. In the age group 20 to 34 years the leading causes of death are suicide & injury or poisoning of undetermined intent, accidental poisoning, transport accidents.

Source: The KIng's Fund

Life Expectancy Slowdown in Mexico



Life expectancy, just like malnutrition and infant mortality statistics, shows how well a certain country is living.

Between 2005 and 2015, average life expectancy in Mexico fluctuated. Life expectancy in the country was 77.8 years for women and 72.6 for men in 2005, but by 2010 the figures decreased to 78.1 for women and 72.3 for men. This is in stark contrast to most of the world where life expectancies are rapidly increasing elsewhere, which have gone up continuously since 2000, according to the WHO, which cites improvements in health care and the development of medical devices and pharmaceutical products.

According to the National Population Council (CONAPO) report, recent fluctuations in life expectancy are a reflection of changes in mortality levels due to the increase in older adults and deaths related to diabetes mellitus and violent causes.

Source: World Health Organization | Risk Factors

Health Status in Mexico

Risk Factor	National Target Set	Indicator	2016
Premature mortality from NCDs	X	Total NCD deaths	521 800
		Risk of premature death between 30-70 years (%)	16
Harmful use of alcohol	X	Total alcohol per capita consumption, adults aged 15+ (litres of pure alcohol)	7
Physical inactivity	X	Physical inactivity, adults aged 18+ (%)	28
Salt/Sodium intake	X	Mean population salt intake, adults aged 20+ (g/day)	7
Tobacco use	X	Current tobacco smoking, adults aged 15+ (%)	14
Raised blood pressure	X	Raised blood pressure, adults aged 18+ (%)	19
Diabetes	X	Raised blood glucose, adults aged 18+ (%)	10
Obesity	X	Obesity, adults aged 18+ (%)	28
		Obesity, adolescents aged 10-19 (%)	14

Risk Factor: Mexicans have the second highest prevalence of obesity in the OECD (33% of adults), and highest overall share of population overweight or obese (73%). However, the country also has the lowest rates of daily smoking (7.6% compared to an OECD average of 18.4%) and consumes little alcohol (5.2 litres of annual pure alcohol per capita compared to an OECD average of 9.0 litres).

Resources: health spending averages $1 080 per person (adjusted for local costs), four times lower than the OECD average of $4 003. Mexico has 2.4 doctors per 1000 population relative to 3.4 on average across the OECD, and less than one-third the number of nurses and hospital beds per 1000 population than the OECD average.

Source: WHO

Main Factors Contributing to the Slowdown in Life Expectancy in Mexico

1. Obesity is drastically reducing the quality of life in Mexico and shortening life expectancy

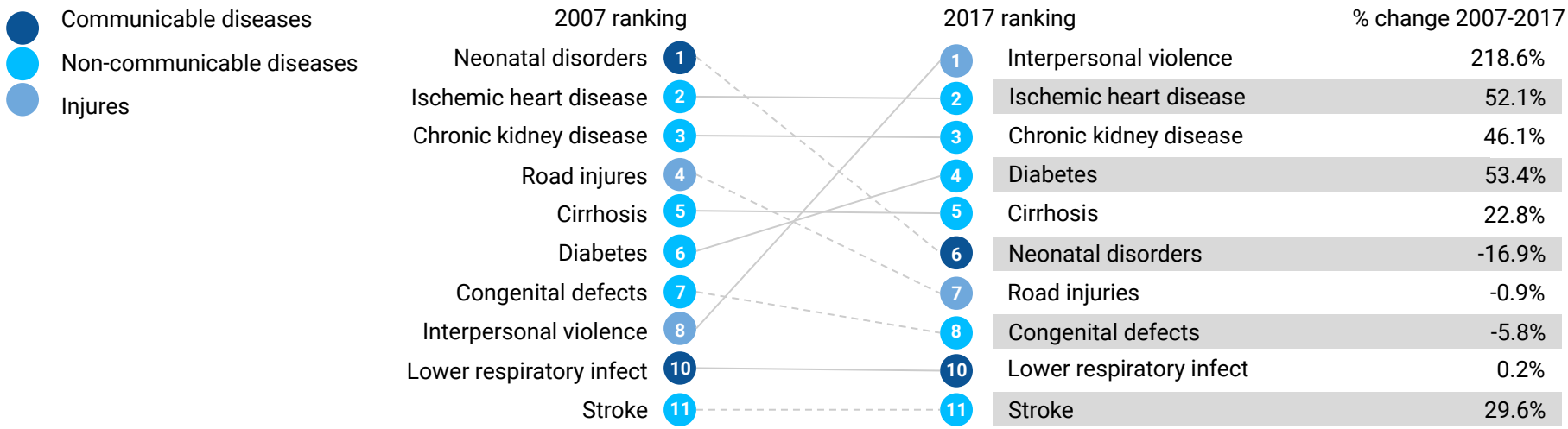
At just over 33%, the rate of adult obesity in Mexico. Further, 35% of teenagers aged 12 to 19 are overweight or obese. Obesity is a well-known risk factor for many chronic diseases. It largely explains why Mexico has the highest prevalence of diabetes among OECD countries (15.8% of adults affected). High obesity rates, along with other factors such as a lack of progress in reducing mortality from circulatory diseases, high death rates from road traffic accidents and homicides, as well as persistent barriers of access to quality care, explain why gains in life expectancy in Mexico have been slower in recent years (+3.8 years between 1985 and 2000, relative to +1.7 years between 2000 and 2015).

2. Health inequality

There is a noticeable gap between life expectancies based on the various regions in Mexico. For example, in 2015, Mexico City was the region with the highest life expectancy at 76.2, while Guerrero had the lowest life expectancy at 72.7.

3. Murders and crime

Before 2007, around 10,000 people were murdered each year in Mexico. However, since the start of the war on drug trafficking in Mexico, homicide rates have increased. In 2018, a new record was set as 28,816 people were murdered. President Andrés Manuel López Obrador, who took office in December 2018, has promised to “calm” the country after 12 years of a militarized crackdown on drug-related organized crime.



Source: Healthdata

Public Spendings and Healthcare Efficiency

Methodology

Public spending is a factor making a large impact on the healthcare systems of the countries which indirectly affects health-adjusted life expectancy (HALE) and life expectancy (LE) of population. To help formulate and prioritize among social and health government expenditures, estimations of relationship between HALE and public spendings for countries that differ solely in their national plans, target programmes can provide valuable information.

All the calculations are made on data from open databases provided by the World Bank, World Health Organisation, Organisation of Economic Cooperation and Development.

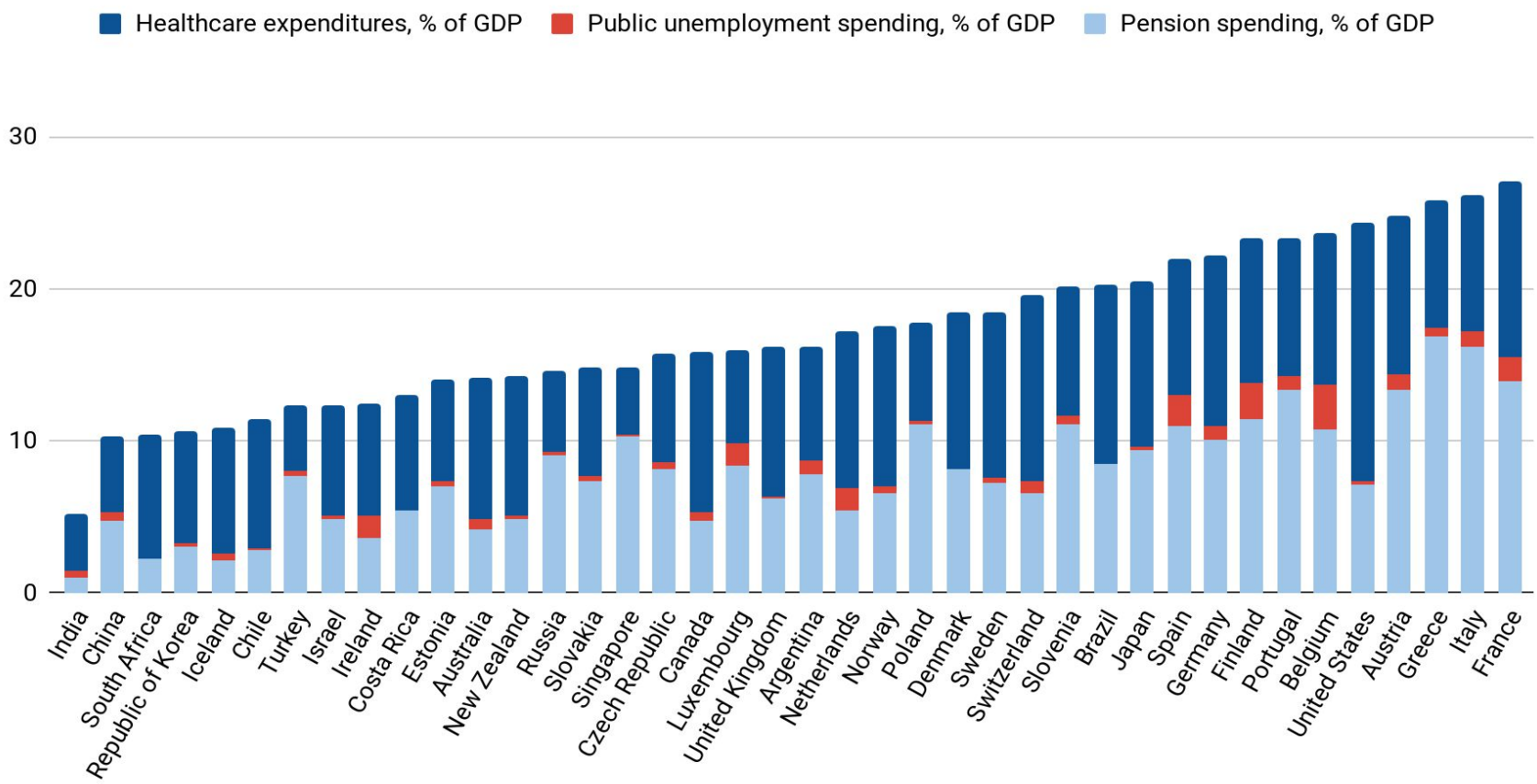
- **Health spending** measures the final consumption of health care goods and services including personal health care and collective services, but excluding spending on investments.
- **Pharmaceutical spending** covers expenditure on prescription medicines and self-medication, Final expenditure on pharmaceuticals includes wholesale and retail margins and value-added tax.
- **Public unemployment spending** is defined as expenditure on cash benefits for people to compensate for unemployment.
- **Pension spending** is as all cash expenditures on old-age and survivors pensions.
- **Social expenditure** comprises cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes. Benefits may be targeted at low-income households, the elderly, disabled, sick, unemployed, or young persons.

The estimator of the relationship between HALE and public spending is intraclass correlation coefficient (ICC).

The assessment of pair correlation between a particular type of spending and HALE was performed in following steps:

1. Divide countries into several groups by the level of spendings (health spending, pharmaceutical spendings, public unemployment spending, pension spending or social expenditure). As data is not available for all countries, in cases (depending on the type of spending) there are different number of groups.
2. Based on distribution of countries by the level of spending calculate mean value of HALE for a particular group of countries.
3. Estimate general variance and variance between groups.
4. Calculate intraclass correlation coefficient. ICC is always non-negative, allowing it to be interpreted as the proportion of total variance that is between groups. This ICC can be generalized to allow for covariate effects.

Social Protection and Healthcare



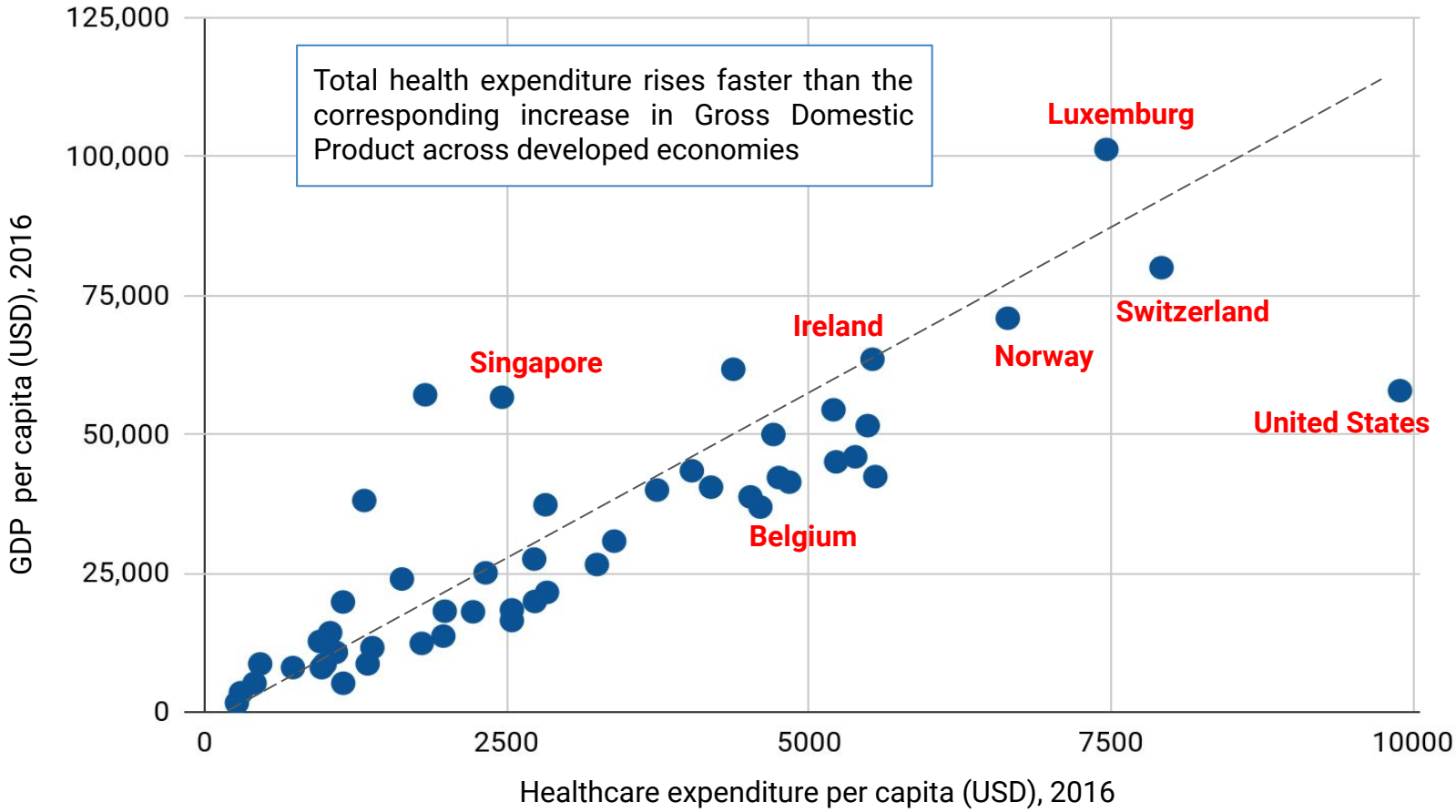
Spending on social protection is distributed unevenly across countries, as each country has particular features of political, economic, and social systems.

In 2016, the United States spent about 17.1 percent of GDP, on health expenditures – more than twice the average among developed countries.

The biggest shares of pension spending is in Greece, equals 16.9%. The high rate in Greece does not translate into high takings per recipient; it is related to the structure of the Greek pension system, which is distributive, operating in a distorted way as there are too few workers and too many pensioners.

Source: OECD

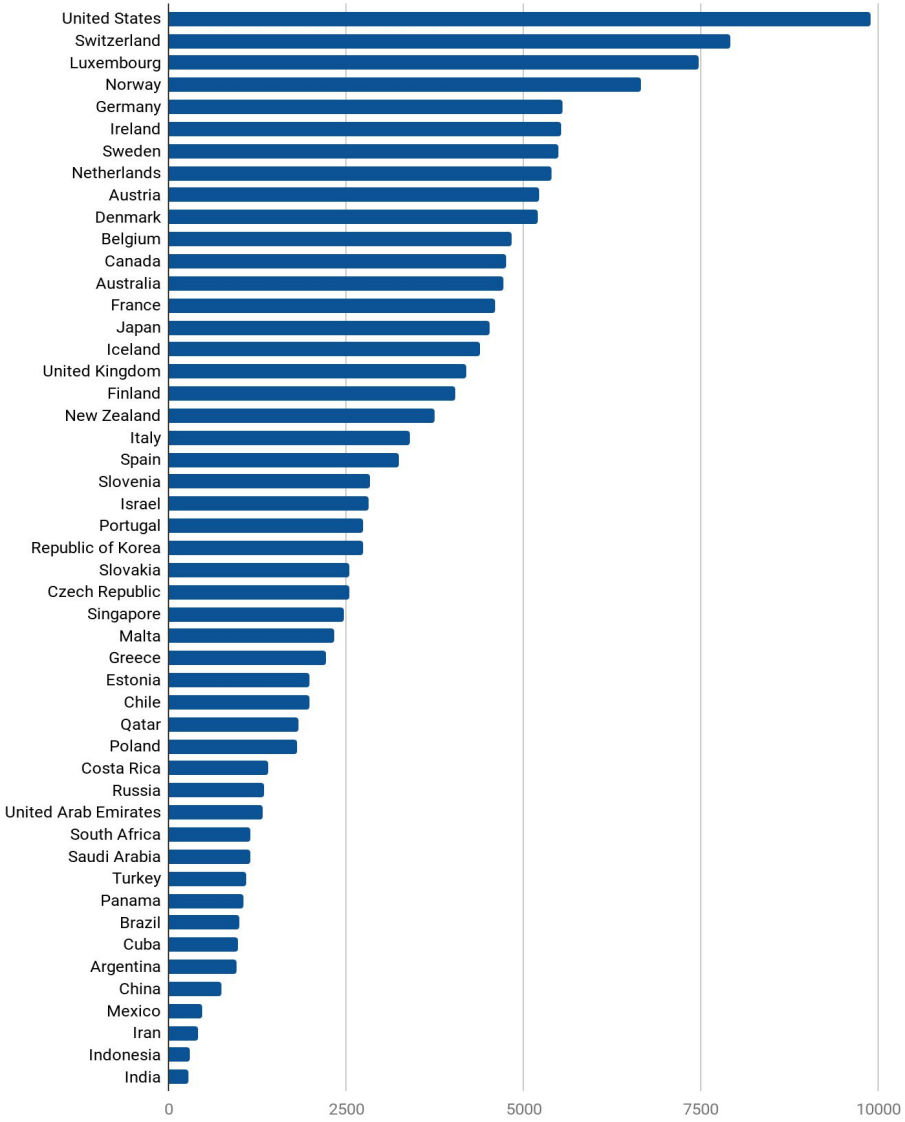
Healthcare Spendings and GDP



This chart collection takes a look at how spendings on healthcare are correlated with GDP per capita. The analysis looks at 2016 health and economic data from the World Bank and Organization of Economic Cooperation and Development (OECD). As would be expected, wealthy countries like the United States, Norway, Switzerland, Luxemburg, and Sweden, tend to spend more per person on health care and related expenses than lower income countries such as India, Brazil, South Africa and Indonesia. However, even as a high income country, the U.S. spends more per person on health than comparable countries. Comparing health spending in countries is complicated, as each country has unique political, economic, and social attributes that contribute to its spending.

Source: World Bank | OECD

Healthcare Expenditures per capita by Country



Healthcare expenditure per capita (USD), 2016

Source: World Bank | OECD

The financial resources that a country devotes to health care and how this changes over time and is a result of a wide array of social and economic factors, as well as financing and organisational structure of country's health system.

The United States spends more on health care than any other country in the world, and a large share of that spending comes from the federal government. Relative to the size of its wealth, the United States spends a disproportionate amount on health care. Compared with the other G7 countries United States spends almost 80% more than Germany and more than twice on healthcare per person in Japan, Canada and France. In the medium term, the US Center for Medicare and Medicaid Services (CMS) expect health spending growth above that of GDP in the United States, driven on by faster growing medical prices.

Per capita spending on health across countries continued to grow in 2016 following the trend of recent years. This comes after the slowdown between 2009 and 2011 caused by the global financial crisis.

Away from Europe, in Singapore health spendings are projected to grow faster than GDP, implying the potential growth of private healthcare. The increase will be focused on research and development for pharmaceutical products, medical devices and laboratory services.

Why the Health Care System is So Expensive in the United States

1. Administrative Costs

About one quarter of health care cost is associated with administration, which is far higher than in any other country.

2. Drug Costs

Another major difference in health costs between the US and every other developed nation is the cost of drugs. In most countries, the government negotiates drug prices with the drug makers, but when Congress created Medicare Part D, it specifically denied Medicare the right to use its power to negotiate drug prices.

3. Defensive Medicine

Another big driver of the higher US health insurance bill is the practice of defensive medicine. A 2010 Gallup survey estimated that $650 billion annually could be attributed to defensive medicine. Everyone pays this with higher insurance premiums, and out-of-pocket costs, as well as taxes that go toward paying for governmental health care programs.

4. Expensive Mix of Treatments

US medical practitioners also tend to use a more expensive mix of treatments. According to a 2019 OECD report, 17.1% of the United States' GDP was spent on health in 2017. More people in the US are treated by specialists, whose fees are higher than primary-care doctors when the same types of treatments are done at the primary-care level in other countries.

5. Wages and Work Rules

Wages and staffing also drive up costs in health care. Specialists are commanding high reimbursements, and the over-utilization of specialists through the current process of referral decision-making drives health costs even higher.

6. Branding

Providers who can demand the highest prices are the ones who create a brand everyone wants. In some markets, the prestigious medical institutions can name their price.

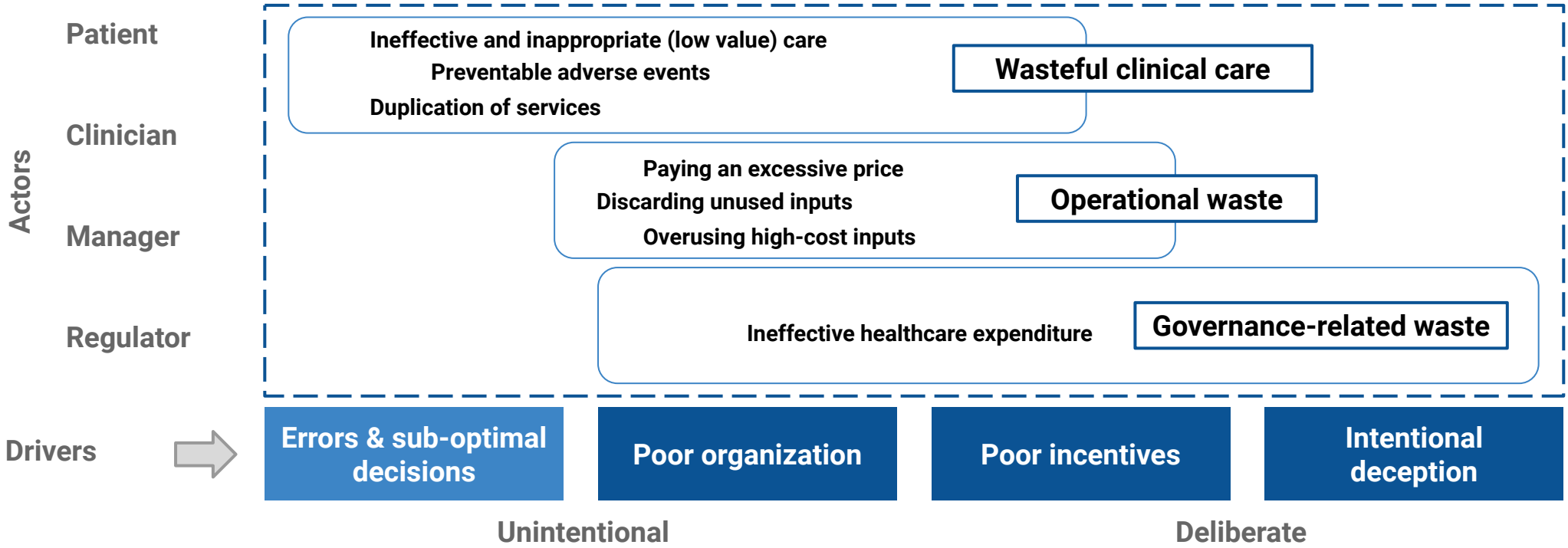
Source: Consumer Reports

Wasteful Health Care Spendings

Health expenditure is rising in the United States as in most OECD countries. Yet, a considerable part of this health expenditure makes little or no contribution to improving people's health. In some cases, it even results in worse health outcomes. The United States could potentially spend significantly less on health care with no impact on health system performance or on health outcomes.

Behavioral root causes of wasteful health care spendings include the following:

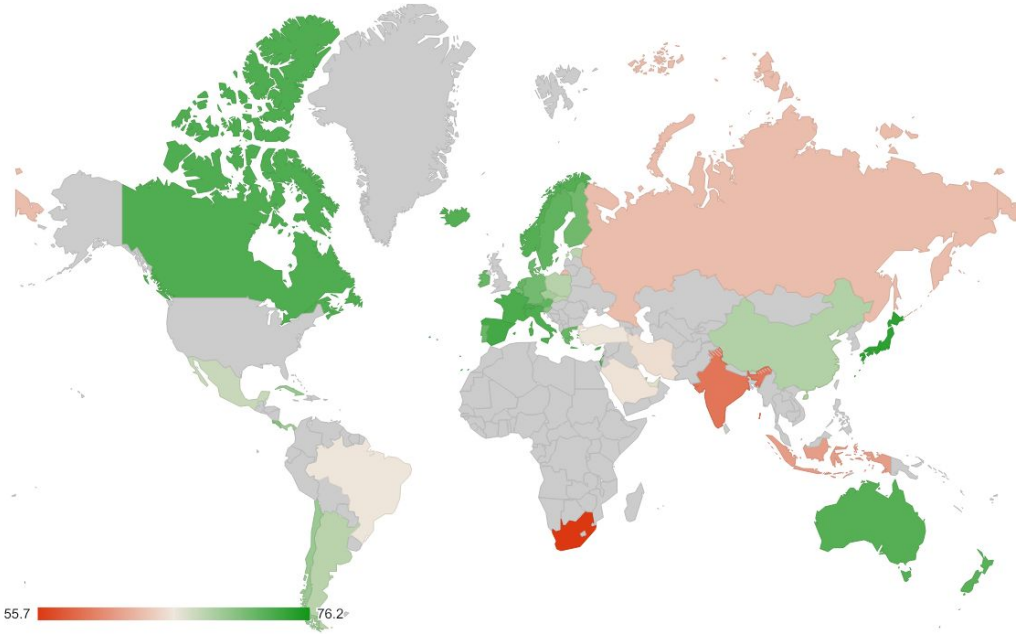
- imperfect knowledge and cognitive biases;
- poor management, organization and coordination;
- incentives misaligned with system goals.



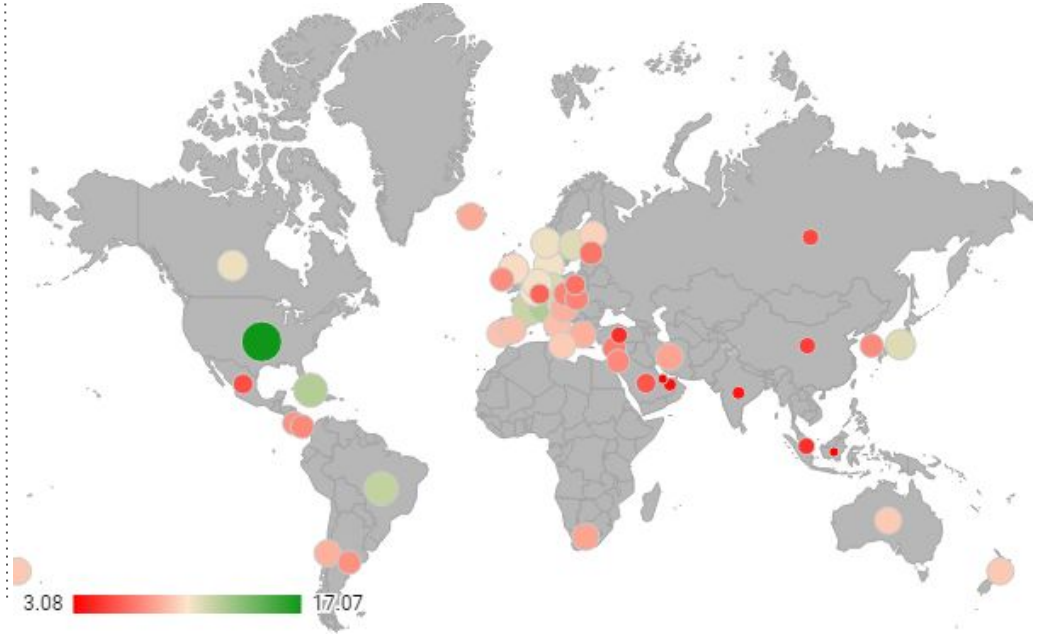
Source: OECD

HALE and Life Expectancy: Factors Affecting HALE

Both Sexes HALE



Public Health Care Expenditure (as % of GDP)



Public share of health care expenditure is a major characteristic of a country's health care policy and therefore is a key variable with regard to the purpose research. There is wide variation in the percentage of public healthcare expenditure across countries, reflecting profound differences in health care systems around the world.Therefore, public share of health care expenditure influences the efficiency of health care, rather than being an input in the health production function.

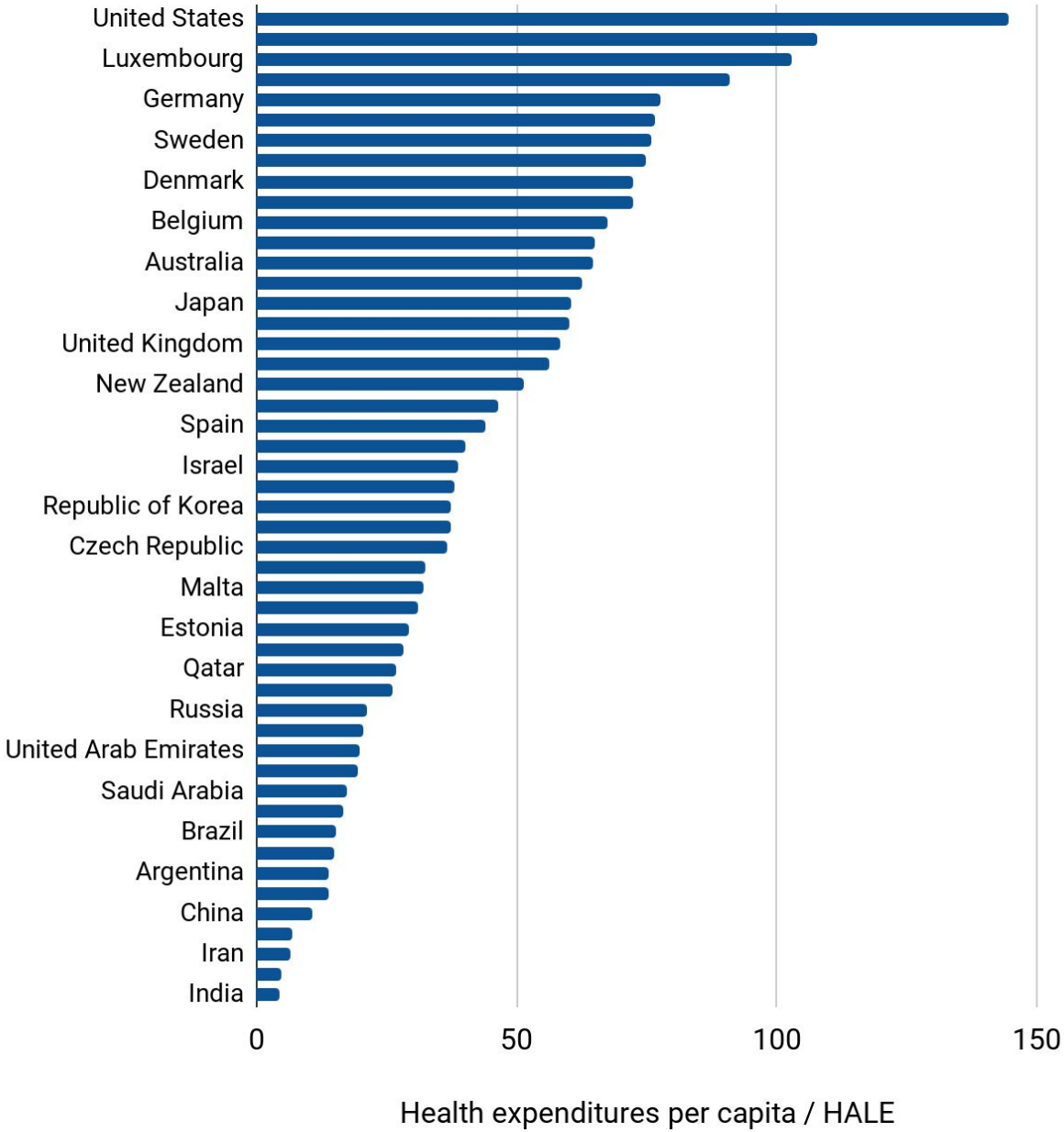
Efficiency of healthcare system can not be simply measured by the greatest share of healthcare expenditures as percentage of GDP. Health spending includes consumption of health care goods and services including personal health care and collective services. It is a complex indicator that varies across countries. Healthcare spendings in developed countries are affected with higher prices, high administrative and transaction costs. That is why not in all cases higher healthcare spendings contribute to efficiency of healthcare system and better health.

Tackling Wasteful Spending on Health

Wasteful Health Care Expenditures	Tackling Issues
Clinical Care	◆ Development of robust information systems to identify low-value care ◆ Creation of reporting and learning systems of adverse events ◆ Patient-reported measures to receive value and safety from the perspective of care recipient ◆ Adherence to clinical guidelines and protocols can be encouraged by audits and feedback ◆ Behavior change campaigns ◆ Financial incentives and nudges in form of disinvestments
Operational Care	◆ Payments and financial incentives to promote day-surgery ◆ Behaviour change for providers and patients through clinical guidelines and disease management ◆ Promotion of self-management by patients and education campaigns
Government Care	◆ Acting in the detection, prevention and response to fraud in the delivery and financing of care ◆ Proactively seek to identify problem areas (data mining, campaigns targeted at specific types of care susceptible to abuse ◆ Combat inappropriate business practices
Strategies to reduce waste can be summed up as: stop doing things that do not bring value, and swap when equivalent but less pricey alternatives exist.	

Source: OECD

Healthcare Spending and HALE



Healthcare spendings per capita divided by HALE is efficiency ratio. It shows how much is spent on average in one healthy life year .

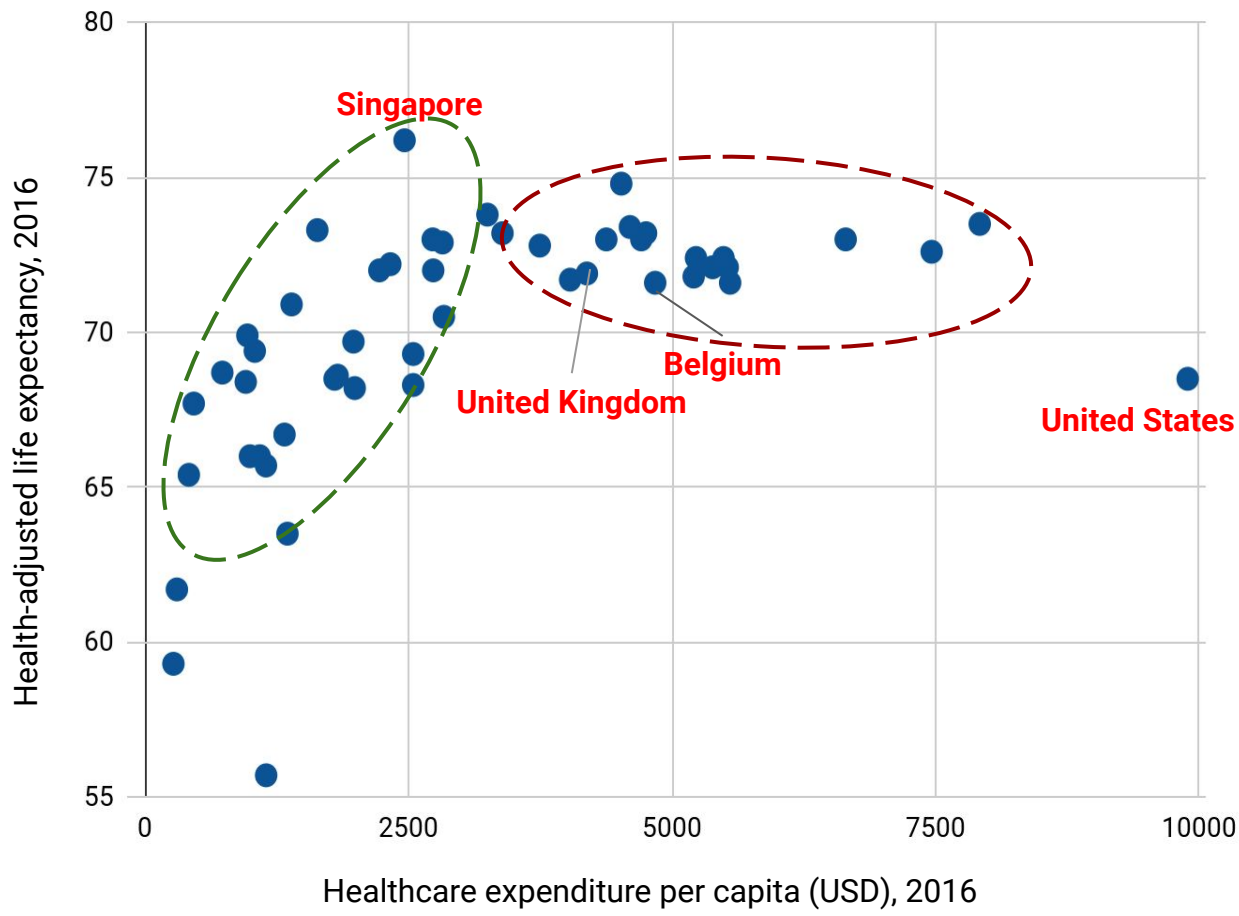
The United States spends a disproportionate amount on health care, more than any other country, but HALE is relatively low. It occurs because chronic disease is now the biggest threat to the longevity. The United States now has the lowest HALE levels among high-income developed countries, including Western Europe, Australia, and Japan.

The Luxembourg healthcare system is one of the most comprehensive systems in the world offering virtually unrestricted access to the Luxembourg population. It also ranks in the top five countries for per-capita healthcare expenditure. The total spending on healthcare is almost 8% of the country's Gross Domestic Product (GDP). High health spendings correlates with high HALE and life expectancy.

India has the lowest value of indicator. India spends the least amount. The main problem is the lack of healthcare facilities which contributes to bad health and low HALE.

Source: OECD | WHO

Healthcare Spending and Health-adjusted Life Expectancy



This chart collection takes a look at how spending on healthcare are correlated with Health – Adjusted Life Expectancy. The analysis looks at 2016 health data from OECD and World Health Organization.

As we can see there is no linear relationship between the life expectancy and healthcare expenditures. It means that more public expenditures on healthcare do not guarantee healthier and longer life.

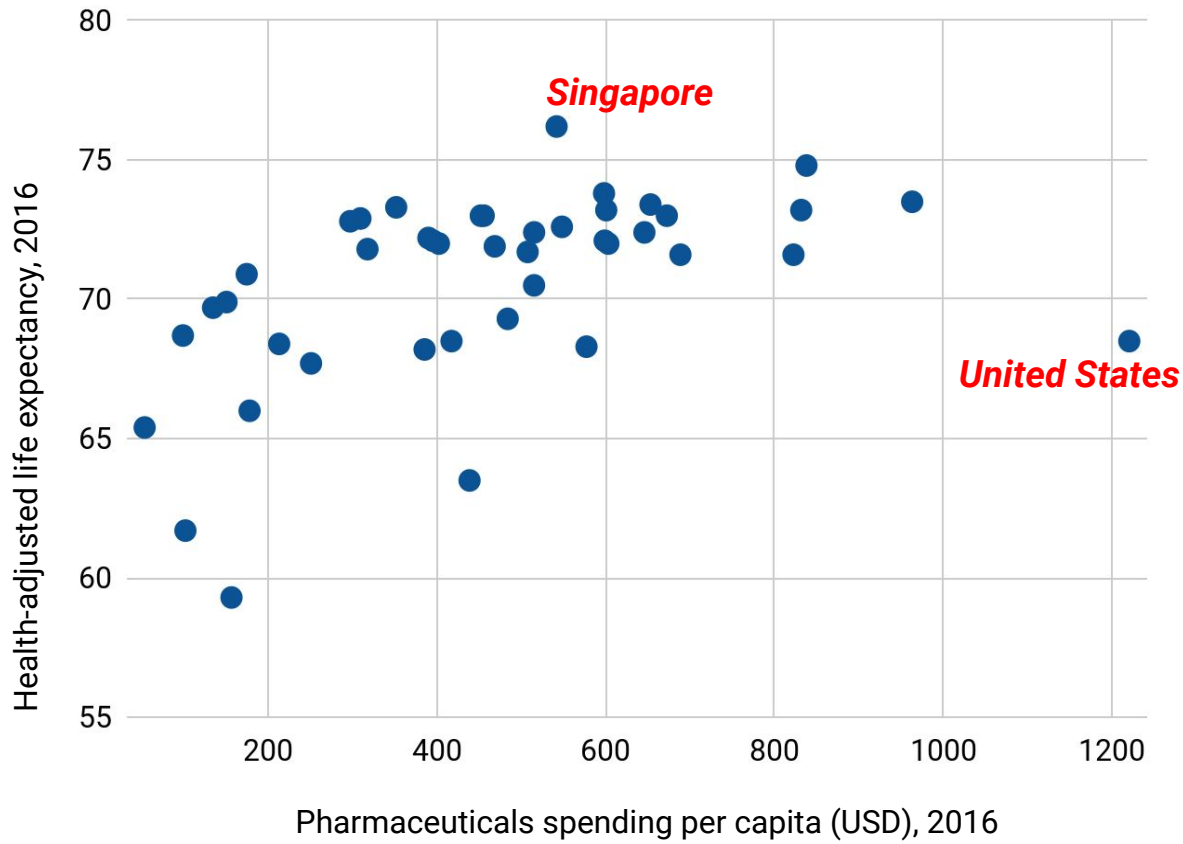
The graph we could divide into two main groups. The first group include developing countries, such as India, Brazil, Russian Federation, Argentina. There increase in public spending contributes to increase in healthy life.

The second group is developed countries. Wealthy countries spend more per person on health care and related expenses than lower income countries which does not lead to increase in life expectancy.

The most evident difference in effectiveness of government expenditures on healthcare is between United States and Singapore. These countries are approximately of the same level of wealth, GDP per capita equals 57 904,2 and 56 724,2 USD respectively in 2016, but lower healthcare spending per capita in Singapore contribute to higher Health Adjusted Life Expectancy (HALE) comparing to United States.

Source: OECD | WHO

Pharmaceuticals Spending per capita and HALE



This chart collection takes a look at how pharmaceuticals spending are correlated with Health – Adjusted Life Expectancy. The analysis looks at 2016 health data from OECD and World Health Organization.

There is no strong relationship between HALE and pharmaceuticals spendings as only 23% of variation in HALE is explained by variation in pharmaceuticals expenditures per capita.

Pharmaceuticals spending is an adjusted indicator as it covers expenditure on prescription medicines and self-medication, often referred to as over-the-counter products.

It is aggregated and its components vary across countries. In some countries, different medical non-durable goods are included. Total pharmaceutical spending refers in most countries to “net” spending, i.e. adjusted for possible rebates payable by manufacturers, wholesalers or pharmacies.

The high value of pharmaceuticals spendings in the United States is caused by high medical prices. Switzerland is the second by this indicator. The growth of pharmaceuticals spendings in Switzerland is due to the launch of new and innovative medicines – especially for cancer. In Singapore the government pursues cost-effective approach for drugs development and other medical treatment, that is why relatively small amount of spendings corresponds to the highest HALE across observed countries.

Source: OECD | WHO

Social Protection and Healthcare vs HALE

To estimate the relationship between social protection and healthcare spendings and HALE we calculated Intraclass correlation coefficient (ICC). It measures the reliability of ratings or measurements for clusters — data that has been sorted into groups. The ICC ranges from 0 to 100%.

- A high Intraclass Correlation Coefficient (ICC) close to 100% indicates that variance of dependent variable (HALE) can be explained by the variance of the chosen factor (type of spending).
- A low ICC close to zero means that relation between values is low, not significant.

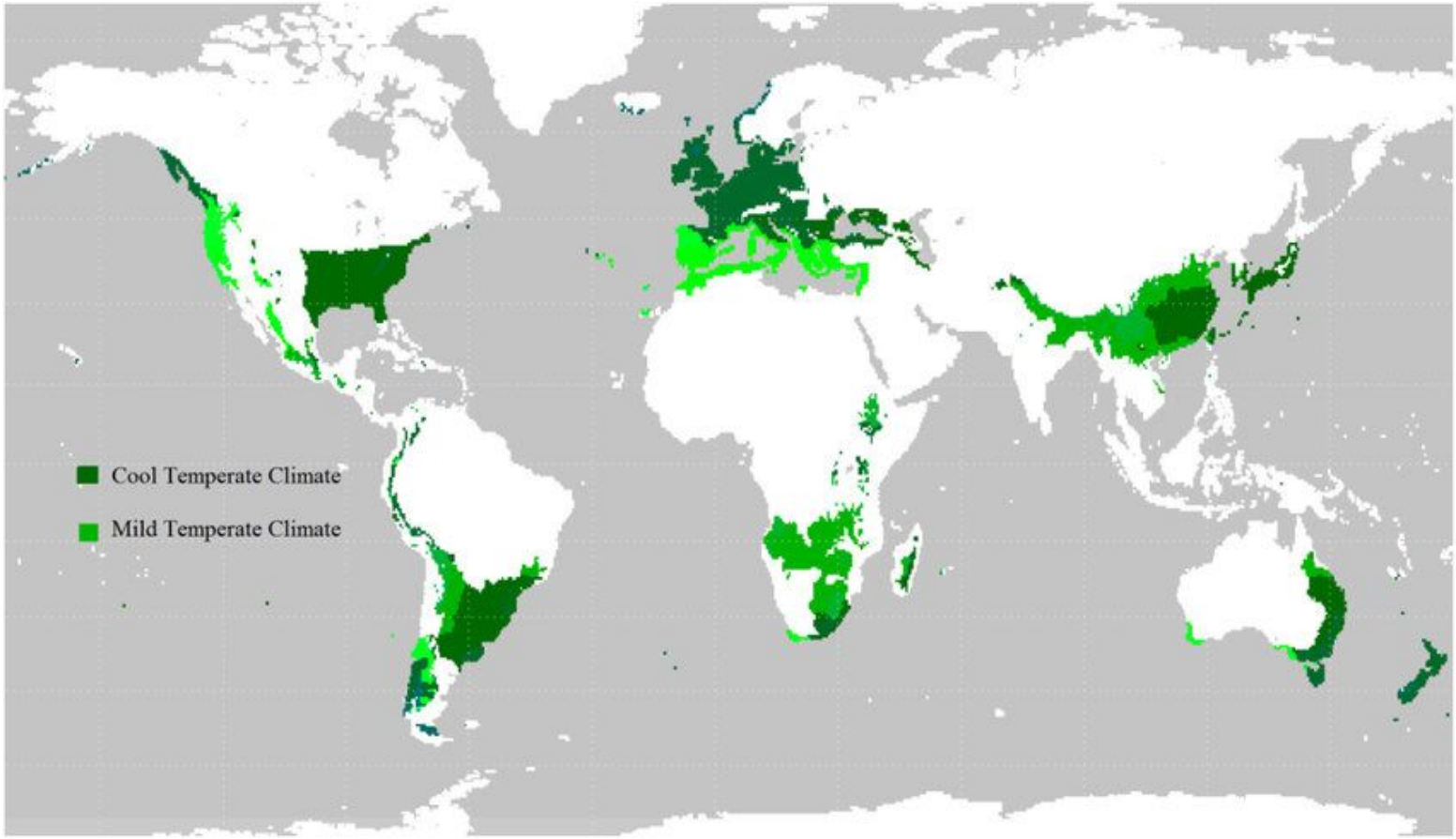
Type of spending, USD	Number of estimated groups	ICC, %*
Health spending per capita	7	58.1
Pharmaceuticals spendings per capita	5	37.2
Public unemployment spending per capita	5	42.6
Pension spending per capita	6	57.2
Social expenditures per capita	6	38.6

** All the results are approximate assessments as the nature of indicator varies across observed 50 countries. As data were not available several countries were excluded from the analyses.*

The highest ICC is between health spendings per capita and HALE. It indicates that 58.1% variance in HALE can be explained by variance in healthcare spendings. According to our analysis, this type of spending is the most significant factor that influences HALE. Pension spending is the second sufficient indicator, the ICC equals 57.2%. It can be explained by the nature of the indicator such as pension spending provides an income for persons retired from the labour market or guarantees incomes when a person has reached a 'standard' pensionable age or fulfilled the necessary contributory requirements.

Climate and Healthy Longevity

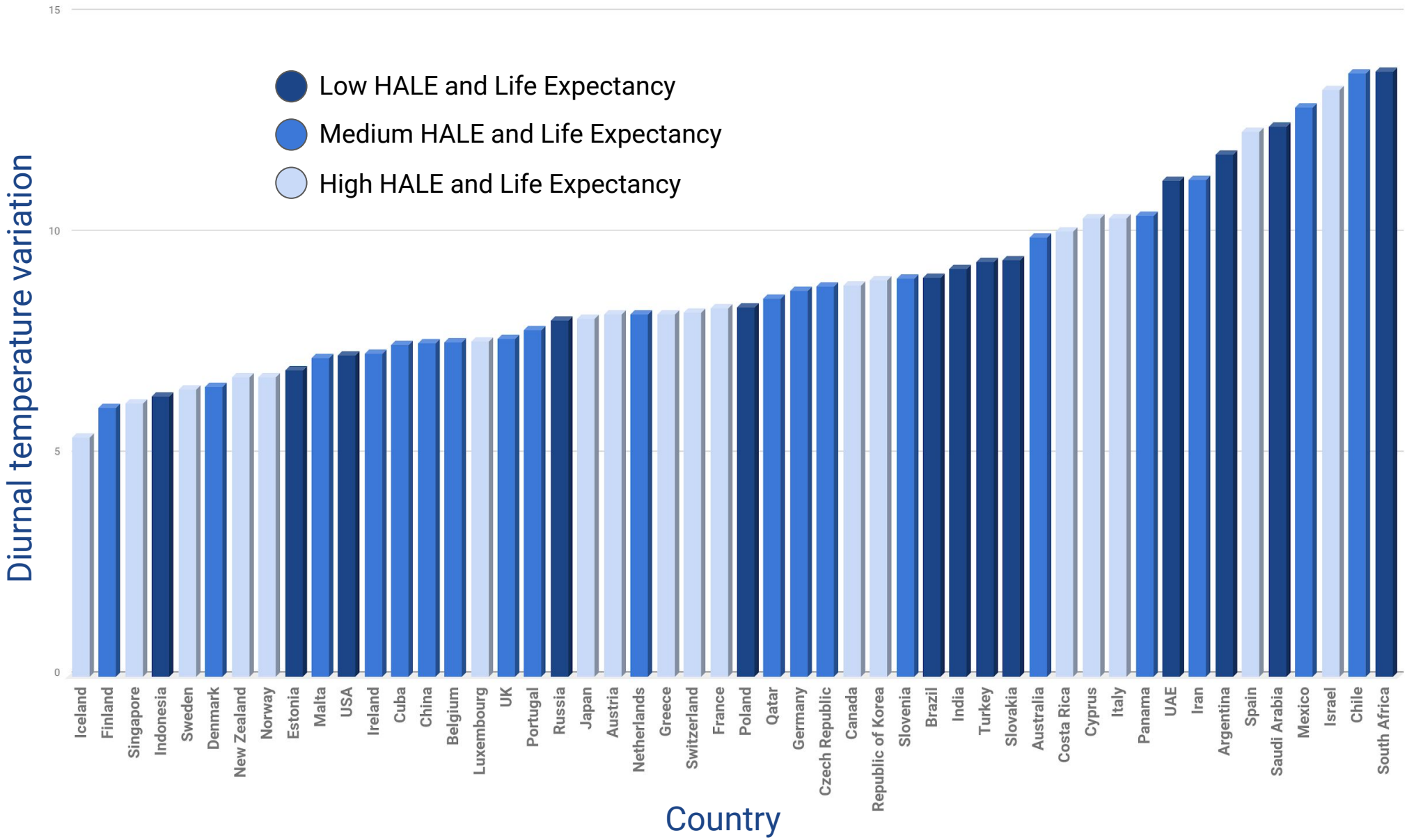
Meteorological Analysis. Overview



As can be seen from the temperate climates map on the left, which is based on Köppen climate classification, around 80% of chosen countries are located in a temperate climate zone, which is no coincidence. Though first human civilizations were situated in warmer areas, it has changed recently due to a number of factors, one of which was the Industrial Revolution. The significance of agriculture and warmer climate has drastically reduced, and European countries took over. That's where economic development and, consequently, healthy people reside. Though it does not guarantee a sound nation, it surely contributes to the general picture. Ceteris paribus, where does a man have greater productivity: in the country with mild temperatures and relatively comfortable other weather conditions (that is close to a definition of a temperate climate) or in the country where it's hot and humid or cold and dry? Furthermore, greater productivity is the foundation of economic development, quality of life and healthy longevity. One could argue that with an invention of air conditioning systems and evermore dominant service sector the importance of a mild climate diminishes, and human capital has come to the forefront and could be right, Singapore is a good example of it. Though it still plays and will play its part in the foreseeable future.

Source: Researchgate

Diurnal Temperature Variation



Diurnal Temperature Variation

Diurnal temperature variation (DTV) is the variation between a high temperature and a low temperature that occurs during the same day. Although DTV is a key index of climate change, few studies have reported the health burden of it and its temporal changes at a multi-country scale. Therefore, during the investigation was assessed the attributable risk fraction of DTV on mortality and its temporal variations in a multi-country data set.

On any given day, the temperature swing from low and high temperature is roughly 10 to 15°C . A number of conditions can widen or lessen this range, such as:

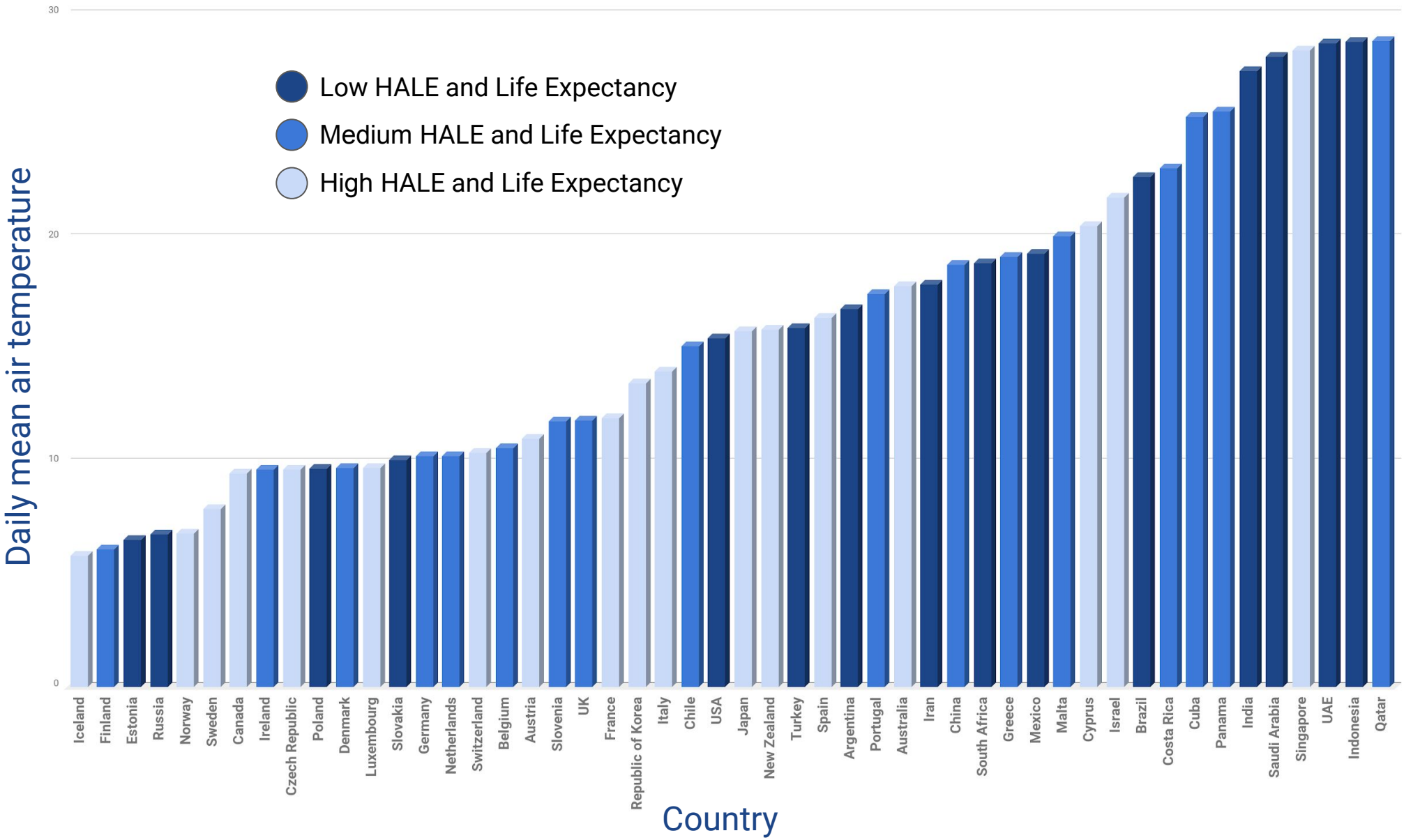
- day length
- cloudiness
- elevation
- humidity
- wind speed

High desert regions typically have the greatest diurnal temperature variations, while low-lying humid areas typically have the least.This explains why an area like **United Arab Emirates**, can have difference in temperature up to **11.2 °C**. At the same time, **United States of America,** which are on average more humid, has temperature variations of only **7.2 °C**, urban ***Singapore*** has a diurnal temperature range of little more than **6 °C**.

During the past decade, DTV mortality association assessment has received increasing interest in environmental epidemiology, linking large DTV with increased mortality risk in geographical locations with different climate characteristics.

Shown in the diagram life expectancy displays people who live in areas of lower diurnal temperature variation are often live longer and healthier. Thus, **low HALE** and life expectancy are more often in areas of **high DTV,** as shown in the examples of the **United Arab Emirates, Saudi Arabia, and Turkey**. For the whole population, higher DTV significantly increased daily **non-accidental mortality**, especially **cardiovascular mortality**.

Daily mean air temperature



Daily Mean Air Temperature

Heat waves and cold spells have both shown adverse effects on mortality. Moreover, a recent study by *Gasparrini and colleagues* estimated that 7.7% of the mortality was attributable to non-optimum temperature using data from 384 locations. Cold was responsible for a higher proportion of deaths than was heat, while moderate high and low temperatures represented most of the total health burden.

Although forecasting studies suggest the passage of (summertime) cold fronts will diminish in frequency in a warmer climate, this will not per se mean that cold effects will only have a very small effect on population health. Studies have already shown that health effects associated with temperature decreases in winter and summer can be similar in magnitude but are more pronounced in years with higher average temperatures. Therefore, the influence of unexpected temperature changes may be more relevant than the absolute temperature level itself.

The purpose of the systematic review was to present quantitative evidence on the effects of non-optimum high and low ambient temperatures on a range of cause-specific mortality and morbidity outcomes in the elderly.

During the investigation was identified substantially elevated risks in the elderly for temperature-induced **cerebrovascular, cardiovascular,** and **respiratory outcomes** in particular. In their meta-analysis for morbidity, scientists showed that the effect estimates for respiratory causes were much larger than for cardiovascular causes with both, high and low temperatures – although for mortality, the effect estimates for cardiovascular causes were similar or slightly larger than for respiratory causes in case of high temperatures. This phenomenon has been already shown in previous studies. However, the underlying mechanisms through which high temperatures may increase the risk of morbidity from respiratory causes are yet unclear.

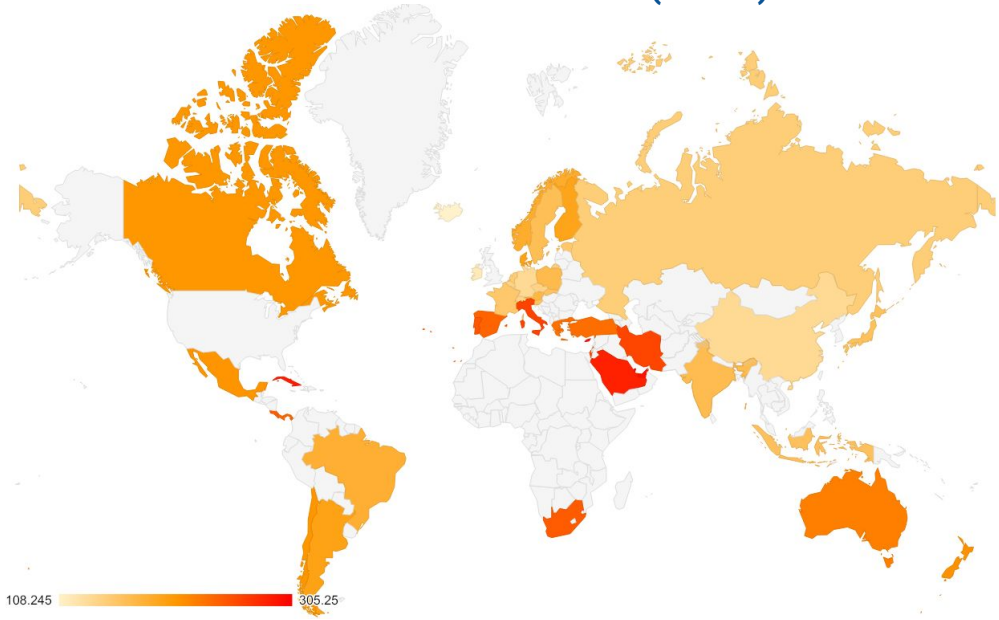
Additionally, during HALE investigation in 50 different countries, it was found that lower daily mean air temperature means higher life expectancy.

For example, countries like **Sweden, Luxembourg, Norway, Iceland** have **high HALE** and low daily mean air temperature. It means that in countries with low daily mean air temperature it is easier to stay healthy for longer period of life.

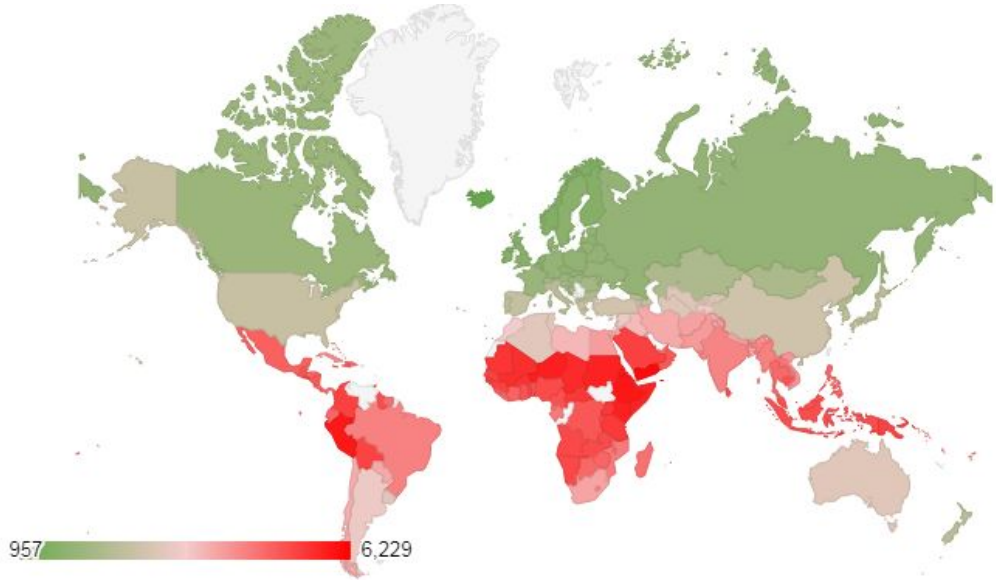
Singapore seems to be like an exception in this sample. The reason for it is in the high development of this country, so qualified medicine and insurances let it be in the number of countries with high daily mean air temperature, but with high HALE.

Sunshine Hours

Total Annual Sunshine (hours)



Exposure to solar ultraviolet (UV) radiation (in J/m2)

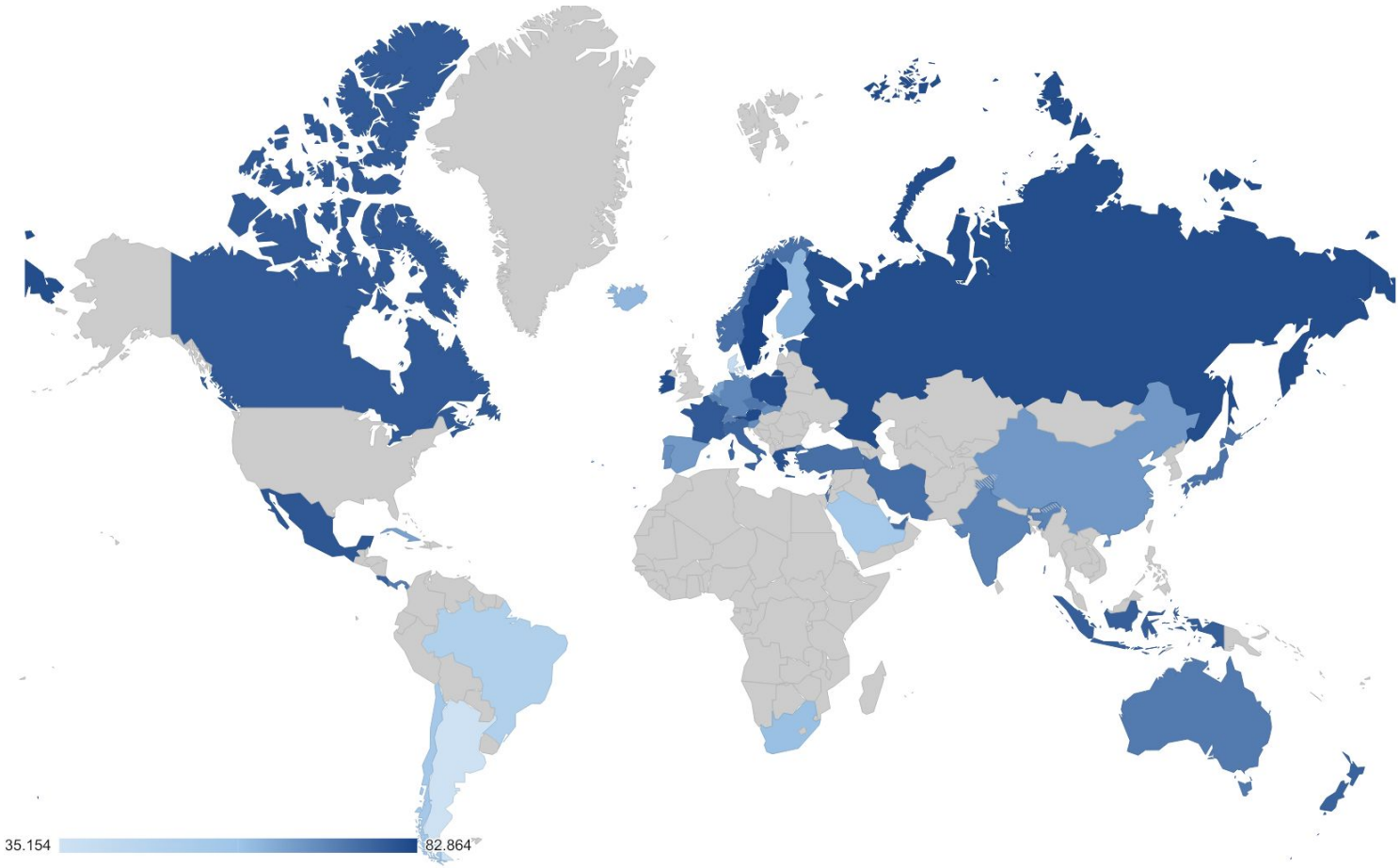


High levels of sun exposure during the year of birth may increase infant mortality and shorten the average lifespan of a population. For example, peak solar activity brings higher levels of ultraviolet radiation to Earth, and some evidence suggests that UV radiation may increase infant mortality by degrading folic acid, or vitamin B9, which is important for the rapid cell division and growth that happen during pregnancy.

Therefore, we can observe a correspondence between the UV radiation volumes and HALE indicators in different countries. Countries with high life expectancy and HALE are situated mainly in the temperate climate zone where the solar activity is less intensive. For comparison, HALE in Argentina, Brazil, United Arab Emirates does not reach the appropriate mark of Iceland, Singapore, United Kingdom of Great Britain and Northern Ireland.

However, many studies shows that people who avoided the sun had a life expectancy 0.6 to 2.1 years shorter than those in the group with higher sun exposure.So, countries with high HALE and life expectancy have low level of UV radiation, but a relatively larger number of sunny hours per year.

Relative Humidity



Both temperature and humidity are meaningful determinants of mortality. Humidity can affect human health through a variety of mechanisms. On one hand, low-humidity levels can lead to dehydration and promote the spread of airborne diseases, like influenza. On the other hand, high-humidity levels exacerbate the effects of heat stress because humidity impairs the body's ability to sweat and cool itself. High-humidity levels can also affect respiratory health since they promote the spread of bacteria, fungi, and dust mites. Low humidity levels are especially dangerous, temperature and humidity have a large impact on cardiovascular- and influenza-related mortalities.

Optimal humidity is between 35 and 50 percent. However, relative humidity indicator in most countries is not appropriate to this level. The analysis shows that countries with average values (60-67 %) have higher HALE than countries with extreme value of the pointer.

Healthy Longevity and Metabesity

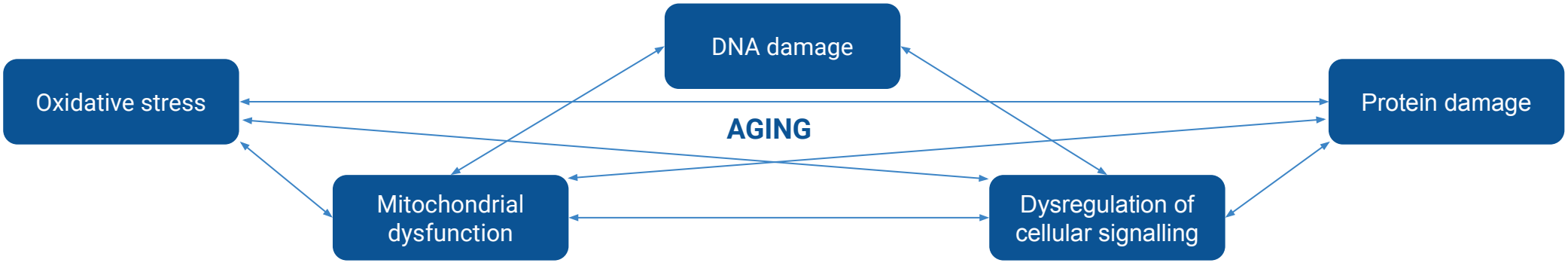
What is Metabesity?

Our metabolism comprises all of the chemical reactions that help keep our bodies alive. Factors such as resting metabolic rate ("RMR"), thermic effect of food ("TEF"), exercise and non-exercise activity thermogenesis ("NEAT") all work together in a coordinated manner in order to maintain good health. Most of the major diseases of our time (including diabetes, cardiovascular and neurodegenerative diseases, and cancer) have common metabolic roots, and thus may be susceptible to common solutions. This constellation of interconnected diseases can be called **"metabesity."**

Metabolic syndrome has long been recognized as an important risk factor for cardiovascular disease, and its prevalence has been increasing. More recently, metabolic syndrome and other forms of metabolic dysfunction have been linked to other conditions including dementia, cancer, and the aging process. The term "metabesity" was coined by Dr. Alexander Fleming.to reflect the broader impact of metabolic dysfunction on these major diseases.

"Scientific evidence has been accumulating over recent decades that major non-communicable diseases of aging, such as diabetes, cardiovascular diseases, neurodegenerative disease and cancer, have common metabolic roots, and thus may be susceptible to common solutions."

Dr. Alexander Fleming, Founder and Executive Chairman of Kinexum, and Chief Medical Officer of Tolerion, a biotechnology company developing disease-modifying treatments for type 1 diabetes and other autoimmune diseases.

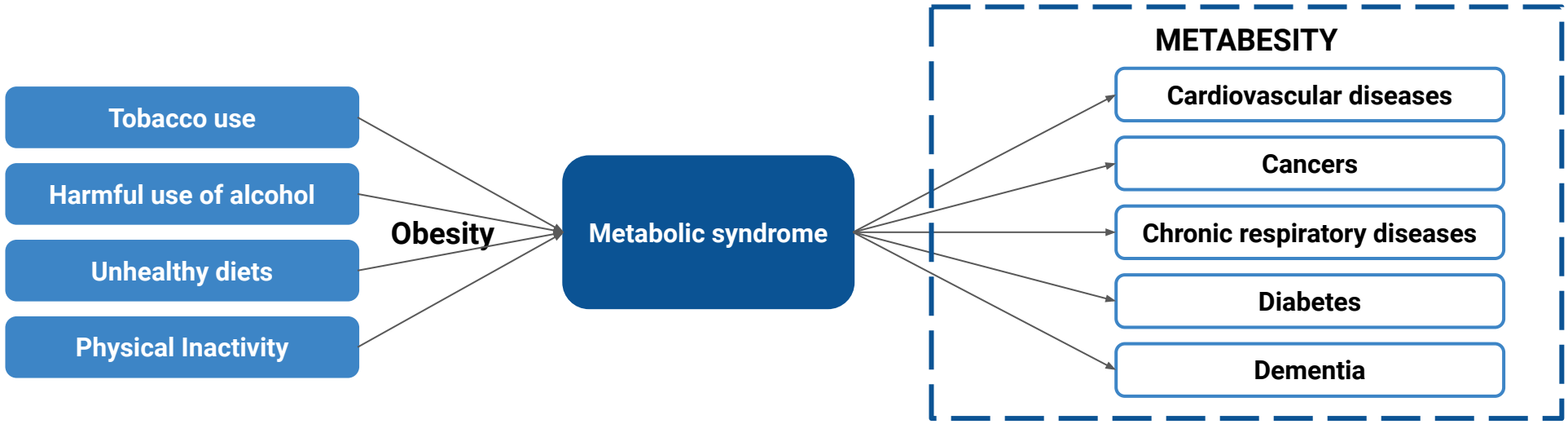


Influence of Age on the Prevalence and Components of Metabesity and the Association with Mortality Risk Factors

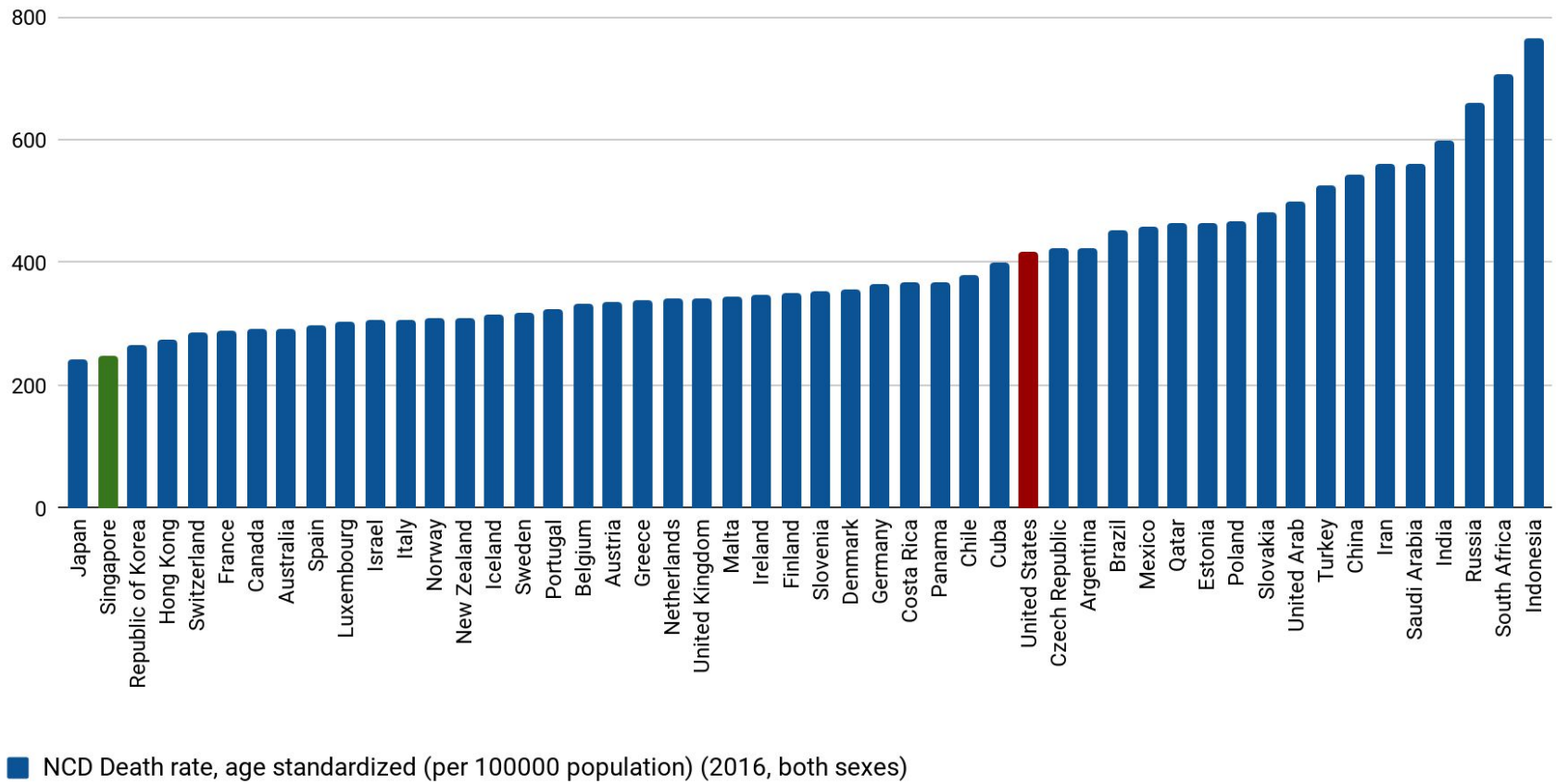
Noncommunicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavior factors. Such diseases have common metabolic roots, and their interconnection can be called **"metabesity."**

The main types of NCDs are cardiovascular diseases (such as heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes. These conditions are often associated with older age groups. Among age-related changes are also dementia and severe memory loss that are considered to be not part of the normal aging process.

The prevalence of NCDs are considered to be a "**slow motion disaster.**" Noncommunicable diseases are driven by forces that include unplanned urbanization, globalization of unhealthy lifestyles and population aging. Unhealthy diets and a lack of physical activity may show up in people as raised blood pressure, increased blood glucose, overweight and obesity. These are called "metabolic risk factors" and can lead to cardiovascular disease, the leading NCD with regard to premature deaths. All risk factors of NCDs lie in non-health sectors, requiring collaboration across all of government and all of society to combat them.



Rising Prevalence of Premature Death from Noncommunicable Diseases

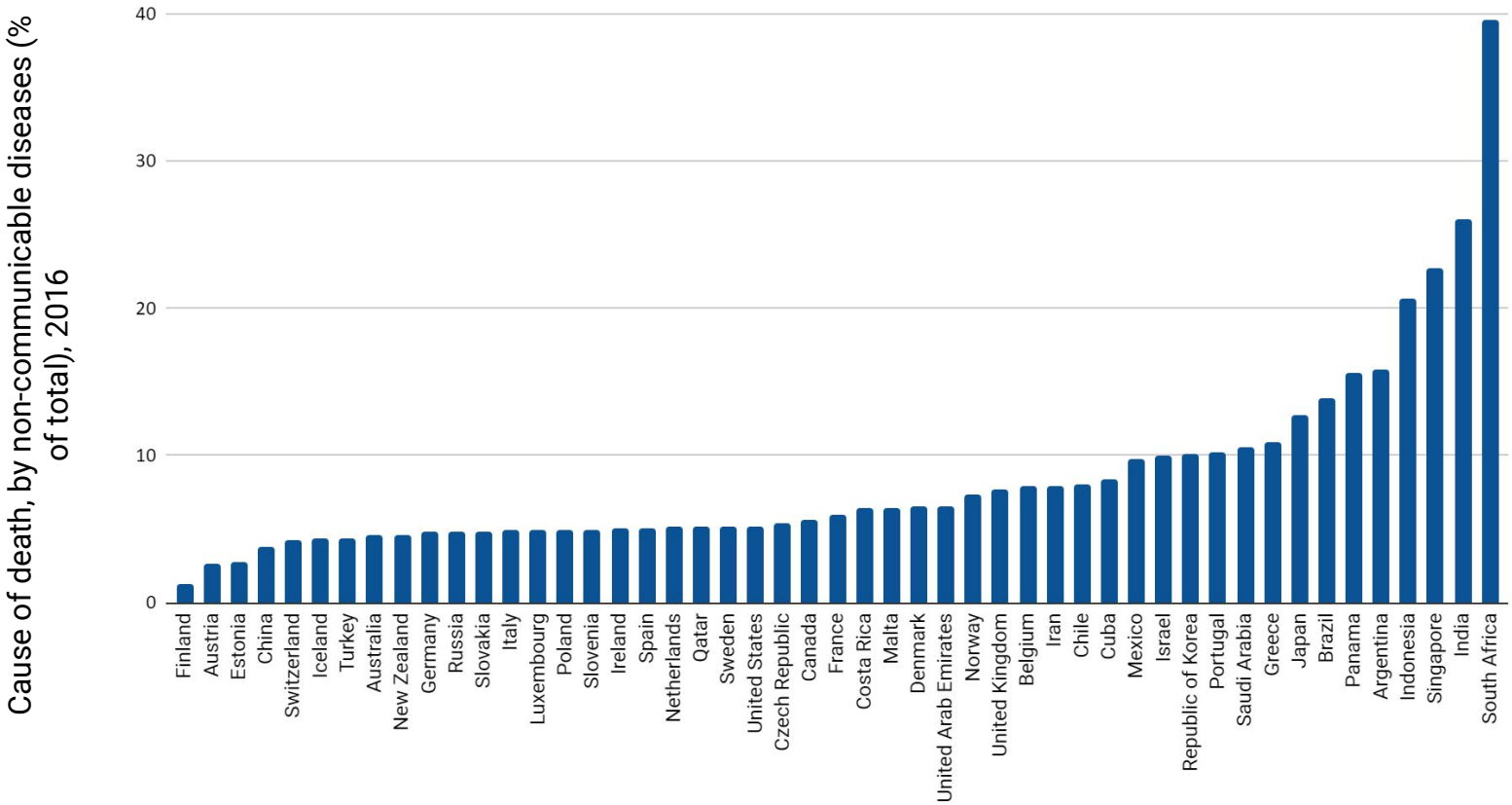


Measuring how many people die each year and what are the main causes of death in each country plays important role for assessing the effectiveness of a country's health system.

World Health Organisation reports that noncommunicable diseases (NCDs) caused 71% of deaths globally, ranging from 37% in low-income countries to 88% in high-income countries. All but one of the 10 leading causes of death in high-income countries were NCDs. In terms of absolute number of deaths, however, 78% of global NCD deaths occurred in low- and middle-income countries.

Source: WHO

The Prevalence of Communicable Diseases in Developing and Low-Income Countries



Communicable, or infectious diseases, are caused by microorganisms such as bacteria, viruses, parasites and fungi that can be spread, directly or indirectly, from one person to another. Worldwide, developed and developing countries are facing the double burden of communicable and noncommunicable diseases. However, developing countries are more exposed and more vulnerable due to a multitude of factors, including geographic, demographic and socio-economic factors. Noncommunicable diseases like cardio-vascular diseases, cancer, diabetes, chronic obstructive pulmonary disease and mental disorders are affecting developing countries with an increasing trend. In parallel, communicable diseases such as HIV/AIDS, malaria, tuberculosis, acute respiratory infections and diarrheal disease are causing high mortality rates especially in low and middle income countries.

Source: WHO

Links Between Longevity, Metabesity and Disease

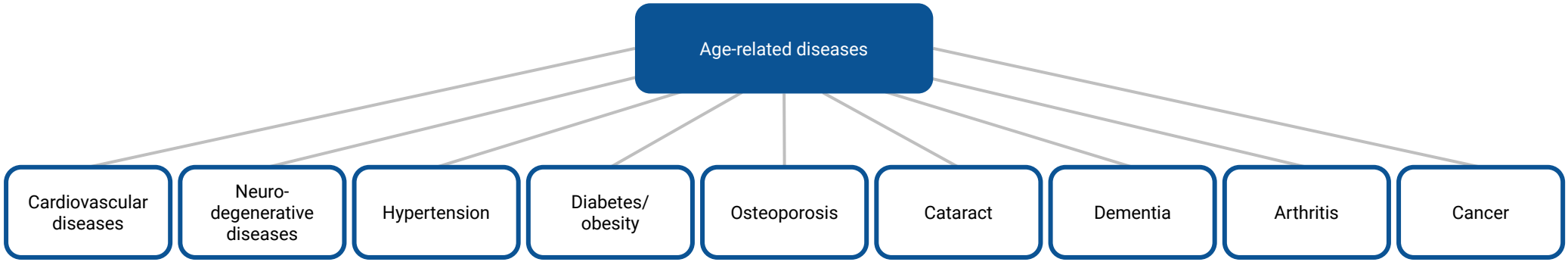
Aging itself is largely a metabolic condition. As we get older, the day-to-day operations of metabolism inflict damage on human cells and organs. Moreover, as this damage accumulates, metabolism itself is thrown into disarray, and these things are no longer coordinated with each other, causing metabolism to malfunction further and inflict more damage.

Among the many signs of metabolic discoordination is a buildup of visceral fat, which may be partly a symptom and partly a cause of aging.

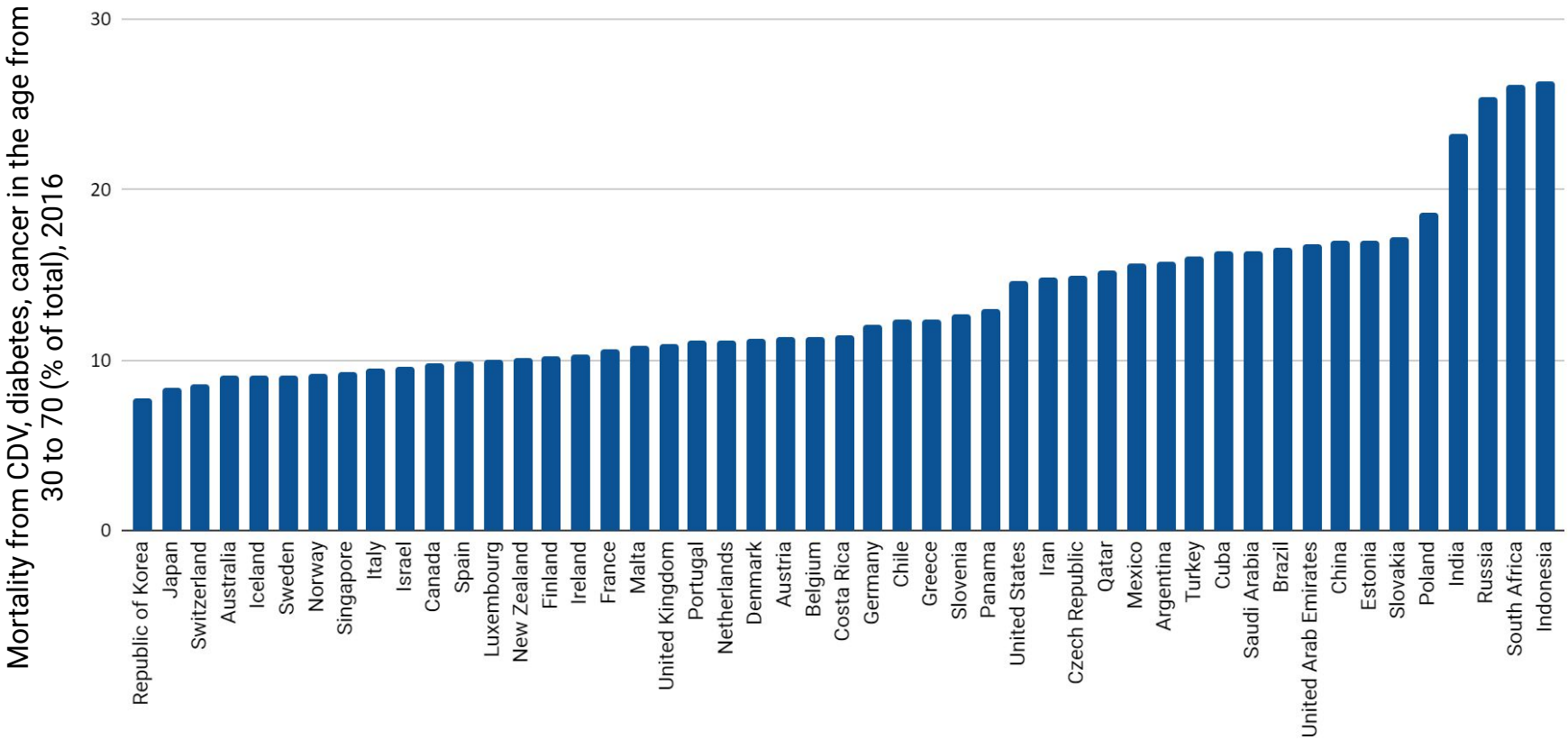
It is well known that carrying excess visceral fat tissue increases risk of age-related diseases, shortens life expectancy, and raises lifetime medical expenditure. For example, excess visceral fat tissue adds to the presence of senescent cells, causing chronic inflammation via several age-associated changes. The more fat tissue, the worse the outcome – even being moderately overweight rather than obese still produces a negative impact on long-term health.

Aging, therefore, along with diabetes, cardiovascular and neurodegenerative diseases, and cancer, is itself an additional component of metabesity. It is also well known that the Western diet and lifestyle similarly contribute to the same metabolic dysfunction and to signs of premature aging.

Given how intimately connected aging, metabesity and disease are, seeking to address the metabolic roots of various diseases might also lead us to discover methods for improving the aging process itself, with positive ramifications for everything from obesity to arthritis.



Prevalence of Deaths from Age-Related Diseases



With the burden growing non-communicable diseases in almost every country, their prevention is one of the most significant public health challenges of the 21st century.

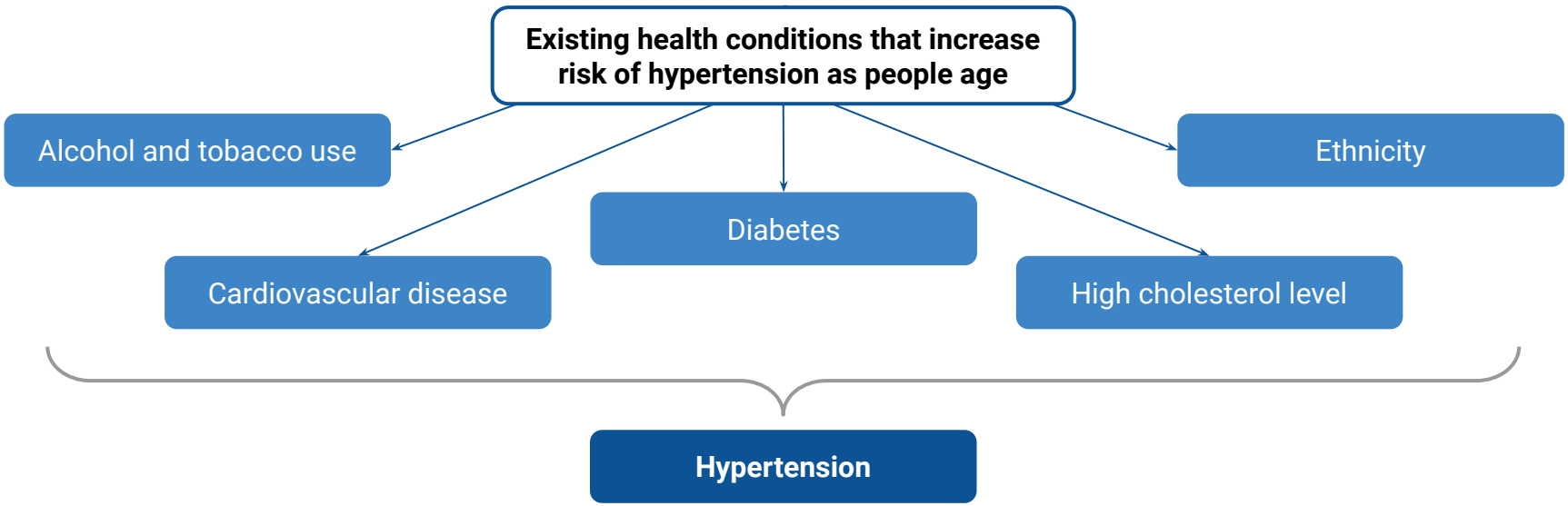
Around 40% of cancer cases could be prevented by reducing exposure to cancer risk factors including diet, nutrition and physical activity. For many cancers, overall incidence rates in developed countries in low-income countries with. However, the differences in mortality rates between these two categories of countries are smaller, on the one hand because lower-Human Development Index countries have a higher frequency of certain cancer types associated with poorer survival, and on the other hand because access to timely diagnosis and effective treatment is less common.

Source: WHO | WCRF

Hypertension and Healthy Longevity

Hypertension can cause serious damage to the heart. Excessive pressure can harden arteries, decreasing the flow of blood and oxygen to the heart.

- Hypertension - or elevated blood pressure - is a serious medical condition that significantly increases the risks of heart, brain, kidney and other diseases.
- An estimated 1.13 billion people worldwide have hypertension, most (two-thirds) living in low- and middle-income countries.
- In 2015, 1 in 4 men and 1 in 5 women had hypertension.
- Fewer than 1 in 5 people with hypertension have the problem under control.
- Hypertension is a major cause of premature death worldwide.
- One of the global targets for noncommunicable diseases is to reduce the prevalence of hypertension by 25% by 2025 (baseline 2010).

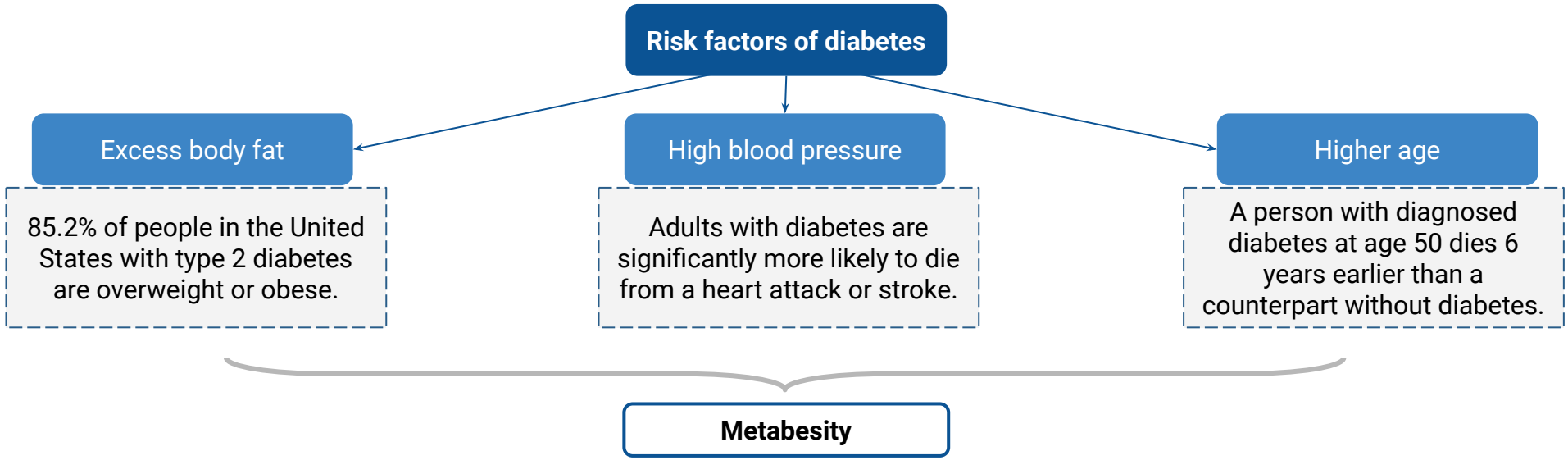


Source: WHO

Diabetes and Healthy Longevity

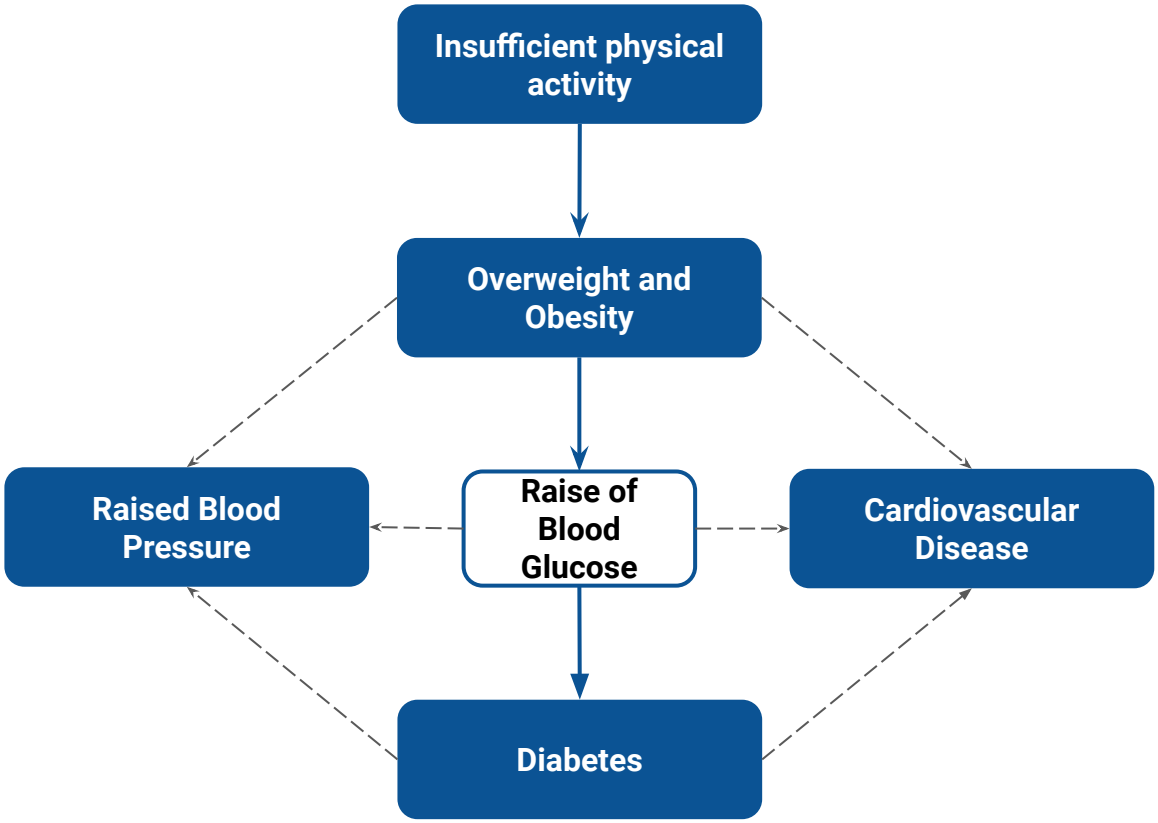
Diabetes remains the 7th leading cause of death in the world.

- The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014.
- Diabetes prevalence has been rising more rapidly in middle- and low-income countries.
- Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation.
- In 2016, an estimated 1.6 million deaths were directly caused by diabetes. Almost half of all deaths attributable to high blood glucose occur before the age of 70 years. WHO estimates that diabetes was the seventh leading cause of death in 2016.
- Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes.
- Diabetes can be treated and its consequences avoided or delayed with diet, physical activity, medication and regular screening and treatment for complications.



Source: WHO

Obesity and Healthy Longevity



Overweightness and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. Once considered a problem only in high income countries, overweight and obesity are now dramatically on the rise in low- and middle-income countries, particularly in urban settings.

Some recent WHO global estimates follow:

- In 2016, more than 1.9 billion adults aged 18 years and older were overweight. Of these over 650 million adults were obese.
- In 2016, 39% of adults aged 18 years and over (39% of men and 40% of women) were overweight.
- Overall, about 13% of the world's adult population (11% of men and 15% of women) were obese in 2016.

The worldwide prevalence of obesity nearly tripled between 1975 and 2016.

In 2016, an estimated 41 million children under the age of 5 years were overweight or obese. Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings. In Africa, the number of overweight children under 5 has increased by nearly 50 per cent since 2000. Nearly half of the children under 5 who were overweight or obese in 2016 lived in Asia.

Source:	WHO	GOV.UK	pdf

Obesity and Healthy Longevity

OECD Rank (Global Rank)	Country	% of Adult Population that is Obese
1 (12)	United States	36.2
2 (17)	Turkey	32.1
3 (22)	New Zealand	30.8
4 (26)	Canada	29.4
5 (27)	Australia	29.0
6 (28)	Mexico	28.9
7 (32)	Chile	28.0
8 (33)	United Kingdom	27.8
9 (41)	Hungary	26.4
10 (44)	Israel	26.1

In 2015, across the OECD, 19.5% of the adult population was obese. This rate ranges from less than 6% in Korea and Japan to more than 30% in Hungary, New Zealand, Mexico and the United States. More than one in four adults is obese in Australia, Canada, Chile, South Africa and the United Kingdom. Overweightness and obesity rates have grown rapidly in England, Mexico and the United States since the 1990s.

Over the past decade, the prevalence rate of overweightness and obesity has increased in Canada, France, Mexico, Switzerland and the United States, while it has stabilised in England, Italy, Korea and Spain. There is, however, no clear sign of retrenchment of the epidemic, in any country.

Education and socio-economic background affect obesity. Reciprocally, obesity damages labour market outcomes that, in turn, contribute to reinforcing existing social inequalities. Obese people have poorer job prospects compared to normal-weight people, they are less likely to be employed and have more difficulty re-entering the labour market. Obese people are less productive at work due to more sick days and fewer worked hours, and they earn about 10% less than non-obese people. Addressing obesity and the associated negative labour market outcomes would help break the vicious circle of social and health inequalities.

Source: OECD

Obesity and Healthy Longevity

Obesity has been linked to a number of chronic diseases, including Type 2 diabetes, cardiovascular disease, and cancer, to name a few. Several experts have postulated that the obesity epidemic may result in a decline in life expectancy and HALE in the United States in the 21st century.

The Link Between Obesity and Life Expectancy

One study has estimated that obesity causes approximately 300,000 deaths per year. Being overweight and obesity in childhood is especially ominous. In men especially, being overweight in childhood has been found to increase the risk of death from any cause. Some researchers have determined that, in those who are extremely obese, life expectancy may be reduced by an estimated 5 to 20 years.

Obesity as a Global Problem

Numerous organizations, including the World Health Organization (WHO), have issued a call to action on the obesity epidemic, citing it as a major global health problem. The WHO estimates that at least 2.8 million people worldwide die each year due to being overweight or obese. The WHO also notes that the prevalence of obesity globally nearly doubled between 1980 and 2008, and where obesity was once associated with high-income countries, it is now associated with low- and middle-income countries as well. Childhood obesity has become a global health problem as well; according to the WHO, over 40 million preschool children were overweight in 2008, and children who are overweight are more likely to become obese as adults.

Obesity Treatment and Prevention

Such statistics make treatment and prevention of obesity ever more urgent. Individuals can take simple steps to prevent obesity and combat sedentary lifestyles, getting more physical activity on a daily basis and paying close attention to diet. Eliminating sources of added sugar and empty calories can go a long way toward weight management, and a growing awareness on local, national, and global levels is finally beginning to translate into community and policy measures.

Source: Verywell Health

Obesity and Trends in Life Expectancy

Multiple studies demonstrate that obesity reduces lifespan, with a loss of 9-13 years of life for individuals with BMI >35. It is possible that health and life expectancy gains could be even greater if it was not for the increasing prevalence of extreme obesity.

Pharmacological Treatment

There is the possibility of improved medical interventions in some of the pathways linking obesity to cardiovascular disease and all-cause mortality.

Prevalence of More Extreme Obesity

The most robust estimates of the association between BMI and mortality, suggests that the mortality risk from excess body weight increases from a BMI of 25 but is not substantial until BMI exceeds 32–35.

Reversal of Relationship in Old Age

In old age those of low body weight are at higher risk of disability (limitations to activities of daily living) and mortality. The relationship between obesity and health appears to reverse in old age.

Body Weight Per Se Not Associated with Mortality

It is possible that body weight is not a significant risk factor for mortality. Body weight may act simply as a surrogate for a constellation of attributes of lifestyle, in particular diet,physical activity level, and genetic factors.

Latency Period and Cohort Effect

The impact of obesity trends has not affected life expectancy due to latency period between onset of obesity and disease. Recent cohorts of the US population are experiencing a greater magnitude and duration of obesity over their lifetime.

The Obesity Paradox

There is the “obesity paradox” in which survival from acute events such as myocardial infarction, heart failure, and dialysis for renal failure is improved in patients with overweightness and obesity.

Source: Journal of Obesity

Adult and Childhood Obesity

Childhood obesity is one of the most serious public health challenges of the 21st century. The problem is global and is steadily affecting many low- and middle-income countries, particularly in urban settings. The prevalence has increased at an alarming rate. Globally, in 2016 the number of overweight children under the age of five, is estimated to be over 41 million.

Childhood obesity is associated with a higher chance of premature death and disability in adulthood. Overweight and obese children are more likely to stay obese into adulthood and to develop noncommunicable diseases (NCDs) like diabetes and cardiovascular diseases at a younger age. For most NCDs resulting from obesity, the risks depend partly on the age of onset and on the duration of obesity. Obese children and adolescents suffer from both short-term and long-term health consequences.

The most significant health consequences of childhood overweight and obesity, that often do not become apparent until adulthood, include:

- **Cardiovascular diseases** (mainly heart disease and stroke);
- **Diabetes**;
- **Musculoskeletal disorders**, especially osteoarthritis;
- Certain types of **cancer** (endometrial, breast and colon).

At least 2.6 million people each year die as a result of being overweight or obese.

Overweightness and obesity, as well as their related diseases, are largely preventable. **Prevention of childhood obesity therefore needs high priority**.

The WHO Member States in the 66th World Health Assembly have agreed on a voluntary global NCD target to halt the rise in diabetes and obesity.

A number of countries have developed national strategies and action plans to tackle a troublesome issue.

Source: WHO

Obesity Prevention Programmes in the USA

SISTERS TOGETHER: Move More, Eat Better

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) has announced the program guide for the popular Sisters Together: Move More, Eat Better national health awareness program. It encourages black women ages 18 and older to reach and maintain a healthy weight by being more physically active and making healthier food choices.

North Carolina's EAT SMART, MOVE MORE Campaign

Orange County promotes increased opportunities for healthy eating and physical activity where people live, learn, earn, play, and pray. Healthy Carolinians of Orange County launched Eat Smart, Move More Orange County to reduce the growing problem of family obesity.

JUST for KIDS!

It was developed at the University of California School of Medicine, and was successfully tested in San Francisco schools. Just For Kids! is a health education program for all children which helps them make changes in their diet, exercise, communication and affect which result in decreased obesity, improved cardiovascular and physical fitness, and increased nutrition knowledge.

Source: NIDDK | Orange County | Just for Kids!

Tackling Overweight and Obesity in Australia National Obesity Strategy

In 2017-18, the Australian Bureau of Statistics' National Health Survey showed that two thirds (67.0%) of Australian adults were overweight or obese (12.5 million people), an increase from 63.4% in 2014-15. The National Health Survey also indicated that almost one quarter (24.9%) of children aged 5-17 years were overweight or obese in 2017-18 (17% overweight and 8.1% obese).

At the 12 October 2018 Council of Australian Governments (COAG) Health Council (CHC) meeting, Ministers agreed that a **National Obesity Strategy would be developed** and that the first phase of the development process would include a Commonwealth funded **National Obesity Summit**.

The National Obesity Summit was held in Canberra on 15 February 2019 and was attended by approximately 120 participants from government, academia/research, medical and public health organisations, the food industry and consumer groups. The National Obesity Summit brought together experts in obesity to explore factors leading to overweight and obesity and to identify and agree on priority areas for action (for inclusion in the Strategy).

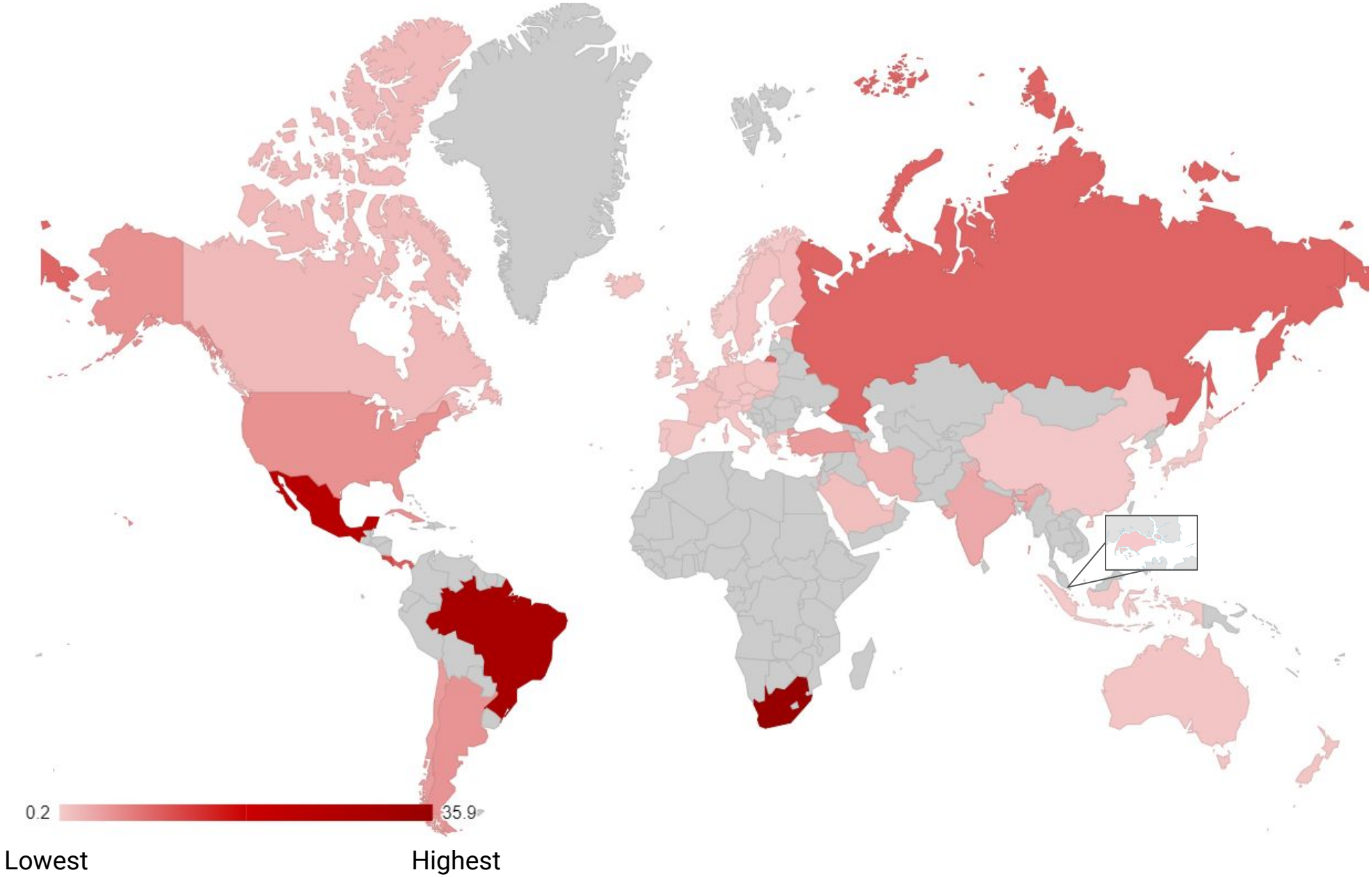
Key conclusions and recommendations:

- **Targeted interventions**: Early childhood and the antenatal period are emerging as critical periods for obesity interventions. More interventions for children 0-2 years old to prevent progression towards obesity are required.
- **Systems perspective**: In the health system, reform is needed to realign and coordinate resources to manage the complex and long term nature of obesity treatment, and increase resourcing for prevention.
- **Reframing success**: Achieving weight loss has potentially been used as an overly simple definition of success. There is scope to investigate and reframe the conversation towards weight management and achieving healthy wellbeing.
- **Working Together**: Creation of a statutory body, with bipartisan support and secured funding to allow for long term investments. Development of a stand-alone, resourced Physical Activity Plan with long-term sustainable physical activity programs separate from nutrition, diet or obesity.

Source: Health.gov.au

Crime and Corruption Impact on People's Healthy Longevity

Murder Rate per 100 000 population, 2016



Murder Rate

Due to economic inequality, unemployment and unequal development there exists a huge gap in murder rates between 'core' countries with high industrialization level and richness, and 'peripheral' developing and poor countries. The existing point of view emphasises that long-term improvement of murder rates in Western Europe countries should be considered in complex with general country modernization and following changes in daily life, such as increasing of domesticity, self-control and consolidation of the rule of law.

Murder rates are strongly influenced by economic, social and environmental situations and trends, and the rule of law. Conversely, murder rate also has a negative impact on country development. The situation occurred in Mexico is a good example which describes this dependence: from 1995 to 2006 murder rates here declined, but in 2007-2012 years rates more than doubled because of At the subnational level, gains in life expectancy attributable to medically amenable causes, such as infectious diseases, respiratory diseases, and birth conditions, were wiped out by the increase of homicides after 2005 in each of the 32 states in Mexico, with large regional variation (according to Aburto, Beltrán-Sánchez, 2019).

Other recent studies confirm, that murders cause substantial reductions in life expectancy. Violence has become a major public health issue in Latin America, as this region experiences the highest murder rate in the world (more than 16.3 per 100 000 people), with some countries in Central America undergoing a recent upsurge in homicides. As a response to existence of murder problem, countries developed mechanisms, systems and institutions aimed to violence reduction and prevention, and degrees of success of such methods varies.

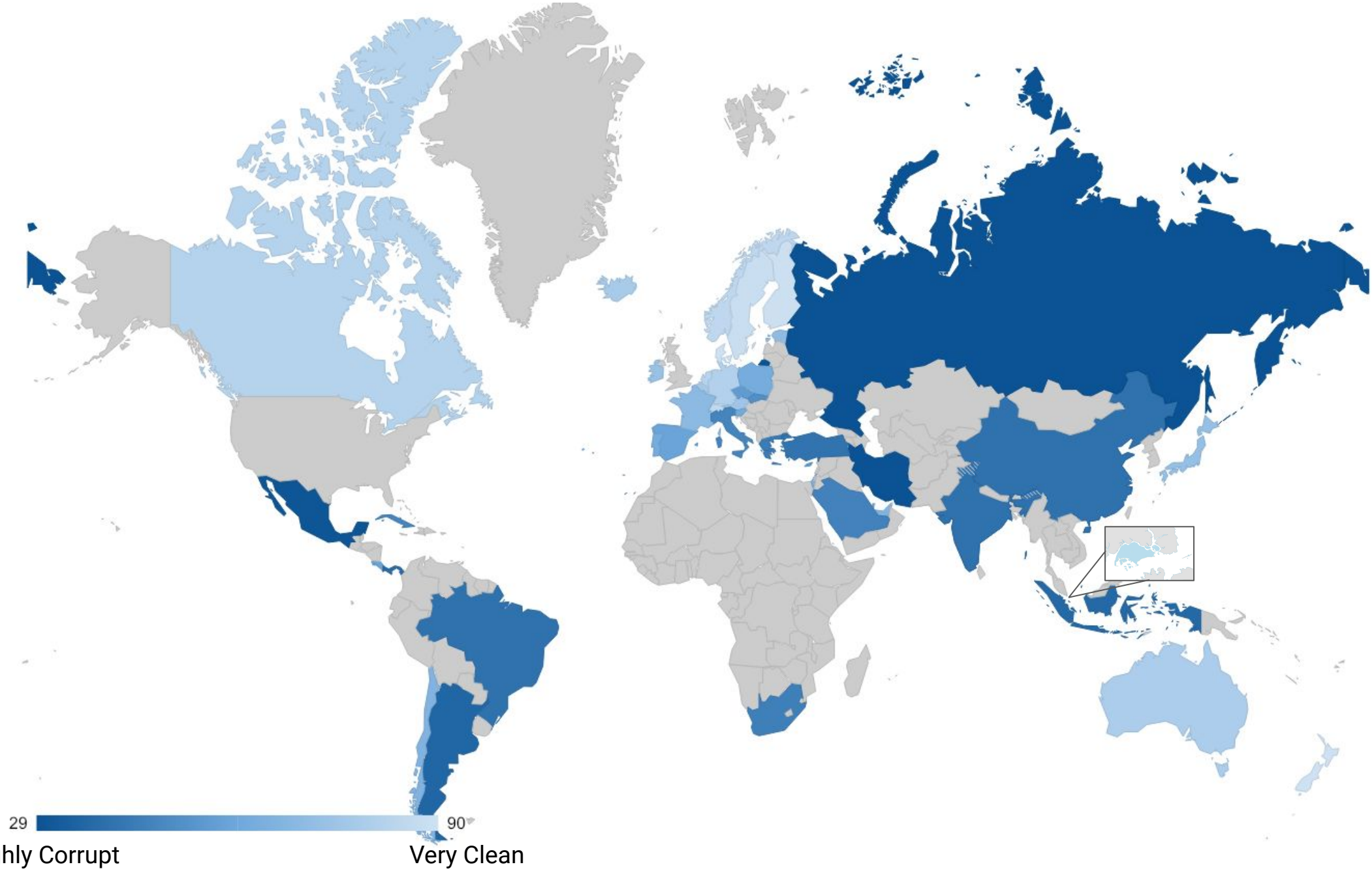
United States

Murder rate in the United states of America is significantly higher than in European countries. It has to be considered that the U.S. spends much more money on healthcare system, but despite this fact has low HALE and Life Expectancy.

Louisiana is a state that has the highest murder rate value throughout the last 20 years. It is believed that factors leading to increased violation are poverty (Louisiana has the third-lowest median household income ahead of Mississippi and Arkansas), lax gun laws and climate conditions. FBI's crime report (2012) shows that 68% homicides caused in the U.S. involved firearm, and Louisiana protects the right to bear arms. According to the FBI 2014 data, 53% of offenders with known race were black, and 88.2% of total recognized offenders were male.

Source: WHO **pdf**

Corruption Perceptions Index 2016



Corruption Impact

The World Health Organization divides corruption into four types: bribery, theft, bureaucratic or political corruption, and misinformation for private gain.

Study performed by Lio, Lee, 2015 confirms that dependency between life expectancy and corruption is significant. According to them, "... a country with better control of corruption, or a lower level of corruption, displays better health outcomes—longer life expectancy, lower infant and under-five mortality and lower HIV prevalence. [...] One possible interpretation of our finding is that life expectancy, the infant mortality rate and the under-five mortality rate are indicators of outcomes that involve a substantial amount of people and decisions and involve a complex process of resource allocation."

Corruption and inequality feed off each other, creating a vicious circle between corruption, unequal distribution of power in society, and unequal distribution of wealth. It is known that corruption has bigger impact on health outcomes, such as lower life expectancy and higher infant mortality, in poor and developing countries than in richer and developed nations. Regardless of the level of development of a country, corruption exists to a greater or lesser extent in every country.

Examples

Nowadays Singapore holds 3d place in the list of corrupt-free countries.

In 2016 USA held 18th place in the list of least corrupt countries, but in 2018 it fell to 22 place.

Russia is one of extremely corrupted countries with high levels of corruption in all social spheres, especially education and healthcare. This led the country to great loss in economy, governance efficiency, trust in public institutions and quality of life. All this changes reflect negatively on life expectancy of citizens.

Source: WHO | Transparency international | **pdf**

Preventive Medicine and Healthy Longevity

The Shift from Sick Care to Preventive Medicine

The biotechnological tools and funding necessary to directly intervene in metabesity already exist. The question that remains is the degree of personalization, precision, prevention, and patient participation involved in their application. The current state of medicine and health care is currently being disrupted by a shift away from "one-treatment-fits-all" blockbuster drugs and towards P4 (Personalized, Precision, Preventive and Participatory) medicine: optimized disease prevention and applying drugs long before the underlying pathology develops into actual chronic disease. This increasing precision would allow for a series of increasingly smaller micro-doses as technology advances.

This medicine consists of the leading edge of advanced biomedicine already at the level of practical, real-world implementation and use. The “preventive” focuses on maintaining a state of good health, and implicitly decreasing the probability of disease development through periodic health monitoring, and the application of treatments. The “personalized” and “precision” refer to the drugs and treatments that will be designed and applied using precise, individually-tailored methods of dosing, cocktail compositions of micro-dosages, and efficient methods of delivery. The “participatory” refers to the increasingly active role that patients are taking in managing their own health. Its high degree of complexity necessitates not only innovative frameworks for general benchmarking and forecasting, but also the general assessment of its technologies’ and therapies’ basic safety and efficacy. This starts with development of biomarker panels for aging as a means of evolving effective P4 strategies. Vast amounts of data aggregation and analysis are required to identify predictive markers. Data aggregating for biomarkers of aging (rather than biomarkers of disease) is particularly difficult, as by definition it has to be gathered from healthy disease-free populations rather than from among the health data of hospital populations. Furthermore, as the scope of P4 medicine broadens in the coming years, the number of biomarkers and technologies involved will increase rapidly to the thousands.

Identifying a vast number of biomarkers will eventually require the aggregation of incomprehensibly large volumes of data, making the implementation of P4 medicine infeasible with conventional computation. AI is the indispensable tool for overcoming this limitation, and is already in use in longevity-progressive states such as the UK, Switzerland and Singapore.

The Shift from Sick Care to Preventive Medicine

With the aging of the population and an increase in the proportion of older persons, the shift in the burden of disease towards chronic conditions has accelerated. And chronic diseases are responsible for 7 out of 10 deaths. These rates are expected to increase significantly over the next two decades, particularly due to the obesity epidemic.

Increases in the prevalence of chronic disease are outstripping reductions in acute infectious diseases. Such epidemiologic evolution demands a focus on public health and prevention.

For years, the United States has approached public health backwards. The health care system has been set up to treat people after they are sick rather than keeping them well in the first place.

Yet economic and technological factors dating from the early 20th century remain strong barriers to effective disease prevention. A key feature of the system is its use of a piecemeal, task-based system that reimburses for “sick visits” aimed at addressing acute conditions or acute exacerbations of chronic conditions.

Economic incentives encourage overuse of services by favoring procedural over cognitive tasks and specialty over primary care. Prevention is the most effective, common-sense way to improve health and reduce health care costs in the United States.

Steps that should be taken to put prevention first in the health care system

Advance and modernize the nation’s public health system

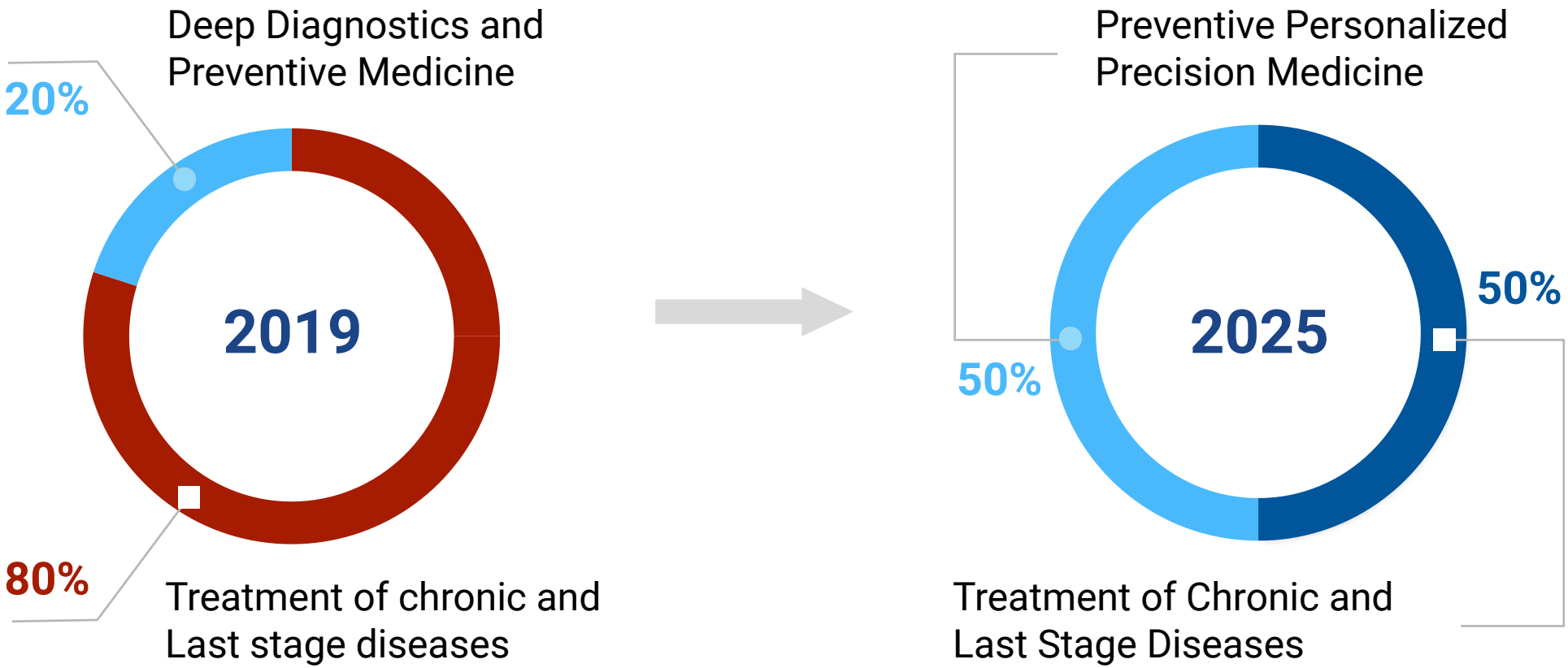
Build partnerships within and outside the health field

- Partnering with health care payers, including both public and private insurers
- Partnering with health care providers, including expanding health care models
- Partnering with sectors beyond the healthcare system, including drawing the connection between all facets of society and health

Source: NCBI | Huffpost

Preventive Medicine and HALE

Healthcare has changed since the decline in mortality caused by infectious diseases as well as chronic and non-contagious diseases, with a direct impact on the cost of public health and individual health care. We must now transition from traditional reactive medicine based on symptoms, diagnosis and treatment to a system that targets the disease before it occurs and, if it cannot be avoided, treats the disease in a personalized manner. Precision Medicine is that new way of thinking about medicine. Precision medicine is poised to have an impact on patients, health care delivery systems and HALE in ways that were only imagined 15 years ago when the human genome was first sequenced.



Progressive Model of P4 Medicine Platform

Personalisation and precision of diagnostics, prognostics and treatment for individual patients

Healthy lifespan extension and ageing processes reversal to a young state

01 Access to advanced preventive restorative medicine technologies

- Safe testing of novel therapies on individual`s stem cells, skin and other organs

02 Personalized longevity programs

- Personalised diagnostics, prognostics and therapeutics
- Virtual human body for health monitoring

03 Health management by world leading experts

- Continuous health monitoring by the world leading experts

Precision Health Structure

AI-Driven Precision Diagnostics

- Multi-Omic Sequencing
- Continuous monitoring powered by Big Data Analytics
- Continuous monitoring of health state based on changes in biomarkers of aging

AI-Driven Advanced Prognostics

- AI-driven prognostics
- Advanced biomarker-based prognostics
- AI-driven predictive prognostics based on personalized multi-omics

Personalised Treatment Optimization

- AI-driven in silico personalised treatment optimization
- AI-driven personalised in vivo drug optimization
- Treatment optimization based on patient genetics

AI-Driven Preventative Treatment

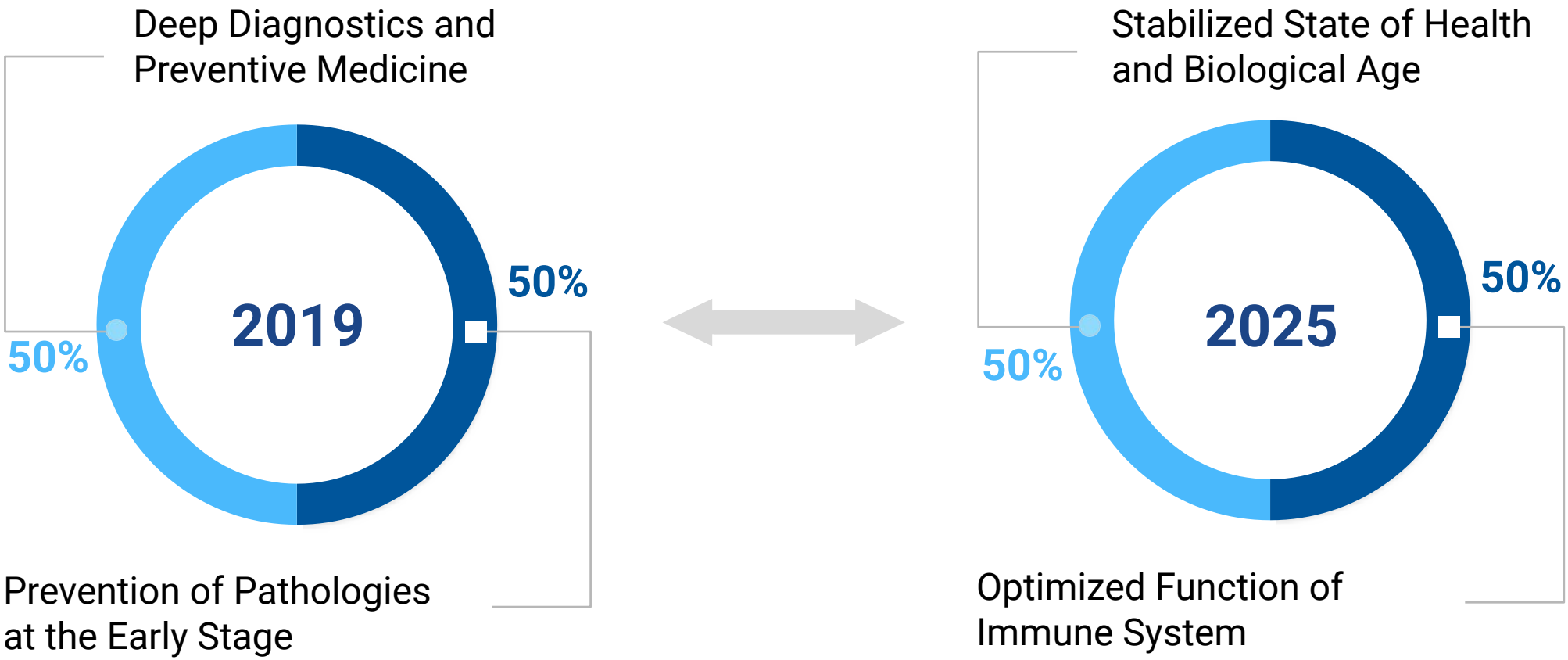
- Maintenance state of precision health through preventive medicine
- AI-based predictions of optimal drug combination

Advanced Areas P4 Medicine

Constant growth in medicine leads the clinics to the need for choosing some areas to maximize their impact of treatment. It highly impacts the methods they use and the diseases they treat. The most advanced areas can be split into such categories as:

- **Personalized Diagnostics.** Mostly it uses different "-omic" fields in rational design approaches to provide a cost-effective alternative to expensive and time-consuming laboratory tests in order to assist health care personnel with disease diagnosis decisions.
- **Personalized QALY & HALE Estimation.** HALE is a tool to integrate or unite the public health focus on geographic populations and the clinical focus on individual patients, and can be used to explain and assess the effects of interventions on individual patients and on populations. QALY is a generic measure of disease burden, including both the quality and the quantity of life lived.
- **Personalized Biomarker Analysis.** Personalized analysis of traceable biomedical substances used for tracking the patient's state. Biomarkers reflect core pathologic mechanisms that enable the identification and characterization of initial injuries and the secondary pathological cascades, as well as determining the risk or progression of a disease and the susceptibility of the disease to a given treatment.
- **Personalized Prognostics.** An approach in diagnostic based on precision. It uses multi-omic sequencing, non-invasive continuous monitoring, multi-modal total-body imaging, 3D integration of cross-sectional tissue and organ imaging, and whole-body and organ-specific biological age calculation based on biomarkers.
- **Personalized *in vivo* & *in silico* drug testing.** Implementation of the personalized approach in drug testing.
- **Preventive Therapies.** Therapies that consists of measures taken for disease prevention, as opposed to disease treatment. Disease prevention relies on anticipatory actions that can be categorized as primal, primary, secondary, and tertiary prevention.

From Precision Diagnostics to Precision Health



Precision Health reimagines medicine to focus on predicting, preventing, and curing disease precisely. Compiling two seemingly different approaches — high-tech and high-touch — science creates new vision of the unique biology and life circumstances of each individual, with an emphasis on catching disease before it strikes. Precision Health represents a fundamental shift to more proactive and personalized care that empowers people to lead healthy lives.

Precision Diagnostics

Digital avatar visualizes a combination of biomarkers and other diagnostic results

Collect the data today:

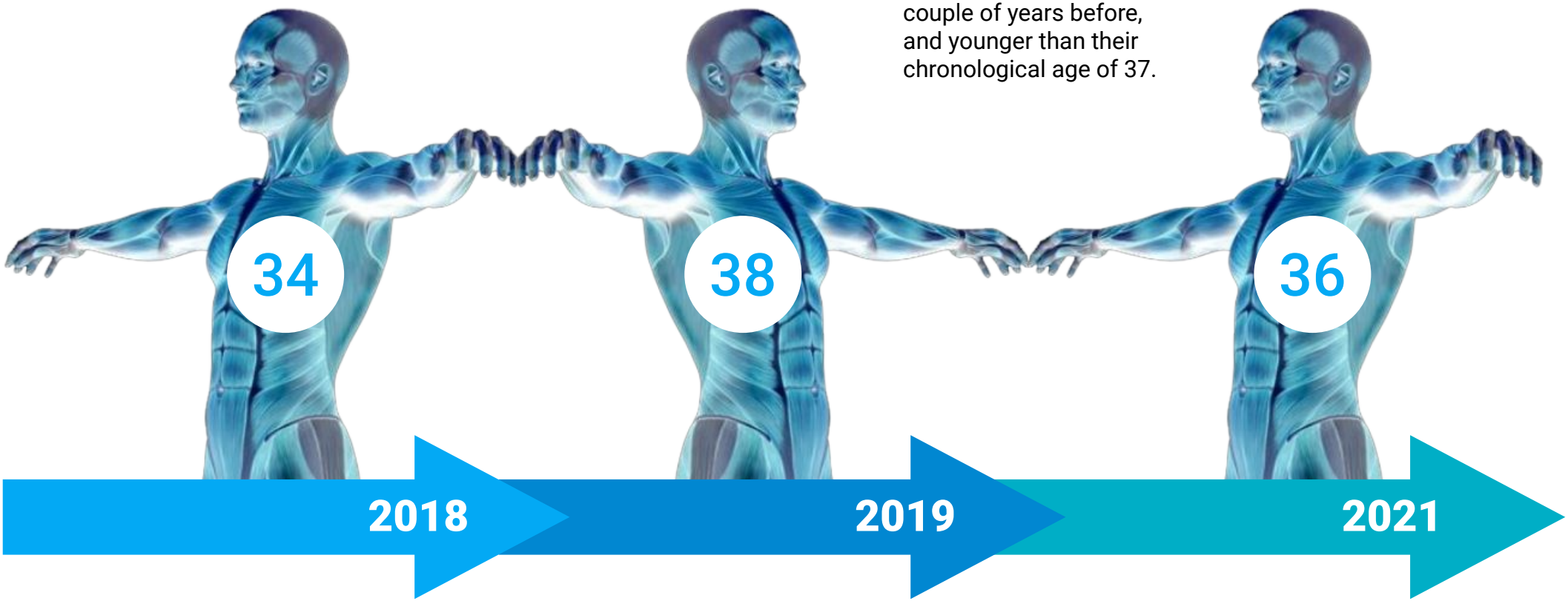
- Blood samples
- Biomarker analysis
- Database of personal biomedical data stored on blockchain

Future benefits:

- Data driven analysis of biomarkers dynamics over time
- Analyse the changes in a digital avatar
- Personalized interventions

Precision Diagnostics

A patient may see that their **biological age** is 36 in 2021 — younger than a couple of years before, and younger than their chronological age of 37.



Medical knowledge will double every 73 days by 2020 vs. every 3.5 (years) in 2010, and genomic sequencing costs have fallen 99 % since 2003. This has enabled a new frontier in precision medicine to further extend life expectancy, heralding a 'techmanity' (technology meets humanity) revolution. Preventive interventions permanently reduced the incidence of cancer, diabetes, heart disease, hypertension, lung disease, and stroke. **This, evidently, increase the amount of healthy years which people could live.**

Global Government Policy and Precision Medicine

In view of its potential and the high expectations and promises for global health, it is not surprising that worldwide numerous national initiatives have been launched over the past decades to foster the development of personalized health. For example, as early as 1999 the Estonian government decided to create a population-based biobank that has the right "to collect, store and use biological samples and phenotype information for genetic research and is further expected to use the results to improve public health." Since this innovative and future-oriented decision, Estonia has reached further milestones towards personalized medicine, including the development of a nationwide technical infrastructure that allows for secure electronic exchange of medical information, as well as accessibility of medical data from hospitals, primary care physicians and pharmacies in a strictly regulated manner.

Meanwhile, other countries with universal health care and comprehensive medical registers have developed similar precision medicine programs on a national scale, including Denmark, France, the Netherlands, Sweden and the United Kingdom. The UK government mandated the Department of Health to initiate the 100,000 Genomes Project, whose goal is to sequence 100,000 genomes from National Health Service (NHS) patients by the end of 2017 and thereby " create an ethical and transparent program based on consent, to bring benefit to patients and set up a genomic medicine service for the NHS, to enable new scientific discovery and medical insights."

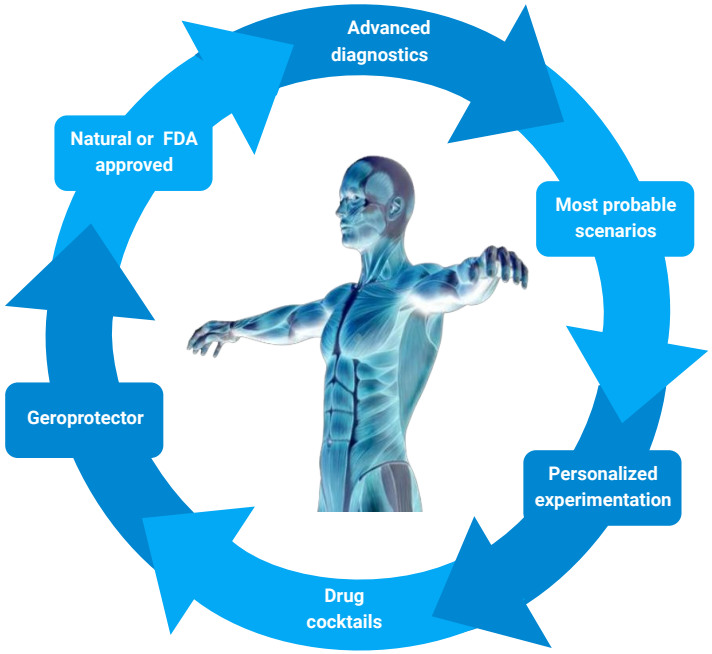
On the European level, the International Consortium for Personalized Medicine (ICPerMed) was established following the PerMed project funded by the European Union's 7th Framework Programme (FP7). The consortium is composed of over 30 European and international partners representing ministries, the European Commission, and funding agencies. ICPerMed aims to position Europe as global leader in personalized medicine research by providing a platform where members can exchange and coordinate research and funding activities at the European level and later at the global level.

Outside the Europe, China announced the launch of the "China Precision Medicine Initiative" in March 2017, with an estimated budget of US$9.2 billion over 15 years, indicating that China is about to take the global lead in precision/personalized medicine.

Precision Medicine in Singapore

Singapore is known in the world over for its efficient healthcare system. Research undertaken in this country, proves that patients who received personalised treatment had higher response rates and overall survival compared with those who received non-personalised treatment. One potential area that **Singapore may still continue to lead the pack is through its strides in comprehensive genomic profiling and precision medicine** which will offer a truly patient-centred approach to cancer treatment in the years ahead.

For example, the latest collaboration between **the Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Singapore's Nanyang Technological University (NTU)** aims to help improve seniors' health through extensive research on their gut microbiome.



While CSIRO and NTU already have a series of joint projects underway — mostly focused on biomedical manufacturing — **this is the first joint Australia-Singapore funded project under CSIRO's Precision Health Future Science Platform (FSP)**, whose main goal is to develop tailored solutions to help the elderly live better for longer.

So perhaps the future of medicine in Singapore and throughout the world could soon look something like this: A man with a cancer diagnosis goes to his healthcare provider who works with partners to analyze his genome, the DNA of the tumor, and the various biomarkers in his body. Simultaneously, wearable technology is used to track the man's lifestyle and health fluctuations throughout his daily life. Then, the large stacks of data are compiled, crunched and compared to other available global data with the assistance of AI to determine the best treatment for his particular body and cancer.

Healthy Longevity and Supercentenarians

Supercentenarians
A Phenomenon or a Future Trend?

A supercentenarian is someone who has reached the age of 110. Naturally, very few people reach such age, even those who are already quite old, e.g. Kannisto (1997) has calculated the chances of surviving from age 100 to age 110 in Nordic countries in different periods for male and female centenarians (people who've reached the age of 100), respectively; based on data from the most recent period (1980-1990), it has been estimated that fewer than one out of 1,000 male centenarians will reach age 110, while about 2.1 out of 1,000 female centenarians will celebrate their 110th birthdays.

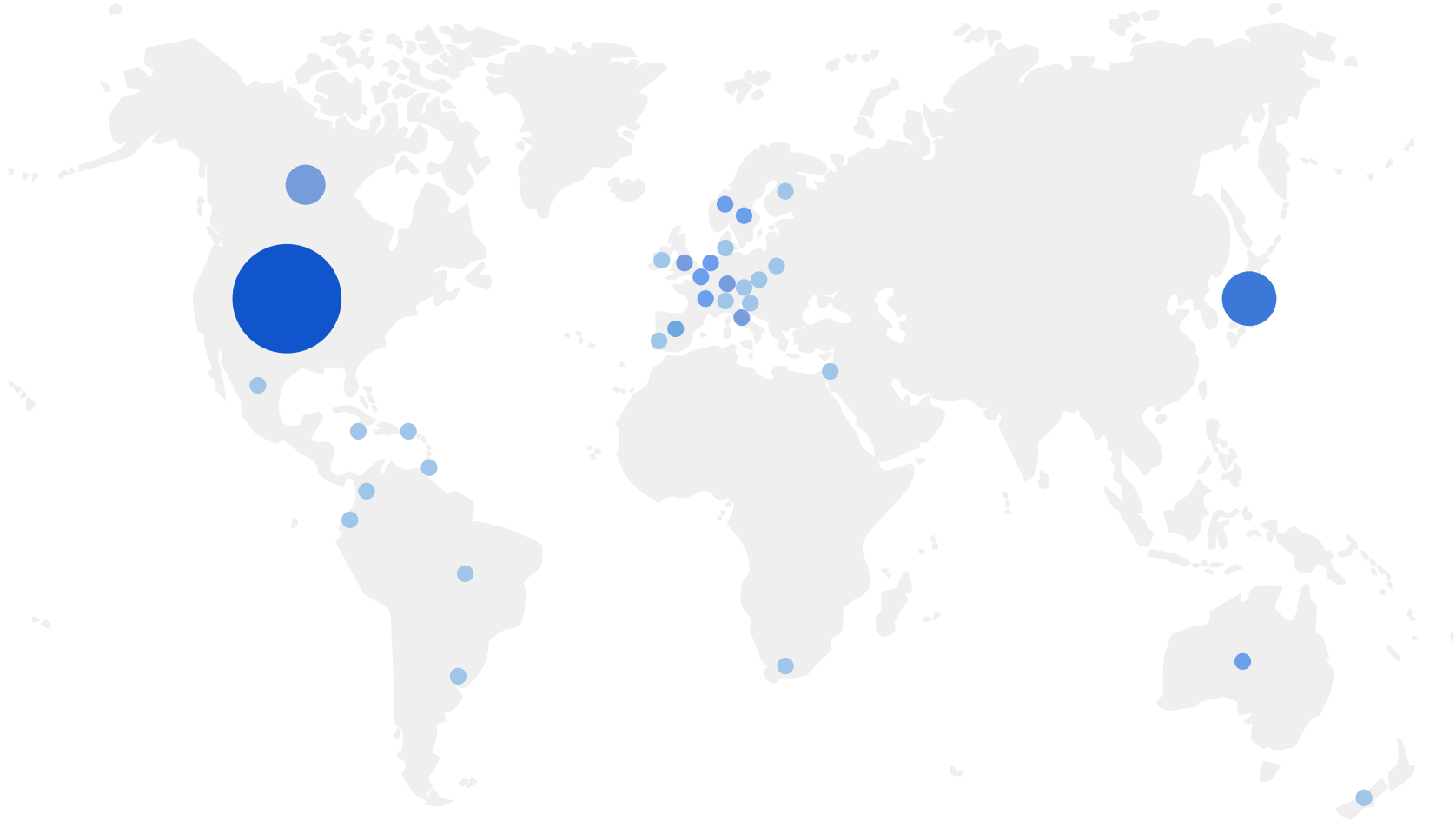
How do people reach such extreme age? Obviously, there are many factors and it is often difficult to separate them but studies have found supercentenarians appear to be almost as diverse as individuals at younger ages, albeit almost all are women, most enjoyed comparatively good health until advanced old age and none were heavy cigarette smokers. The number who did not marry or who had fewer children than average appears high compared with marriage and childbearing patterns for people who died younger. Also some studies suggest that another influence factor is genetic profiles. According to Stuart Kim who is an aging researcher formerly at Stanford University, about 25 percent of how long a given person lives is due to genetic factors, and the rest is really luck and lifestyle.

All of the today's supercentenarians were born at the beginning of the XXth century or even at the end of the XIXth century. Let's face it - in those days the conditions were far from ideal for healthy ageing. It was extremely unlikely for newborn to live up to 110 years. It is still dubious but to far less extent.

The advances in biomedicine with the potential to target the fundamental mechanisms of ageing at their source, with the potential to increase Healthy Longevity are at the heart of another megatrend, a rapid global population aging, also known as the "Silver Tsunami". It is not even an argument whether people would live to 110, it is a question of their health condition at those age. What will be their biological age as opposed to chronological age, how much will the gap between HALE and life expectancy be reduced? The former in all likelihood will exceed a person's age, and the latter might be reduced to a minimum value. It will, of course, depend on many variables such as the governments' commitment to implementing Healthy Longevity strategies and development plans as well as other complex factors, but the world community is hopeful of successful outcomes.

Source: MPIDR | HuffPost

All Supercentenarians
Distribution by Nations (cumulative total)



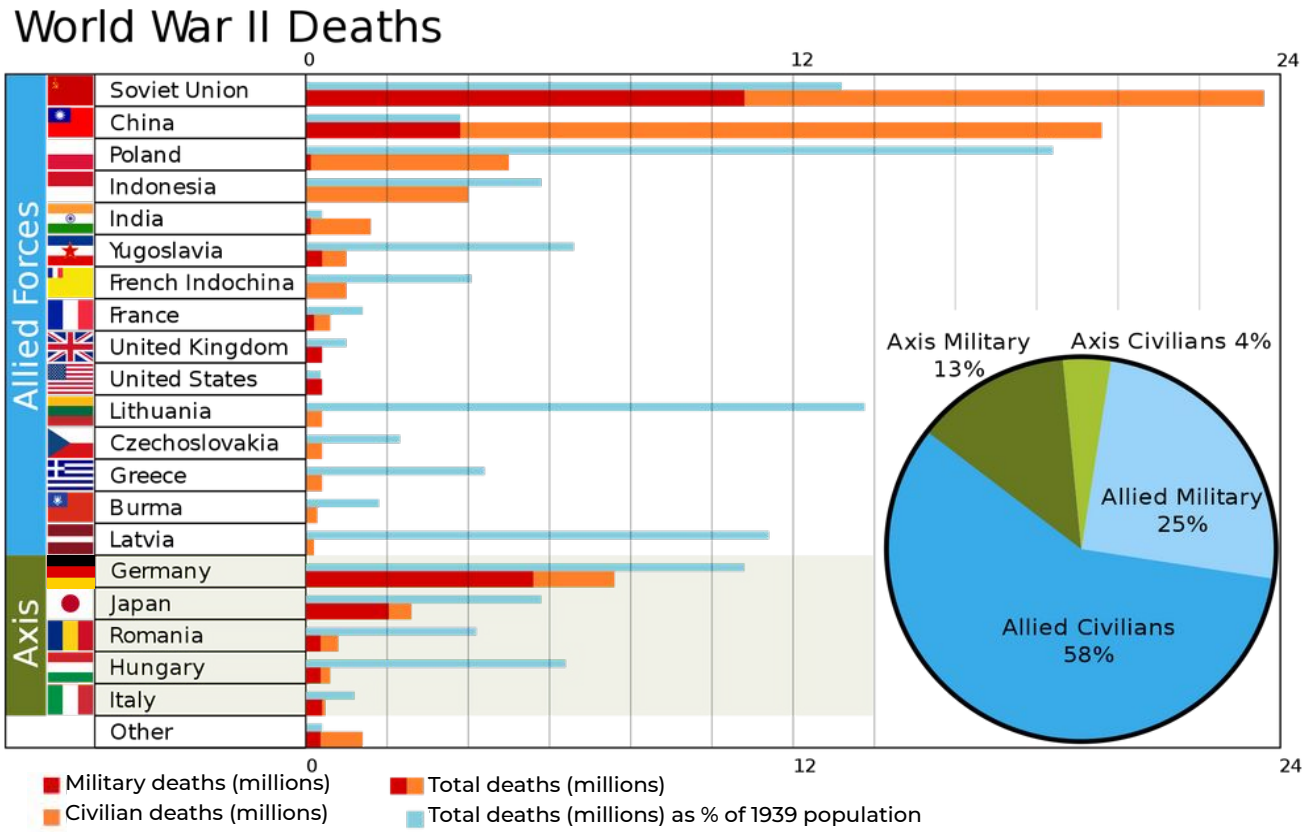
782	USA	157	France	124	Italy	49	Germany	27	Netherlands	17	Belgium	11	Norway
263	Japan	132	United Kingdom	50	Canada	42	Spain	26	Australia	15	Sweden	1-7	Others

Source: GRG Table G

Supercentenarians
The Case of the USA

The population is another factor to consider in the case of USA. Today, the U.S. is the third most populous in the world, falling far behind China and India. By some estimates, the United States was the third or fourth largest country in the world in 1900 and 1950 and by far the most economically developed country at the time of turmoil caused by the two world wars.

All in all, a supercentenarian had the best probability of being born and raised in the U.S. because of its huge population and a more favorable economic and social environment for a person's well-being. It is highly arguable whether this is the case right now considering the overall evolution of economy and healthcare in all the countries around the world, and far better effectiveness of the former in the countries like Singapore.

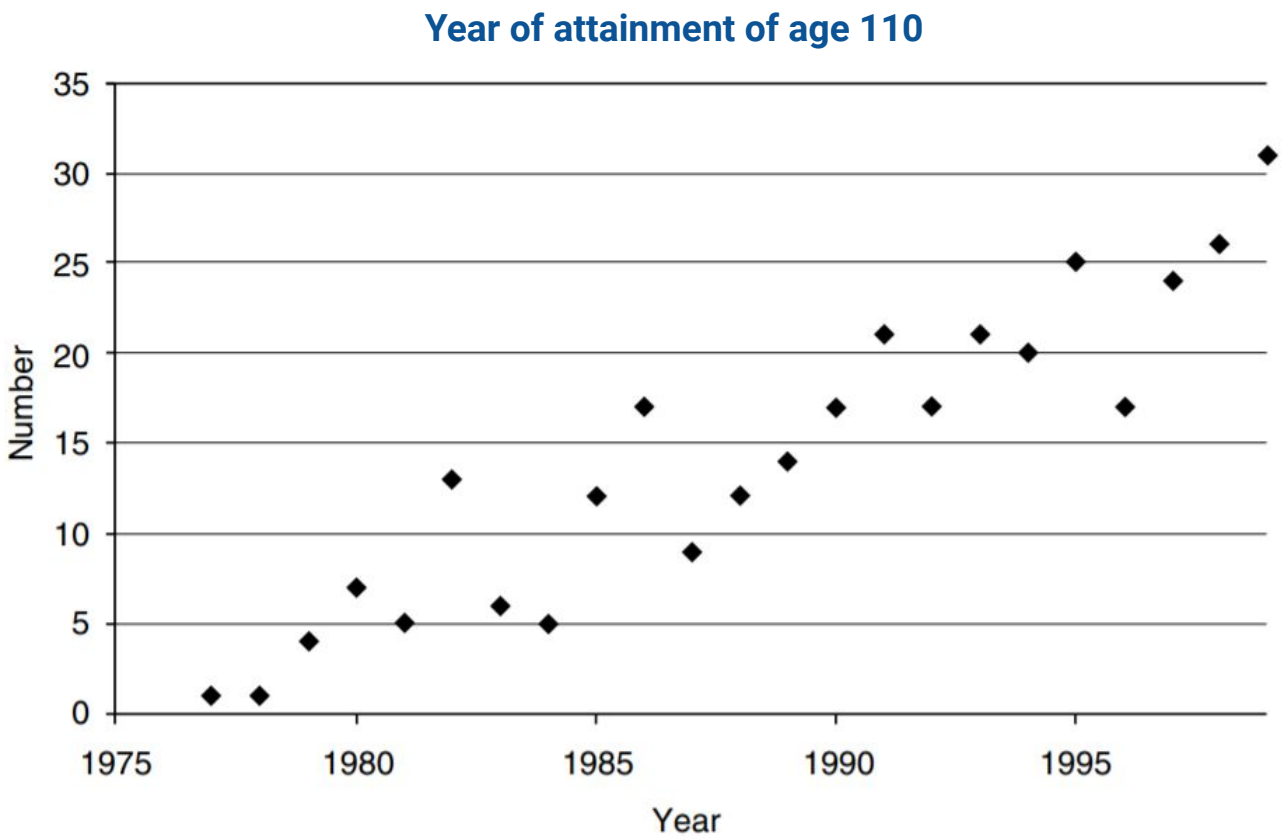


The chart on the left depicts the death toll of World War II. Millions of casualties, among civilians in particular, and serious social and economic implications substantially reduced the number of would-be supercentenarians all around the world, and in countries that could have challenged the U.S. for being a place where a person could live up to 110 years.

Supercentenarians in the United States

The United States has contributed to the International Database on Longevity (IDL) 325 persons who lived in the United States during the prior two decades beyond their 110th birthday, and who were deceased as of June 2003. The major contribution was made by the Program on Population, Policy, and Aging at Duke University, under the leadership of Dr. James Vaupel; and by the Population Studies Center at the University of Pennsylvania, under the leadership of Dr. Samuel Preston; and assistance of Mr. Robert Young.

IDL data agrees with the GRG data in that it shows a rising number of US supercentenarians over time.



The oldest supercentenarian in our contribution to the IDL database is Sarah Knauss, age 119 at death. The next oldest is Lucy Terrell Hannah, age 117 at death. The oldest male is the Danish-born Christian Mortensen, age 115 at death.

The state in which the largest number of confirmed supercentenarians were born is New York, with 23, followed by Texas (20), Pennsylvania and Illinois (19), and Ohio (16). The states in which the largest number of confirmed supercentenarians resided at the time of their deaths are California (32), Texas (20), Illinois (19), New York (18), and Massachusetts (17).

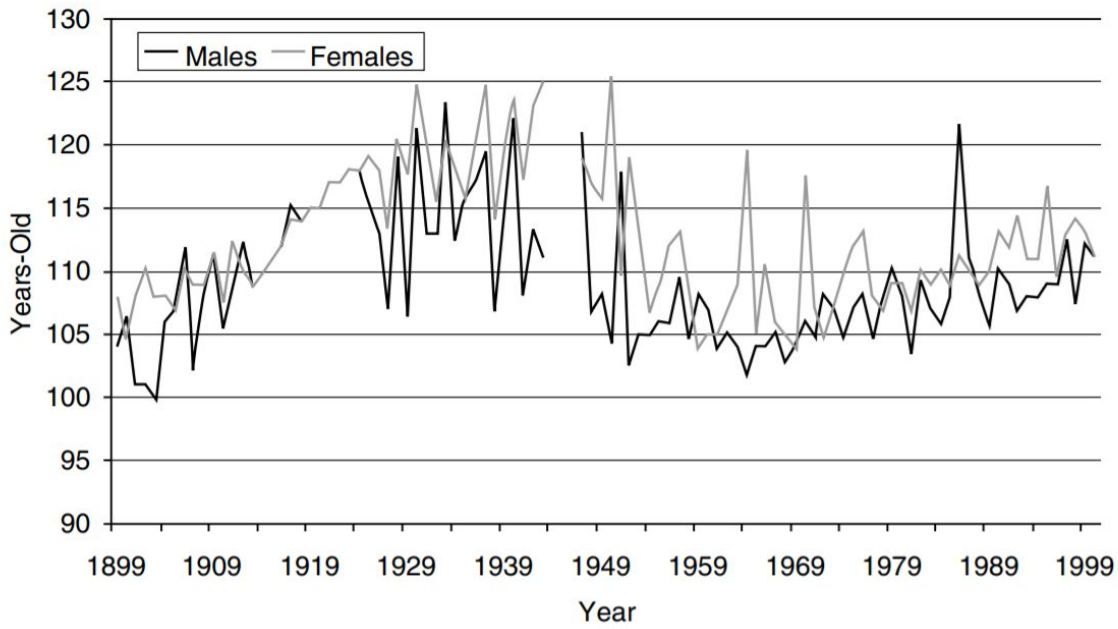
Source: International Database on Longevity

Supercentenarians in Japan

The number of **centenarians** in Japan reported by the Ministry of Health, Labor and Welfare **in 2003 was 20,561**. The number had increased more than 130-fold since 1963, when the then Ministry of Health and Welfare started reporting the number of centenarians. At that time, there were only **153 persons aged 100 and over**. The source of these figures and the only publicly available data source for living persons aged 100 and over by single years of age in Japan is the government-produced list of centenarians. Japan is one of the very few countries having a sizable number of centenarians and supercentenarians.

With the institution of birth registration in Japan with the KOSEKI system in the 1870s, the Japan supercentenarian data since that time has been more reliable, as evidenced by no outliers (no one older than 117) for any Japan cases born after the registration system began (the Izumi case, ostensibly from 1865, predates the birth registration period).

Highest reported age at death by sex: 1899-2000



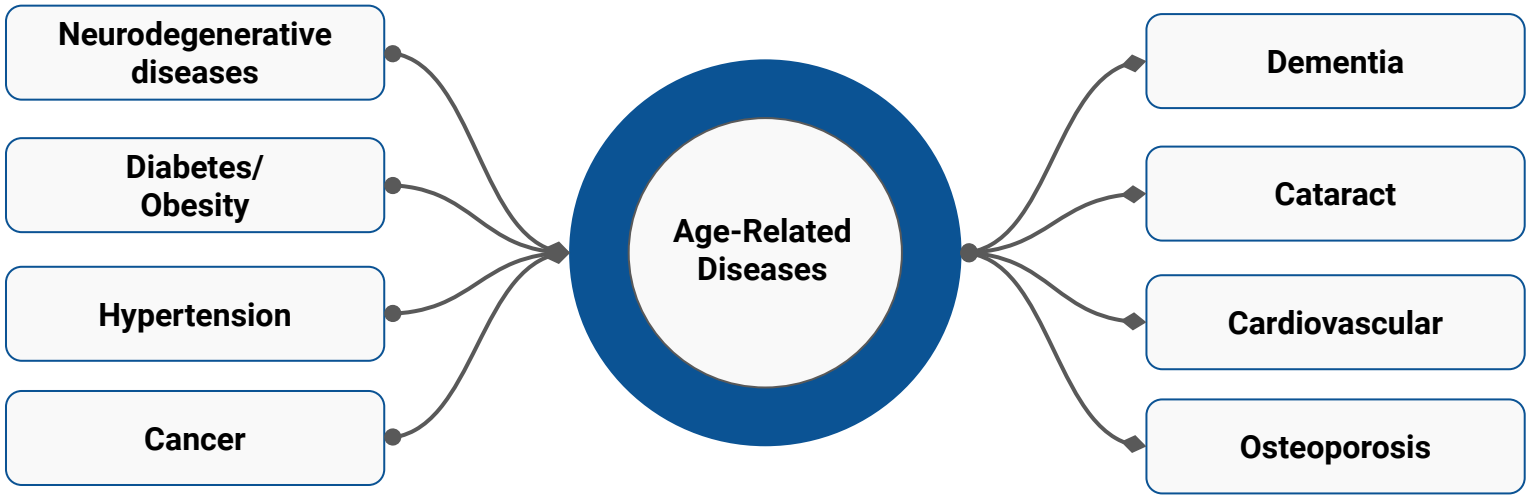
In Japanese Vital Statistics, there are 13 persons whose reported age at death exceeds 122 years old between 1930 and 1950. The highest age at death recorded in the Vital Statistics in Japan is 125, and was reported in 1943. As Figure illustrates, the highest age at death showed an upward trend from 1899 to 1930, and plateaued at around 120 in the 1930s and 1940s. After the 1950s, the highest age at death ranges between 100 and 115, with very few exceptions. One exception is the case of Shigechiyo Izumi, in 1986. The highest ages at death by sex fluctuate widely, but, without outliers, there seems to be increasing trend in the highest age at death for both sexes.

Source: International Database on Longevity

Supercentenarians Have "Super" Immune Systems

The new study "Single-cell transcriptomics reveals expansion of cytotoxic CD4 T cells in supercentenarians" reveals that immune cells profiled from supercentenarians hava very unique characteristics. Supercentenarians are rare individuals who reach 110 y of age. They are endowed with high resistance to non-communicable diseases such as cancer, stroke, and cardiovascular disease. Demographers in Canada estimated that the chance of living more than 110 y is as low as 1 in 100,000. According to the population census covering the whole territory of Japan in 2015, the number of centenarians was 61,763, of which only 146 were supercentenarians. However the study of extreme longevity comes up against a problem of methodology: how to validate claims about a person's age when there is an issue of the "lack of birth registration".

A distinctive feature of supercentenarians is a long healthy lifespan, maintaining relatively high cognitive function and physical independence even after 100 y of age. In other words, many supercentenarians can spend almost their entire lives in good health due to the delayed onset of age-related diseases and compression of morbidity. Therefore, supercentenarians can be considered a good model of successful aging, and understanding their attributes would be beneficial for superaging societies.



Source: PNAS

Singapore and USA Healthy Longevity Comparison

Healthcare System in Singapore

Policy Tools in Singapore's Healthcare System

Government

Organization	Fiscal
• Public ownership of Hospitals • Active Management of Hospitals • Competition among hospitals	• Subsidy to Public Hospitals • Medisave, Medifund, and Medishield • Out-of-pocket payments
Regulation	**Information**
• Close monitoring of all significant aspects of providers' operations • Active regulation of providers	• Publishing prices, bill sizes, and clinical outcomes • Public Campaigns

Unlike in the US, where the government's main role is to manage insurance programs, Singapore's government controls and pays for the healthcare system itself – many hospitals belong to the public sector, a majority of doctors work predominantly for the state, and the government subsidizes many medical bills directly.

Basic care at government hospitals is affordable, and sometimes even free for Singaporeans, with more deluxe care in private rooms charging extra. Singapore's employees inject around 37 percent of their salaries in mandated savings accounts that may be spent on healthcare, housing, education, and insurance, with part of this being contributed by their employers.

The Singaporean government also uses its bulk purchasing power to spend less on drugs, controls the number of medical students and physicians, and plays a role in deciding how much they earn.

The government also acts to keep medical costs low amid an aging population, and then uses these low costs to create a market-driven insurance system. For example, the Ministry of Health publishes public and private treatment fee benchmarks, which gives patients an estimate of what they can expect to pay for care. People can refer to the benchmark to see if they are paying a fair amount for treatment.

Source: Pacific Prime Singapore | The Healthcare System in Singapore | **pdf**

Healthcare System in Singapore

Healthcare services available in Singapore

From primary care services to residential and long-term care, the Ministry of Health has designed their services to ensure all Singaporeans have access to affordable care. The Singaporean healthcare system is characterized by these major services:

- **Primary healthcare**: These services are usually provided by GPs in polyclinics and private clinics.
- **Hospital services**: There are currently 9 public and 8 private hospitals in Singapore. Private hospitals play an important role in alleviating the patient caseload in the public sector.
- **Dental services:** The health promotion board specifically focuses on preventative dentistry.
- **Intermediate and long term care:** These facilities offer care to those who no longer need hospital care, but need continued care.
- **Traditional Chinese Medicine:** The Ministry of Health's aim is to ensure the highest quality in the realm of Traditional Chinese Medicine practices.
- **Support services:** Support services to hospitals and primary care programs include blood transfusion, forensic pathology, and pharmaceutical services.

Singapore's health insurance system

The basic structure of Singapore's health insurance system is built around the '3Ms': Medishield, Medisave, and Medifund:

- **Medishield:** For big expenses, Singaporeans can access their Medishield Life, a basic health insurance scheme that all permanent residents and citizens can use to pay for large bills, as well as costly outpatient treatments like kidney dialysis. Those seeking to top up their Medishield Life plans can purchase Private Integrated Shield Plans, which are designed and managed by private health insurance companies.
- **Medisave:** This is a mandatory savings plan that consumes between 7 and 9.5 percent of a worker's wages. Singaporeans can use their Medisave accounts to pay for some types of routine care.
- **MediFund** is an endowment fund set up by the Government. It provides a safety net for patients who face financial difficulties with their remaining bills after receiving Government subsidies and drawing on other means of payment including MediShield Life, MediSave and cash.MediFund Silver and MediFund Junior are carved out from MediFund to provide more targeted assistance for the needy elderly and the young respectively.

Source: Pacific Prime Singapore | Ministry of Health Singapore

Healthcare System in the United States

A lack of insurance coverage

Health care and health insurance are not equivalent—that getting more people insured will not necessarily improve health outcomes

Administrative inefficiency

They waste a lot of money on administration. It is not ideal that different insurance plans cover different treatments and procedures, forcing doctors to spend precious hours coordinating with insurance companies to provide care.

Underperforming primary care

The United States have a very disorganized, fragmented, inefficient and under-resourced primary care system.

Wasteful Healthcare Spendings

About $1 of every $4 spent on healthcare in the United States may be squandered due to a combination of potentially avoidable administrative hassles, failures in coordination and delivery of services, use of treatments of little care, and fraud, a study found.

Healthcare is subject to extensive regulation at both the federal and the state level. Under this system, the federal government cedes primary responsibility to the states under the McCarran-Ferguson Act. Essential regulation includes the licensure of healthcare providers at the state level and the testing and approval of pharmaceuticals and medical devices by the U.S. Food and Drug Administration (FDA), and laboratory testing.

Healthcare facilities in the United States are largely privately owned. American citizens obtain health insurance through their employers, independently through private purchase, or through government-based programs. Some low-cost and cost-free health care services exist through non-profit organizations, charities, and publicly funded programs. However, international visitors should always carry their insurance when they visit the United States. The cost of treating a serious emergency can be catastrophically high.

The United States is home to some of the best hospitals and research facilities in the world. Their top treatment hospitals include the Mayo Clinic, the Cleveland Clinic, Johns Hopkins Hospital, UCLA Medical Center, and Massachusetts General Hospital. The United States is also considered one of the best destinations in the world for cancer care, cardiac care, and orthopedic medicine. In major cities, there's a wide range of public and private hospitals, surgery centers, urgent care clinic, and specialty clinics. In smaller communities, care options are more limited and may include everything from a county hospital, a community care clinic run by nurse practitioners, to telehealth services.

Source: International Insurance | MIT Medical

Healthcare System in the United States

The United States spends more on health care than any other country in the world, and a large share of that spending comes from the federal government. Federal health spending has grown significantly over the past several decades and is projected to grow in the future. Most federal health care resources go toward financing items: Medicare, Medicaid, the tax exclusion for employer-sponsored health insurance, the exchange subsidies established under the Affordable Care Act.

Medicare

Medicare is the largest federal health care program, serving 58 million elderly and disabled people at a gross cost of $702 billion in 2017 and a cost net of premiums of $591 billion. Medicare consists of three programs: Part A covers hospital and inpatient care, Part B covers physician and outpatient care, and Part D covers prescription drugs. Part A is funded primarily by a payroll tax while Parts B and D are funded through a combination of premiums and general revenue.

Medicaid and CHIP

Medicaid is a state-run and jointly-financed health insurance program serving lower-income residents. Medicaid provides benefits for both acute and long-term care, covering nearly 100 million people over the course of a year. The Children's Health Insurance Program (CHIP) is a similarly structured program that covers almost 10 million children in a given year.

Exchange Subsidies and Other Spending

This category includes subsidies for insurance purchased on the exchanges, veterans' health care provided through the Department of Veterans Affairs, and health care for active-duty military and their dependents. Both military health care and veterans' health care are discretionary programs, meaning that they are appropriated each year rather than allowed to function automatically.

The Employer-Sponsored Health Insurance Exclusion and Other Tax Benefits

The tax code also provides several subsidies for health care and insurance. By far the largest is the exclusion for employer-provided insurance. Other tax subsidies totaled about $25 billion in 2017. The largest of these benefits is the medical expense deduction, available only to taxpayers who itemize their deductions and have medical expenses that exceed 7.5 percent of their income (or 10 percent after 2018).

Source: CRFB

Projections: US Health Care Costs to Rise, Life Expectancy to Plummet

US **health expenditures** are projected to grow at an average annual rate of 5.5% during 2018–27 and represent **19.4% of gross domestic product in 2027**. During that period, prices for health care are projected to grow 2.5% per annum – faster than during the last decade. Among the major payers, annual spending growth in Medicare (7.4%) is expected to exceed that in Medicaid (5.5%) and private health insurance (4.8%).

Although expected life span will rise globally in 2040, the United States, despite the projected increase in its health care spending, is expected to further plunge in life expectancy rankings in 2040 – from 43rd place to 64th – the largest decrease for a country defined as high income. With a projected lifespan of 79.8 years (just 1.1 years increase), the US will sit behind countries including the United Kingdom, Colombia, Japan, Costa Rica, Saudi Arabia and Turkey. China's global ranking is projected to rise from 68th to 39th place.

The underlying study projected a **significant increase in deaths from noncommunicable diseases**, including diabetes, chronic obstructive pulmonary disease, chronic kidney disease, lung cancer, and worsening health outcomes linked to obesity. The top 5 health drivers that explain most of the future trajectory for premature mortality are high blood pressure, high body mass index, high blood sugar, tobacco and alcohol use, and air pollution. However, the future is not preordained; adequately addressing these drivers by health systems will be key to progress or stagnation.

2040 Rank	2040 Projected LE	2016 Rank & LE
1. Spain	85.8	82.9 (4th)
2. Japan	85.7	83.7 (1st)
3. Singapore	**85.4**	**83.3 (3rd)**
4. Switzerland	85.2	83.3 (2nd)
5. Portugal	84.5	81 (23rd)
6. Italy	84.5	82.3 (7th)
7. Israel	84.4	82.1 (13th)
8. France	84.3	82.3 (8th)
9. Luxembourg	84.1	82.2 (10th)
10. Australia	84.1	82.5 (5th)
39. China	81.9	76.3 (68th)
64. USA	**79.8**	**78.7 (43rd)**

Source: Peterson-Kaiser Health System Tracker

Healthcare System in Singapore:
What can U.S. Healthcare System Learn

1. Healthier Population
Singapore is an island city-state of around 5.8 million without rural or remote areas. Everyone lives close to doctors and hospitals. Citizens there have much less poverty than one might see in other developed countries. Rates of smoking, alcoholism and drug abuse are relatively low. So are rates of obesity. All of this predisposes the country to better health and accompanying lower health spending.

2. Use of policy tools simultaneously
A concerted use of different tools promote complementarities that are unavailable when they are used in isolation. For example, instead of running hospitals in traditional command-and-control ways, the Singapore government uses its ownership rights to force them to compete with each other and with private hospitals for users' funds with the objective of promoting customer focus and operational efficiency on their part. Its ownership also makes it easier for the government to force them to disclose information on costs and clinical outcomes, a requirement vehemently resisted by private hospitals but essential if users are to make informed decisions.

3. Cost-efficiency
Government in Singapore decides where and when the private sector can operate. In the United States, the opposite situations is true. The private sector is the default system, and the public sector comes into play only when the private sector doesn't want to. In Singapore, the government strictly regulates what technology is available in the country and where. It makes decisions as to what drugs and devices are covered in public facilities. It sets the prices and determines what subsidies are available.

4. Large focus on delivery of care that on insurance
Singapore gets a lot of attention because of the way it pays for its health care system. Primary care, which is mostly at low cost, is provided mostly by the private sector. About 80 percent of Singaporeans get such care from about 1,700 general practitioners. Polyclinics have been designed to process as many patients as quickly as possible. The government encourages citizens to use their online app to schedule appointments, see wait times and pay their bills.

Source: The New York Times | The Healthcare System in Singapore | **pdf**

Healthcare System in Singapore:
What can U.S. Healthcare System Learn

5. Public health initiatives

Government control applies to public health initiatives. Officials began to worry about diabetes, so they acted. School lunches have been improved. Regulations have been passed to make meals on government properties and at government events healthier. In the United States, the American Academy of Pediatrics and the American Heart Association recently called on policymakers to impose taxes and advertising limits on the soda industry. But that is merely guidance. In Singapore, campaigns have encouraged drinking water, and healthier food choice labels have been mandated. The country, with control over its food importation, even got beverage manufacturers to agree to reduce sugar content in drinks to a maximum of 12 percent by 2020.

6. Combination of public ownership, market competition, and price transparency

Public ownership allows the Ministry of Health to directly acquire operational information from public hospitals and respond with appropriate directives as necessary. This is particularly relevant in healthcare as the governance failures are multi-faceted and deeply intertwined and, hence cannot be addressed in isolation.

Singapore's healthcare system shows that an combination of conservative and liberal ideas in healthcare is possible. Unlike in the US, where the government's main role is to manage insurance programs, Singapore's government controls and pays for the healthcare system itself – many hospitals belong to the public sector, a majority of doctors work predominantly for the state, and the government subsidizes many medical bills directly.

Singapore made progress, relatively inexpensively (with lower health spendings), in infant mortality and increased life expectancy. It did so in part through better vaccinations, better sanitation, good public schools, public campaigns against tobacco.

But in recent years, as in the United States, costs have started to rise much more quickly with greater use of modern technological medicine. The population is also aging rapidly. It's unlikely that the country's spending on health care will approach that of the United States (18 percent of G.D.P. in 2018). The health care system in Singapore seems more geared toward raising up all its citizens than on achieving excellence in a few high-profile areas.

Source: The New York Times

Singapore and Hong Kong Healthy Longevity Comparison

Health Care System in Hong Kong

The healthcare system in Hong Kong has high-quality private and public healthcare tracks. Together public and private health care systems serve roughly 7.4 million people. The delivery of health services is influenced by the patient's insurance coverage or financial means. When access to the public system is limited due to increased demand, health insurance coverage becomes a determinant factor for healthcare access.

1. High quality of provided services and efficiency.

- Life expectancy is one of the highest in the world. According to the Department of Health in Hong Kong, life expectancy has reached 81.9 years for males and 87.6 years for females in 2017.
- Infant mortality rate and maternal mortality rate are among the lowest in the world.
- With 43 public hospitals 12 private hospitals in a densely populated city, healthcare is easily accessible (doctor home-visits are not common).

2. Healthcare is a dual-track system.

- A public system provides over 90% of all in-patient bed-days and 30% outpatient service according to the Department of Health in Hong Kong.
- A very expensive private system takes on 70% of primary care services and only 10% of in-patient service according to the Department of Health in Hong Kong.

3. Private health insurance is one of the most expensive

- While there is a six-month waiting period for some outpatient clinics in the public system, private outpatient clinics can usually take patients without delay. However, the private clinics have their own market value and often charge their clients higher rates. Private insurance companies tend to negotiate their rates with individual clinics, or patients can pay out of pocket. Yet, self-pay is only possible for people with sufficient means and makes healthcare services less accessible to people with limited financial resources.

4. Population faces very long wait times in the public sector

- All patients in Hong Kong have access to public healthcare services when they are in need, but increasingly with delay. E.g. people have to wait 8 to 30 months for a cataract operation.

Source: Healthy Matters | China Perspectives | pdf

Current Challenges for Hong Kong's Healthcare System

1. Shortage of doctors and other health professionals in public sector.

A key issue is that the supply of doctors has not kept pace with demographic trends and the increasing demands of an ageing population. It expects a chronic shortage of 300 doctors at all times. In fact, a strategic review of health care staff planning, released by the Food and Health Bureau in 2017, predicted Hong Kong would be short of 500 doctors in 2020.

2. Timeliness of healthcare services.

Timeliness for healthcare services is closely linked to staff shortages. When, for example, a patient with knee pain consults a primary care physician, and a referral for physiotherapy services is issued, the patient's treatment in an overcrowded public system would be delayed unless the patient decides to go to a private clinic (at higher cost or with a partial subsidy through health care vouchers). In Hong Kong, the elderly population is particularly vulnerable, facing significant difficulties in accessing primary healthcare services. For example, elderly living in Hong Kong's lower socio-economic status neighbourhoods are more likely to be hospitalised for avoidable healthcare problems, thereby not only increasing the cost of healthcare services but also creating a heavier burden due to the shortage of staff. Given the need for improving Hong Kong's health services, the biggest challenge the city will face in the near future is to keep delivering high quality healthcare in a timely fashion and to maintain and enhance the population's health (e.g., health promotion and prevention).

3. Aging population with growing demand.

One of the major challenges for Hong Kong to sustain its global city status is to find ways to manage significant demographic changes in society. According to "Hong Kong Population Projections 2015-2064", the number of elderly people, those aged 65 or older, in Hong Kong will reach 2.58 million by 2064, around 35.9 per cent of the population. The work force, those aged 15 to 64, will shrink to 3.92 million, or 54.6 per cent of the population).

4. Lack of public-private partnerships in healthcare sector.

Primary health care in Hong Kong is not doing enough to alleviate the pressure on hospitals. The reasons for this minimal contribution lie deep in the structure of the health care system. Public clinics, with their limited scale, are not able to provide care to patients with lower socio-economic status, thus increasing their risk of hospitalisation. Without a comprehensive health care financing programme for citizens, the private sector is not adequate to provide primary care to those most at risk.

Source: Healthy Matters | China Perspectives | pdf

Health Facts of Hong Kong and Singapore

Healthcare Statistics for 2018	Hong Kong	Singapore
Land Area (Sq. km)	1 106.7	710.0
Mid-year Population ('000)	7 451.0	5 810.0
Population Density (Persons per sq. km)	6 890	8175
Annual Population Growth Rate (%)	0.80	0.81
Crude Birth Rate (Registered births per 1 000 mid-year population)	7.3	3.9
Crude Death Rate (Registered deaths per 1 000 mid-year population)	6.4	2.1
Infant Mortality Rate (per 1 000 registered live births)	1.5	1.61
Life Expectancy at Birth (Years)	84.6	82.9
Overweight and obesity (BMI>23.0), %	38.8	36.2
Healthcare Expenditure (as % of GDP)	6.2	5.6
Out-of-pocket Expenditure (% of current healthcare expenditures)	36.0	31.2
Age Dependency Ratio (% of working-age population)	40	30
Number of Doctors (Per 1000 of Population)	1.97	2.37

Source: Department of Health | Statistics Singapore

The life expectancies at birth for both sexes in Singapore and Hong Kong have steadily increased during the past 50 years to 82.9 and 84.6 years in 2018 respectively. Both cities have reduced the rates of infant mortality, which are among the lowest in the world in 2018.

Singapore has younger population, which is explained by lower age dependency ratio. Hong Kong' population is exposed to higher risks of premature deaths that are caused by many serious diseases. They are cancer, heart disease, stroke, respiratory disease, kidney disease, dementia, arthritis, and osteoporosis, which increase prevalence with age.

Singapore has slightly lower level of overweight and obesity comparing to Hong Kong. Both cities show great results in smoking rates reduction.

Both in Hong Kong and Singapore total health expenditure rises faster than the corresponding increase in Gross Domestic Product (GDP) in recent years. In Hong Kong, total health expenditure as a percentage of GDP went up from 3.6% in 1989/90 to 6.2% in 2017/18.

Singapore's Health Care System Beats Hong Kong's in its Efficiency, Affordability and Quality

Measures	Hong Kong	Singapore
Healthy Longevity	✓ Life Expectancy in Hong Kong is 84.6 years in 2018. ✓ Improved medical treatment, diet, resilience, adaptability, healthy lifestyles and technology contribute to longer lifespan. ✗ The major contribution to the improvement in life expectancy in Hong Kong for both males and females was mainly attributable to the older population.	✓ Life Expectancy in Singapore is 82.9 years in 2018. ✓ The increase in Singaporeans' life expectancy can be attributed to its health system and how key health issues are addressed. ✓ Most of the improvement is due to reduction in years of life lost, which means the burden of early death has declined.
Ageing Population	✗ Hong Kong faces a declining labour force, shrinking average family size, rising elderly dependency ratio and ageing population, the demand for elderly-related goods and services will keep increasing.	✗ Singapore's population will age rapidly. The median age is expected to rise from 40.6 in 2010 to 53.7 in 2050. Institute of Policy Studies revealed that today's seniors aged 65 and above consider an amount of at least S$1,379 each month to be necessary to meet basic needs.
Leading Causes of Death	✗ Six types of non-communicable diseases, namely, cancers, diseases of heart, cerebrovascular diseases, chronic lower respiratory diseases, injuries and poisoning, and diabetes mellitus, accounted for 59.3% of all registered deaths in 2017. Structure of major causes of death is more diversified comparing to Singapore.	✓ Three types of non-communicable diseases, cancer, pneumonia and ischaemic heart diseases, accounted 67.7% of all registered in 2017. The crude birth rate is lower comparing to Hong Kong.
Support of Older People	✓ The concept of age-friendly cities and communities had high level political commitment. Age-friendly platforms have been established in all 18 districts, with older adults empowered to raise their concerns, advocate change, negotiate with local government departments, and report to the media to raise awareness of public concerns.	✓ Given the corresponding demand on healthcare services from an ageing population, Singapore is committed to bring healthcare closer to home and support Singaporeans to age well in their community, make healthy lifestyle choices, and get good healthcare at the best affordable value.

Singapore's Health Care System Beats Hong Kong's in its Efficiency, Affordability and Quality

Measures	Hong Kong	Singapore
Healthcare Financing	✗ Total health expenditure rises faster than the corresponding increase in Gross Domestic Product (GDP). ✗ Total health expenditure amounted to 6.2% of GDP in 2018, with annual per capita spending at $22,672.	✗ Total health expenditure rises faster than the corresponding increase in Gross Domestic Product (GDP). ✓ Total health expenditure amounted to 5.6% of GDP in 2018, with annual per capita spending at $ 2,462.
Healthcare Coverage	✓ The government provides all public healthcare services free of charge or for a small fee. ✗ Private health insurance is one of the most expensive in the world. It is essential to have a good private medical insurance. The private clinics have their own market value and often charge their clients higher rates.	✓ Singapore citizens and permanent residents are entitled to subsidised healthcare services provided through government healthcare facilities. ✗ Finding the right medical insurance policy can be a very time-consuming task and prone to error as insurance companies usually have many exclusions and exceptions in their coverage policies.
Care Delivery	✗ There is shortage of doctors and other health professionals in public sector. The supply of doctors has not kept pace with demographic trends and the increasing demands of an ageing population. ✗ Timeliness for healthcare services.	✓ The number of doctors here hit a new high of 2.37 per 1 000 population in 2018. With a greater need for healthcare professionals as Singapore's population grows and ages, the authorities have been actively recruiting foreigners to fill the gap.
Digitization of Healthcare	✓ The government has established an electronic health record refers to a record in electronic format containing health-related data of an individual. ✓ There private digital initiatives to help shape its healthcare delivery model, optimise resources, and ultimately benefit society.	✓ Singapore have taken steps in establishing a centralised National Electronic Health Record. ✓ Singapore is piloting several health technology initiatives to help shape its healthcare delivery model, optimise resources, and ultimately benefit society.

Conclusions and Recommendations

Conclusions

I. Nowadays such complex indicators as life expectancy and health-adjusted life expectancy go beyond the traditional measures of the demographic potential of a country.

Longevity progressiveness is important for driving economic progress and competitiveness—both for developed and developing economies. Many governments are putting policies on longevity at the center of their growth strategies and budget planning. The definition of longevity has broadened—it is no longer quantitative increase in life expectancy at birth. Today longevity is about social inclusiveness, high quality of life, technical innovations in care delivery and medical treatment, and modified business and governmental models.

II. The prevalence of NCDs are considered to be a “slow motion disaster” and rising challenge for life expectancy and health-adjusted life expectancy dynamics.

Noncommunicable diseases (NCDs) tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioral factors. Such diseases have common metabolic roots. They are the major reason of the increasing risk of premature death and result in more disability years in older age.

III. All risk factors of NCDs lie in non-health sectors, requiring collaboration across all of government and all of society to combat them.

Noncommunicable diseases are driven by forces that include unplanned urbanization, globalization of unhealthy lifestyles and population aging. Unhealthy diets and a lack of physical activity may show up in people as raised blood pressure, increased blood glucose, overweight and obesity. These are called metabolic risk factors that can lead to cardiovascular disease, the leading NCD in terms of premature deaths.

IV. Healthy Longevity progressiveness is about the public-private balance in health care system.

It is important for longevity governance find effective combination of universal health coverage system, support from citizens and the private sector.

Conclusions

V. Low socioeconomic inequality and reduced disparity in health outcomes should be key goals in Healthy Longevity plans and healthcare policies.

Research shows that people living in more affluent areas live significantly longer than people living in deprived areas. Socio-economic inequalities in life expectancy are also widening in both sexes as a result of greater gains in life expectancy in less deprived populations. Many health outcomes — everything from life expectancy to infant mortality and obesity — can be linked to the level of economic inequality within a given population. Greater economic inequality appears to lead to worse health outcomes.

VI. Healthcare policies should be focused on the care delivery to improve healthcare outcomes and provide higher efficiency of healthcare expenditure.

Nowadays it is unclear why countries are investing so much money in research focused on reducing death rates in the elderly, if the consequence is advancing ageing, that can be described as the increase in disability years, plus pension, and social and medical costs, in an unsustainable way. The policy should be focused on health status for measuring efficiency ratio of healthcare system.

VII. A focus on national-level health status and its temporal trajectory is critical.

Health status is one of the most important indicators of well-being, and it predicts a large proportion of societal expenditures on health and social services for the elderly. It depends on individual lifestyle factors, social and community networks, general socioeconomic. Health status is also reciprocally affected by social and political policies and programs.

VIII. Corruption in healthcare is a barrier for improvements of care delivery and indirectly affects the slowdown of both life expectancy and health-adjusted life expectancy growth.

Corruption significantly weakens overall health system performance, and has been found by multiple studies to have a significant negative impact on important health outcomes. Corruption is a major reason of high administrative costs and wasteful healthcare expenditures in clinical care, operational activities and governance. It results in long waiting periods, unmet needs of population and high level of satisfaction of healthcare system performance in general.

Conclusions

IX. There is an evident linkage between level of income and health status: wealthier nation healthier population.

Healthcare performance is strongly dependent on the economy, but also on the health systems themselves. Investment in health is not only a desirable, but also an essential priority for most societies. Health status depends on the development of healthcare infrastructure, medical facilities, high qualification of medical staff, provision of healthcare coverage and competition in private insurance sector. All four pillars of Healthy Longevity Progressiveness, accessibility, affordability, health outcomes and spendings, depends on economic conditions, successful provision of reforms. However, health systems face tough and complex challenges, in part derived from new pressures, such as ageing populations, growing prevalence of chronic illnesses, and intensive use of expensive yet vital health technologies.

X. Utilisation of Artificial Intelligence opportunities in preventive medicine to minimise costs and improve accessibility of healthcare services.

AI has great potential in terms of tackling the problem of bureaucracy and inefficient administration, relieving doctors from time-consuming administrative tasks and giving them more time to spend with their patients. By automating and improving processes, artificial intelligence can benefit both patients and medical staff. By optimising patient processing planning it can reduce the waiting time and length of stay for patients, and it can also help medical staff in their day-to-day work.

XI. Polluted environment and unfavorable climate conditions threaten average life span and health-adjusted life expectancy.

Countries are currently experiencing unusual environmental issues which provide serious health risks to people. Many developing countries lack the skill, technology and resources to handle climate change related problems like the developed countries. Hence, the outcome of the present research can aid in taking proactive measures which will put in check diurnal temperature variation, daily mean air temperature, relative humidity for Healthy Longevity increasing.

Countries with Low HALE and Life Expectancy and High Gap: Recommendations

United States

In death ratio some improvements are observed owing to declining death rates from the three leading causes of death in the country -- heart disease, cancer and stroke. But in recent years, in United States costs of healthcare provision have started to rise much more quickly with greater use of modern technological medicine. While spending is highest, the United States ranks not in the top in the world for its levels of health care. So, first of all, in order to improve HALE government should improve health insurance for poor population as there is big income inequality and reduce high administrative costs for cost efficiency. The government should focus on medical advances, some improvements in lifestyle, and screening and diagnosis.

Estonia

Estonia shows the trend of increase in HALE. Estonia implements e-health solutions but digital tools should not increase existing health inequalities. Rather, they should increase equity. One way to do this is to use health data for policy making.

Iran

The health system is one of the most complex systems with many variables and uncertainties. The management of this system needs trained managers. One of the current shortcomings is lack of those specifically trained for this purpose. There is all high income inequality in the country. Government should improve access in healthcare coverage for the families with a low income.

Turkey

Turkey faces a health care system inefficiencies. Infant mortality rate is relatively high and not all population had health insurance, resulting in unequal healthcare access among different population groups. It is need to improve access for high-quality healthcare services and target the main causes of death through government initiatives.

United Arab Emirates

As residents have high HALE than non-residents in the country it is needed to enhance the health of individuals a through the provision of comprehensive health services for both residents and non-residents in order to decrease gap between levels of HALE, through implementing policies, legislations, programs and effective partnerships.

Countries with Low HALE and Life Expectancy and Medium Gap: Recommendations

Brazil

Socioeconomic inequality is one of the biggest problems. The wealthiest are less likely to need help, but when help is needed are more likely to receive formal care, while the poor relied on informal care. Brazil has to make progress towards providing healthcare for all, built on the solid foundations of primary care. It now needs to maintain momentum by exploiting the potential of digital services in healthcare.

India

The country faces public health challenges, particularly for the poor. These include child undernutrition, growth in obesity, diabetes, and tobacco use, leading to cancer and other diseases. There are targets to improve public health: accessible and affordable nutritious food, sanitary facilities, health centres in rural areas, affordable health care.

Poland

To improve public health it is needed to focus on health education, prevention programmes and purchasing of new equipment.

Mexico

In Mexico the main challenge is to reduce inequality in healthcare and ensure that an important proportion of the population gain access to wide health coverage, including, access, quality, and costs. Mexico, due to its high prevalence of obesity, faces serious public health consequences, especially cardiovascular diseases and diabetes, that should also be addressed.

Saudi Arabia

The country need to reduce disparities in health and health care systems between poorer and richer families and underfunded health care systems that in many cases are inefficiently run and underregulated.

Slovakia

The most pressing issues to be addressed are enhancing the efficiency and quality of primary care, modernising hospital infrastructure and management, promoting better care access for the poor population and improving lifestyles through well-designed public health and disease-prevention policies.

Countries with Low HALE and Life Expectancy and Low Gap: Recommendations

Argentina

Argentina's healthcare system is segmented and highly fragmented system. It is needed to develop strategy to advance the integration of healthcare coverage among subsectors. Policies should address healthcare provision in rural areas and better sanitary facilities.

Indonesia

There are important regional and socioeconomic inequities in the health system. Health financing also is low and inequitable. Government should concentrate the use of public funds on delivery of public goods and improving equity for priority health outcomes focus on improving health and on managing the whole health system, control the spread of HIV/AIDS by focusing on prevention.

Russian Federation

The general health of the Russian population has declined significantly since the collapse of the Soviet Union, as a result of several social, economic, and lifestyle changes. One of the problem that should be dealt with is poor quality of healthcare delivery. There is outdated and often nonfunctioning equipment, a lack of medicines and hospital beds, and a shortage of medical specialists.

South Africa

South Africa must focus on making sure all healthcare workers have the right knowledge, skills and resources, for example by training the next generation of scientific leaders. It is needed to focus on the management of institutions and care delivery which is at the districts, hospital and clinic level. Government should address inequality, provide betters sanitation facilities, develop agenda to improve public health and decrease burden of chronic diseases.

Countries with Medium HALE and Life Expectancy and High Gap: Recommendations

Belgium

There are disparities in unmet care needs by income group. As cardiovascular diseases and cancer are the leading causes of death, the challenge is to strengthen prevention and primary care.

Chile

In order to improve public health and increase HALE policy should response to the obesity epidemic. Government should take actions for further development of epidemiological surveillance, costing strategy, stronger data governance.

Denmark

Initiatives to reduce levels of drinking and promote healthy lifestyle in Denmark are a welcome development. The proportion of residents who report being in good health is high, although a gap exists between income groups that should be addressed.

Ireland

It should be focused on the proportion of people who are healthy at all stages of life, reduction health inequalities, protection the public from threats to health and wellbeing.

Czech Republic

There is a regional variations in health outcomes in the country. It is important to develop targeted policy solutions, as institutions, life-style and socio-economic characteristics are considered to be the main explanatory factors that affect HALE.

Finland

Alcohol consumption should be considered as it remains an important public health issue in Finland, with more than one-third of adults reporting heavy alcohol consumption on a regular basis.

Germany

A balanced diet and sufficient physical exercise are important aspects of a health-promoting lifestyle in Germany. They can help to prevent the occurrence of obesity, lipid metabolic disorder and hypertension.

Slovenia

Medical workers must continue to be supported in delivering the best evidence-informed high-quality care through firm commitments to training, professional development and access to resources.

Countries with Medium HALE and Life Expectancy and Medium Gap: Recommendations

Cuba

Ageing, an increase in obesity and problems with tobacco and alcohol are main causes of death among Cuba's citizens. Cuban government should address to health challenge, which is a huge investment in public health education around smoking, alcohol, diet and exercise. The foundation of Cuban's preventative health care model that is at primary care level should be in priority.

Greece

Creating an effective network of primary care services is one of the most urgent priorities to respond effectively to the needs of population and reduce overcrowding of emergency departments and unnecessary hospital admissions. Universal health coverage can be financially sustainable, to finance public spending.

Netherlands

Smoking, drinking and obesity are main behavioral factors of bad health which should be addressed. Large inequalities in health persist according to education and income. On the positive side, public health policies are starting to tackle this, but may need time to become effective.

Malta

Malta has the highest obesity rate in the EU, and this remains the major public health issue, both in adults and in children. Poor health behaviours tend to be most common among lower socio-economic groups. Policies should deal with encouragement of health behaviour and reduction of income inequality.

Portugal

The prevalence of chronic diseases in the population means that Portugal, in common with many other countries, needs to introduce new service models that provide integrated care, focused on care delivery and creation of medical networks.

Qatar

The government should focus on improvement of nutritions and promotion of healthy lifestyle, also pay attention to improvement of healthcare services and their accessibility to all income groups.

United Kingdom

The United Kingdom should address inequalities in health by socio-economic status as bad health is more prevalent among population with lower income and education.

Countries with Medium HALE and Life Expectancy and Low Gap: Recommendations

China

China faces many health challenges. These include increasing rates of cancer and cardiovascular disease linked to lifestyle factors like smoking, an ageing population. Therefore, a key component of healthcare should be the promotion of healthy lifestyles and physical fitness, including through the development of healthy cities, to ensure a greater focus on prevention rather than treatment. For greater reduction in infant mortality and rates of infectious diseases, government should invest in expanding health infrastructure, improvement quality of healthcare service and provision of affordable health care in rural areas across country.

Costa Rica

Diseases that most affect quality of life are heart disease, back pain, depressive disorders, hearing loss and diabetes. Inequalities also persist among the various population groups. Country needs to expand its efforts to promote healthy living, particularly young people. The health system needs to contribute to higher levels of equity and solidarity.

Panama

Improve access to health services, as it remains inequitable, a fact readily visible in the marked discrepancy between health outcomes in urban and rural settings. Health infrastructure should be developed more evenly, including availability of health workers, medicine and technological equipment, both urban centres and rural areas where populations face with limited access to health services now. The availability of water has been identified as one of the country's leading environmental problems, that decrease average level of public health. Both the quantity and quality of available water during the dry season should be of concern. The lack of of professionals is also an issue limited to the health sector. The government needs commitments to increasing human resources for the healthcare sector, that will necessarily lead to expanding the capacity of the country's medical faculties.

Countries with High HALE and Life Expectancy and High Gap: Recommendations

Australia

Australians are living longer and with more years in a good health. Heart disease is largest cause of death. Adults at high risk of heart attack or stroke should receive appropriate treatment and be aware of their risk factors. In order for the Australian healthcare system to handle the gradual population aging, government and administration must develop new policies and programs to accommodate the needs of changing demographics.

Austria

Behavioural risk factors are a major public health issue in Austria. Alcohol consumption and smoking rates are among the highest across the EU. To increase public health they should be addressed.

Canada

Recommendations suggested facilitating the exchange of information and interaction between health providers and government figures as well as flexible funding would also contribute to improvement and solve the problem of differences in regional care by allowing regions to determine the needs of their general populace and meet those needs more efficiently by allowing target-specific allocation of funds.

France

The main challenges are to promote prevention and healthy behaviour. Disparities of coverage across social groups suggest paying attention to co-ordination between universal healthcare provision and private insurance. The first government responsibility is fixing the rate at which medical expenses should be negotiated. The second government responsibility should be oversighting of health-insurance funds, to ensure that they are correctly managing the sums they receive, and to ensure oversight of the public hospital network.

Italy

Further efforts are needed to reduce smoking rates, so as to reduce deaths from lung cancer and other smoking-related deaths and the prevalence of overweight and obesity.

Luxembourg

A set of health strategies, targeted health awareness promotion and prevention activities aims to address death risks and reduce level of chronic diseases. Also government should provide evidently a direct result in order to decrease high levels of consumption of harmful drinking patterns among people in Luxembourg.

Countries with High HALE and Life Expectancy and High Gap: Recommendations

Norway

The main causes of disability and reduced health are lack of physical activity, mental disorders, cardiovascular disease and cancer. The government should focus on providing effective care and primary care settings. Low back and neck pain has the highest share of total DALYs, but it is slightly decreasing. Therefore, targets that are likely to remain the focus of political attention and policy development are those relating to sustainable consumption and production, health and education, equality, employment, and migration.

Republic of Korea

The government should address the following challenges to improve public health and increase average life expectancy: reduce inequality in health coverage outcomes, improve primary health care and coordination between hospitals and long-term care facilities, meet the needs of the aged population.

Sweden

The government should further develop following initiatives: improve health and medical care that more actively promotes good health, promote good eating habits and safe food to decrease obesity and overweight, reduced use of tobacco and alcohol.

Switzerland

The main challenge to improve public health is to reduce disparities of healthcare coverage across income groups groups. The ministry along with other government bodies should supervise activities at the lower levels, allocates grants and periodically evaluates services to ensure correspondence to national goals.

Countries with High HALE and Life Expectancy and Medium Gap: Recommendations

Iceland

To improve health and wellbeing of people living in Iceland government policies should be focused on obesity, tobacco, healthy workplaces, child wellbeing. eHealth initiatives should meet the needs of the aged population.

Israel

Life expectancy and HALE are increasing in Israel. The country has developed healthcare system, but some improvements should be done: enhance primary care services by expanding the number of chronic disease conditions covered through data monitoring and encouraging younger doctors to work in primary care, boost current efforts to tackle inequalities in health care coverage.

Japan

Japan is facing a rising burden of chronic disease, and a rising number of frail and elderly persons. In addition, Japan faces some relatively unique public health risks, notably a significant exposure to natural hazards such as earthquakes, floods, typhoons, and tsunamis. So, improvement of public health emergencies systems are in priority.

New Zealand

The government should commit to reduce smoking rates, the overall negative impact of alcohol, prevent and manage obesity, and to support and encourage healthy eating and physical activity, provide better access to primary health care.

Spain

The Spanish national health system is a comprehensive network, for its technological capacity and human capital, for the accessibility of its service network, for offering access to the latest advances in medicine and medical technology. There are several ways to improve public health and decrease gap between life expectancy and HALE at birth: increase the efficiency and effectiveness of the health provision system, support and encourage healthy eating and physical activity, address aging, customize healthcare services to meet needs of aged population.

Countries with High HALE and Life Expectancy and Low Gap: Recommendations

Hong Kong, SAR

The government should provide strategic review of health care staff planning to reduce the shortage of healthcare staff. Timeliness for healthcare services is closely linked to staff shortages. In Hong Kong, the elderly population is particularly vulnerable, facing significant difficulties in accessing primary healthcare services. Given the need for improving Hong Kong's health services, the biggest challenge the city will face in the near future is to keep delivering high quality healthcare in a timely fashion and to maintain and enhance the population's health (e.g., health promotion and prevention).

Singapore

Chronic disease care is a critical part of a people's health. The patient should be persuaded about exercise, diet and lifestyle change: all important for chronic disease control. Caregivers and patients should be empowered through education, information and communication. Further implementation of eHealth initiatives will lead to the reduction of number of patient visits to hospitals for routine checks, will free up healthcare resources, enabling healthcare staff to better manage their time and focus on priorities.

Country Infographics Profiles

Argentina

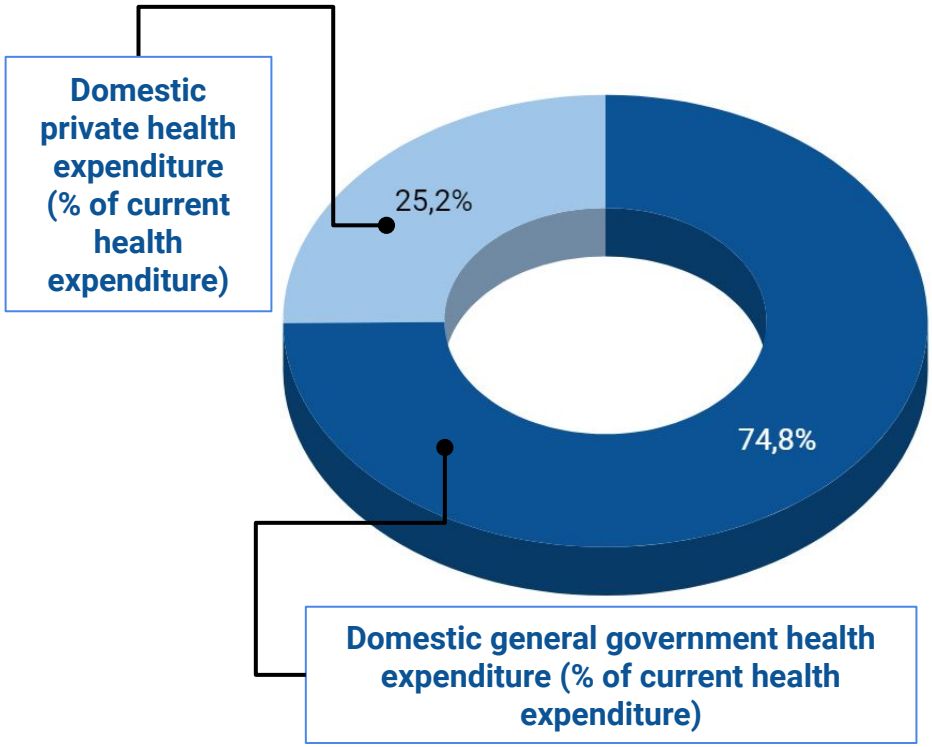
General metrics

HALE	Both Sexes HALE (2016)	68.4 years
	HALE/Life Expectancy Difference 2016	8.5
Economy	GDP per Capita, Current Prices (2016)	12.79 thousand ($)
	Annual GDP Growth (2016)	-2.1 %
Healthcare	Current Health Expenditure per Capita (2016)	0.95 thousand ($)
	Public Health Care Expenditure 2016	7.55 % of GDP
Retirement	Age Dependency Ratio 2016	57
	Population over 65, 2016	11.1 %
	Number of WHO Age Friendly Cities and Communities	10
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	9.8
	Annual Cigarette Consumption (Units per Capita) 2016	1176
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	62.7 % of adults

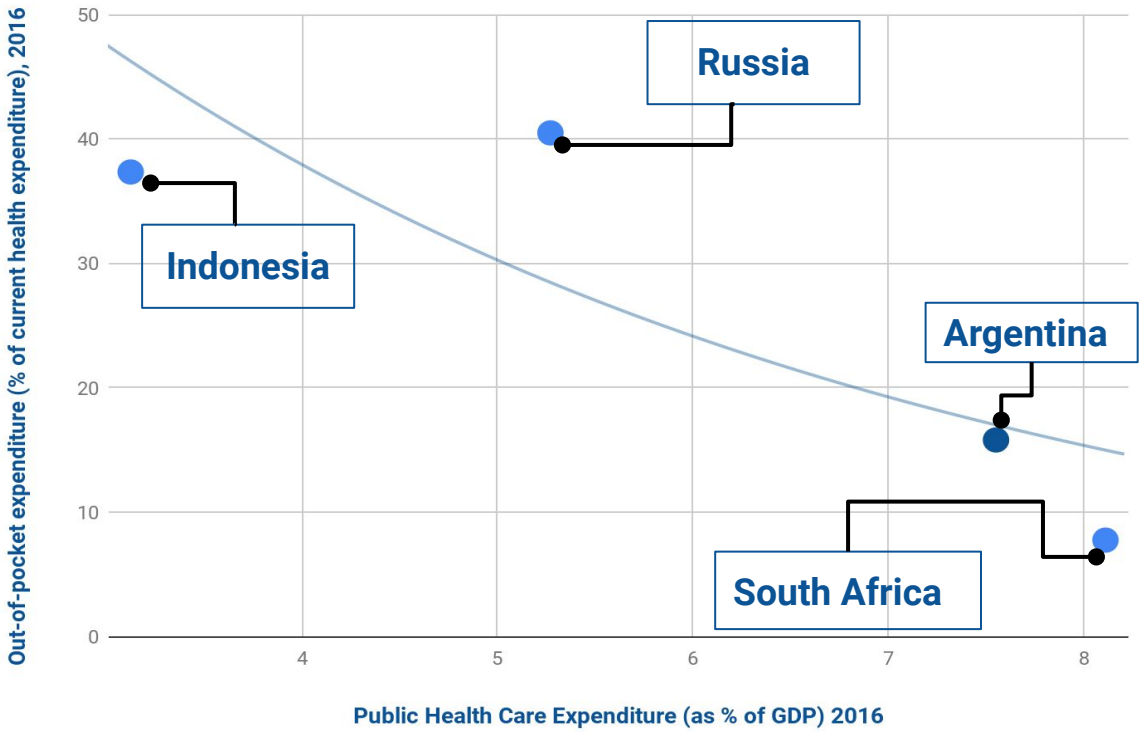
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **68**
- Human Development Index 2016: **0.82**
- E-Government Development Index 2016: **0.7**
- Corruption Perceptions Index 2016: **36**
- Global Gender Gap Index 2016: **0.74**
- Democracy Index 2016: **6.94**

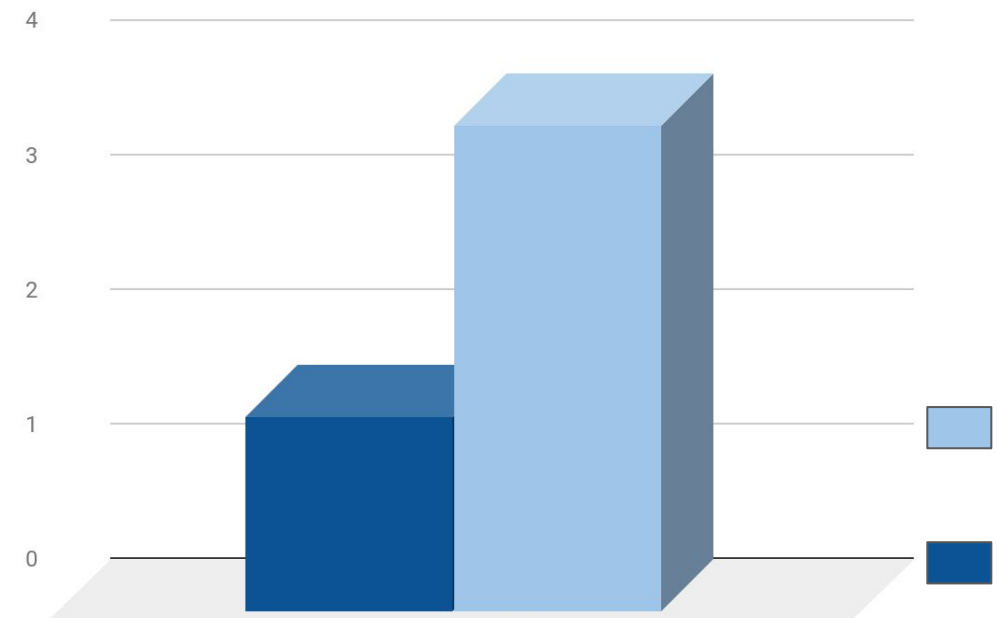
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Low Gap



Effectiveness ratios



Argentina's healthcare system is segmented and highly fragmented system. It is needed to develop strategy to advance the integration of healthcare coverage among subsectors. Policies should address healthcare provision in rural areas and better sanitary facilities.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Argentina

STRENGTHS

- There is a wide range of medical specialists and high-quality treatments.
- Large private hospitals and health groups have their programmes that allow to choose different payments, offer discounts and provide easier access to medical service.
- Argentina's health care system is comprehensive and consists of the public sector (50% of the population), the mutual sector (45%) and private (5%).

WEAKNESSES

- The disparity in access to healthcare across urban and rural areas.
- Treatments for some medical conditions may cost for thousand dollars and require huge investments in a short period.
- It is hard to access high quality medicine in less advanced regions and remote area.
- Most of clinics work in the private sector that means part of the population cannot afford to pay for their services to boost their healthy years of life and longer the life expectancy.

OPPORTUNITIES

- Promotion of developed cosmetic surgery among international tourists.
- Surgery is very popular in Argentina so it can bring additional investments in hospitals in the country. Procedures such as eyelid corrections, plastic correction of ears, nose surgery and others are offered.
- Utilize opportunities for AI and other advanced technologies to make the treatments cost- and outcome-effective.

THREATS

- Negative GDP growth and economic crises can cause a decrease in costs invested in the universal health care system and R&D in medicine that will make the equipment less modern and the quality of treatment will be lower than in developed countries and even in countries with the same income.
- High unemployment and socio-economic instability.
- High level of corruption.
- Income inequality plays out in the country: the richest 10%, control more wealth than the poorest 60% of the country.

Analysis of Strengths and Weaknesses of Health Care System in Argentina

- Employes are highly involved in the healthcare system through the Obras Sociales and provide an insurance for employees that helps to acquire additional costs for payments for medical services of doctors and specialists and get certain funds for hospital's modernization. Employees have an opportunity to receive treatments.
- Provision of transparency in social security sector is a key driver for attraction of additional funds in order to finance the programmes for boosting the longevity and the HALE.
- There is a separate network for each of sectors and they can range from rundown public sector to high tech private sectors.
- Everyone in Argentina has an access to the medical system. The public sector involves network of public hospitals and primary health care units that provide help for poor and uninsured population.

- Obras Sociales in Argentina vary in quality and effectiveness that's why 30% of such organizations have an control of 75% resources in health care system of Argentina and held 73% of beneficiaries.
- After Argentina's economic crisis in 2001 lots of people lost their access to insurance that affects general healthcare system badly.
- Relatively high to other OECD countries level of alcohol, tobacco and unhealthy food consumption that have a great impact on the cancer and cardiovascular diseases burden. Nearly a third (29.7%) of adults in Argentina are obese. Cholesterol levels are high and there is 53% increase in patients with hypertension. And environmental factors, including risks of epidemics, distruct the situation more.
- According to 2000 figures, 37.4% of Argentines had no health insurance, that's why nowadays practically over a half of Argentina's citizens use the public sector. They usually have to undergo a lengthy test and can be rejected. The rejection ratio is 30-40%, so this people can't afford to look after own health.

Recommendations for Argentina

- **Promotion the healthy lifestyle.** Smoking, drinking of alcohol, eating fast food and other behavioral factors destruct the healthy life and can shorten it so it should be quit for elongation of nation's life expectancy and HALE.
- **Provide more accessible and comprehensive healthcare coverage.** Accessible healthcare treatment may help to meet patients needs. Diversified portfolio of basic healthcare services with great emphasis on prevention may help to mitigate financial burden and improve health status.
- **Launch of modernisation of equipment in public hospitals.** Most of public sectors' establishments have not up-to-date equipment that reflects on quality of treatment. Basically only surgery provided by private clinics is on top position in Argentina but other types are not so progressive especially if to speak about public hospitals. This is also the question about additional investments and economic reform.
- **To cancel test before acquiring the services.** These test can leave people with serious diseases without an appropriate treatment. The rejection level is also high, which means than the health system in Argentina is less accessible than the government claims.
- **Focus on remote areas.** Concentration on provision of remote regions with useful equipment and well-trained specialists and also provision with access to qualitative treatment will boost populations healthmetrics.
- **Combat with infant and maternal mortality.** Lack of equipped hospitals for alternative care, vaccinations for youngers, appropriate work conditions for women and proven methodologies for abortions and infant care for first month can impact dramatically the mothers' and children's health, so these need to be focused on.
- **Ensuring adequate funding for the health system.** Reducing the high levels of out-of-pocket spending on health is vital for affordable healthcare treatment. Argentina should reduce corruption in healthcare and provide incentives for development of public-private partnership between healthcare providers.

Australia

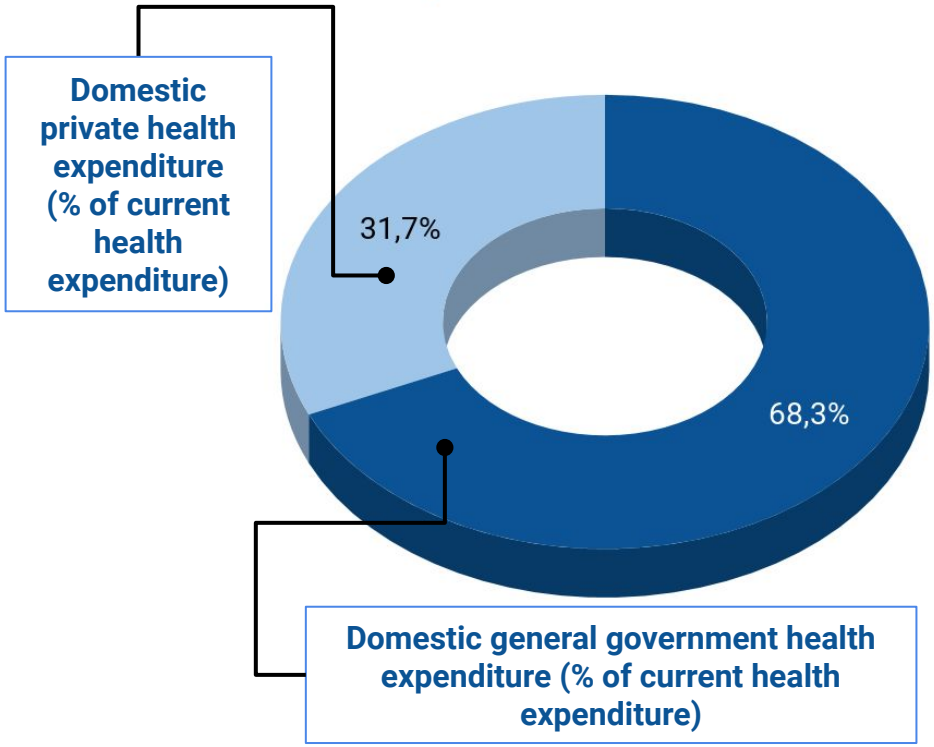
General metrics

HALE	Both Sexes HALE (2016)	73 years
	HALE/Life Expectancy Difference 2016	9.9
Economy	GDP per Capita, Current Prices (2016)	50.02 thousand ($)
	Annual GDP Growth (2016)	2.8 %
Healthcare	Current Health Expenditure per Capita (2016)	5.00 thousand ($)
	Public Health Care Expenditure 2016	9.25 % of GDP
Retirement	Age Dependency Ratio 2016	52
	Population over 65, 2016	15.3 %
	Number of WHO Age Friendly Cities and Communities	28
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	10.6
	Annual Cigarette Consumption (Units per Capita) 2016	916
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	64.5 % of adults

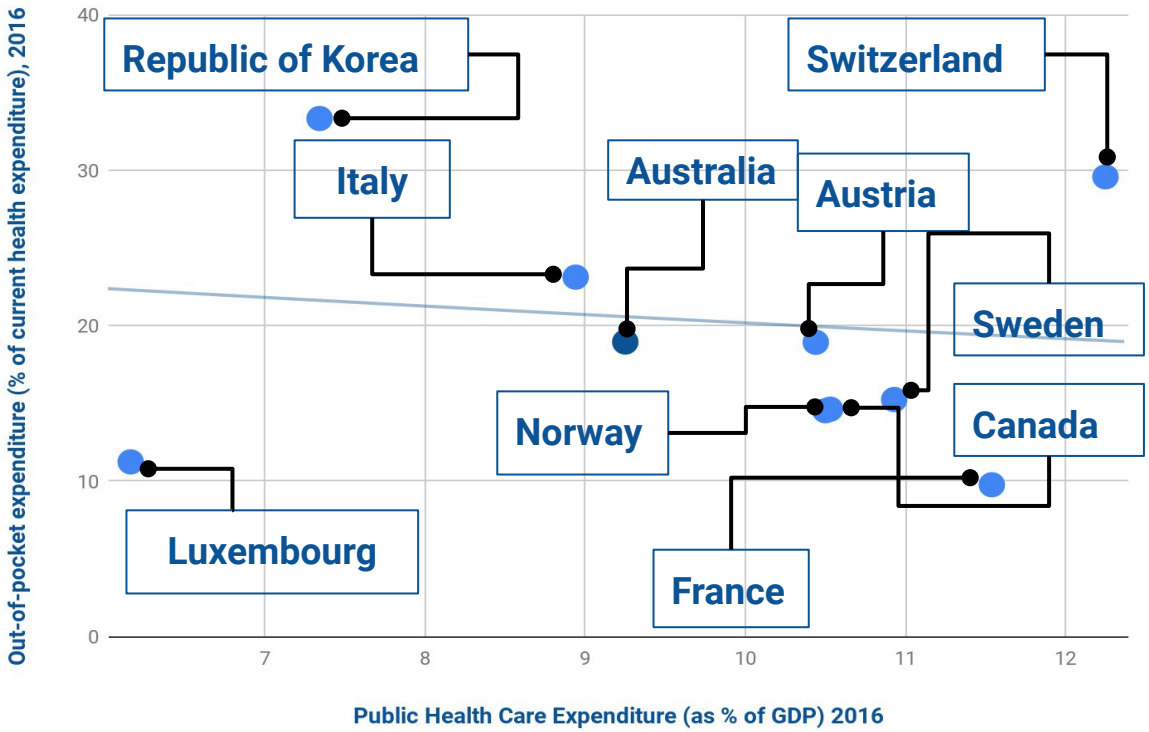
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **96**
- Human Development Index 2016: **0.94**
- E-Government Development Index 2016: **0.91**
- Corruption Perceptions Index 2016: **79**
- Global Gender Gap Index 2016: **0.72**
- Democracy Index 2016: **9.01**

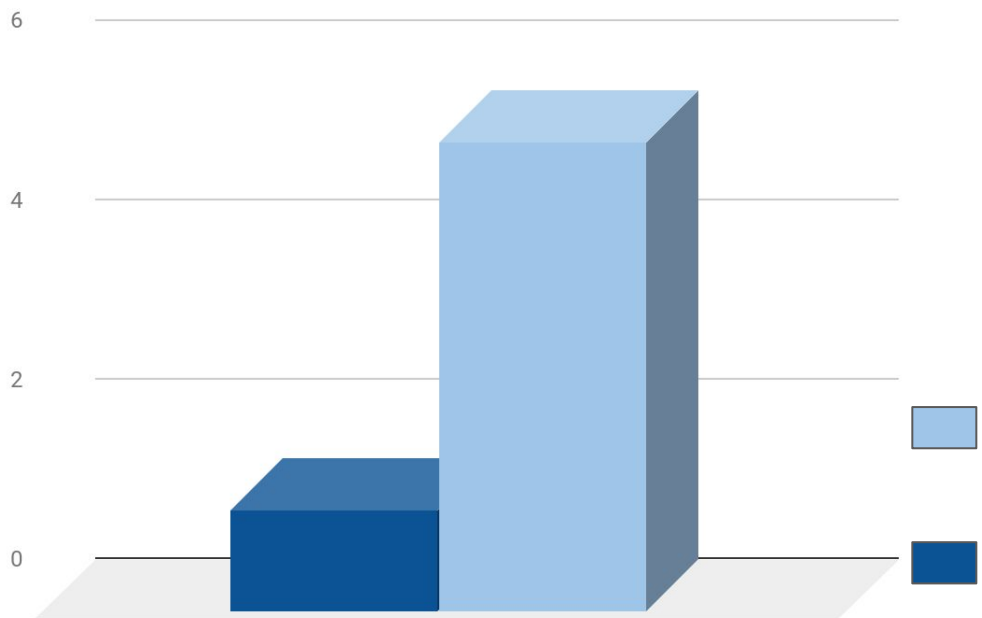
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



Australians live longer and with more years in a good health. Heart disease is largest cause of death. Adults at high risk of heart attack or stroke should receive appropriate treatment and be aware of their risk factors.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Australia

STRENGTHS

- Australia's healthcare system includes both public healthcare system and private healthcare system, where public healthcare system is comprehensive (Medicare) and provides free or low-cost services for taxpayers with additional benefits.
- High range of different funds that finance services provided by specialists and doctors and hospitals besides government. This funds can be mutual and "for cost".
- Different initiatives of government that helps to encourage people to purchase private insurance.

WEAKNESSES

- The lover level of public healthcare expenditure than average in OECD - 67% in comparison with 72%.
- The health care system is hybrid state model, that makes its' institutions an instrument in political games during elections.
- An average level of doctors and specialists for 1000000 population as was fixed in 2011-12.
- The lack of flexibility in public hospitals that not allow patients to choose the doctor or specialist and makes them to wait for some services for 12 month.
- The highest total cancer rate in the world.

OPPORTUNITIES

- Ability to spend more taxes and funds in investment in research and development and boosting of doctors' and specialists' qualifications.
- Providing more free and low-cost services to people with lower income and giving more subsidies for medicines.
- Government should concentrate more focus on remote population its' life expectancy and HALE in order to increase it and on resource allocation.
- Encourage companies to provide their employees with medical insurance that will allow them to visit private hospital and choose a specialist.

THREATS

- Decrease in costs spent on health in % of GDP in 2017-18 according to Australian Institute of Health and Welfare.
- Existence of unique flora and fauna creates a springboard for the epidemics and severe diseases.
- Non-Indigenous Australians live for up to 7 years less than other population that threats average life expectancy in Australia.
- Less breakthrough progress in medicine that brings new methods and technologies to provide high quality service than in other developed countries.

Analysis of Strengths and Weaknesses of Health Care System in Australia

- Australian people have a high life expectancy (83) and HALE, especially, in comparison with other developed countries. Cigarette and alcohol consumption is lower than in North America and most European countries.
- Medicare covers 100% of costs in public hospitals for general services and 85% of costs for specialists and also 75% of costs for public patients in private hospital that allows reducing out-of-pocket costs.
- Lifetime Health Cover and Medicare Levy Surcharge allow the government to stimulate adults to take private hospital insurance that encourages people to protect and maintain their health on a certain level and make universal healthcare system balanced.
- Deaths in early childhood have reduced substantially over the past 100 years. In 1907, child deaths (aged 0–4 years) accounted for 26% of all deaths compared to less than 1% in 2017.
- Control of infectious disease and better hygiene and nutrition. The decline in the later years was associated with improvements in road safety measures, a decrease of smoking, detection and prevention of CDV and chronic diseases.

- Though Australia received good positions in the investigation carried out by OECD countries it's health care system was weaker than Canadian and German.
- People in remote regions usually live less.
- Public medicine does not allow its patients to choose a doctor or specialist because of a certain load and have a waiting period for up to 12 months on benefits that can be connected with some medical conditions.
- Concerning adults' access to healthcare, 10% of Australians had to wait for 4 months or more for elective surgery whereas only 4% of the patients had to wait for elective surgery in Canada. About 21% of the patients had experienced a care coordination problem in the past 2 years.
- Coronary heart, Alzheimer disease, dementia, cerebrovascular disease and lung cancer with COPD are top causes for death in Australia for the younger and elder population.

Recommendations for Australia

- **Use of bundled payment mechanism** to reduce costs and maintain the quality of services and patients' outcomes. Bundled payments can also be used to reduce unplanned readmissions.
- **Effective allocation of healthcare resources, giving particular attention to remote areas.** The government should appoint more costs to remote regions. This actions will allow spending more on less developed areas and less advanced regions to provide qualified medical aid and healthcare treatment.
- **Conduct additional activities and initiatives to remove crucial causes of popular diseases that can lead to death, especially, among elders.** Lifestyle, habits and working conditions are the first moving point for keeping the nation healthy for long years.
- **Increase investment in healthcare for creation both tangible and intangible assets.** This will allow spending more on research and development to find out more progressive means and ways to conduct surgery and observations that will improve the average level of quality of medicine in Australia.
- **Move from cure to prevention to combat with non-communicable diseases risk factors.** Prevention faces two main barriers. First, most doctors worldwide are trained to diagnose, treat, and cure diseases, but not to prevent them. Incentive schemes in many health care settings reflect that emphasis. Second, the risk factors for these diseases – tobacco use, the harmful use of alcohol, unhealthy diets, and physical inactivity – lie in non-health sectors and are strongly influenced by the behaviours of powerful economic operators.
- **Support a healthy lifestyle.** This means that government should popularize the healthy food and non-alcohol and non-cigarette life to make teenagers and adults healthier that will positively influence HALE and life expectancy with the help of mass media.

Austria

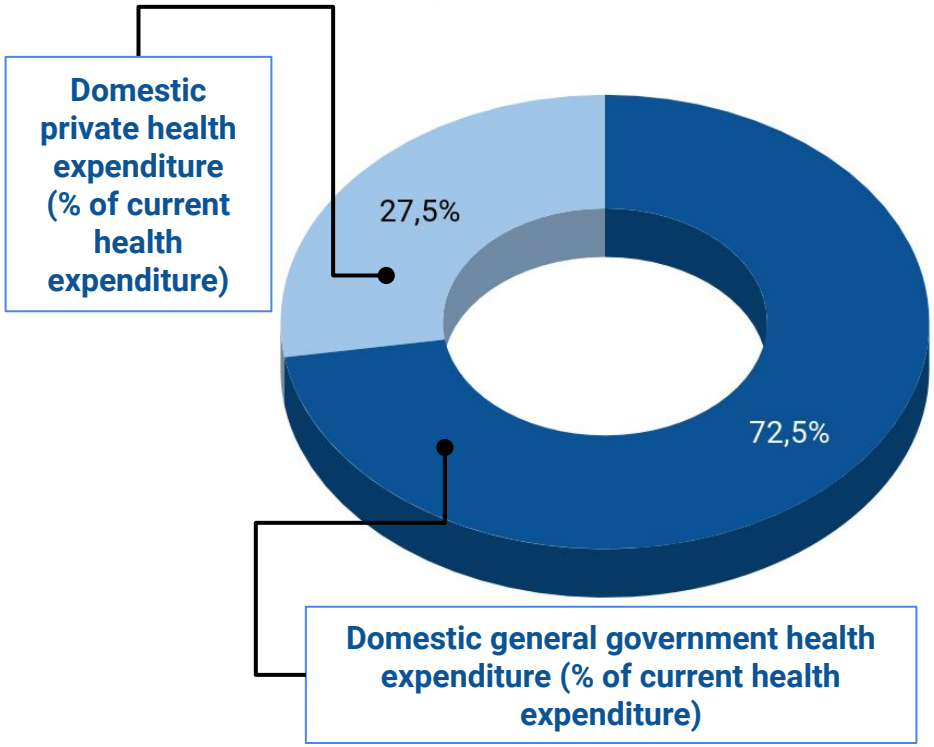
General metrics

HALE	Both Sexes HALE (2016)	72.4 years
	HALE/Life Expectancy Difference 2016	9.5
Economy	GDP per Capita, Current Prices (2016)	45.10 thousand ($)
	Annual GDP Growth (2016)	2 %
Healthcare	Current Health Expenditure per Capita (2016)	4.69 thousand ($)
	Public Health Care Expenditure 2016	10.44 % of GDP
Retirement	Age Dependency Ratio 2016	50
	Population over 65, 2016	19.0 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	11.6
	Annual Cigarette Consumption (Units per Capita) 2016	1926
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	54.3 % of adults

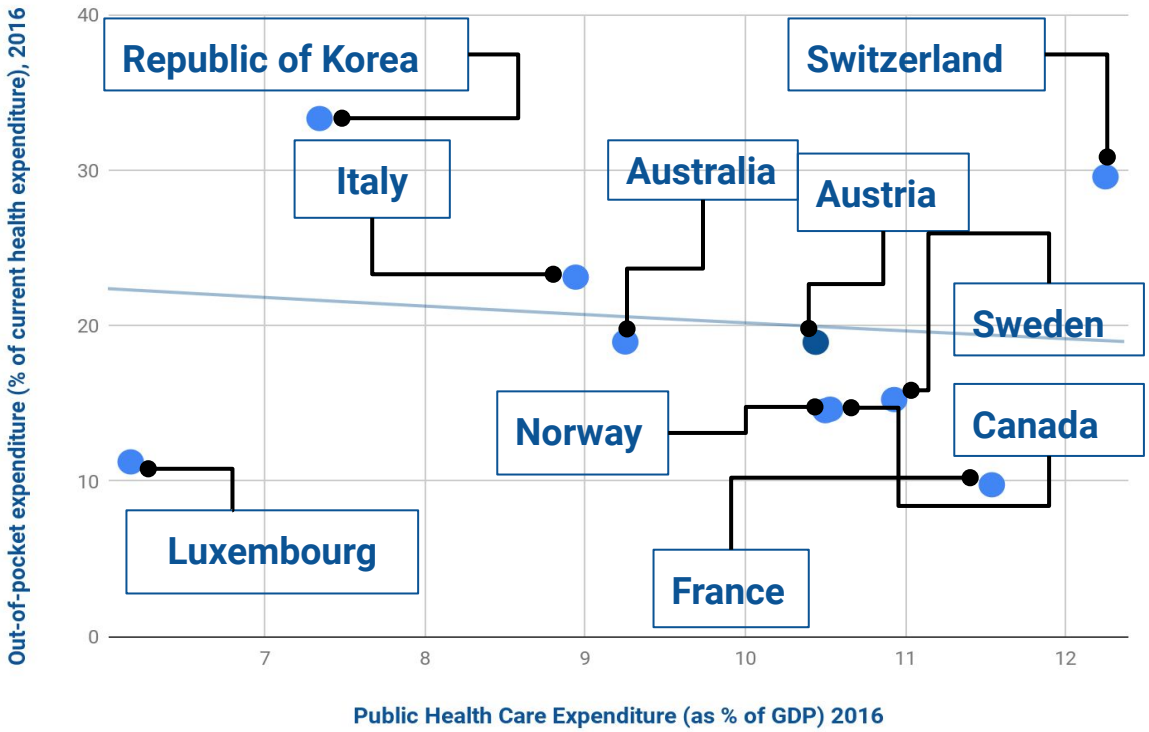
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **94**
- Human Development Index 2016: **0.91**
- E-Government Development Index 2016: **0.82**
- Corruption Perceptions Index 2016: **75**
- Global Gender Gap Index 2016: **0.72**
- Democracy Index 2016: **8.41**

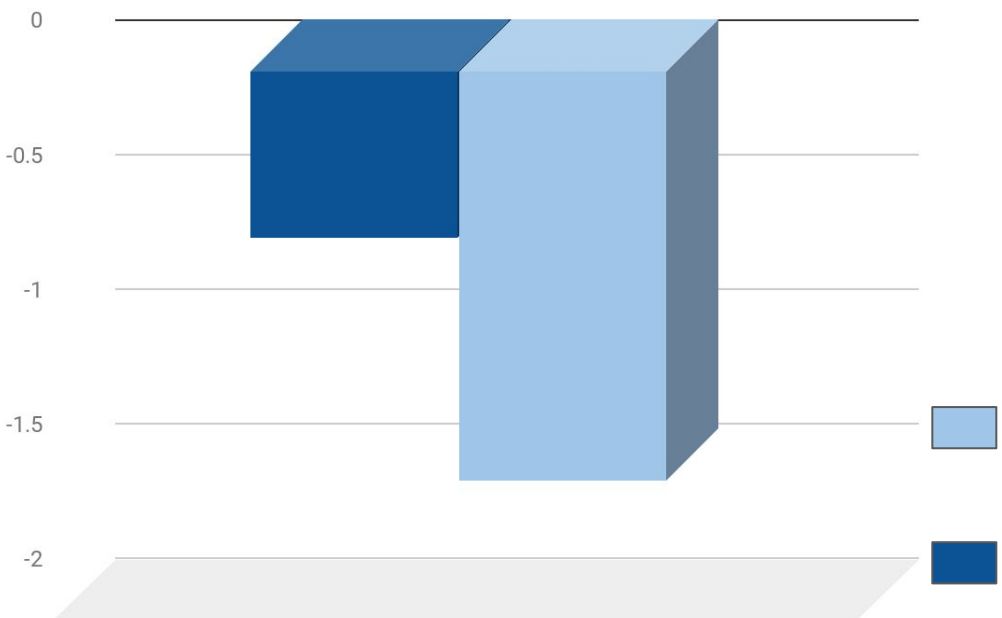
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



Behavioural risk factors are a major public health issue in Austria. Alcohol consumption and smoking rates are among the highest across the EU. To increase public health they should be addressed.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Austria

STRENGTHS

- The two-level healthcare system that allows to receive public medical services and purchase additional private insurance.
- The relatively good economic situation that allows people to use private insurance plans with the opportunity to choose flexible conditions.
- Healthcare in Austria is universal, comprehensive and accessible.
- Residents automatically get involved in healthcare, usually, it is connected with employment, but it is also for co-insured, pensioners, students, disabled etc.

WEAKNESSES

- Low level of WHO age-friendly cities.
- High level of alcohol and cigarette consumption among the population.
- Wasteful health care expenditure.
- Half-of-year and longer waits are normal for some kinds of surgery.
- Lack of flexibility in a social security system - though funds are ranged for effective reaction, the membership is compulsory and citizens can't choose to which fund to belong to.

OPPORTUNITIES

- Money paid for public insurance range based on income not on the individual's medical conditions, that makes the system more balanced.
- Opportunity to use widely e-systems for effective regulation of the public healthcare system.
- The wide range of hospitals allows providing qualitative treatment and hospital stay (6,6 days) to boost health, life expectancy and HALE.
- Well-trained physicians provide good treatment.

THREATS

- After the economic crisis was an increase in out-of-pocket spending on health and now they are 28% of general health costs.
- Social insurance patients need to wait twice and even 3-4 times longer than those ones with private.
- Because of federal status in Austria, a social security system in the country is unusually complex and bulky that can bring additional bureaucracy,
- 54.1% of the adult population (≥ 20 years old) in Austria was overweight that brings the risk of CVD and diabetes.

Analysis of Strengths and Weaknesses of Health Care System in Austria

- Austria's health care was given the 9th place in the rank of WHO. The general health expenditure is fifth higher than in whole of Europe.
- The city of Vienna received first place in the quality of living ratio.
- In a sample of 13 developed countries, Austria was 5th in its population weighted usage of medication in 14 classes in 2009 and fourth 2013. Amenable mortality rates are lower than in many other EU countries.
- Public medicine is one of the most accessible and effective in the world. It is all reinforced by the good environmental conditions and usage of fresh resources and developed infrastructure.
- Austrian specialists are well trained and highly qualified.

- Austria's healthcare system is closely connected with other social security, indicating the proliferating bureaucracy.
- Lack of flexibility in a social security system - though funds are ranged for effective reaction, the membership is compulsory and citizens can't choose to which fund to belong to.
- General behavioural patterns are not appropriate especially if to speak about the longevity - big alcohol and cigarette consumption can be a reason for lowering of life expectancy and HALE indicators. Behaviour factors and working conditions lead to high index mass and obesity among adults and are the reason for death from cancer, CVD and diabetes. But the changes are good for adolescents.
- Long waiting periods for surgery can be the reason for the low quality of treatments mostly in the public sector usually for important and difficult operations which is also the aftermath of the bureaucracy.
- Though the life expectancy in Austria remains long and is above average in the EU, the statistics for healthy years of life hasn't changed and remain to be below the average in the EU.

Recommendations for Austria

- **To take a reform for the healthcare system.** Federative status of Austria causes a lot of bureaucracy during the regulation and decision-making process in the country especially in the public sector that can lead to errors in management. Changes in institutions' organization and their authorities can help to make the healthcare system more advances and manning.
- **Promotion a healthy lifestyle.** Behavioural factors are the key factors that negatively affect healthy longevity in Austria. The prevalence of overweight, insufficient physical activity result in an increase in disability-adjusted years.
- **Struggle with long waiting periods.** Long waiting periods in the public insurance sector testify that it is not so effective as government claims and private hospitals offer better conditions. To lower this gap and make services more qualified government should provide additional actions (for example, more staff, types of equipment and hospitals).
- **Undertake sustained effort to reduce risk factors** such as high body mass index, high fasting glucose, high blood pressure and high cholesterol that increases with ageing population.
- **Initiate more education and training programmes to to sustain improvements in health services.** The knowledge and skills of the health and public health workforce needs to be kept up to date and developed.
- **Usage of Artificial Intelligence in precision care in Austria.** Translating the tremendous growth in data into clinical insights falls into the hands of AI (artificial intelligence)/ML (machine learning) platforms. The rapid growth in investment in AI and cloud computing are beginning to create the foundations for the precision health market of the future. But apart from advanced research, it is important to provide effective, low-cost treatments that work, triggering unnecessary treatments and higher costs down the line.

Belgium

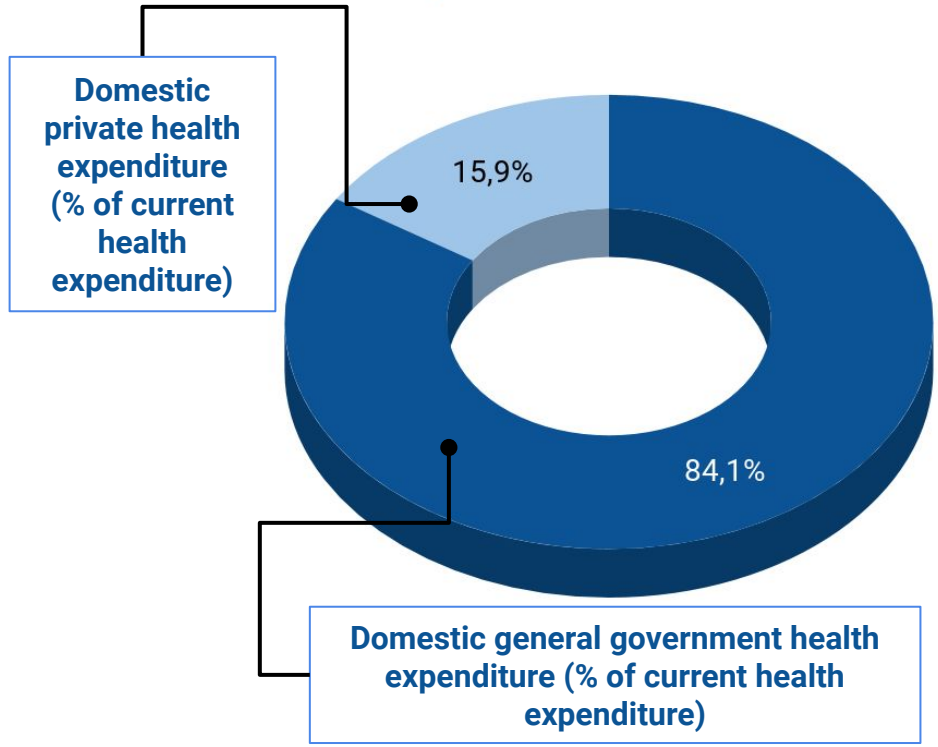
General metrics

HALE	Both Sexes HALE (2016)	71.6 years
	HALE/Life Expectancy Difference 2016	9.6
Economy	GDP per Capita, Current Prices (2016)	41.45 thousand ($)
	Annual GDP Growth (2016)	1.5 %
Healthcare	Current Health Expenditure per Capita (2016)	4.15 thousand ($)
	Public Health Care Expenditure 2016	10.04 % of GDP
Retirement	Age Dependency Ratio 2016	55
	Population over 65, 2016	18.4 %
	Number of WHO Age Friendly Cities and Communities	9
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	12.1
	Annual Cigarette Consumption (Units per Capita) 2016	2440
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	59.5 % of adults

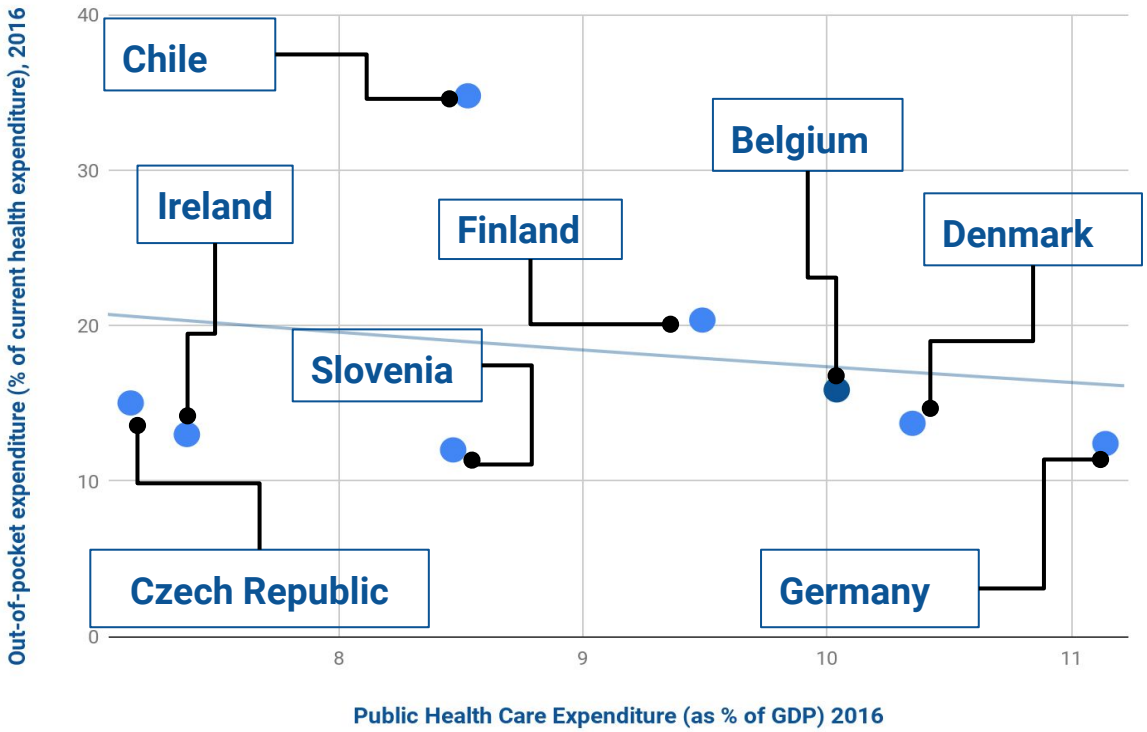
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **93**
- Human Development Index 2016: **0.92**
- E-Government Development Index 2016: **0.79**
- Corruption Perceptions Index 2016: **77**
- Global Gender Gap Index 2016: **0.75**
- Democracy Index 2016: **7.77**

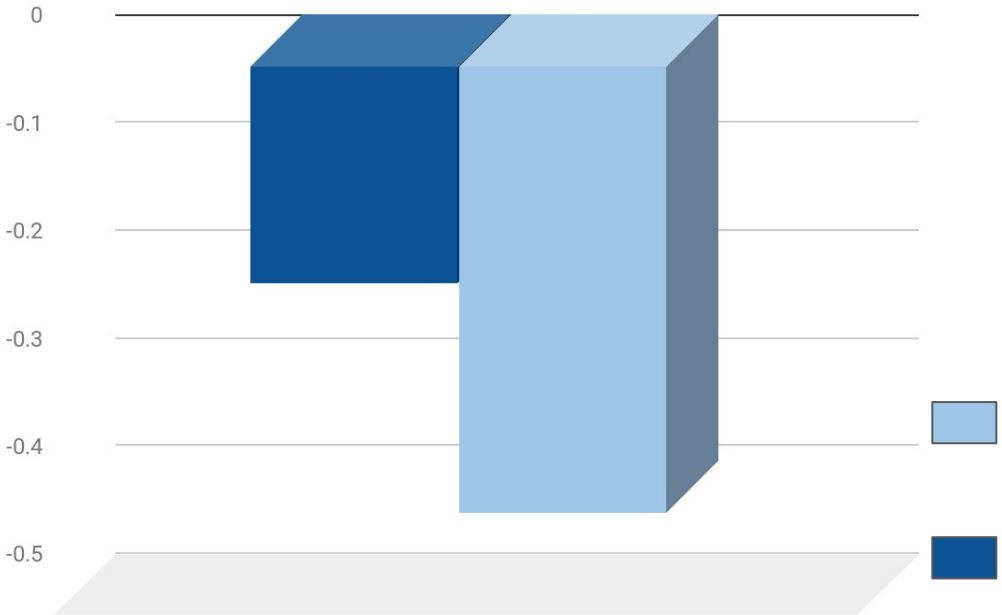
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and High Gap



Effectiveness ratios



There are disparities in unmet care needs by income group. As cardiovascular diseases and cancer are the leading causes of death, the challenge is to strengthen prevention and primary care.

SWOT Analysis of Healthcare in Belgium

STRENGTHS

- Low amenable mortality.
- Nearly universal compulsory health insurance.
- The quality of acute care for cardiovascular diseases is better than the EU average.
- High quality of cancer care.
- Simplified measures to reduce the impact of co-payment for vulnerable groups.
- eHealth helps to manage operations quickly and struggles the bureaucracy.
- Even expats entitled to the universal healthcare system.

WEAKNESSES

- Increasing behavioural risks: regular heavy alcohol consumption in adults is above the EU average, increasing obesity.
- Large inequalities in life expectancy by socioeconomic status.
- Too high antibiotic consumption.
- Cigarette consumption is above the EU average and is very high.
- Belgium medical system is relatively high costed.
- The outcomes of Belgium healthcare system are lower than in other developed countries.

OPPORTUNITIES

- Improve prevention and primary care through utilizing modern technologies and applying modern concepts in healthcare, such as P4 Medicine
- Reducing cancer mortality through early detection and greater prevention.
- Improve hospital efficiency.
- Generate additional databases on health through voluntary patients' contributions.
- Residents have full flexibility in choice of private insurance provider.

THREATS

- Reduced growth in public spending on health.
- Shortage of health professionals, in particular doctors.
- Behavioural factors can shorten life expectancy and healthy years of life.
- Unemployed population, students, pensioners etc have the same subsidies as a working population that borns a disbalance in the system.
- The public healthcare in Belgium is not fully free, it is partly subsidized, so most of patients purchase additional private insurance.

Analysis of Strengths and Weaknesses of Health Care System in Belgium

- Belgium ranked fifth in the 2018 Euro Health Consumer Index.
- Belgium spends 10% of its annual GDP on healthcare expenditure, according to 2016 figures. This places it ninth out of countries from the EU and European Free Trade Association (EFTA). This indicator is higher than the EU average.
- Economic stability, good infrastructure for healthcare, progressive effective medicine and ability to pay for medical help to increase the life expectancy and HALE.
- Health insurance contributions are 7.35% of gross salary (3.55% from salary; 3.8% paid by the employer).
- Long-term care policy has for a long time aimed at developing care services at home to postpone institutionalisation of elderly people as much as possible. Funding for care at home has increased significantly.

- Dental services can be not covered by basic health insurance and can be expensive enough.
- Dramatical behavioural factors which mean high cigarette and alcohol consumption, fat and unhealthy food popularisation that can decrease the life expectancy and healthy years of life.
- Hospital stay and treatment can cost high and insurance can not cover some of the services so patients usually need to make out-of-pocket spendings on, for example, daily care and some medicine.
- Only prescribed medicines are refunded, those non-prescribed are bought by patients. Some medications are reimbursed fully, while others only up to 20%.
- Smoking, alcohol, fast food consumption and lack of physical activities are the major causes of the diseases, especially, chronic one that can be the reason for a decrease in longevity.
- Ischemic heart disease, Alzheimer and stroke are the top reasons for death in older age.

Recommendations for Belgium

- **Move to a life-course perspective in tackling the rising epidemic of "metabesity."** Initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of behavioural factors such as insufficient physical ability, overweight, alcohol abuse, smoking. This will stimulate policy initiatives that supplement income and improve educational opportunities, housing prospects, and social mobility as income is strongly associated with morbidity and mortality.
- **Investments into the new progressive ways of medical treatment.** Development of new medicines and innovative approaches to treatment will solve the problem of enormous antibiotic consumption and make treatment even more effective leading to sufficient improvements in health status.
- **Make healthcare more affordable by spending more costs on public medicine.** The public sector in Belgium is developed enough but still, it is just subsidized, that means the public sector covers only part of expenses on healthcare services. The share of out-of-pocket payments in current healthcare expenditures is high which cause a financial burden on low socio-income groups.
- **Initiate social protection programmes to reduce high disparities in health status.** Currently, people with a higher socioeconomic status (SES) live longer. The gap in life expectancy (at age 25) between the highest and lowest educational levels is 6.1 years for men and 4.6 years for women. People with higher SES also live longer in good health. The gap in health expectancy without disability (Healthy Life Years) between the highest and lowest educational levels is 10.5 years for men and 13.4 years for women. The gaps in health expectancy have increased over time.
- **Support development of the pharmaceutical industry and utilizing AI opportunities for drug discovery.** Artificial intelligence can improve efficiency and outcomes in drug development across therapeutic areas.

Brazil

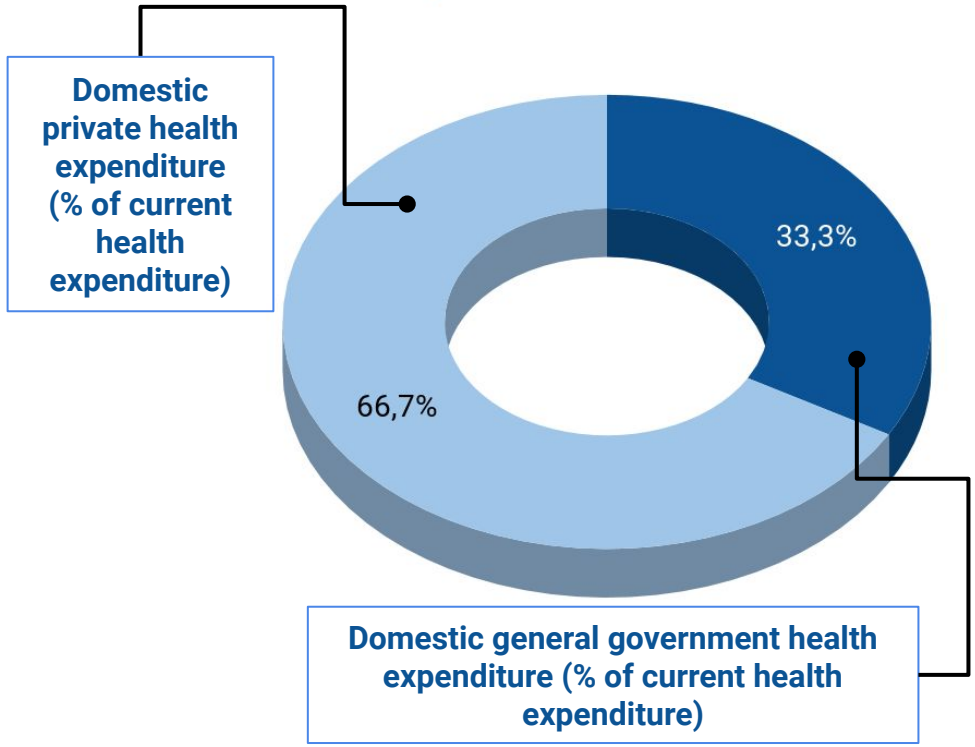
General metrics

HALE	Both Sexes HALE (2016)	66 years
	HALE/Life Expectancy Difference 2016	9.5
Economy	GDP per Capita, Current Prices (2016)	8.71 thousand ($)
	Annual GDP Growth (2016)	-3.3 %
Healthcare	Current Health Expenditure per Capita (2016)	1.02 thousand ($)
	Public Health Care Expenditure 2016	11.77 % of GDP
Retirement	Age Dependency Ratio 2016	44
	Population over 65, 2016	8.2 %
	Number of WHO Age Friendly Cities and Communities	5
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	7.8
	Annual Cigarette Consumption (Units per Capita) 2016	333
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	56.5 % of adults

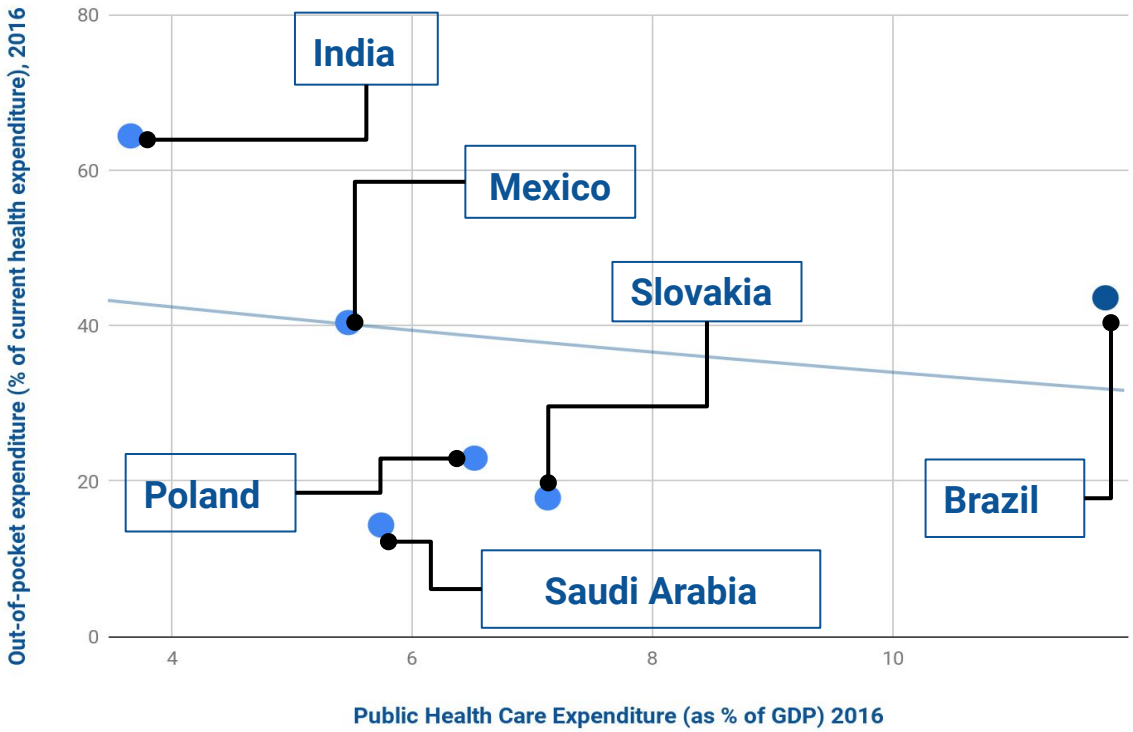
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **64**
- Human Development Index 2016: **0.76**
- E-Government Development Index 2016: **0.64**
- Corruption Perceptions Index 2016: **40**
- Global Gender Gap Index 2016: **0.69**
- Democracy Index 2016: **6.9**

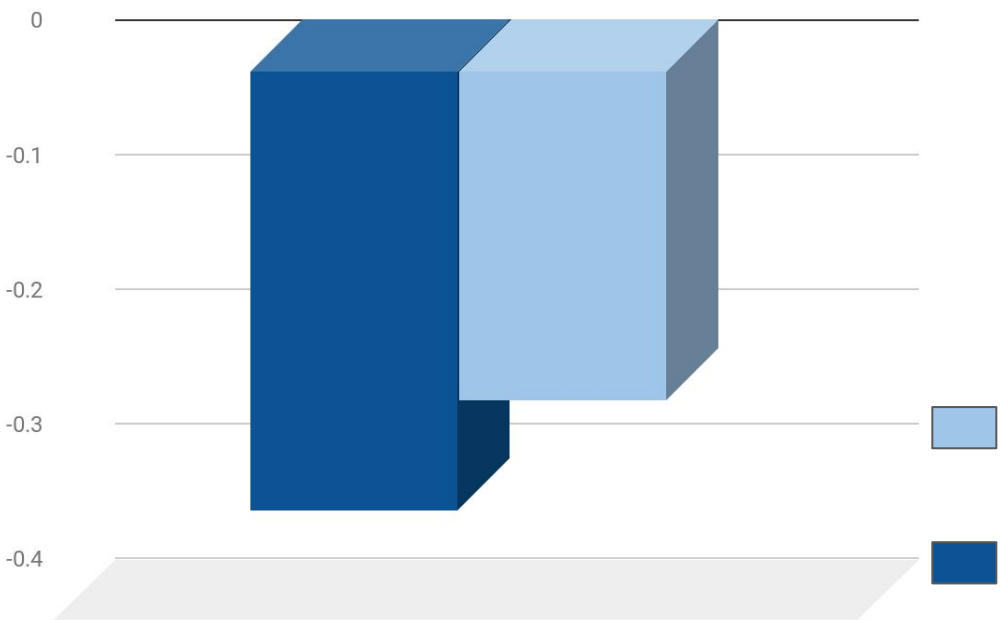
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Medium Gap



Effectiveness ratios



Socioeconomic inequality is one of the biggest problems. The wealthiest are less likely to need help, but when help is needed are more likely to receive formal care, while the poor relied on informal care. Brazil has to make progress towards providing healthcare for all, built on the solid foundations of primary care. It now needs to maintain momentum by exploiting the potential of digital services in healthcare.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Brazil

STRENGTHS

- Relatively low level of cigarette and alcohol consumption in comparison to other countries.
- Citizens are provided with medical services through the universal medical system called the Unified Health System, that is free for everyone.
- The activities of the federal government are to be based on multiyear plans approved by the national congress for four-year periods.
- Legislative control of the food that is used on the territory of Brazil that helps to boost the immunization of the population.

WEAKNESSES

- Uneven location of sufficiency and staffing hospitals in Brazil.
- Most of the hospitals belong to the private sector and are expensive for the entire population.
- In the area of diagnostic support and therapy, 95% of the 7,318 establishments are also private.
- Prevalence of domestic private expenditures on health.
- 78% of hospitals are involved in general medicine, only 16% are specialized and 6% provide outpatient care only that is not enough for the building of the holistic system.
- Less qualified staff in comparison with developed countries that influence the quality of medical services.

OPPORTUNITIES

- Provision of the healthcare reform that can boost the general level of medical services and build an effective regulation of the whole system.
- Laboratories and institutions that can control and regulate the problems connected with epidemics and vaccinations.
- Most of ambulatory care is regulated by the public sector that can provide the entire part of the population with basic healthcare services.
- Brazil is a member of BRICS, one of the countries with a quickly growing economy that can bring additional funds for investment in the healthcare system.

THREATS

- Total health expenditure rises faster than the corresponding increase in the Gross Domestic Product.
- Economic crisis can be more destructive for the countries with an unstable economy in case of financing healthcare initiatives and programmes.
- Higher mortality in comparison with other countries that has a demographic impact.
- Over 55% of public hospitals have less than 50 beds.
- Tendencies to the ageing of the population, dramatic ecological situation and lack of medical infrastructure have a bad impact on longevity.

Analysis of Strengths and Weaknesses of Health Care System in Brazil

- Wide range of government programmes and initiatives, for example, the Ministry of Public Health has been carrying out a health surveillance project in Amazonia that includes epidemiological and environmental health surveillance, indigenous health and disease control components.
- Wide access to medicines and drugs that cost 40% less than brand-named analogues.
- Powerful enough laboratories for producing a certain quantity of vaccines to struggle local epidemics. In 2000, there were 14 industries authorized to produce generic drugs and about 200 registered generic drugs were being produced in 601 different forms.
- Relatively low cancer mortality (Brazil take place in the top five).
- The infant mortality rate in Brazil has fallen greatly over the past two decades.

- In 2014 only 43% of public hospital beds and half the hospital admissions were in municipal establishments.
- Only 25% of the population is covered by at least one of type of health insurances, 75% of which is regulated by commercial organisations and individual plans.
- OECD ranked Brazil's healthcare system as 125 that is a very low indicator, especially, if to compare with other countries.
- The overall regulatory system of the universal healthcare system is too bulky and ineffective that's why all investments in healthcare system can't find the appropriate outcomes.
- Low level of physicians and specialists per 10000 population.
- Emergency services are usually complected with physicians that take this job for supplementary income or had an unsuccessful private clinic practise.
- Behavioural factors such as smoking, alcohol drinking and, especially, obesity cause a decrease in longevity and HALE. Though the life expectancy is still growing the mass index remains to be high because of unhealthy dishes in cuisine.

Recommendations for Brazil

- **Providing economic reform for real development and growth.** Unemployment, crimes, socioeconomic inequality impede economic growth creating barriers for healthy longevity. High level of corruption in conjunction with macroeconomic instability, directly and indirectly, increase the burden of diseases and reduce improvements in health status and well-being.
- **Spending more on healthcare.** Brazil's expenditures on health are lower comparing to more developed countries and advanced economies. Spending more on public health and initiation of obligatory insurance will help to enhance the population's health and HALE.
- **Promotion a healthy lifestyle.** Though consumption of cigarette and alcohol is lower than in the EU it is still high enough and can have a bad impact on health and life expectancy.
- **Utilise AI for collection and analysis of healthcare system information.** Voluntary data contributions from patients via mobile phone applications or from wearable devices can be used to help clarify relationships between diseases on the one hand, and environmental, behavioural, and genetic factors on the other.
- **Strengthen primary and preventive care.** A core function of a strengthened primary care sector must be the effective management of patients with multiple, complex health care needs, including long-term conditions such as diabetes. The government should devise a comprehensive approach to tackling diabetes, high blood pressure and other chronic diseases through public health programmes and public policy.
- **Increase productivity and quality of the healthcare workforce.** The government should provide initiative concerning smart management of the healthcare workforce. Hiring and working conditions of health personnel should be more flexible. Remuneration mechanisms for physicians should reduce their dependence.

Canada

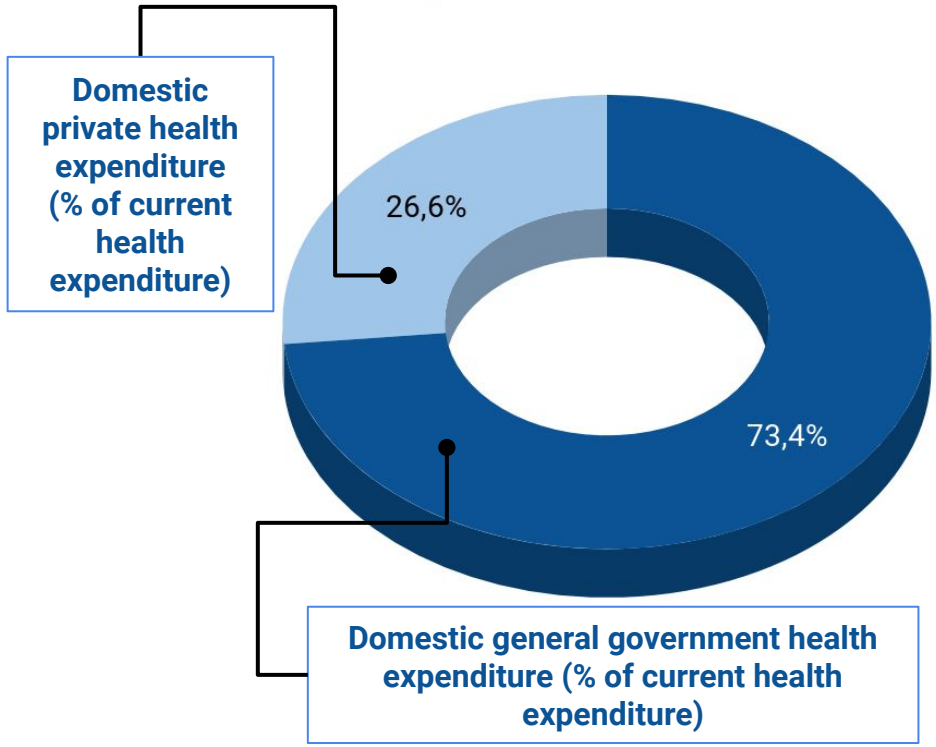
General metrics

HALE	Both Sexes HALE (2016)	73.2 years
	HALE/Life Expectancy Difference 2016	9.6
Economy	GDP per Capita, Current Prices (2016)	42.28 thousand ($)
	Annual GDP Growth (2016)	1.1 %
Healthcare	Current Health Expenditure per Capita (2016)	4.46 thousand ($)
	Public Health Care Expenditure 2016	10.53 % of GDP
Retirement	Age Dependency Ratio 2016	48
	Population over 65, 2016	16.6 %
	Number of WHO Age Friendly Cities and Communities	85
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	8.9
	Annual Cigarette Consumption (Units per Capita) 2016	1021
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	64.1 % of adults

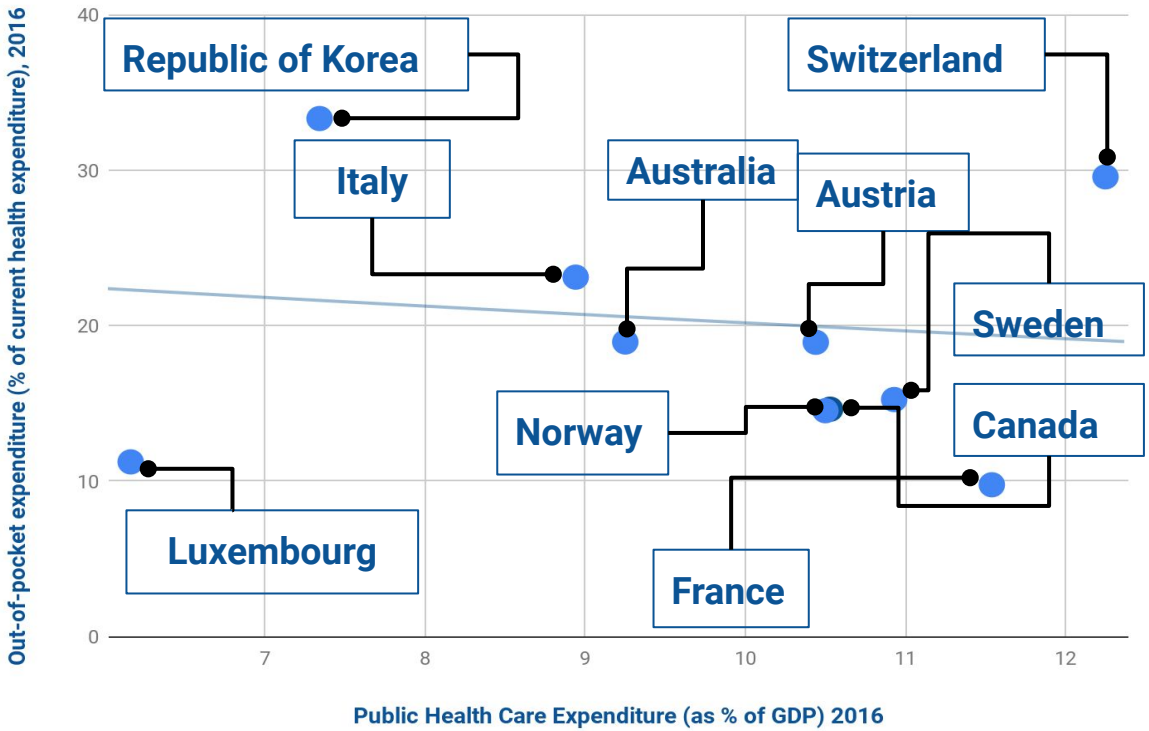
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **94**
- Human Development Index 2016: **0.92**
- E-Government Development Index 2016: **0.83**
- Corruption Perceptions Index 2016: **82**
- Global Gender Gap Index 2016: **0.73**
- Democracy Index 2016: **9.15**

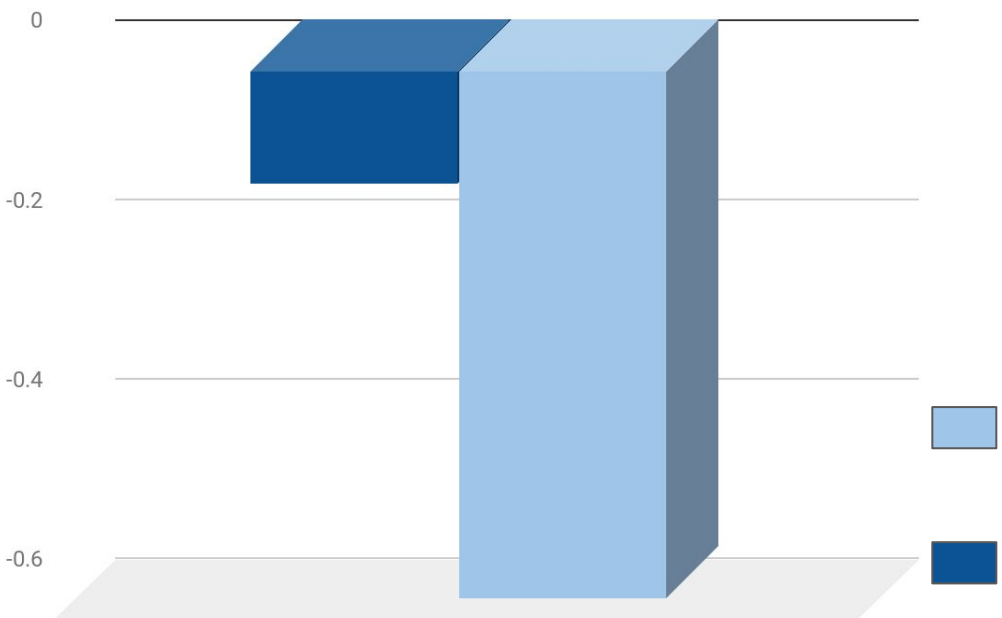
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



Recommendations suggested facilitating the exchange of information and interaction between health providers and government figures as well as flexible funding would also contribute to improvement and solve the problem of differences in regional care by allowing regions to determine the needs of their general populace and meet those needs more efficiently by allowing target-specific allocation of funds.

SWOT Analysis of Healthcare in Canada

STRENGTHS

- Life expectancy in Canada is high and is above the average in OECD.
- Existence of universal medicare and subsidizing of drugs and medicines.
- Organisation and functioning are highly decentralized and territories are highly involved in the administering of medicare.
- Canada has a predominantly publicly financed health system with approximately 70% of health expenditures financed through the general tax revenues.

WEAKNESSES

- The limited scope of services covered by medicare is the reason for the gaps in the general healthcare system.
- Large numbers of cancer and cardiovascular diseases that are the main reasons for deaths.
- Unhealthy lifestyle: high consumption of cigarettes, alcohol and unhealthy food.
- Low effectiveness of health expenditures for HALE and life expectancy.
- OECD has ranked the Canadian healthcare system as 30.

OPPORTUNITIES

- Infant and maternal mortality rates are worse than in other Virtual care, big health data and new technological developments as 3D-printing, IoT, robotics and health apps found the utilization in the Canadian healthcare system.
- Regular implementation of deep reforms to enhance the Canadian healthcare system.
- Services can be provided based on need rather than on the ability to pay that creates opportunity to protect the health.
- Canada has cutting-edge technology, big data clouds and digital infrastructure to implement P4 medicine for building systems biology models.

THREATS

- Risk of fiscal imbalances in healthcare.
- The trend for deeper centralization to minimize the influence of regional health authorities.
- Economic crises, health care costs grow faster than the economy, especially, in case of drug development and prescription of medicines.
- Existence of a big number of institutions and programmes can bring problems in regulation and decision-making process in the medical system.

Analysis of Strengths and Weaknesses of Health Care System in Canada

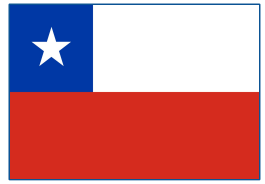
- In spring 2007, all provinces and territories publicly committed to establishing a Patient Wait Times Guarantee that means specialists react quickly on situations.
- The government actively manages and develops the national healthcare system the progress in the treatments and medicines in complex with effective health expenditures that drives HALE to increase.
- The Canada Health Act discourages the extra-billing and users fees.
- The federal government also provides Equalization payments to less prosperous provinces and territorial financing to the territories.
- The health system offers universal coverage with low rates of cost-sharing.

- The level of private health expenditures is still high.
- Besides the claims territorial programmes are aimed for certain categories of the people and can require additional users' fees.
- Between the mid-1970s and 2000, capital investment in hospitals declined.
- The number of acute care beds per capita has continued to fall, in part a result of the increase in day surgeries.
- Canadian specialists score poorly in terms of its effective use of ICT relative to other high-income countries.
- Increase in the immigration of foreign-educated doctors and nurses.
- A pan-Canadian drug coverage programme is catastrophic and even government's efforts can't change the situation significantly.
- The country has turned a blind eye to the troubles of its aboriginal people and it caused an arise of unusual kinds of diseases.
- Obesity (26% of adults) and alcohol consumption are the crucial risk factors for the Canadian nation.

Recommendations for Canada

- **Preventive care is the best way to lower health care costs.** Canada needs a new approach that shifts away from "sick care" to a model of empowering overall health and wellness, providing patients with access to proactive care that identifies risk and manages the chronic disease early to prevent escalation and deterioration.
- **The utilisation of Artificial Intelligence opportunities in preventive medicine to minimise costs and improve the accessibility of healthcare services.** AI has great potential in terms of tackling the problem of bureaucracy and inefficient administration, relieving doctors from time-consuming administrative tasks and giving them more time to spend with their patients. By automating and improving processes, artificial intelligence can benefit both patients and medical staff. By optimising patient processing planning it can reduce the waiting time and length of stay for patients, and it can also help medical staff in their day-to-day work.
- **Enable patient-centred care with information technology systems.** Embracement of technology in health care will lead to personalization and improvement of the quality of medical care through close coordination between patients, caregivers, and professionals.
- **Investment in healthcare infrastructure, facilities and equipment.** As it is known financing of hospitals in Canada decreased for the past years. Quality and effectiveness of treatment usually depend on progressive equipment for observations and investigations that is also can be a key factor in the comprehensiveness of medical system.
- **This shift from treatment to prevention is ultimately leading to a coming age of precision health.** "Precision health" denotes the continuous stabilization of health and the maximum-obtainable maintenance of a young biological age via the routine application of micro-interventions in response to ongoing fluctuations in biomarkers of ageing and health.

Chile



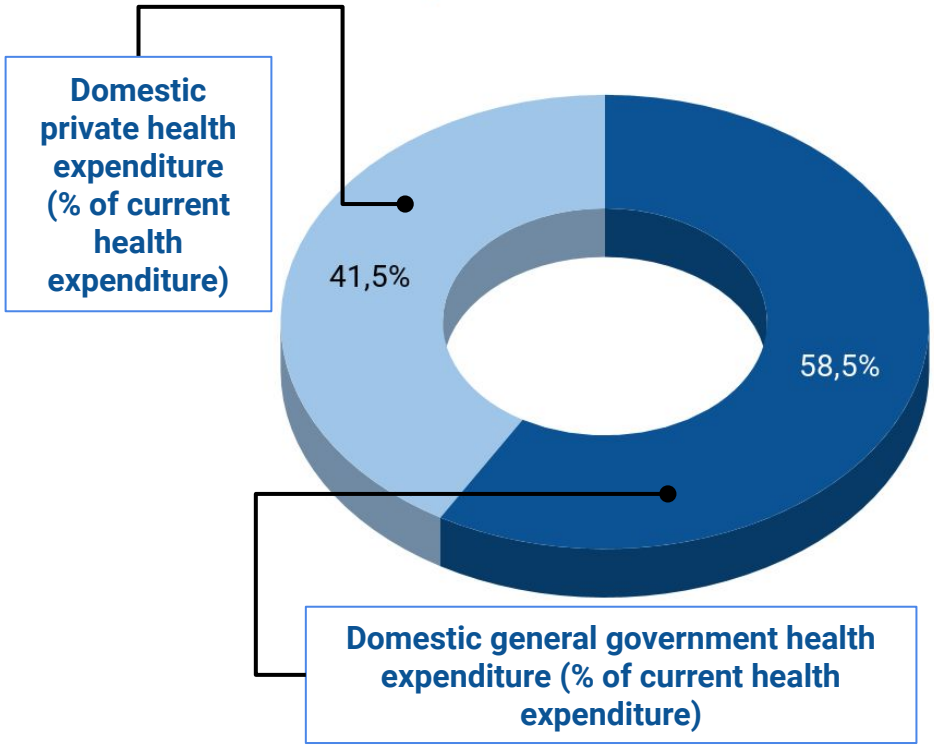
General metrics

HALE	Both Sexes HALE (2016)	69.7 years
	HALE/Life Expectancy Difference 2016	9.8
Economy	GDP per Capita, Current Prices (2016)	13.79 thousand ($)
	Annual GDP Growth (2016)	1.7 %
Healthcare	Current Health Expenditure per Capita (2016)	1.19 thousand ($)
	Public Health Care Expenditure 2016	8.53 % of GDP
Retirement	Age Dependency Ratio 2016	46
	Population over 65, 2016	10.7 %
	Number of WHO Age Friendly Cities and Communities	22
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	9.3
	Annual Cigarette Consumption (Units per Capita) 2016	769
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	63.1 % of adults

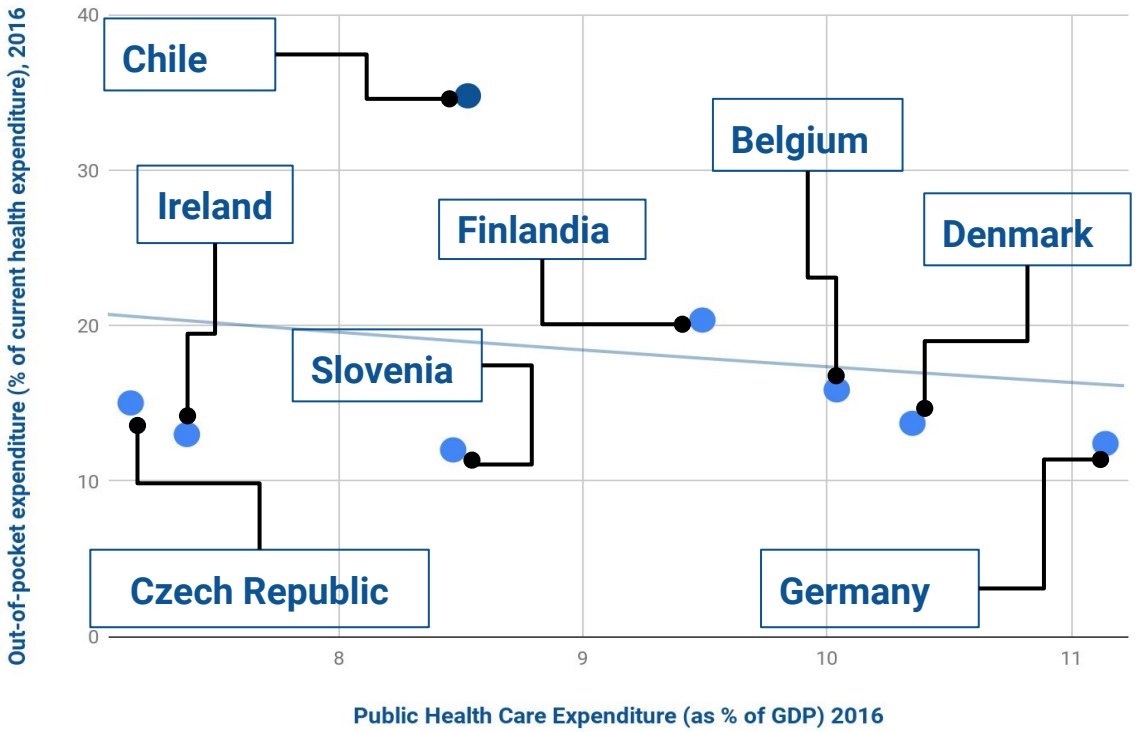
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **78**
- Human Development Index 2016: **0.84**
- E-Government Development Index 2016: **0.69**
- Corruption Perceptions Index 2016: **66**
- Global Gender Gap Index 2016: **0.7**
- Democracy Index 2016: **7.78**

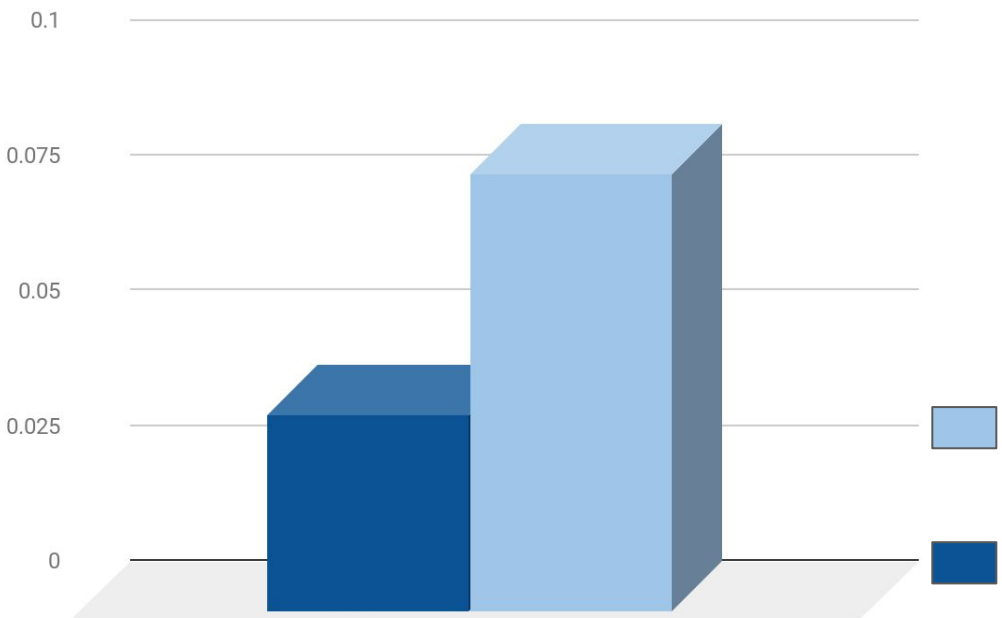
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and High Gap



Effectiveness ratios



In order to improve public health and increase HALE policy should response to the obesity epidemic. Government of Chile should take actions for further development of epidemiological surveillance, costing strategy, stronger data governance.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Chile

STRENGTHS

- Chile has a complex two-level system that consists of the public level that provides a basic set of services that can't be paid by some layers of the population and private insurances schemes.
- Relatively low level of cigarette consumption.
- The system also provides additional immunization and the supplementary food programme.
- Public sector covers 76.3% of the population that is a relatively good indicator.
- People usually spend 5% of income on health that is not dramatic.

WEAKNESSES

- At present, the health system is fragmented concerning both financing and delivery of services, with unequal availability of resources for serving.
- Out-of-pocket spending are high, 38% of total health expenditures.
- The quality of healthcare in Chile is unsustainable and vary regionally.
- Modern equipment is only in hospitals in big cities, remote area is less supplied.
- State hospitals are usually crowded with long waiting periods.

OPPORTUNITIES

- Medical treatment is affordable and of high-quality in both private and public sectors for residents and expats.
- The quality of medicine in big cities is high.
- Private hospitals provide a standard of care with good equipment and well-trained, usually, overseas, staff.
- Public costs can be partly put in reimbursement of spendings on drugs.
- Improved hygiene and sanitation conditions, universal hospital delivery coverage, the creation of outpatient care facilities and a decrease in diseases.

THREATS

- The country has a rugged and mountainous topography and is vulnerable to natural disasters, such as earthquakes and tsunamis.
- Ageing population.
- Poverty and low level of disposable income: 4% of the population faced the necessity to spend 30% of income on the treatments
- Climate and flora and fauna can be the reason for epidemics - diseases that can take a lot of life - so vaccination is an issue.
- Neoplasms and diseases of the circulatory system are key reasons for death in older ages.

Analysis of Strengths and Weaknesses of Health Care System in Chile

- The life expectancy is high - 79,1 year as a result of the compound impact of the decrease in child mortality, increase in healthcare coverage, development infrastructure, and technological advancement in medical treatment.
- Alcohol consumption among adults is lower than the OECD average.
- Starting from 2005 there was set a benefit basket under the public healthcare system that is guaranteed by the government.
- Chile's healthcare system is accessible in case of provision of the basic set of services.
- Chile's healthcare system is robust and functioning well enough.
- Chile's government implement programmes starting from school interventions and ending with labeling food.

- There is a negative trend in rising alcohol consumption
- Male smoking in Chile is higher than female smoking, 28.2% of Chilean males 20.9% of Chilean females were daily smokers in 2016.
- The low rate of screening in obesity, cardio and cancer situation that brings high mortality from this factors.
- Decreasing share of the older age group in age structure.
- Limited access to healthcare services in remote areas causes a disparity in healthcare status and self-reported well being across the country
- Unmet public check-up goals: in 2016 21.1% of the population received an adult blood glucose tests check, still not meeting the 25% goal for coverage.
- Chile is vulnerable to a wide range of severe natural disasters such as earthquakes, air pollution and wastes.

Recommendations for Chile

- **Promotion a healthy lifestyle.** Alcohol consumption, junk food, smoking are a challenge for the government and local Health Authorities, as those behavioural factors are factors that contribute to increase in the level of chronic diseases and increase the probability of premature death. The promotion of a healthy lifestyle with initialisation of programmes targeted on the reduction of the harmful impact of bad habits on the health status.
- **Providing additional programmes for monitoring and managing epidemics.** Hot climate and the existence of certain types of insects can bring epidemics. Establishment of modern laboratories with up-to-date equipment is one of the initiatives that can be undertaken to solve this critical issue.
- **Improve engagement of the population in the process of healthcare to increase health awareness.** People are not so concerned about their health status, which can be a consequence of low development of health screening and preventive medicine.
- **Providing additional insurance for the unsecured layers of the population.** Socioeconomic inequality results in inequalities in life expectancy across different regions and population groups in Chile. Affordable private insurance and high costs on specific treatments and medicine lead to worsening of public health.
- **Even distribution of medicines and progressive equipment among the regions.** It is a well known Chilean problem with the irrational distribution of drugs, other pharmaceutical products and healthcare facilities. Search for progressive ways of treatments and drug discovery can help doctors and specialist to provide advanced services to boost the population's health status. Financing of R&D and utilizing 3D-printing, cloud data storage, eHealth can make medications more effective and accessible.

China

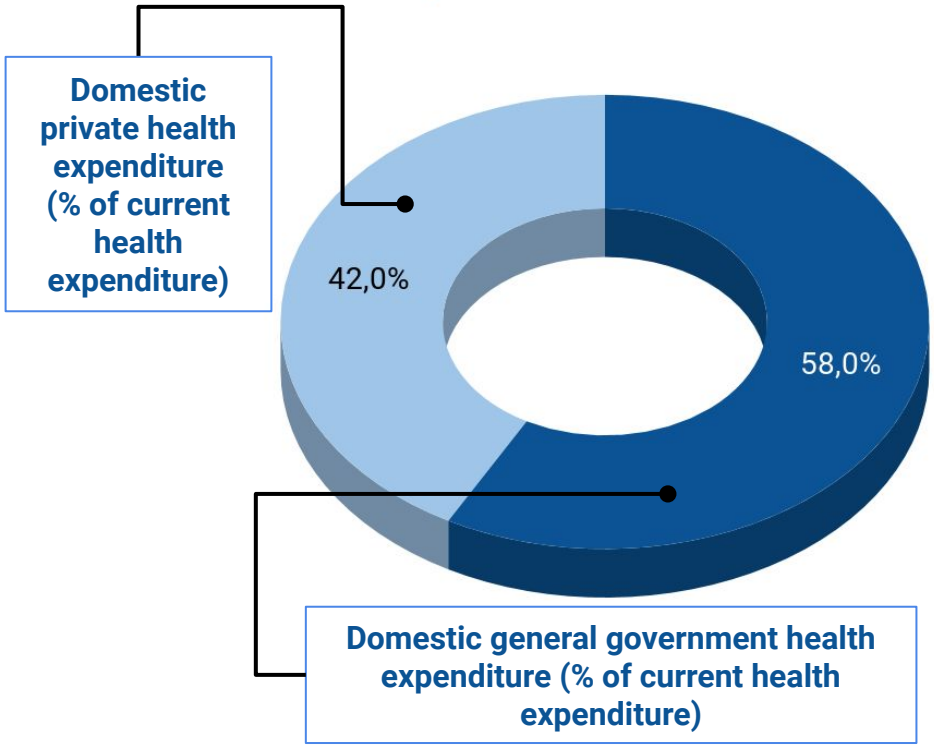
General metrics

HALE	Both Sexes HALE (2016)	68.7 years
	HALE/Life Expectancy Difference 2016	7.4
Economy	GDP per Capita, Current Prices (2016)	8.08 thousand ($)
	Annual GDP Growth (2016)	6.7 %
Healthcare	Current Health Expenditure per Capita (2016)	0.4 thousand ($)
	Public Health Care Expenditure 2016	4.98 % of GDP
Retirement	Age Dependency Ratio 2016	39
	Population over 65, 2016	10.1 %
	Number of WHO Age Friendly Cities and Communities	19
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	7.2
	Annual Cigarette Consumption (Units per Capita) 2016	2043
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	32.1 % of adults

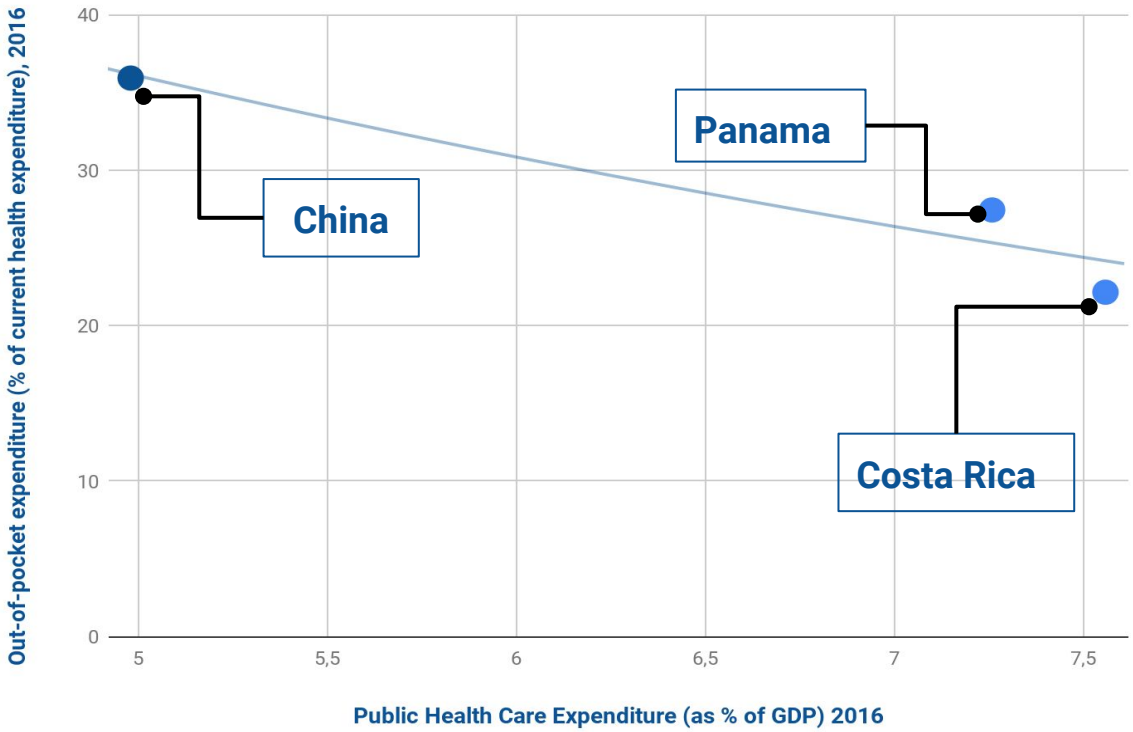
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **78**
- Human Development Index 2016: **0.75**
- E-Government Development Index 2016: **0.61**
- Corruption Perceptions Index 2016: **40**
- Global Gender Gap Index 2016: **0.68**
- Democracy Index 2016: **3.14**

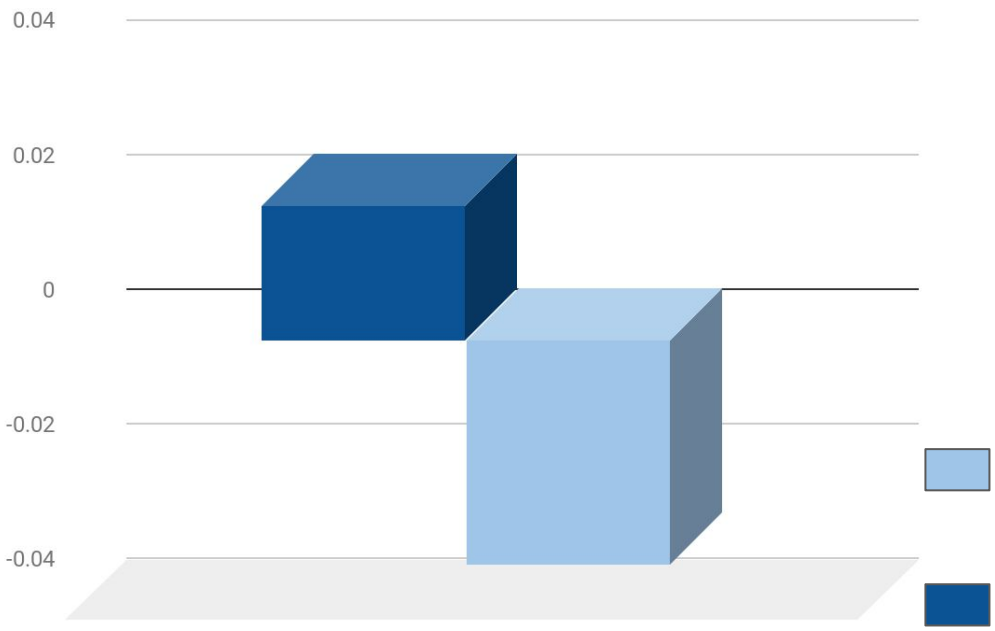
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Low Gap



Effectiveness ratios



China faces many health challenges. A key component of healthcare should be the promotion of healthy lifestyles and physical fitness, including through the development of healthy cities, to ensure a greater focus on prevention rather than treatment. For greater reduction in infant mortality and rates of infectious diseases, government should invest in expanding health infrastructure, improvement quality of healthcare service and provision of affordable health care in rural areas across country.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in China

STRENGTHS

- 95% of the population have insurance for at least basic health coverage that provides treatments on primary care for the population.
- The government claims that public insurance covers 70% of medicare that is a relatively good indicator for healthcare.
- In the then-impoverished country, the system contributed to a remarkable increase in life expectancy by more than 30 years since 1960 to reach 76.2 years in 2016.
- The infant mortality rate in China has fallen greatly, coming down to 18.3 deaths per 100,000 population in 2018.

WEAKNESSES

- The effectiveness of spending on health is low.
- Public health insurance covers only half of the costs of medication.
- Unaffordable healthcare: people with income lower than average do not afford treatment of serious chronic diseases.
- Shortage of healthcare specialist that cause long waiting periods and low quality of care delivery.
- Uneven distribution of hospitals and specialists - people in the remote area have no opportunity to cure serious diseases.
- The smoking rate is still high and stood at 24% in 2010, three percentage points higher than the OECD average of 21%.

OPPORTUNITIES

- Rapidly growing population's wealth is driving overall health care market expansion.
- China is a major market for different multinational health companies.
- There is an overall tendency in the decrease in smoking rates among the world.
- A fast-growing economy that can learn from advanced countries' healthcare systems and invest in the improvement of its own by the development of modern technologies and P4 medicine.

THREATS

- Environmental crises can be the reason for serious injuries, epidemics and diseases.
- The country has a large health care demand gap due to an ageing population, growing urbanization, proliferating lifestyle diseases.
- The obesity rates are rising and are more than in Japan and Korea.
- Continuing failures in the reforming of healthcare.

Analysis of Strengths and Weaknesses of Health Care System in China

- Obesity is much lower than in other OECD countries. The World Health Organization estimated that 4.6% of men and 6.5% of women were obese in China in 2008.
- Healthcare expenditures in China are growing rapidly from year to year with the growth of income.
- The government became highly concerned about the healthcare system that resulted in the implementation the three types of insurances, two of them on a voluntary basis.
- The health status of the population has been improved for several past decades,
- Living standards and health status of the population have been significantly improved since the 1980s.
- From 1990 to 2000, infant mortality decreased from 65 to 31 per thousand live births, and maternal mortality decreased by nearly 50 per cent.

- With 1.6 physicians per 1000 population in 2012, China had much fewer doctors per capita than the OECD average (3.2 physicians).
- The economic success wasn't mirrored on healthcare and such issues as longevity in particular.
- China's spent on healthcare only 5.4 per cent of gross domestic product (GDP) in 2013 that is much lower as compared to OECD countries.
- The hospitals in China are prevalent in the urban area, in big cities and are very overcrowded, so rural population is left without an appropriate medical establishment and usually get impoverished by the payments for noncommunicable diseases treatment.
- The out-of-pocket cost issue is the most pressing, especially in rural areas.
- Noncommunicable diseases have become the major disease burden, infectious diseases such as tuberculosis, hepatitis, and schistosomiasis are still the major health problems in poor rural areas. The prevalence of noncommunicable diseases such as cancer, diabetes and cardiovascular disease.

Recommendations for China

- **A focus on national-level health status and its temporal trajectory.** Health status is one of the most important indicators of well-being, and it predicts a large proportion of societal expenditures on health and social services for the elderly. Health status depends on individual lifestyle factors, social and community networks, general socioe-conomic, cultural and environmental conditions. Health status is also reciprocally affected by social and political policies and programs.
- **Improve engagement of staff in healthcare.** Though the government claims that there is basic insurance and treatments for 95% of the population are available, the real situation is the opposite. People find it difficult to receive the qualified treatments because of queries, waiting period and difficult system to sign up for a visit to a doctor. And this is in big cities where the huge public clinics have enough equipment, instruments and well-trained staff.
- **Provide more freedom for private sector development.** Private clinics can bring advanced methods and technologies in treatments, especially, foreign one by following the successful examples of the developed OECD countries that effectively tackle the burden of the noncommunicable diseases and provide the appropriate medications for elders.
- **Health system re-orientation towards the changing epidemiological landscape**. The increasing burden of noncommunicable diseases highlights the need to move from sick treatment to the prevention of chronic conditions. It requires patients' participation and high health consciousness.
- **Combat with undernourishment, poverty and socioeconomic inequality.** Results of our study show an evident linkage of health and wealth. Healthy longevity in China should be started from the provision of basic services for all population, including adequate sanitation facilities, improved water sources, effective prevention and treatment. The focus also should be made on both the healthcare status of adults and children to create favourable conditions for the growth of future generations.

Costa Rica

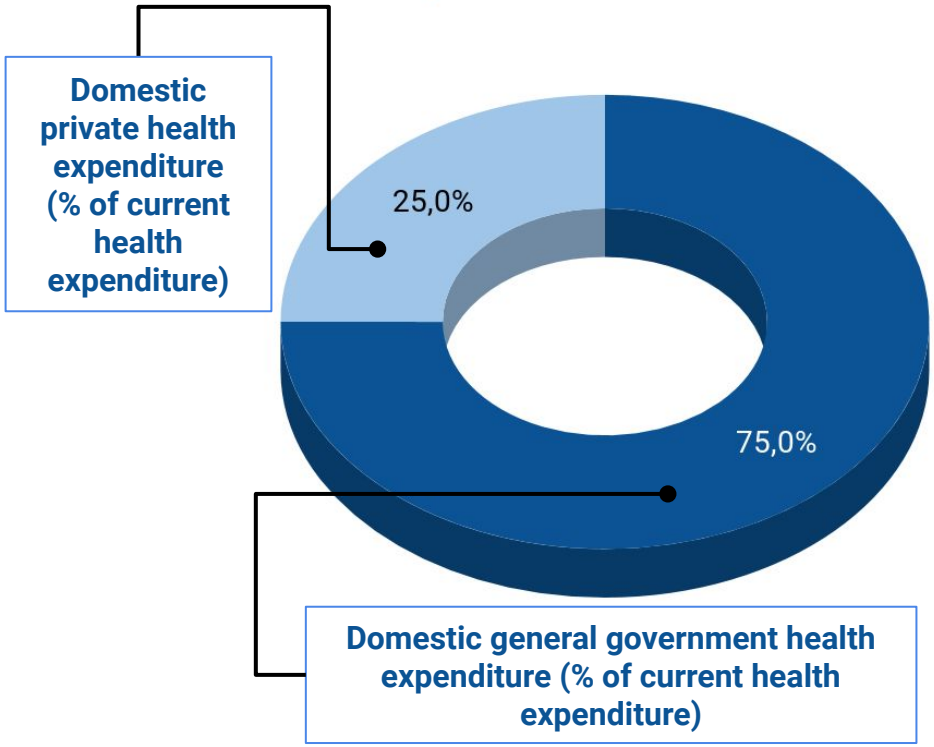
General metrics

HALE	Both Sexes HALE (2016)	70.9 years
	HALE/Life Expectancy Difference 2016	8.7
Economy	GDP per Capita, Current Prices (2016)	11.67 thousand ($)
	Annual GDP Growth (2016)	4.2 %
Healthcare	Current Health Expenditure per Capita (2016)	0.89 thousand ($)
	Public Health Care Expenditure 2016	7.56 % of GDP
Retirement	Age Dependency Ratio 2016	45
	Population over 65, 2016	9.2 %
	Number of WHO Age Friendly Cities and Communities	2
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	4.8
	Annual Cigarette Consumption (Units per Capita) 2016	411
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	61.6 % of adults

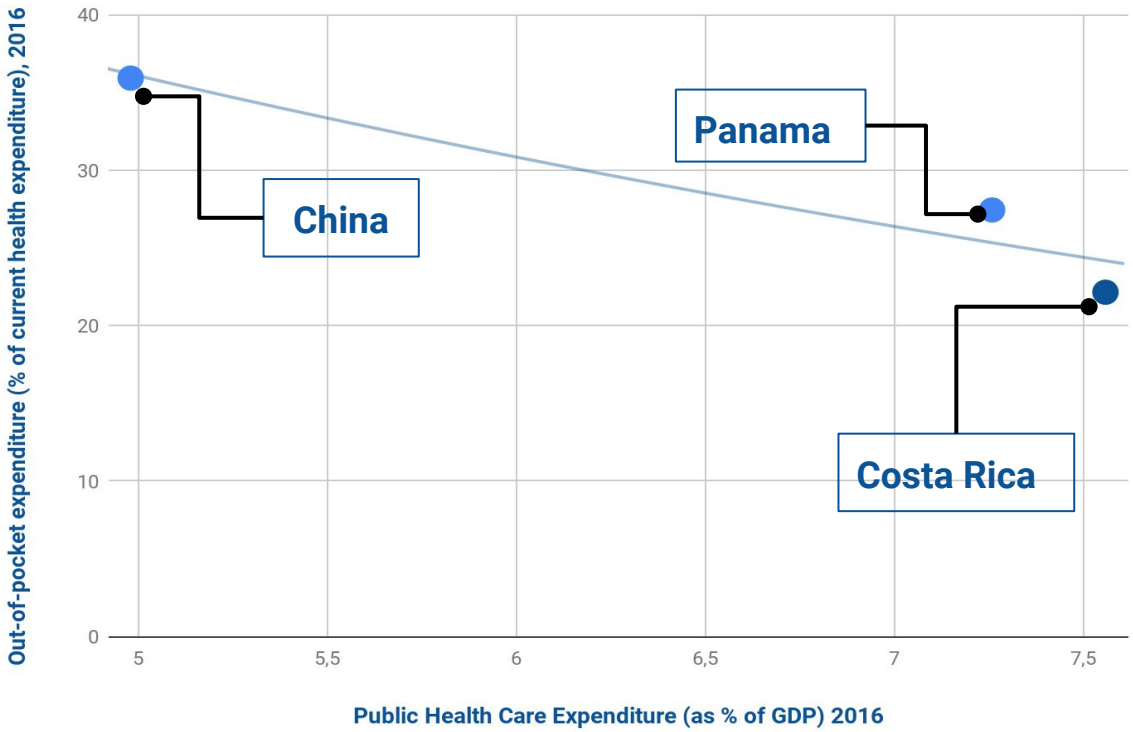
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **74**
- Human Development Index 2016: **0.79**
- E-Government Development Index 2016: **0.63**
- Corruption Perceptions Index 2016: **58**
- Global Gender Gap Index 2016: **0.74**
- Democracy Index 2016: **7.88**

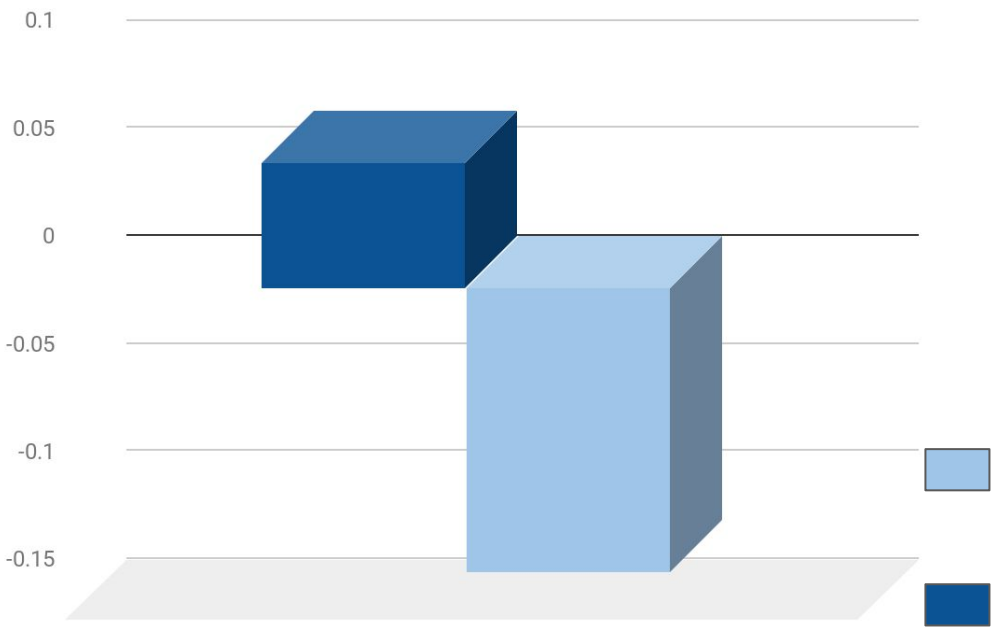
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Low Gap



Effectiveness ratios



Diseases that most affect quality of life are heart disease, back pain, depressive disorders, hearing loss and diabetes. Inequalities also persist among the various population groups. Costa Rica needs to expand its efforts to promote healthy living, particularly young people. The health system needs to contribute to higher levels of equity and solidarity.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Costa Rica

STRENGTHS

- The life expectancy exceeds the average in the OECD and longevity is above the US because of healthy dietary and favourable climate conditions.
- 11.1% of the population over the age of 20 used tobacco products in 2018. That figure is down from 14.2% in 2010, representing a decrease of more than 33,000 tobacco users.
- Over 95% population is covered by the public insurance that is Caja.
- Healthcare system in Costa Rica is available and universal for people of all ages.

WEAKNESSES

- Diseases of the circulatory system were the leading cause of death, followed by neoplasms; together, these two groups accounted for more than half of all deaths.
- Patients don't have an opportunity to choose provider and service.
- The benefits package mostly covered for primary care but not defined for the secondary one.
- There is a lack of specialists for providing primary care and most of them don't have post-graduate training.
- The death rate for Costa Rica in 2018 was 5.046 deaths per 1000 people, a 1.45% increase from 2017.

OPPORTUNITIES

- Primary care continues to develop with a few established entities such as Centers for Integrated Healthcare.
- Costa Rica has developed a multi-sectoral approach to tackle the challenges of the ageing population that can become an instrument for longevity enhance.
- Implementation of the innovative approach to delivering medical services can make Costa Rica's health care even more sustainable.
- The worldwide decrease in smoking rates.

THREATS

- There is a rapid population ageing. In 2010 the population 65+ was 5% according to the whole population an by 2050 this number expects to increase to 21%.
- The main risks for longevity are NCDs, cardiovascular diseases are the main burden accounting of 30% of deaths and 23% of reasons for deaths are occupied by cancer.
- In 2014 was figured out that 60% Costa Ricans between 20 and 44 were overweight or obese, and there is a tendency in growing risks of obesity.
- Environmental risks, such as earthquakes, tsunamis and epidemics because of tropic fauna.

Analysis of Strengths and Weaknesses of Health Care System in Costa Rica

- Out-of-pocket spending was 24.4% in 2014 that is lower than the average in the region.
- Approval of national strategy that can help to struggle the noncommunicable diseases through the smoking by reduction to 12% in its rates, decrease in obesity with a 15% reduction in salt intake and a 2% reduction in child obesity by 2021.
- Great improvements are achieved in the waiting periods by governmental intervention. After the appropriate initiative in 2014 93% of hospitals were able to reduce waiting periods.
- Services in Costa Rica have relatively low prices for the same quality and availability.
- Healthcare system in Costa Rica is affordable for people of all ages. Healthcare is free for the poorest Costa Ricans.

- Increasing crude death rate: the death rate for Costa Rica in 2018 was 5.046 deaths per 1000 people, a 1.45% increase from 2017.
- The attempt to reform of the healthcare provision through the hospitals was abandoned among the other crucial reforms that are also not effective enough.
- Long waiting periods before receiving the healthcare in different entities is lower than the accessibility of the whole system and patients' outcomes. Almost a third (31%) of patients were waiting more than 540 days for elective surgery. Long waiting periods in primary care cause the poor access to this kind of service that leads to overload in the hospital emergency rooms. Patients have to get up very early to handle the huge query in the clinic.
- Probability of increase in the financial burden of out-of-pocket spending, the catastrophic expenditure in health and impoverishment expenditure.
- Specialists and physician density remains to be 2.1 per 1000 population that is below OECD average.

Recommendations for Costa Rica

- **Concentrate on the planning, assessment and control of the functioning of the universal healthcare coverage.** A key issue concerns long waiting times, which have been a persistent and challenging problem. A preoccupation with waiting times also means that other dimensions of quality, particularly patient outcomes, have not received sufficient attention in recent years. Some key quality indicators, such as those relating to patient experience and patient safety, are not regularly collected.
- **Strengthen primary and preventive care.** A core function of a strengthened primary care sector must be the effective management of patients with multiple, complex health care needs, including long-term conditions such as diabetes. The government should devise a comprehensive approach to tackling diabetes, high blood pressure and other chronic diseases through public health programmes and public policy.
- **Promotion a healthy lifestyle to decrease the burden of behavioural risk factors.** Increasing obesity in Costa Rica in constellation with smoking and alcohol consumption are major factors that contribute to the slow-motion disaster of non-communicable diseases.
- **Improve engagement of high-qualified staff in healthcare.** The government should provide financial incentives for medical staff in the public sector and funding to state healthcare services.
- **Enhance eHealth infrastructure.** To achieve higher efficiency of the healthcare system and better health outcomes in the context of ageing and life expectancy improvements the government should modernise health centres by providing the latest technological equipment. The government also should give particular attention to the development of eHealth systems, include the creation of electronic patient records in primary health care, e-prescription services and patient registries.

Cuba

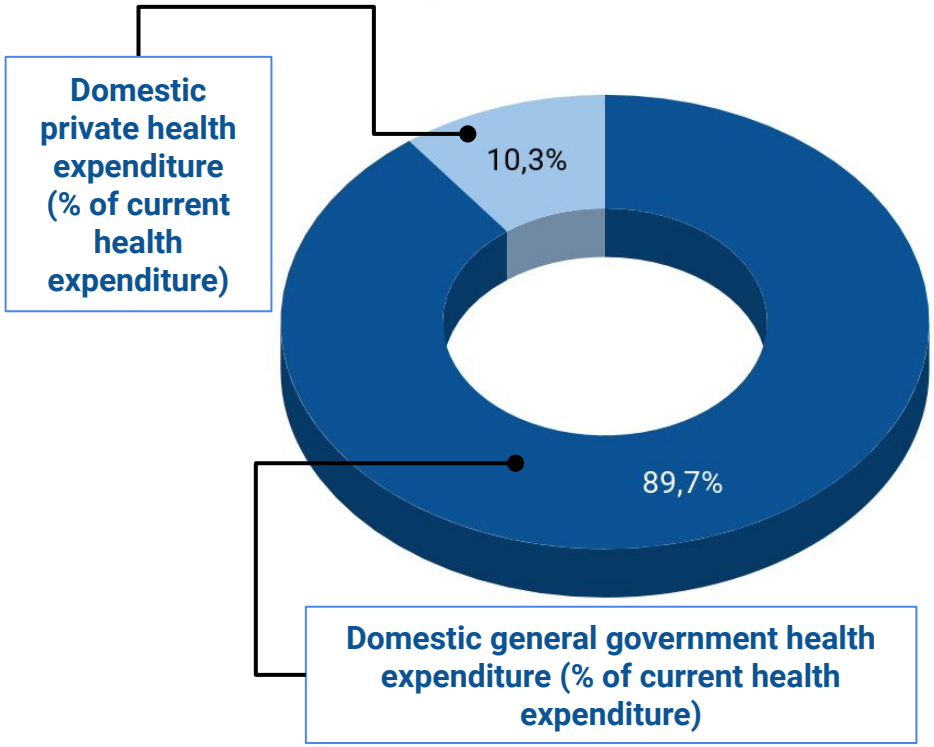
General metrics

HALE	Both Sexes HALE (2016)	69.9 years
	HALE/Life Expectancy Difference 2016	9.1
Economy	GDP per Capita, Current Prices (2016)	8.06 thousand ($)
	Annual GDP Growth (2016)	0.5 %
Healthcare	Current Health Expenditure per Capita (2016)	0.97 thousand ($)
	Public Health Care Expenditure 2016	12.19 % of GDP
Retirement	Age Dependency Ratio 2016	44
	Population over 65, 2016	14.3 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	6.1
	Annual Cigarette Consumption (Units per Capita) 2016	233
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	58.5 % of adults

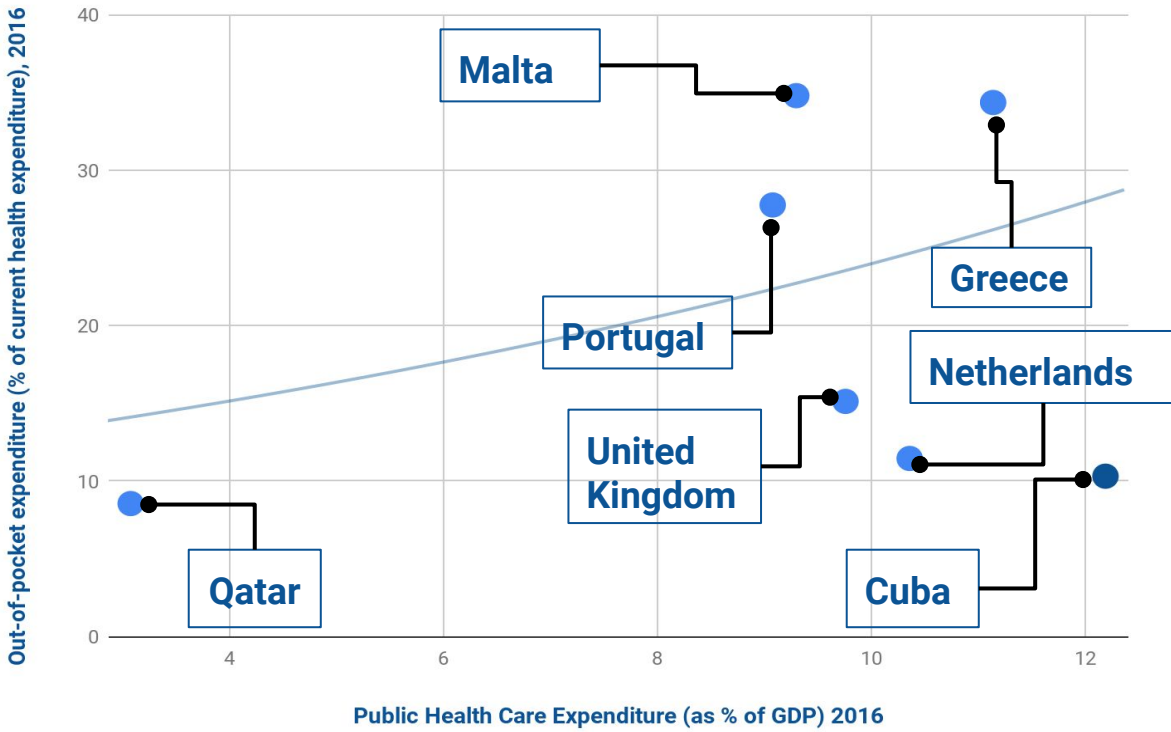
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **76**
- Human Development Index 2016: **0.74**
- E-Government Development Index 2016: **0.35**
- Corruption Perceptions Index 2016: **47**
- Global Gender Gap Index 2016: **0.74**
- Democracy Index 2016: **3.46**

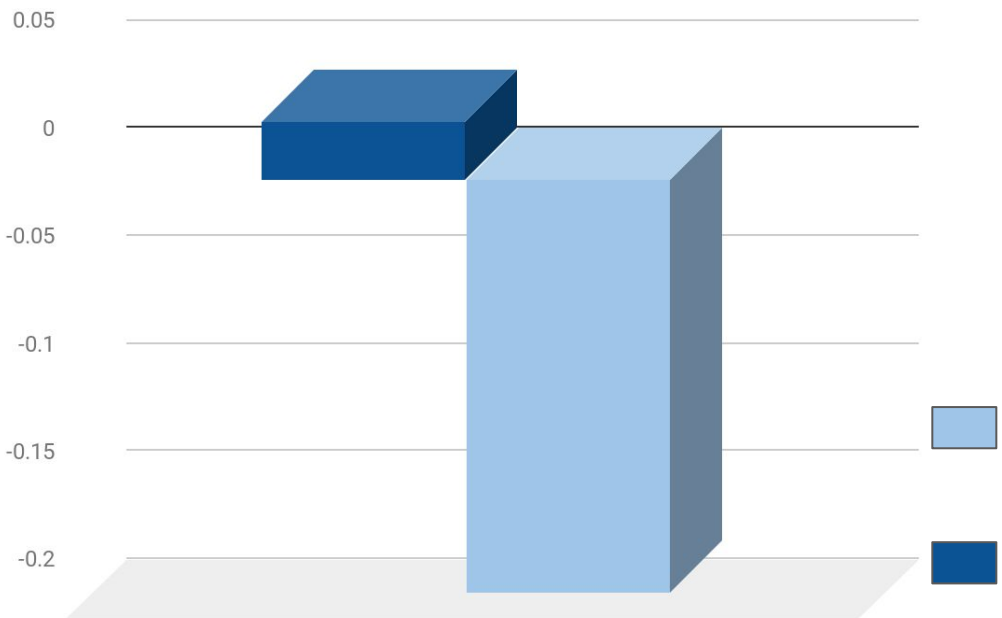
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Medium Gap



Effectiveness ratios



Ageing, an increase in obesity and problems with tobacco and alcohol are main causes of death among Cuba's citizens. Cuban government should address to health challenge, which is a huge investment in public health education around smoking, alcohol, diet and exercise. The foundation of Cuban's preventative health care model that is at primary care level should be in priority.

SWOT Analysis of Healthcare in Cuba

STRENGTHS

- The outstanding decrease in child mortality aged less than 5 years for the past decades from 46 death per 1000 40 years earlier to 7 per 1000 in 2014.
- Cuba has a really well-educated population and a surfeit of doctors. Life expectancy on the island is higher than in the U.S. and Cubans have almost more than three times as many doctors per capita.
- Every physician completes a family medicine residency.
- Developed preventive and primary care.

WEAKNESSES

- The age-adjusted death rate for coronary heart diseases is 100.35 per 100,000 of population ranks Cuba #116 in the world and reached 19,504 or 23.02% of total deaths.
- About half of Cubans suffer from obesity
- A national survey revealed that they eat only 3.2 fruits and vegetables per week that is a very low amount.
- Cuba has one of the highest abortion rates.
- The healthcare system is one-tier consistent only of public establishments that bring the lack of flexibility and makes it dependent on government.

OPPORTUNITIES

- Regular provision of reforms in Cuba leads to the modernization of polyclinics and training of good staff that cause a significant improvement in healthcare.
- Government is the key player of the healthcare system in Cuba and can observe, plan and regulate the functioning of the healthcare with no limits that bring simply mechanisms and effectiveness with further equal distribution of resources.
- Streamline establishment of different entities such as polyclinics and laboratories that can struggle the epidemic and the viruses.
- Regular provision of the renovation of the equipment.

THREATS

- Epidemics caused by different viruses are among the major causes of death that increase the risk of premature disability.
- 42 per cent of the Cuban population are overweight and it is a risk of CVD for the country.
- Lack of financial resources can be the obstacle to rebuilding a strong healthcare system.
- Past conflict with the USA that brought the increase in medications' and drugs' costs up to 30%.
- Stroke is the second risk factor for death and it reached 10.77% of deaths in 2017.

Analysis of Strengths and Weaknesses of Health Care System in Cuba

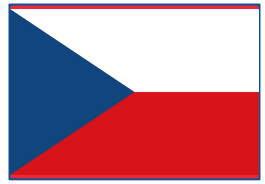
- Cuban life expectancies of 79.5 years and infant mortality rates of 4.3 per 1000 live births (2015) compare well with rich nations like the USA (78.7 years and 5.7 per 1, 000 live births).
- Cuba spends 11.1% of GDP on the healthcare that is above the average indicator in the world.
- The patient to doctor ratio has decreased sufficiently for the few past decades and stood for 147 in 2010.
- Cuba could reach the record of 98% full immunization by the age of 2 years, vaccinating children against 13 illnesses; antenatal care for 95% of pregnant women with rates of infant mortality less than 5 per 1000 births; and chronic disease control, including a yearly blood pressure measurements for the entire population.
- By 1999 Cuba could reach the full basic coverage of the population by the functioning of medical teams.
- Smoking and alcohol consumption are below the OECD average.

- Centralized planning brings certain disadvantages to the functioning of the healthcare system because of penalties for physicians in case of bad statistic for the patients' outcomes, so they usually manipulate the data.
- Great disparities in the rural and urban areas because of the uneven distribution of medical facilities and specialists.
- Poor focus on care delivery: too long waiting periods and short consultations.
- Doctors and specialists are usually overworked because of the great amount of visits (800-1000 per day) and their colleagues are involved in the abroad health missions.
- There are severe problems with the diagnostics and supply of up-to-date equipment and even with an electricity supply that destruct the functioning of hospitals and medical centres
- Prevalence of tobacco use was revealed among the 37% of students and alcohol consumption among 74.1%, students with 3.7% classified as at risk for death.

Recommendations for Cuba

- **Struggling against the bureaucracy.** Bureaucracy does not strengthen the healthcare system. It inevitably leads to higher administrative costs, corruption, poor focus on the quality of healthcare and care delivery itself.
- **Resolving the issue with healthcare accessibility.** There must be certain facilities and conditions for the medical staff to provide appropriate diagnostics and effective treatment. Investment in the modernisation of healthcare facilities may help to boost healthcare efficiency and improve health outcomes.
- **Improve staff engagement in the health care system.** Certainly, the government earns from foreign health missions but the entire population in Cuba suffers from bad care delivery and shortage of employees in hospitals. Making physicians tired from overwork is very risky because such a situation can lead to mistakes and bad patients' outputs.
- **Focus on longevity global challenges.** The "silver tsunami" is an actual challenge for Cuba. Government initiatives should follow the worldwide movement to improve physical, mental, social well-being for people as they age. The initiative should aim to comprehensively address the challenges and opportunities presented by the ageing of the population.
- **Tackle rising obesity.** Thus rates of smoking and alcohol consumption are relatively low, the prevalence of overweight among adults is a rising issue. The government should initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of behavioural factors such as insufficient physical ability, overweight, alcohol abuse, smoking.
- **Plan and implement developmentally appropriate programs in school-aged environments, encourage social media responsibility to maintain social network and develop inclusive society for the elderly.**

Czech Republic



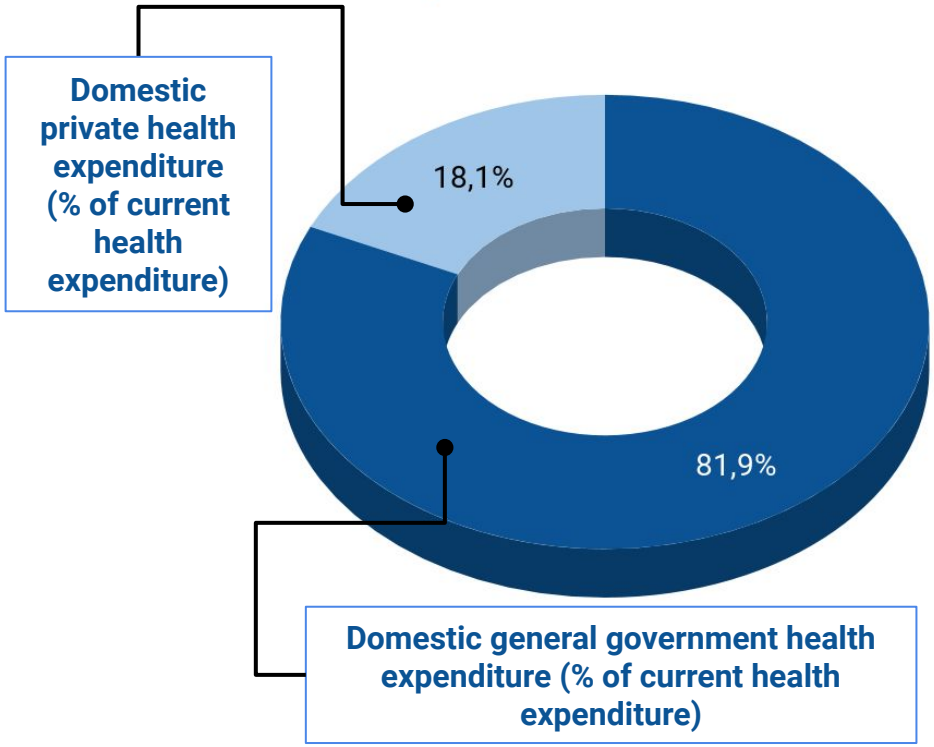
General metrics

HALE	Both Sexes HALE (2016)	69.3 years
	HALE/Life Expectancy Difference 2016	9.9
Economy	GDP per Capita, Current Prices (2016)	18.46 thousand ($)
	Annual GDP Growth (2016)	2.5 %
Healthcare	Current Health Expenditure per Capita (2016)	1.32 thousand ($)
	Public Health Care Expenditure 2016	7.15 % of GDP
Retirement	Age Dependency Ratio 2016	51
	Population over 65, 2016	18.5 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	14.4
	Annual Cigarette Consumption (Units per Capita) 2016	2427
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	62.3 % of adults

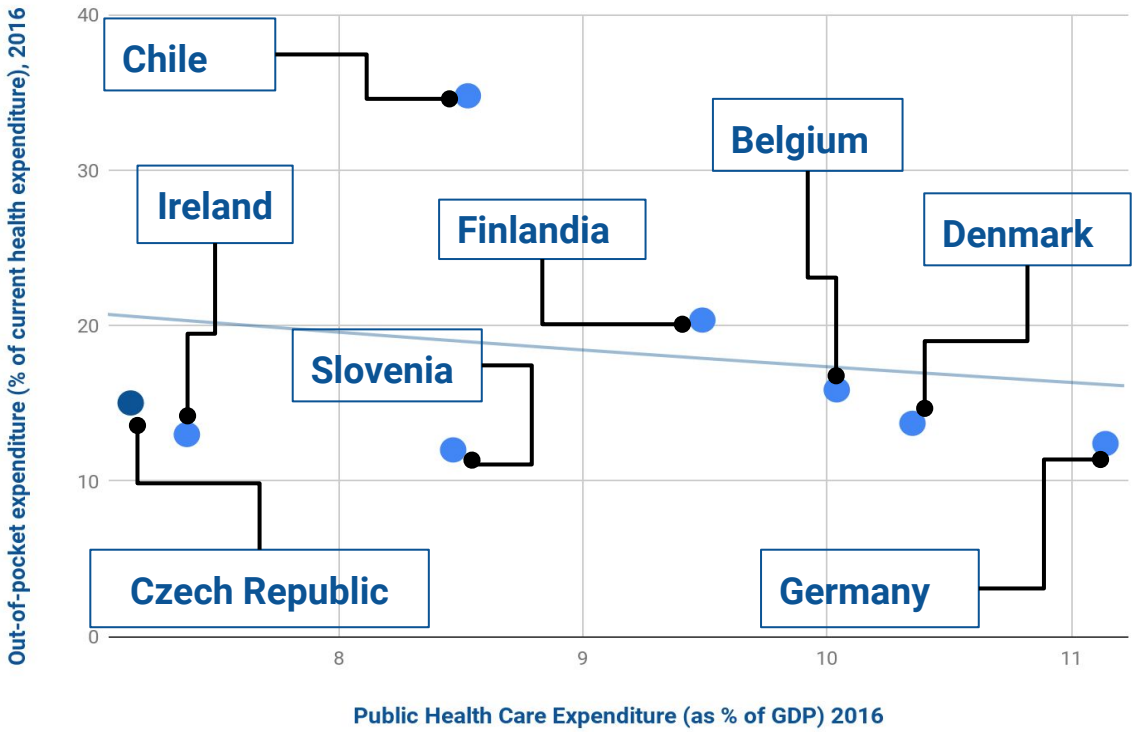
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **89**
- Human Development Index 2016: **0.89**
- E-Government Development Index 2016: **0.64**
- Corruption Perceptions Index 2016: **55**
- Global Gender Gap Index 2016: **0.69**
- Democracy Index 2016: **7.82**

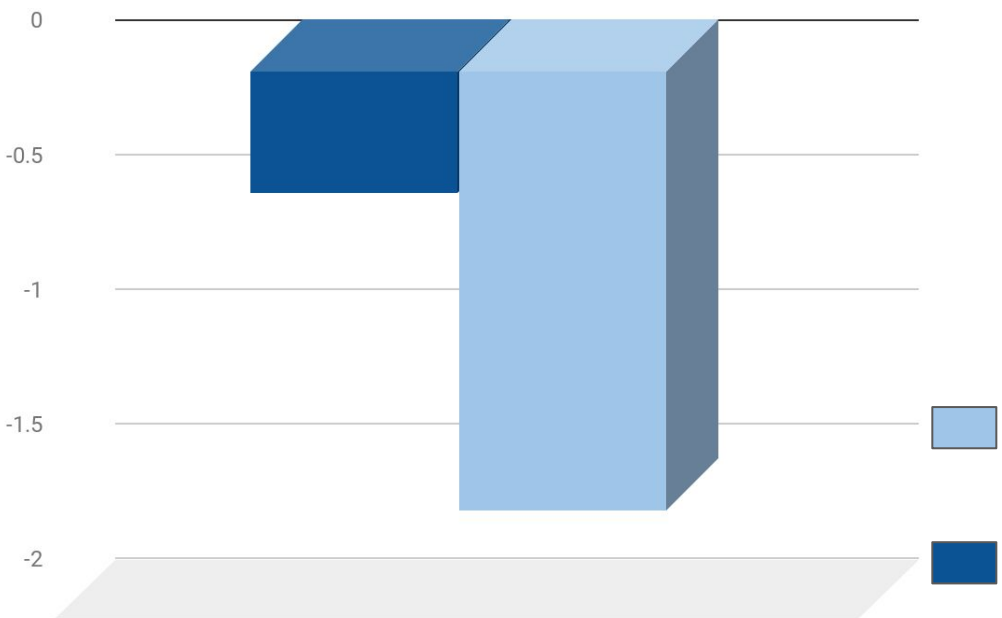
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and High Gap



Effectiveness ratios



There is a regional variations in health outcomes in the country. It is important to develop targeted policy solutions, as institutions, life-style and socio-economic characteristics are considered to be the main explanatory factors that affect HALE.

SWOT Analysis of Healthcare in Czech Republic

STRENGTHS

- Amenable mortality has decreased greatly and tended to reach the OECD average indicator.
- Relatively low amount of unmet needs for medical care in comparison to other countries and fewer disparities among different income groups.
- Quality of medicine and its accessibility is relatively high and reached 89.0 in 2016.
- There is a slight decrease in the key risk factors for the country such as tobacco and dietary habits.
- Infant mortality is one of the lowest and rates 2.5 infant death per 1000 live birth in 2015.

WEAKNESSES

- The age-standardised mortality rate for cardiovascular diseases is 60% higher than the EU average. CDV cause about half of the deaths.
- Levels of Ischaemic heart disease, stroke and others remains to be the highest than the EU average while lung cancer is the leading cause.
- Nearly 1 in 4 people of Czechs reports living with hypertension and 1 in 13 with diabetics.
- Only 61% of Czechs feel that they are healthy that is generally lower than in other EU countries.
-

OPPORTUNITIES

- There are certain improvements in the prevention of premature deaths, for example, from cardiovascular diseases.
- The healthcare system is financed by the public sources that are 82.4% and private sector spendings have been stable for the past years because of the financial protection.
- The decrease is amenable mortality is a good springboard for the boost of primary and preventive care and also public services.
- There is a sufficient decline in smoking (from 24% to 18%).

THREATS

- The increase in death from diabetes, cancer, dementia and other diseases are the major risk and issue to resolve.
- CVD mortality though is the main cause of death and is double high than OECD average.
- Smoking rates in Czech are higher than in OECD.
- There are more obese than in other EU countries and this risk factor is on the rise that creates great concern for society.
- Traditions influenced alcohol consumption in the Czech that is 11.9 litres and higher than the OECD average.
- No political concerns on health problems.

Analysis of Strengths and Weaknesses of Health Care System in Czech Republic

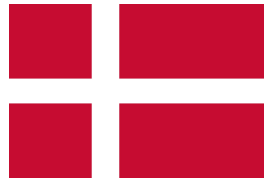
- Death from the respiratory and mental, behavioural disorders are lower than the OECD average.
- The life expectancy of Czech women after 65 years was 19.5 years in 2015.
- The healthcare in the Czech Republic is based on the Social Health Insurance scheme and provides the generally good basket of benefits.
- Czech Republic has the fours public funding share of 82.4% after such countries as Germany, Denmark and Sweden.
- There is a good number of acute beds for long-term care that is above the EU average.
- The amount of doctors and specialists per population seems to be very high and complete. The stuff in the Czech Republic is qualified and well trained.

- Musculoskeletal problems and depressive disorders are some of the leading determinants for disability-adjusted life years.
- The high level of correlation with education, so the population with the lowest levels of education are more likely to have the diabetics and others.
- 29% of 15-year-old girls and 32% of boys have been drunk more than twice and it is above the EU average.
- Nearly 1 in 5 adults (19%) are now obese and the obesity for adolescents is 18% and has been doubled twice.
- There are usually delays in the implementation processes for enhances the services and the effectiveness of the healthcare system.
- Many institutions and long-term care facilities in the remote area require a certain modernization.
- The physician personnel is ageing and over 30% of general practitioners and 40% of pediatrics are after 60.

Recommendations for Czech Republic

- **Reduce high disparities in healthcare status across regions.** Health and socio-economic inequality inevitably influence the overall health status of the nation. The provision of the activities to enhance and maintain qualitative medicine in rural areas can bring more health-adjusted years for the Czechs.
- **Prepare new job orientations and train the young staff in the healthcare system in the Czech Republic.** New challenges are arising with the increasing global trend of the ageing population. The government should prepare the new staff to minimise the future risk concerning the shortage of personnel.
- **Increase healthcare spendings.** The lack of financing is a key reason for limited access and affordability of healthcare services. Investments can help to combat the disparities in the region with investments in innovations and breakthrough approaches such as 3D-printing, P4 medicine and artificial intelligence.
- **Addressing global longevity challenge through the focus on the elderly's well-being.** Longevity planning can certainly define the key strategies and steps on the way to Healthy Longevity. The government should accumulate affords to build a broad ecosystem for support by enabling scientists, engineers, policymakers, and other stakeholders to coordinate performance for healthy longevity progressiveness.
- **Address the rising burden of non-communicable disease.** Lifestyle risk behaviours are responsible for a large proportion of disease burden and premature mortality worldwide. Risk behaviours tend to cluster in populations. Non-communicable disease is caused by the set of emerging risk factors (sleep, sitting time, and social participation) and unique risk combinations and their associations with all-cause and cardio-metabolic mortality.
- **Health records and linkage to survey data should be used more extensively** to refine disease prevalence estimates and provide more reliable data to guide policy and programmes to address these causes of ill health.

Denmark



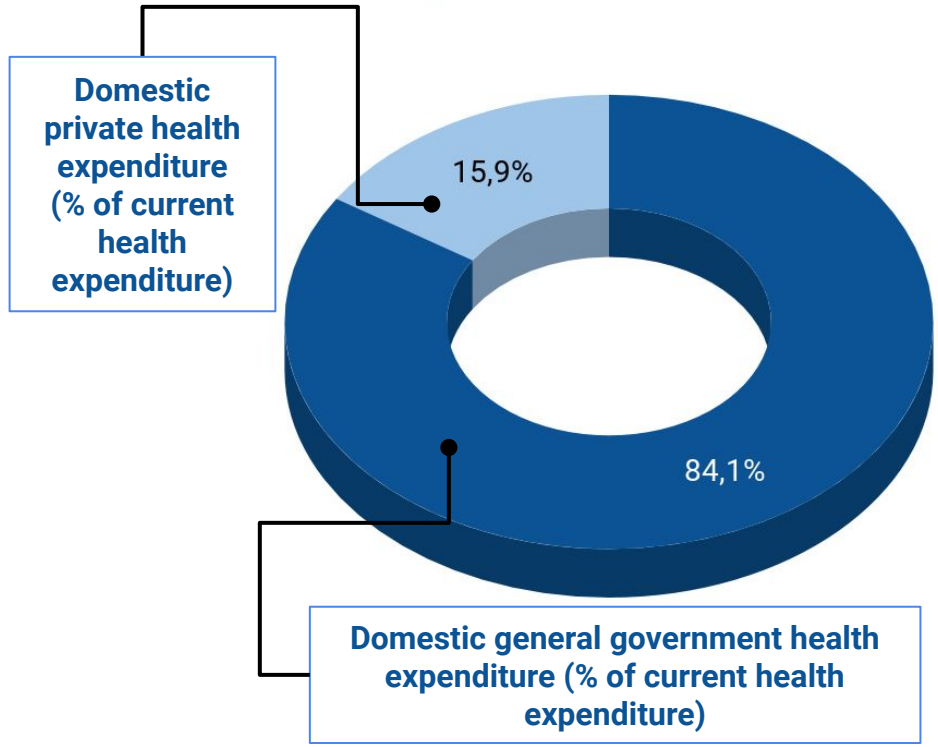
General metrics

HALE	Both Sexes HALE (2016)	71.8 years
	HALE/Life Expectancy Difference 2016	9.4
Economy	GDP per Capita, Current Prices (2016)	54.47 thousand ($)
	Annual GDP Growth (2016)	2.4 %
Healthcare	Current Health Expenditure per Capita (2016)	5.57 thousand ($)
	Public Health Care Expenditure 2016	10.35 % of GDP
Retirement	Age Dependency Ratio 2016	56
	Population over 65, 2016	19.4 %
	Number of WHO Age Friendly Cities and Communities	1
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	10.4
	Annual Cigarette Consumption (Units per Capita) 2016	1298
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	55.4 % of adults

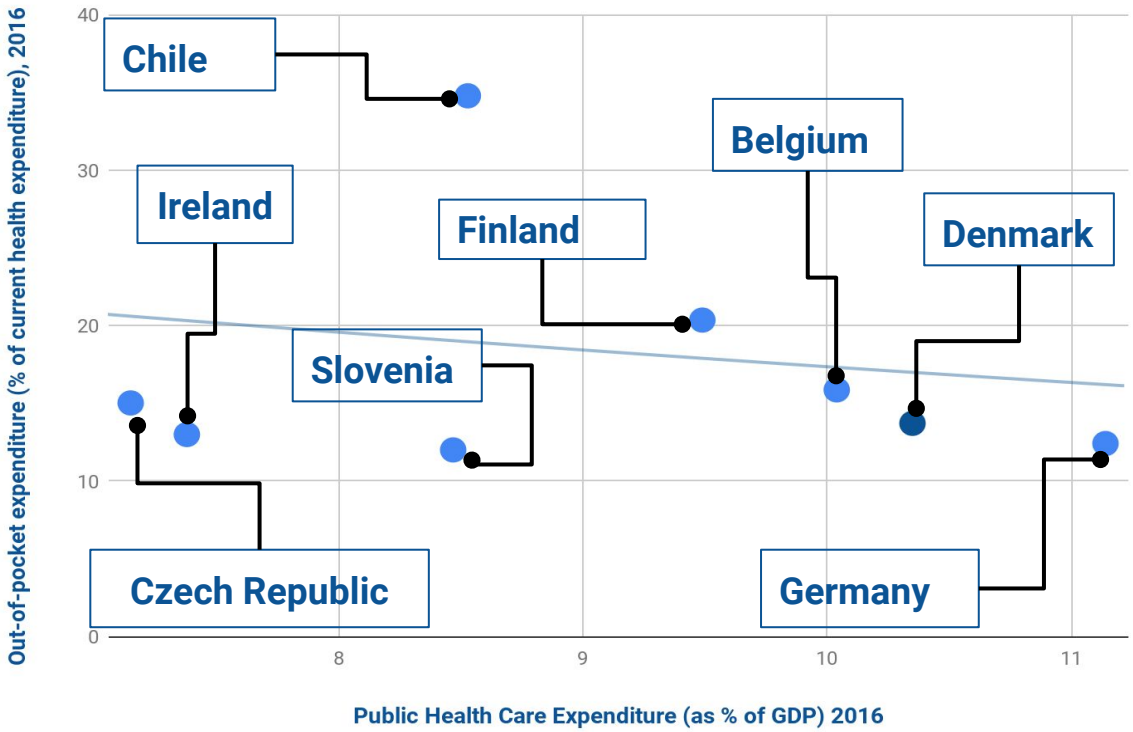
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **92**
- Human Development Index 2016: **0.93**
- E-Government Development Index 2016: **0.85**
- Corruption Perceptions Index 2016: **90**
- Global Gender Gap Index 2016: **0.75**
- Democracy Index 2016: **9.2**

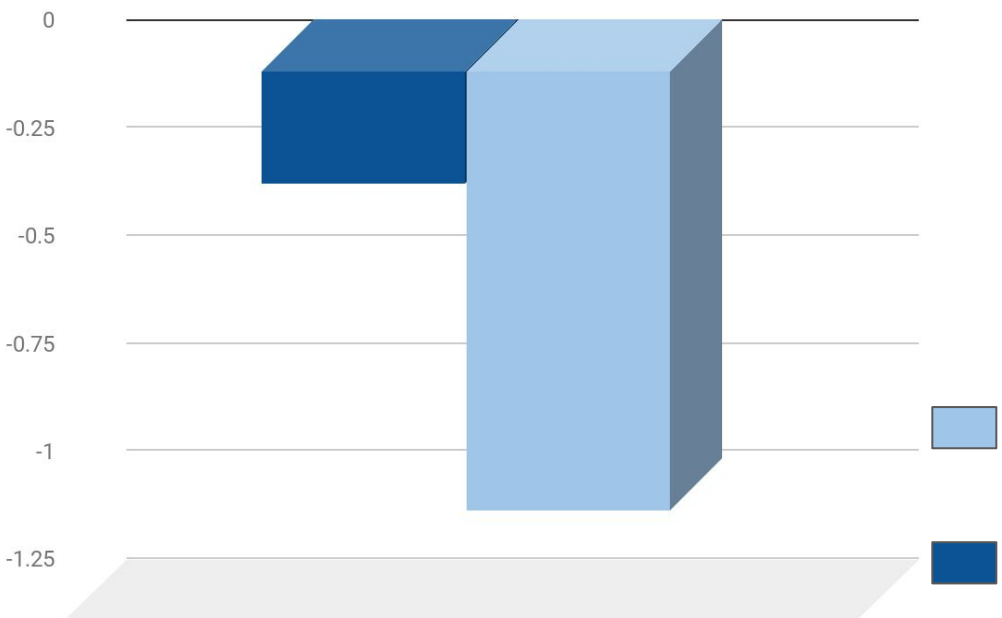
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and High Gap



Effectiveness ratios



Initiatives to reduce levels of drinking and promote healthy lifestyle in Denmark are a welcome development. The proportion of residents who report being in good health is high, although a gap exists between income groups that should be addressed.

SWOT Analysis of Healthcare in Denmark

STRENGTHS

- Outstanding long live expectancy for elders: at 65 women expect to leave 20 years and men 18 years more.
- Smoking rates now are among the lowest in the EU.
- Amenable mortality is almost the lowest in the EU.
- There is a low amount of unmet health needs in Denmark.
- Great reduce in mortality rates after 65 years that influenced positively the healthy longevity.
- Healthcare system is well-organized, comprehensive and composed of two levels: public and private, where public occupies 84%.
- The obesity levels are much lower than in other EU countries.

WEAKNESSES

- The life expectancy gap is still high for Denmark, only 60% of additional predicted years can be health-adjusted.
- The mortality rate due to cancer is the fourth largest in the EU and this disease remains to be the main burden for the slowdown of life expectancy improvements.
- Nearly 1 in 5 people in Denmark lives with hypertension and 1 in 12 lives in chronic depression.
- Waiting periods for some diagnostic procedures can be long enough.
- OECD ranked Denmark's healthcare system 34th.

OPPORTUNITIES

- The great amount of General Practitioners that provide the effective services (91% compared to the OECD average) for the population and provide an accessible basic medical coverage.
- Healthcare system is effective in treating life-threatening conditions.
- Vast opportunities to finance implementation of AI and other advanced technologies in the healthcare such as robotics in surgery, 3D-printing, smart biomarker panels.
- Modernization of hospitals and other medical facilities with focus on prevention.

THREATS

- 1 in 6 is aged 65 years and suffer from NCDs such as diabetics, arthritis or depression and are used to apply to healthcare system.
- Ischemic heart disease, stroke and Alzheimer's disease and lung cancer are the main reasons of deaths in the elder years.
- Low back pain, diabetes, falls and headache disorders are the main causes of the disability-adjusted years.
- The main diseases burden in Denmark remains to be NCDs including musculoskeletal and depressive disorder.
- 37% of Danish people report to have a regular heavy alcohol consumption.

Analysis of Strengths and Weaknesses of Health Care System in Denmark

- Low disparities in access to healthcare system across different income groups.
- Broaden use of advanced technologies with focus on cost reduction and rise of efficiency.
- Out-of-pocket expenditures on health are relatively low and are just 19% of total expenses.
- There is a Danish Patient Compensation Association for control of the provision of the services and dealing with complaints.
- In 2016 the government has launched the special programme with investments of EUR 40.2 million dollars in elderly care.
- Physical activity among adults is higher that the EU average as it was reported that almost 80% of people are involved in at least moderate activity.

- High disparities in educational level: people with lower level of education are nearly 30% more likely to suffer from asthma and 2.5 more likely to have diabetics.
- The number of doctors is increasing with lower pace compared to other EU countries. That cause disproportions between unmet needs and growing population.
- There is a gap in well-being across different income groups: 82% of people with high income report to feel healthy, while in low income group there are only 68% of people that feel good.
- 30% of diseases in Denmark are caused by the behavioural risk factors such as smoking, drinking, eating of the unhealthy food and lack of physical activity.
- 40% of adolescents were drunk at list twice in their life due to the data of the 2013 year.
- 14% of population were obese in 2014 and this indicator increased if to compare with 2000.
- Low physical activity among 15-year-olds is a great concern for Denmark as only 12% were involved in some activities.

Recommendations for Denmark

- **Devise a strategic plan focused on elderly health status and reduction of disability-adjusted years.** To boost healthy longevity and bring more productive and effective years government should focus on the slow-motion disaster of non-communicable diseases.
- **More focus on elderly support and social inclusiveness.** Increasing demand for age-friendly services and products creates both challenges and opportunities for the government and business. Aging causes pressure on the national budget and stability of the economy. On the other hand, aged people are becoming the "seventh continent", so businesses should adjust their strategies in the long-term perspective.
- **Attract more innovation-focused investments in healthcare.** It is vital for every economy to expand the usage of advanced technologies with focus on cost reduction and rise of efficiency.
- **Reducing obesity with a focus on elimination its negative impact on health.** Rising obesity is one of the most harmful behavioral risk factors. It can be attributed to burden cardiovascular diseases and a great number of deaths in the elder years.
- **Utilising opportunities of Artificial Intelligence and Machine Learning in healthcare.** Denmark is one world's most eHealth-ready countries, it has a strong culture for partnerships between the public and private sector. The country ranks number one in the world for the IT systems in our hospitals and general practice surgeries and for digital communication between healthcare sectors. Advanced health research and development is supported at national, regional and municipal level.
- **Popularization of healthy way of life.** Initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of behavioral factors.

Estonia

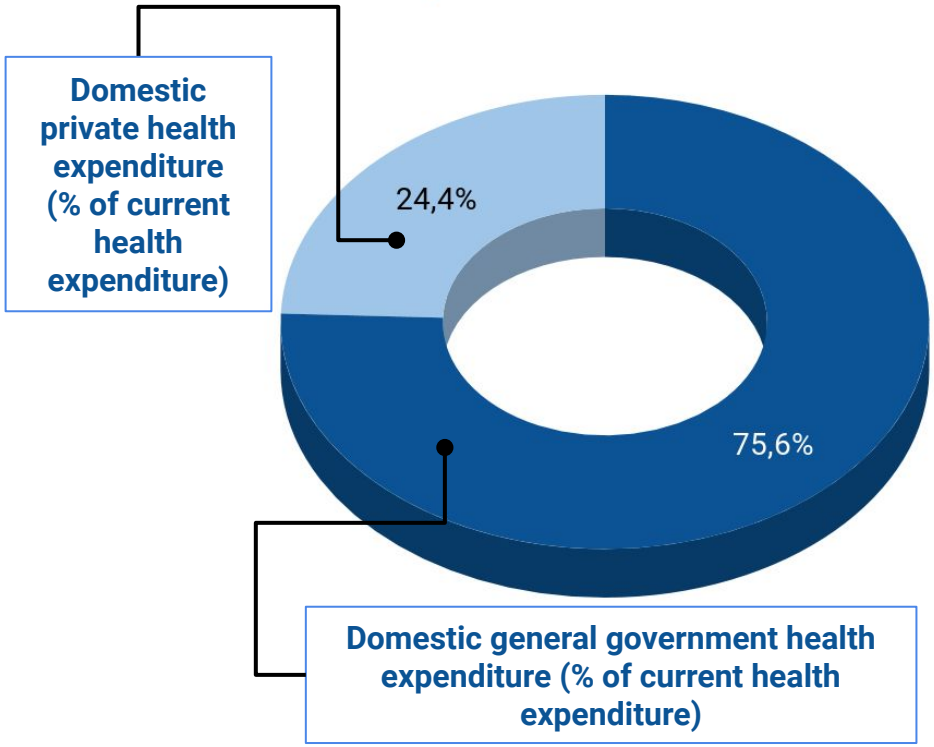
General metrics

HALE	Both Sexes HALE (2016)	68.2 years
	HALE/Life Expectancy Difference 2016	9.6
Economy	GDP per Capita, Current Prices (2016)	18.29 thousand ($)
	Annual GDP Growth (2016)	3.5 %
Healthcare	Current Health Expenditure per Capita (2016)	1.19 thousand ($)
	Public Health Care Expenditure 2016	6.68 % of GDP
Retirement	Age Dependency Ratio 2016	55
	Population over 65, 2016	19.2 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	11.6
	Annual Cigarette Consumption (Units per Capita) 2016	1759
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	55.8 % of adults

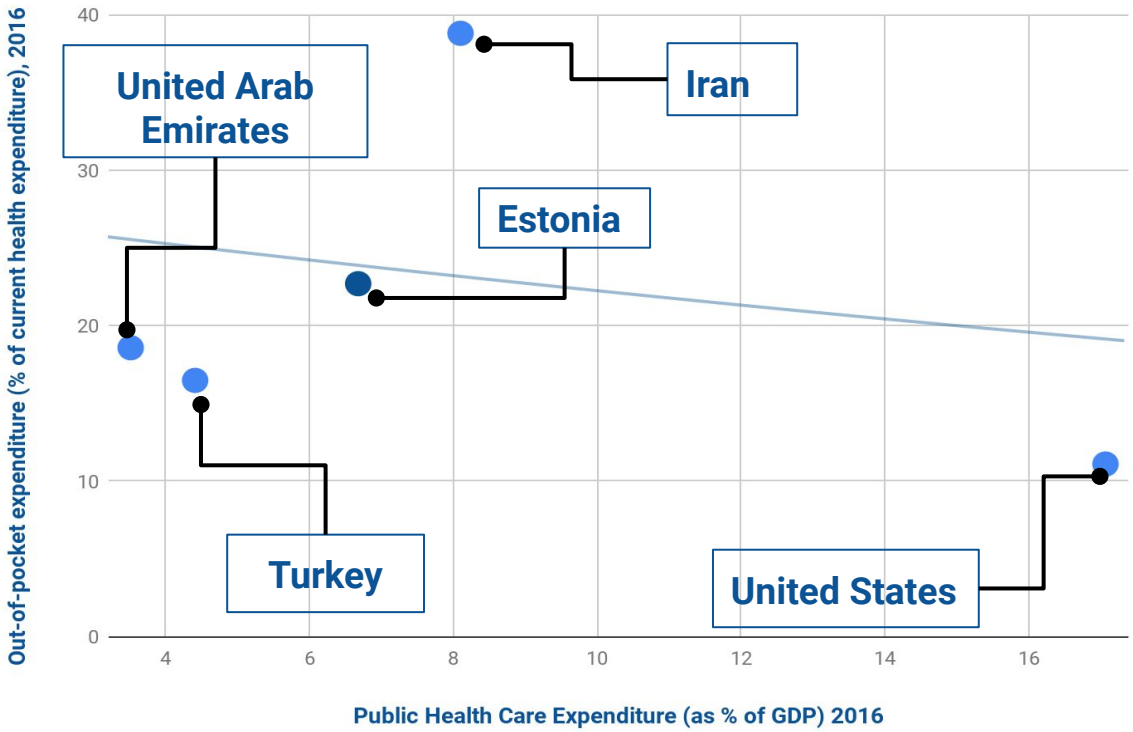
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **86**
- Human Development Index 2016: **0.87**
- E-Government Development Index 2016: **0.83**
- Corruption Perceptions Index 2016: **70**
- Global Gender Gap Index 2016: **0.75**
- Democracy Index 2016: **7.85**

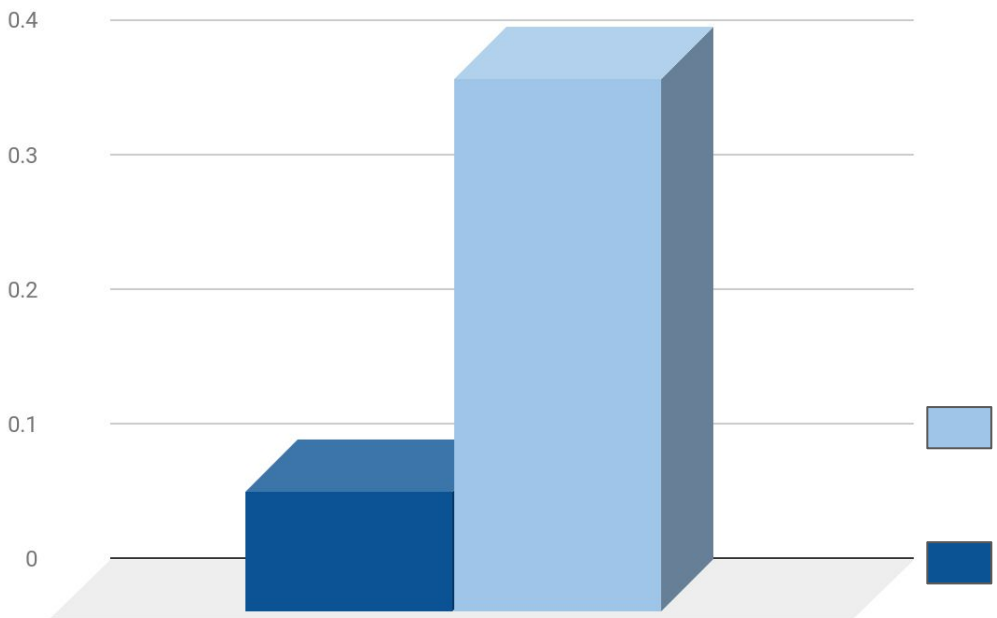
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and High Gap



Effectiveness ratios



Estonia shows the trend of increase in HALE. Estonia implements e-health solutions but digital tools should not increase existing health inequalities. Rather, they should increase equity. One way to do this is to use health data for policy making.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Estonia

STRENGTHS

- The life expectancy is relatively high (78.0 years).
- Great reductions in premature deaths from CDVs.
- Great aquirings for the elders in LE: women in 65 expect to live 20 years more and men 15 years more.
- 75% of Estonian funding of the healthcare system is governmental.
- The death rates from heart diseases and stroke fell substantially.
- Low level of infant mortality and it is 2.2 per 1000 in 2017.
- The healthcare system is generally accessible and QAH index is 85.9 for Estonia.

WEAKNESSES

- The gap between life expectancy in Estonia and the EU average is still significant.
- Level of health expenditures is 6.5% of GDP and it is significantly lower than the EU average.
- Amenable mortality is one of the highest in the EU and is greatly above the EU average.
- There is a considerable amount of unmet needs and waiting periods for some kinds of services, for example, specialized.
- Existing disparities among the different socioeconomic groups in access to the services.

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OPPORTUNITIES

- The good tendency for the disability-free years in Estonia for the past six years that reached 58.7 for females and 54.2 years for males.
- The effective utilization of the national database e-Health Record that is a very convenient platform for patients to search for and receive qualified treatments.
- The great decrease in the HIV that has come down from the onset of the epidemic at 108.1 diagnosed cases per 100 000 in 2001 to 17.4 in 2016.
- The government plan to create a wide revenue base for healthcare and enhance and maintain its sustainability.

THREATS

- Noncommunicable diseases, especially, CDVs are the main cause of deaths in Estonia including 45% of death for men and 60% for women in 2016.
- HIV infections and tuberculosis are still the greatest challenges.
- The second largest risks for Estonia is cancer counted 25.3% of deaths in 2016.
- Injuries and external causes are still the burdens for the health system of Estonia that, for example, caused 5.7% deaths in the 2016 year.
- The healthcare system is unstable because of the reliance on the payrolls from the population.

Analysis of Strengths and Weaknesses of Health Care System in Estonia

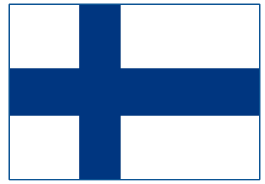
- Adults smoking rates have dropped significantly and were 24% in 2015 compared to 30% in 2000.
- Alcohol consumption per person is declining in Estonia.
- There also was a significant decline in the adoption of risk behavioural factors among adolescents.
- Overweight and obesity levels among adolescents remain to be lower than the EU average.
- The primary healthcare system is comparatively well established and effective.
- The level of vaccination coverage in Estonia is generally good and is about 95-99% of total children under 2 years.
- Estonia is an advanced country in the broader use of the digital images, e-prescriptions and e-consultations.

- There is a great number of disability-adjusted years for Estonian: women live in this state three quarters of four additionally predicted years and men live two thirds of additionally predicted years and only half of them is insured.
- The mortality rate for cancer in Estonia is nearly double high than the EU average and there was no decline in this mortality rate, it remains to be above the EU average.
- CDVs, low back and neck pain, alcohol-related disorders are the main causes for the disability-adjusted years.
- Almost a quarter of Estonians have hypertension, more than 1 in 20 have the diabetics.
- Relatively low health status of the Estonians is contributed by working and living conditions, behavioural risk factors and also low physical activity.
- The increase in obesity level was 40% in 2000-2015 and 1 in 5 Estonians is obese now.
- The levels of smoking and alcohol consumption in Estonia are still higher than the EU average.
- The number of working doctors and nurses in Estonia is starting to decrease in comparison with the EU.

Recommendations for Estonia

- **Reforming health care system.** Estonian government should address the longstanding challenge of financial sustainability of the health system by expanding its revenue base. Currently, Estonia relies predominantly on payroll contributions from the working population, which exposes the system to economic shocks and population ageing.
- **Spending more on healthcare.** The financial sustainability of the Estonian health system will be an ongoing concern, as further reforms and government initiatives should focus on the provision of additional funds to support an ageing population and tackle the increasing prevalence of chronic diseases.
- **Improve engagement of staff in healthcare.** The lack of a workforce can be the reason for waiting periods and unmet needs. So the government should put more effort to engage qualified staff into the healthcare system to cope effectively with life-threatening illnesses.
- **Shift towards disease prevention and health promotion with more focus on elderly health status.** The health promotion and disease prevention approach is one of several possible strategies to deal with the prevalence of multiple chronic illnesses or functional impairments among the elderly.
- **Utilising great opportunities for advanced technologies in health care.** The Estonian e-health system is among the world's most ambitious and clear example of why this small EU country is widely hailed as one of the most advanced digital nations on the planet. This system – which not only improves the cost-effectiveness, sustainability and efficiency of the Estonian healthcare service but also facilitates the transition to preventive, rather than curative, medicine – is underpinned by blockchain technology, a crucial pillar in ensuring the integrity and security of all patient data.
- **International collaboration on ageing.** The strategic partnership between countries would provide access to world's most successful practises for the maintenance the optimal state of health and best forms of AgeTech, WealthTech and other technologies, products, services and social policies.

Finland



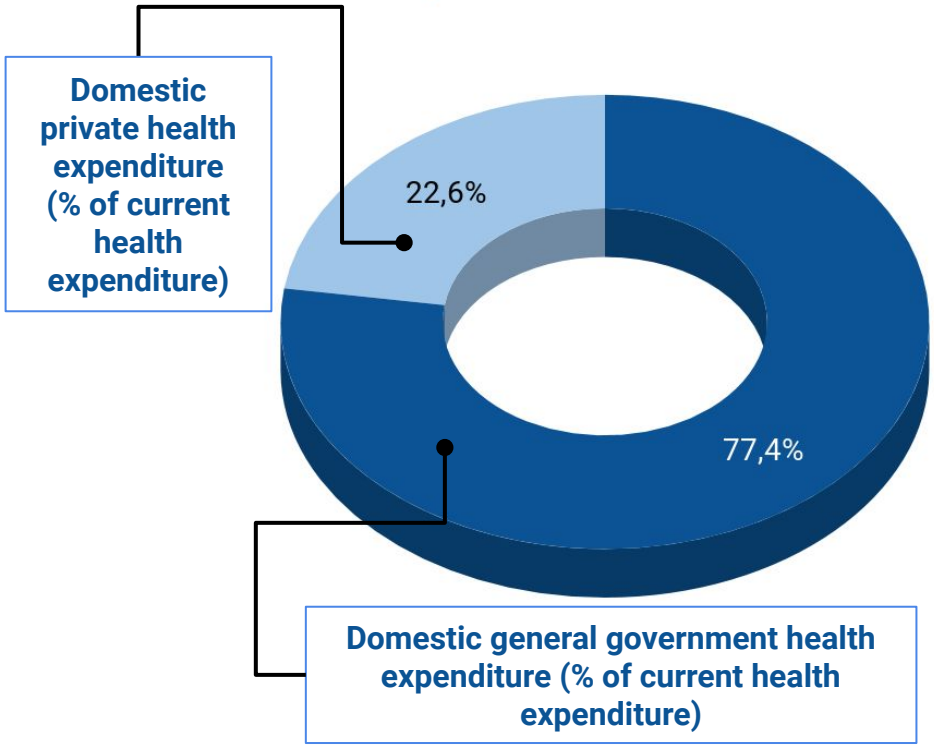
General metrics

HALE	Both Sexes HALE (2016)	71.7 years
	HALE/Life Expectancy Difference 2016	9.7
Economy	GDP per Capita, Current Prices (2016)	43.49 thousand ($)
	Annual GDP Growth (2016)	2.8 %
Healthcare	Current Health Expenditure per Capita (2016)	4.12 thousand ($)
	Public Health Care Expenditure 2016	9.49 % of GDP
Retirement	Age Dependency Ratio 2016	59
	Population over 65, 2016	20.8 %
	Number of WHO Age Friendly Cities and Communities	1
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	10.7
	Annual Cigarette Consumption (Units per Capita) 2016	1098
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	57.9 % of adults

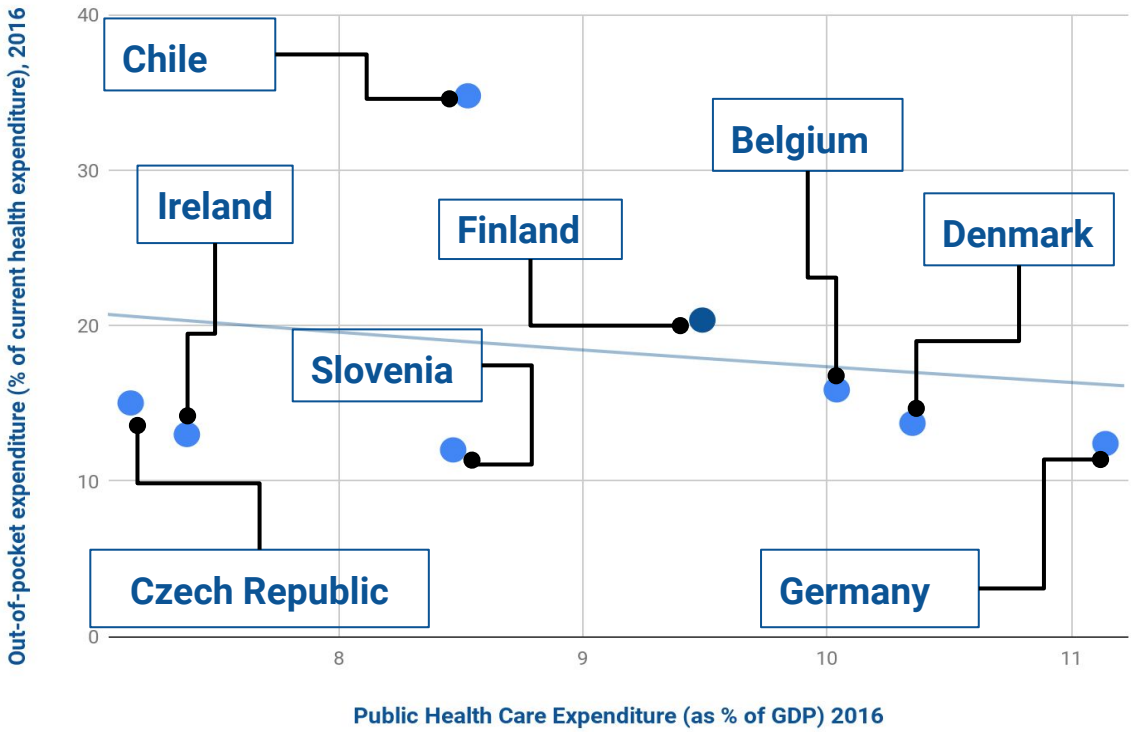
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **96**
- Human Development Index 2016: **0.92**
- E-Government Development Index 2016: **0.88**
- Corruption Perceptions Index 2016: **89**
- Global Gender Gap Index 2016: **0.85**
- Democracy Index 2016: **9.03**

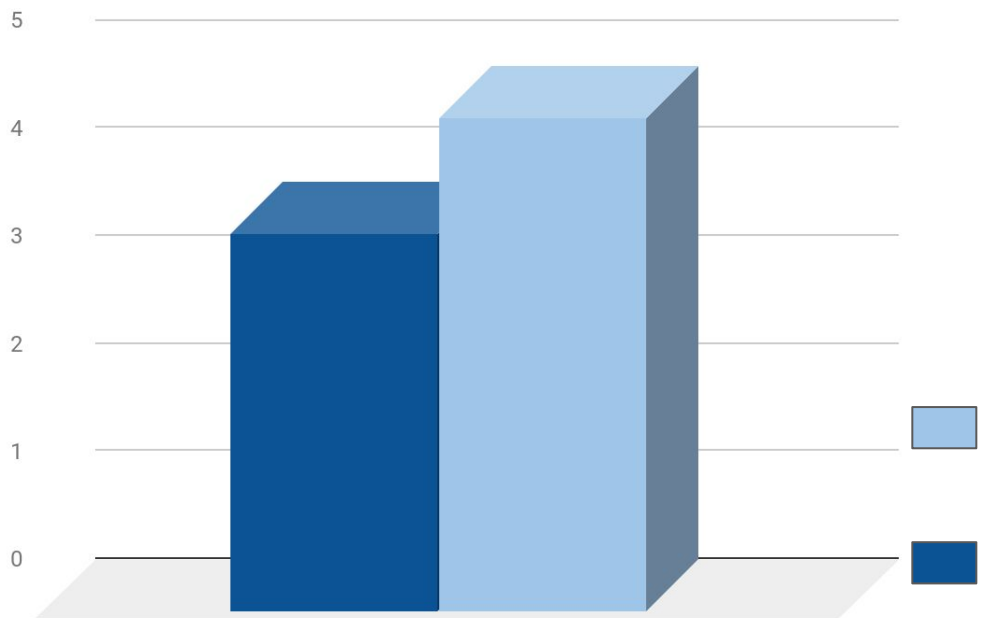
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and High Gap



Effectiveness ratios



Alcohol consumption should be considered as it remains an important public health issue in Finland, with more than one-third of adults reporting heavy alcohol consumption on a regular basis.

SWOT Analysis of Healthcare in Finland

STRENGTHS

- Life expectancy in Finland is high and now above the EU average (81.6 years).
- There was a great reduce in the mortality from cardiovascular diseases for people aged more than 65 years for the past decades.
- Relatively high spending on health in Finland that is 9.4% and is just slightly below the EU average.
- The public funding occupies the three quarters of total costs that is the relatively good amount and matches the EU average.
- Amenable mortality is lower than the EU average.
- The healthcare is generally accessible and HAQ index is 95.9.

WEAKNESSES

- The gap between HALE and life expectancy is still high: people aged 65 years and higher can live only half of additionally predicted years without a disability.
- There is a considerable amount of spending by households.
- Unmet needs for medical care in Finland are higher than the EU.
- There are disparities among the different income groups: those with lower incomes can be involved in the long waiting periods.
- Men live six years less than women and this indicator is higher than EU average.
- People aged 65 expect to live only half of additional years without disabilities.

OPPORTUNITIES

- Healthcare is focused on care delivery and successful outcomes of medical interventions.
- Increase the financial sustainability of the health system by expanding its revenue base.
- Municipalities organise many services for the elderly to make their lives easier and to enable them to live in their own homes for as long as possible.
- There is a significant reduction in waiting times for the surgery.
- A great springboard for the use of the advanced methods and technologies along with P4 medicine can create an additional force to struggle the NCDs and other diseases burdens.

THREATS

- The unemployed population have no access to occupational healthcare.
- Metabolic and behavioural factors are the main causes of the disability-adjusted years in Finland.
- Cardiovascular diseases (38% of death among women and 37% of death among men), cancer and nervous system disorders are the key reasons for the deaths among all age groups in Finland.
- An ageing population and slow-motion disaster of age-related diseases.

Analysis of Strengths and Weaknesses of Health Care System in Finland

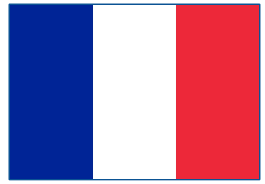
- Finnish women in age 65+ can live additionally 21.9 years and men 18.3 years and this indicator tend to grow.
- The Finnish healthcare system proposes universal coverage for the entire population including some basic service. It is a comprehensive one consisting of the decentralized three-levelled public system and less loaded smaller private sector.
- 70% of population reports to be in a good health that is higher than the EU average.
- There was a sharp decrease in the smoking rates that included the decline from 23% in 2000 to 15% in 2014 with more significant decrease in smoking for the adolescents (from 30% to 13%).
- Cancer care is generally effective in Finland: the overall mortality from cancer is among the lowest in the EU.
- The number of hospital beds has increased and the equipment became more available during the past decade.

- The rate of people died from the Alzheimer's disease and dementia has doubled for the past years.
- Ischaemic heart diseases are the main causes for death in Finland and occupied 20% of deaths in 2014.
- There was an increase in death from the liver diseases through the past years due to the heavy alcohol consumption and increase in the levels of the death from other types of cancer except lung.
- 1 in 9 people in Finland lives with asthma, more than 1 in 10 live in chronic depression and more than 1 in 12 with diabetics.
- There is a big gap in health status among different layers of the population that is connected with education and income.
- The alcohol consumption is still the great burden for the Finland because there is 34% of people that are involved in regular drinking that is significantly higher than the EU average.
- 1 in 5 of adults (18%) in Finland was obese and this rate was above the most countries in EU.

Recommendations for Finland

- **Tackle socioeconomic inequality and reduce disparity in health outcomes.** Struggling with inequalities should be key goals in Healthy Longevity plans and healthcare policies to boost longevity and bring more health-adjusted years to the Finnish population.
- **Accumulate affords to improve care delivery.** Care coordination is closely connected with the primary care that is not fully accessible for all layers of the population. Some people need to go to specialists or emergency to receive treatments that are not needed and should be provided by the primary doctors. The government should solve this problem to reduce out-pocket expenditure and minimise risks exposure.
- **Struggling with heavy alcohol consumption.** Alcohol consumption in Finland is generally the reason for most of the noncommunicable diseases that can cause early deaths. Initiatives should be focused on minimising behavioral risk factors that are key causes of most non-communicable diseases.
- **Popularisation of healthy way of life.** Strong health is a fundamental for the long life expectancy and healthy years of life. Physical exercises, balanced diet help to maintain a healthy body weight, keep sound health.
- **Utilizing advanced technologies in healthcare.** Advanced technologies can help to combat with main disease burden and reduce the bad impact of metabolic processes on health-adjusted life expectancy and can greatly elongate the life expectancy and health-adjusted years.
- **Shift from the primary to the preventive care.** This is the place where P4 medicine can be used when every person in Finland can be in authority of its health and well-being. Preventive care can also reduce the expenditure on health and make treatments more effective when the diseases can be diagnosed in early stages to cure a person quickly, mitigating risk of premature death.

France



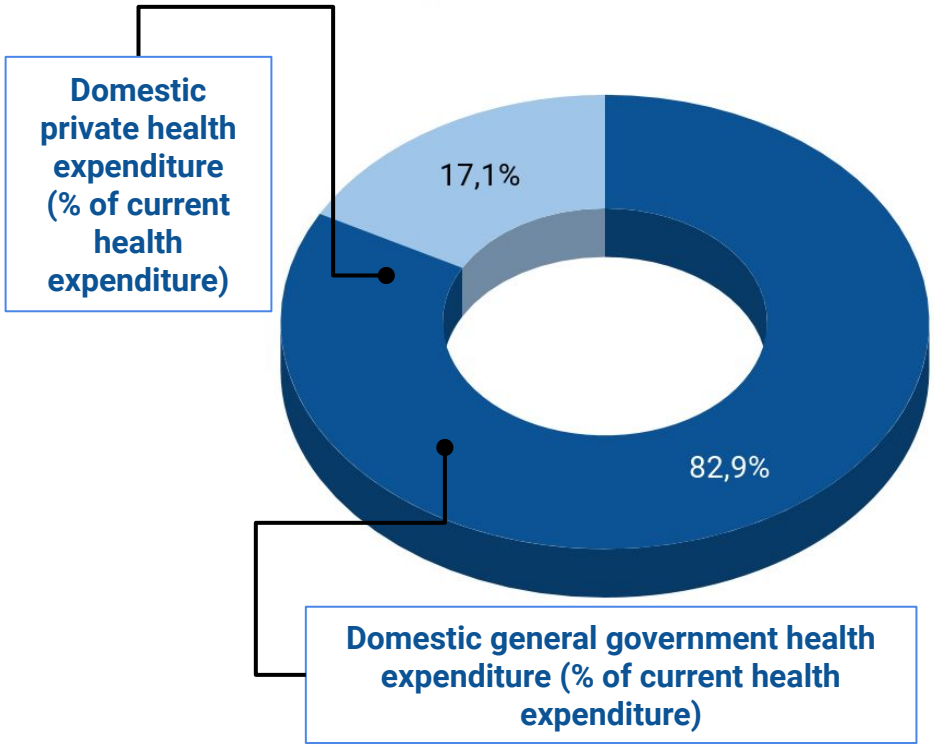
General metrics

HALE	Both Sexes HALE (2016)	73.4 years
	HALE/Life Expectancy Difference 2016	9.5
Economy	GDP per Capita, Current Prices (2016)	36.96 thousand ($)
	Annual GDP Growth (2016)	1.1 %
Healthcare	Current Health Expenditure per Capita (2016)	4.26 thousand ($)
	Public Health Care Expenditure 2016	11.54 % of GDP
Retirement	Age Dependency Ratio 2016	60
	Population over 65, 2016	19.3 %
	Number of WHO Age Friendly Cities and Communities	58
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	12.6
	Annual Cigarette Consumption (Units per Capita) 2016	1089
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	59.5 % of adults

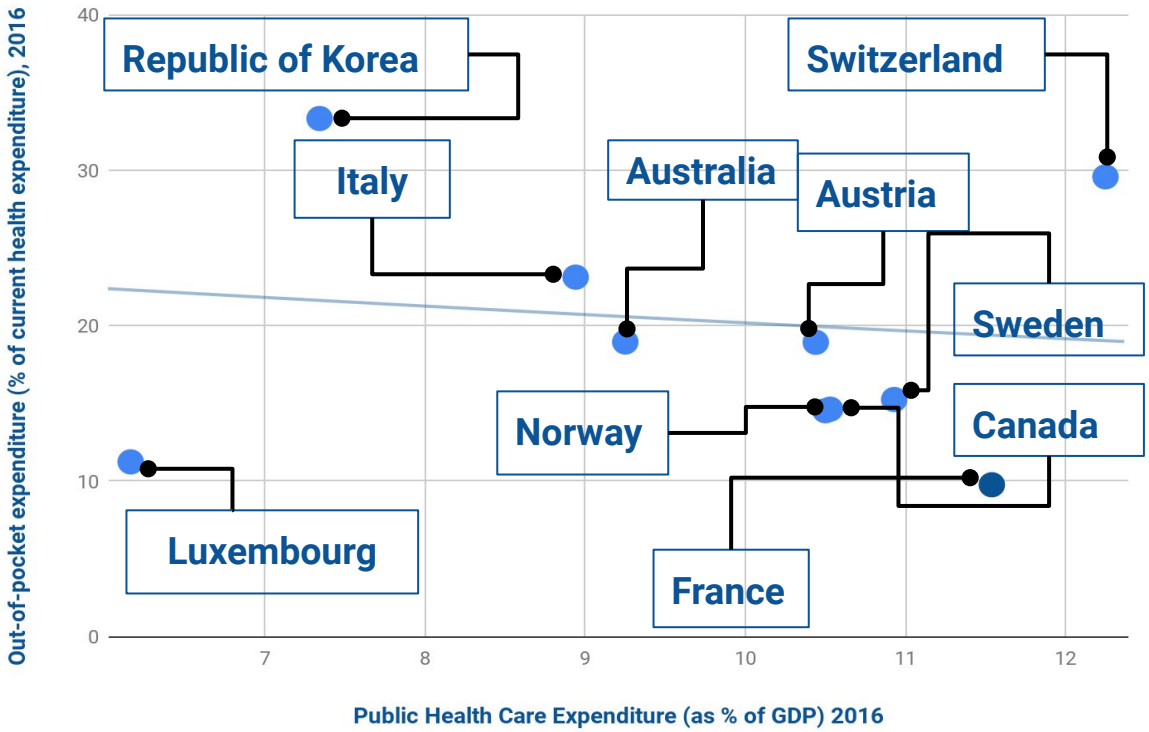
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **92**
- Human Development Index 2016: **0.9**
- E-Government Development Index 2016: **0.84**
- Corruption Perceptions Index 2016: **69**
- Global Gender Gap Index 2016: **0.76**
- Democracy Index 2016: **7.92**

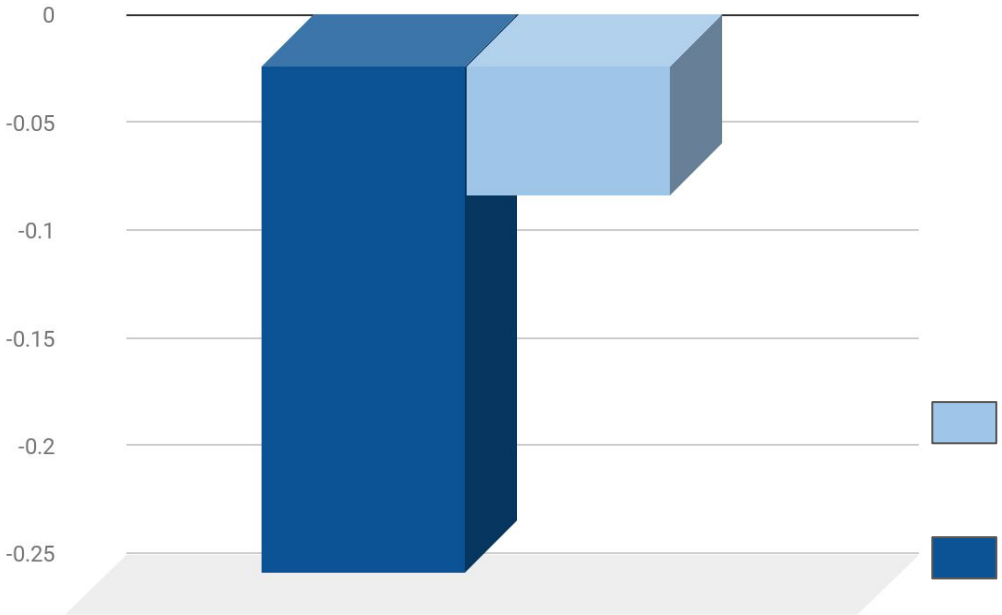
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



The main challenges are to promote prevention and healthy behaviour. Disparities of coverage across social groups suggest paying attention to coordination between universal healthcare provision and private insurance.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in France

STRENGTHS

- France has one of the best healthcare systems in the world according to the World Health Organization data.
- 76.6% of total health expenditures are publicly financed.
- The healthcare system in France is comprehensive cosistenting of two levels that include public and private one.
- The life expectancy is very high in France and reached 82.4 that is higher than the EU average.
- The share of out-of-pocket spendings is lower than among the other countries.
- Healthcare Access and Quality index is 91.7.

WEAKNESSES

- There is less than half years that elderly people can live disability free, so the LE and HALE gap is still high.
- The gender gap in life expectancy is higher than in most EU countries and is 6 years.
- Prevalence of health status inequality across different socio-economic groups.
- Only 60% of people with low income report to be healthy if to compare with 72% of people with high one and this indicators are among the lowest one in the EU.
- The distribution of doctor and specialists is uneven among the regions.

OPPORTUNITIES

- Patients can easily access the specialists compared to other countries where there are long waiting lists.
- The life expectancy is predicted to increase.
- There was a launch of modernization and streamlining of the hospitals in France.
- Great opportunities to use innovative medicine that can include progressive advanced technologies and development of P4 medicine.
- The effective well-performed governmental structure and infrastructure for the efficient regulation of the healthcare including planning and defining the strategic tasks.

THREATS

- Regular physical activity among the adolescents is much lower than in other EU countries, especially, for girls.
- There are some local disparities in the access to care that can be the threat for health of people in remote areas.
- The main reason for deaths in France is cancer that occupies the 28% of all death.
- The second important risk factor for French people is other type of NCDs - cardiovascular diseases.
- Ischemic heart diseases and others remain to be a great burden for the healthcare in France.

Analysis of Strengths and Weaknesses of Health Care System in France

- Amenable mortality in France is among the lowest in the EU and most people can survive the life-threatening conditions such as heart attack and stroke.
- More than two thirds of population in France report to be in good health (68%).
- There was a sufficient decrease in smoking and drinking in recent years.
- The proportion of adolescents have been drunk more than twice in their life is reported to be lower than in the rest of the EU countries.
- 1 in 10 French people is covered by additional complementary insurance aimed to provide access for services that are not covered by the social one.
- The benefit package of coverage is very broad.

- Musculoskeletal, mental disorders and chronic conditions are the leading causes of the disability-adjusted years in France and are their main determinants.
- 1 in 7 people in France reported leaving with hypertension, 1 in 11 live with asthma and 1 in 10 live with diabetics.
- Smoking (9%) and dietary factors (8.2%) are the main burdens for health-adjusted years among the other factors.
- 24% of adults were still smoking in 2014 that is higher than the EU average. And nearly 1 in 5 adolescents reported to smoke daily.
- The alcohol consumption in France is relatively high if to compare EU average and is 12 litres per person in year.
- More than 1 in 7 adults is now obese and that is 15% of total population that is becoming to be a growing public issue.

Recommendations for France

- **Reduce the discrepancies of medical equipment provision used in hospitals across regions.** These disparities cause unequal access to medicine in different regions and negatively affect the gap between life expectancy and health-adjusted life expectancy (HALE). Despite this concern, investment in new equipment is probably essential to achieve the need level of access to healthcare services.
- **Improve healthcare staff engagement.** For many years the French Government has vigorously applied a system of numerus clausus as an effective tool to limit the growth in numbers of health staff. However, the debate has shifted in recent years and there is now a fear of shortages of doctors, nurses and other health care professionals.
- **Tackle rising "slow-motion" disaster of non-communicable diseases (NCDs).** Management of NCDs includes detecting, screening and treating these diseases, and providing access to palliative care for people in need. High impact essential NCD interventions can be delivered through a primary health care approach to strengthen early detection and timely treatment.
- **Struggle the socioeconomic inequalities and increase access to professional medical treatment.** As it was pointed out there is a great difference in behavioural patterns and health status among different socio-economic groups. Government should work out the policy to eliminate issues concerning inequalities, provide population with the equal access to the qualitative medicine.
- **Movement from primary to preventive care.** Health care leaders must shift the nation's "sick care" approach to care that is preventive and comprehensive. "Precision health" denotes the continuous stabilization of health and the maximum-obtainable maintenance of a young biological age via the routine application of micro-interventions in response to ongoing fluctuations in biomarkers of aging and health.

Germany

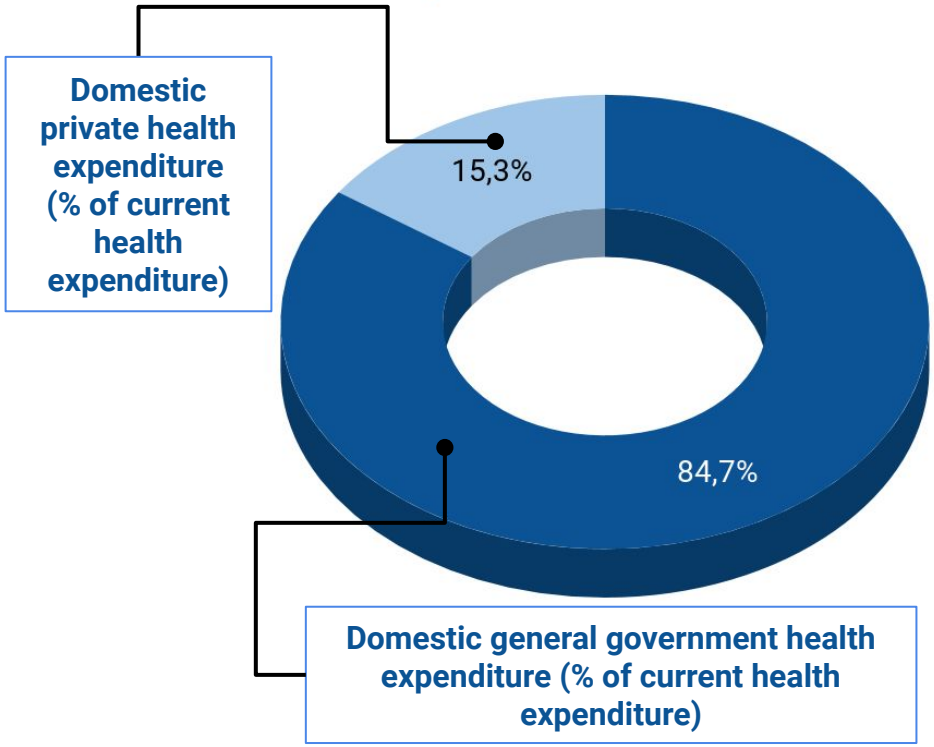
General metrics

HALE	Both Sexes HALE (2016)	71.6 years
	HALE/Life Expectancy Difference 2016	9.4
Economy	GDP per Capita, Current Prices (2016)	42.44 thousand ($)
	Annual GDP Growth (2016)	2.2 %
Healthcare	Current Health Expenditure per Capita (2016)	4.71 thousand ($)
	Public Health Care Expenditure 2016	11.11 % of GDP
Retirement	Age Dependency Ratio 2016	52
	Population over 65, 2016	21.3 %
	Number of WHO Age Friendly Cities and Communities	1
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	13.4
	Annual Cigarette Consumption (Units per Capita) 2016	1599
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	56.8 % of adults

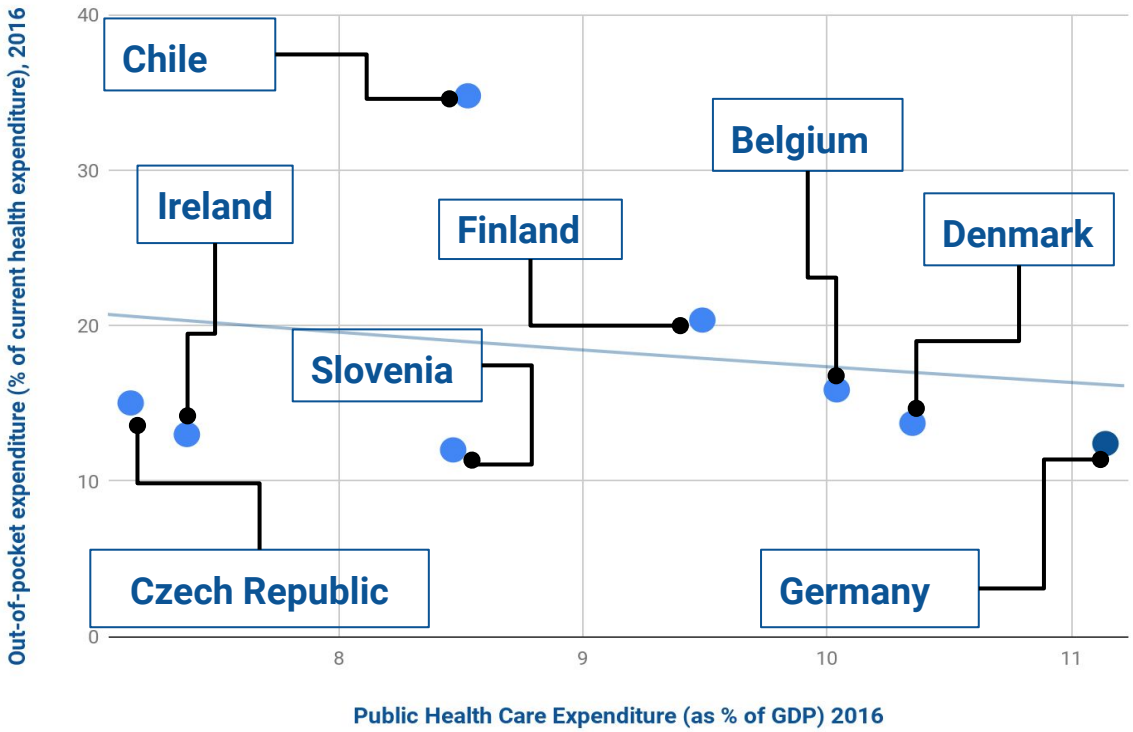
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **92**
- Human Development Index 2016: **0.93**
- E-Government Development Index 2016: **0.82**
- Corruption Perceptions Index 2016: **81**
- Global Gender Gap Index 2016: **0.77**
- Democracy Index 2016: **8.63**

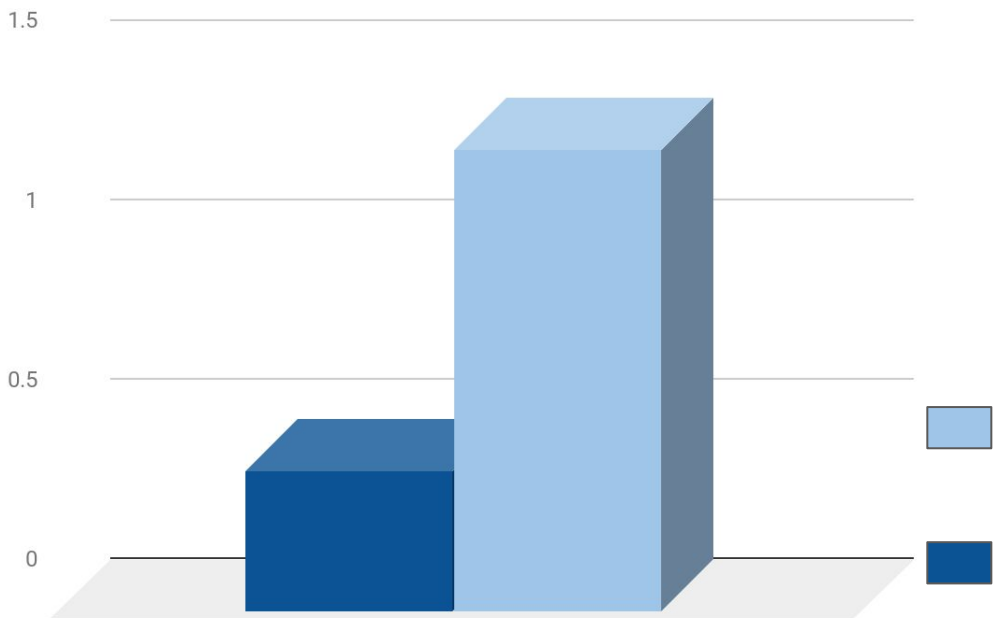
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and High Gap



Effectiveness ratios



A balanced diet and sufficient physical exercise are important aspects of a health-promoting lifestyle in Germany. They can help to prevent the occurrence of obesity, lipid metabolic disorder and hypertension.

SWOT Analysis of Healthcare in Germany

STRENGTHS

- High life expectancy at a birth (80.7 years) that is slightly above the EU average.
- The number of hospital beds in Germany is higher than in other OECD countries.
- Great spending on health per capita that is 11.2% of GDP and is the second highest in the EU.
- Amenable mortality is below the EU average.
- The level of services in Germany is high.
- There is a high level of public expenditures on the health - 84.5% - one of the highest in Europe.
- Developed preventive medicine subsector and qualified staff.

WEAKNESSES

- Uneven distribution of doctors and specialists
- Self-employed people with low income and migrants have the limited access to the benefits of social insurance in comparison with other citizens.
- Only 60% of additionally prognosed years (21.0 for female and 17.9 for male) German people can live disability free that is low amount.
- There are certain disparities in different income groups - people with lower education and income are twice as tend to live with diabetics and on 30% more likely to have asthma and adopt risky behavioural factors.

OPPORTUNITIES

- The above OECD average amount of doctors and other personnel that is well-trained and qualified.
- There are considerable resources for enhancing and maintaining the healthcare system in Germany that include financial, human and organizational ones.
- There are big numbers of hospitals and physician and well trained nurses for providing the qualitative services to population.
- Investments in R&D in era of advanced medical treatment and disruptive technologies.

THREATS

- Ageing of medical workforce (42% of doctors are more than 50 years old) can lead to the shortage of healthcare personnel in the future.
- Expensive pharmaceuticals products.
- CDVs (cardiovascular diseases) (42% of deaths for women and 35% of death for men) and cancer (23% of deaths for women and 29% for men) are the leading causes of the death in Germany.
- The number of deaths from dementia is increasing.

Analysis of Strengths and Weaknesses of Health Care System in Germany

- The alcohol consumption has declined rapidly in recent years and relatively with faster pace than in other EU countries.
- The proportion of drinking adolescents is slightly lower than in the EU and tend to decline through the years.
- The smoking rates for adolescents had been falling greatly for the past two decades - from 34% in 2000 to 15% in 2014.
- Relatively good amount of adults in Germany is involved at least in the moderate activity.
- The life expectancy gap between eastern and western regions began to narrow and is predicted to decrease.
- The number of hospital beds in Germany is higher than in other OECD countries.

- Musculoskeletal, dementia and mental health disorders contribute a lot to the disability-adjusted years.
- Heart diseases and strokes are the huge burden for the death and DALY.
- 1 in 16 people live with asthma and 1 in 10 live with chronic depression.
- Lower proportion of the population reports to be in good health compared to the EU average - only 65%.
- 1 in 3 adults in Germany reports to be involved in the bridge drinking.
- There is a large proportion of smoking adults - one quarter of Germans are smoking regularly for men and 1 in 6 women are smoking daily.
- The prevalence of obesity has been increased for the past years sharply and the level of obesity is now bigger than in the EU.
- The bad impact of high blood pressure, body mass index and high fasting plasma glucose on DALY has increased.

Recommendations for Germany

- **Enable patient-centered care with information technology systems.** Embracement of technology in health care will lead to personalization and improvement of the quality of medical care through close coordination between patients, caregivers, and professionals.
- **Strengthening disease prevention and health promotion with a focus on non-communicable diseases** remains an issue. Favourable living conditions in Switzerland, such as good housing conditions, a high-quality education system and low rates of unemployment contribute to healthy living conditions.
- **Move to a life-course perspective in tackling the rising epidemic of "metabesity."** Initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of behavioral factors such as insufficient physical ability, overweight, alcohol abuse, smoking. This will stimulate policy initiatives that supplement income and improve educational opportunities, housing prospects, and social mobility as income is strongly associated with morbidity and mortality.
- **The strengthening of incentive mechanisms for the research and development of new antibiotics.** Representatives of the public health institutes within the human and veterinary medicine sector in partnership with government authorities should joint effort to tackle antibiotic resistance.
- **Provide incentives for development of patient-centered treatments.** Strengthen prevention and health promotion across all areas of life including day-care centres, schools and nursing homes, strengthen workplace health promotion and better integrate it with occupational safety and health.
- **Focus on elderly healthcare status through utilizing opportunities of Artificial Intelligence for precision health**. Novel methods of using AI to optimize psychological wellness, social activity, promote neuroplasticity and combat loneliness and social isolation among elderly.

Greece

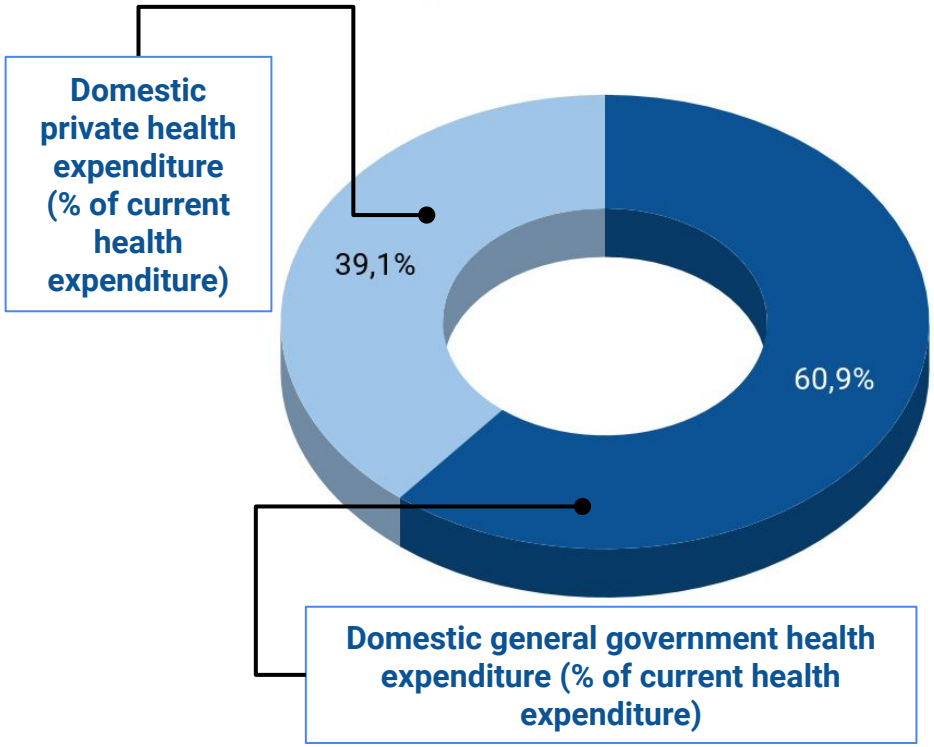
General metrics

HALE	Both Sexes HALE (2016)	72 years
	HALE/Life Expectancy Difference 2016	9.2
Economy	GDP per Capita, Current Prices (2016)	18.12 thousand ($)
	Annual GDP Growth (2016)	-0.2 %
Healthcare	Current Health Expenditure per Capita (2016)	1.51 thousand ($)
	Public Health Care Expenditure 2016	8.45 % of GDP
Retirement	Age Dependency Ratio 2016	53
	Population over 65, 2016	20.2 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	10.4
	Annual Cigarette Consumption (Units per Capita) 2016	2078
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	62.3 % of adults

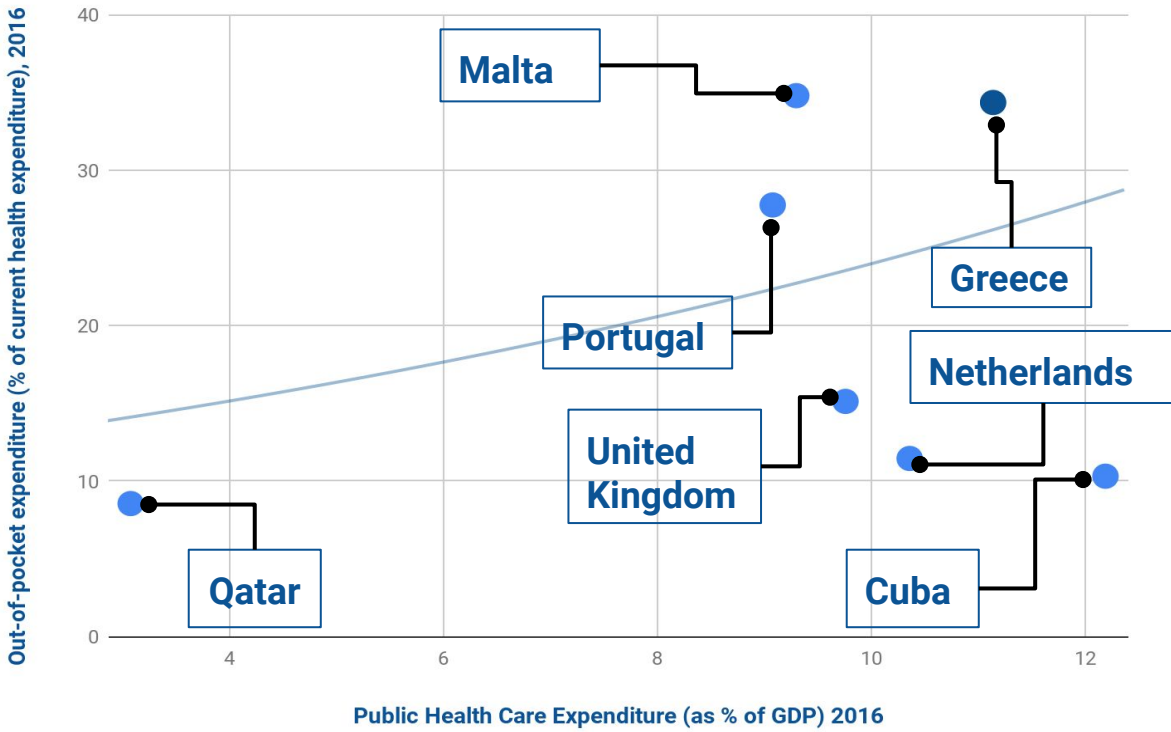
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **90**
- Human Development Index 2016: **0.87**
- E-Government Development Index 2016: **0.69**
- Corruption Perceptions Index 2016: **44**
- Global Gender Gap Index 2016: **0.68**
- Democracy Index 2016: **7.23**

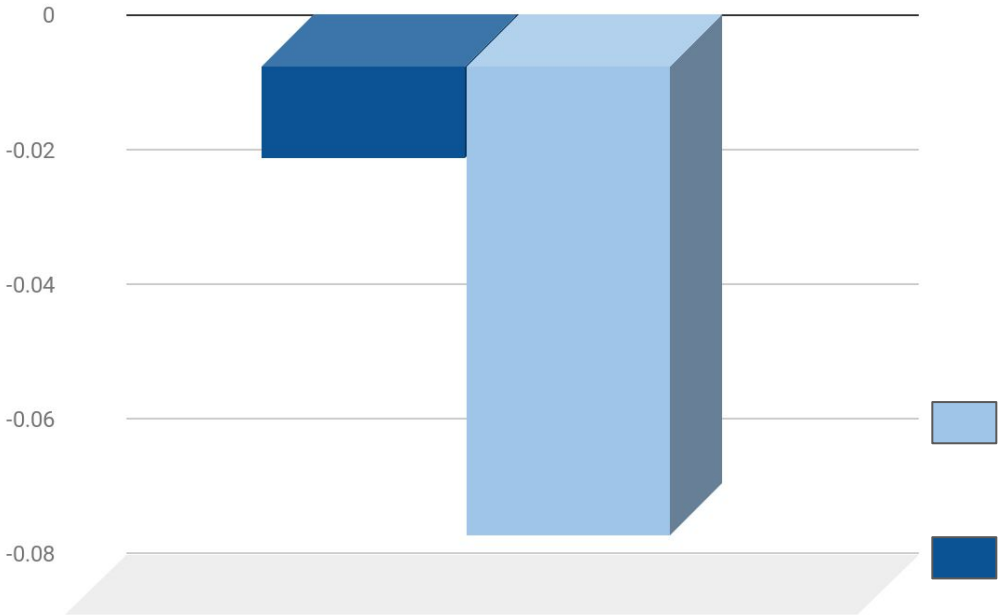
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Medium Gap



Effectiveness ratios



Creating an effective network of primary care services is one of the most urgent priorities to respond effectively to the needs of population and reduce overcrowding of emergency departments and unnecessary hospital admissions. Universal health coverage can be financially sustainable, to finance public spending.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Greece

STRENGTHS

- The healthcare system is comprehensive and mixed and consist of social insurance and central financing of the National Health System.
- Relatively low infant mortality.
- The amount of doctors per population is high (6.3 per 1000 population).
- The amenable mortality has fallen steadily through the past decades.
- The healthcare system is generally accessible and the HAQ index is 90.4.
- Life expectancy is high and is 81.5 years.

WEAKNESSES

- Healthcare system is unjustifiably centralized.
- The universal coverage for basic services is provided only for 83% of population.
- There are long-time delays and waiting times to see the doctor on day.
- Out-of-pocket spendings on health are 33% of the total spending on health in Greece.
- Poor continuity of care, excessive use of curative services, lack of preventive measures, low levels of satisfaction.
- Significant inequalities in the range and quality of health services.

OPPORTUNITIES

- There is a great amount of specialists in Greece per population.
- National strategy for primary health care. Greece should address chronic diseases, which account for 70% of our disease burden.
- The governmental programmes that are aimed to bring not only effectiveness to the healthcare but transparency and accountability through struggling with corruption and bureaucracy.
- Lots of deaths can be eliminated by the development of preventive care.

THREATS

- Economic instability, high level of real unemployment and inflation make healthcare affordable.
- Bad impact of the economic crisis has led to the decline in the healthcare expenditure. Per capita spending has fallen since 2009, when it was EUR 2 287, to EUR 1 650 in 2015.
- Ischaemic heart disease, stroke and lung cancer continue to have a major impact on mortality.
- 27% of adults smoked everyday in 2014 that is higher than in the EU.

Analysis of Strengths and Weaknesses of Health Care System in Norway

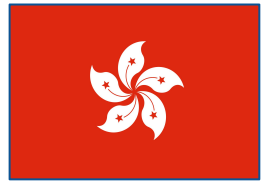
- Children's vaccination is very good and is above the 96%.
- Greece has one of the lowest rates of heart disease in the world, which is largely attributed to their diet, which includes lots of garlic, olive oil and red wine.
- Alcohol consumption has declined and is significantly below the EU average.
- There was a 14% decrease in deaths from cardiovascular diseases - the major causes for deaths in Greece.
- The hospitals in the more metropolitan areas are of excellent standards. Pharmacies and medications are of good quality with highly trained pharmacist. Medicines are also highly subsidized since only 25% of the actual cost of the prescriptions is charged. Emergency care is provided free of charge in public hospitals to anyone, regardless of nationality.

- There is a little coordination between primary care providers and hospital doctors.
- There are no regular cancer screening programmes in Greece
- Failed attempts of the government to reduce the smoking rates.
- There is a lack in quality assurance of the effective functioning of the healthcare in Greece.
- Two-thirds of the additionally predicted years for elders are spent with the disability.
- A quarter of 15-year-old adolescents is overweight or obese.
- Currently, only 59% of health spending is publicly funded that is greatly below the EU average indicator.
- Cancer causes 20% of death among women and 30% deaths among men.
- There was a notable increase in suicides after the start of economic crisis.
- Poor continuity of care, excessive use of curative services, lack of preventive measures, low levels of satisfaction and high out-of-pocket expenditures.

Recommendations for Greece

- **Tackling poverty and socio-economic inequality.** Boosting economic growth and investment to create jobs, improve the stability of public finances and provide an effective social safety net are crucial to help Greece recover from the profound social costs of the economic crisis.
- **Ensuring adequate funding for the health system.** Reducing the high levels of out-of-pocket spending on health is vital for affordable healthcare treatment. Greece should reduce corruption in healthcare and provide incentives for development of public-private partnership between healthcare providers.
- **There is a need to develop this focus into longer-term strategic reforms that enhance efficiency while guaranteeing the delivery of health services and improving the overall quality of care.**
- **Create mechanisms that allow adequate planning and allocation of physical and human resources.** Generally speaking, resources are unevenly distributed across the country, with a much higher concentration of health services and medical equipment in large cities compared with rural areas; private facilities are also largely located in urban centres.
- **Addressing the challenge of weak primary care system.** Public health services have taken a back seat in favour of the development of secondary care services. The services that are delivered rarely engage in prevention, health promotion, social care and rehabilitation. The primary care system has not been developed fully, and patients face problems with access, continuity of care and coordination as well as comprehensiveness of services. A mix of public and private providers delivers ambulatory care.
- **Creating an effective network of primary care services.** It is one of the most urgent priorities to respond effectively to the needs of population and reduce overcrowding of emergency departments and unnecessary hospital admissions. Universal health coverage can be financially sustainable, to finance public spending.

Hong Kong, SAR



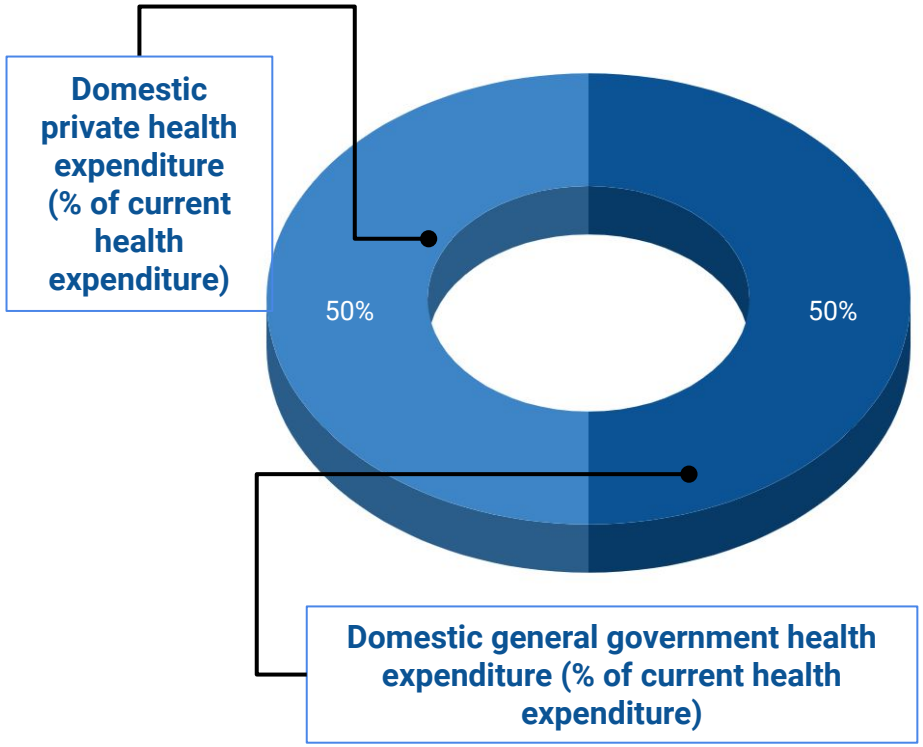
General metrics

HALE	Both Sexes HALE (estimated) (2016)	75.8 years
	HALE/Life Expectancy Difference 2016	8.2
Economy	GDP per Capita, Current Prices (2016)	43.7 thousand ($)
	Annual GDP Growth (2016)	2.2 %
Healthcare	Current Health Expenditure per Capita (2016)	- thousand ($)
	Public Health Care Expenditure 2016	6.0 % of GDP
Retirement	Age Dependency Ratio 2016	40
	Population over 65, 2016	15.8 %
	Number of WHO Age Friendly Cities and Communities	1
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	2.86
	Annual Cigarette Consumption (Units per Capita) 2016	-
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	38.8 % of adults

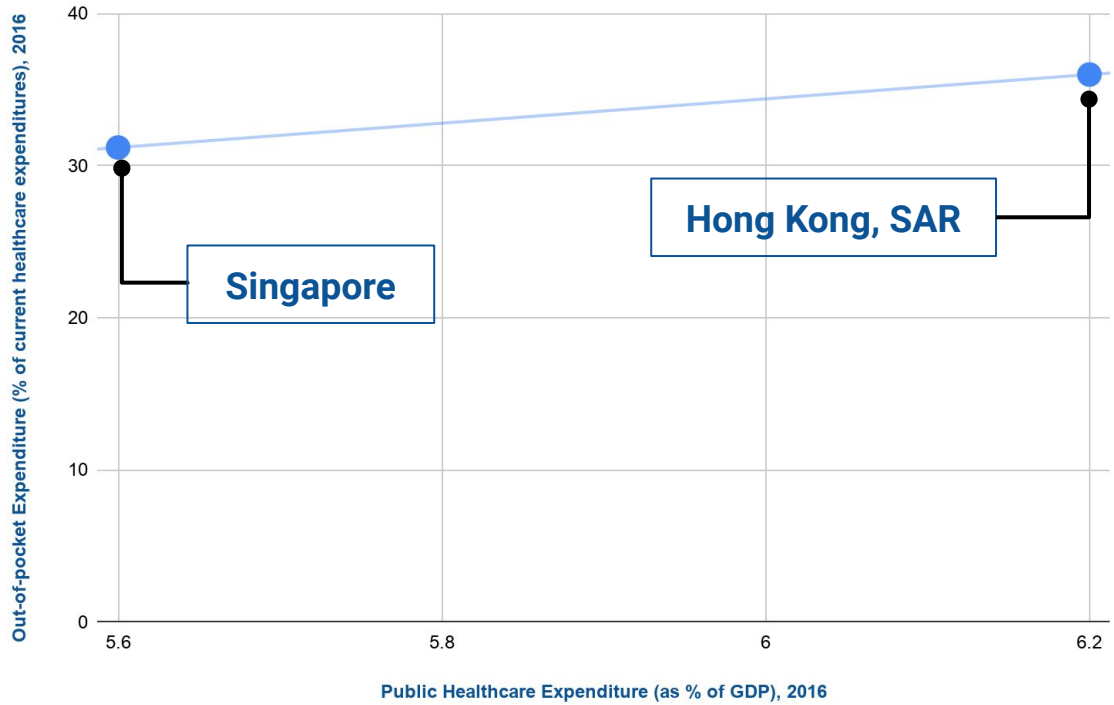
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **89.5**
- Human Development Index 2016: **0.930**
- E-Government Development Index 2016: **-**
- Corruption Perceptions Index 2016: **77**
- Global Gender Gap Index 2016: **-**
- Democracy Index 2016: **0.65**

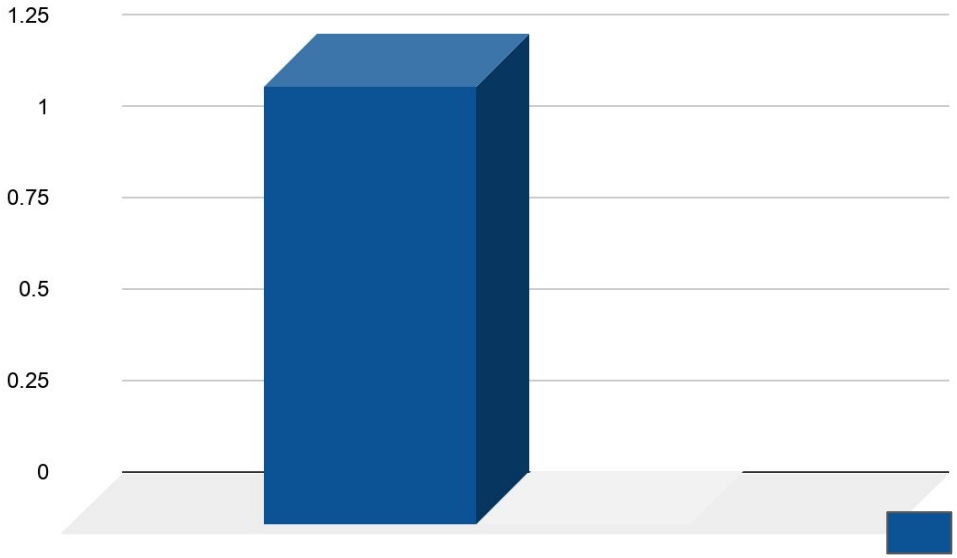
Current Healthcare Expenditure



Countries with high HALE and Life Expectancy and Small Gap



Effectiveness Ratio



To improve health and wellbeing of people living in Iceland government policies should be focused on obesity, tobacco, healthy workplaces, child wellbeing. eHealth initiatives should meet the needs of the aged population.

LE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Hong Kong

STRENGTHS

- Healthcare system is known for its quality and efficiency, and the healthy population it serves.
- Life expectancy is one of the highest in the world. According to the Department of Health in Hong Kong, life expectancy has reached 81.9 years for males and 87.6 years for females in 2017.
- Infant mortality rate and maternal mortality rate are among the lowest in the world.
- People in Hong Kong are able to enjoy public healthcare services at highly subsidised rates.
- WHO Age-friendly city

WEAKNESSES

- Long waiting times for non-emergency procedures (e.g. cataract surgery, joint replacement surgery)
- Heavy workloads for clinical staff
- Very expensive private system; prices vary greatly depending on doctors' reputation and location.
- High level of prevalence of overweight among adults (38.8% in 2016)
- High level of out-of-pocket expenditure in Hong Kong (36% of current healthcare expenditure) indicates limited access to high-quality preventive services and diseases treatment.

OPPORTUNITIES

- Provision of subsidies to reduce disparities and obtain treatment at private primary care providers.
- Building a sophisticated national electronic health record system, that collects, reports, and analyzes information to aid in formulation of policy, monitoring of implementation, and sharing of patient records.
- Utilizing their strength in the artificial intelligence industry for meaningful improvements in medical care.
- International partnership on Healthy Longevity.

THREATS

- Increasing service demand and staff shortages are leading to an inadequate health service delivery with long waiting times for certain procedures
- Public clinics, with their limited scale, are not able to provide care to patients with lower socio-economic status, thus increasing their risk of hospitalisation.
- Rising burden of non-communicable diseases: six types of non-communicable diseases, namely, cancers, diseases of heart, cerebrovascular diseases, chronic lower respiratory diseases, injuries and poisoning, and diabetes mellitus, accounted for 59.3% of all registered deaths in Hong Kong in 2017.

Analysis of Strengths and Weaknesses of Health Care System in Hong Kong, SAR

- Life Expectancy in Hong Kong is 84.6 years in 2018.
- Improved medical treatment, diet, resilience, adaptability, healthy lifestyles and technology contribute to longer lifespan.
- The government has established an electronic health record refers to a record in electronic format containing health-related data of an individual.
- There private digital initiatives to help shape its healthcare delivery model, optimise resources, and ultimately benefit society.
- The concept of age-friendly city has high level political commitment.
- The government provides public healthcare services free of charge or for a small fee.

- The major contribution to the improvement in life expectancy in Hong Kong for both males and females was mainly attributable to the older population.
- Private health insurance is one of the most expensive in the world. It is essential to have a good private medical insurance. The private clinics have their own market value and often charge their clients higher rates.
- Hong Kong had been relying on the supply of foreign-trained.
- Noncommunicable diseases have become the major disease burden, infectious diseases such as tuberculosis, hepatitis, and schistosomiasis are still the major health problems in poor rural areas. The prevalence of noncommunicable diseases such as cancer, diabetes and cardiovascular disease.
- Hong Kong population experiencing an accelerating ageing trend.
- Fertility rate is decreasing.
- High burden of mental illnesses that significantly contribute to DALY (Disability-adjusted years)

Recommendations for Hong Kong, SAR

- **Large focus on delivery of care that on insurance.** Primary care services are of limited access due to high prices. The health authorities should focus on delivering healthcare services in Hong Kong in line with a more holistic view of health.
- **Improve engagement of staff in healthcare.** The role of health professionals within a paradigm of the social model of health could be the key for improved healthcare services in general, as well as access to healthcare for the population. Even in a public health system as efficient as Hong Kong's, access might increasingly be at risk due to staff shortages, issues related to health insurance coverage, and increasing waiting lists for certain procedures (timeliness).
- **Health system re-orientation towards the changing epidemiological landscape**. The increasing burden of noncommunicable diseases highlights the need to move from sick treatment to prevention of chronic conditions. It requires patients' participation and high health consciousness.
- **Support healthy and disease-free lifestyles with emphasis on health status of elderly.** Promoting healthy, disease-free aging must be a central priority for Japan, and attention must also be paid to the potential for rising rates of risky health behaviour, alcohol consumption and even rates of obesity.
- **Manage to maintain modest overall spending.** Hong Kong should developed portfolio of targeted tools to address specific problems to respond to aging in the coming years. The coordinated use of these tools ensures that healthcare providers compete on affordability and quality, and that total costs remain relatively low.
- **Develop novel financial systems.** It will be necessary for novel financial systems to be developed which monetize Healthy Longevity, and repeatedly reinvest in the technologically-reinvigorated working population, if they are to survive the silver tsunami.

Iceland

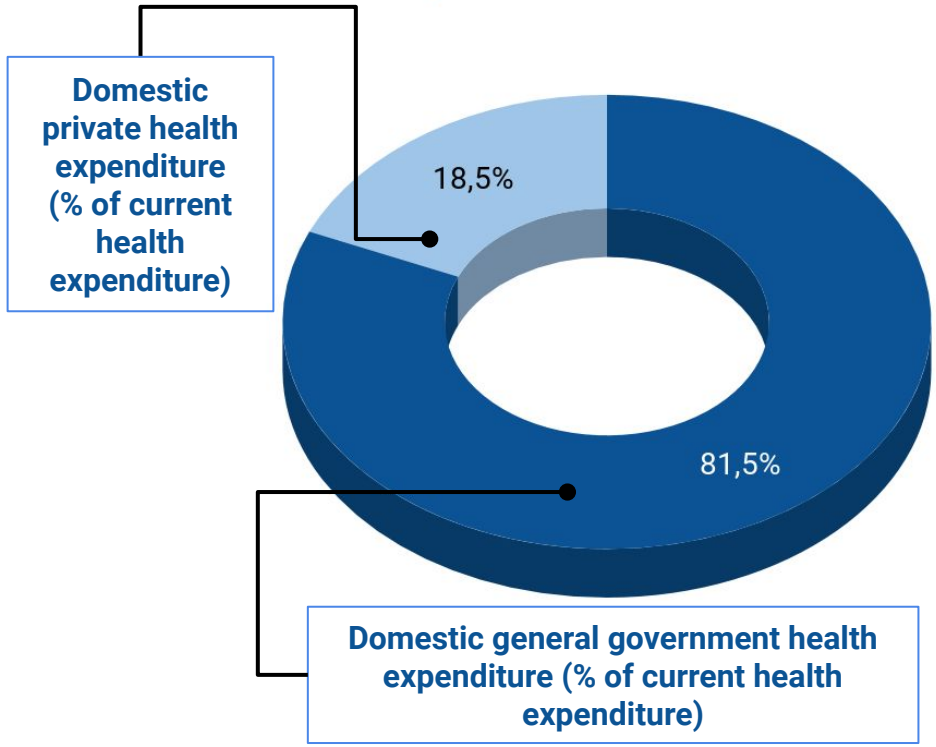
General metrics

HALE	Both Sexes HALE (2016)	73 years
	HALE/Life Expectancy Difference 2016	9.4
Economy	GDP per Capita, Current Prices (2016)	61.76 thousand ($)
	Annual GDP Growth (2016)	7.4 %
Healthcare	Current Health Expenditure per Capita (2016)	5.06 thousand ($)
	Public Health Care Expenditure 2016	8.29 % of GDP
Retirement	Age Dependency Ratio 2016	52
	Population over 65, 2016	14.1 %
	Number of WHO Age Friendly Cities and Communities	1
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	9.1
	Annual Cigarette Consumption (Units per Capita) 2016	848
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	59.1 % of adults

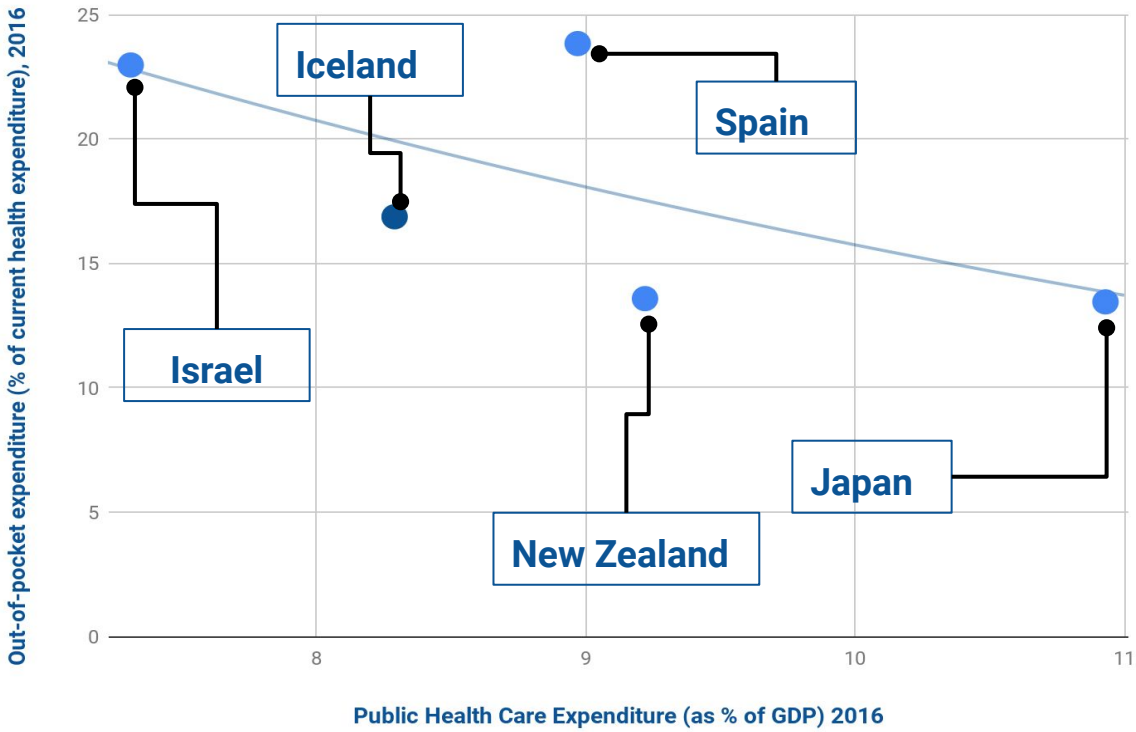
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **97**
- Human Development Index 2016: **0.93**
- E-Government Development Index 2016: **0.77**
- Corruption Perceptions Index 2016: **78**
- Global Gender Gap Index 2016: **0.87**
- Democracy Index 2016: **9.5**

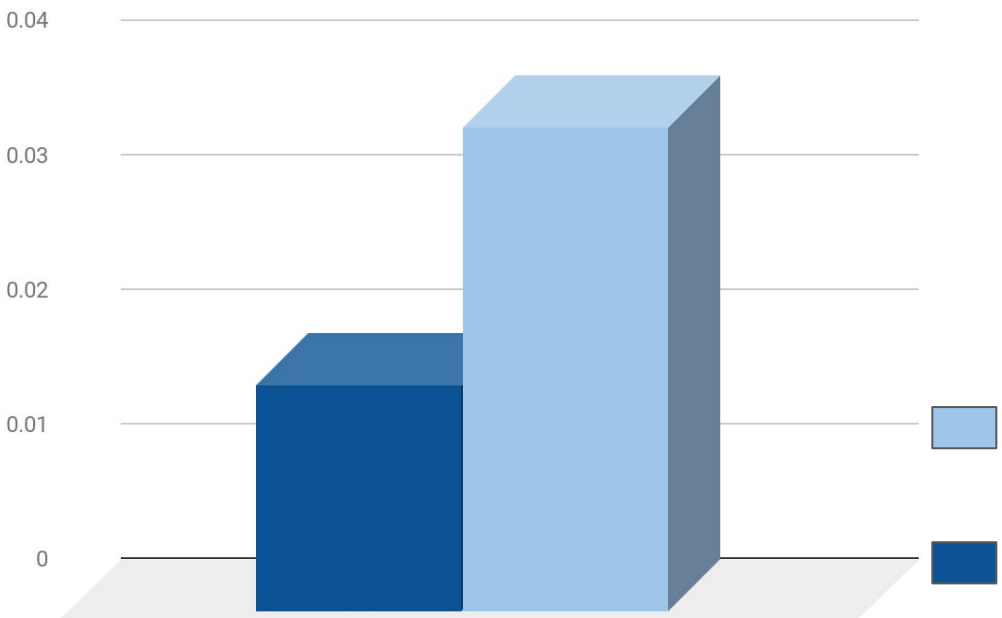
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and Medium Gap



Effectiveness ratios



To improve health and wellbeing of people living in Iceland government policies should be focused on obesity, tobacco, healthy workplaces, child wellbeing. eHealth initiatives should meet the needs of the aged population.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Iceland

STRENGTHS

- The healthcare system is comprehensive and provides the easy and equal access to the healthcare to the whole population and the HAQ index stands for 97.1.
- Infant mortality in Iceland is the lowest in the world and is 1.3 per 1000 population.
- Maternal mortality is the lowest in the world and is 3 deaths per 1000000 of population.
- The population is relatively young and productive.
- Healthcare system shares access to the most optimum health service that can be provided at any time

WEAKNESSES

- The total expenditures on health are 8.8 of GDP that is lower than the Nordic countries.
- There is still a great amount of spending on the inpatient care - the half of the total spendings.
- There is a relatively high level of the unmet needs in Iceland (4%) for medical and dental care.
- There are also the large inequalities in different income groups concerning the access to the medical system and the obesity level and sometimes the waiting times occurs due to the geographical locations.

OPPORTUNITIES

- The crime rate in Iceland is very low, with the majority of incidents involving theft and pick pocketing.
- Universal healthcare coverage includes sickness benefits in case of an illness or injury that leaves you temporarily unable to work.
- Well-composed primary care based on the reimbursement model including transparency, quality control and equal distribution of the resources among the facilities.
- Shift to precision health and development of private insurance market.

THREATS

- The decline in the fertility rate.
- The levels of obesity are high in the Iceland, especially among the adolescents - 22,2% compared to the OECD average and among the adults the obesity rates start to be close to the OECD average indicator.
- The great impact of the economic crisis and the banking system destructions on health and longevity industries.
- The severe climate that demands the sustainable medical system.

Analysis of Strengths and Weaknesses of Health Care System in Iceland

- Waiting times are relatively short and the patient's outcomes are one of the best in the Europe - Iceland occupies the 8th place by the Health Consumption Index.
- The smoking rates are also lower than the EU average - 11,4% compared to the 19,7%.
- People feel relatively good and are more satisfied by their life than other OECD countries.
- The retirement age in Iceland is one of the highest in the OECD.
- The share of out-of-pocket spendings in Iceland is lower than in the other OECD countries.
- The number of nurses and doctors in Iceland is relatively high and is above the OECD average and continue to rise.

- The direct household payments are high for the dental care and pharmaceuticals (60%).
- Only one of fifth doctors are specialized in the general medicine.
- The Iceland had a relatively low consumption of the fruits among the other countries despite the good supply - the mean consumption of vegetables was 120 grams per day and the mean consumption of fruit was 119 grams per day.
- Ischemic heart disease, Alzheimer's disease, stroke and lung cancer are the main reasons of the premature deaths.
- There was the significant increase of the bad impact of the diabetes in the Iceland (39,8%) in 2017, that along with low back pain, headache disorders and neck pain are the main reasons of the disability years.
- High fasting plasma glucose and high body mass index are increasing causes of the death and DALE along with the tobacco that is still the leading reason.

Recommendations for Iceland

- **Develop optimal Panels of Biomarkers of aging.** The necessary biotechnologies for the implementation of P4 Medicine technologies and therapies are in place. Now Big Data analytics is needed to develop optimal Panels of Biomarkers of aging and to determine how to optimize their implementation. A panel of less precise but easily implementable biomarkers of aging would be much better than an extremely precise and comprehensive panel of biomarkers of aging that is too hard or expensive to translate easily into widespread practical use across nations.
- **Creation and application of life data**. Data collected on a massive scale from individuals can be used in scientifically-backed and precise ways to preserve and maintain an optimal state of health. Through voluntary data contribution from patients genomics, transcriptomics, metabolomics, and microbiomics data can be generated in real time.
- **Use AI opportunities in Health and Longevity industry.** Artificial Intelligence provides large amount of opportunities to optimize psychological wellness, create inclusive societies and combat loneliness and social isolation among elderly. Research tools, data storage, and processing technologies generate data from DNA sequence analysis and electronic patient health records.
- **Devise government-led Longevity development plan.** In the next few years several technologically advanced smart states will emerge as global competitors in the development of integrated Longevity Industry ecosystem. To be in forefront of Longevity industry Iceland should develop national Longevity plan with detailed agenda and initiatives to undertake various project on the way of Healthy Longevity, such as smart cities that integrate all subsectors of the multifaceted Longevity Industry to create an optimized ecosystem for the maintenance of health and wealth.
- **Minimise the burden of behavioral risks factors.** The risk factors for non-communicable diseases – tobacco use, the harmful use of alcohol, unhealthy diets, and physical inactivity – lie in non-health sectors. They should be addressed by creation advanced health care ecosystem with sophisticated private insurance, WealthTech, AgeTech available.

India

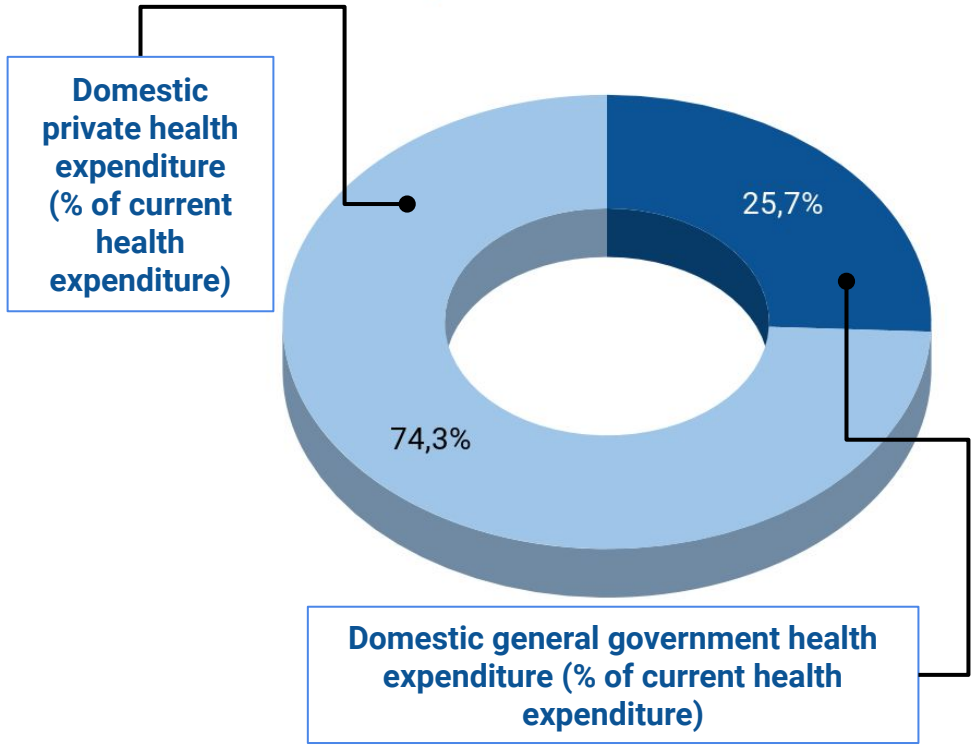
General metrics

HALE	Both Sexes HALE (2016)	59.3 years
	HALE/Life Expectancy Difference 2016	9.26
Economy	GDP per Capita, Current Prices (2016)	1.73 thousand ($)
	Annual GDP Growth (2016)	8.2 %
Healthcare	Current Health Expenditure per Capita (2016)	0.06 thousand ($)
	Public Health Care Expenditure 2016	3.66 % of GDP
Retirement	Age Dependency Ratio 2016	52
	Population over 65, 2016	5.8 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	5.7
	Annual Cigarette Consumption (Units per Capita) 2016	89
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	19.7 % of adults

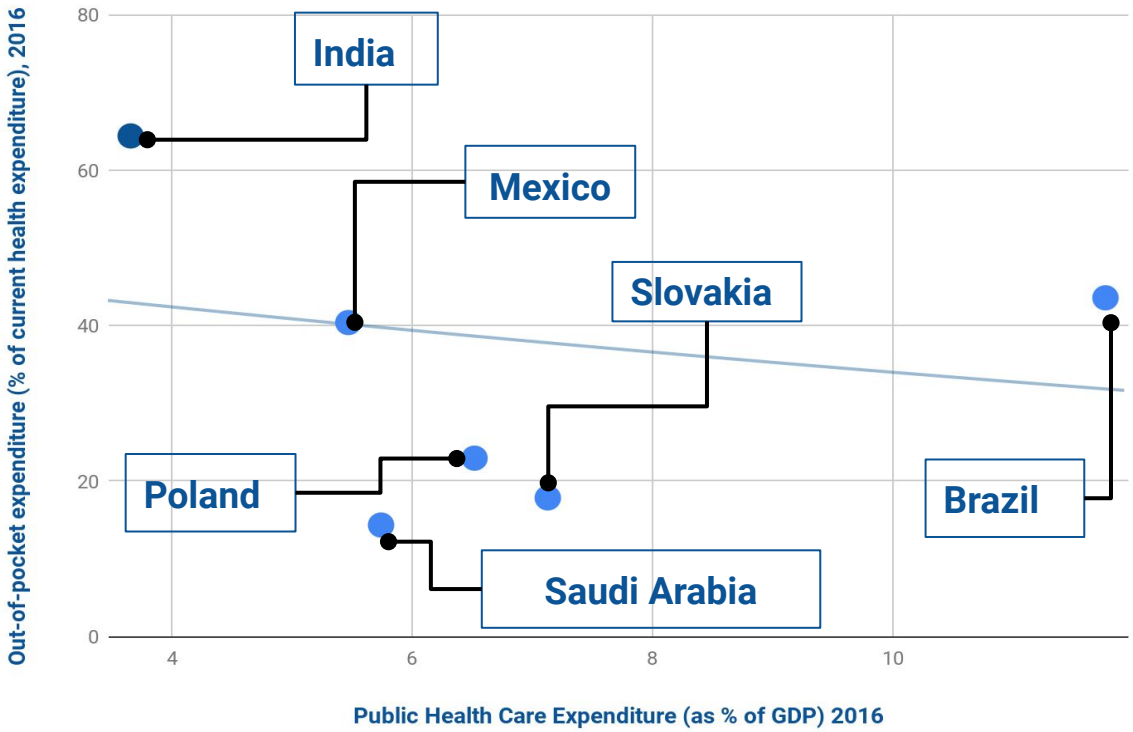
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **41**
- Human Development Index 2016: **0.64**
- E-Government Development Index 2016: **0.46**
- Corruption Perceptions Index 2016: **40**
- Global Gender Gap Index 2016: **0.68**
- Democracy Index 2016: **7.81**

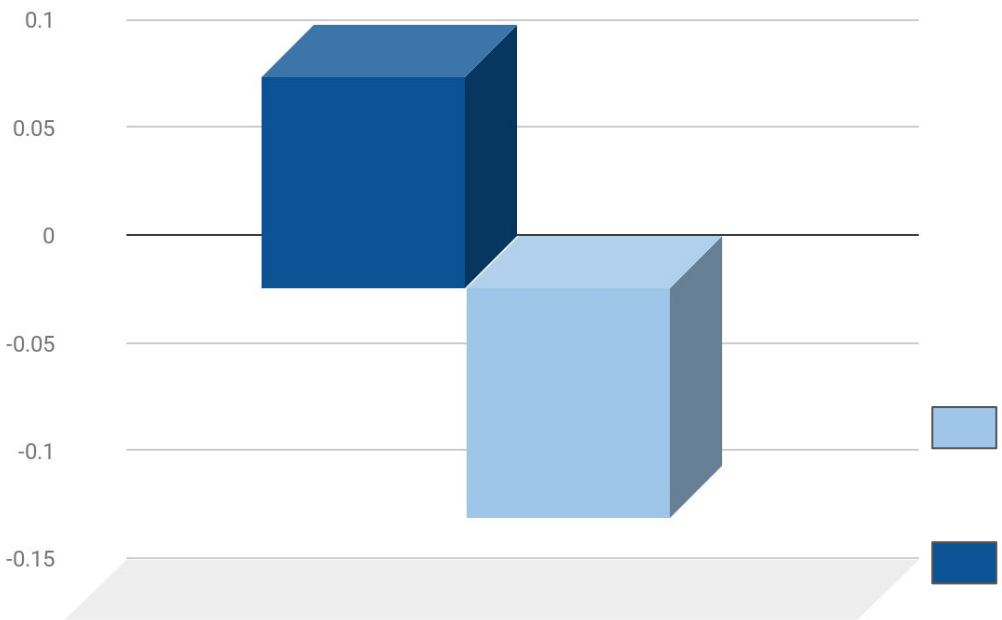
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Medium Gap



Effectiveness ratios



The country faces public health challenges, particularly for the poor. These include child undernutrition, growth in obesity, diabetes, and tobacco use, leading to cancer and other diseases. There are targets to improve public health: accessible and affordable nutritious food, sanitary facilities, health centres in rural areas, affordable health care.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in India

STRENGTHS

- Vaccination coverage of the population riches 75% but is lower than in the OECD countries.
- Life expectancy at birth has increased significantly through the past decades for 25 years.
- There was a significant cut in the infant mortality for the few past decades.
- The smoking rates in India are twice lower than in the OECD and are just 10.7.
- India provided the activities to improve access to the clean water up to 93%.

WEAKNESSES

- Total health expenditures in India are 4% of GDP and it is less than half of the OECD average.
- The value of healthcare spending per capita is critically small.
- Public spending on health in India accounted for only 33% of total expenditures while out-of-pocket one were 60% of total expenditures on health in 2012.
- There is a relatively low amount of doctors and nurses in India compared to OECD countries.
- Relatively low level of access to basic sanitation facilities and poor supply of improved water sources.
- High burden of communicable diseases.

OPPORTUNITIES

- The wide range of policies provided by the government to make better sanitation in India and reduce the infant mortality and children's diseases.
- Preventive interventions such as improving access to a clean water supply, reducing the spread of HIV/AIDS through better sexual education, and vaccination campaigns for other diseases will each deliver significant returns.
- India is one of the BRICs countries that is developing rapidly, so it can afford to direct more funds to the healthcare to make it as effective and reliable as in other OECD countries or countries with the same income.

THREATS

- High level of ambient air pollution.
- Chronic diseases are the main reasons for deaths and account almost 50% of total deaths in India.
- The burning of solid fuels is a great risk factor.
- Ischemic heart diseases, lower respiratory infections and chronic obstructive pulmonary diseases are the main reasons for the death in India that can cause a stroke.
- Dietary iron deficiency, headache disorders and low back pain are the most reasons for the disability-adjusted years.
- Socio-economic inequality and high level of poverty.

Analysis of Strengths and Weaknesses of Health Care System in India

- India is a popular destination for medical tourists, given the relatively low costs and high quality of its private hospitals. International students in India should expect to rely on private hospitals for advanced medical care.
- In advanced regions there are usually big hospitals stuffed with all medicines and well-trained personnel that can provide innovative and cost-effective treatment.
- There was a training for the managers of primary health centres and district hospitals to provide efficient administration of the hospital in order to achieve good patient outcomes.
- There was a significant growth in the private sector in order to meet the growing needs and expectations for the outcomes of the population.

- Spending on pharmaceuticals in India is the highest component of the total spendings on health and is 45%.
- The health care system in India is universal. That being said, there is great discrepancy in the quality and coverage of medical treatment in India. Healthcare between states and rural and urban areas can be vastly different. Rural areas often suffer from physician shortages, and disparities between states mean that residents of the poorest states.
- 11% of the lowest economic quintile and 16% of highest one don't undertake any sufficient physical activity.
- Only 16% of households have the access to free or partially fee healthcare and the HAQ index is 41.2.
- The quality of the delivered services varies by the region and the area. 41% of people in rural area and 45% in urban area were not satisfied by their treatments.
- 10% of primary health care centres are without a doctor, 37% are without a laboratory technician and 25% without a pharmacist.
- Lack of adequate coverage by the health care system in India means that many Indians turn to private healthcare providers, although this is an option generally inaccessible to the poor.

Recommendations for India

- **Utilising opportunities of current development of health industry in India.** India is a land full of opportunities for players in the medical devices industry. India's healthcare industry is one of the fastest growing sectors and it is expected to reach $280 billion by 2020. The country has also become one of the leading destinations for high-end diagnostic services with tremendous capital investment for advanced diagnostic facilities, thus catering to a greater proportion of population.
- **Increase the level of health awareness in both urban and rural areas.** The answers may lie in low educational status, poor functional literacy, low accent on education within the healthcare system, and low priority for health in the population, among others.
- **Improve the access and quality of healthcare services.** The government must encourage discussion on the determinants of access to healthcare. It should identify and analyze possible barriers to access in the financial, geographic, social, and system-related domains.
- **Make healthcare affordable and treatment reliable for all population.** The solutions to the problem of affordability of healthcare lie in local and national initiatives. Nationally, the Government expenditure on health must urgently be scaled up, from <2% currently to at least 5%–6% of the gross domestic product in the short term. This will translate into the much-needed infrastructure boost in the rural and marginalized areas and hopefully to better availability of healthcare– services, infrastructure, and personnel.
- **Combat with undernourishment, poverty and socioeconomic inequality.** Results of our study shows an evident linkage of health and wealth. Healthy longevity in India should be started from the provision of basic services for all population, including adequate sanitation facilities, improved water sources, effective prevention and treatment. The focus also should be made on both healthcare status of adults and children to create favorable conditions for growth of future generations.

Indonesia

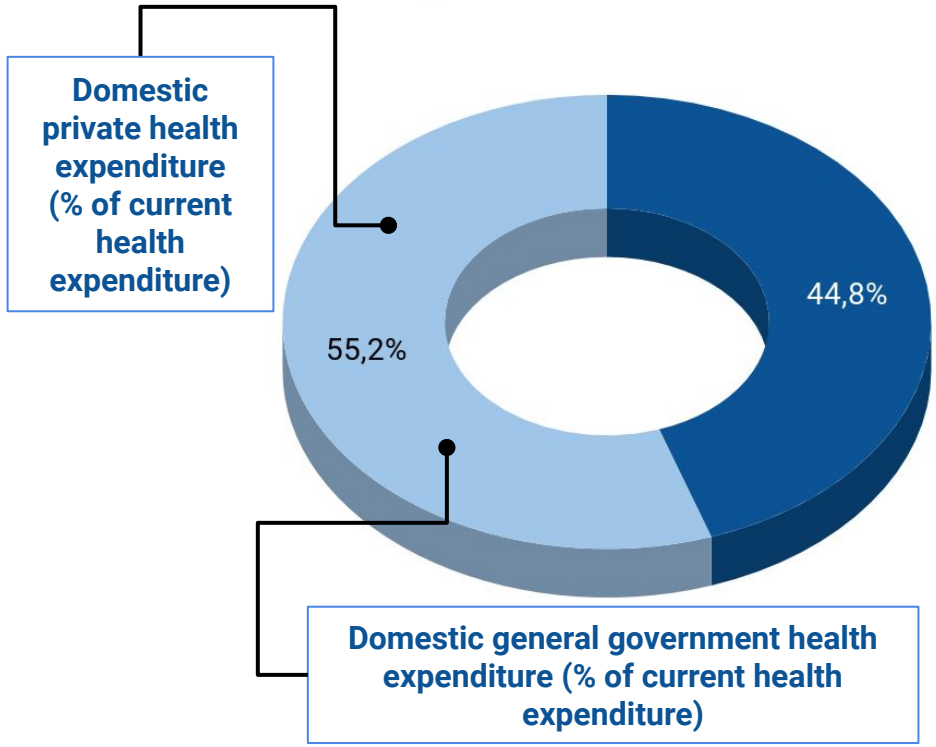
General metrics

HALE	Both Sexes HALE (2016)	61.7 years
	HALE/Life Expectancy Difference 2016	7.49
Economy	GDP per Capita, Current Prices (2016)	3.56 thousand ($)
	Annual GDP Growth (2016)	5 %
Healthcare	Current Health Expenditure per Capita (2016)	0.11 thousand ($)
	Public Health Care Expenditure 2016	3.12 % of GDP
Retirement	Age Dependency Ratio 2016	49
	Population over 65, 2016	5.2 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	0.8
	Annual Cigarette Consumption (Units per Capita) 2016	1675
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	28.2 % of adults

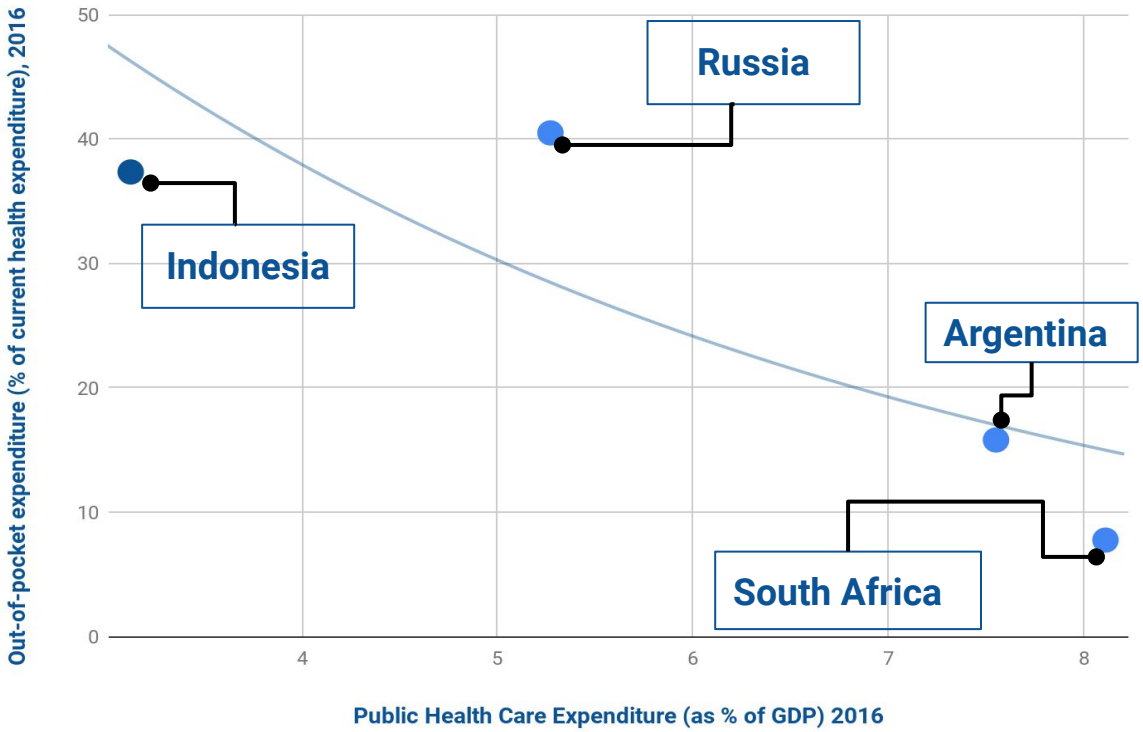
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **44**
- Human Development Index 2016: **0.69**
- E-Government Development Index 2016: **0.45**
- Corruption Perceptions Index 2016: **37**
- Global Gender Gap Index 2016: **0.68**
- Democracy Index 2016: **6.97**

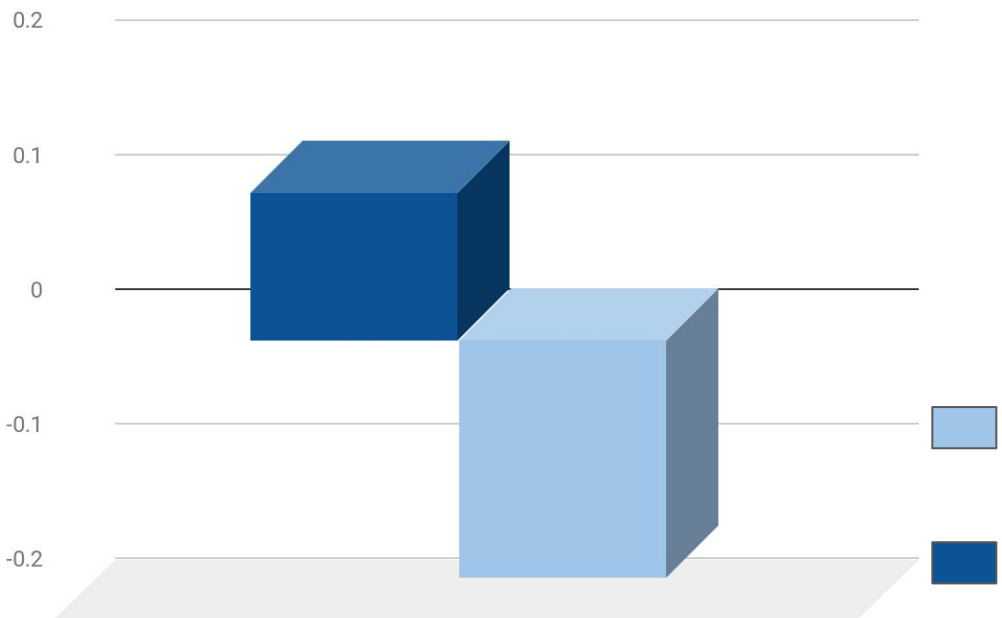
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Low Gap



Effectiveness ratios



There are important regional and socioeconomic inequities in the health system of Indonesia. Health financing also is low and inequitable. Government should concentrate the use of public funds on delivery of public goods and improving equity for priority health outcomes focus on improving health and on managing the whole health system, control the spread of HIV/AIDS by focusing on prevention.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Indonesia

STRENGTHS

- The life expectancy in Indonesia had increased by 25 years for few past decades and it was 70.2 in 2012.
- The coverage for vaccinations for measles is relatively high and is 80%.
- There was also a great decrease in the mortality rate that had fallen from 62 death to 26 death in 2012.
- There was a slight progress in reducing the spread of HIV/AIDS.
- There was a decline in deaths from tuberculosis by more than a half.

WEAKNESSES

- Total spendings on health are 3% of GDP and it is three times less than the OECD average.
- The healthcare spending per capita is $150 that is extremely below the OECD average.
- Only 40% of all healthcare costs are funded publicly that is greatly lower than the OECD average of 72%.
- Cancer and tuberculosis are the second major reasons of premature deaths in Indonesia.
- Risk factors for NCDs, such as high blood pressure, high cholesterol, overweight and smoking, are increasing.

OPPORTUNITIES

- Disease epidemiology patterns in the country have become increasingly complex in recent decades.
- The increasing demand on the health service.
- Development of healthcare tourism
- The Indonesian health system has a mixture of public and private providers and financing.
- Utilizing advanced technologies in healthcare.
- The government can initiate the longevity plan based on successful experience of developed countries.

THREATS

- There are only 0.3 doctors per 1000 population and 1 nurse per 1000 that is the threatening situation for meeting the healthcare needs of the population.
- There is a very low coverage of vaccination for children against diphtheria, tetanus and pertussis.
- According to the data of the 2016 tobacco smoking is still the major risk factor for the Indonesian people as one fourth of the population reported to smoke daily.
- Stroke is the leading cause of death and it causes 19.2% of death in Indonesia.

Analysis of Strengths and Weaknesses of Health Care System in Indonesia

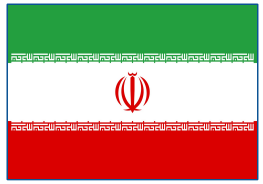
- There was a significant decrease in maternal mortality from 210 to 168 deaths per 100000 people.
- The life expectancy is growing at relatively high rate of 1.05% per year.
- The regulation for the healthcare is branched out and consists of few institutions for the effective regulation.
- Civil society actively participates in the health sector. Various nongovernmental organizations (NGOs) engage in health-related issues in Indonesia, and play an important role in promoting awareness, preventive measures, fund-raising, policy advocacy and working in 27 partnership with the government on monitoring and evaluation.
- Developed pharmaceutical industry.

- The disability-adjusted years in Indonesia are mainly caused by the dietary risks (11%), high blood pressure (10%) and smoking (9%).
- The causes for years of life lost are mainly cerebrovascular diseases, tuberculosis and road injures.
- Childhood underweight and occupational risks are the main reasons for the death among children up to 5 years old and from 15-49 years old respectively.
- 67.2% of Indonesian has tooth decay.
- Indonesia is ranked among the 10 countries with the highest diabetes and tuberculosis burden.
- 95% of ingredients for pharmaceuticals are imported that can lead to the rise of some of them.
- The access to the healthcare is unequal in different regions and HAQ index is 44.5.
- The high levels of out-of-pocket expenditure impacts access to health services for the poor.

Recommendations for Indonesia

- **Provide wider immunization coverage.** The lack of appropriate vaccinations among children can cause severe problems and spread the broaden epidemics that can lead to the young deaths.
- **Improve engagement of staff in healthcare.** Human resources for health have also grown in the last two decades, with increases in health worker to population ratios. However, the ratio of physician to population is still lower than the WHO-recommended figure, and ongoing geographical disparities exist. There is also a pronounced shortage of nurses and midwives.
- **Expand population coverage.** In response to the high levels of out-of-pocket expenditure and its impact on access to health services by the poor, the Government of Indonesia has to introduce various social insurance programmes for health.
- **Tackle environmental problems.** Bad environmental conditions contribute to poor health and inequality in healthcare status. Indonesia's large cities are prone to pollution, and this can exacerbate existing respiratory conditions like asthma. One of the most significant problems is the fact that tap water in Indonesia is not generally safe to drink.
- **Utilize AI for generating health databases of voluntary self-reported data.** Information on user experience is limited in both the public and private sectors. Requirements for informed consent are regulated but there is no national charter to describe the rights of patients in choice of provider, privacy or information. The ratio of health workers to population has improved over time, but disparities between provinces remain large.
- **Health system re-orientation towards the changing epidemiological landscape**. The increasing burden of noncommunicable diseases highlights the need to move from sick treatment to prevention of chronic conditions. It requires patients' participation and high health consciousness.

Iran



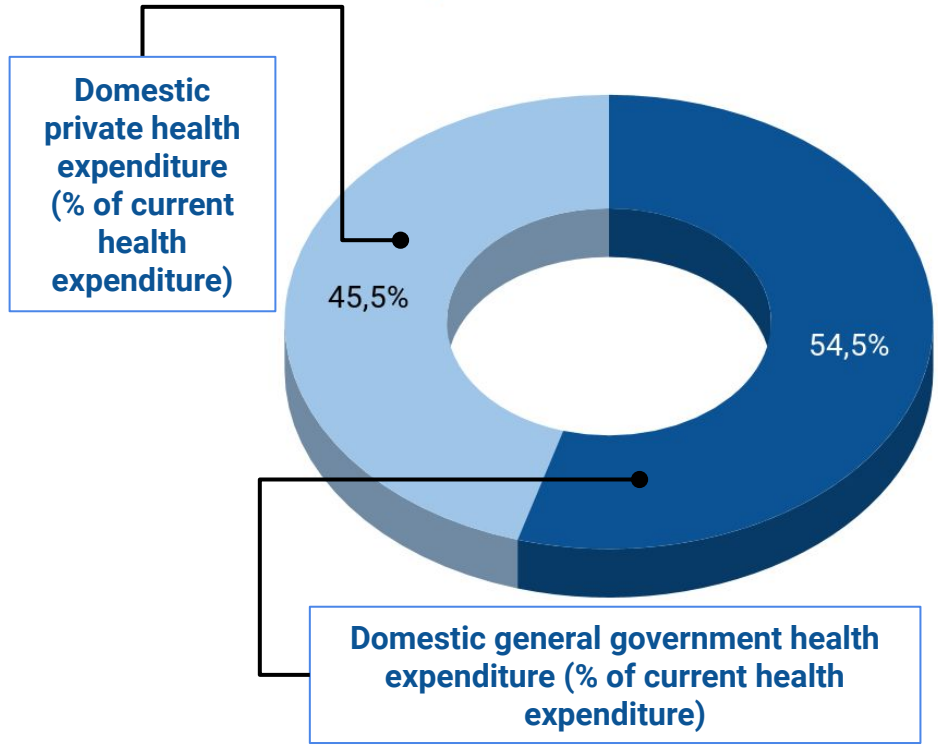
General metrics

HALE	Both Sexes HALE (2016)	65.4 years
	HALE/Life Expectancy Difference 2016	6.55
Economy	GDP per Capita, Current Prices (2016)	5.26 thousand ($)
	Annual GDP Growth (2016)	13.4 %
Healthcare	Current Health Expenditure per Capita (2016)	0.42 thousand ($)
	Public Health Care Expenditure 2016	8.1 % of GDP
Retirement	Age Dependency Ratio 2016	41
	Population over 65, 2016	5.2 %
	Number of WHO Age Friendly Cities and Communities	1
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	1
	Annual Cigarette Consumption (Units per Capita) 2016	937
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	61.6 % of adults

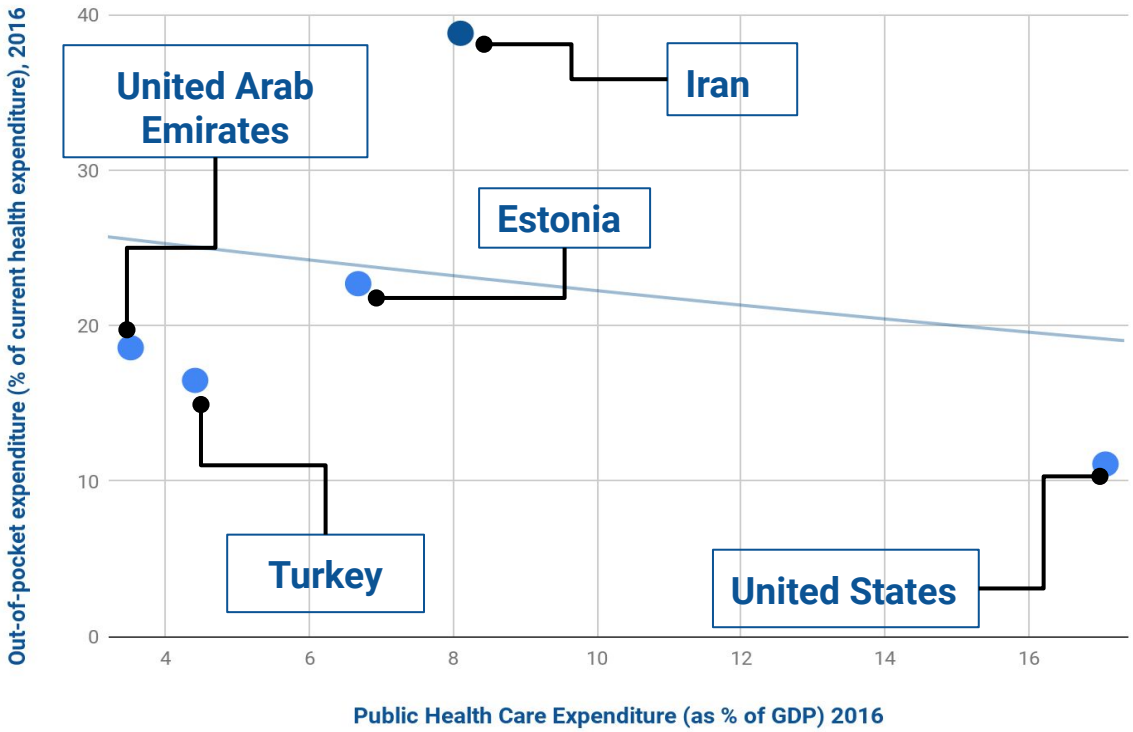
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **72**
- Human Development Index 2016: **0.8**
- E-Government Development Index 2016: **0.46**
- Corruption Perceptions Index 2016: **29**
- Global Gender Gap Index 2016: **0.59**
- Democracy Index 2016: **2.34**

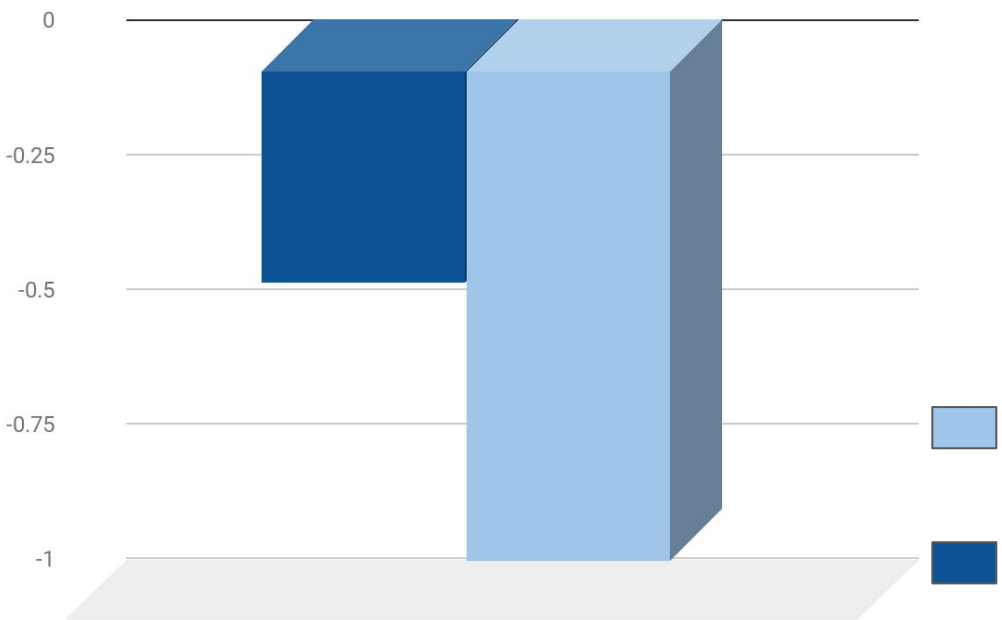
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and High Gap



Effectiveness ratios



The health system is one of the most complex systems with many variables and uncertainties. The management of this system needs trained managers. One of the current shortcomings is lack of those specifically trained for this purpose. There is all high income inequality in the country. Government should improve access in healthcare coverage for the families with a low income.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Iran

STRENGTHS

- Iran population is young - only 5% of the population is over 60 years old.
- The healthcare system is comprehensive includes both public and private healthcare providers.
- The public centre is the main provider of the healthcare services throughout the country, some services are free of charge.
- There are lots of non-profit organizations in Iran that play an active role in resolving healthcare issues such as cancer etc.
- There is relatively high level of density of doctors and nurses.

WEAKNESSES

- Spending on health per capita is lower than in other OECD and EU countries.
- The level of out-of-pocket healthcare expenditures is still high and remains to be 39% of current healthcare expenditures.
- The life expectancy is still low remains to be 71 years for both sexes, but the gender gap is lower than EU-average.
- More than 45% of death in Iran are caused by cardiovascular diseases.
- Accidents are the second risky factor for the Islamic Republic of Iran and occupy 18% of death.

OPPORTUNITIES

- There is a wide range of the training medical universities and schools for the preparation of the qualified medical workforce.
- The living conditions throughout the world are getting better that influence life expectancy and HALE positively.
- There is a significant increase in some healthcare indicators for Iran that will certainly continue to grow.
- Modernization of healthcare facilities and appling modern techniques of treatment and prevention.
- Increase number of reciprocal medical arrangements between Iran and other countries for exchange of knowledge and experience.

THREATS

- There is a considerable shortage of healthcare personnel in peripheral areas.
- Cancer all the reason for lots of death in Iran as there are 14% of deaths because of it.
- Neonatal and respiratory diseases are also the burdens for healthcare in Iran and cause 6% of total deaths in the country.
- There is an increase in the burden of the communicable diseases that threaten life expectancy and HALE.
- Years of Western-imposed sanctions cause problems in the medical field.

Analysis of Strengths and Weaknesses of Health Care System in Iran

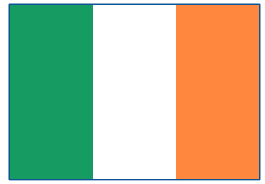
- Government is highly proactive in the questions of healthcare and undertakes steps to make it more balanced.
- More than 90% of Iranian people are under the coverage of at least one of the kind of insurance.
- There is a high level of immunization among children in Iran.
- The performance of the healthcare institutions is great and effectiveness is very impressive due to the decrease though slight in infant mortality and elimination of the burden of the infection in childhood.
- Prices for pharmaceuticals are among the lowest in the region.

- The infant mortality in the Islamic Republic of Iran is still high and is far from the millennium goals.
- There are considerable gaps in the access and quality of the healthcare system and HAQ index is just 71.8.
- Secondary and third tiers entities do not provide the services as effective as primary healthcare does.
- Headache disorders, low back pain and depressive disorders along with the drug addiction are the main causes for the disability-adjusted years in Iran.
- The coverage by the hospitals and hospital beds per population is far from the OECD countries and the grows of their amount is slower than the demand for services.
- Medical education is still not enough community-based.
- High blood pressure, dietary risks and high fasting plasma glucose are the main risk factors for Iran.
- Malaria can be a risk in rural parts of Iran. Expats in these areas should take the necessary precautions such as keeping well covered and using an effective mosquito repellent.
- Despite healthcare coverage out-of-pocket expenditure accounts 39% of current healthcare expenditures

Recommendations for Iran

- **Pay special attention to cardiovascular disease.** Changing trend of mortality causes from contagious diseases to lifestyle affected diseases has brought about striking rate of mortality caused by unintentional diseases, cancers, and cardiovascular diseases.
- **Take actions to monitor and treat communicable diseases.** To completely eradicate malaria, health officials should concentrate resources to prevent and treat the disease in the specific provinces where the disease is most prevalent. Policymakers should monitor borders to prevent the spread of malaria into Iran from outside the country. They should strengthen cooperation between institutions and improve the health system's' ability to quickly identify epidemics.
- **Address the vast divergence of health care access between rural and urban areas.** Iran's rural population face a severe lack of health care infrastructure and people are forced to travel large distances to receive basic care. The government should eliminate the inequality, as the rural population face far higher infant mortality rates and maternal mortality rates, and lower levels of vaccination than urban residents.
- **Shift from sick treatment to preventive medicine.** Greater than half of the under-5 deaths in Iran are the result of preventable or easily-treatable diseases and illnesses, such as malnutrition, which affects some 45 percent of children under the 5-years-old in Iran.
- **Provide effective treatment for marginalized groups.** In conditions of socio-economic instability healthcare facilities should provide services including medical and mental health consultations, testing and treatment for sexually transmitted infections, ante- and postnatal care and family planning.
- **Develop government-led longevity plan.** Although Iran population is relatively young, government should devise longevity strategy with focus on high quality of life, technical innovations in care delivery and medical treatment, and modified business and governmental models.

Ireland



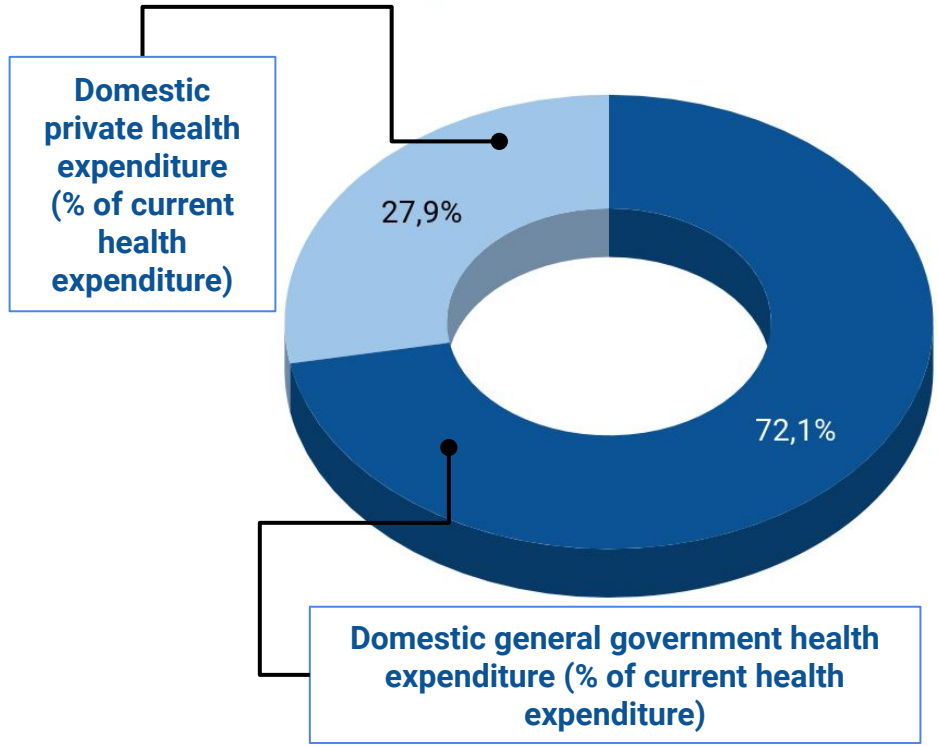
General metrics

HALE	Both Sexes HALE (2016)	72.1 years
	HALE/Life Expectancy Difference 2016	9.4
Economy	GDP per Capita, Current Prices (2016)	63.56 thousand ($)
	Annual GDP Growth (2016)	5 %
Healthcare	Current Health Expenditure per Capita (2016)	4.76 thousand ($)
	Public Health Care Expenditure 2016	7.38 % of GDP
Retirement	Age Dependency Ratio 2016	55
	Population over 65, 2016	13.6 %
	Number of WHO Age Friendly Cities and Communities	28
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	13
	Annual Cigarette Consumption (Units per Capita) 2016	976
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	60.6 % of adults

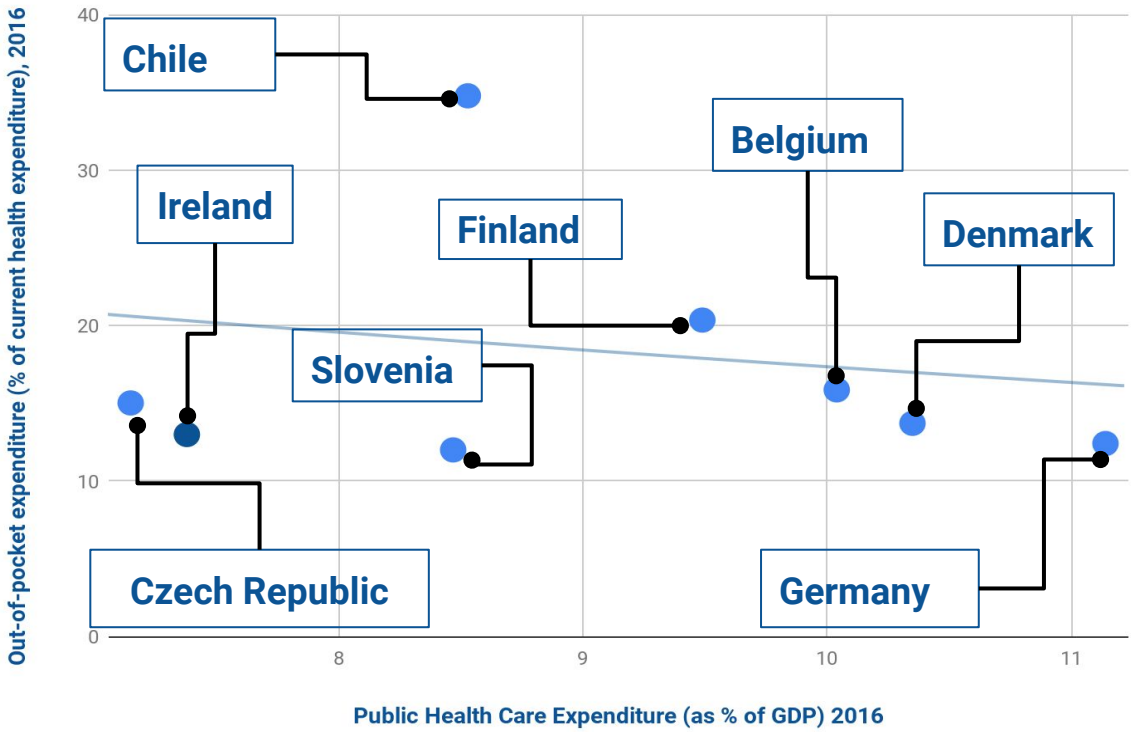
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **95**
- Human Development Index 2016: **0.93**
- E-Government Development Index 2016: **0.77**
- Corruption Perceptions Index 2016: **73**
- Global Gender Gap Index 2016: **0.8**
- Democracy Index 2016: **9.15**

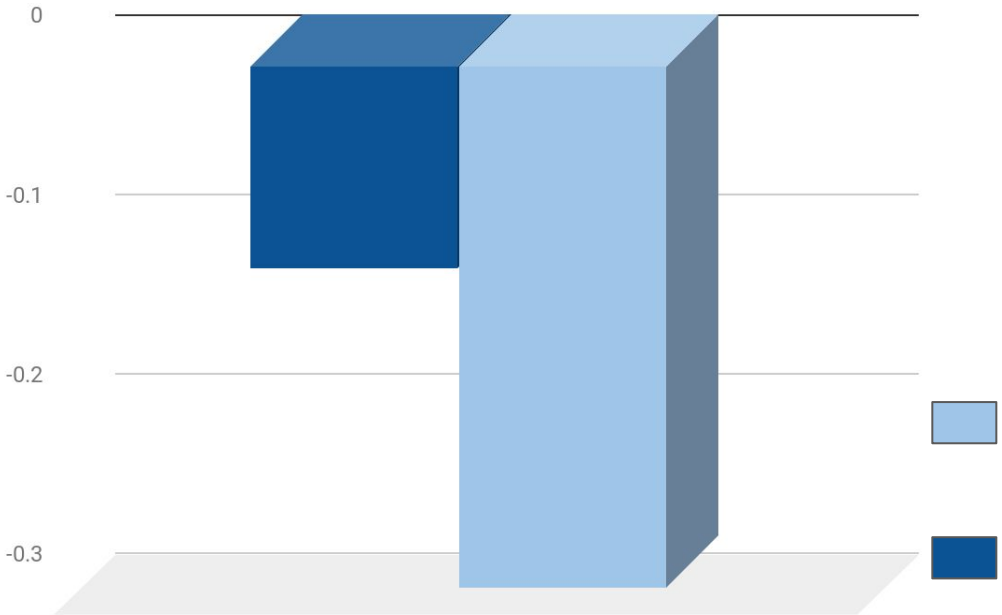
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and High Gap



Effectiveness ratios



It should be focused on the proportion of people who are healthy at all stages of life, reduction health inequalities, protection the public from threats to health and wellbeing.

SWOT Analysis of Healthcare in Ireland

STRENGTHS

- One of the highest levels of the occupational rated for acute care beds (98%).
- The healthcare system in Ireland is comlex, public funded with developed private sector.
- Ireland's spending on health per capita is more than 40% higher than the OECD average.
- Out-of-pocket payments occupy only 15.2% of total expenditures.
- Life expectancy in Ireland is high. It was 81.5 years in 2015 due to the reductions in premature deaths.

WEAKNESSES

- High occupancy rate for acute beds can be the evidence of increase in waiting times
- Patients wait for more than three months for cataract surgery, knee and hip replacement in Ireland.
- There is a great amount of a avoidable hospital admissions because of COPD and asthma that Ireland can avoid.
- Ireland spends only 7.8% on health that is lower that the OECD.
- 19% of adults in Ireland were smoking regularly in 2015 year.
- 32% of adults had at least six drinks in single occasions per month in 2015.

OPPORTUNITIES

- Reforming healthcare system with focus on care delivery and extended access for effective prevention and advanced treatment.
- Medical Cards that function in the Irish healthcare system give an opportunity to visit GPs free of charge and provide reduced costs for medications.
- Gains in health status and this are paralleled by major investment in the health services.
- Explore the potential of new technologies within the healthcare industry.

THREATS

- Current economic crisis has led to the hospital investment postponement and shortage of the medical staff and reduction of healthcare expenditures.
- Ischemic heart disease is the leading cause of the deaths in Ireland.
- There is no universal coverage for the primary care.
- Cancer is the leading cause of death for men (32% of incidents).
- Diseases of old age are major contributors to the slowdown in life expectancy improvements.

Analysis of Strengths and Weaknesses of Health Care System in Ireland

- Amenable mortality in Ireland in below the EU average. Also there is very low level of infant mortality and it is 3 deaths per 1000 population.
- The healthcare system in Ireland is relatively effective in treating life-threatening conditions.
- Life expectancy continues to rise as the result of the improved survival rates after the age of 65.
- Irish women at age 65 are predicted to live 21.0 years more and Irish men are predicted to live additional 18.4 years at the same age.
- The gap in life expectancy between men and women starts to narrow.
- More than 80% of population in Ireland report to be in good health.
- Developed network of preventive medicine.

- Spending on pharmaceuticals is among the highest in the Ireland and is 652 USD per capita.
- The prevalence of obesity in Ireland is above the EU average and it totals 19% of the all Irish population. There is an increase in the overweight among children.
- There are high levels of alcohol consumption per capita that counts for 10.6. Alcohol burden o contributes to death and disability through accidents, assault, violence, homicide and suicide. 20% of the population drinking nearly 2/3 of all alcohol.
- Only 47% of population have a coverage to visit the general practitioners.
- There is a low level density of doctors that causes long waiting periods and limited access for effective treatment.
- Other factors that contribute to life expectancy slowdown are rising obesity and inequality.

Recommendations for Ireland

- **Implementation of the universal healthcare coverage with a particular focus on the elder population needs.** Plenty of households in Ireland prefer to buy additional health insurance to serve their medical needs and fulfill the gaps in universal healthcare coverage.
- **Legislated incentives to provide transparent and readily available information on quality and cost.** Hospitalists need to work collaboratively with their hospital systems to collect and widely report on quality and cost metrics for the patients they serve.
- **Move to a life-course perspective in tackling the rising epidemic of "metabesity."** Ireland faces major challenges in curbing the negative health impacts of obesity, diabetes and an increasingly sedentary Western lifestyle. Cardiovascular disease remains the number one killer in Ireland. The government should initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of behavioral factors such as insufficient physical ability, overweight, alcohol abuse, smoking.
- **Holding the healthcare industry to a higher standard.** Ireland's healthcare system should focus developing advanced treatments. Apart from advanced research, however, it is important to provide effective, low-cost treatments that work, triggering unnecessary treatments and higher costs down the line.
- **Shift from curative to preventive medicine with emphasis on the P4 clinics and advanced technologies in treatments.** Universal coverage is the healthcare's dimension that government should improve and it can be concerned not primary care at the first point, but preventive one when adults starting from the early ages will look after their one health through regular check-ups. It will allow defining symptoms and illnesses' markers on early stages to eliminate the diseases and leave people healthy and productive.

Israel

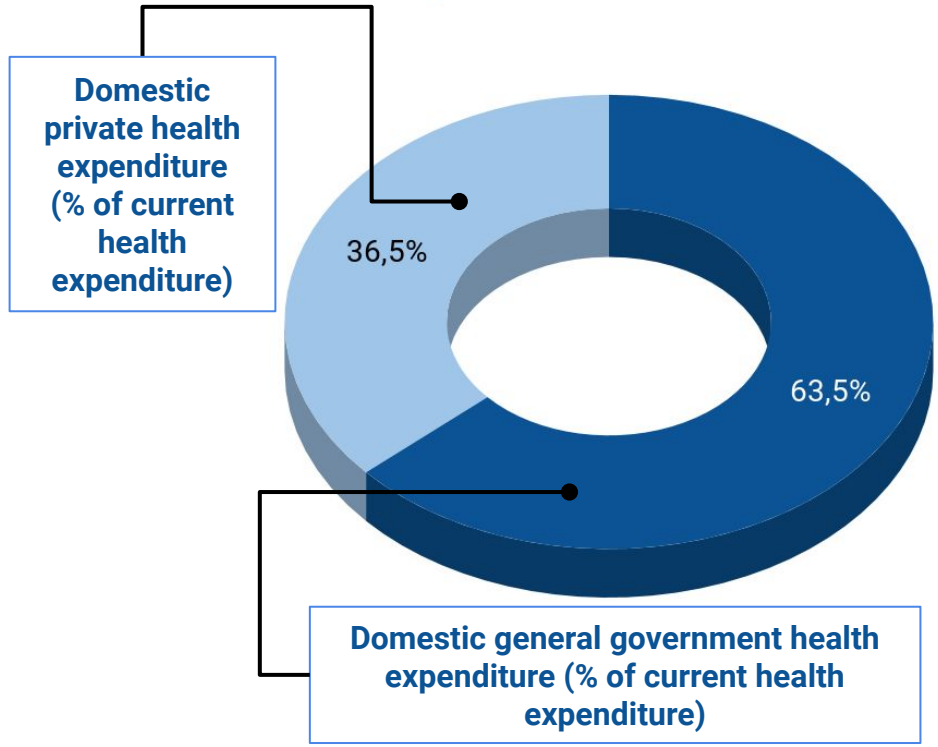
General metrics

HALE	Both Sexes HALE (2016)	72.9 years
	HALE/Life Expectancy Difference 2016	9.4
Economy	GDP per Capita, Current Prices (2016)	37.37 thousand ($)
	Annual GDP Growth (2016)	4 %
Healthcare	Current Health Expenditure per Capita (2016)	2.84 thousand ($)
	Public Health Care Expenditure 2016	7.31 % of GDP
Retirement	Age Dependency Ratio 2016	65
	Population over 65, 2016	11.5 %
	Number of WHO Age Friendly Cities and Communities	4
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	3.8
	Annual Cigarette Consumption (Units per Capita) 2016	1280
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	64.3 % of adults

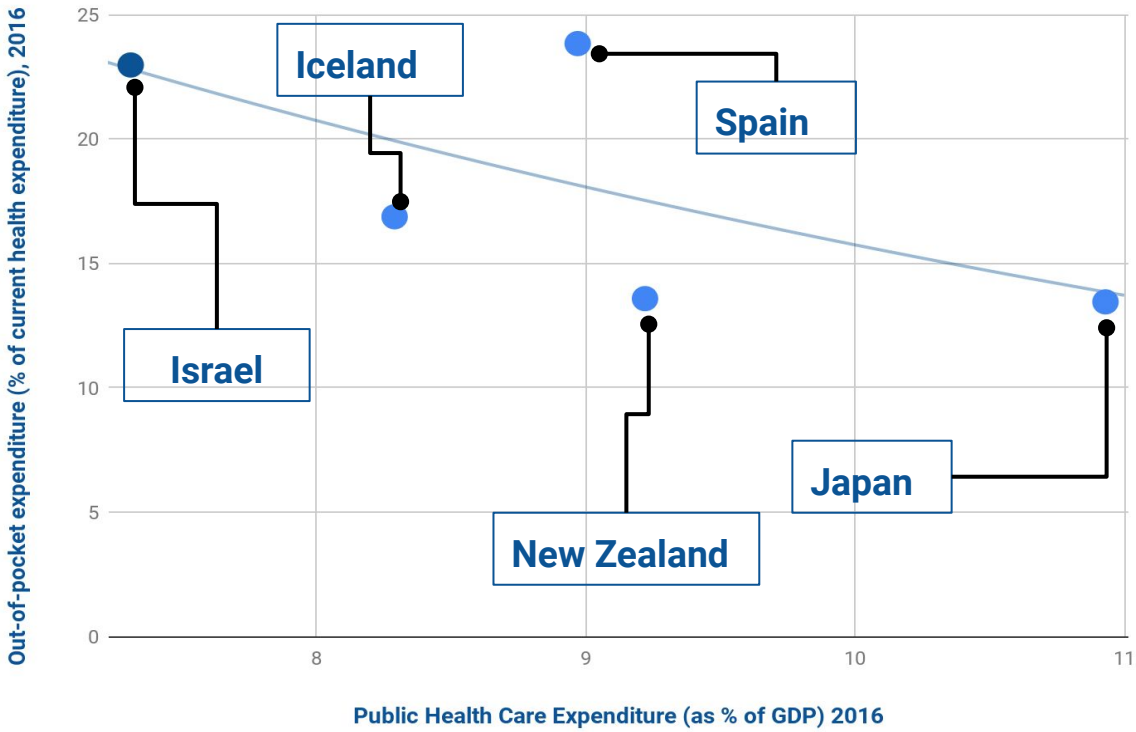
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **85**
- Human Development Index 2016: **0.9**
- E-Government Development Index 2016: **0.78**
- Corruption Perceptions Index 2016: **64**
- Global Gender Gap Index 2016: **0.72**
- Democracy Index 2016: **7.85**

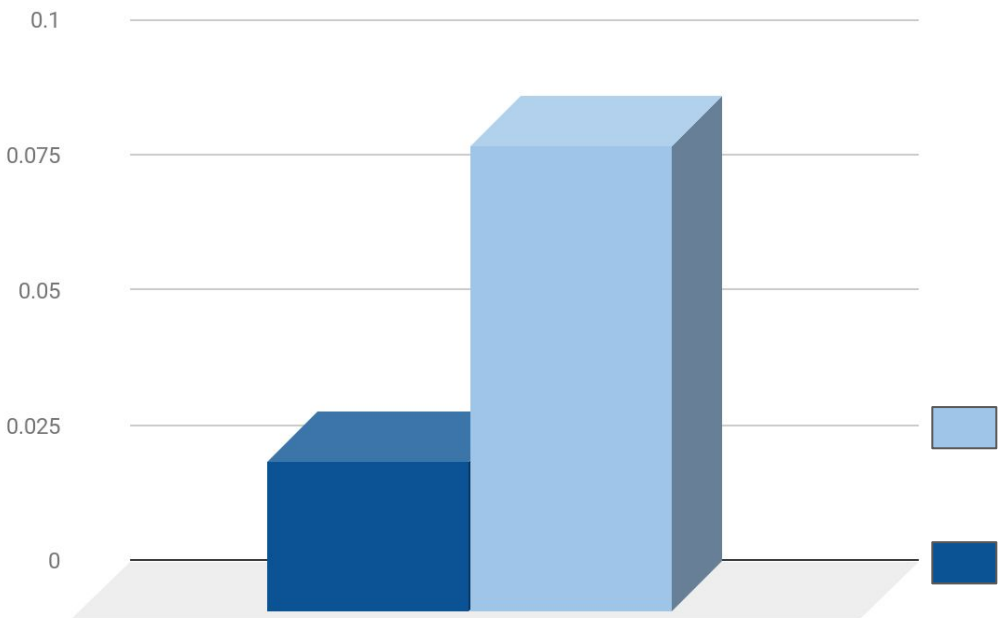
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and Medium Gap



Effectiveness ratios



Life expectancy and HALE are increasing in Israel. The country has developed healthcare system, but some improvements should be done: enhance primary care services by expanding the number of chronic disease conditions covered through data monitoring and encouraging younger doctors to work in primary care, boost current efforts to tackle inequalities in health care coverage

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Israel

STRENGTHS

- The life expectancy at birth is high and is 81.3 years for males and 84 years for females and is predicted to increase further.
- The healthcare system in Israel is comprehensive consistent of two levels: public and private with prevalence of public sector.
- Medical system of Israel is effective and is example for other countries because its primary care is closely connected with preventive medicine.
- Low levels of amenable and infant mortality.
- Mental health care is broad and includes psychotherapy, medications, and inpatient and outpatient care.

WEAKNESSES

- Healthcare expenditure in Israel is lower that the OECD average. It was 7.3% of GDP in 2013.
- The share of public spending in Israel is only 60% of total health expenditures that is considerably lower than the OECD average.
- There was a significant growth of out-of-pocket spending on health.
- There is a low density of nurses per population.
- Lack of availability of services and professionals in peripheral regions.
- Financial barriers to care, particularly for those with low incomes and other vulnerable populations

OPPORTUNITIES

- Utilize the advanced healthcare technologies in Israel.
- Use the increasing opportunities offered by digitalization and eHealth. Integration of technologies to the healthcare system makes it easier for people to achieve good and equal health and welfare.
- Adoption of P4 medicine will increase efficiency of healthcare system in terms of rise of health-adjusted life expectancy. P4 medicine will use the power of systems medicine and big data to bring to bring all individuals into their 90s with full mental and physical function.

THREATS

- Israel's healthcare system is under pressure of growing demand on services and limited public financing.
- The rising costs on the medicine can lead to the deficit in funding of healthcare facilities.
- Lots of physicians are going to retire that create a risk of shortage of medical workforce.
- The ageing of the population arises the growing demand on the healthcare services and financial resources.
- There was a significant increase in the Alzheimer's disease and lower respiratory infections burden that along with the ischemic heart disease and stroke are the main reasons of death.

Analysis of Strengths and Weaknesses of Health Care System in Israel

- The Israeli healthcare system sets high standards for care to meet growing of population.
- Israel succeeded in building efficient and comprehensive primary healthcare system
- The healthcare system is relatively accessible and highly qualitative due to the HAQ index that was 84.8 in 2017.
- Smoking rate for Jewish men is lower than for Arabian and is 21% of total Jewish men that is also lower that the OECD average.
- Alcohol consumption is lower than in other OECD countries.
- All health plans have electronic health record (EHR) systems that link all community-based providers—primary care physicians, specialists, laboratories, and pharmacies. All GPs work with an EHR. Hospitals are also computerized but are not fully integrated with the health plan EHRs.

- CDVs and lung cancer are the main reasons of the premature deaths in Israel.
- Low back pain, headache and depressive disorders along with blindness are the major causes for the disability-adjusted years.
- High fasting plasma glucose, tobacco and high-body mass index are the key risks for the death.
- he Middle Eastern country suffers from chronic shortages of nurses, hospital beds, and scanning devices such as MRIs and CTs.
- There are long wait times for hospital care and emergency room care.
- The country is also facing the threat of a physician shortage in the foreseeable future due to retirement.
- Private health expenditures in Israel are high in comparison to the OECD and US averages

Recommendations for Israel

- **Promoting greater poverty awareness at all levels of the health system.** Compiling, analyzing, and publicly disseminating information about health care disparities, including periodic reporting of variations in health and health care access and instituting an annual conference showcasing initiatives to reduce disparities.
- **Implementing intersectoral efforts to address the social determinants of health and promote healthy lifestyles.** Consuming more fruits, veggies and whole grains, along with not smoking, staying lean and exercising 30 minutes daily may help prevent leading causes of death, including high blood pressure, heart disease, diabetes.
- **Reducing surgical waiting times**. Long waiting times are perceived as one of the major causes of the recent growth in private financing and care provision. The government should develop initiatives to reduce surgical waiting times. This will involve additional funding to expand the hours of operation for surgical theaters, as well as a series of organizational changes to improve efficiency.
- **Adoption of P4 Medicine concept in healthcare.** P4 Medicine is the care that is predictive, preventive, personalized and participatory. Together, these capabilities will prevent the development of many of the chronic conditions that ravage our collective health and cost our system billions every year.
- **Development of regenerative medicine.** Regenerative medicine seeks to replace tissue or organs that have been damaged by disease, trauma, or congenital issues. There is a lack of donors for an organ transplant, and the budget set for patients to go abroad is not enough to accommodate the number of people waiting. Approximately 100 people die annually waiting for approval to go abroad for surgery.
- **International collaboration on ageing.** Strategic partnership between countries would provide access to world's most successful practices for the maintenance the optimal state of health and best forms of AgeTech, WealthTech and other technologies, products, services and social policies.

Italy

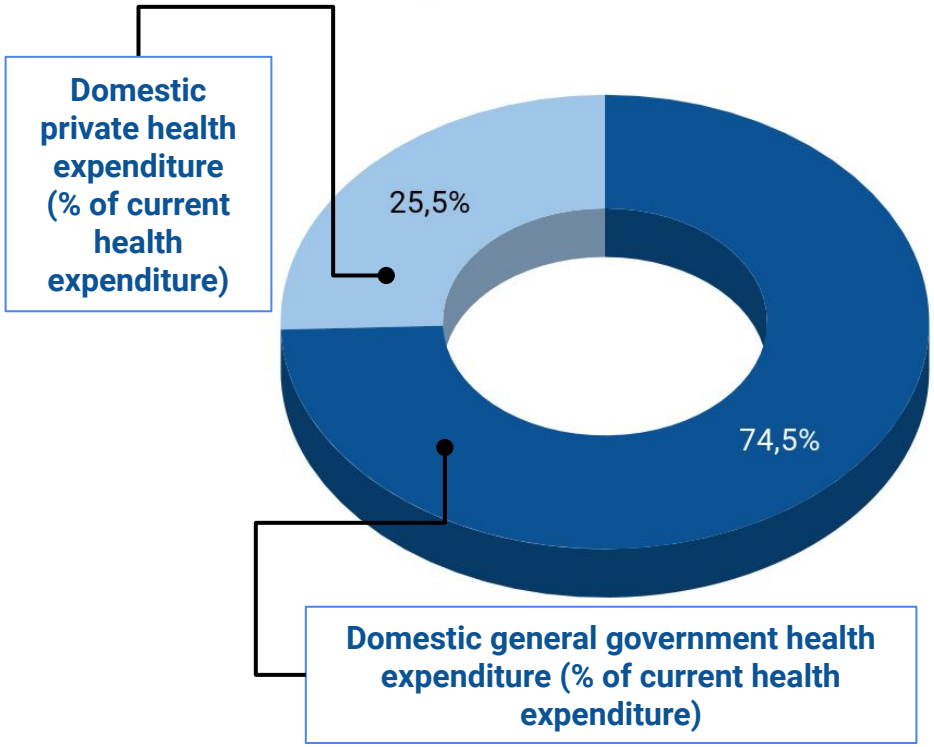
General metrics

HALE	Both Sexes HALE (2016)	73.2 years
	HALE/Life Expectancy Difference 2016	9.6
Economy	GDP per Capita, Current Prices (2016)	30.83 thousand ($)
	Annual GDP Growth (2016)	1.1 %
Healthcare	Current Health Expenditure per Capita (2016)	2.74 thousand ($)
	Public Health Care Expenditure 2016	8.94 % of GDP
Retirement	Age Dependency Ratio 2016	57
	Population over 65, 2016	22.7 %
	Number of WHO Age Friendly Cities and Communities	3
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	7.5
	Annual Cigarette Consumption (Units per Capita) 2016	1493
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	58.5 % of adults

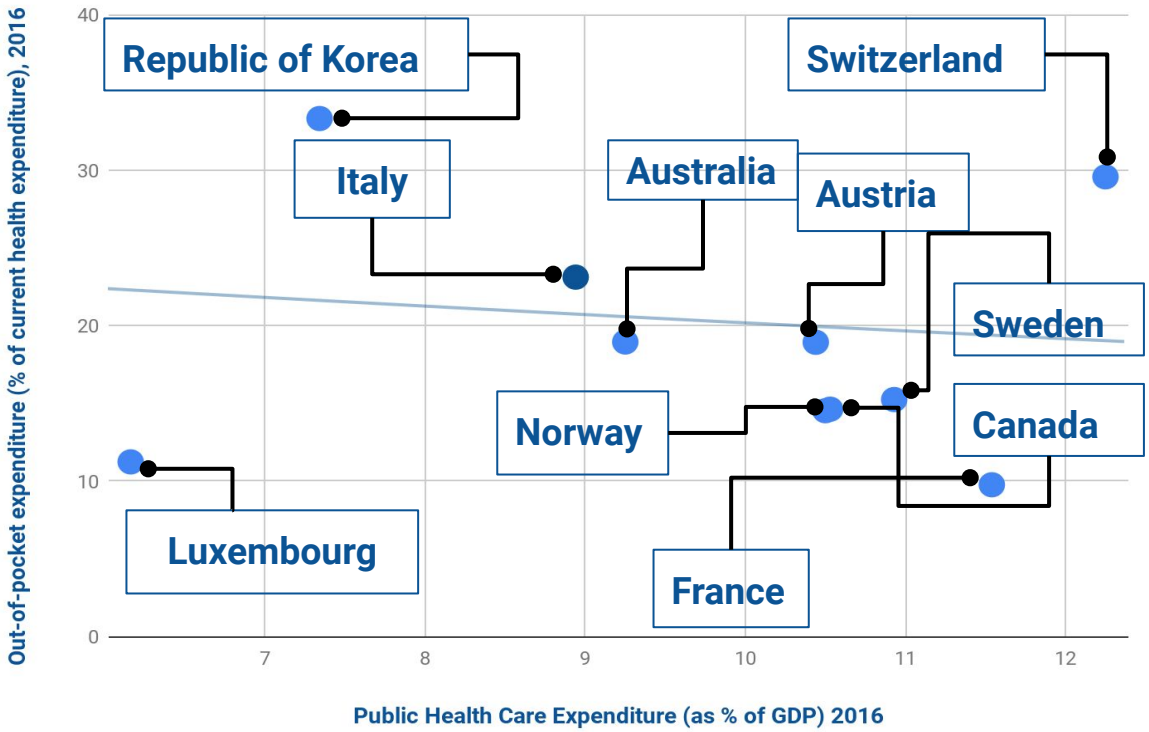
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **95**
- Human Development Index 2016: **0.88**
- E-Government Development Index 2016: **0.78**
- Corruption Perceptions Index 2016: **47**
- Global Gender Gap Index 2016: **0.72**
- Democracy Index 2016: **7.98**

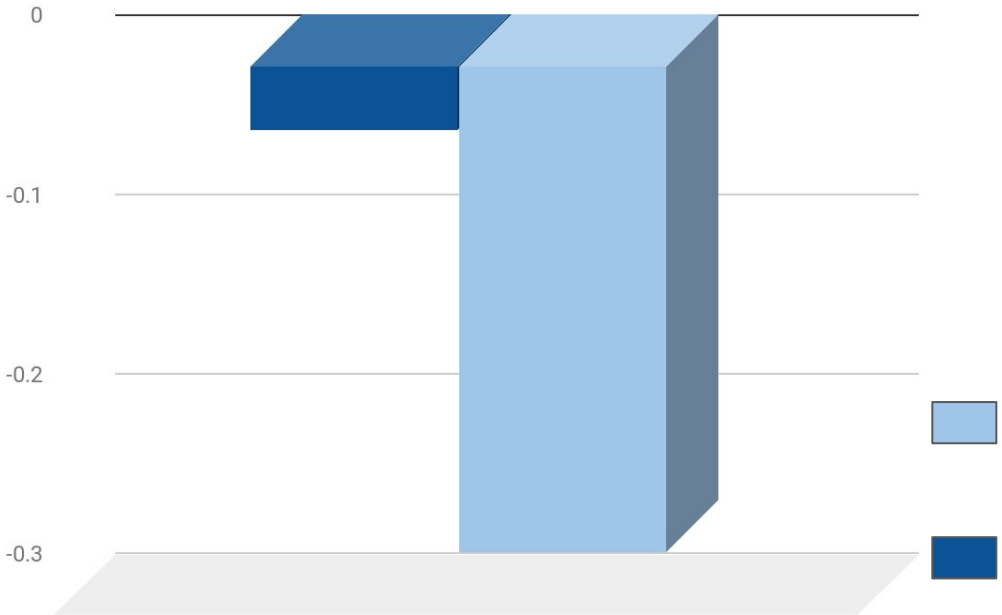
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



Further efforts are needed to reduce smoking rates, so as to reduce deaths from lung cancer and other smoking-related deaths and the prevalence of overweight and obesity

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Italy

STRENGTHS

- The life expectancy at births was 82.6 years in 2015 slightly higher that the OECD average and the fourth highest in the EU.
- Italy has one of the levels of obesity that is only 10.3%.
- Healthcare system in Italy is comprehensive offering the universal coverage.
- Primary care in Italy is of high quality with low levels of admissions for some diseases.
- Italy has good levels of cancer survival and mortality.
- There are low levels of amenable and infant mortalities suggesting that the Italian medicine is effective in treating of life-threatening conditions.

WEAKNESSES

- There is a high level of antibiotics prescribed and defined at 27.5 daily doses per 1000 population.
- The level of healthcare expenditure per capita is slightly lower than the OECD average.
- There is the lowest doctors per nurses level in Italy along with the shortage of acute beds in hospitals.
- Community care and preventive medicine are less developed in Italy that in other OECD countries.
- Disparities in health status exist across regions and socioeconomic groups.

OPPORTUNITIES

- The focus on care integration and coordination to improve efficiency of healthcare sector.
- Adoption of P4 medicine will increase efficiency of healthcare system in terms of rise of health-adjusted life expectancy. P4 medicine will use the power of systems medicine and big data to bring to bring all individuals into their 90s with full mental and physical function.
- Strong commitment to adopt new technologies and improve performance measurement by strengthening eHealth and health information infrastructure.

THREATS

- Ageing of the population arises new challenges for the life expectancy.
- Italy has the second highest dementia prevalence among the OECD countries and its ratios are predicted to increase.
- High levels of obesity among adolescents.
- 21% of adolescents in Italy are smoking regularly.
- There are low rates of physical activity among the teenages in Italy.
- Access to health care in Italy varies largely by region and income group.

Analysis of Strengths and Weaknesses of Health Care System in Italy

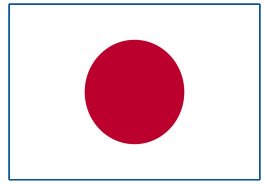
- The smoking rates in Italy are slightly below the EU average and tend to decrease.
- The alcohol consumption in Italy fell and it is well below the EU average.
- Healthcare system is accessible and core services are free for citizens and foreigners both as the HAQ index is 94.9.
- Italian women at age 65 can live 22.2 years more while Italian men are expected to have additional 18.9 years at 65.
- Two-thirds of the Italian population report being in good health, a rate close to the EU average.
- Italian primary healthcare makes the strong emphasis on the effective care coordination and guarantees.

- The population is ageing dashingly (22% of total population are older than 65 years) and it is the oldest in Europe.
- Disparities in the use of specialist care, diagnostic services and basic medical tests are largely connected to higher health literacy of the well-off (affecting the utilisation rates of preventive services and screening), and low-quality services and long waiting lists.
- Provision of the long-term care in Italy remains to be poor if to compare with other developed countries.
- There is a relatively high out-of-pocket spending in Italy - 23% of total costs.
- There is a low amount of disability-free years that Italian elders can live.
- Cardiovascular diseases and cancer are the main reasons for the deaths for Italian people.
- There was a significant increase in the deaths from Alzheimer's disease and other forms of dementia since 200 year.

Recommendations for Italy

- **Stop focusing on "sick care."** Health care leaders must shift the nation's "sick care" approach to care that is preventive and comprehensive.
- **Reduce socioeconomic inequality and disparities in health outcomes.** Despite full coverage for basic medical services, 7% of Italians reported some unmet needs for medical care in 2015 either for financial reasons, geographic reasons (having to travel too far) or waiting times. This is a higher proportion than the EU average (less than 4%) and has grown in recent years. Most of the unmet medical needs are attributable to care being too expensive, with waiting lists and geographic barriers accounting for a relatively small share.
- **Adoption of P4 medicine concept in healthcare.** Preventive, precision, personalised and participatory care will increase efficiency of healthcare system in terms of rise of health-adjusted life expectancy. P4 medicine will use the power of systems medicine and big data to bring to bring all individuals into their 90s with full mental and physical function.
- **Utilizing AI opportunities for preventive medicine and precision health.** Translating the tremendous growth in data into clinical insights falls into the hands of AI (artificial intelligence)/ML (machine learning) platforms. The rapid growth in investment in AI and cloud computing are beginning to create the foundations for the precision health market of the future. But apart from advanced research it is important to provide effective, low-cost treatments that work, triggering unnecessary treatments and higher costs down the line.
- **Focus on health status of elderly.** The government should initiate strategy focused on health status of elderly and ageing population. Provision of increasingly complex mechanical and electronic devices for the treatment and rehabilitation of older persons, development of socialization activities for elderly to handle stress better, social activities may lead to important increases in cardiovascular health and an improved immune system.

Japan



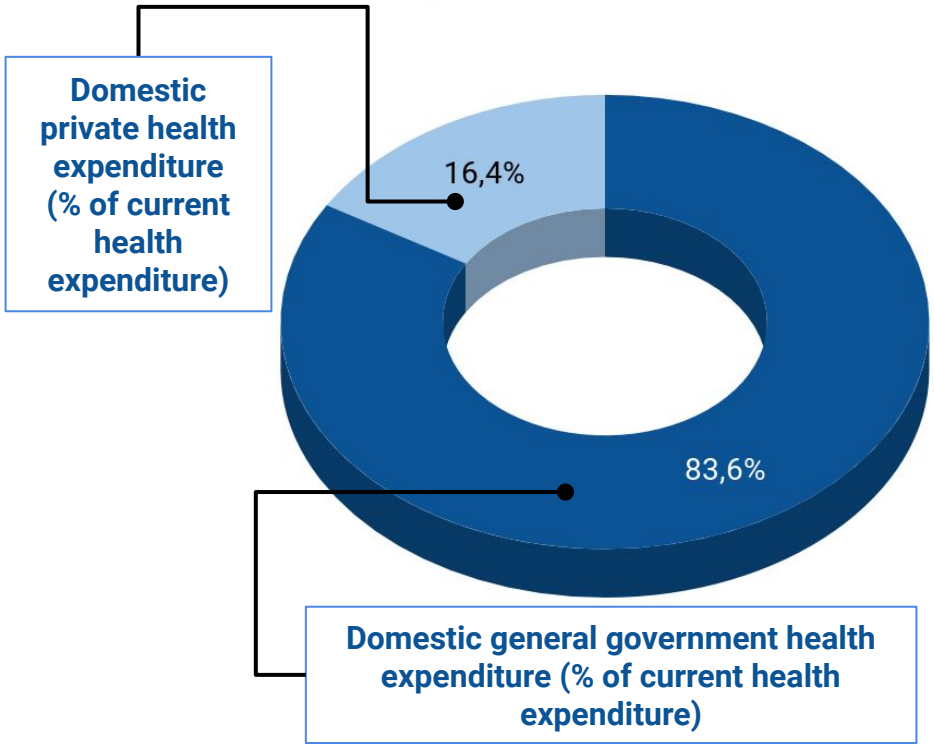
General metrics

HALE	Both Sexes HALE (2016)	74.8 years
	HALE/Life Expectancy Difference 2016	9.4
Economy	GDP per Capita, Current Prices (2016)	38.79 thousand ($)
	Annual GDP Growth (2016)	0.6 %
Healthcare	Current Health Expenditure per Capita (2016)	4.23 thousand ($)
	Public Health Care Expenditure 2016	10.93 % of GDP
Retirement	Age Dependency Ratio 2016	65
	Population over 65, 2016	26.6 %
	Number of WHO Age Friendly Cities and Communities	24
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	8
	Annual Cigarette Consumption (Units per Capita) 2016	1583
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	27.2 % of adults

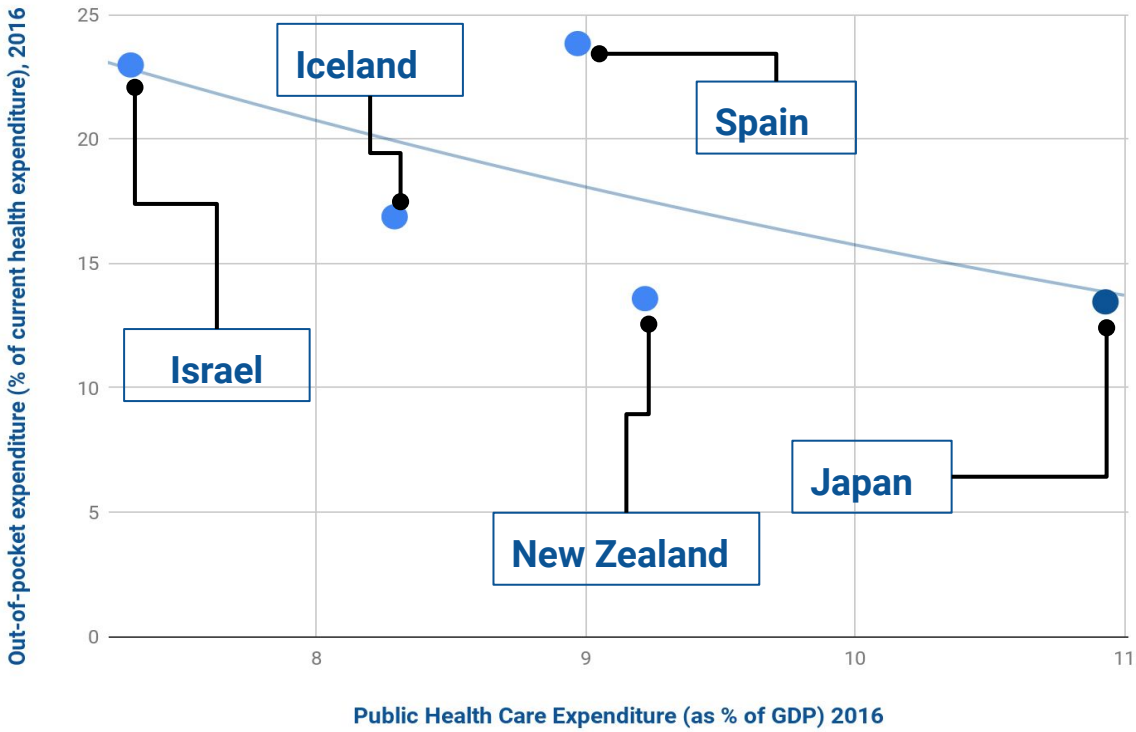
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **94**
- Human Development Index 2016: **0.91**
- E-Government Development Index 2016: **0.84**
- Corruption Perceptions Index 2016: **72**
- Global Gender Gap Index 2016: **0.66**
- Democracy Index 2016: **7.99**

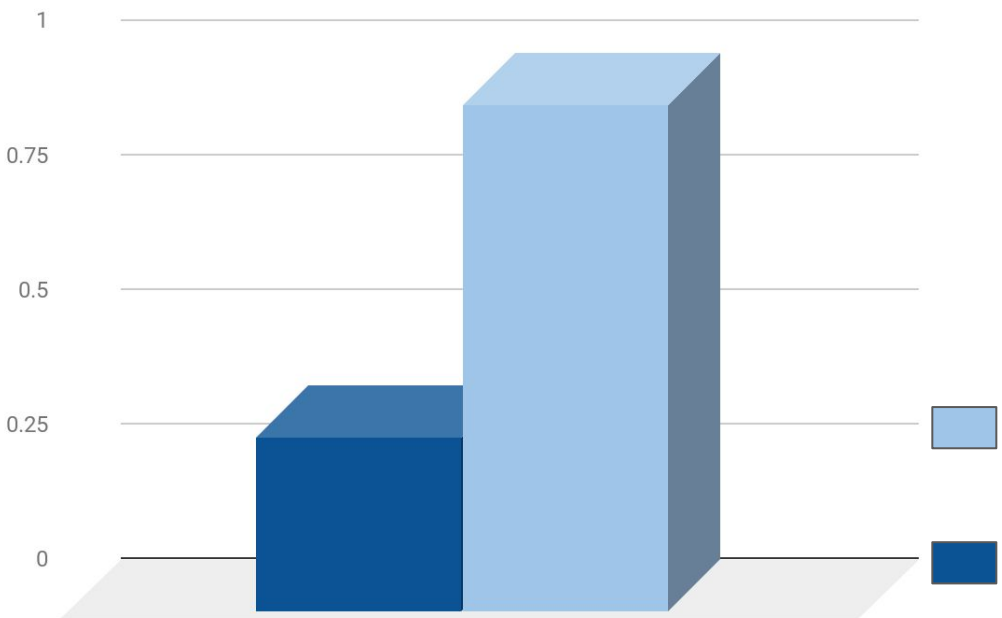
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and Medium Gap



Effectiveness ratios



Japan is facing a rising burden of chronic disease, and a rising number of frail and elderly persons. In addition, Japan faces some relatively unique public health risks, notably a significant exposure to natural hazards such as earthquakes, floods, typhoons, and tsunamis. So, improvement of public health emergencies systems are in priority.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Japan

STRENGTHS

- Japan has the highest life expectancy among the OECD countries. Life expectancy at birth was 83.9 years in 2015.
- Japan has the lowest obesity rates and low alcohol consumption if to compare with other OECD countries.
- Cancer survival remains to stay at good levels.
- Healthy life expectancy at birth, the average number of years that a newborn can expect to live in full health, rose from 70.4 years in 1990 to 73.9 years for both sexes in 2015.
- The burden of communicable diseases has decreased substantially over the past five decades.

WEAKNESSES

- Japan has the highest dementia prevalence among the OECD countries at 2.7% of population in 2017.
- There are high occupancy rates, especially, among elders for the long-term care.
- The suicide level is significantly above the EU average despite the significant efforts of the government putted to reduce the level starting from 2007.
- Like many other high-income countries, non-communicable diseases (NCDs) are now the leading cause of mortality and morbidity in Japan.

OPPORTUNITIES

- Japanese institutions are fully involved in the process of the of building of communities that can help people with chronic conditions and their families to withstand the illnesses.
- Japanese government have strong aims to improve the healthcare coordination for primary and long-term care sectors to address the challenge of the ageing population.
- Utilising AI opportunities in precision medicine, preventive health, drug discovery.
- There is an increasing demand on the healthcare services.

THREATS

- Ageing of the population is a rising issue for healthcare and pension systems stability.
- There is a high level of smoking among men that is 30%.
- Cancer causes 28.7% of deaths according to the data of 2015 and remains to be the main reason for mortality in Japan.
- Incidents of deaths from tuberculosis are slightly higher than the OECD average.
- There is a heavys salt consumption in Japan.
- Low back pain, headache disorders and diabetes are main reasons for DALY.

Analysis of Strengths and Weaknesses of Health Care System in Japan

- Health spending averages $4 519 per person (adjusted for local costs), slightly higher than the OECD average.
- Alcohol consumption and transport accident deaths have decreased substantially over the past 50 years.
- Mortality from the cardiovascular diseases is among the lowest in the OECD countries.
- In the past five decades, Japan has achieved a large number of health successes. These include the full implementation of universal insurance coverage, cultivating the world's highest healthy life expectancy, and the control and even eradication of common infectious diseases.
- Personal healthcare access and quality index is 94.1.
- The healthcare system is Japan is comprehensive and consists of two levels: public and private that offer the universal coverage for medical services.

- Hospital admissions for diabetes are higher than the OECD average.
- 20% of population consumes 69% of alcohol and it is third highest concentration in OECD countries.
- There are low screening rates for the breast cancer and mammography.
- Mortality from acute myocardial infarction is 50% higher than the OECD average.
- Negative population growth, an ageing population, low fertility, a shrinking economy, increasing unemployment, and an increasing NCD-related disease burden are considered to be major issues on the way to healthy Longevity improvements.
- Although the overall life expectancy and healthy life expectancy have been increasing in Japan, there are increasing disparities among prefectures, demonstrating a need for region-specific health policies.
- Japan has made limited progress in reducing tobacco consumption over the past few decades, and it remains a leading cause of premature death.

Recommendations for Japan

- **Introduce long term care insurance system.** Japan is facing super ageing problem; the number of elderly population is expected to grow from the current 16 million to 20 million by 2020, and the working population will be expected to decline from 109 million to 100 million during the same period. This demographic change will require drastic reform of healthcare and long-term care systems. Unless tackled, the rapid increase in aging population can impose a large burden on the health care system including universal health insurance system.
- **Support healthy and disease-free lifestyles with emphasis on health status of elderly.** Promoting healthy, disease-free aging must be a central priority for Japan, and attention must also be paid to the potential for rising rates of risky health behaviour, alcohol consumption and even rates of obesity.
- **Development of health information systems for better monitoring and evaluation.** A strong health information system has the potential to be the backbone for monitoring and evaluating different aspects of health check-ups and cancer screening and further developing its secondary prevention policies.
- **Shift from "sick care" to preventive medicine.** The government should focus on reduction of diseases burden through provision of initiatives aiming to deliver more years in good health and decrease the gap between life expectancy and health-adjusted life expectancy. The goal of healthcare policy is to build a sustainable health care system that delivers better health outcomes through care that is responsive and equitable to each member of the society and that contributes to prosperity in Japan and the world.
- **Utilise AI opportunities for precision health for cost-efficiency and improved health outcomes.** Japan should consider using innovative approaches taken in other countries in context of prevention. For example, within the national cancer screening programmes, a use of selected self-sampling tools for cancer screening were found effective in reaching out to non-participants for cervical and colorectal cancer.

Luxembourg

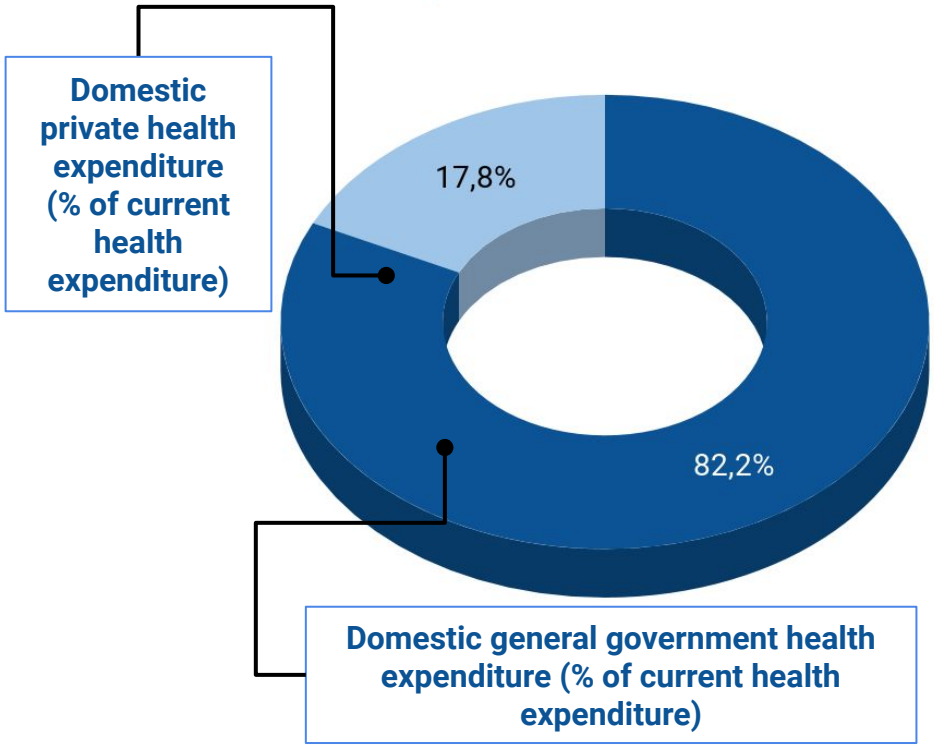
General metrics

HALE	Both Sexes HALE (2016)	72.6 years
	HALE/Life Expectancy Difference 2016	9.7
Economy	GDP per Capita, Current Prices (2016)	101.3 thousand ($)
	Annual GDP Growth (2016)	2.4 %
Healthcare	Current Health Expenditure per Capita (2016)	6.27 thousand ($)
	Public Health Care Expenditure 2016	6.16 % of GDP
Retirement	Age Dependency Ratio 2016	44
	Population over 65, 2016	14.1 %
	Number of WHO Age Friendly Cities and Communities	1
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	13
	Annual Cigarette Consumption (Units per Capita) 2016	6330
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	58.7 % of adults

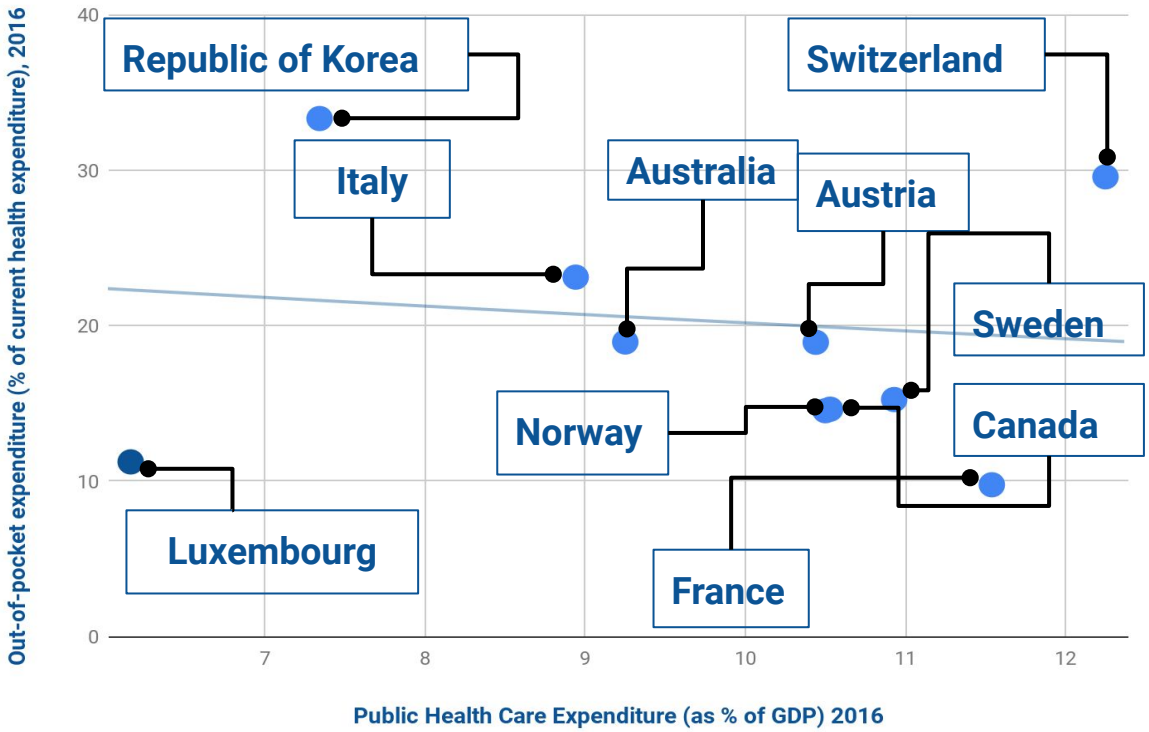
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **96**
- Human Development Index 2016: **0.9**
- E-Government Development Index 2016: **0.77**
- Corruption Perceptions Index 2016: **81**
- Global Gender Gap Index 2016: **0.73**
- Democracy Index 2016: **8.81**

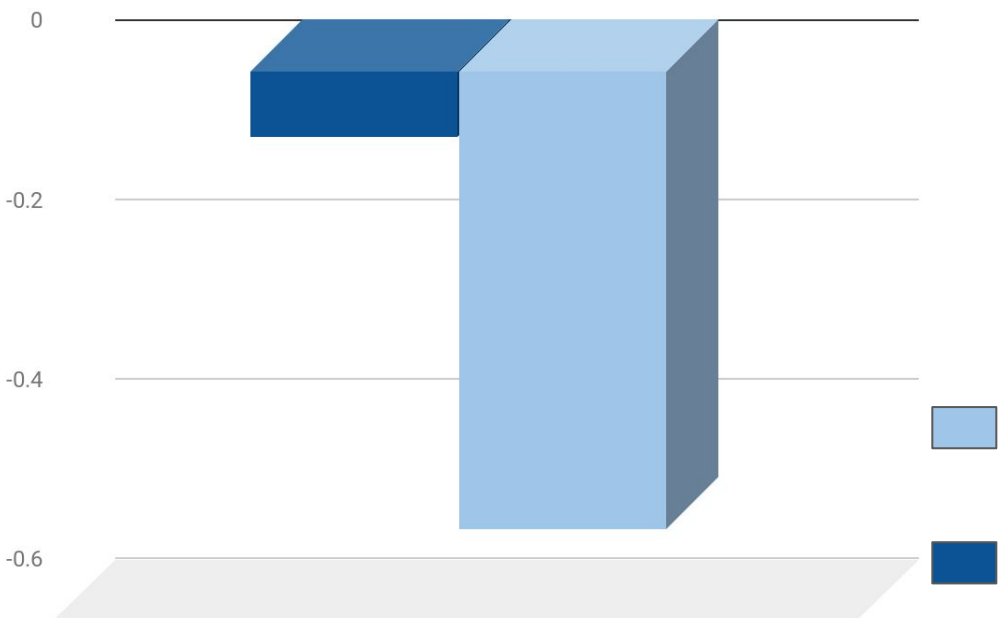
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



A set of health strategies, targeted health awareness promotion and prevention activities aims to address death risks and reduce level of chronic diseases.

SWOT Analysis of Healthcare in Luxembourg

STRENGTHS

- Healthcare system in Luxembourg is comprehensive and based on compulsory social insurance.
- 95.2% of citizens were covered by the social insurance in 2016.
- The primary care is comprehensive and relatively good coordinated.
- Amenable mortality is among the best in EU and is the evidence of the healthcare efficiency in Luxemburg.
- There is a good quality of healthcare services and products and high level of self-reported health.
- There was a good rate for vaccinations for children.

WEAKNESSES

- Number of elders that receive long-term care at home is lower than the OECD average.
- Fruit and vegetable consumption is below the EU average.
- Healthcare in Luxemburg is the most expensive in Europe.
- The healthcare providers are critically dependent on foreign nurses and foreign-trained doctors.
- There is a low number of physicians in country.
- The primary care governance is weak.
- 23% of adults in Luxemburg are obese.
- Heavy episodic drinking is higher than in Europe.

OPPORTUNITIES

- Special Acts are accepted to improve the living conditions for people with dementia and diagnose this disease in early stages to reduce the mortality rate caused by it.
- Reducing cancer mortality through early detection and greater prevention.
- Improve hospital efficiency.
- Generate additional databases on health through voluntary patients' contributions.
- The health system's cost-effectiveness could be improved, particularly with greater use of generics.

THREATS

- Shifting demographics, resulting in ageing population.
- Increase in public health spending and changes in finance and reimbursement policies.
- There is a great amount of prescriptions of antibiotics in Luxemburg. This country has the 6th highest antibiotic consumption in Europe that can lead to rising bacterial resistance.
- There are concerns over growing healthcare costs.
- Growing mortality from pancreatic cancer and diabetes give cause for concern

Analysis of Strengths and Weaknesses of Health Care System in Luxembourg

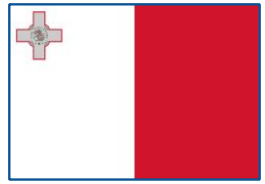
- Life expectancy is high and was 82.4 years in 2015, and this indicator is above the EU average.
- Free choice of providers by the patient and direct access to specialists. Global supervision and planning of hospital and pharmaceutical sectors
- 82% of spending on health is publicly funded and it is among the highest spending per capita in the world..
- Per capita health care spending in Luxembourg is the highest among EU countries. This allows for a very generous benefits package with low cost-sharing and high quality of health care services.
- The population benefits from good financial and geographic access to services, which is reflected in the low level of unmet needs and out-of-pocket expenditure

- Mortality due to the diabetes continues to increase.
- There was an increase in the smoking rates through the past decades and led to the rises in mortality rates for lung cancer among women.
- Alcohol is the second leading cause for the road accidents caused 30% of fatalities in 2015.
- Excessive alcohol consumption among adults and young adults remains a concern. 15% of adults in Luxemburg were smoking tobacco every day according to the data of 2015 year.
- There is room for making prevention and treatment of diseases such as diabetes more effective.
- There are difficulties in attracting and retaining skilled workforces.
- Availability of health care services seems to be very good, although many complex treatments and diagnostic procedures are routinely provided in neighbouring countries because the size of Luxembourg's population makes it inefficient to offer services domestically.

Recommendations for Luxembourg

- **Support healthy and disease-free lifestyles with emphasis on health status of elderly and health awareness.** Behavioural risk factors – smoking, drinking and obesity – are important challenges for the health system and reveal substantial inequalities according to education and income status. A comprehensive set of health strategies, targeted health promotion and prevention activities should to address these risks.
- **Facilitate government initiatives related to behavioral risk factors caused by income and education inequality**: improve health and medical care that more actively promotes good health, promote good eating habits and safe food to decrease obesity and overweight, reduced the use of tobacco and alcohol, eliminate avoidable health status gaps between population groups within one generation.
- **International collaboration on ageing.** Strategic partnership between countries would provide access to world's most successful practices for the maintenance the optimal state of health and best forms of AgeTech, WealthTech and other technologies, products, services and social policies.
- **Utilising advanced technologies and implementation social policies to improve efficiency of healthcare.** Setting up appropriate information systems will be key in this effort.AI will enable healthcare professionals to understand diseases faster and make better clinical decisions, and it will help researchers innovate quickly by failing fast en route.
- **Provide incentives for development of patient-centered treatments.** Strengthen prevention and health promotion across all areas of life including day-care centres, schools and nursing homes, strengthen workplace health promotion and better integrate it with occupational safety and health.
- **Improve engagement of high-qualified staff in healthcare.** The government should provide financial incentives for medical staff in public sector and funding to state healthcare services.

Malta



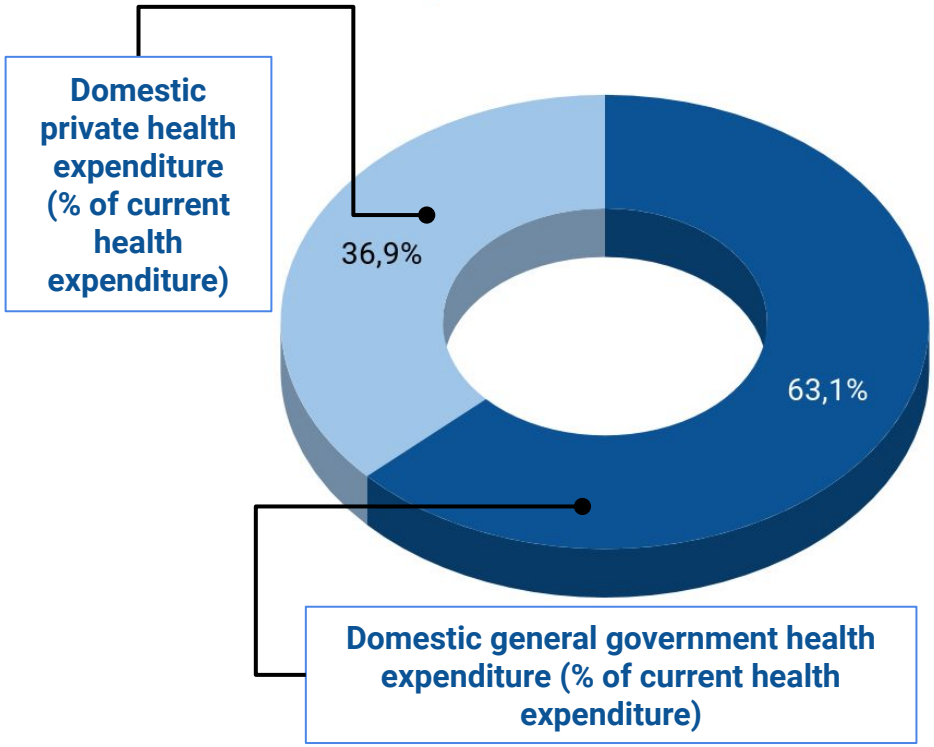
General metrics

HALE	Both Sexes HALE (2016)	72.2 years
	HALE/Life Expectancy Difference 2016	9.3
Economy	GDP per Capita, Current Prices (2016)	25.13 thousand ($)
	Annual GDP Growth (2016)	5.7 %
Healthcare	Current Health Expenditure per Capita (2016)	2.39 thousand ($)
	Public Health Care Expenditure 2016	9.3 % of GDP
Retirement	Age Dependency Ratio 2016	50
	Population over 65, 2016	18.9 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	8.1
	Annual Cigarette Consumption (Units per Capita) 2016	1527
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	66.4 % of adults

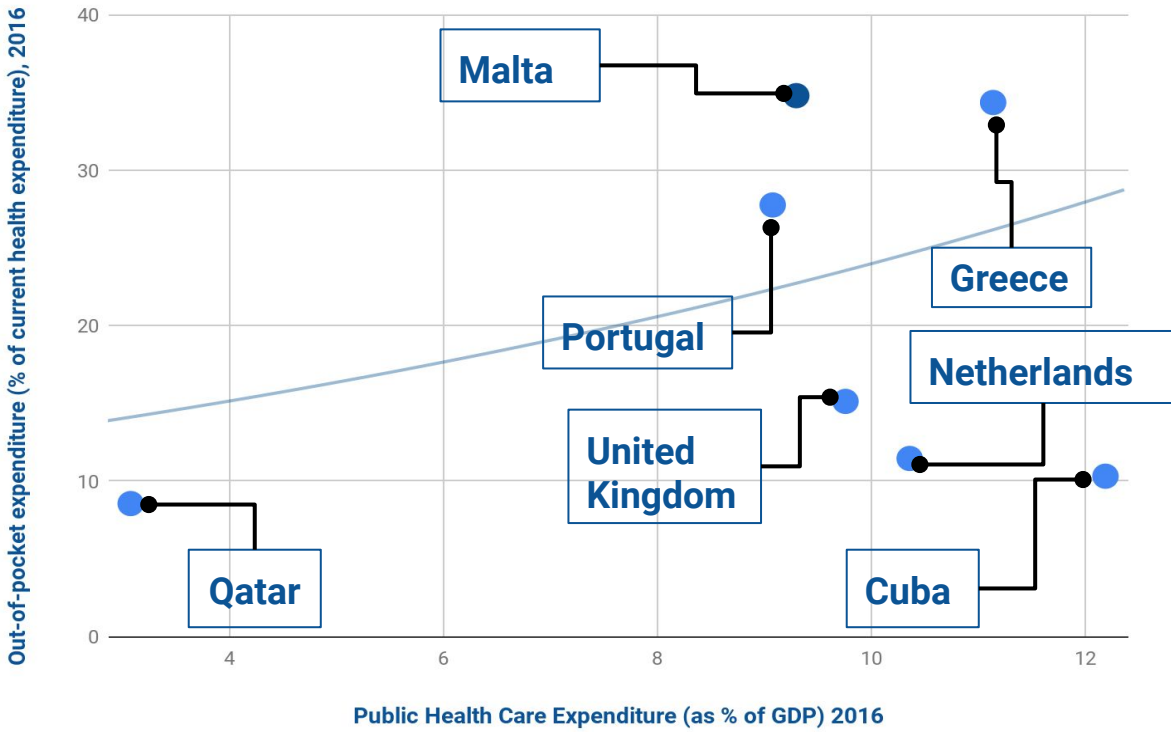
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **90**
- Human Development Index 2016: **0.88**
- E-Government Development Index 2016: **0.74**
- Corruption Perceptions Index 2016: **55**
- Global Gender Gap Index 2016: **0.66**
- Democracy Index 2016: **8.39**

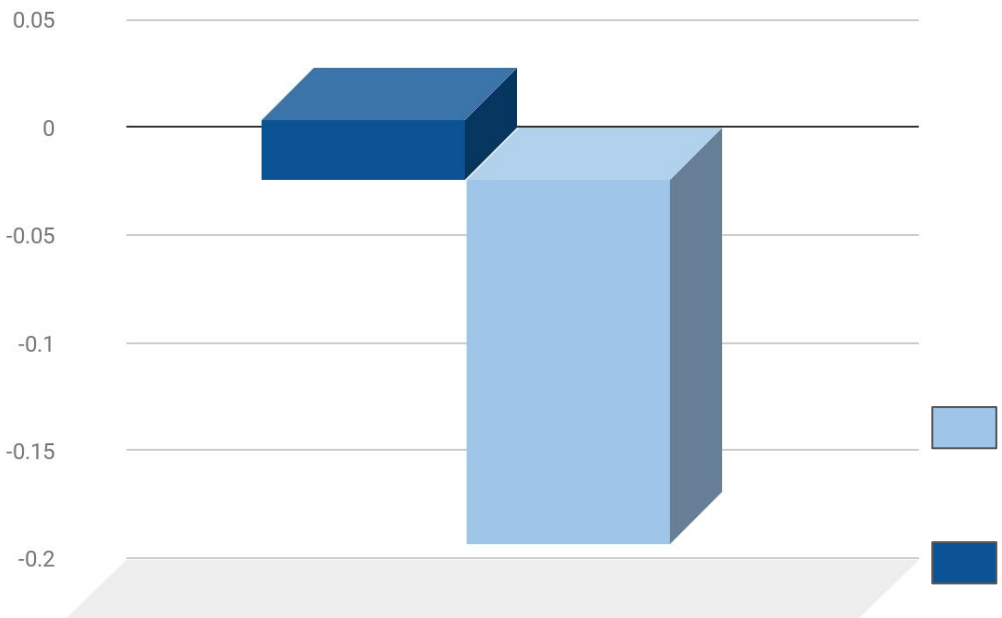
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Medium Gap



Effectiveness ratios



HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

Malta has the highest obesity rate in the EU, and this remains the major public health issue, both in adults and in children. Poor health behaviours tend to be most common among lower socio-economic groups. Policies should deal with encouragement of health behaviour and reduction of income inequality.

SWOT Analysis of Healthcare in Malta

STRENGTHS

- Life expectancy at birth is 81.9 years which is higher EU average.
- There was a significant reduction in premature deaths from cardiovascular diseases.
- Amenable mortality in Malta has fallen rapidly for the few past decades.
- There is a good access to the healthcare in Malta with low number of unmet needs.
- Maltese people enjoy 90% of their lives in good health.
- Malta has successfully tackled long waiting times for surgical interventions and diagnostics.

WEAKNESSES

- Health expenditure is lower than EU average and reaches 8.4% of GDP.
- There is a high level of out-of-pocket that is about 30% of total expenditures.
- There is at least a three-year gap in life expectancy between people with lower and higher education qualifications.
- In 2015 Malta recorded the third highest rate of newly reported HIV cases in the EU/EEA.
- Health inequality is caused by socioeconomic disparities in Malta: a third of those in the lowest income quintile are obese compared to only one fifth in the highest.

OPPORTUNITIES

- There is a great room for the capacity building and increasing the number of doctors, nurses and facilities.
- Develop government-led plan and specific programmes that aim to decrease probability of premature deaths with particular focus on behavioral risk factors.
- Expand acute hospital capacity and geriatric care.
- Well-composed primary care based on the reimbursement model including transparency, quality control and equal distribution of the resources among the facilities.

THREATS

- 20% of adults smoked tobacco every day.
- Increasing alcohol consumption among adults.
- Obesity rates are highest in the EU as the quarter of the adult population and 30% of adolescents are obese.
- Shifting demographics, resulting in ageing population.
- Increase in public health spending and changes in finance and reimbursement policies.
- Death rates from the ischemic heart disease are above the EU average.
- 27% of deaths in Malta are caused by cancer.

Analysis of Strengths and Weaknesses of Health Care System in Malta

- Maltese men and women aged 65 and over can expect to live 13.4 years and 14.0 years respectively of their remaining life free of disability, the second highest among EU countries.
- There was a significant decline in mortality rates from treatable cancers and respiratory diseases.
- More than 70% of people in Malta report being in good health.
- Healthcare system in Malta is comprehensive and characterised by predominantly public providers in the hospital sector and a pluralism of providers in the primary care and ambulatory care specialist sectors.
- Waiting lists for hospital interventions have been successfully reduced by increasing the number of procedures performed in public hospitals.
- Essential medicines are free of charge for low income households

- Ischemic heart disease, musculoskeletal disorders and diabetes are the main reasons for the disability-adjusted years.
- There was an increase of the cases of Alzheimer diseases since 2000 due to the lack of the effective treatments.
- More than one in five people in Malta lives with hypertension, one in twelve lives with diabetes, and one in seventeen lives with asthma.
- There are low level of physical activities among adults and 15-year-olds in Malta.
- Malta records relatively high levels of deaths within 30 days of admission to hospital for acute myocardial infarction.
- Malta faces important fiscal challenges, in part due to the expected costs of caring for its ageing population and associated increases in chronic conditions.

Recommendations for Malta

- **Enhance eHealth infrastructure.** To achieve higher efficiency of healthcare system and better health outcomes in context of ageing and life expectancy improvements the government should modernise health centres by providing the latest technological equipment. The government also should give particular attention to development of eHealth systems, include the creation of electronic patient records in primary health care, e-prescription services and patient registries.
- **Shift from "sick care" to preventive medicine.** Enhancement of primary care through incorporation of advanced preventive medicine is an important step on the way to Healthy Longevity. Strengthening public primary and community care would also result in fewer self-referrals to hospital emergency departments for minor ailments and conditions where treatment costs are much higher.
- **Move to a life-course perspective in tackling the rising epidemic of "metabesity."** Initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of behavioral factors such as insufficient physical ability, overweight, alcohol abuse, smoking. This will stimulate policy initiatives that supplement income and improve educational opportunities, housing prospects, and social mobility as income is strongly associated with morbidity and mortality.
- **Introduce long term care insurance system.** Malta faces important fiscal challenges, in part due to the expected costs of caring for its ageing population and associated increases in chronic conditions. Current demographic trends pose threats on fiscal sustainability. The government should provide incentives for longevity financial industry development to minimise future risks exposure.
- **Enhance physical healthcare infrastructure and extend its network.** Increased immigration from workers and pensioners, tourists using the health system and changing population risk behaviours stretch healthcare system capacity.

Mexico

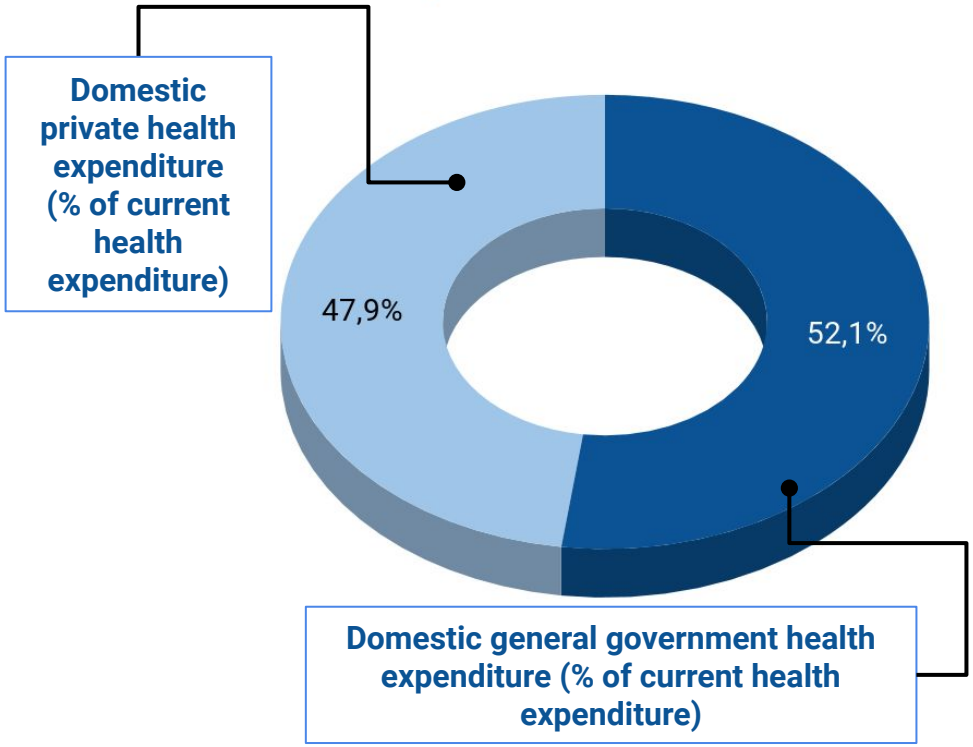
General metrics

HALE	Both Sexes HALE (2016)	67.7 years
	HALE/Life Expectancy Difference 2016	8.9
Economy	GDP per Capita, Current Prices (2016)	8.74 thousand ($)
	Annual GDP Growth (2016)	2.9 %
Healthcare	Current Health Expenditure per Capita (2016)	0.46 thousand ($)
	Public Health Care Expenditure 2016	5.47 % of GDP
Retirement	Age Dependency Ratio 2016	51
	Population over 65, 2016	6.7 %
	Number of WHO Age Friendly Cities and Communities	2
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	6.5
	Annual Cigarette Consumption (Units per Capita) 2016	327
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	64.9 % of adults

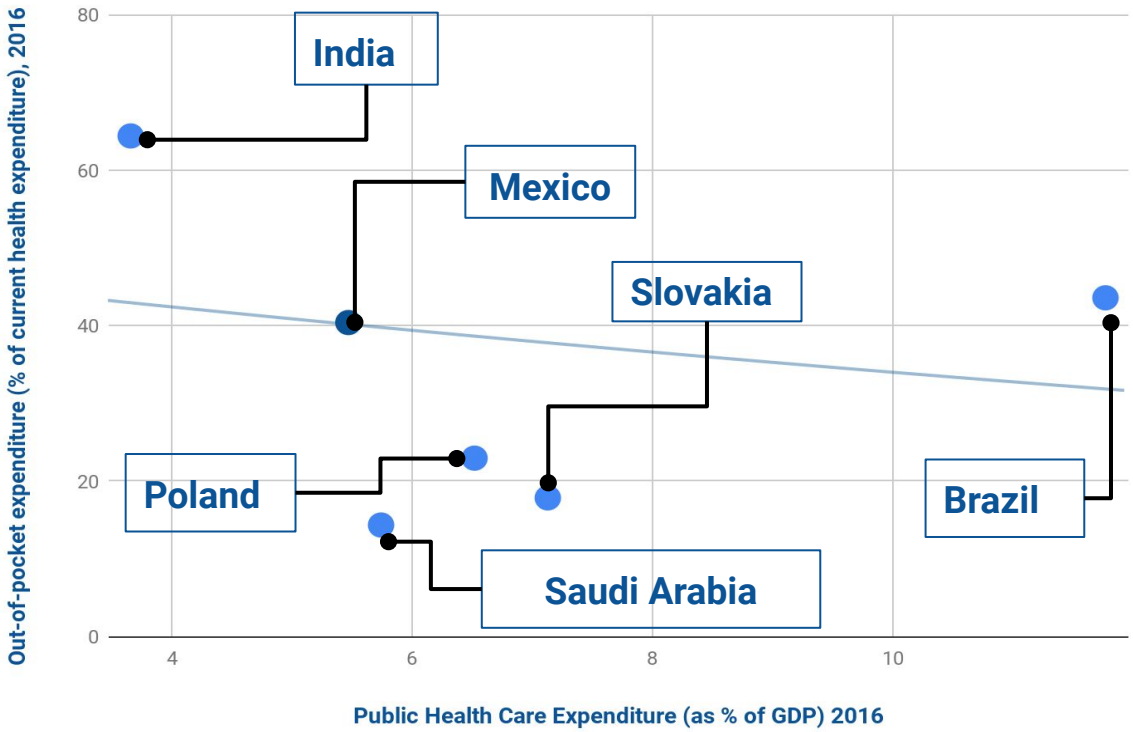
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016:
  66
- Human Development Index 2016:
  0.77
- E-Government Development Index 2016:
  0.62
- Corruption Perceptions Index 2016:
  30
- Global Gender Gap Index 2016:
  0.7
- Democracy Index 2016:
  6.47

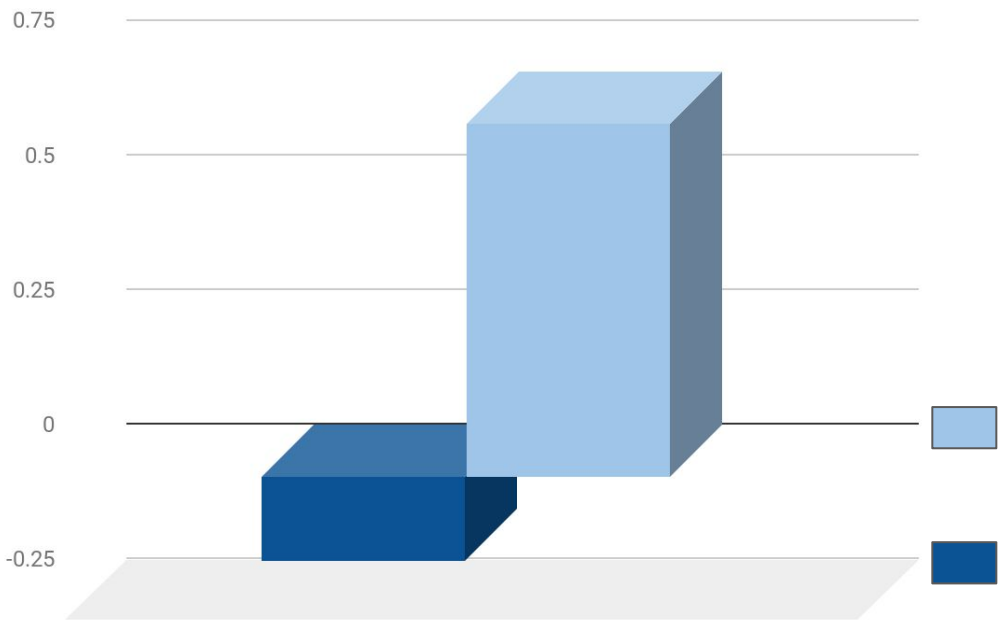
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Medium Gap



Effectiveness ratios



In Mexico the main challenge is to reduce inequality in healthcare and ensure that an important proportion of the population gain access to wide health coverage, including, access, quality, and costs. Mexico, due to its high prevalence of obesity, faces serious public health consequences, especially cardiovascular diseases and diabetes, that should also be addressed.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Mexico

STRENGTHS

- Life expectancy has increased substantially since 1970.
- The burden of behavioral risk factors, including smoking, alcohol consumption, is lower compared to OECD average.
- Mexico shows good performance in reduction of admissions caused by treated conditions such as asthma and COPD.
- Significant reduction in out-of-pocket expenditure with introduction of extended publicly-funded health insurance.
- Mexican population is young, with around nine people of working age for every adult aged over 65.

WEAKNESSES

- Life expectancy in Mexico is one of the lowest in the OECD. It was just 75 years in 2015.
- The access to the healthcare in Mexico is lower than the OECD average.
- Consumption of fruit is also among the lowest in the OECD.
- Personal healthcare access and quality index stands for 66.3 that is the evidence for low quality of services.
- A particularly worrying concern is Mexico's high rates of overweight and obesity.
- 15.9% of adults have diabetes, more than double the OECD average of 6.9%.

OPPORTUNITIES

- Successful reforms give the opportunity to 50 millions Mexican people to receive access to the healthcare and revealed them from the risk of the unaffordable health care bills.
- Mexican government has launched several programmes to effectively tackle increasing obesity that include taxation on sugar-sweetened beverages, nutritional labelling on food products, and better regulation of food advertising for children.
- Utilize AI opportunities in healthcare improve the delivery of the healthcare services..

THREATS

- There are high mortality rates from acute myocardial infarction and they stand for 28% of hospital admissions that is significantly higher than in the OECD.
- Health and prosperity continue to be unequally distributed, with people in southern states, women, children and indigenous groups leading notably disadvantaged lives.
- Despite major redistributive reforms, poverty remains endemic.
- High fasting plasma glucose, high body mass index and dietary risks are the main reasons for the disability years.
- Out-of-pocket spending in Mexico constitutes 45% of health system revenue and 4.0% of household expenditure.

Analysis of Strengths and Weaknesses of Health Care System in Mexico

- The share of the population exposed to unaffordable or impoverishing health care costs has fallen from 3.3% to 0.8% of the population in the past decade.
- Public spending on health care increased from 2.4% to 3.2% of GDP between 2003 and 2013.
- The private sector of Mexican healthcare system offers a wide range of services with an outcome-related approach though it is very expensive.
- There is a steady decline in the mortality rates in Mexico starting from 27 deaths per 1000 inhabitants in 1930 to 4.9 deaths per 1000 inhabitants in 2008.

- Health spending is four times lower than the OECD average and is 1080 per capita that is extremely bad for Mexican healthcare.
- Mexico has 2.4 doctors per 1000 population relative to 3.4 on average across the OECD, and less than one-third the number of nurses and hospital beds per 1000 population than the OECD average.
- Mexican health care is provided through a cluster of disconnected sub-systems. Each sub-system offers different levels of care, at different prices, with different outcomes. Individuals effectively have neither choice of insurance plan nor of provider network, since affiliation is determined by their job.
- There is high financial burden on households in Mexico because of lack of public spending on health and out-of-pocket spending is 41%.
- Mexican population is now ageing more rapidly than any other OECD country, there is little reason to hope that these adverse trends can be reversed without a substantial strengthening of the health system.
- Health and prosperity continue to be unequally distributed, with people in southern states, women, children and indigenous groups leading notably disadvantaged lives.

Recommendations for Mexico

- **Focus on care delivery and particular people needs.** Resourcing is unequal across sub-systems, out-of-pocket payments remain high and deep-rooted inefficiencies persist. Poor performance of healthcare system and ineffective allocation of healthcare resources underlines the urgency of reforms. The government should provide incentives to invest in prevention services, making healthcare good for patients and for taxpayers.
- **Utilise AI for collection and analysis of healthcare system information.** Voluntary data contributions from patients via mobile phone applications or from wearable devices can be used to help clarify relationships between diseases on the one hand, and environmental, behavioral, and genetic factors on the other.
- **Strengthen primary and preventive care.** A core function of a strengthened primary care sector must be the effective management of patients with multiple, complex health care needs, including long-term conditions such as diabetes. The government should devise comprehensive approach to tackling diabetes, high blood pressure and other chronic diseases through public health programmes and public policy.
- **Increase productivity and quality of healthcare workforce.** The government should provide initiative concerning smart management of healthcare workforce. Hiring and working conditions of health personnel should be more flexible. Remuneration mechanisms for physicians should reduce their dependence.
- **Provide more accessible and comprehensive healthcare coverage.** Accessible healthcare treatment may help to meet patients needs. Diversified portfolio of basic healthcare services with great emphasis on prevention may help to mitigate financial burden and improve health status.
- **Tackle rising "slow-motion" disaster of non-communicable diseases (NCDs).** Management of NCDs includes detecting, screening and treating these diseases, and providing access to palliative care for people in need. High impact essential NCD interventions can be delivered through a primary health care approach to strengthen early detection and timely treatment.

Netherlands

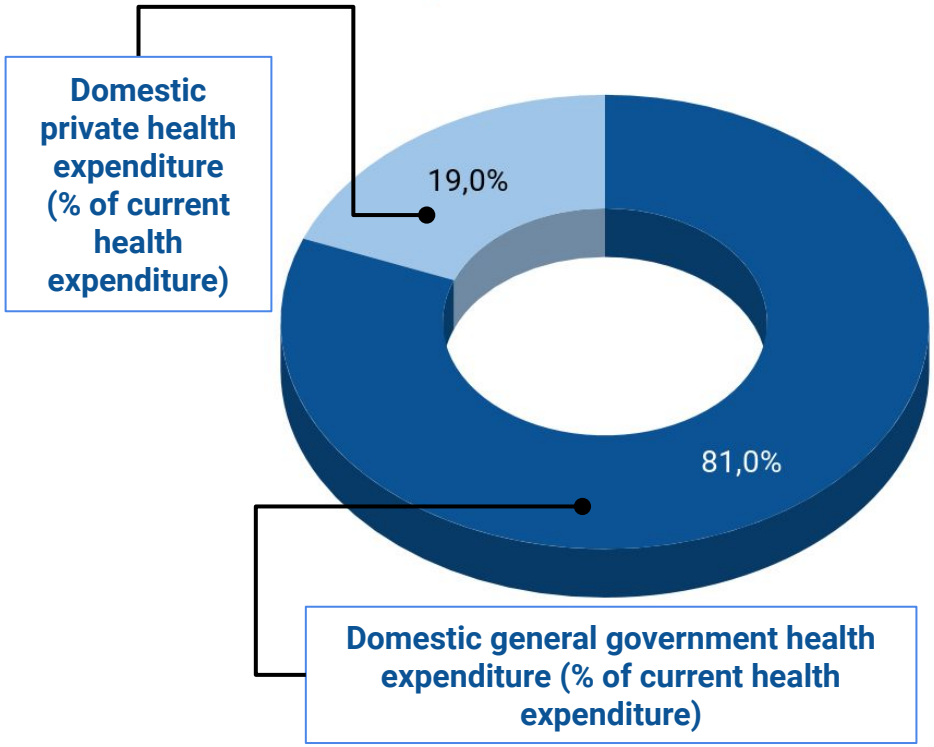
General metrics

HALE	Both Sexes HALE (2016)	72.1 years
	HALE/Life Expectancy Difference 2016	9.5
Economy	GDP per Capita, Current Prices (2016)	46.01 thousand ($)
	Annual GDP Growth (2016)	2.2 %
Healthcare	Current Health Expenditure per Capita (2016)	4.74 thousand ($)
	Public Health Care Expenditure 2016	10.36 % of GDP
Retirement	Age Dependency Ratio 2016	54
	Population over 65, 2016	18.4 %
	Number of WHO Age Friendly Cities and Communities	2
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	8.7
	Annual Cigarette Consumption (Units per Capita) 2016	1459
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	57.8 % of adults

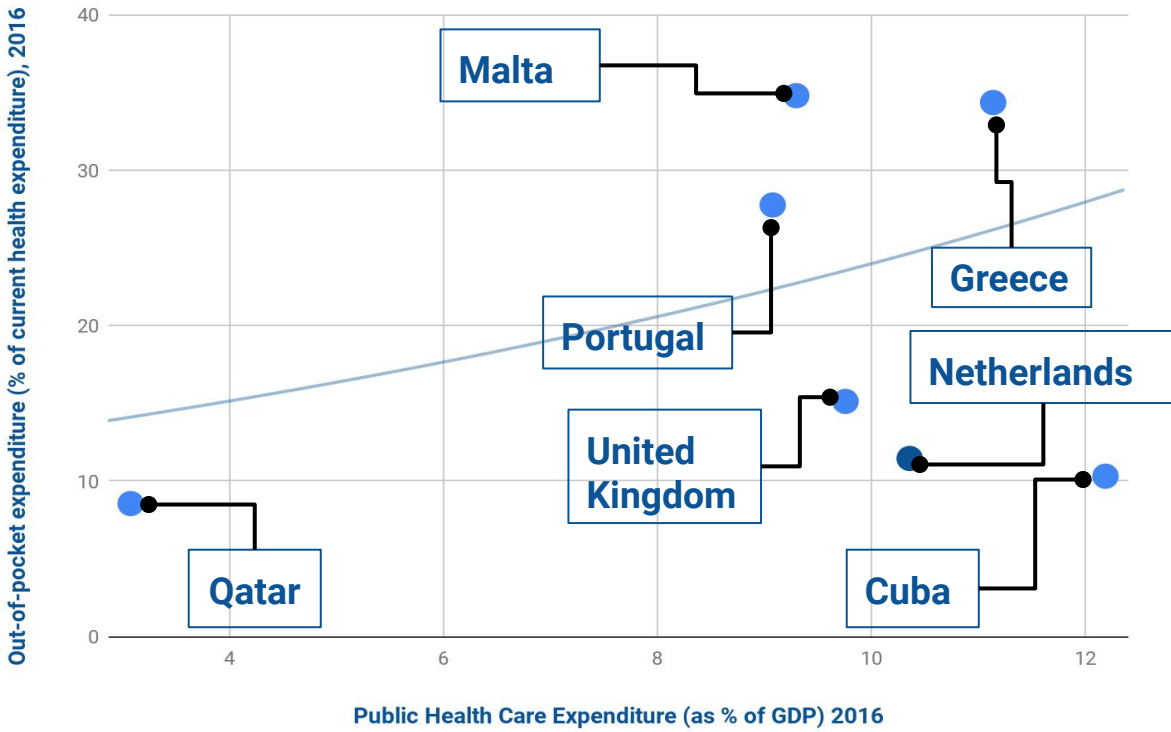
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **96**
- Human Development Index 2016: **0.93**
- E-Government Development Index 2016: **0.86**
- Corruption Perceptions Index 2016: **83**
- Global Gender Gap Index 2016: **0.76**
- Democracy Index 2016: **8.8**

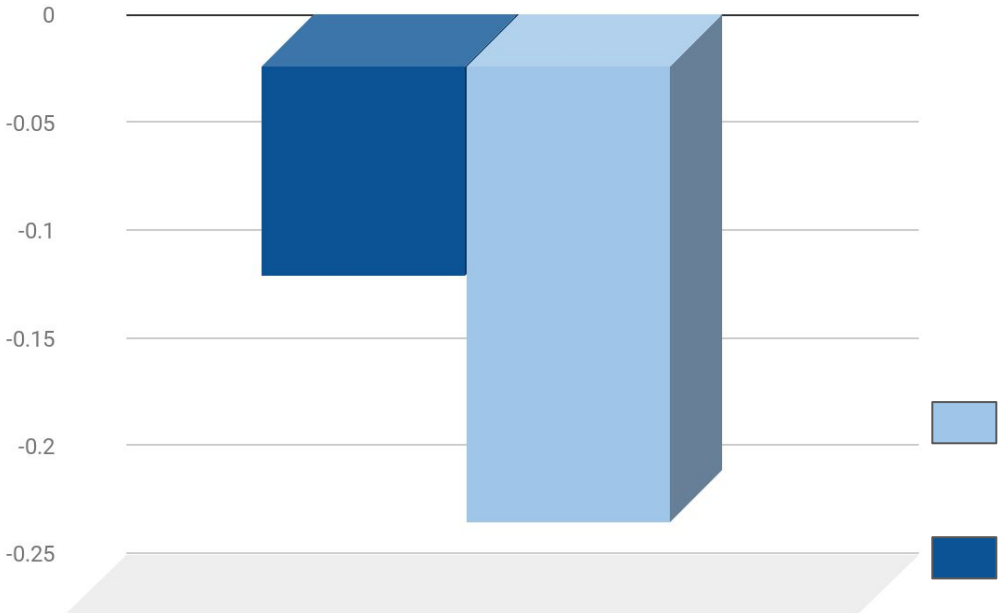
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Medium Gap



Effectiveness ratios



Smoking, drinking and obesity are main behavioral factors of bad health which should be addressed. Large inequalities in health persist according to education and income. On the positive side, public health policies are starting to tackle this, but may need time to become effective.

SWOT Analysis of Healthcare in Netherlands

STRENGTHS

- There was a considerable decrease in the mortality rate from cardiovascular diseases for the past years.
- People enjoy good access to a dense network of effective primary and secondary care providers and generous long-term care.
- Amenable mortality in the Netherlands is very low, indicating (together with other relevant indicators) that the health care system is effective.
- Access to healthcare is good as number of unmet needs is low

WEAKNESSES

- General practitioners may not be supported sufficiently to identify mental disorders and treat patients with less severe mental health problems.
- Health system is one of the most expensive in the EU.
- More than a quarter of overall diseases burden is linked to is linked to behavioural risk factors – including smoking, poor diet, low physical activity, and alcohol use.
- Health inequality persist according to income status and education.
- There is the disagreement on proper role of market mechanisms in regulation of the healthcare system.

OPPORTUNITIES

- There is little room to improve cancer care to boost the survival.
- Comprehensive government-led policies policy addressing mental health promotion and prevention.
- Implement policies to ease the costs of population ageing.
- Generating of additional funds to finance advanced technologies and approaches in health.
- Increase the availability of intermediate care, to improve hospital transitions.

THREATS

- High healthcare spending in Netherlands generates additional pressure on the budget.
- Obesity rates are on the rise as there were only 11% of obese adults in 2011 compared to 13% of obese adults in 2015 with the increase by 20%.
- Illicit stimulants are commonly used without now sign of stabilisation.
- 1 in 6 people in Netherlands live with hypertension, 1 in 18 with asthma and 1 in 12 with chronic depression.
- Ageing of the population is a rising issue for healthcare and pension systems stability.

Analysis of Strengths and Weaknesses of Health Care System in Netherlands

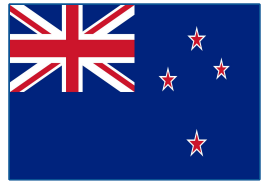
- Over 80% of overall healthcare spending are publicly funded and health spending per capita is also higher than the EU average.
- Amenable mortality in Netherlands is very low that is the evidence for the effectiveness of the medical system in treating life-threatening conditions.
- Primary care is strong. Diversified public healthcare services portfolio include services such as health promotion, screening and vaccination, and youth health care.
- The number of acute beds and outpatient clinics continue to grow steadily.
- Healthcare system is characterized with good geographical accessibility, developed both eHealth and physical infrastructure.

- There is a decline in healthy years of life for the additional time that older people have to live: only 57% of additionally expected years to have than can spend without disability for men and 45% for women.
- There is a significant incidents of deaths for elders from cancer and CDVs that could be avoided through the improvements of treatments and preventive care.
- There are certain disparities for the people from different income groups and with different level of education. Only 2% of representatives from low income group report to have poor health while 10% of low income quintile report to have weak health.
- 26% of burden of diseases are linked to the behaviour risk factors such as smoking, bad diet, low physical activity and drinking.
- The shortage of nurses is emerging that becomes a great concern for the healthcare system in Netherlands.
- There are growing concerns of long-term care quality and its sustainability in terms of rising costs and large focus on direct treatment of disabilities.

Recommendations for Netherlands

- **Bridge the gap between health professionals and data scientist by utilising AI for Healthy Longevity.** AI offers a range of effective and innovative solutions to medical problems, revolutionizing medical domain. Machine learning makes diagnosing more efficient. It processes information with less time and provide generated data with the right context.
- **Reduce socioeconomic inequalities in health at individual and population level.** Behavioural risk factors tend to be more common among people at a disadvantage because of a lesser education or lower income.
- **Address rising burden of non-communicable disease.** Lifestyle risk behaviours are responsible for a large proportion of disease burden and premature mortality worldwide. Risk behaviours tend to cluster in populations. Non-communicable disease are caused by the set of emerging risk factors (sleep, sitting time, and social participation) and unique risk combinations and their associations with all-cause and cardio-metabolic mortality.
- **Utilize AI for financial wellness.** Ageing of the population is a rising issue for healthcare and pension systems stability in Netherlands. The utilization of novel forms of financial data to enable AI-empowered AgeTech and WealthTech services may help to maintain complemeted balance between advances in “wealthspan” and “healthspan”.
- **Enable patient-centered care with information technology systems.** Embracement of technology in health care will lead to personalization and improvement of the quality of medical care through close coordination between patients, caregivers, and professionals.
- **Accelerate the paradigm shift from disease treatment and sick care to preventive medicine, and from preventive medicine to precision health.**

New Zealand



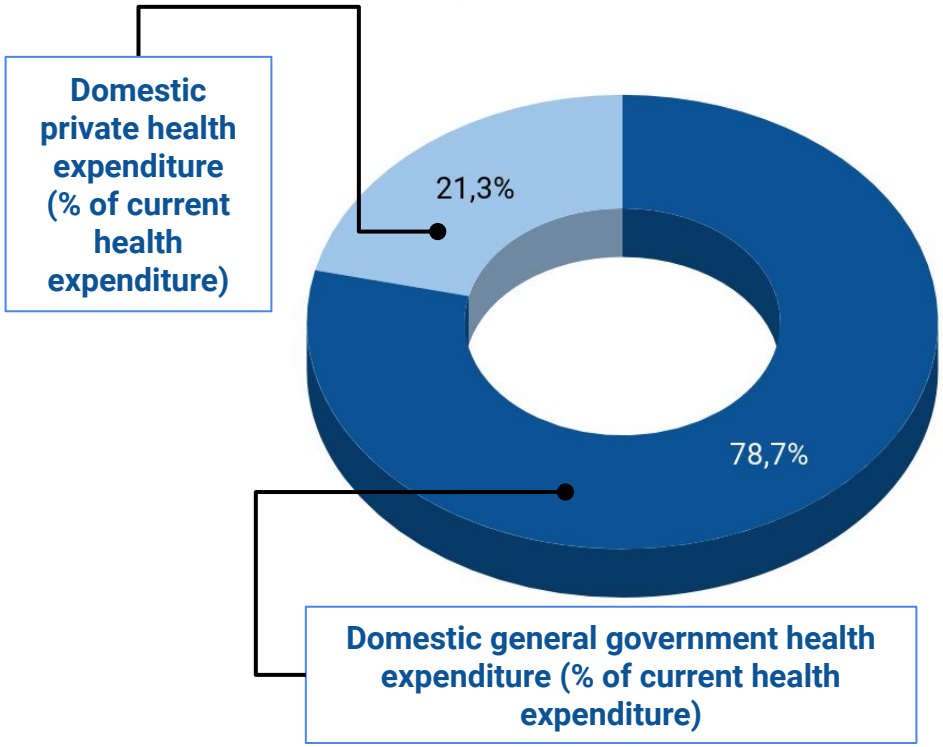
General metrics

HALE	Both Sexes HALE (2016)	72.8 years
	HALE/Life Expectancy Difference 2016	9.4
Economy	GDP per Capita, Current Prices (2016)	40.03 thousand ($)
	Annual GDP Growth (2016)	3.6 %
Healthcare	Current Health Expenditure per Capita (2016)	3.75 thousand ($)
	Public Health Care Expenditure 2016	9.22 % of GDP
Retirement	Age Dependency Ratio 2016	53
	Population over 65, 2016	15 %
	Number of WHO Age Friendly Cities and Communities	2
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	10.7
	Annual Cigarette Consumption (Units per Capita) 2016	685
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	65.6 % of adults

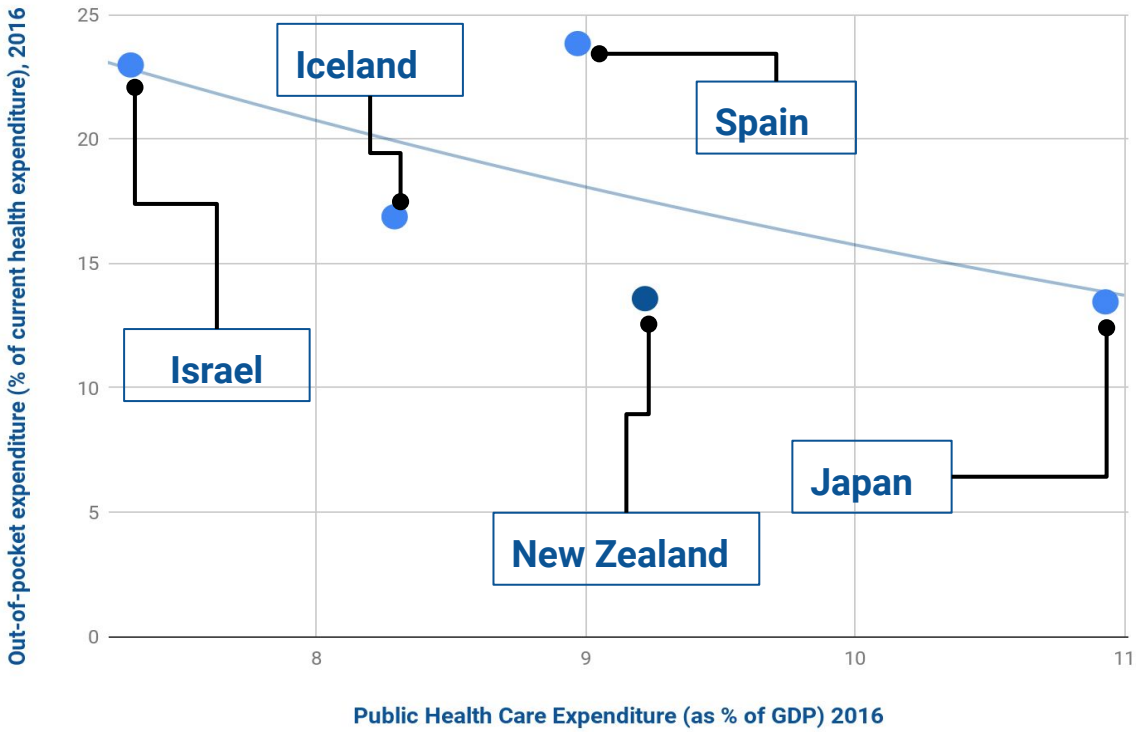
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **92**
- Human Development Index 2016: **0.92**
- E-Government Development Index 2016: **0.86**
- Corruption Perceptions Index 2016: **90**
- Global Gender Gap Index 2016: **0.78**
- Democracy Index 2016: **9.26**

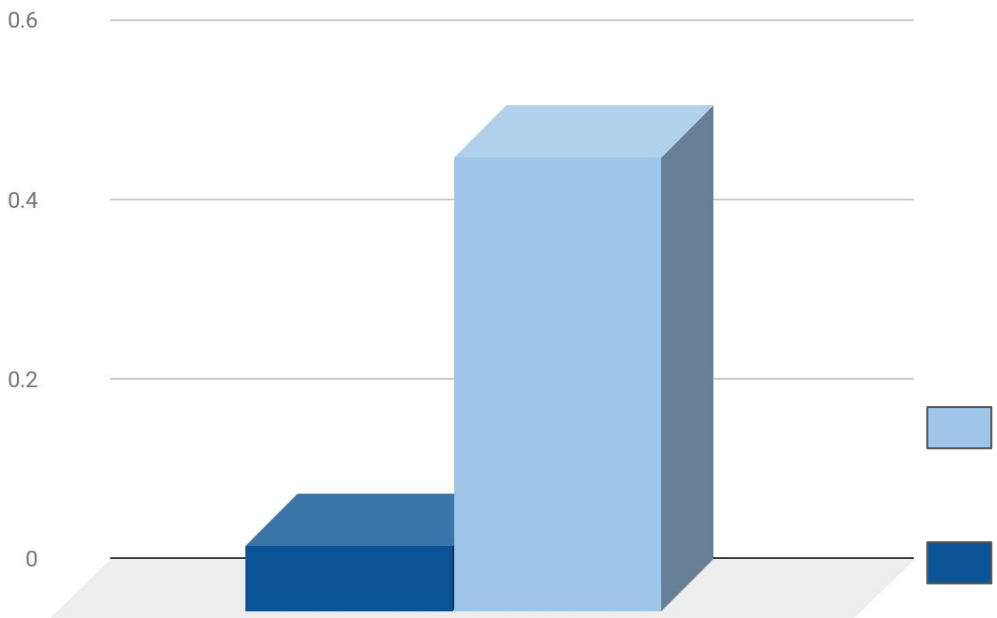
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and Medium Gap



Effectiveness ratios



The government should commit to reduce smoking rates, the overall negative impact of alcohol, prevent and manage obesity, and to support and encourage healthy eating and physical activity, provide better access to primary health care.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in New Zealand

STRENGTHS

- New Zealand has a generally high performing health system, which provides universal coverage and publicly funded access to a large set of core health services.
- Public care is funded through general taxation. This means residents receive free or subsidised medical care.
- Health insurance in New Zealand isn't overly expensive. Some employers offer medical cover.
- Well-developed medical infrastructure. There is a wide range of clinics and private hospitals. Private testing laboratories and radiology clinics are also available.

WEAKNESSES

- The level of hospital admissions for COPD and asthma in New Zealand is one of the highest in the world.
- There are great disparities in the life expectancy and DALYs between New Zealand and Maori with Pacifica tribes.
- Maori health status is poorer because of notably lower socioeconomic status, reduced access to health services and professionals, and health risk factors.
- There is the third highest rate of prevalence of obesity in New Zealand that stands for 30.6% of adults that is the great risk factor for most of chronic diseases.

OPPORTUNITIES

- Encourage a more active lifestyles through health promotion media campaigns and make physical activity an easier choice in the workplace.
- Improve the flow and quality of clinical information utilizing AI opportunities in life science and data generation.
- Enhance physical and eHealth infrastructure to widen the access to qualified healthcare treatment.
- Improve access to care for disadvantaged or underserved populations.

THREATS

- Breast and colorectal cancers are above the OECD average though there were slight improvements in the rates.
- Prevalence of health inequalities between different socio-economic groups.
- Poor diet and lack of physical activity remain key risk factors for the future.
- Ageing of the population is a rising issue for healthcare and pension systems stability.
- Growing burden of non-communicable and chronic diseases as a result of rising concern on behavioral risk factors.

Analysis of Strengths and Weaknesses of Health Care System in New Zealand

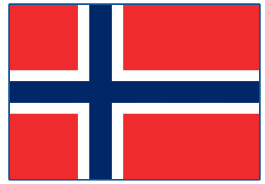
- The Human Development Index in New Zealand is 0.908 that is the reason for placement of the country in 'very high human development' category.
- Perinatal, neonatal, post-neonatal mortality rates are all low and have continued to decline.
- Personal healthcare access and quality index is high and is 92.4 that is the evidence for the well-functioning healthcare system in New Zealand.
- New Zealand has universal coverage health system with services provided by public, private and non-governmental sectors. 83.2% of expenditures funded through public sources in 2009–2010 while out-of pocket expenditures 16.8% of expenditure and private health insurance contributed only 4.9% of expenditures in 2009–2010.
- Relatively young population slightly mitigate the pressure on pension system.

- The main causes of death are circulatory diseases, malignancies, ischaemic heart disease, cerebrovascular disease and chronic respiratory disease.
- There was an increase in the rates of termination of pregnancy: from 14 per 1000 in 1990 to 19.2 in 2009.
- There was and increase in incidence of a range of diseases in the Māori population compared the non-Māori population.
- Maori smoking rates are 46% overall, compared with 31% for Pacific, 23% for European/other and 13% for Asian peoples.
- Cancer remains to be the key factor for deaths for the Maori population and the major reason for disability-adjusted years.
- There is unequal distribution of key specialists and other resources among the population and it causes lots of unmet needs in some districts with long waiting lists.

Recommendations for New Zealand

- **Reduce socioeconomic inequalities in health at individual and population level.** Behavioural risk factors tend to be more common among people at a disadvantage because of a lesser education or lower income.
- **Strengthen primary and preventive care.** A core function of a strengthened primary care sector must be the effective management of patients with multiple, complex health care needs, including long-term conditions such as diabetes. The government should devise comprehensive approach to tackling diabetes, high blood pressure and other chronic diseases through public health programmes and public policy.
- **Utilize AI opportunities for future of Healthy Longevity.** Artificial Intelligence may help to improve productivity and efficiency of healthcare system, processes information with less time and provide generated data with the right context for decision making process. Subsequently, AI will enable organisations to complete some complex tasks at scale, at a fraction of the cost of human labour and often with superior results. AI will also supplement and amplify human capability so that people and organisations can achieve even more.
- **Engage healthy lifestyle.** There is rising concern on prevalence of overweight and obesity among adolescents and adults. One of the top priorities for government on the way to Healthy Longevity is to encourage a more active lifestyles through health promotion media campaigns and make physical activity an easier choice in the workplace; tighten regulations of food advertising to better protect children.
- **Introduce long term care insurance system.** New Zealand also faces the rising issue of “silver tsunami”. Challenges related to population ageing should be transformed into plenty of market opportunities. First of all, this demographic change will require drastic reform of healthcare and long-term care systems. Unless tackled, the rapid increase in aging population can impose a large burden on the health care system including universal health insurance system.

Norway



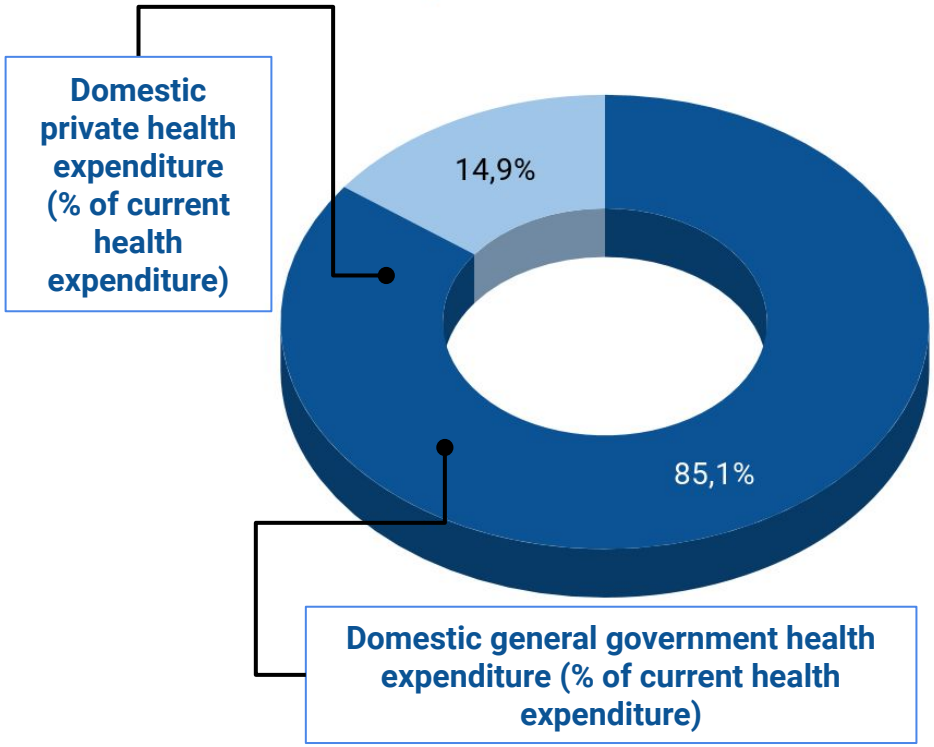
General metrics

HALE	Both Sexes HALE (2016)	73 years
	HALE/Life Expectancy Difference 2016	9.5
Economy	GDP per Capita, Current Prices (2016)	70.94 thousand ($)
	Annual GDP Growth (2016)	1.2 %
Healthcare	Current Health Expenditure per Capita (2016)	7.48 thousand ($)
	Public Health Care Expenditure 2016	10.5 % of GDP
Retirement	Age Dependency Ratio 2016	52
	Population over 65, 2016	16.6 %
	Number of WHO Age Friendly Cities and Communities	3
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	7.5
	Annual Cigarette Consumption (Units per Capita) 2016	552
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	58.3 % of adults

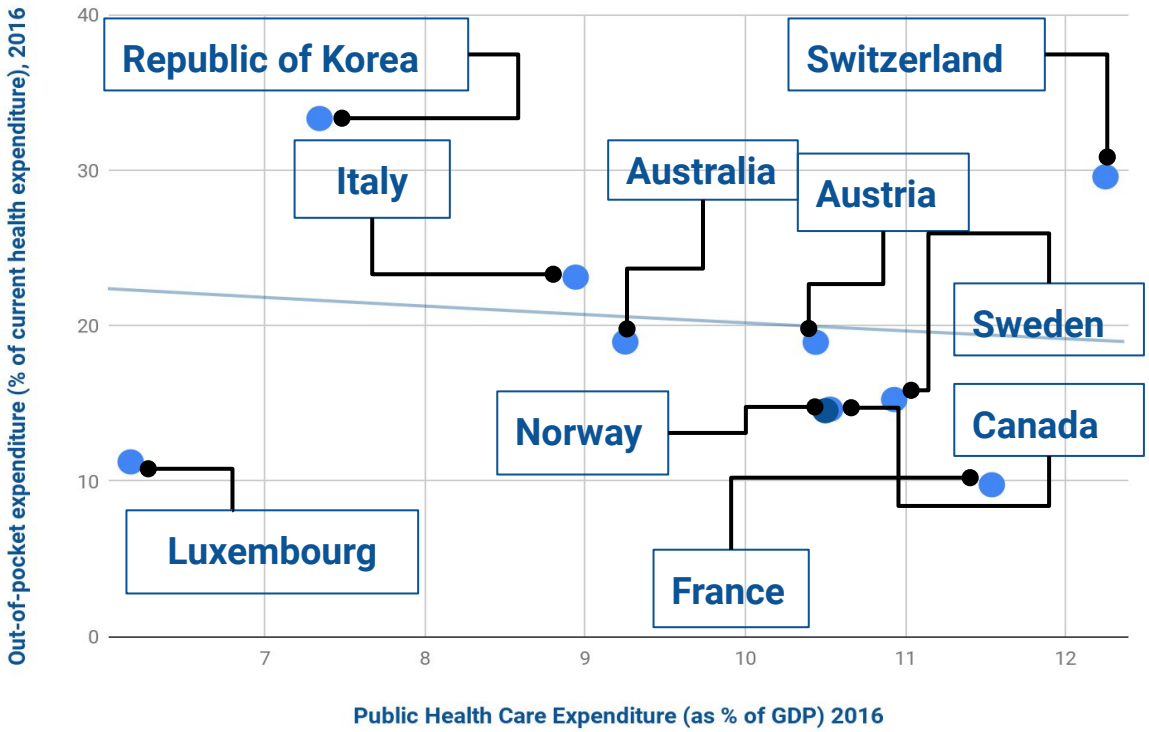
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **97**
- Human Development Index 2016: **0.95**
- E-Government Development Index 2016: **0.81**
- Corruption Perceptions Index 2016: **85**
- Global Gender Gap Index 2016: **0.84**
- Democracy Index 2016: **9.93**

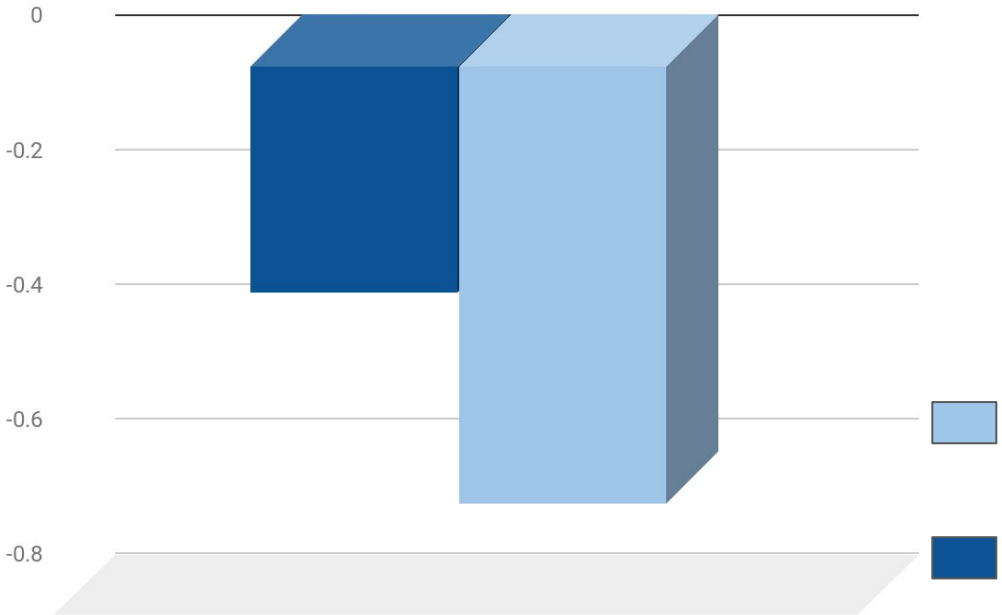
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



The main causes of disability and reduced health are lack of physical activity, mental disorders, cardiovascular disease and cancer. The government should focus on providing effective care and primary care settings.

SWOT Analysis of Healthcare in Norway

STRENGTHS

- Norway is one of the countries that spends a lot on healthcare - 9.9% of GDP that is higher than the OECD average.
- Financial protection of the healthcare system is good.
- Norway has a comprehensive healthcare system that provides the universal healthcare coverage.
- High life expectancy at birth for male 79 years and for female 83.5.
- The number of new cases of myocardial infarction (heart attack) per 100,000 inhabitants per year is declining. Mortality is also falling.
- Low level of corruption.

WEAKNESSES

- There are strong disparities in the access to the healthcare across urban and rural areas.
- Significant part of the population applies for the disability pension (about 10%).
- Income inequality has increased in Norway as a result of changes to the country's tax system.
- The Council has not been sufficiently engaged in primary health care or the caregiving sector, or issues related to coordination between the healthcare sectors in Norway.
- Huge amount of different acts that hard to record and use.

OPPORTUNITIES

- Norway has the 4th highest per capita income in the world. The country maintains a Nordic welfare model with universal health care, subsidised higher education, and a comprehensive social security system.
- Norway is in the forefront worldwide when it comes to healthcare. It is one of the leading countries in the world on new technologies, skills and knowledge.
- Use the increasing opportunities offered by digitalization and eHealth. Integration of technologies to the healthcare system makes it easier for people to achieve good and equal health and welfare.

THREATS

- Prevalence of mortality from mental disorders.
- Ageing population: the proportion of the population aged 65 and over is projected to increase from around 30% of the population aged 20-64 in 2011 to around 60% by 2050.
- The prevalence of hypercholesterolemia and hypertension is the higher than OECD average.
- The obesity and overweight rates have grown rapidly in recent years.
- The level of alcohol consumption has increased by 36% for past decades despite the governmental activities.
- Malignant neoplasms remain the second risk factor of deaths.

Analysis of Strengths and Weaknesses of Health Care System in Norway

- Decline in the infectious diseases due to the vaccinations, hygiene and improved sanitation facilities.
- The healthcare system is generally accessible and the HAQ index is 96.6.
- There is a relatively low amount of people that suffer from alcohol addiction - only 5% of total population.
- The well composed comprehensive healthcare system with the acute distribution of responsibilities and authorities among them that provides equal access to services.
- Governmental attention to the patient safety and cost-effectiveness of the treatments and its quality.
- Norway is more equal, with wealth inequality exceeding Japan but lower than France, Germany, UK and US. Nonetheless, the Nordic countries score very highly in terms of major welfare and development indicators.

- There was a decrease in death from cardiovascular diseases that is one of the main causes of premature death.
- The share of people ill with mental disorders has grown by 8 points through the past years.
- Ischemic heart disease, Alzheimer and stroke are the major causes for deaths and still have a bad impact on longevity.
- The prevalence of obesity and 2 types diabetes has increased among the adults.
- The levels of obesity among adults has increased significantly: 32% among men and 23% among women.
- Only 20% of the population meets the current physical activity guidelines of 60 minutes per day.
- Behavioral, dietary and metabolic risks including tobacco, high fasting plasma glucose and high blood pressure are still the key reasons for the disability years. Low back and neck pain along with headache and anxiety disorders can significantly decrease DALE.

Recommendations for Norway

- **Address rising burden of non-communicable disease.** Lifestyle risk behaviours are responsible for a large proportion of disease burden and premature mortality worldwide. Risk behaviours tend to cluster in populations. Non-communicable disease are caused by the set of emerging risk factors (sleep, sitting time, and social participation) and unique risk combinations and their associations with all-cause and cardio-metabolic mortality.
- **Utilizing strength in artificial intelligence industry leads to meaningful improvements in medical care.** Translating the tremendous growth in data into clinical insights falls into the hands of AI (artificial intelligence)/ML (machine learning) platforms. The rapid growth in investment in AI and cloud computing are beginning to create the foundations for the precision health market of the future. But apart from advanced research it is important to provide effective, low-cost treatments that work, triggering unnecessary treatments and higher costs down the line.
- **Shift from the primary care to the preventive medicine.** Lots of death in Norway can be prevented by the regular check-ups through the preventive care that provides the early diagnostics of the problems for their further elimination by various ways through the effective treatments.
- **Devise government-led Longevity development plan (focused on health status of elderly).** In the next few years several technologically advanced smart states will emerge as global competitors in the development of integrated Longevity Industry ecosystem. Norway, having great potential in terms of funding and innovation, can be in the forefront of Longevity Industry, developing AgeTech, WealthTech and P4 Medicine subsectors.
- **Health records and linkage to survey data should be used more extensively** to refine disease prevalence estimates, and provide more reliable data to guide policy and programmes to address these causes of ill health.

Panama

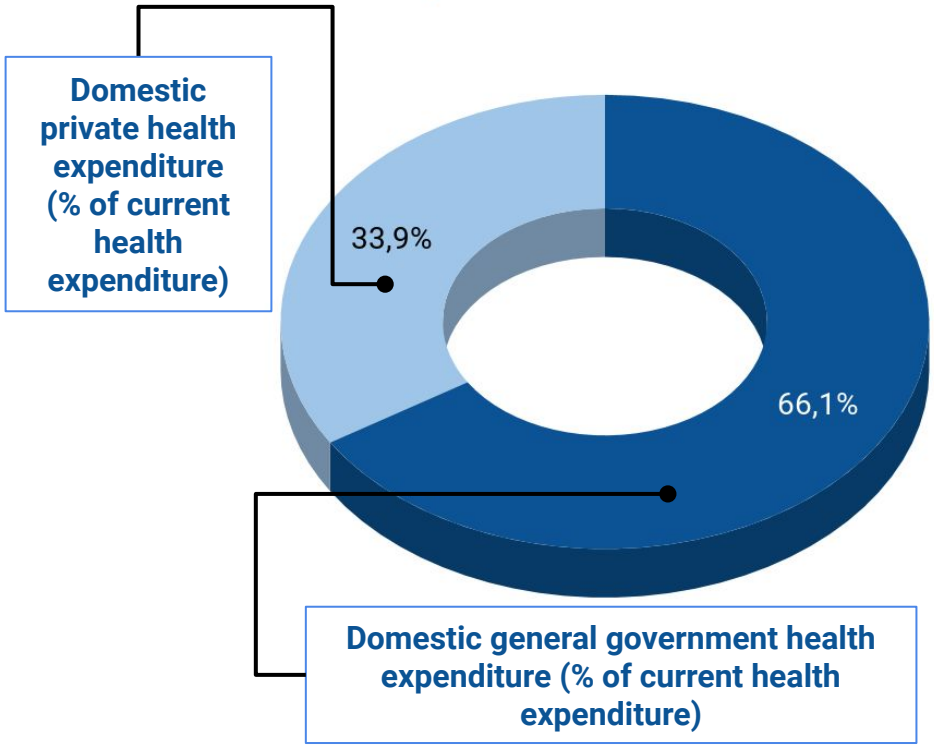
General metrics

HALE	Both Sexes HALE (2016)	69.4 years
	HALE/Life Expectancy Difference 2016	8.6
Economy	GDP per Capita, Current Prices (2016)	14.36 thousand ($)
	Annual GDP Growth (2016)	5 %
Healthcare	Current Health Expenditure per Capita (2016)	1.04 thousand ($)
	Public Health Care Expenditure 2016	7.26 % of GDP
Retirement	Age Dependency Ratio 2016	55
	Population over 65, 2016	7.7 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	7.9
	Annual Cigarette Consumption (Units per Capita) 2016	1280
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	64.3 % of adults

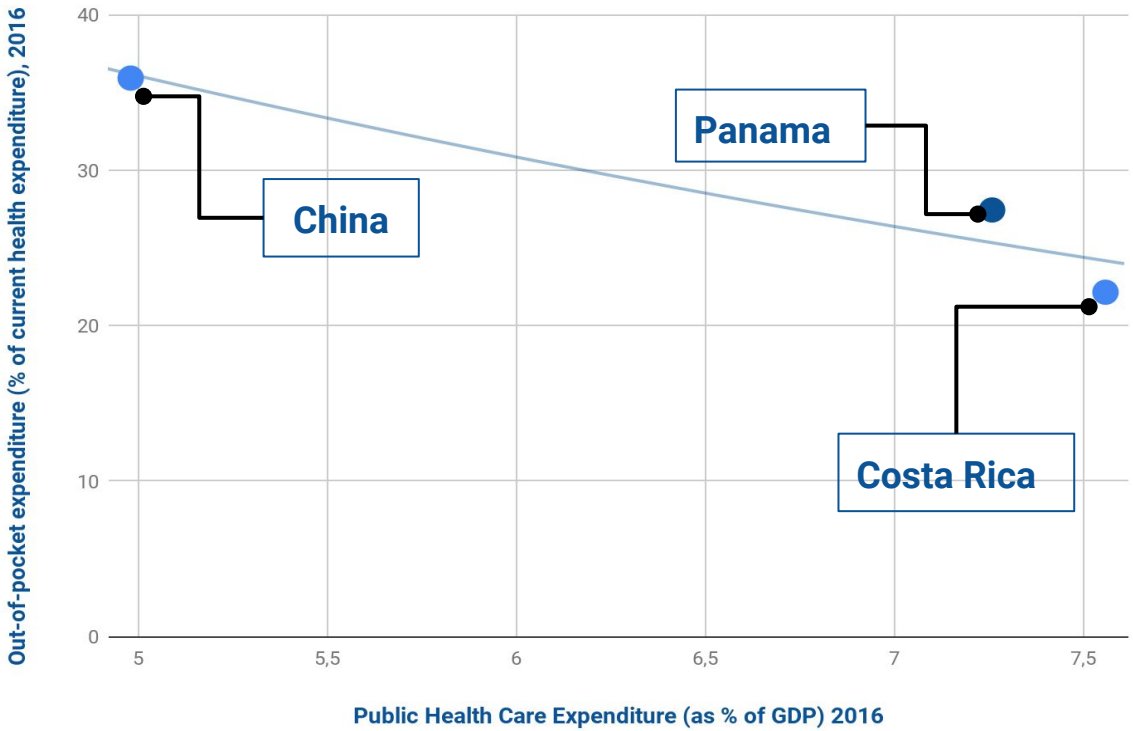
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **68**
- Human Development Index 2016: **0.79**
- E-Government Development Index 2016: **0.49**
- Corruption Perceptions Index 2016: **38**
- Global Gender Gap Index 2016: **0.72**
- Democracy Index 2016: **7.13**

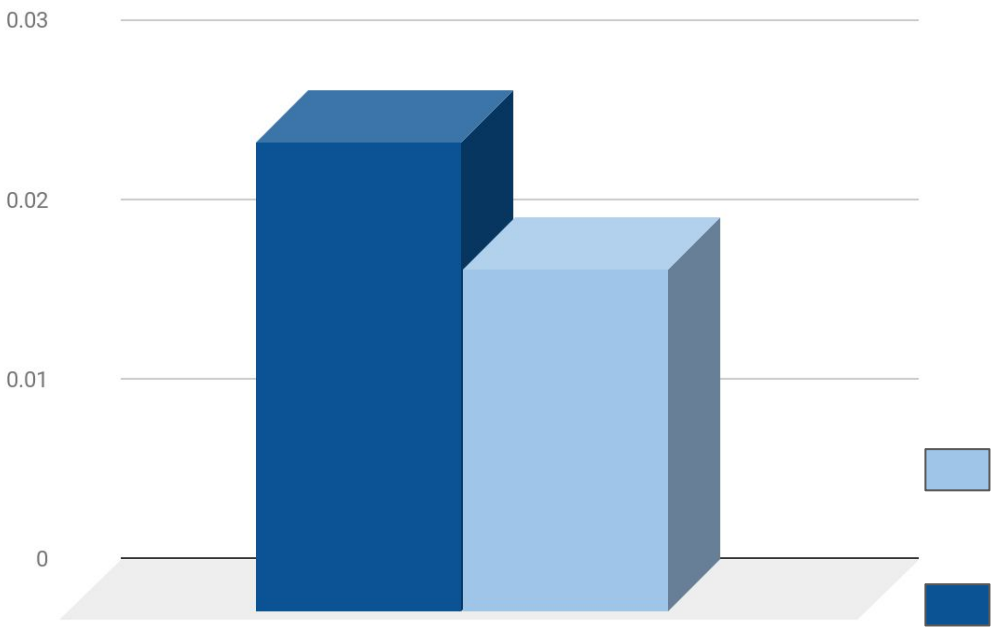
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Low Gap



Effectiveness ratios



Health infrastructure should be developed more evenly, including availability of health workers, medicine and technological equipment, both urban centres and rural areas where populations face with limited access to health services now. The lack of of professionals is also an issue limited to the health sector. The government needs commitments to increasing human resources for the healthcare sector, that will necessarily lead to expanding the capacity of the country's medical faculties.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Panama

STRENGTHS

- Panama's healthcare system consists predominantly of large public sector with small but expanding private sector.
- The entire population is entitled to the healthcare system through the employee contributions to the social fund aimed to finance their medical needs and their family's.
- Significant increase in healthcare coverage and affordability of healthcare treatment as a result of reduced level of unemployment.
- The life expectancy in Panama has significantly improved for the past decade.

WEAKNESSES

- Services is Panama provided by public sector, especially, by MISA are relatively expensive.
- Access to health services remains inequal, a fact readily visible in the marked discrepancy between health outcomes in urban and rural areas.
- In 2014 there was a nine-year gap between the region with the highest life expectancy (Panama at 79 years) and the lowest (the indigenous reservation Comarca Ngobé Buglé at 70 years).
- The infant mortality is relatively high and was 13.4 in 2017 that is several times higher than in OECD countries.

OPPORTUNITIES

- The public sector is currently undergoing unprecedented expansion, as the government seeks to increase and renovate existing health infrastructure.
- The country embarked on an ambitious infrastructure expansion plan, which included the construction of five regional hospitals, a medical city in the capital, and a network of smaller health care facilities and ambulatory services.
- The 2015 budget allocates nearly $2bn to MINSA (an increase from $1.84bn in 2014), of which $590.5m is earmarked for investment.

THREATS

- Population growth and rising family incomes are two factors driving up demand for health services, and putting additional pressure on the care system, which is characterised by crowded facilities and long waiting periods for surgery.
- Ischemic heart diseases, stroke and Alzheimer's diseases are the main causes of deaths for elders in Panama and there is a bad tendency in the increasing of their bad impact on the health status of the population.
- Headache disorders, low back pain and blindness along with diabetes are the main reasons for the disability-adjusted years in Panama.

Analysis of Strengths and Weaknesses of Health Care System in Panama

- There were significant decreases in the infant mortality rates starting from 1990s.
- There is a significant amount of doctors in Panama. The country's average was 15.9 doctors per 10,000 inhabitants in 2012, according to MINSA.
- More than a decade of stable economic growth has resulted in demand for private health services increase significantly.
- MiniMed is Panama's first medical franchise specialising in primary care that has a good expansion.
- There was a significant decrease in the bad impact of the malnutrition for the health status and mortality rates.
- Smoking and alcohol consumption rates are relatively low in Panama.

- Health infrastructure, including availability of health workers, medicine and technological equipment, is concentrated in urban centres, leaving indigenous and rural populations with limited access to health services.
- There is a lack of transparency for the governmental regulation of the projects in the healthcare system.
- The care offered by the public sector is less progressive and outcome-oriented.
- Private expenditure represented 31.4% of total health spending in 2012, with the majority of that total (79%) being out-of-pocket expenditure (down from 85.1% in 2010) and is share is relatively high.
- There is a significant lack of professionals in the healthcare system of Panama that represents a skill shortage in the country and generates a challenge for the operation's dimension of hospitals. The country faces a shortage of some 190 general practitioners, 700 nurses and another 700 medical technicians.
- Panama's government is facing the challenge of increasing capacity for the public sector in the healthcare system.

Recommendations for Panama

- **Provide incentives for development of patient-centered treatments.** Strengthen prevention and health promotion across all areas of life including day-care centres, schools and nursing homes, strengthen workplace health promotion and better integrate it with occupational safety and health.
- **Improve engagement of high-qualified staff in healthcare.** Shortage of staff is the additional burden on the healthcare system as it is the reason for the unmet needs and worse patient outcomes that lead to premature deaths. The government should provide financial incentives for medical staff in public sector and funding to state healthcare services.
- **Bridge the gap between health professionals and data scientist by utilising AI for Healthy Longevity.** AI offers a range of effective and innovative solutions to medical problems, revolutionizing medical domain. Machine learning makes diagnosing more efficient. It processes information with less time and provide generated data with the right context.
- **Reduce socioeconomic inequalities in health at individual and population level.** Behavioural risk factors tend to be more common among people at a disadvantage because of a lesser education or lower income.
- **Focus on care delivery and particular people needs.** Resourcing is unequal across sub-systems, out-of-pocket payments remain high. Ineffective allocation of healthcare resources underlines the urgency of reforms. The government should provide incentives to invest in prevention services, treatment of mental diseases, making healthcare good for patients and for taxpayers.
- **International collaboration on ageing.** Strategic partnership between countries would provide access to world's most successful practices for the maintenance the optimal state of health and technologies, products, services and social policies.

Poland

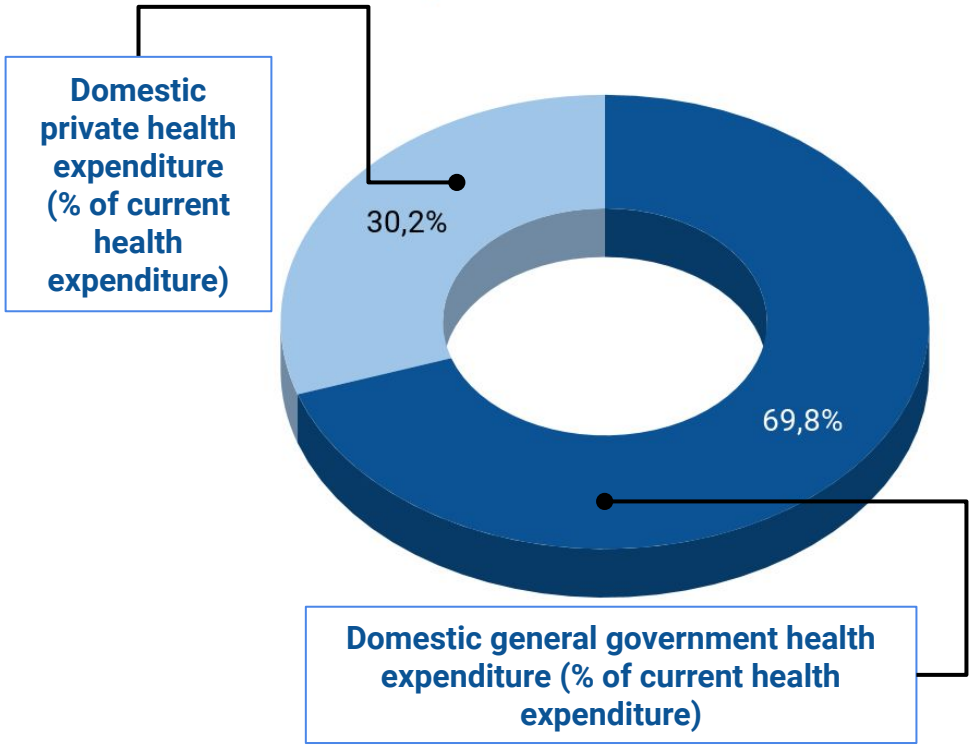
General metrics

HALE	Both Sexes HALE (2016)	68.5 years
	HALE/Life Expectancy Difference 2016	9.3
Economy	GDP per Capita, Current Prices (2016)	12.43 thousand ($)
	Annual GDP Growth (2016)	3.1 %
Healthcare	Current Health Expenditure per Capita (2016)	0.81 thousand ($)
	Public Health Care Expenditure 2016	6.52 % of GDP
Retirement	Age Dependency Ratio 2016	45
	Population over 65, 2016	16.2 %
	Number of WHO Age Friendly Cities and Communities	6
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	11.6
	Annual Cigarette Consumption (Units per Capita) 2016	1363
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	58.3 % of adults

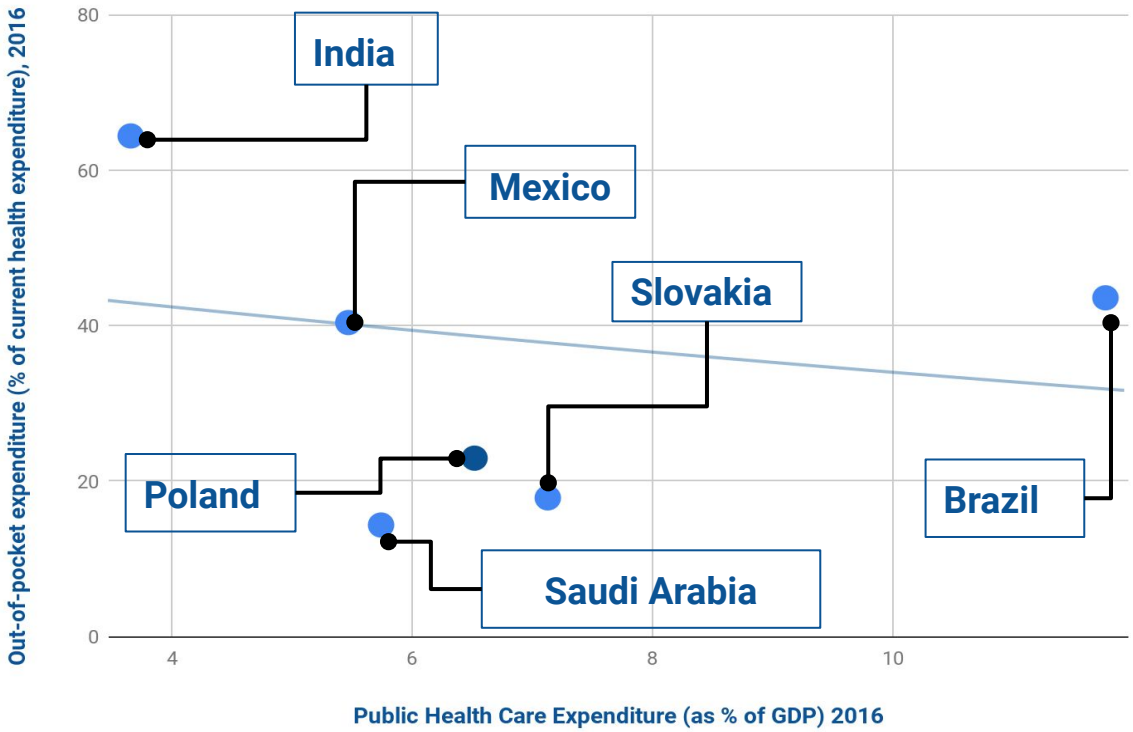
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **82**
- Human Development Index 2016: **0.86**
- E-Government Development Index 2016: **0.72**
- Corruption Perceptions Index 2016: **62**
- Global Gender Gap Index 2016: **0.73**
- Democracy Index 2016: **6.83**

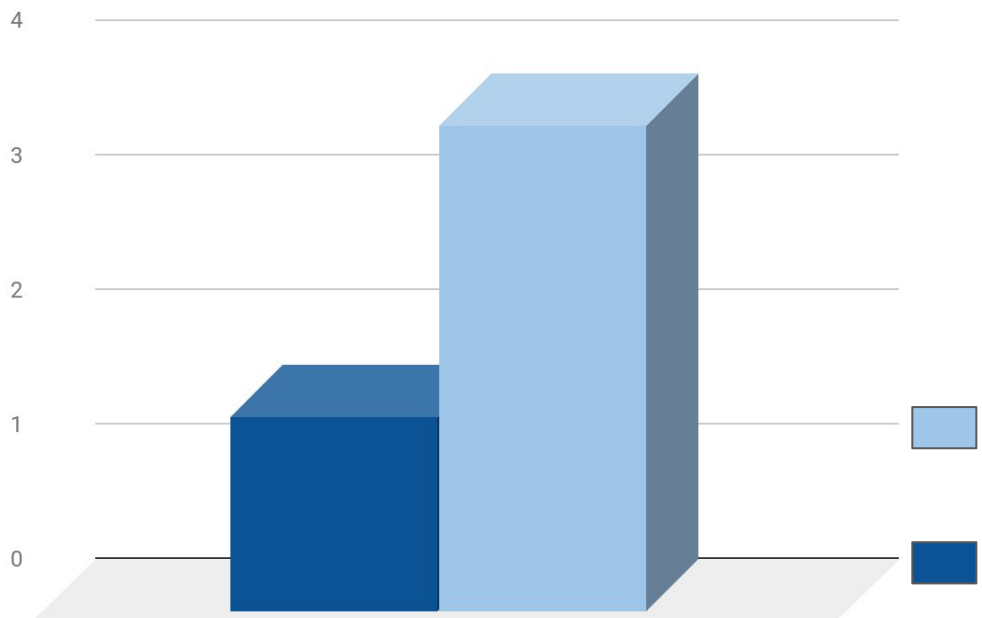
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Medium Gap



Effectiveness ratios



To improve public health it is needed to focus on health education, prevention programmes and purchasing of new equipment.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Poland

STRENGTHS

- The healthcare system in Poland is strongly decentralized with the social insurance provided to cover population's needs. This insurance is executed by the 16 autonomous funds.
- The organisation of the healthcare system's regulation is comprehensive and consists of several entities that are responsible for particular functions starting from the national level and ending with local governments.
- There was a slight increase in the healthcare spending in Poland.
- Compulsory health insurance covers 91% of the population.
- 70% of healthcare system is publicly funded.

WEAKNESSES

- The share of GDP devoted to the healthcare is significantly lower than the EU average and was 6.3% in 2015.
- The healthcare coverage is lower than the EU average. The 9% of the population not covered is mainly the result of casual or typical work contracts.
- The supply of services is limited and it results long waiting times.
- In 2015, private out-of-pocket payments made up more than one-fifth of health expenditure (23%), versus the EU average of 15%.
- There is low coverage for the pharmaceutical spending.

OPPORTUNITIES

- Poland will receive $3 billion of earmarked funding for emergency medical infrastructure, prevention programmes, long-term care and eHealth solutions.
- Utilize advanced technologies in healthcare, including modern equipment, data analytics and advanced concepts of treatment.
- A better balance between disease prevention and care may help to improve population health status and reduce health inequalities, while at the same time reducing pressures on the health and long-term care systems.

THREATS

- Recruiting and retaining doctors to work in family medicine is a particular challenge in Poland that current reforms are attempting to address.
- Alcohol consumption has increased substantially since 2000 and one in six adults report heavy drinking on a regular basis.
- Obesity rates also increased and are now above the EU average.
- Around 50% of all deaths among women and 40% of all deaths among men were from cardiovascular diseases.
- Population ageing and lifestyle factors caused the increase in the deaths from different forms of cancer and diabetes.

Analysis of Strengths and Weaknesses of Health Care System in Poland

- There is a big number of hospital beds per population in Poland and its level is above the EU average.
- Hospitals in Poland generally provide effective treatment for people requiring acute care, most notably in the area of cardiology.
- The smoking rates are relatively small in the Poland and a better balance between disease prevention and care may help to improve population health status and reduce health inequalities, while at the same time reducing pressures on the health and long-term care systems.
- Life expectancy growth represents a slight narrowing of the gap between Poland and EU average indicator compared to 2000.
- There was a remarkable reduce in the mortality rates after 65 years.

- Access to care is limited as a result of uneven geographical distribution of hospitals, with some areas remaining underserved.
- Shortages of health workers are reflected in the low numbers of practising nurses and physicians, which at 5.2 and 2.3 per 1 000 population, respectively, are among the lowest in the EU.
- There is a poor primary care coordination in Poland that has implications for the care of people with chronic conditions in primary care and the level of avoidable hospitalisations.
- Long waiting periods for the elective surgery introduce the challenge for the government of Poland that is the additional burden for the healthcare system worsening patients' outcomes.
- There is a substantial pressure on the delivery of the long-term care for people with chronic conditions caused by the shortage of nurses that basically provide such services.
- Amenable mortality rates are higher in Poland than the EU average.

Recommendations for Poland

- **Initiate certain reforms to enhance the healthcare system of Poland** to create a room for the issues of the long-livers in the strategical onset on the risky factors that slack the longevity expansion in the country. The reason for the low focus on the problems of elders is grounded in the weak performance of the fundamental healthcare system. That's why there is no acute strategic plan on how Poland will withstand the impending silver wave that will create the burden on the overall economic growth of the country and will put a pressure on the long-term care sector of medical system.
- **Increase spending on the healthcare needs to resolve the question of the medical services accessibility.** Narrow set of services offered by the public sector opens an issue for the effectiveness of the Poland's medical system in struggling with the life-threatening conditions that predominantly occur with aged population. These situation inputs additional risk for the premature deaths and arises the tendency for plateauing of the lifespan.
- **Develop novel financial systems.** It will be necessary for novel financial systems to be developed which monetize Healthy Longevity, and repeatedly reinvest in the technologically-reinvigorated working population, if they are to survive the silver tsunami.
- **Modifying the behaviour risk factors including smoking, alcohol consumption and obesity rates.** The risk factors for non-communicable diseases – tobacco use, the harmful use of alcohol, unhealthy diets, and physical inactivity – lie in non-health sectors. They should be addressed by creation advanced health care ecosystem with sophisticated private insurance, WealthTech, AgeTech available.
- **Strengthen primary and preventive care.** A core function of a strengthened primary care sector must be the effective management of patients with multiple, complex health care needs, including long-term conditions such as diabetes. The government should devise comprehensive approach to tackling diabetes, high blood pressure and other chronic diseases through public health programmes and public policy.

Portugal

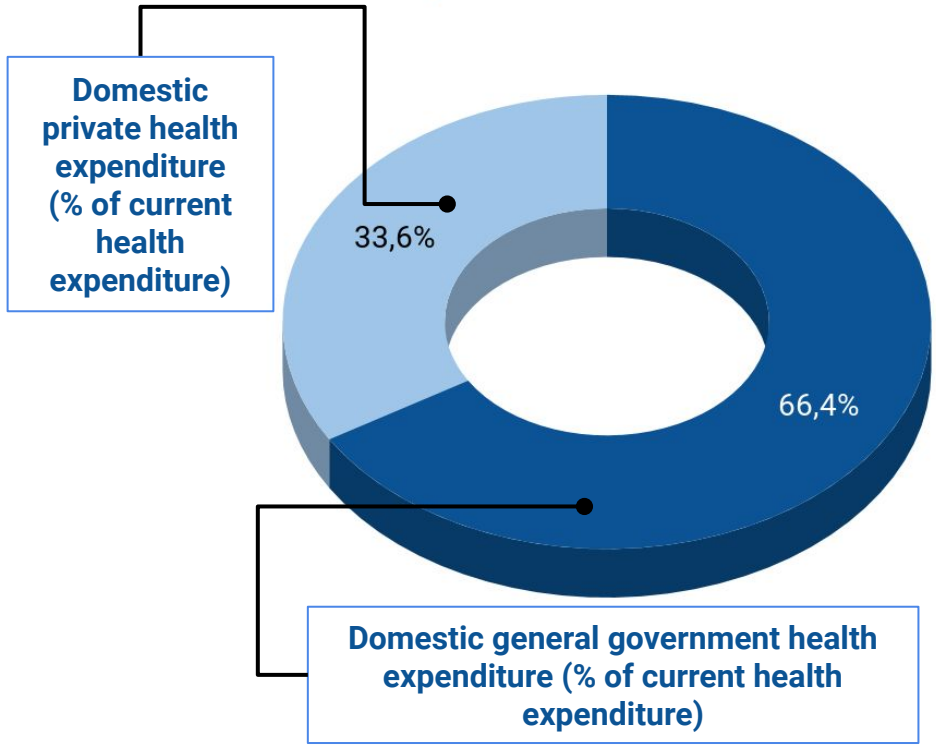
General metrics

HALE	Both Sexes HALE (2016)	72 years
	HALE/Life Expectancy Difference 2016	9.5
Economy	GDP per Capita, Current Prices (2016)	19.98 thousand ($)
	Annual GDP Growth (2016)	1.9 %
Healthcare	Current Health Expenditure per Capita (2016)	1.80 thousand ($)
	Public Health Care Expenditure 2016	9.08 % of GDP
Retirement	Age Dependency Ratio 2016	54
	Population over 65, 2016	21.1 %
	Number of WHO Age Friendly Cities and Communities	13
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	12.3
	Annual Cigarette Consumption (Units per Capita) 2016	1133
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	57.5 % of adults

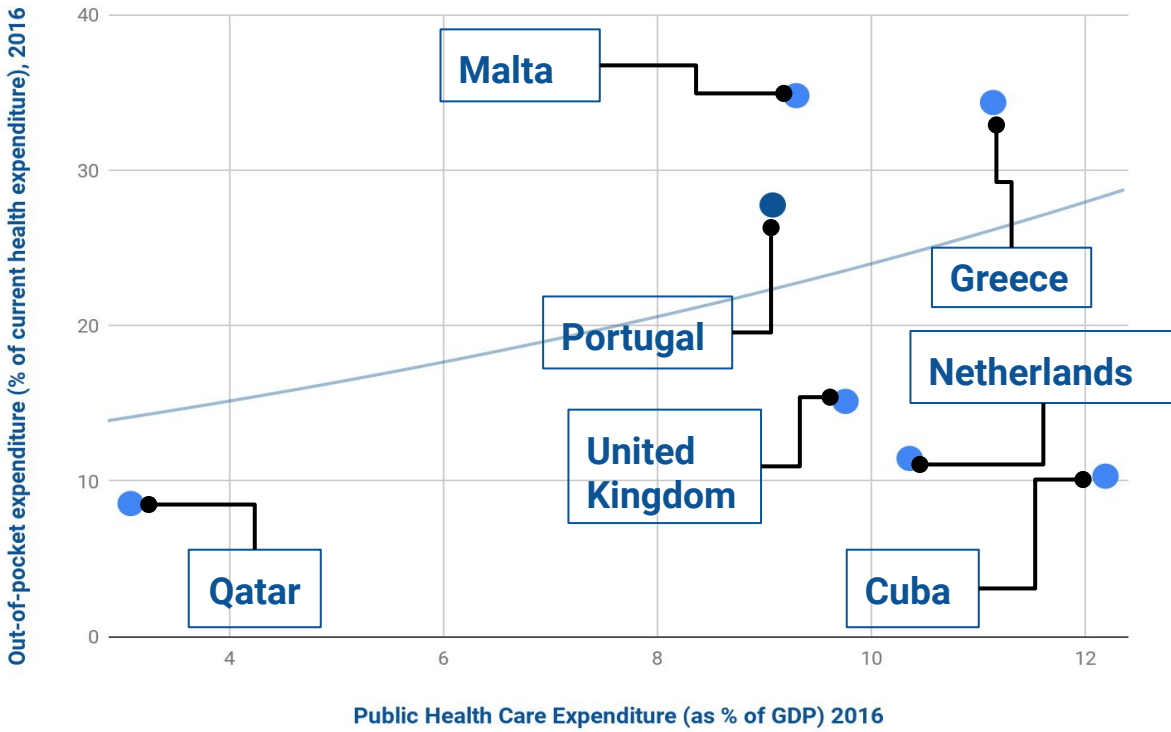
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **86**
- Human Development Index 2016: **0.85**
- E-Government Development Index 2016: **0.71**
- Corruption Perceptions Index 2016: **62**
- Global Gender Gap Index 2016: **0.74**
- Democracy Index 2016: **7.86**

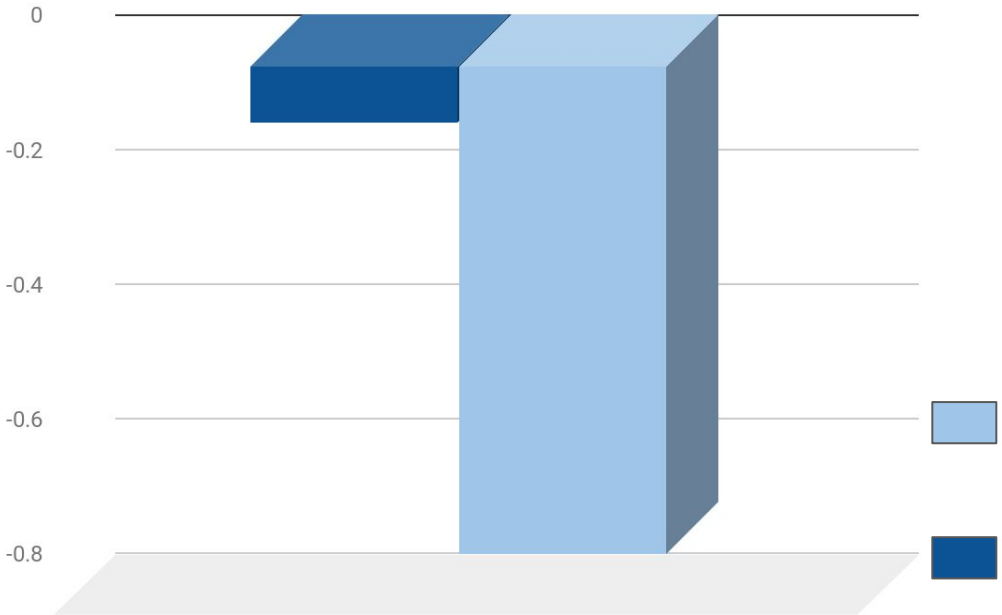
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Medium Gap



Effectiveness ratios



The prevalence of chronic diseases in the population means that Portugal, in common with many other countries, needs to introduce new service models that provide integrated care, focused on care delivery and creation of medical networks.

SWOT Analysis of Healthcare in Portugal

STRENGTHS

- Portuguese government is concentrated on the cost-effective regulation of the healthcare system.
- The rate of obesity among adults in Portugal is relatively low compared with other OECD countries.
- Portugal has made progress in improving care coordination for the elderly through the development of the National Network of Integrated Continuous Care.
- The National Health Service is universal, comprehensive and almost free at point of delivery, and all residents are covered despite their status.

WEAKNESSES

- Out-of-pocket spending on healthcare system is relatively high compared to other OECD countries.
- Unmet care needs are significant, particularly for dental care, second highest compared with most OECD countries.
- Case-fatality of patients after heart attack and stroke is higher than many OECD countries.
- Public spending on long-term care is still small, and the number of psychiatrists, nurses, other long-term care workers is low.
- Many elderly who should be discharged from hospital continue to stay in hospitals due to an underdeveloped long-term care sector.

OPPORTUNITIES

- Prescribing in primary care suggest room for improvement.
- There is a little room in the enhancing the preventive care of the population through the regular check-ups, advanced monitoring, diagnostics and screening and promotion of the healthy lifestyles.
- Utilization of Artificial intelligence opportunities in healthcare through the up-to-date equipment aimed to provide progressive treatments.

THREATS

- The prevalence of risk factors in Portugal is growing, with obesity rates among children above OECD average.
- The share of total expenditure dedicated to prevention activities in Portugal (1.8%) is almost half of that spent on average by 27 OECD countries (2.8%).
- The Portuguese population is ageing rapidly, with about half of the elderly encountering limitations for daily activities.
- 17% of adults in Portugal smoked tobacco every day.
- Adults obesity rates has increased over the past few years and pretend to be the risk for the CDVs burden.
- CDVs and cancer are the main contributors to mortality.

Analysis of Strengths and Weaknesses of Health Care System in Portugal

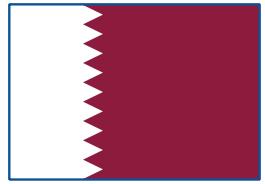
- The number of physicians is above the EU average that contributes to the effective coverage of the growing healthcare needs caused by the ageing of population.
- There were progressive gains in the infrastructural renovation of the healthcare infrastructure as the new hospitals were opened to replace old ones.
- The number of the psychiatric beds also decreased in the arising shifting to the ambulatory treatments due to the intensive progress in the mental health medication.
- Survival rates from the treatable cancer are relatively high that is strengthen by the better screening and diagnostics in early stages.
- The life expectancy in Portugal is high and has reached 81.3 years in 2015 that is above the EU average.

- There was a decline on spending for healthcare in Portugal in a wake of the economic crisis that damaged badly the healthcare system. Portugal spent 1989 per capita on healthcare that is 30% below OECD average.
- There was a significant decrease in the public spending on health, and now it accounts 66% that is lower than in other OECD countries.
- The nurses to doctors ratio is relatively low, and this shortage creates pressure while the slow-motion disaster of an increased number of elders demanding professional care is approaching.
- Portugal suffers from the lower supply of the acute beds in hospital per 100000 population and it is lower than the EU average.
- Portugal faces the decrease in initiatives focused on prevention of the non-communicable diseases.
- Less than half of the Portuguese population reports to be in good health that is significantly lower than in other countries.

Recommendations for Portugal

- **Promotion of the healthy lifestyles.** Portuguese government faces severe problems connected with avoidable mortality in hospitals. Some deaths from most common diseases can be generally prevented through the popularisation of the healthy lifestyle.
- **Reinforcement of the primary care system.** Unmet needs and relatively high amenable mortality are the evidence of the weak performance of the primary care in some aspects of its functioning. Though Portugal has considerable gains in the increasing of survival from common diseases that cause deaths. There is a certain room for the improvement of the medical services delivery with the cost-effective approach that will allow to keep people healthy and productive for long years.
- **Struggling the regional and socioeconomic disparities.** Uneven distribution of resources is the reason why some region face great amount of unmet needs and lower amenable mortality. The other point that government should consider is unequal access to the healthcare system and well-being among different socioeconomic quintiles.
- **Accumulate affords to improve care delivery.** Care coordination is closely connected with the primary care that is not fully accessible for all layers of the population. Some people need to go to specialists or emergency to receive treatments that are not needed and should be provided by the primary doctors. The government should solve this problem to reduce out-pocket expenditure and minimise risks exposure.
- **There is a need to develop this focus into longer-term strategic reforms that enhance efficiency while guaranteeing the delivery of health services and improving the overall quality of care.**
- **Create mechanisms that allow adequate planning and allocation of physical and human resources.** Generally speaking, resources are unevenly distributed across the country, with a much higher concentration of health services and medical equipment in large cities compared with rural areas; private facilities are also largely located in urban centres.

Qatar



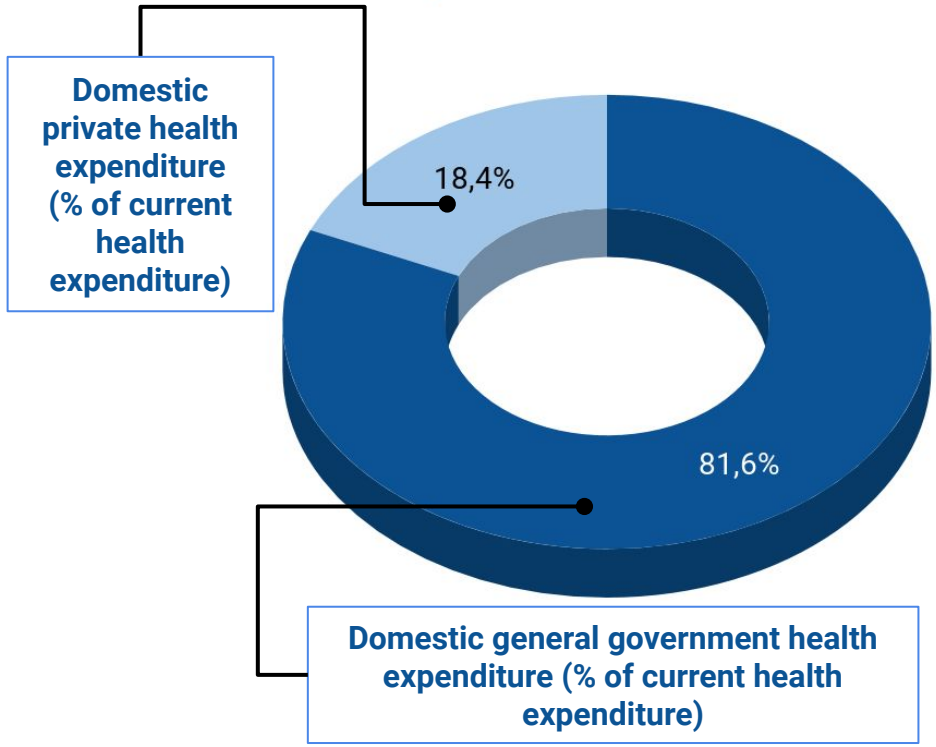
General metrics

HALE	Both Sexes HALE (2016)	68.6 years
	HALE/Life Expectancy Difference 2016	9.5
Economy	GDP per Capita, Current Prices (2016)	57.16 thousand ($)
	Annual GDP Growth (2016)	2.1 %
Healthcare	Current Health Expenditure per Capita (2016)	1.83 thousand ($)
	Public Health Care Expenditure 2016	3.08 % of GDP
Retirement	Age Dependency Ratio 2016	18
	Population over 65, 2016	1.2 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	2
	Annual Cigarette Consumption (Units per Capita) 2016	1020
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	71.7 % of adults

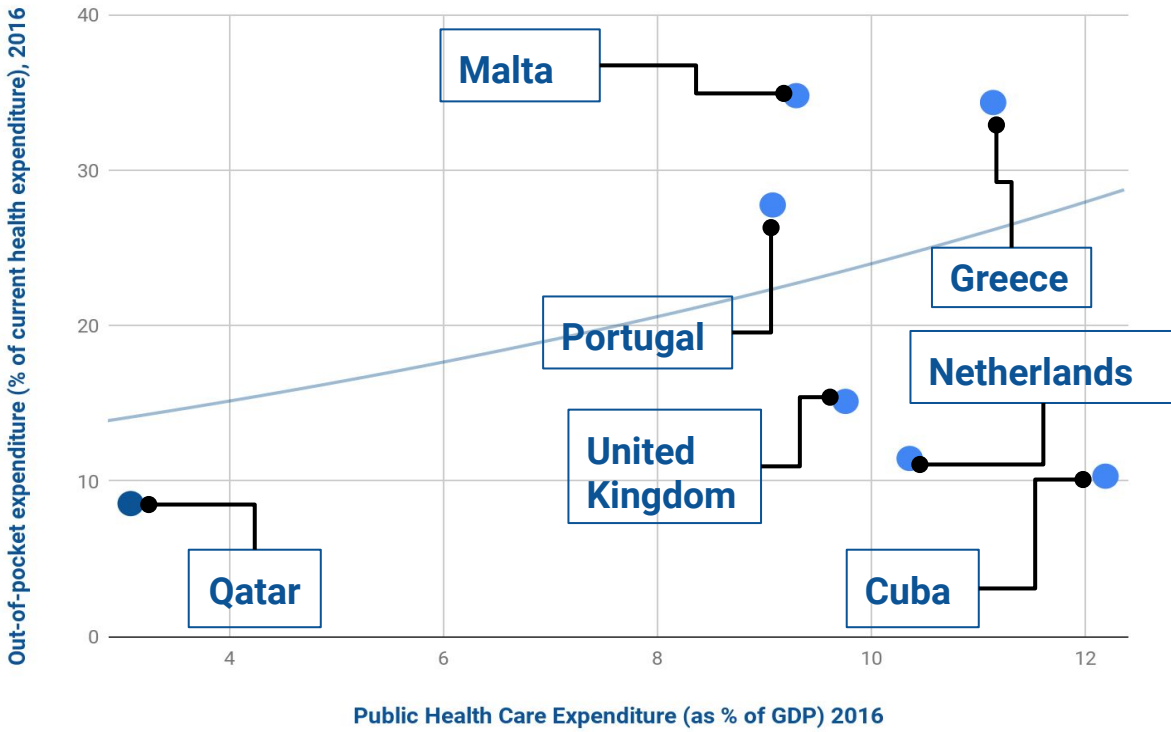
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **82**
- Human Development Index 2016: **0.86**
- E-Government Development Index 2016: **0.67**
- Corruption Perceptions Index 2016: **61**
- Global Gender Gap Index 2016: **0.64**
- Democracy Index 2016: **3.18**

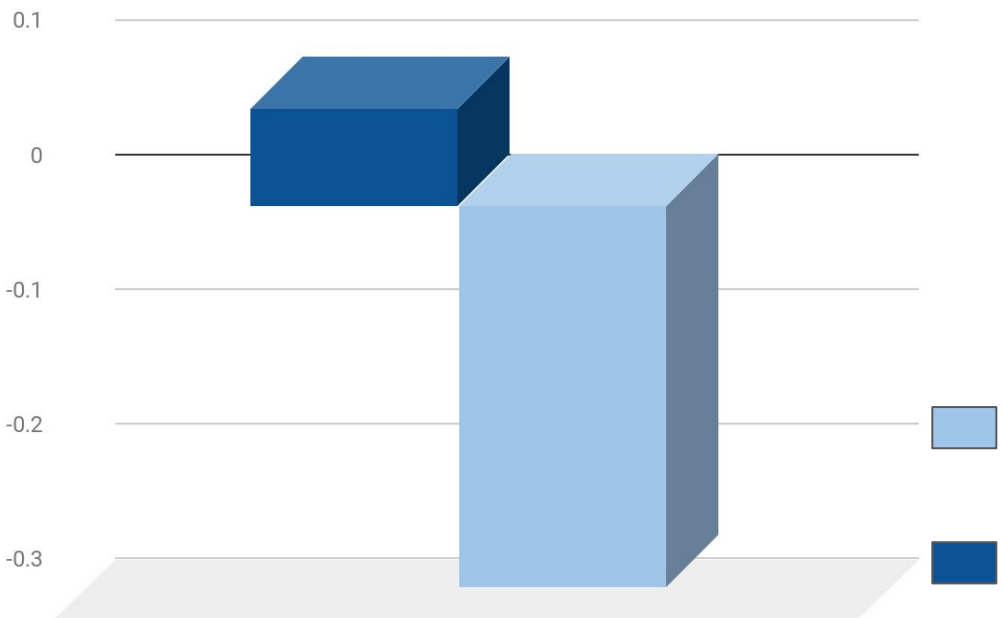
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Medium Gap



Effectiveness ratios



The government should focus on improvement of nutritions and promotion of healthy lifestyle, also pay attention to improvement of healthcare services and their accessibility to all income groups.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Qatar

STRENGTHS

- The healthcare system is available to both Qataris and expatriates. Qatar has a public health service that provides free or highly subsidized healthcare.
- 19 million USD has been dedicated to biotechnology research with the creation of Qatar Science and Technology Park (QSTP).
- The World Health Organization (WHO) recently ranked Qatar at the top of the per capita health expenditure list among the Gulf Cooperative Council.
- There are now currently 36 hospitals and numerous clinics in Doha, the capital city. Health centers have also been set-up along the highways for ease of access.

WEAKNESSES

- The proportion of healthcare spending by the private sector has been steadily rising since 2003 from 17% to 22.55% in 2010.
- Medicine is heavily subsidized. For instance, a course of antibiotics for a government pharmacy costs 1.5 US dollar.
- There is need for more medical workers in primary health care.
- 69% of mortalities occur from chronic conditions, particularly cardiovascular diseases (24%), cancer (18%) and diabetes (7%).
- 70.1% of Qatari adults are overweight that is the additional burden of cardiovascular diseases on the health status of the population.

OPPORTUNITIES

- The Qatari government is aimed to improve the healthcare through developing state of the art medical facilities and medical education.
- The Supreme Council is focusing on health reform by the development of medical insurance, electronic record keeping and data collection, and improvements in quality assurance and evidence based medicine at its various hospitals.
- Complex reformation of the healthcare system to receive the outcomes that will allow to meet needs of the existing and future generations.

THREATS

- 43.9% of Qatari adults have low levels of physical activity that creates the challenge for the effective engagement of population in sports.
- 88% of Qatari children have dental caries that is the problem of weak preventive care in this healthcare's sector.
- Air pollution in Qatar vastly exceeds safe limits and is damaging the health of the population. Qatar has the second highest levels of PM2.5 particles in the world, behind Saudi Arabia.

Analysis of Strengths and Weaknesses of Health Care System in Qatar

- Seventy-seven percent of current healthcare expenditures are in the public sector.
- eHealth is currently widely used by the Qatari healthcare as the government hopes to develop a system that allows good data collection, quik processing and generation useful insight.
- Qatari government uses the healthcare system vision that assumes the building of the patient-centered healthcare system which main figure is population's health and well-being.
- Life expectancy for Qataris is 80.4 years and as of July 2017 less than 2% of the population are 65 years or older.
- At 65 years, women are expected to live a further 20.3 years, 14.3 of which are healthy. At 65 years, men are expected to a live a further 18.7 years, of which 13.5 are healthy.

- There are relatively high levels of tobacco use among men that are 31.9% and children that are 13-15 years old (15.7%).
- Approximately 16% of patients with more than one chronic disease were readmitted at the emergency department within 28 days of discharge.
- Approximately 6% of total emergency admissions were patients with more than one chronic condition.
- Cardiovascular disease, diabetes, and cancer are the three top causes of mortality, accounting for 24%, 17%, and 9% respectively.
- Qatar is experiencing trends in aging similar to that of other developed countries and the proportion of older people is expected to grow.
- Qatar's polluted air is harmful for residents' health. Doha had the 12th highest average levels (93 ug/m3) of PM2.5 of all world cities. The town of Al Wakrah to the south ranked 25th on the same list (85 ug/m3).

Recommendations for Qatar

- **Creation of the patient-centered model of service delivery.** Patients health should be the most valuable asset for the government.
- **Utilizing the Artificial intelligence and Machine learning for simplifying the healthcare experience.** Artificial intelligence is the advanced technology that can reduce time and money spent on treatments through the intensive processing of the medication for patients with even more outstanding results. Machine learning is the additional tool for simplifying treatments with the help of progressive equipment supplied to the net of hospitals and clinics throughout Qatar.
- **Modifying the behavioural risk factors that sharpen most common non-communicable diseases.** If to look through the analyses of the health status and medical systems of developed countries the strong correlation between the wrong lifestyles and arising of the CDVs can be pointed out. Practically quarter of burden of chronic conditions is caused by the tobacco and alcohol use, bad dietary habits and low physical activity, so there is a crucial task for government to initiate campaigns aimed to reduce the negative impact of these risks on the health status of the population.
- **Adoption of the P4 clinics for the on time delivery of the preventive care.** Most deaths in Qatar generally can be avoided and are caused by diseases that are treatable in case of early diagnostics and efficient medications. This points out the need in P4 medicine when every person can receive individual healthcare.
- **Reduce socioeconomic inequalities in health at individual and population level.** Behavioural risk factors tend to be more common among people at a disadvantage because of a lesser education or lower income.
- **Tackle environmental problems.** It is known that air pollution has adverse effects on health and human life in general. The most Qatari GHG emissions is caused by energy consumption, it is very important to examine how one can reduce the GHG emissions to better improve the air quality without harming economic growth.

Republic of Korea

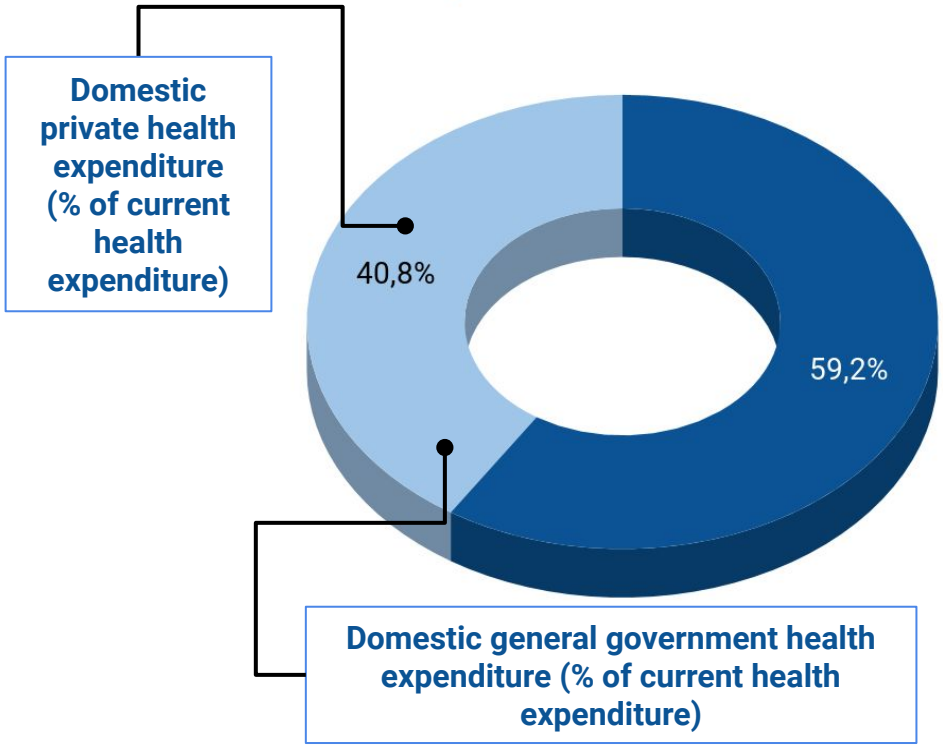
General metrics

HALE	Both Sexes HALE (2016)	73 years
	HALE/Life Expectancy Difference 2016	9.7
Economy	GDP per Capita, Current Prices (2016)	27.61 thousand ($)
	Annual GDP Growth (2016)	2.9 %
Healthcare	Current Health Expenditure per Capita (2016)	2.04 thousand ($)
	Public Health Care Expenditure 2016	7.34 % of GDP
Retirement	Age Dependency Ratio 2016	37
	Population over 65, 2016	13.4 %
	Number of WHO Age Friendly Cities and Communities	11
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	10.2
	Annual Cigarette Consumption (Units per Capita) 2016	1667
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	30.3 % of adults

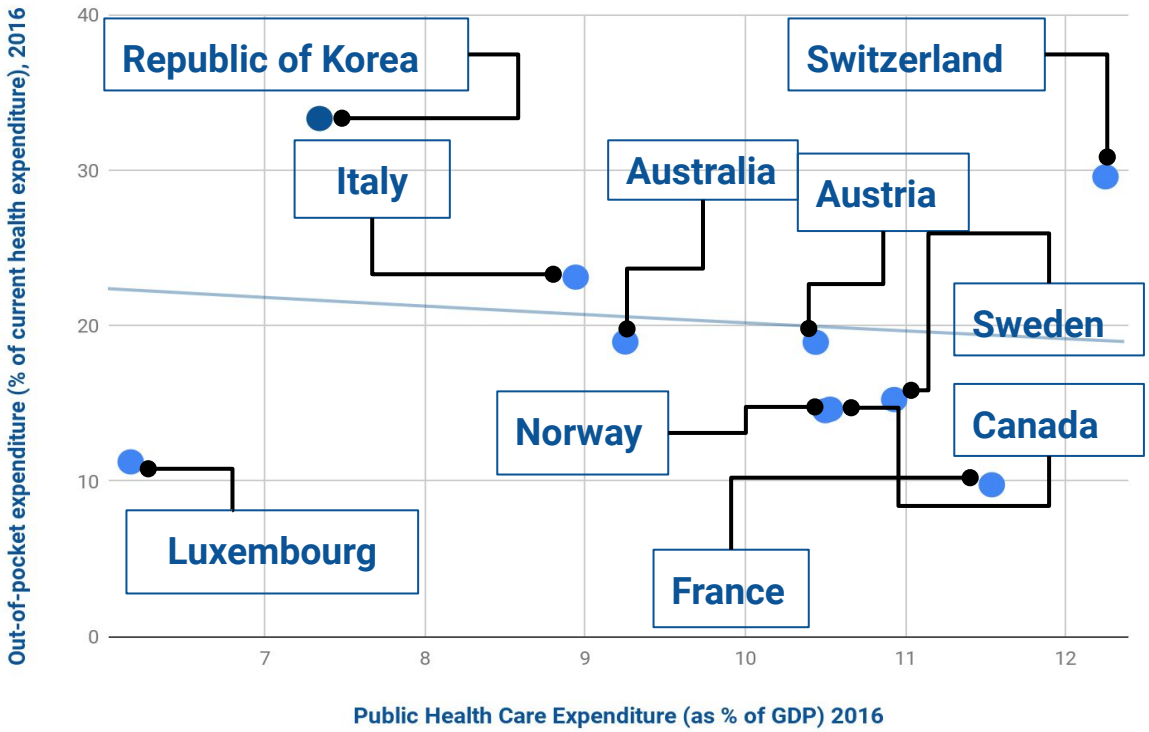
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **90**
- Human Development Index 2016: **0.9**
- E-Government Development Index 2016: **0.89**
- Corruption Perceptions Index 2016: **53**
- Global Gender Gap Index 2016: **0.65**
- Democracy Index 2016: **7.92**

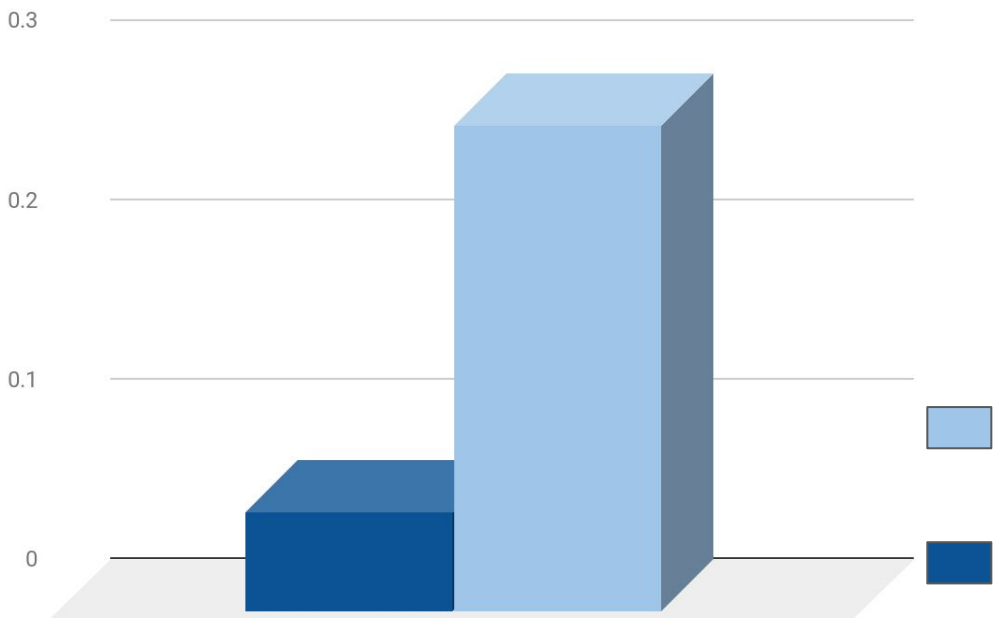
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

The government should address the following challenges to improve public health and increase average life expectancy: reduce inequality in health coverage outcomes, improve primary health care and coordination between hospitals and long-term care facilities, meet the needs of the aged population.

SWOT Analysis of Healthcare in Republic of Korea

STRENGTHS

- The South Korean health care system has developed quite successfully in several dimensions. Achieving universal health insurance coverage within a very short period was an unprecedented outcome.
- Average life expectancy has increased consistently: while women's life expectancy at birth was 66.7 years in 1970, it grew to 82.4 in 2006, much higher than the world average.
- The infant mortality rate, which is frequently quoted as an index of health care conditions in a country, was 23 per 1000 live births in 1985, but dramatically decreased to 4.7 in 2005.
- The crude death rate decreased to 5 persons per 1000 in 2006.

WEAKNESSES

- In 2013, the share of OOP spending allocated to medical care is 1.7 times higher in Korea that the OECD average and it is the additional burden on the access to the healthcare system.
- 37% of health spending in Korea is financed directly by households.
- Korea has some of the highest levels of supply of hospital services amongst OECD countries and this overcapacity is the major quality issue for the Korean medical system.
- Avoidable admissions for chronic conditions are significantly above the OECD average.

OPPORTUNITIES

- The system of health and welfare for the elderly with age-related disabilities has developed significantly since the launch of the long-term care insurance scheme in July 2008.
- Utilization of complementary and alternative medicine (CAM) is a traditional and important part of South Korea's health services framework.
- South Korea has one of the highest rates of computer and Internet access in the world that opens great opportunities for eHealth.

THREATS

- The suicide rate is the highest in the OECD.
- Tobacco is a major risk factor for at least two of the leading causes of premature mortality: cardiovascular diseases and cancer. One in five deaths among adults aged 30 years and over are attributable to tobacco in Korea.
- Diseases of the circulatory system explain 23.1% of total deaths, while neoplasms explain 27.3%.
- Tuberculosis is one of the most frequently appearing diseases. The incident rates of scrub typhus, mumps and malaria are also quite high.

Analysis of Strengths and Weaknesses of Health Care System in Republic of Korea

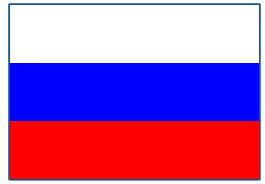
- The incidence of communicable diseases is declining in general, largely due to the development of health care technologies, enhanced knowledge about disease and improvements in living conditions.
- Incentives for customer-oriented providers are available. Providers who treat patients in the evenings and at weekends are entitled to claim higher fees than the fees charged during regular working hours.
- There were a total of 593 long-term care hospitals in 2007, a 54% increase from the previous year.
- Government encourages facilities to utilize the advanced technologies and equipment in health effectively and intensively through the limit for their supply. Though the number of big-ticket technologies has increased continuously over the past 15 years.
- The number of all categories of health care personnel has grown continuously.

- Korea reports the third highest excess mortality rates from schizophrenia and bipolar disorder across OECD countries.
- The distribution of alcohol drinking is heavily concentrated. In Korea, the heaviest-drinking 20% of the population drink 66% of all alcohol.
- The share of GDP allocated to health spending (excluding capital expenditure) in Korea was 6.9% in 2013, compared with an OECD average of 8.9%
- Reduced fertility rates led to an increasing aging population. As a result, increasing health costs require additional measures to improve health equity and strengthen health promotion.
- Public sources accounted for 56% of overall health spending, well below the OECD average.
- Services are mainly delivered by the private sector. Nearly 90% of doctors were involved in private facilities that is the additional limitation for the access to the healthcare system.

Recommendations for Republic of Korea

- **Continuously generate the patient-centred medical system to provide universal coverage to achieve outstanding patients' outcomes.** Personalized health care is an integral part of a dynamic new trend that takes into account a person's environment, lifestyle, diet, values and lifelong medical data. With this approach, citizens themselves are called upon to play a more active role. Personalized medicine is suited to meet challenges of chronic diseases and ageing.
- **Focus on health status of elderly.** Appropriate health interventions are necessary to address different healthcare issues of ageing population, including specialized treatment programs, regenerative medicine and care support initiatives. Great attention should be paid to supply of advanced gerontological services.
- **Utilizing Artificial intelligence and Machine learning for simplifying the healthcare experience.** Artificial intelligence is the advanced technology that can reduce time and money spent on treatments through the intensive processing of the medication for patients with even more outstanding results.
- **Modifying the behavioural risk factors including obesity, smoking and alcohol consumption.** If to look through the analyses of the health status and medical systems of developed countries the strong correlation between the wrong lifestyles and arising of the CDVs can be pointed out. Practically quarter of the burden of chronic conditions is caused by the tobacco and alcohol use, bad dietary habits and low physical activity, so there is a crucial task for the government to initiate campaigns aimed to reduce the negative impact of these risks on the health status of the population.
- **A smooth shift from the "sick care" to the preventive one** that lies in the broaden utilization of "precision medicine" aimed to tackle symptoms of the most common communicable diseases and their consequences reflected on the mortality rates of the population. Precision medicine alls offers advanced onset on the early biomarkers of ageing to slow down their negative impact on patient's organism and to elongate his lifespan.

Russian Federation

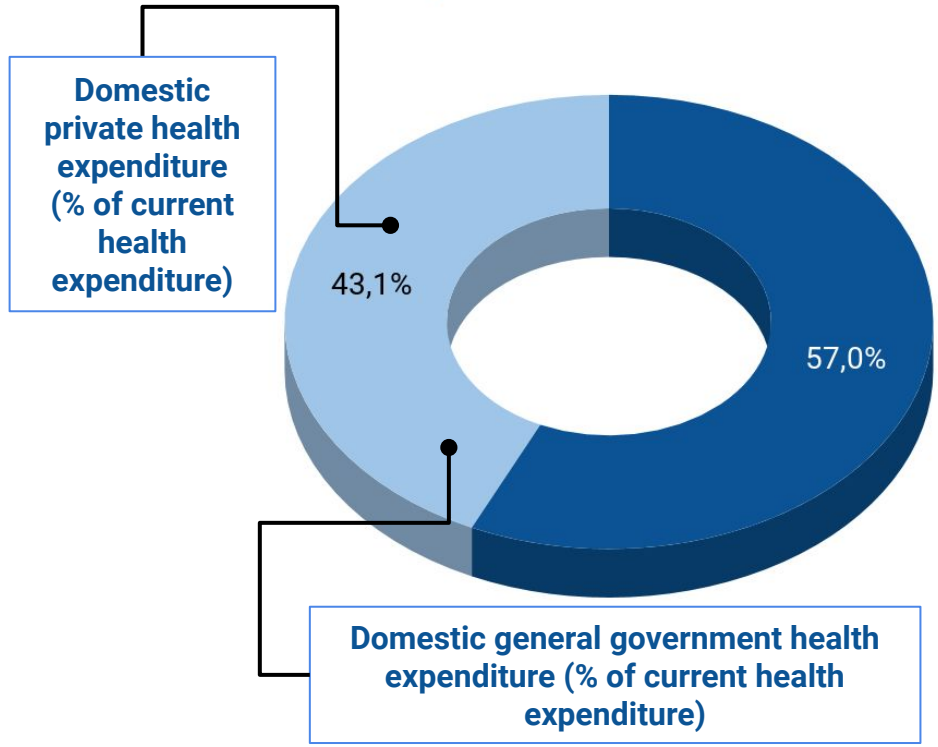


General metrics		
HALE	Both Sexes HALE (2016)	63.5 years
	HALE/Life Expectancy Difference 2016	8.15
Economy	GDP per Capita, Current Prices (2016)	8.75 thousand ($)
	Annual GDP Growth (2016)	0.3 %
Healthcare	Current Health Expenditure per Capita (2016)	0.47 thousand ($)
	Public Health Care Expenditure 2016	5.27 % of GDP
Retirement	Age Dependency Ratio 2016	45
	Population over 65, 2016	13.8 %
	Number of WHO Age Friendly Cities and Communities	8
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	11.7
	Annual Cigarette Consumption (Units per Capita) 2016	2295
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	57.1 % of adults

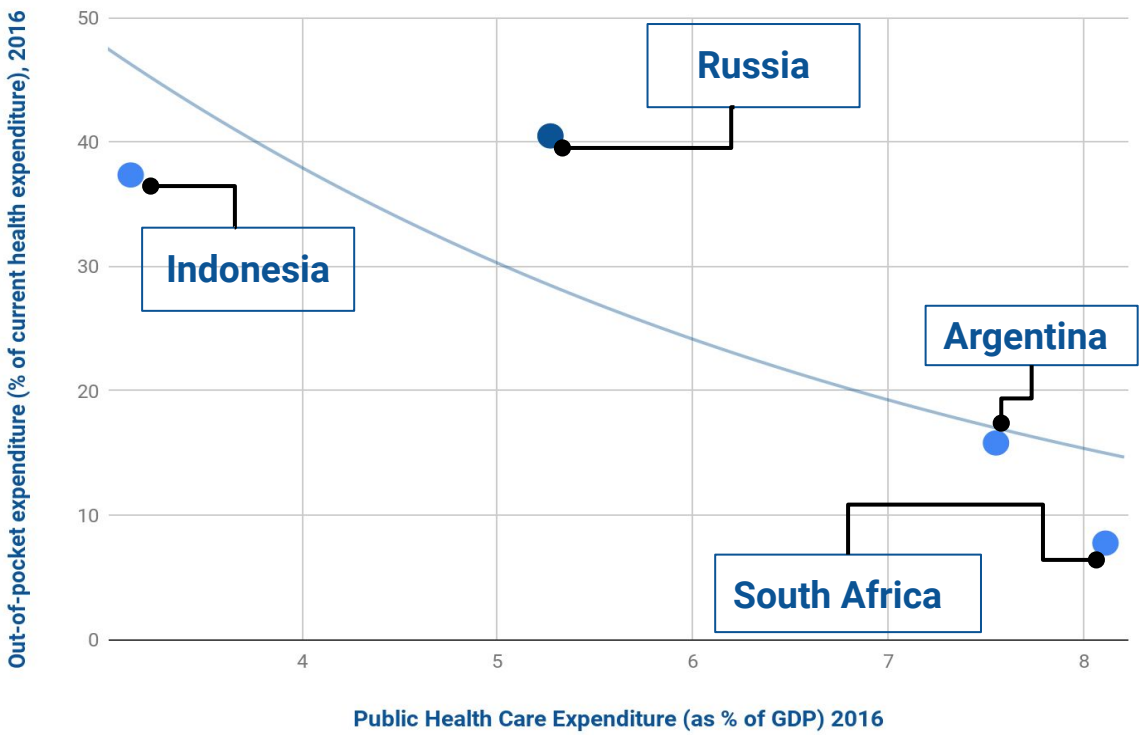
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **75**
- Human Development Index 2016: **0.82**
- E-Government Development Index 2016: **0.72**
- Corruption Perceptions Index 2016: **29**
- Global Gender Gap Index 2016: **0.69**
- Democracy Index 2016: **3.24**

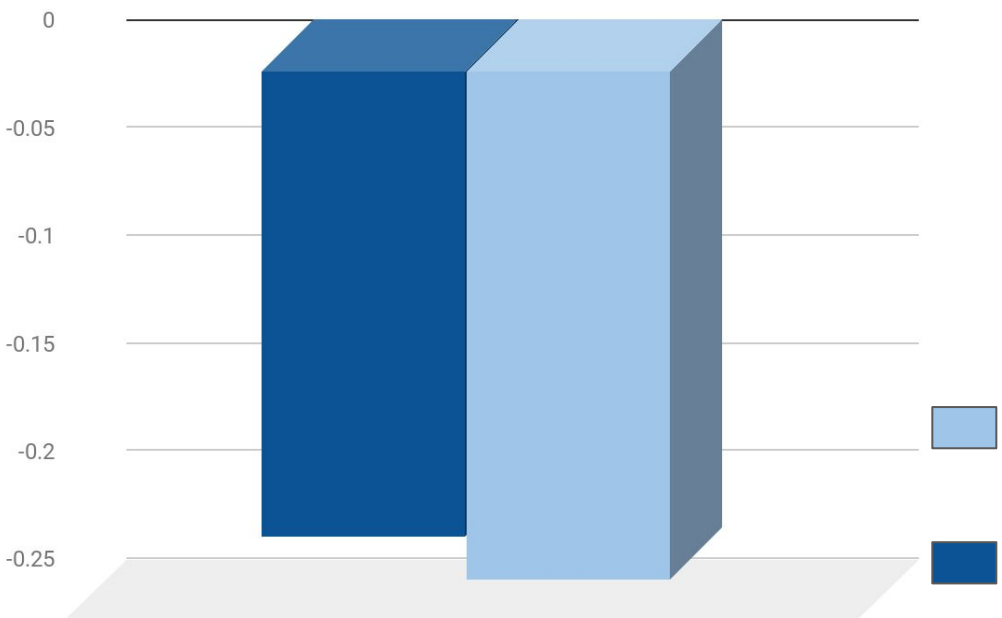
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Low Gap



Effectiveness ratios



The general health of the Russian population has declined significantly since the collapse of the Soviet Union, as a result of several social, economic, and lifestyle changes. One of the problem that should be dealt with is poor quality of healthcare delivery. There is outdated and often non-functioning equipment, a lack of medicines and hospital beds, and a shortage of medical specialists.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Russian Federation

STRENGTHS

- Over the past years mortality trends in the Russian Federation have been decreasing including for diseases of the circulatory system, tuberculosis, external causes of injury and poisoning.
- The country also made good progress in decreasing infant mortality.
- A number of social measures have been undertaken to support birth rate, including improvement in reproductive and maternal health.
- TB incidence and TB mortality decreased by 60% over the last 8 years.

WEAKNESSES

- Non-communicable diseases (NCDs), cardiovascular diseases (CVDs), cancer, pulmonary disease, and diabetes are the main causes (more than 75%) of death in Russia.
- Cardiovascular diseases are a leading cause of a premature death both in men and in women.
- Poor primary health care and universal health coverage.
- Lack of use of health information systems.
- Weak health workforce capacity.
- Alcohol consumption as one of the main factors contributing to variation in the gender gap in life expectancy in the Russian regions.

OPPORTUNITIES

- The Russian Federation became a donor country and plays a growing role in international health cooperation.
- Accumulate efforts and undertake initiatives to reduce alcohol consumption. Reduction in alcohol abuse could also bring other social benefits. Social policy aimed at reducing alcohol consumption should be vigorously reinforced during an economic recovery.
- Launch of modernisation of equipment in public hospitals.
- Utilize opportunities of AI and other advanced technologies to make the treatments cost- and outcome-effective.

THREATS

- Macroeconomic instability, high unemployment rate, socioeconomic inequality contribute to rising prevalence of unhealthy behaviours.
- Tendencies to the ageing of population, dramatic ecological situation and lack of medical infrastructure have a bad impact on longevity.
- High level of corruption in healthcare
- Inefficiency of healthcare financing.
- Lack of medical facilities in remote areas contributes to health status disparities across regions.

Analysis of Strengths and Weaknesses of Health Care System in Russian Federation

- The government is seriously committed to control of infectious diseases through public health measures, and has brought down rates substantially from the 1990s.
- Access to free emergency medical care appears to be universal.
- The system has prioritized the needs of newborns, mothers and young children.
- The recent initiation of “healthy lifestyle” programmes represents a progressive move toward a preventive rather than a curative approach to health care.

- Lack of financial resources in the health care system, which in turn, generates a number of negative consequences: the low salaries of medical personnel, problems of providing the population with free medicines, absence of the possibility of compliance with treatment standards and providing hospitals with modern equipment.
- Deficit and suboptimal quality of medical personnel. A shortage of medical personnel, first of all, is associated with low payment for their work, it is 22% lower than the average salary in the Russian Federation and almost 10 times lower than in developed countries.
- Inequalities in distribution and access to health services contribute to the Russian system’s poor performance and inefficiency. These inequalities are inter-regional, urban–rural, income-based, and social inclusion/exclusion.
- The demographic problem is still urgent due to the projected reduction in the number of women of active reproductive age and growth of the elderly population.
- Low level of information technologies in health care.

Recommendations for Russian Federation

- **Initiate certain reforms to enhance the healthcare system of Russian Federation** to create a room for the issues of the long-livers in the strategical onset on the risky factors that slack the longevity expansion in the country. The reason for the low focus on the problems of elders is grounded in the weak performance of the fundamental healthcare system. That's why there is no acute strategic plan on how Russian Federation will withstand the impending silver wave that will create the burden on the overall economic growth of the country and will put a pressure on the long-term care sector of medical system.
- **Launch of modernisation of equipment in public hospitals.** Most of public sectors' establishments have not up-to-date equipment that reflects on quality of treatment. Basically only surgery provided by private clinics is on top position in Russian Federation but other types are not so progressive especially if to speak about public hospitals. This is also the question about additional investments and economic reform.
- **Increase spending on the healthcare needs to resolve the question of the medical services accessibility.** Narrow set of services offered by the public sector opens an issue for the effectiveness of the Russian Federation's medical system in struggling with the life-threatening conditions that predominantly occur with aged population. These situation inputs additional risk for the premature deaths and arises the tendency for plateauing of the lifespan.
- **Combat with corruption and bureaucracy in healthcare.** Corruption is a major reason of high administrative costs and wasteful healthcare expenditures in clinical care, operational activities and governance. It results in long waiting periods, unmet needs of population and high level of satisfaction of healthcare system performance in general.
- **Develop and implement quality standards for long-term care** (LTC) by working with providers and local governments since a lack of indicators holds back efforts to improve services.

Saudi Arabia

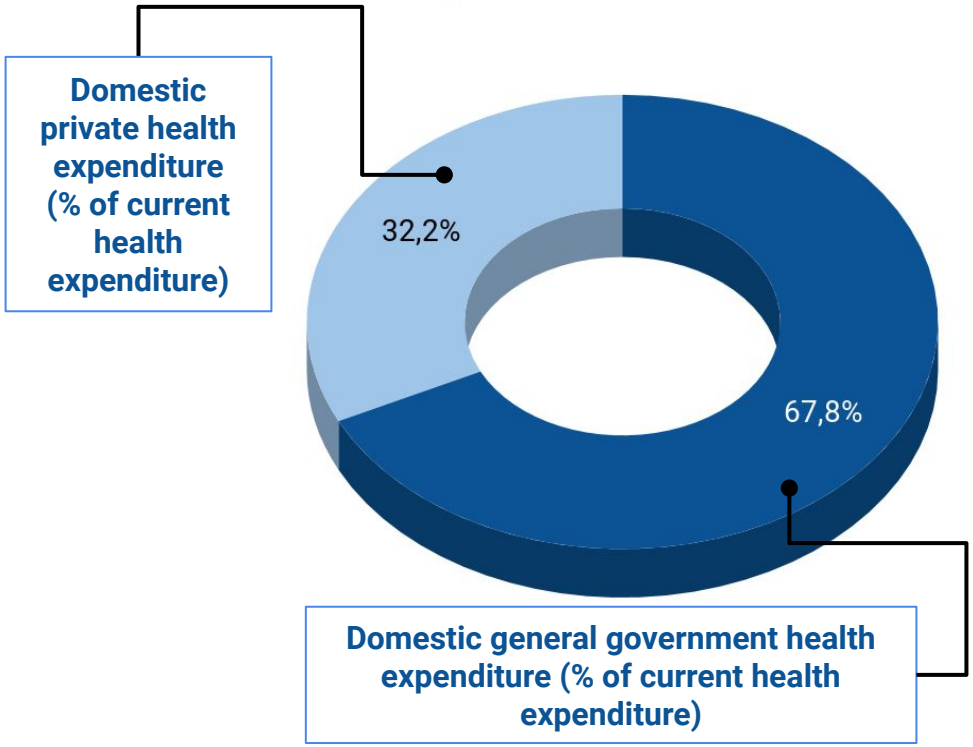
General metrics

HALE	Both Sexes HALE (2016)	65.7 years
	HALE/Life Expectancy Difference 2016	8.86
Economy	GDP per Capita, Current Prices (2016)	19.88 thousand ($)
	Annual GDP Growth (2016)	1.7 %
Healthcare	Current Health Expenditure per Capita (2016)	1.15 thousand ($)
	Public Health Care Expenditure 2016	5.74 % of GDP
Retirement	Age Dependency Ratio 2016	40
	Population over 65, 2016	3.2 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	0.2
	Annual Cigarette Consumption (Units per Capita) 2016	1341
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	69.7 % of adults

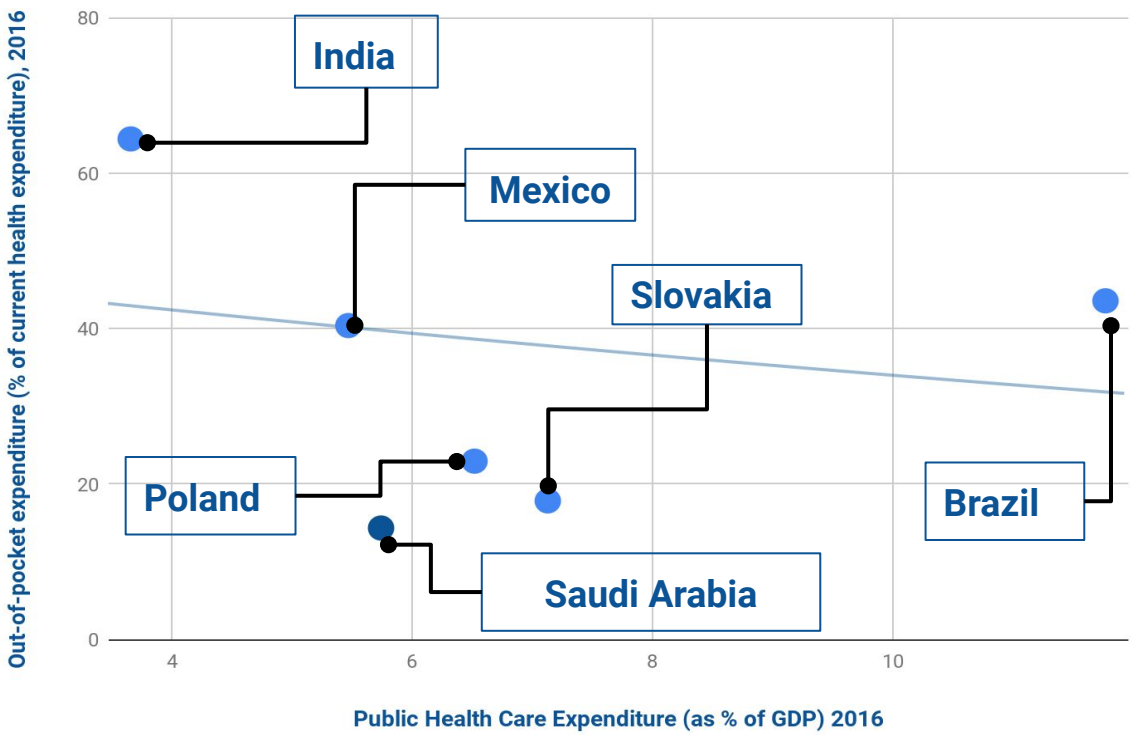
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **77**
- Human Development Index 2016: **0.85**
- E-Government Development Index 2016: **0.68**
- Corruption Perceptions Index 2016: **46**
- Global Gender Gap Index 2016: **0.58**
- Democracy Index 2016: **1.93**

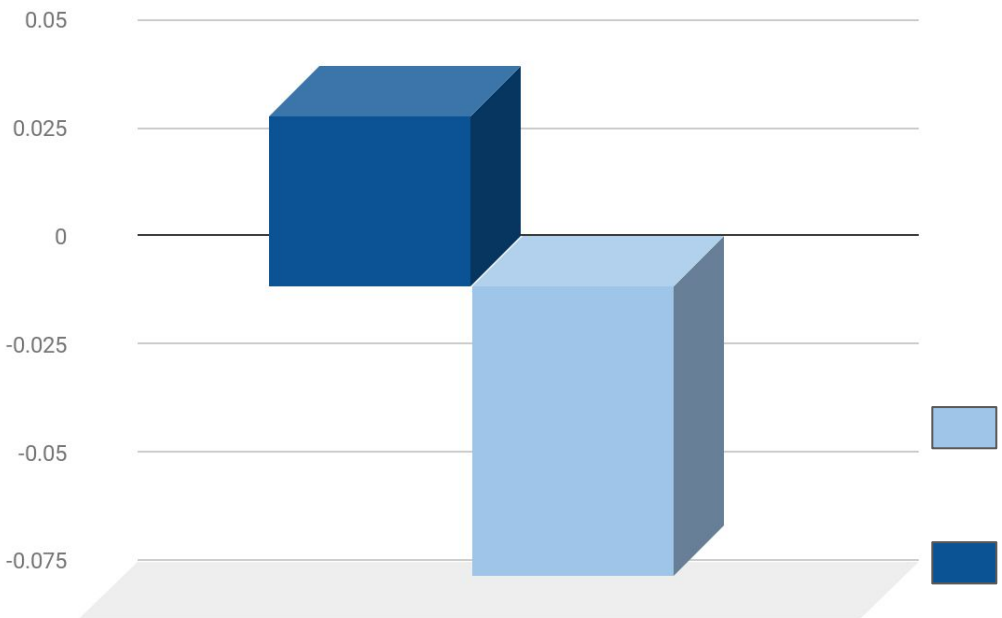
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Medium Gap



Effectiveness ratios



The country need to reduce disparities in health and health care systems between poorer and richer families and underfunded health care systems that in many cases are inefficiently run and underregulated.

SWOT Analysis of Healthcare in Saudi Arabia

STRENGTHS

- Between 2010 and 2016 the number of doctors per 1,000 population increased from 2.4 in 2010 to 2.8. The ratio of nurses improved from 4.8 to 5.7 and number of beds per 1,000 population increased from 2.1 to 2.2.
- The overall decline in communicable diseases can be explained by the improvement in sanitation systems, nutrition, hygiene awareness and invention of more effective medicine.
- The creation of the Saudi Center for Health Information Exchange.

WEAKNESSES

- Overall, the three risk factors that account for the most disease burden in Saudi Arabia are high body-mass index, dietary risks, and high fasting plasma glucose.
- Non-communicable diseases are estimated to account for 73% of all deaths.
- Prevalence of overweight and obesity among adults is on the rise.
- Cardiovascular diseases are the leading causes of death and accounts for 37% of total deaths in 2016.
- Inequality in health outcomes across different socioeconomic groups.

OPPORTUNITIES

- Government continues its efforts in developing various medical cities with the private sector investment using various Public Private Partnership (PPP) models.
- Increasing the availability of a skilled workforce in healthcare is also emerging as a significant focus for country.
- Utilizing information technology to offer management solutions related to cost, quality, access and resources.
- Owing to the large population in the KSA and high occupancy rates of the hospitals, the country requires more primary care clinics and medical centers to meet the demand of the rising population.

THREATS

- Air pollution in Saudi Arabia vastly exceeds safe limits and is damaging the health of the population. Qatar has the first highest levels of PM2.5 particles in the world.
- SEcurity issues relation to patients' information.
- Lack of regional experience and references in the field of eHealth.
- Shortage of Saudi health professionals, effective partnership between patients and their healthcare providers, changing patterns of disease, high demand resulting from free healthcare services for all citizens

Analysis of Strengths and Weaknesses of Health Care System in Saudi Arabia

- The Saudi Arabian government provides free access to a number of health care services to all community members and also to the emigrants working in the country.
- The government is diverting the funds towards creating a robust healthcare infrastructure by building new hospitals.
- Good access and effective care are for certain services including: immunization, maternal health care, and control of epidemic diseases.
- Creation e-health record.

- The health care system still experiences certain challenges in terms of lack of coordination and cohesion among the various health enterprises. These challenges often lead to wastage of resources and duplication of data and effort.
- Because of the enormous changes in the lifestyle of Saudis in the last three decades, the risk factors of coronary heart disease (CHD), including physical inactivity, are increasingly becoming prevalent in the society.
- There is the need for further improvement in the quality of healthcare in university hospitals.
- Poor access and effectiveness are for chronic disease management programs, prescribing patterns, health education, referral patterns, and some aspects of interpersonal care including those caused by language barriers.
- Saudi Arabia is experiencing trends in aging similar to that of other developed countries and the proportion of older people is expected to grow.
- Inequality in health outcomes, and access to health services and their utilisation due to socioeconomic status (SES) is a common theme in health research and policy intervention.
- Social norms and conservative religious beliefs have a powerful effect on women's lives and health in Saudi Arabian society.

Recommendations for Saudi Arabia

- **Prioritise the dealing with a number of healthcare burdens** . Some the same as in many other parts of the world – like rising incidence of heart disease and cancer – and coping with them with innovative use of technology, partnerships and initiatives.
- **Move to a life-course perspective in tackling the rising epidemic of "metabesity."** Saudi Arabia is tackling more unusual challenges, such as a high incidence of congenital diseases due the large number of consanguineous marriages, as well as an explosion in the prevalence of obesity and metabolic syndrome due to a rapidly changing lifestyle to one that is more affluent and sedentary.
- **Consideration of age and sex distribution when planning and implementing health services.** The United Arab Emirates has a rapidly growing population with a unique age and sex distribution. There is an unusually high proportion of young people and expatriates of working age, small numbers of older persons and rapid year on year growth due to high net in-migration.
- **Combat gender inequity.** The traditional Arab family affects women's health in multiple ways. Finances are strictly the man's obligation. Young women are assigned the toughest household tasks. Marriage and motherhood are highly valued, but the pressure to produce sons is strong. Poor relationships with fathers and history of abuse during adolescence can lead to depressive symptoms in girls. There is an inverse relationship between the number of children a woman has and her education, income and age at marriage.
- **Improve the service quality and prevention care.** The paradigm shift from sick care to preventive medicine is focused both on longevity and quality of life. The government should establish an effective referral system to ensure equity and access to the population irrespective of their location of residence, income, education, and social status and age.

Singapore

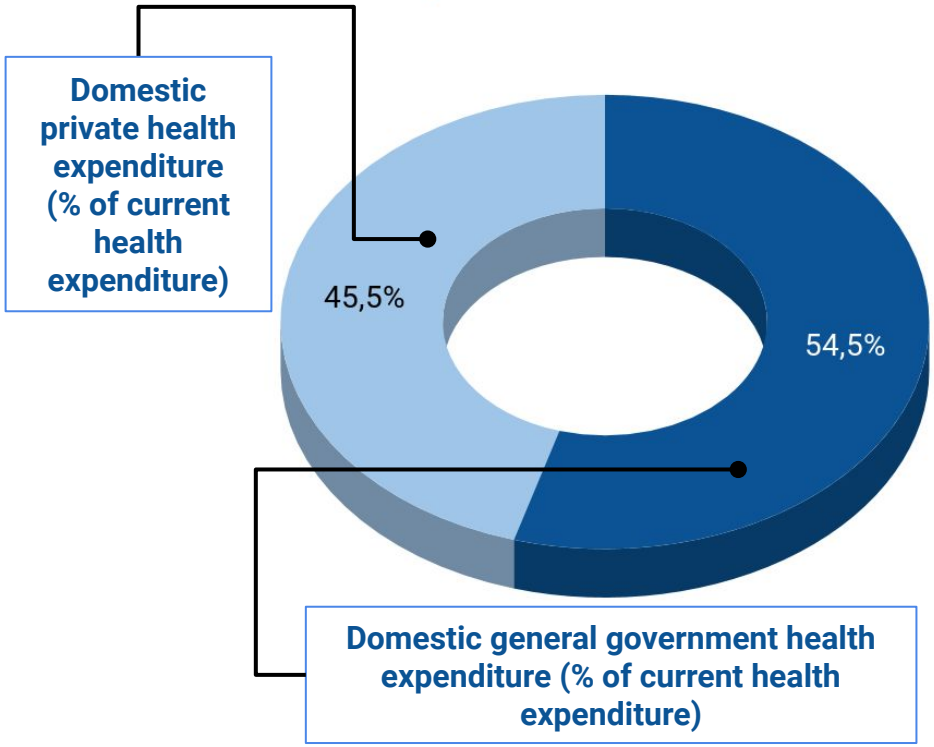
General metrics

HALE	Both Sexes HALE (2016)	76.2 years
	HALE/Life Expectancy Difference 2016	6.7
Economy	GDP per Capita, Current Prices (2016)	56.72 thousand ($)
	Annual GDP Growth (2016)	3 %
Healthcare	Current Health Expenditure per Capita (2016)	2.46 thousand ($)
	Public Health Care Expenditure 2016	4.47 % of GDP
Retirement	Age Dependency Ratio 2016	38
	Population over 65, 2016	12.3 %
	Number of WHO Age Friendly Cities and Communities	1
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	2
	Annual Cigarette Consumption (Units per Capita) 2016	851
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	31.8 % of adults

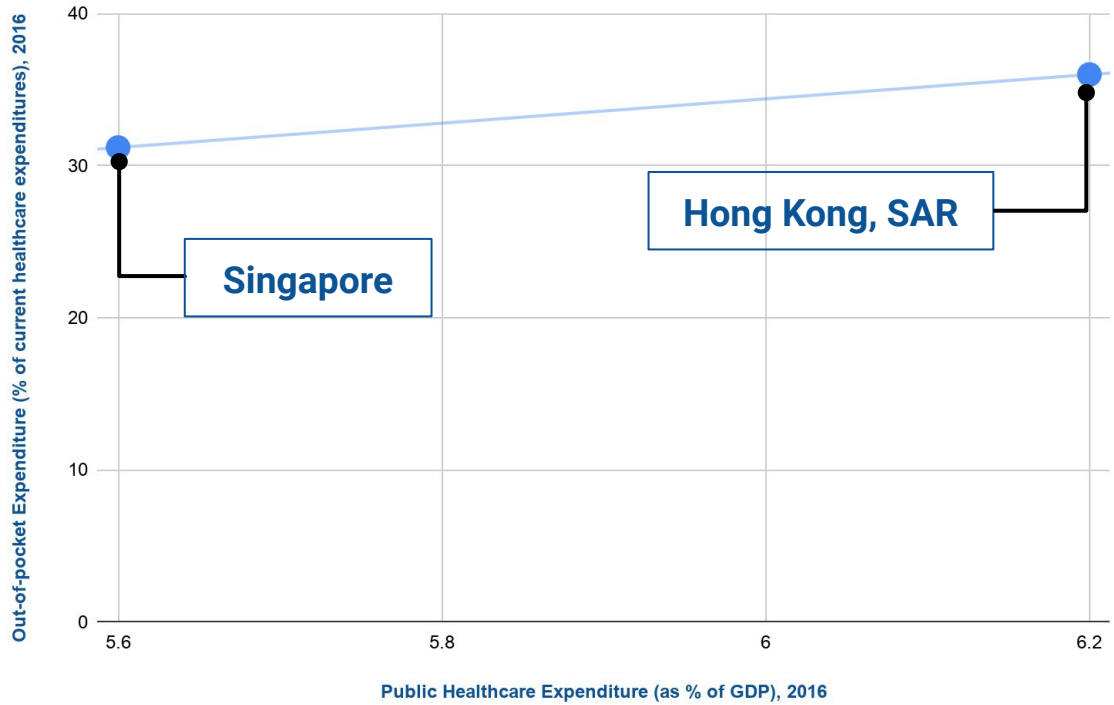
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **91**
- Human Development Index 2016: **0.93**
- E-Government Development Index 2016: **0.88**
- Corruption Perceptions Index 2016: **84**
- Global Gender Gap Index 2016: **0.71**
- Democracy Index 2016: **6.38**

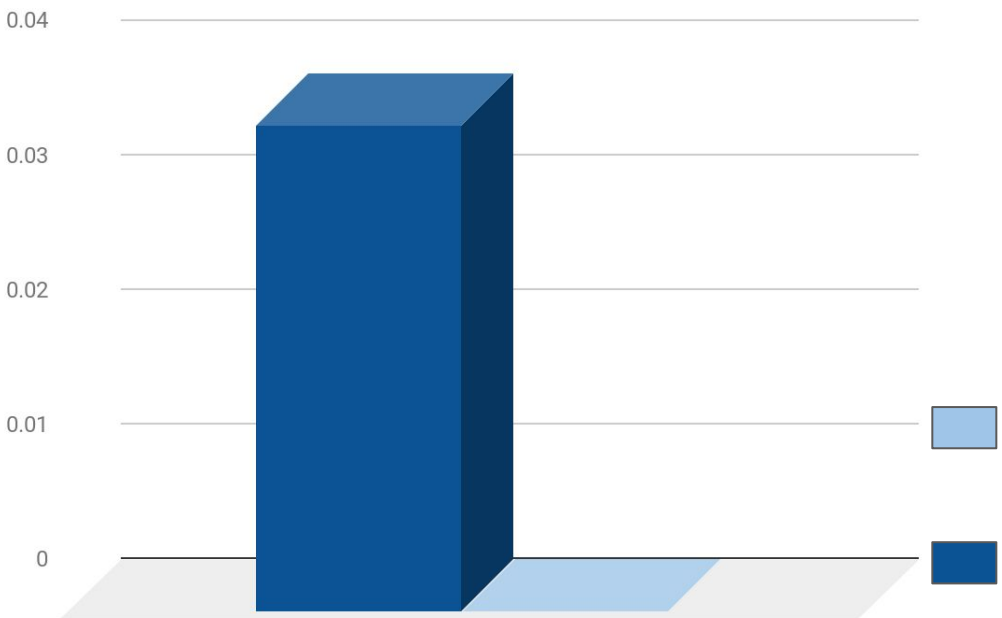
Current Healthcare Expenditure



Countries with high HALE and Life Expectancy and Small Gap



Effectiveness ratios



Chronic disease care is a critical part of a people's health. The patient should be persuaded about exercise, diet and lifestyle change: all important for chronic disease control. Caregivers and patients should be empowered through education, information and communication. Further implementation of eHealth initiatives will lead to the reduction of number of patient visits to hospitals for routine checks, will free up healthcare resources, enabling healthcare staff to better manage their time and focus on priorities.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Singapore

STRENGTHS

- There is a single electronic health record (EHR) in use across the whole country, which makes everything very well-tuned.
- Developed healthcare infrastructure comprises a combination of public 'polyclinics' and hospitals and private medical clinics and hospitals to provide high quality treatment.
- Deliver care to people, focusing on quality, efficiency and cost.
- Developed universal healthcare coverage. Coverage is funded through a combination of government subsidies and private individual savings.

WEAKNESSES

- Healthcare system relies heavily on institutions.
- Certain life-saving procedures result in some of the highest hospital bills that even insurance protection can not fully alleviate.
- Small population size that limits healthcare system potential.
- Despite subsidies long-term care is expensive.
- Out-of-pocket costs make up almost 37% of total healthcare expenditure in Singapore. This figure is almost 3 times as high as the high-income country average and 1.4x higher than the East Asia & Pacific average.

OPPORTUNITIES

- Favorable managing regulations and business environment
- Provision of subsidies to Singaporeans to reduce disparities and obtain treatment at private primary care providers.
- Building a sophisticated national electronic health record system, that collects, reports, and analyzes information to aid in formulation of policy, monitoring of implementation, and sharing of patient records.
- Utilizing their strength in the artificial intelligence industry for meaningful improvements in medical care.

THREATS

- The challenge of funding Singapore's escalating healthcare needs.
- Increasing competition for talent and labor.
- Increasing complexity and costs associated with advancing technology, equipment, treatment and training.
- The trend towards smaller nuclear families.
- Ageing places a great burden on many fronts including health infrastructure, insurance premiums, caregiving professionals and private finances.
- Environmental pollution problems.

Analysis of Strengths and Weaknesses of Health Care System in Singapore

- Singapore gets a lot of attention because of the way it pays for its health care system. What's less noticed is its delivery system. Primary care, which is mostly at low cost, is provided mostly by the private sector.
- Government control applies to public health initiatives. Officials began to worry about diabetes, so they acted. School lunches have been improved. Regulations have been passed to make meals on government properties and events healthier. In Singapore, campaigns have encouraged drinking water, and healthier food choice labels have been mandated.
- Singapore is in forefront of Longevity industry, applying advanced AI opportunities for healthcare and wellness.
- Relatively low level of obesity and decreasing level of overweight among adults. In 2017, 36.2% of Singaporeans aged 18 to 69 are overweight. This is a drop from 2010, when a national survey found 40.1% of adults were overweight.
- The polyclinics is focused on efficiency. They have been designed to process as many patients as quickly as possible.

- There is need to face illnesses that are more typical of this region. In Singapore, about one in five children suffer from asthma. While Singapore itself is not a significant producer of air pollution, neighbouring countries Malaysia and Indonesia still practice slash-and-burn agriculture, as well as intensive logging and heavy industrial manufacturing. This air pollution causes "smog cough", difficulty breathing, respiratory irritation and even asthma.
- Environmental conditions cause negative impact on health-adjusted life expectancy and life expectancy at birth itself. Singapore has high UV levels all year round due to its proximity to the equator, with the UV index (ranging from 0 to extreme levels of 11 and beyond) soaring as high as 9 in some months.
- Singapore has the second-highest proportion of diabetics among developed nations, with one out of nine Singaporeans between 18 and 69 years old being affected by the disease.
- Due to more sedentary lifestyles among Singaporeans, childhood obesity is on the rise.

Recommendations for Singapore

- **Minimising out-of-pocket medical costs.** Medisave forms only a very small part of total expenditures. The should ensure that basic services remain affordable for everybody.
- **Plan and implement developmentally appropriate programs in school-aged environments, encourage social media responsibility to maintain social network and develop inclusive society for elderly.**
- **Focus on health status of elderly.** Health status is one of the most important indicators of well-being, and it predicts a large proportion of societal expenditures on health and social services for the elderly. It depends on individual lifestyle factors, social and community networks, general socioeconomic. Health status is also reciprocally affected by social and political policies and programs.
- **There is a need to do a better job educating medical students and medical residents on how to adapt to an era of technology-enabled healthcare.**
- **Promote research and initiate a wider utilization of Artificial Intelligence for preventive medicine.** Research is vital in providing the knowledge needed to improve health outcomes and reduce inequalities.
- **Identifying and modifying or avoiding key risk factors for diseases, including diabetes, cardiovascular diseases and respiratory conditions.** It can be caused by lack of exercise, ageing, an unhealthy diet and environmental pollution. If left untreated, it may lead to more serious conditions such as kidney failure, coronary heart disease, blindness and even the need for amputations.Initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of mortality factors.
- **Manage to maintain modest overall spending.** Singapore has to calibrate a developed portfolio of targeted tools to address specific problems to respond to aging in the coming years. The coordinated use of these tools ensures that healthcare providers compete on affordability and quality, and that total costs remain relatively low.

Slovakia

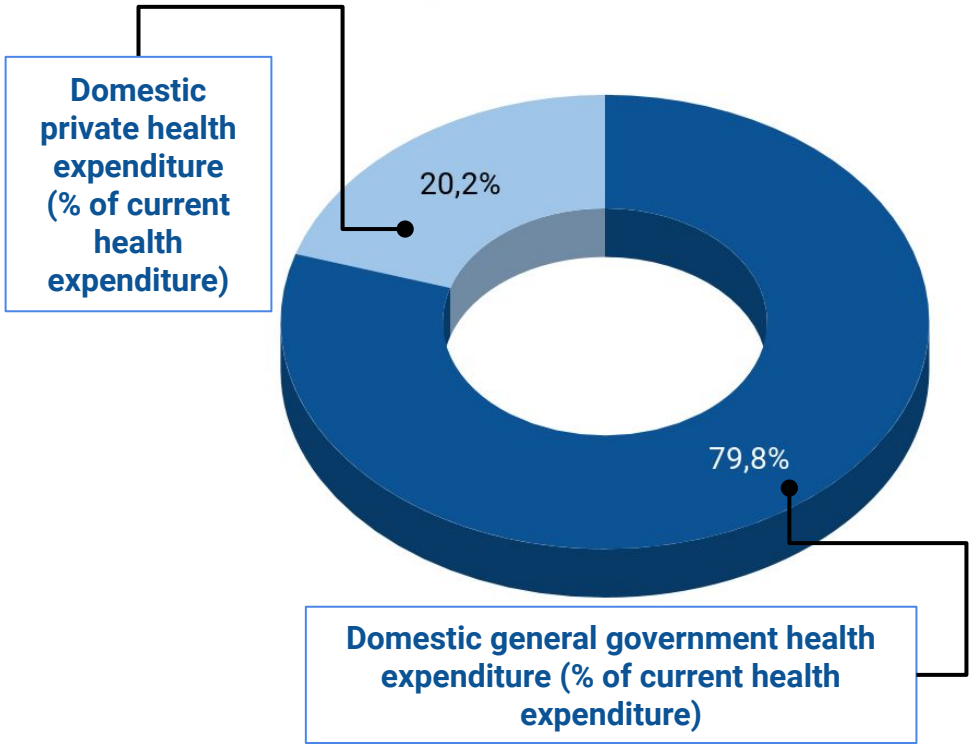
General metrics

HALE	Both Sexes HALE (2016)	68.3 years
	HALE/Life Expectancy Difference 2016	9.1
Economy	GDP per Capita, Current Prices (2016)	16.54 thousand ($)
	Annual GDP Growth (2016)	3.1 %
Healthcare	Current Health Expenditure per Capita (2016)	1.18 thousand ($)
	Public Health Care Expenditure 2016	7.13 % of GDP
Retirement	Age Dependency Ratio 2016	43
	Population over 65, 2016	14.5 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	11.5
	Annual Cigarette Consumption (Units per Capita) 2016	1500
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	56.2 % of adults

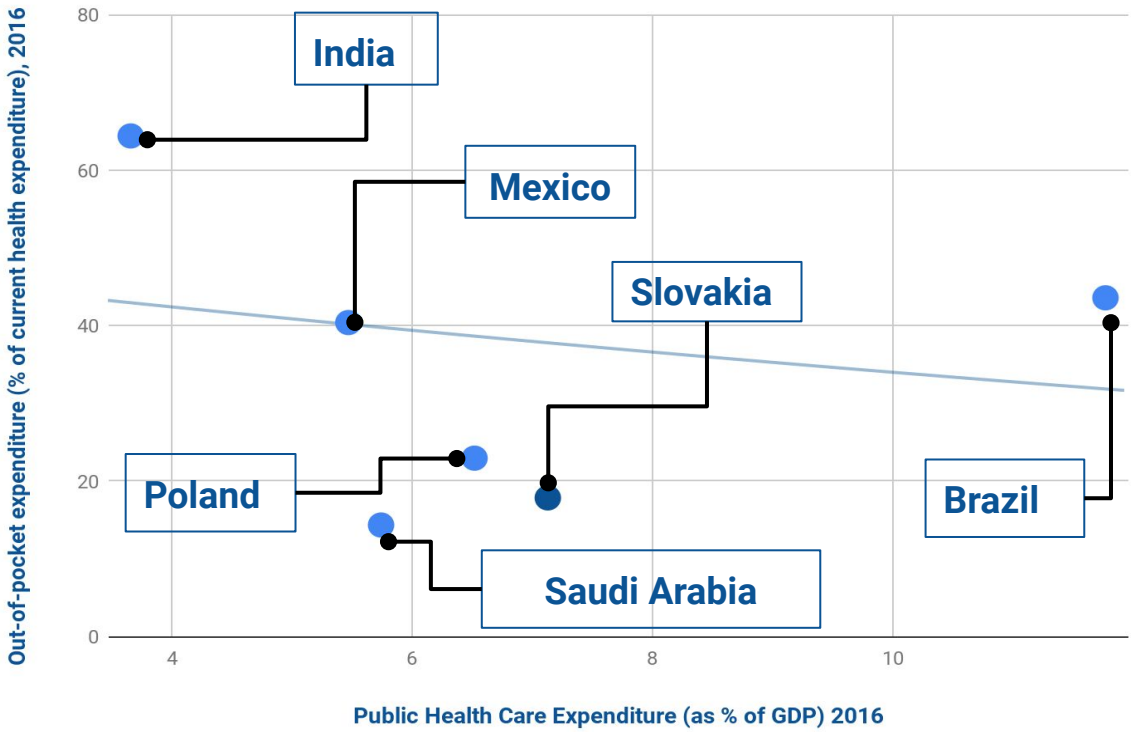
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **83**
- Human Development Index 2016: **0.85**
- E-Government Development Index 2016: **0.59**
- Corruption Perceptions Index 2016: **51**
- Global Gender Gap Index 2016: **0.68**
- Democracy Index 2016: **7.29**

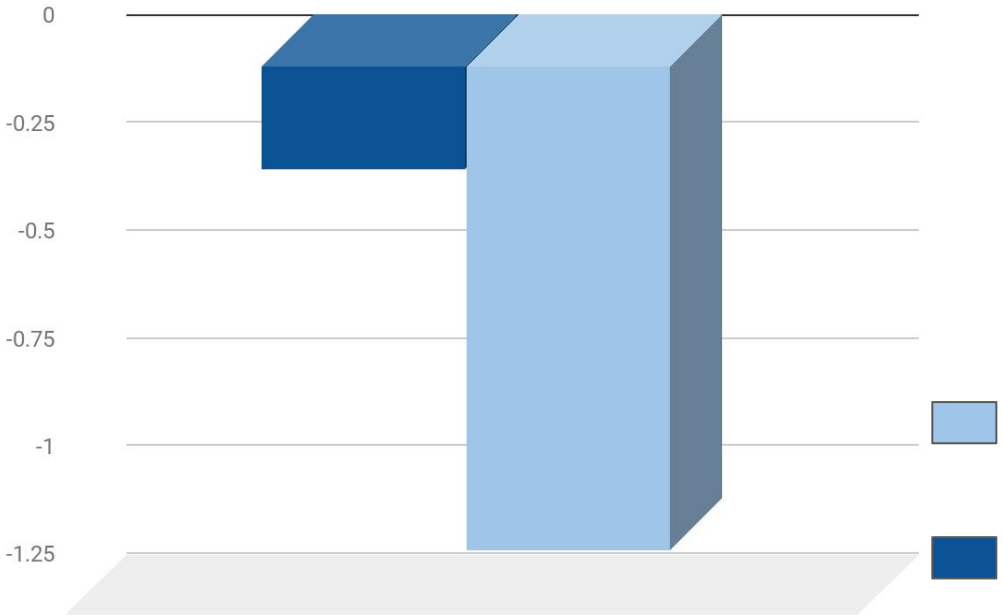
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Medium Gap



Effectiveness ratios



The most pressing issues to be addressed are enhancing the efficiency and quality of primary care, modernising hospital infrastructure and management, promoting better care access for the poor population and improving lifestyles through well-designed public health and disease-prevention policies.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Slovakia

STRENGTHS

- Comprehensive healthcare legislation and institutional framework.
- National immunization plan in line with WHO recommendations, vaccination rate up to 95%
- Regular monitoring of health status, risk factors and recent surveys on social and economic health determinants; systematically published data and their accessibility.
- Risk factors for non-communicable diseases such as alcohol, tobacco consumption and overweight are comparable or below the EU average.

WEAKNESSES

- Lack of modern technologies in laboratories and IT equipment
- Gradual reduction of specialized PH employees, mainly physicians, due to poor financial remuneration and administrative changes, lack of experts in epidemiology (especially NCD), for health statistics and scientific health analyses
- Lack of directly allocated financial resources, coordination and synergic effect of implementation the existing health promotion and disease prevention programmes.
- A large gap in healthcare status exists by socioeconomic status.

OPPORTUNITIES

- There remains a substantial number of vacant physician job openings in the system.
- Start proper monitoring of population health and develop health policies based on actual population needs.
- Establishing information systems that collect meaningful data and holding health actors accountable.
- Improve diagnostic, prevention and treatment procedures.
- Strengthening primary care.
- Improving the cost-effectiveness of Slovakia's healthcare.

THREATS

- Intensive ageing of the population, which is manifested by the increase of the number of people of post-productive age and a reduction in the share of the population in childhood.
- There is inequity in the distribution of health providers, resulting in lengthy travelling distances and waiting times for patients.
- Outdated hospital infrastructure remains a challenge.
- There is an increasing outflow of (young) health personnel out of the Slovak health system due to migration, although exact data are lacking.
- Rising rates of overweight and obesity in children

Analysis of Strengths and Weaknesses of Health Care System in Slovakia

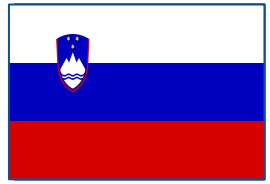
- Thanks to sustained economic growth, at almost 4% on average over the last two decades, living standards have been catching up with higher-income countries.
- While life satisfaction in the Slovak Republic is around the OECD average, work-life balance and social connections indicators are on average better than in other OECD countries. Inequality is comparatively low, and the relative poverty rate at 8.5% is below the OECD average of 11.7%.
- The government-defined benefit package is broad.
- Measures are in place to protect vulnerable groups, including payment ceilings for prescribed pharmaceuticals and tightened rules for extra charges by providers.

- Slovakia also struggles to improve prevention and public health efforts.
- Child immunisations rates are falling from previously high levels and Slovakia has very low cancer screening rates.
- Health outcomes in the Slovak Republic are unequally distributed across the country, both geographically and between population groups.
- The Slovak Republic has one of the highest hospital admission rates for asthma among OECD countries with 110 admission per 100 000 population, more than twice the OECD average of 44 admissions. Hospital admission rates for diabetes and hypertension, as well as congestive heart failure are also high by international comparison.
- The Slovak Republic shows some of the highest mortality rates among OECD countries. Mortality from cardiovascular diseases is exceptionally troublesome. Rates for both ischemic heart and cerebrovascular diseases are the bottom end in OECD.

Recommendations for Slovakia

- **Expand its primary health care sector.** A core function of a strengthened primary care sector must be the effective management of patients with multiple, complex health care needs, including long-term conditions such as diabetes. The government should devise comprehensive approach to tackling diabetes, high blood pressure and other chronic diseases through public health programmes and public policy.
- **Modernise health promotion and disease prevention, and continue to reform hospital services.** Move from a hospital-centred system to providing more and better preventive services and primary care.
- **Reduce inequality in health outcomes across different socio-economic groups and large discrepancies across regions.** Address the poor health outcomes and their regional differences by implementing policies for more equitably distributed services. Health resources can become more available to underserved population groups and geographical areas.
- **Make medical professions more attractive.** The employment and remuneration conditions need to be improved to raise the attractiveness to work as a general practitioners, especially in rural areas. Adopt more and stronger policies to attract medical staff to regions outside the capital. This requires a broad set of actions, such as allocation of resources and incentives to retain old staff and attract new.
- **Strengthen the capacity to innovate and adopt new technologies in health care.** This includes better adapting the skills of the workforce to the changing needs of the labour market, enhancing the business environment, improving the transport infrastructure, stimulating firms' innovation capacities and addressing regional disparities in physical and information infrastructure.
- **Provide incentives for investments in home care services and private providers.** Due to the increasing population of the elderly and the abundance of chronic diseases, long-term care facilities are being continuously demanded by the market

Slovenia



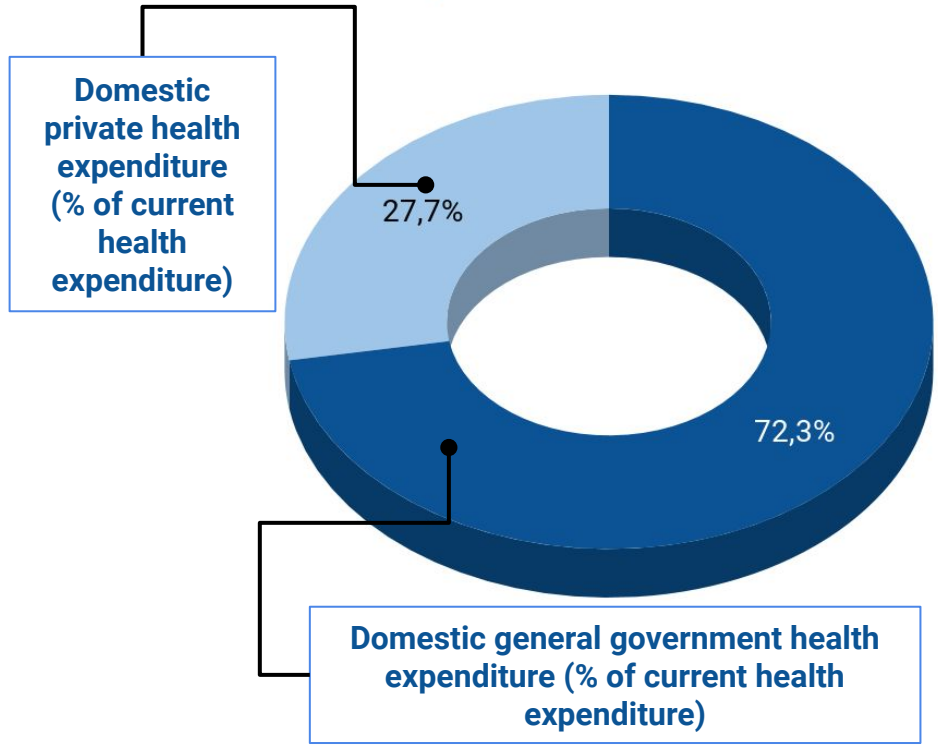
General metrics

HALE	Both Sexes HALE (2016)	70.5 years
	HALE/Life Expectancy Difference 2016	10.4
Economy	GDP per Capita, Current Prices (2016)	21.62 thousand ($)
	Annual GDP Growth (2016)	3.1 %
Healthcare	Current Health Expenditure per Capita (2016)	1.83 thousand ($)
	Public Health Care Expenditure 2016	8.47 % of GDP
Retirement	Age Dependency Ratio 2016	50
	Population over 65, 2016	18.5 %
	Number of WHO Age Friendly Cities and Communities	10
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	12.6
	Annual Cigarette Consumption (Units per Capita) 2016	2236
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	28.4 % of adults

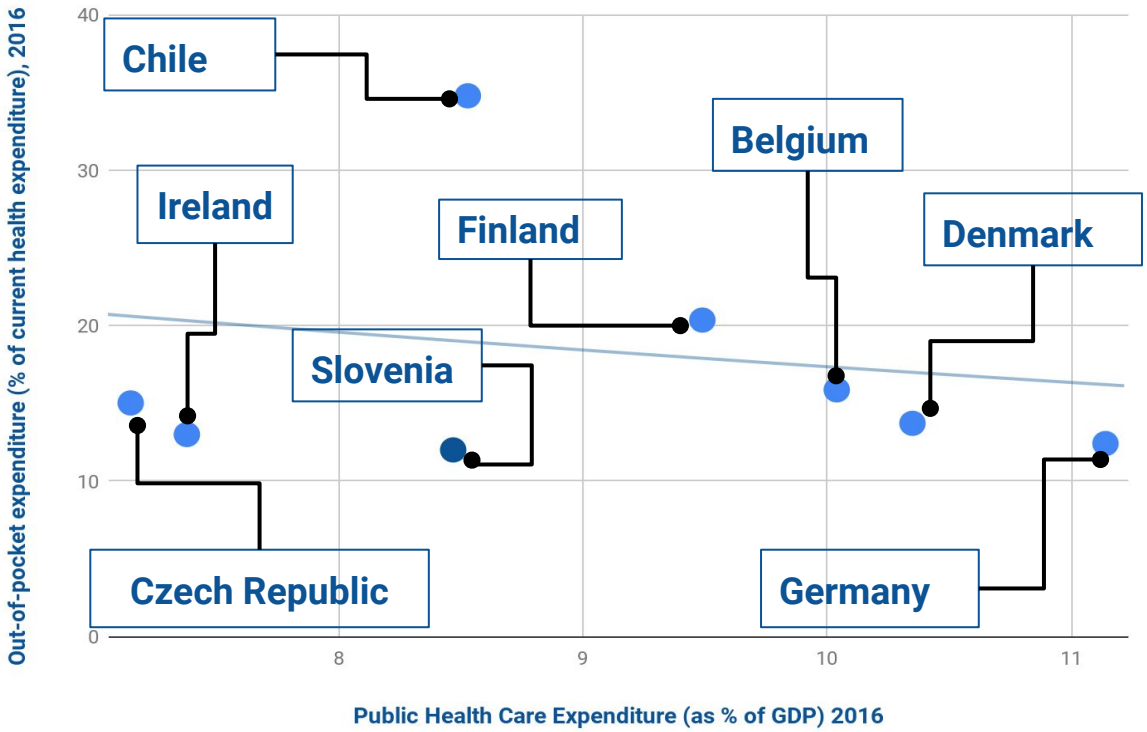
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **91**
- Human Development Index 2016: **0.89**
- E-Government Development Index 2016: **0.78**
- Corruption Perceptions Index 2016: **61**
- Global Gender Gap Index 2016: **0.79**
- Democracy Index 2016: **7.51**

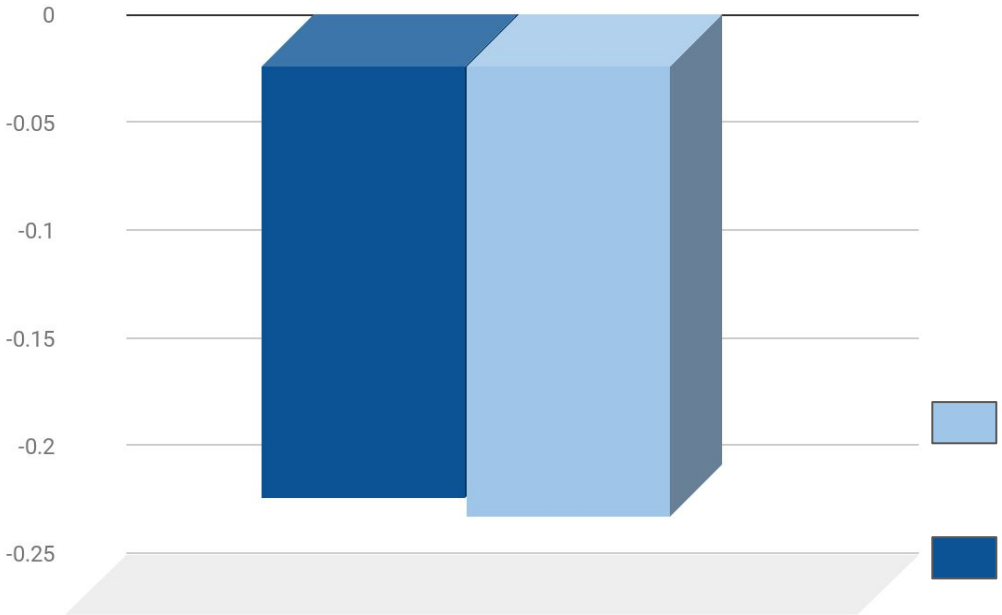
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and High Gap



Effectiveness ratios



Medical workers must continue to be supported in delivering the best evidence-informed high-quality care through firm commitments to training, professional development and access to resources.

SWOT Analysis of Healthcare in Slovenia

STRENGTHS

- Slovenia's average life expectancy is above that of the EU and experienced one of its largest gains over the last two decades.
- Access to health services is good, with very low numbers reporting unmet needs for medical care and almost no variation between income groups.
- The Slovenian health system provides near universal coverage but there are extensive co-payments. To cover these, 87% of the population have voluntary health insurance and there is help for those who cannot afford it.

WEAKNESSES

- Waiting lists for specialised care remain a challenge.
- There continues to be a considerable gender gap with life expectancy at birth for women exceeding that of men by more than six years and inequalities across socioeconomic groups and between western and eastern Slovenia.
- The obesity rate among adults in Slovenia is higher than in most other EU countries despite reporting above average levels of physical activity.
- Slovenia has one of the lowest physician densities in the EU.
- There is a lack of coordination and integration across levels and sectors, causing discontinuity of care.

OPPORTUNITIES

- The digital transformation of the health and social care system. It is part of the ongoing commitment to introducing new technologies into the national healthcare system in order to reduce the burden on clinicians and to enable staff to provide enhanced levels of care.
- Shift from treatment to prevention will have a major impact on reducing both average length of stay in hospital and the number of hospital beds for acute care.
- Reforming healthcare system with focus on care delivery and extended access for effective prevention and advanced treatment.

THREATS

- The economic crisis revealed issues with the fiscal sustainability of the health system.
- There is a longstanding need to redesign the composition of health financing to ensure fiscal sustainability.
- Ageing of the population is a rising issue for healthcare and pension systems stability.
- Growing burden of non-communicable and chronic diseases as a result of rising concern on behavioral risk factors.
- Access to healthcare in Slovenia depends on an individual's status in the country.

Analysis of Strengths and Weaknesses of Health Care System in Slovenia

- In recent years several incentives were introduced to strengthen the provision of preventive services.
- The insured population enjoys a broad range of benefits. Compulsory health insurance does not define a comprehensive list of all benefits, nor does it explicitly exclude services from public coverage.
- Out-of-pocket spending is below the EU average. It has remained stable throughout the last decade and during the economic crisis.
- Slovenian healthcare has not been based on hospital treatment in the past, but has ever since established a good network at the primary level.

- Slovenia experienced moderate shortages within the health professional workforce, in particular regarding physicians and registered nurses but also, to a lesser degree, dentists and pharmacists.
- Lack of reliable data on health status and medical treatment.
- Less developed long-term care, which aim to develop an affordable, effective and sustainable response to the needs of a rapidly ageing population.
- Large majority of households using out-of-pocket payments are still not at risk of impoverishment
- Lack of healthcare system efficiency and sustainability of health system funding.
- Fragmentation of equal access as well as balanced coverage and provision of services across the country.
- Key problem of the healthcare system in Slovenia remains the dispersion of the organization and the provision of health services, which is an even greater challenge in terms of demographic changes and the health status of the population.
- In 2014, Slovenia ranked fourth in terms of mortality from suicide in the EU, with particularly high levels among men and large regional disparities between western and eastern Slovenia.

Recommendations for Slovenia

- **Engage healthy lifestyle.** There is rising concern on prevalence of overweight and obesity among adolescents and adults. One of the top priorities for government on the way to Healthy Longevity is to encourage a more active lifestyles through health promotion media campaigns and make physical activity an easier choice in the workplace; tighten regulations of food advertising to better protect children. The Slovenian government should aim of improving nutrition and physical activity for the whole population and from early life.
- **Solve the issues of inequalities across socioeconomic groups and regions**. Key problem of the healthcare system in Slovenia remains the dispersion of the organization and the provision of health services, which is an even greater challenge in terms of demographic changes and the health status of the population. The government should develop strategic plan to tackle health inequalities in terms of health outcomes, accessibility, affordability and distribution of healthcare resources.
- **Health records and linkage to survey data should be used more extensively** to refine disease prevalence estimates, and provide more reliable data to guide policy and programmes to address these causes of ill health.
- **Enhance long-term care.** Healthcare authorities should to strengthen primary care and provide greater access to comprehensive and quality treatment through better care integration and a more adequate professional skill-mix across care levels. These reforms should also help Slovenia to respond to the changing needs of an ageing population.
- **Enhance physical and information infrastructure.** The government should increase financing health infrastructure for hospitals and other facilities to deliver healthcare programs on a national level to all citizens in Slovenia. Such step may help to minimize number of unmet needs and increase accessibility of healthcare services for population.

South Africa

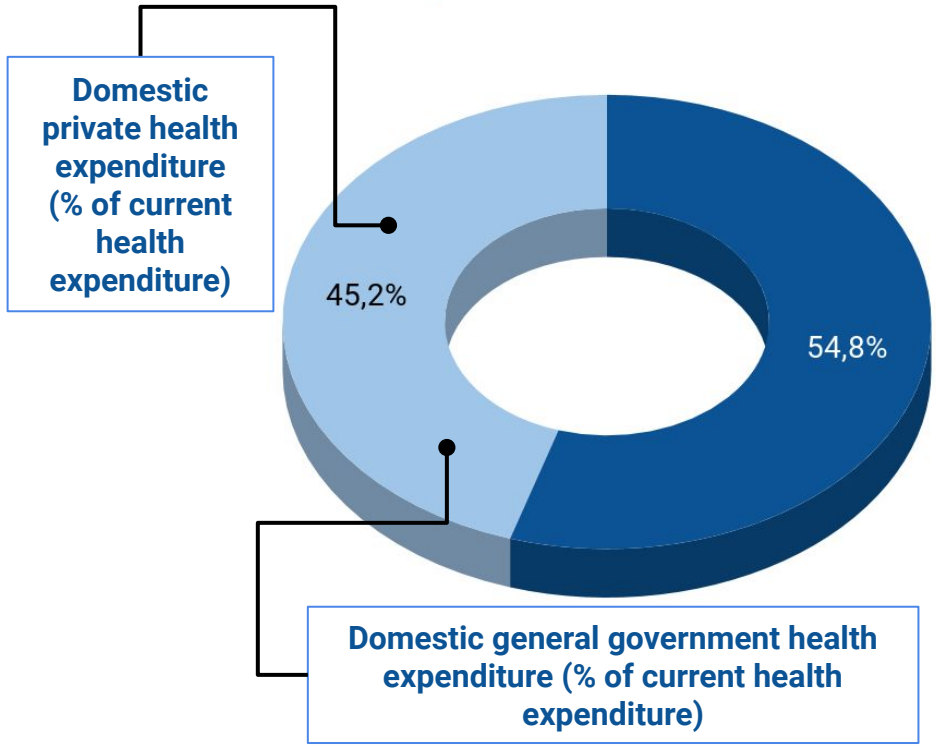
General metrics

HALE	Both Sexes HALE (2016)	55.7 years
	HALE/Life Expectancy Difference 2016	7.07
Economy	GDP per Capita, Current Prices (2016)	5.26 thousand ($)
	Annual GDP Growth (2016)	0.6 %
Healthcare	Current Health Expenditure per Capita (2016)	0.43 thousand ($)
	Public Health Care Expenditure 2016	8.11 % of GDP
Retirement	Age Dependency Ratio 2016	52
	Population over 65, 2016	5.2 %
	Number of WHO Age Friendly Cities and Communities	0
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	9.3
	Annual Cigarette Consumption (Units per Capita) 2016	510
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	53.8 % of adults

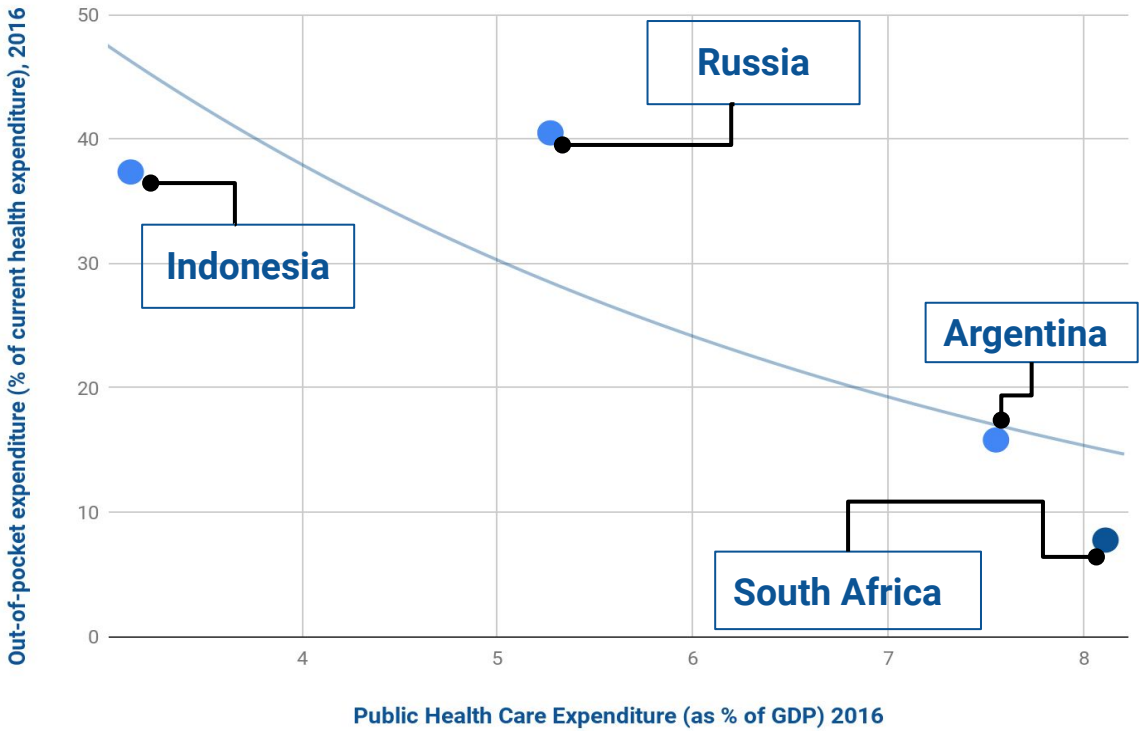
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **50**
- Human Development Index 2016: **0.7**
- E-Government Development Index 2016: **0.55**
- Corruption Perceptions Index 2016: **45**
- Global Gender Gap Index 2016: **0.76**
- Democracy Index 2016: **7.41**

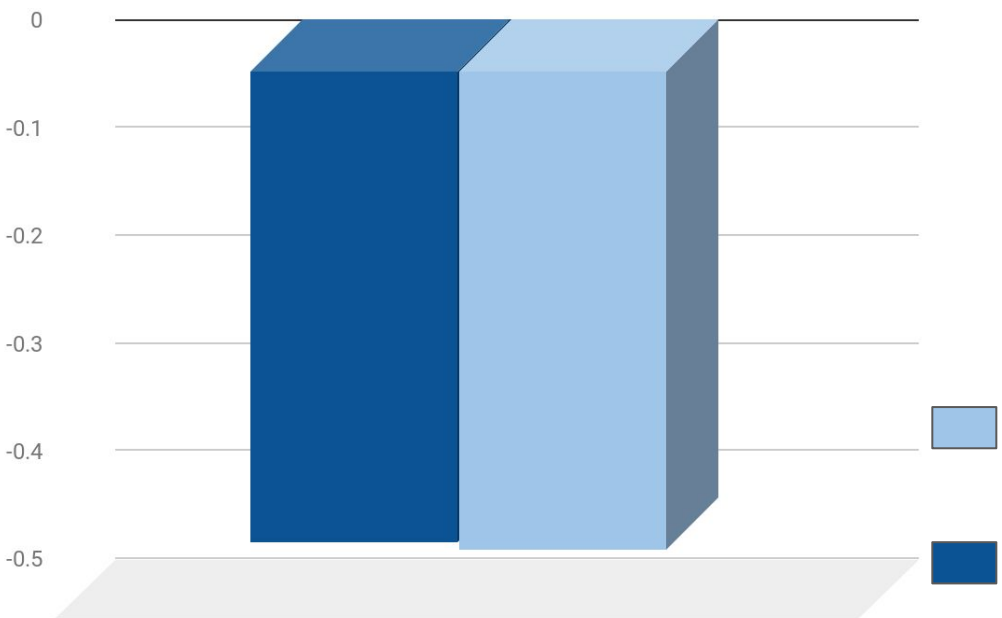
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and Low Gap



Effectiveness ratios



South Africa must focus on making sure all healthcare workers have the right knowledge, skills and resources, for example by training the next generation of scientific leaders. It is needed to focus on the management of institutions and care delivery which is at the districts, hospital and clinic level. Government should address inequality, provide betters sanitation facilities, develop agenda to improve public health and decrease burden of chronic diseases.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in South Africa

STRENGTHS

- Major urban areas of South Africa have many excellent private hospitals and practitioners to choose from.
- There are two major pharmacy chains in South Africa, which are complemented by many independent pharmacies. Pharmacists are well-trained and can offer medical advice on minor ailments and injuries.
- Life expectancy continues to rise in South Africa and morbidity is down.

WEAKNESSES

- Poor hygiene and poor infection control measures. Most facilities have problems with access to improved water sources and adequate sanitation facilities are the reasons, poor waste management, lack of cleanliness and poor maintenance of grounds and equipment.
- The impact of HIV and AIDS has devastated healthcare systems to the extent that they are unable to cope with the demands of high-quality delivery.
- South Africa has very high private health care costs, putting it out of reach for most people in the country.

OPPORTUNITIES

- Institutionalisation of a co-ordinated, comprehensive health workforce planning process in South Africa
- Develop community-oriented primary care
- Improve data use and community engagement. There is a desire for new forms of health information and new forms of engagement (if effectively facilitated). People are willing to break out of conventional ways of thinking and doing when given the opportunity.
- To improve healthcare outcomes there is a room for improvement the quality of care and achieve financial risk protection.

THREATS

- Despite major redistributive reforms, poverty remains endemic.
- Health inequality persist according to income status and education.
- Public hospitals tend to be overcrowded, under-resourced and understaffed, with long waiting times.
- Increasing prevalence of obesity and rising problem with undernourishment.
- Burden of behavioral risk factors, including alcohol consumption and smoking

Analysis of Strengths and Weaknesses of Health Care System in South Africa

- Well-established nurse-based system of public primary healthcare.
- Dubling of public healthcare per capita expenditure on primary healthcare from 2005 to 2015 due to investments in access to HIV and TB services.
- Life expectancy in South Africa has increased dramatically (9.6 years) over a relatively short period of time, rising on average from 51.6 years in 2005 to 62.9 years in 2015. This increase stems from the introduction of antiretroviral treatment for people living with HIV, and other major health initiatives.
- The National Development Plan 2030 seeks to implement a national health insurance system, reduction in the relative cost of private medical care and bolstered by greater human capacity and better systems in the public health sector.

- There is a major gap between private and public healthcare in South Africa.
- Public healthcare has many disadvantages such as long wait times, poor quality of care, rushed appointments, old facilities, and poor disease control and prevention practices.
- Private healthcare is expensive, not funded by the government, and there are fewer facilities.
- Low level of use and interpretation of data at the point of service delivery at district level.
- South Africa has the highest level of HIV prevalence in the world, TB remains the leading cause of death and lifestyle diseases are on the rise. South Africa faces a quadruple burden of disease resulting from communicable diseases such as HIV/AIDS and TB; maternal and child mortality; NCDs such as hypertension and cardiovascular diseases, diabetes, cancer, mental illnesses and chronic lung diseases like asthma; as well as injury and trauma
- Some of the water-borne diseases that pose a high risk to South Africans include gastroenteritis, cholera, viral hepatitis, typhoid fever, bilharziasis and dysentery.

Recommendations for South Africa

- **Provide wider immunization coverage.** The lack of appropriate vaccinations among children can cause severe problems and spread the broaden epidemics that can lead to the young deaths.
- **Expand population coverage.** In response to the high levels of out-of-pocket expenditure and its impact on access to health services by the poor, the Government developed the National Health Strategic Plan 2015-2020, aimed at achieving a long and healthy life for all South Africans.
- **Tackle environmental problems.** Bad environmental conditions contribute to poor health and inequality in healthcare status. Indonesia's large cities are prone to pollution, and this can exacerbate existing respiratory conditions like asthma. One of the most significant problems is the fact that tap water in Indonesia is not generally safe to drink.
- **Contribute towards reduction of the burden of communicable diseases.** The government should provide initiatives to Strengthen the prevention and treatment of TB.
- **Combat with undernourishment, poverty and socioeconomic inequality.** Results of our study shows an evident linkage of health and wealth. Healthy longevity in India should be started from the provision of basic services for all population, including adequate sanitation facilities, improved water sources, effective prevention and treatment. The focus also should be made on both healthcare status of adults and children to create favorable conditions for growth of future generations.
- **Support the prevention and control of non-communicable diseases, mental health disorders, violence and injuries.** Support the development and implementation of policies, strategies and regulations to combat tobacco use, harmful use of alcohol, unhealthy diets, physical inactivity, violence and injuries, and other risk factors. Guide and support the preparation and implementation of multi-sectoral, population-wide programmes to promote mental health and prevent mental and behavioural disorders.

Spain

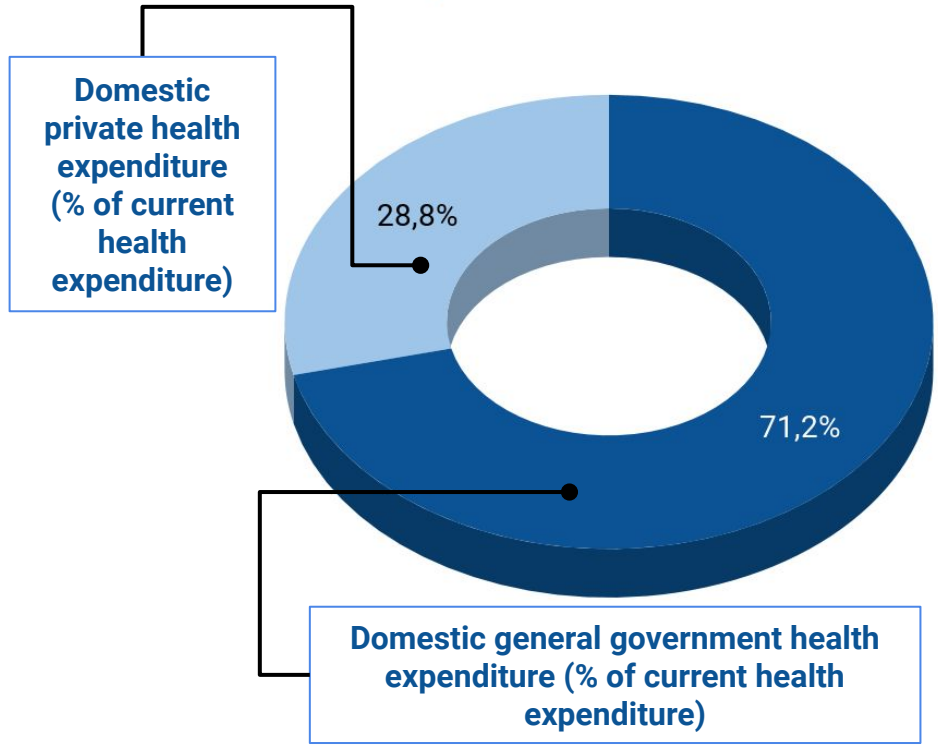
General metrics

HALE	Both Sexes HALE (2016)	73.8 years
	HALE/Life Expectancy Difference 2016	9.3
Economy	GDP per Capita, Current Prices (2016)	26.62 thousand ($)
	Annual GDP Growth (2016)	3.2 %
Healthcare	Current Health Expenditure per Capita (2016)	2.39 thousand ($)
	Public Health Care Expenditure 2016	8.97 % of GDP
Retirement	Age Dependency Ratio 2016	51
	Population over 65, 2016	19.2 %
	Number of WHO Age Friendly Cities and Communities	164
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	10
	Annual Cigarette Consumption (Units per Capita) 2016	1498
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	61.6 % of adults

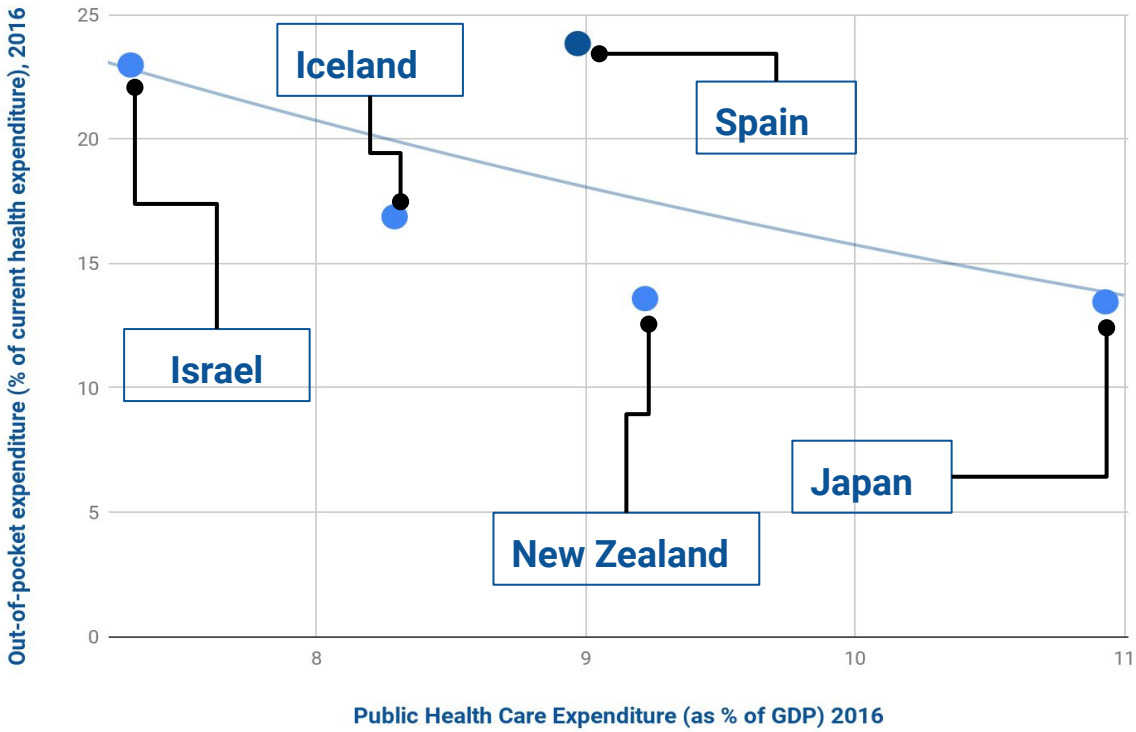
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **92**
- Human Development Index 2016: **0.89**
- E-Government Development Index 2016: **0.81**
- Corruption Perceptions Index 2016: **58**
- Global Gender Gap Index 2016: **0.74**
- Democracy Index 2016: **8.3**

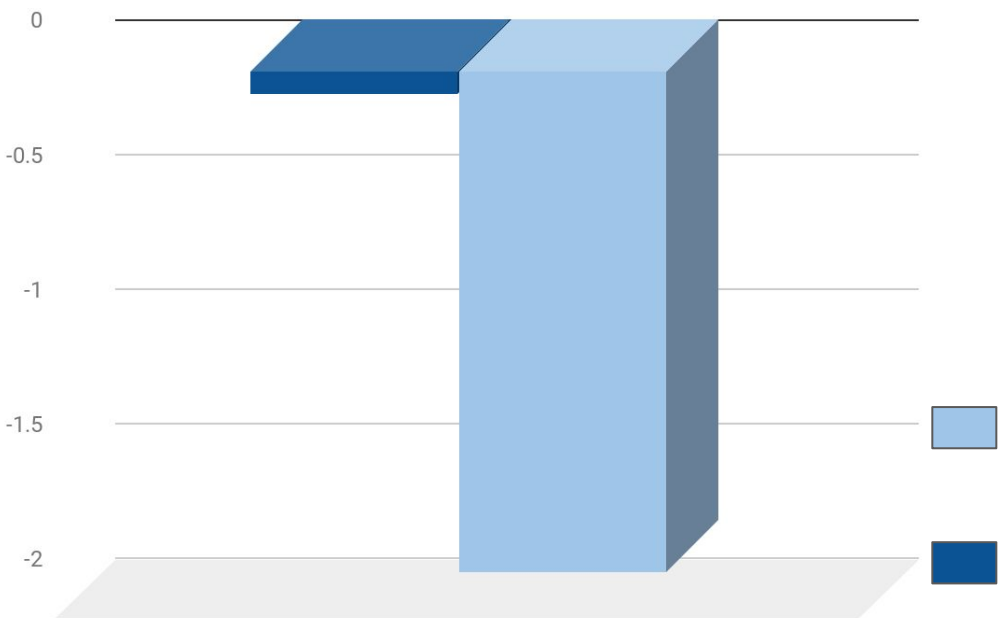
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and Medium Gap



Effectiveness ratios



There are several ways to improve public health and decrease gap between life expectancy and HALE at birth: increase the efficiency and effectiveness of the health provision system, support and encourage healthy eating and physical activity, address aging, customize healthcare services to meet needs of aged population.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Spain

STRENGTHS

- Spain has a high quality healthcare system, offering universal coverage for all residents. It is funded from taxes and and predominantly operates through its public network of providers. The total population coverage is 99.9 %.
- The healthcare system is decentralized and service delivery is organized by 17 regional health ministries.
- More than 70% of the Spanish population reports being in good health, a slightly higher proportion than the EU average of 68%.
- Maintaining the high quality of the healthcare system, health expenditures per capita in Spain remains below the EU average.

WEAKNESSES

- The Spanish healthcare system is criticized for poor accessibility and overdependence on private sector.
- Out-of-pocket expenditure accounts for 24 % of total health spending, a much higher share than the EU average of 15 %.
- Since the healthcare system is decentralized, healthcare spending per capita varies across regions.
- Deaths due to Alzheimer's disease and other dementias became the third leading cause of death, reflecting the effect of population ageing, better diagnosis, lack of effective treatments as well as more precise coding.

OPPORTUNITIES

- The 2014 - 2020 European Structural and Investments Funds provided EUR 500 million to Spain to invest in its health system, including in medical research and development and eHealth.
- Spanish government have strong aims to improve the healthcare coordination for primary and long-term care sectors to address the challenge of the ageing population.
- Utilising AI opportunities in precision medicine, preventive health, drug discovery.
- Accelerate the paradigm shift to precision health.

THREATS

- Arising variation in healthcare spending across the country could lead to a violation of the principle of equal accessibility.
- Overweight and obesity rates among adolescents and adults increased over the past decade and partly linked to low levels of physical activity. This fact puts pressure on the Spanish National Healthcare System.
- With a rapidly ageing population, one of the main challenges for the Spanish health system will be to achieve further efficiency gains in health and long-term care delivery.

Analysis of Strengths and Weaknesses of Health Care System in Spain

- Life expectancy at birth in Spain reached 83.1 years in 2016, up from 79.3 years in 2000. At 65 age Spanish men and women live on average an additional 21 years, of which less than half are lived free of disability.
- Primary care delivery is entirely public. The centers are run by multidisciplinary teams of General Practitioners (GPs), paediatricians, nurses and social workers.
- The Spanish benefit basket is defined by a common package and complementary package. The common package includes basic services (prevention diagnostic, treatment, rehabilitation and emergency transport which are publicly financed at 100 %), supplementary services and ancillary services.
- Public health policies effectively tackle behavioral risk factors: reduction in smoking.
- Primary care services are offered by multidisciplinary teams. Spain has a high number of doctors, although it does not include nurses assistance.

- The relatively high obesity rate among adults in Spain is partly linked to low levels of physical activity. The share of children who are overweight is also significant.
- Although a declining trend, smoking remains a common habit among the Spanish adult population.
- Long waiting time for surgery remains very high. Long waiting times can be detrimental to health outcomes, hence health systems should warrant timely access to necessary treatment and surgery.
- The increase in the amount and share of direct out-of-pocket spending resulted partially from the reduced coverage for certain services and goods.
- Qualitative improvement of long-term care is a challenge in terms of rising particular needs of aged people.
- Promoting better geographic distribution and retention of health workers is a challenge.

Recommendations for Spain

- **There is a need to do a better job educating medical students and medical residents on how to adapt to an era of technology-enabled healthcare.** Expand the number of training places for nurses. Promote retention policies for nurses by creating secure and attractive pay and working conditions, including opportunities for continuing professional development.
- **Develop and implement quality standards for long-term care** (LTC) by working with providers and local governments since a lack of indicators holds back efforts to improve services.
- **Enable patient-centered care with information technology systems.** Embracement of technology in health care will lead to personalization and improvement of the quality of medical care through close coordination between patients, caregivers, and professionals.
- **Utilize AI for financial wellness.** The provision of financial security in retirement is critical for both individuals and societies as countries grapple with the social and economic effects of aging populations in Spain. The utilization of novel forms of financial data to enable AI-empowered AgeTech and WealthTech services may help to maintain complemeted balance between advances in “wealthspan” and “healthspan”.
- **Promote research and initiate a wider utilization of Artificial Intelligence for preventive medicine.** Research is vital in providing the knowledge needed to improve health outcomes and reduce inequalities.
- **Identifying and modifying or avoiding key risk factors for diseases, including diabetes, cardiovascular diseases and respiratory conditions.** It can be caused by lack of exercise, ageing, an unhealthy diet and environmental pollution. If left untreated, it may lead to more serious conditions such as kidney failure, coronary heart disease, blindness and even the need for amputations.Initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of mortality factors.

Sweden

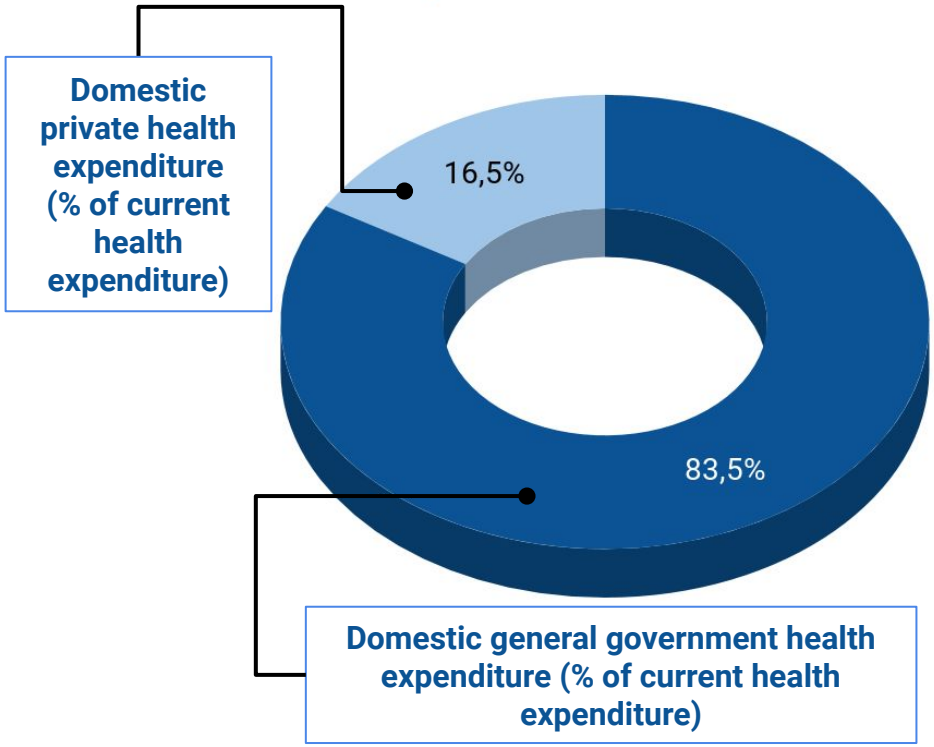
General metrics

HALE	Both Sexes HALE (2016)	72.4 years
	HALE/Life Expectancy Difference 2016	10
Economy	GDP per Capita, Current Prices (2016)	51.62 thousand ($)
	Annual GDP Growth (2016)	2.7 %
Healthcare	Current Health Expenditure per Capita (2016)	5.71 thousand ($)
	Public Health Care Expenditure 2016	10.93 % of GDP
Retirement	Age Dependency Ratio 2016	59
	Population over 65, 2016	19.8 %
	Number of WHO Age Friendly Cities and Communities	5
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	9.2
	Annual Cigarette Consumption (Units per Capita) 2016	716
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	56.4 % of adults

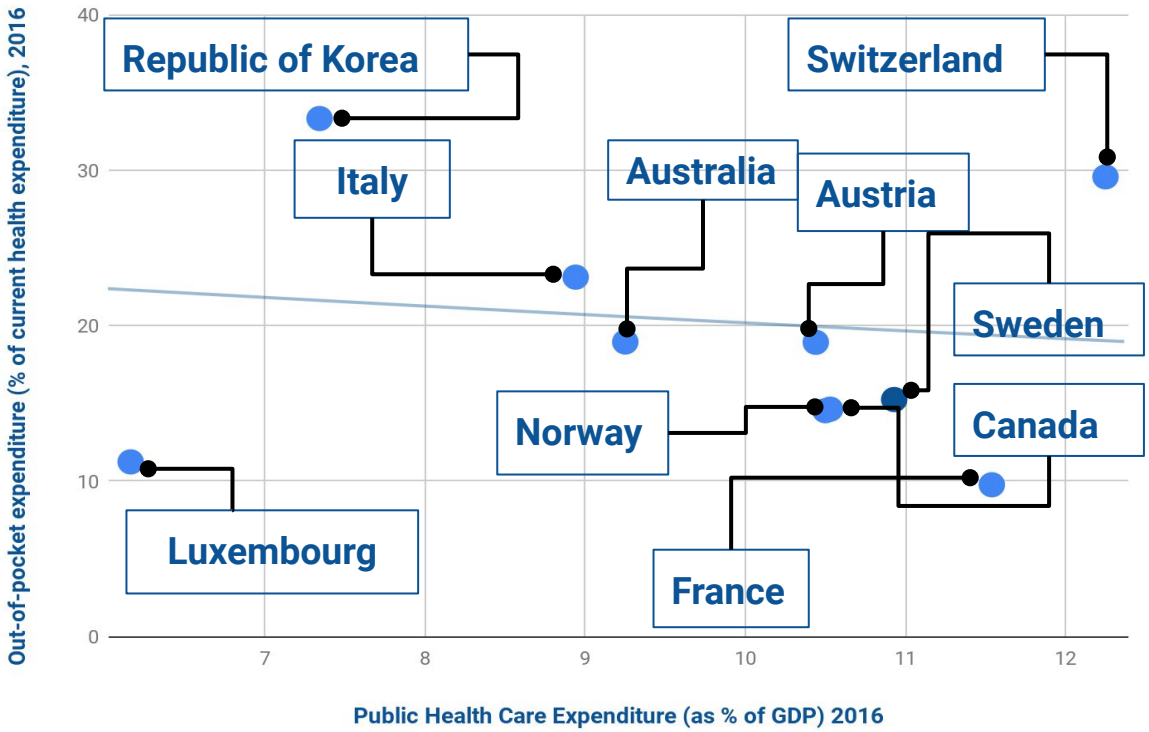
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **95**
- Human Development Index 2016: **0.93**
- E-Government Development Index 2016: **0.87**
- Corruption Perceptions Index 2016: **88**
- Global Gender Gap Index 2016: **0.82**
- Democracy Index 2016: **9.39**

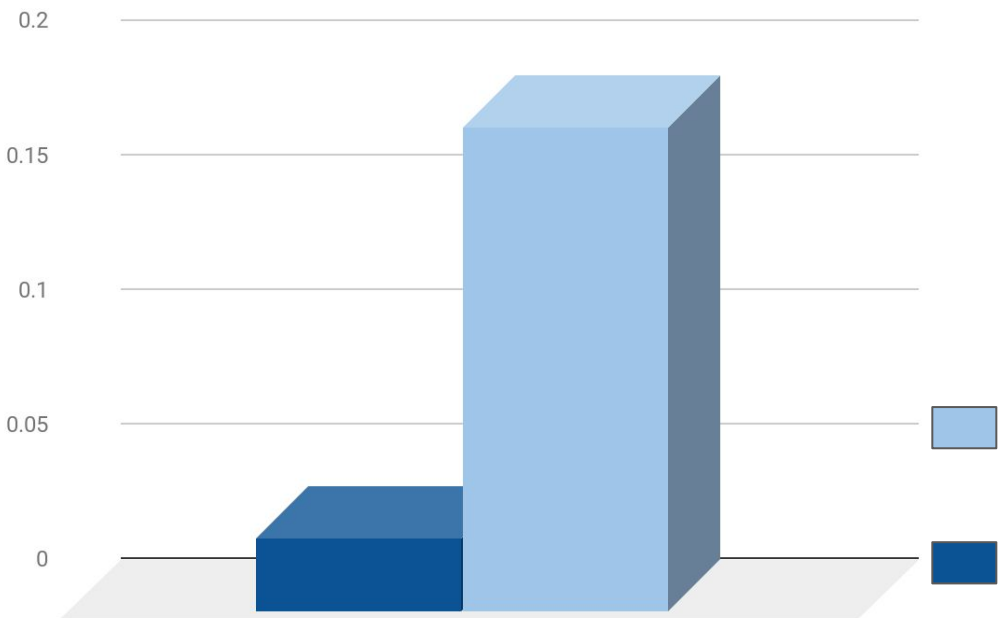
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



The government should further develop following initiatives: improve health and medical care that more actively promotes good health, promote good eating habits and safe food to decrease obesity and overweight, reduced use of tobacco and alcohol.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Sweden

STRENGTHS

- The healthcare system in Sweden is financed primarily through taxes raised by county councils and municipalities.
- Sweden's healthcare system is decentralized and managed on three levels: national, regional and local.
- The central government establishes principles and guidelines and sets the agenda for medical and health care.
- The National Patient Survey conducts an annual measurement of how patients perceived the quality of healthcare. The results are used to develop and improve care.
- The healthcare guarantee introduced in 2015 safeguards to population specialist care within 90 days.

WEAKNESSES

- Swedish healthcare challenges include issues of access, quality, efficiency and funding.
- There is a time gap between requests and treatment. The national guarantee of care aims to keep waiting times below 7 days for visiting a primary care physician.
- While healthcare coverage is extensive, there are small fees paid by patients. Public expenditure accounts for 84 % of the total, a share which has been fairly stable over the past decade and is above the EU average (79 %).
- In Sweden private healthcare isn't commonly used, but since 2010 it's available.

OPPORTUNITIES

- Encourage collaboration between county councils and private healthcare providers. The government covers the fraction of total expenditures but service carried out by private care providers only.
- Use the increasing opportunities offered by digitalization and eHealth. Integration of technologies to the healthcare system makes it easier for people to achieve good and equal health and welfare.

THREATS

- The ageing population, since about one in five people is 65 or older, and growing rates of obesity and physical inactivity among adolescents put pressure on Sweden’s healthcare system.
- Swedish emergency units are below the minimum safe size.
- The decentralization of the healthcare system and lack of privatized health services could lead to inefficiency, because of the counties' extreme amount of flexibility and limitation of the private sector activities.

Analysis of Strengths and Weaknesses of Health Care System in Sweden

- Sweden has a universal healthcare system. Everyone who resides in Sweden should have easy access to it. Private insurance is available for those who want additional insurance support.
- Sweden's county councils provide care for the elderly in the home or in special accommodations. They also are responsible for care for people with physical disabilities or psychological disorders.
- The public maternal healthcare system is particularly strong in Sweden. Maternal mortality rates are some of the lowest in the world, fewer than 3/1,000 babies and 4/100,000 women die during childbirth in 2016.
- Sweden has the fifth highest life expectancy in the EU. Life expectancy at birth was 82.4 years in 2016, up almost 2.7 years from 2000. Healthy life expectancy at 65 is the highest among all EU countries for both men and women.
- The proportion of the Swedish population reporting to be in good health (80% in 2016) is much higher than the EU average (67%).

- There is a time gap between requests and treatment. The national guarantee of care aims to keep waiting times below 7 days for visiting a primary care physician. Also to see a doctor, the patient should first visit the local public health center and then ensure that a doctor is contracted on this system.
- Private healthcare isn't widely spread in Sweden. Private insurance premiums and treatment are more expensive, but many citizens and expats prefer to pay in order to ensure that all of their medical needs are met and to avoid longer waits for the public service.
- Fragmented data systems in primary care prevent effective data sharing as these systems are not always interoperable.
- Sweden has reduced the number of acute care hospital beds and the ratio per population is the lowest of all EU countries (2.3 acute care beds per 1 000 population in 2016). This fact suggests that resources are used fully, and hospital staff express growing concerns about patient safety and working conditions.

Recommendations for Sweden

- **Mitigate the regional differences in healthcare service access and outcomes** by ensuring more equitable distribution of resources and promoting regional collaborations.
- Work with the primary care sector and other providers by solving persistent problems with recruiting staff in rural areas and **define primary care's role** especially for elderly patients.
- **Implement a standardised primary care information infrastructure** to drive quality improvement for data sharing and coordination.
- **Develop and implement quality standards for long-term care** (LTC) by working with providers and local governments since a lack of indicators holds back efforts to improve services.
- **Enable patient-centered care with information technology systems.** Embracement of technology in health care will lead to personalization and improvement of the quality of medical care through close coordination between patients, caregivers, and professionals.
- **Encourage collaboration between county councils and private healthcare providers**. Effective partnerships are essential for advancing the healthcare system by making it a shared vision and value, enhancing services accessibility, quality and increasing its overall cost efficiency.
- **Use the increasing opportunities offered by digitalization and eHealth.** Integration of technologies to the healthcare system makes it easier for people to achieve good and equal health and welfare.
- **Facilitate government initiatives related to behavioral risk factors caused by income and education inequality**: improve health and medical care that more actively promotes good health, promote good eating habits and safe food to decrease obesity and overweight, reduced the use of tobacco and alcohol, eliminate avoidable health status gaps between population groups within one generation.

Switzerland

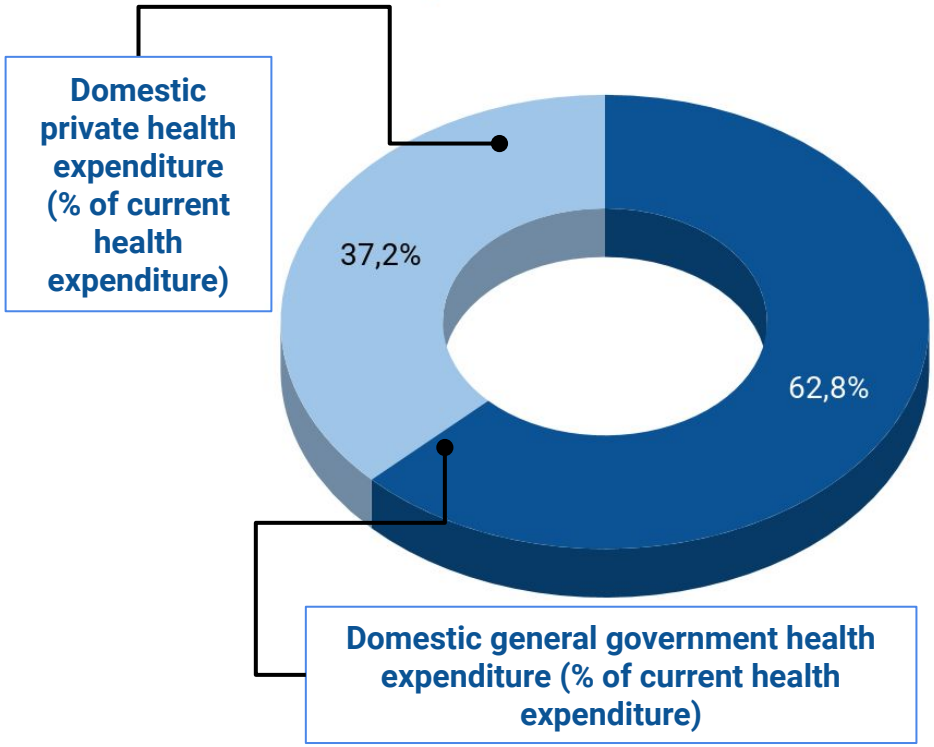
General metrics

HALE	Both Sexes HALE (2016)	73.5 years
	HALE/Life Expectancy Difference 2016	9.8
Economy	GDP per Capita, Current Prices (2016)	80.04 thousand ($)
	Annual GDP Growth (2016)	1.6 %
Healthcare	Current Health Expenditure per Capita (2016)	9.84 thousand ($)
	Public Health Care Expenditure 2016	12.25 % of GDP
Retirement	Age Dependency Ratio 2016	49
	Population over 65, 2016	18.2 %
	Number of WHO Age Friendly Cities and Communities	3
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	11.5
	Annual Cigarette Consumption (Units per Capita) 2016	1489
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	54.3 % of adults

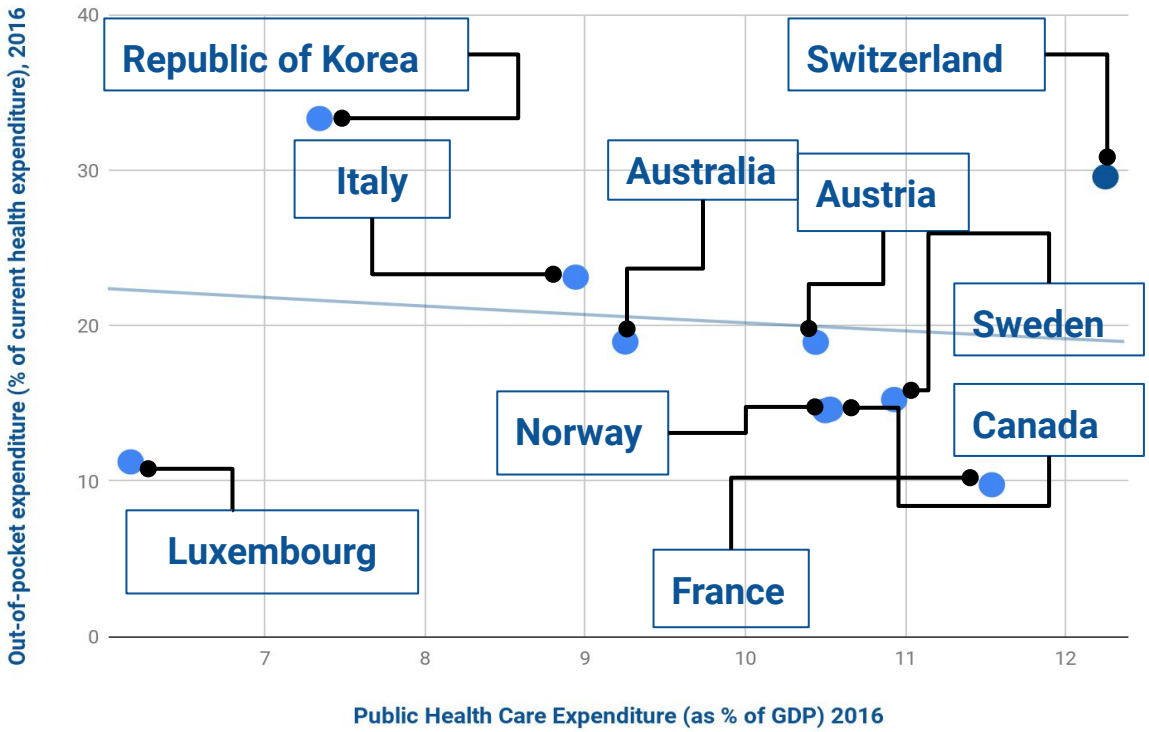
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **96**
- Human Development Index 2016: **0.94**
- E-Government Development Index 2016: **0.75**
- Corruption Perceptions Index 2016: **86**
- Global Gender Gap Index 2016: **0.78**
- Democracy Index 2016: **9.09**

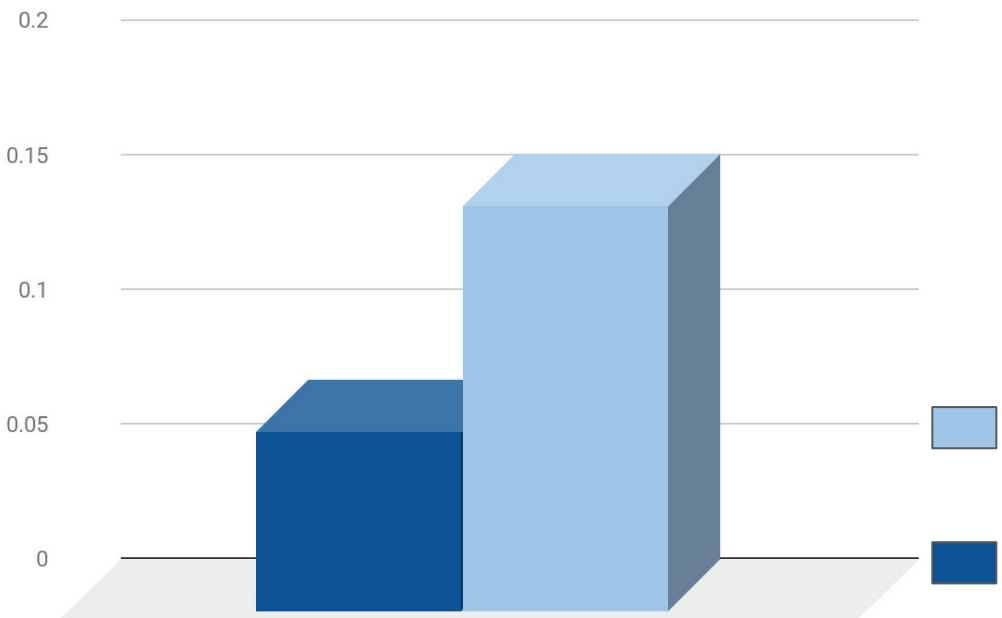
Current Healthcare Expenditure



Countries with High HALE and Life Expectancy and High Gap



Effectiveness ratios



The main challenge to improve public health is to reduce disparities of healthcare coverage across income groups groups.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Switzerland

STRENGTHS

- The Swiss healthcare system is universal and of high standard. Everyone living in Switzerland must have basic health and accident insurance to receive treatment.
- Switzerland has a large network of medical centers, polyclinics, and health spas that provide a range of secondary care and specialist out-patient treatment. What is available varies across the individual cantons and only a limited amount of treatment is covered by basic health insurance.
- High quality of healthcare services.
- Shift from preventive medicine to precision health.

WEAKNESSES

- Decentralized nature of the Swiss health system makes data collection difficult.
- The healthcare is expensive.
- Out-of-pocket spending on healthcare is high. In 2017 it accounted for 28.95% of all healthcare expenditure.
- One in twenty Swiss dies of lung cancer, according to the latest figures published by the Federal Statistical Office, while heart disease and dementia were among the other leading causes of death.

OPPORTUNITIES

- Digitisation and new technologies offer many opportunities to improve healthcare, both in terms of the way patients are treated and the way treatments are organised and enabled. They're also seen as a means of tackling major challenges in the healthcare system.
- Apply the customer-centric approach to enable a solid analysis of patient needs and pain points while at the same time allowing us to identify profound implications in terms of the relevance of these technologies for the healthcare industry.

THREATS

- The globalisation of lifestyles and changing environments due to industrialisation and urbanisation additionally contribute to an increase in NCDs.
- Ageing population.
- Pressure to reduce costs while meeting expectations of universal healthcare coverage.
- Increase in financial burden on the patient, leading to larger medical debt.

Analysis of Strengths and Weaknesses of Health Care System in Switzerland

- The Swiss health system is highly valued by patients.
- The Swiss healthcare system allows patients to see a specialist directly (free choice of doctor).
- Switzerland and the EU have signalled a mutual interest in intensified and institutionalised cooperation in the area of public health. The priorities are the fight against communicable diseases, general health concerns, food safety and production security in general.
- The health system performs very well with regard to a broad range of indicators. Life expectancy in Switzerland (82.8 years) is the highest in Europe after Iceland, and healthy life expectancy is several years above the European Union (EU) average. Coverage is ensured through mandatory health insurance (MHI), with subsidies for people on low incomes.
- Developed network of P4 clinics to make make medicine more Predictive, Preventive, Personalised and Participatory.

- Health insurance premiums are increasing more quickly than Swiss incomes, and low- and middle-income households end up contributing a greater share of their income to the financing of health care than high-income households.
- Switzerland's level of health spending is high compared to most European countries (most of which have single-payer systems).
- The system remains highly fragmented as regards both organization and planning as well as health care provision.
- Non-communicable diseases (NCDs) account for more than 85% of the burden of disease in Switzerland (measured by disability-adjusted life years, DALYs). They are also responsible for the major part of total health expenditure, with more than 50% related to seven NCDs (cardiovascular diseases, musculoskeletal diseases, cancers, psychological disorders, chronic respiratory diseases, dementia and diabetes).

Recommendations for Switzerland

- **Greater use of medical guidelines, investments in patient safety, and the reduction of waste** by improving coordination within and between different levels of care would further improve efficiency.
- **Follow trend towards greater transparency in healthcare**, extending the amount of healthcare data and rising consumer expectations of patients and the public.
- **Improving financial protection and fairness of financing** is becoming more important because rising premiums and OOP payments place an increasingly large financial burden on households with lower and middle incomes.
- **Enable patient-centered care with information technology systems.** Embracement of technology in health care will lead to personalization and improvement of the quality of medical care through close coordination between patients, caregivers, and professionals.
- **Strengthening disease prevention and health promotion with a focus on non-communicable diseases** remains an issue. Favourable living conditions in Switzerland, such as good housing conditions, a high-quality education system and low rates of unemployment contribute to healthy living conditions.
- **Utilising Artificial Intelligence in preventive medicine.** AI has great potential in terms of tackling the problem of bureaucracy and inefficient administration, relieving doctors from time-consuming administrative tasks and giving them more time to spend with their patients. By automating and improving processes, artificial intelligence can benefit both patients and medical staff. By optimising patient processing planning it can reduce the waiting time and length of stay for patients, and it can also help medical staff in their day-to-day work.
- **Promotion of healthy lifestyle and health education**, could potentially have a large impact on further improving the very good health status of the population, while avoiding the costs associated with the treatment of these diseases.

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- **Promotion of healthy lifestyle and health education**, could potentially have a large impact on further improving the very good health status of the population, while avoiding the costs associated with the treatment of these diseases.

Turkey

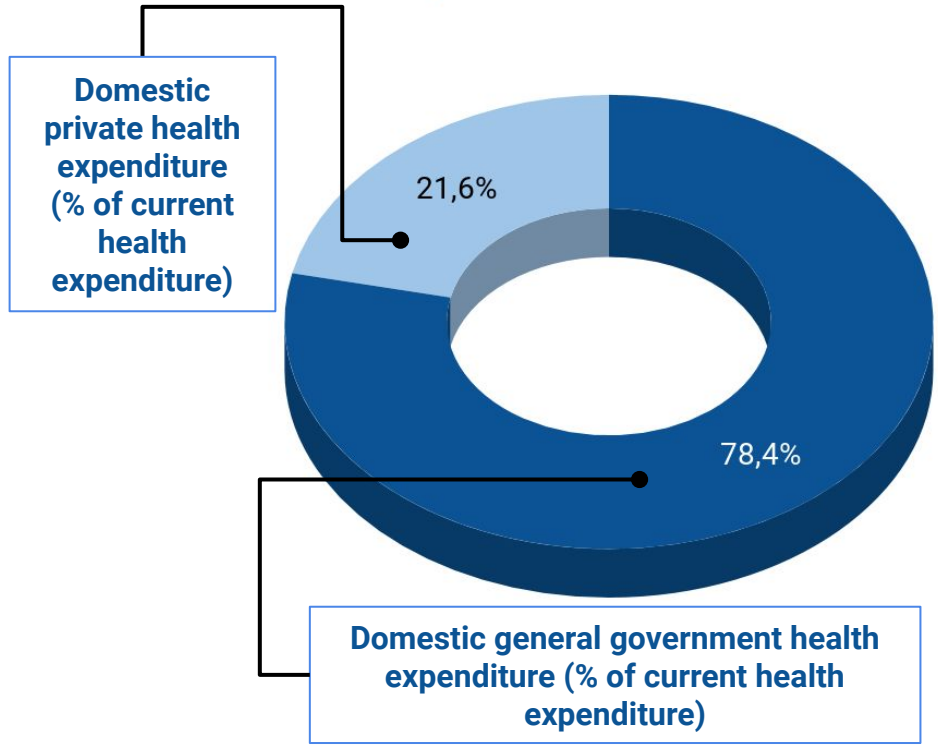
General metrics

HALE	Both Sexes HALE (2016)	66 years
	HALE/Life Expectancy Difference 2016	9.75
Economy	GDP per Capita, Current Prices (2016)	10.82 thousand ($)
	Annual GDP Growth (2016)	3.2 %
Healthcare	Current Health Expenditure per Capita (2016)	0.47 thousand ($)
	Public Health Care Expenditure 2016	4.41 % of GDP
Retirement	Age Dependency Ratio 2016	50
	Population over 65, 2016	8 %
	Number of WHO Age Friendly Cities and Communities	4
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	2
	Annual Cigarette Consumption (Units per Capita) 2016	1771
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	66.8 % of adults

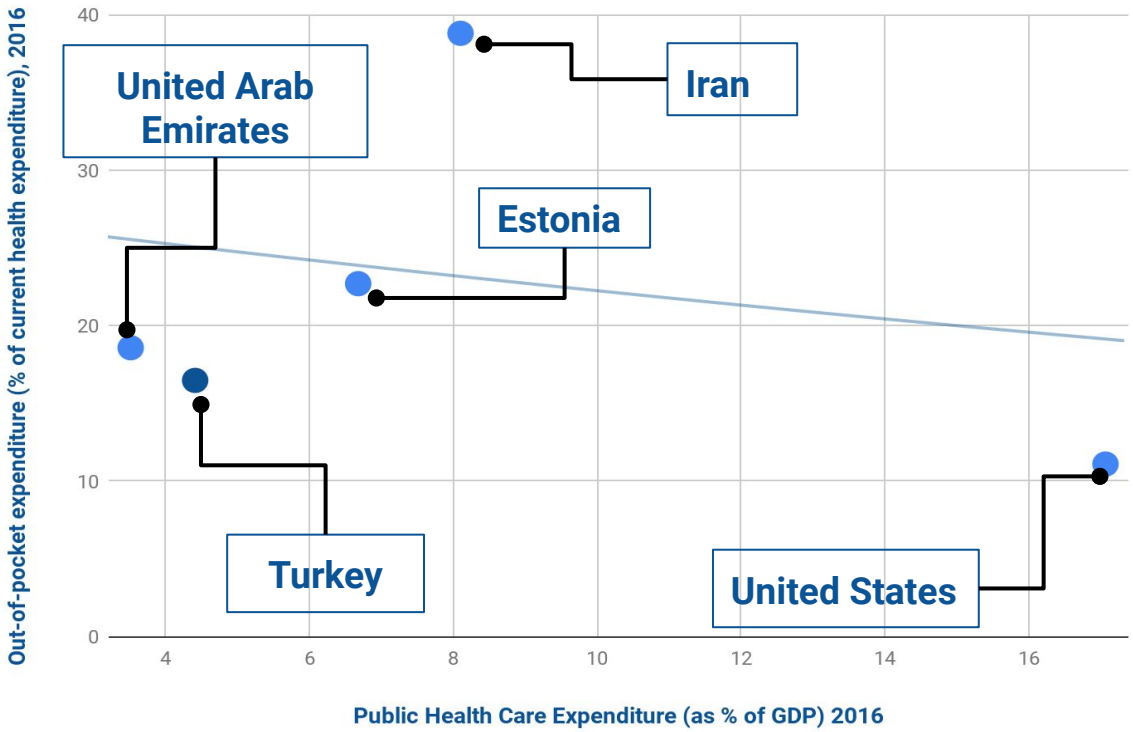
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **74**
- Human Development Index 2016: **0.79**
- E-Government Development Index 2016: **0.59**
- Corruption Perceptions Index 2016: **41**
- Global Gender Gap Index 2016: **0.62**
- Democracy Index 2016: **5.04**

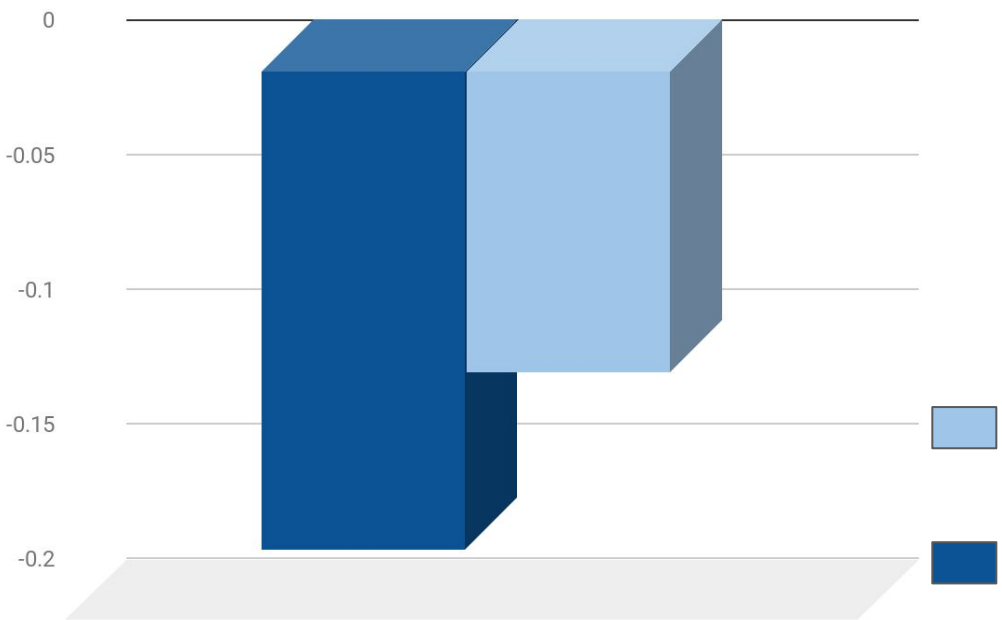
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and High Gap



Effectiveness ratios



Turkey faces a health care system inefficiencies. Infant mortality rate is relatively high and not all population had health insurance, resulting in unequal healthcare access among different population groups. It is need to improve access for high-quality healthcare services and target the main causes of death through government initiatives.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in Turkey

STRENGTHS

- Healthcare spending has shown a CAGR of 14% since 2013 driven by governmental policies that provide universal social security coverage allowing patients to choose which hospitals they want to go to.
- Turkey is the 16th largest pharmaceutical market in the world and the sixth largest in Europe.
- Primary care is free of charge for all citizens and almost the entire population in Turkey (98%) is covered.
- Transforming its healthcare sector so that all citizens have access to quality services

WEAKNESSES

- Most of the hospitals and doctors are concentrated in the cities and large towns, where there are more people and economically more feasible to operate.
- Cardiovascular or circulatory system diseases killed 162000 people in Turkey in 2018, making them the leading cause of deaths.
- Inequalities in access to health care.
- Fragmentation in financing and delivery of health services, which contributes to inefficiency and undermines financial sustainability.
- Poor quality of care and limited patient responsiveness.

OPPORTUNITIES

- Healthcare market is underpenetrated.
- Pharmaceutical market presents significant growth opportunities driven by its population dynamics (rapidly growing, but ageing), urban migration, improved hospital infrastructure with increased access to healthcare services and the rising burden of chronic diseases.
- In 2010-2016, the medical tourism sector grew at a 15% CAGR in the number of visitors, which signaled promising growth for private providers.

THREATS

- Regulatory changes and economic slowdown.
- Air pollution and climate change.
- Ageing population.
- The increasing share of refugee population in the country can contribute to prolonged humanitarian crises, grappling with the challenges of drought, famine, conflict, and population displacement.
- Non-communicable diseases pose a great risk for the future of national healthcare system.

Analysis of Strengths and Weaknesses of Health Care System in Turkey

- The Health Transformation Program led by the Government of Turkey since 2003 has contributed to improved health, enhanced fairness in financing, better financial protection, and increased user satisfaction.
- As a result of the reforms, there were significant additions in terms of capacity in healthcare infrastructure as well as increased access to high quality healthcare services.
- Turkey experiences continuing economic expansion and rising incomes which, in turn, will create more demand for health services and products. These increases are reflected in healthcare spending projections.
- Turkey has been attracting many high profile multinational firms operating in different sub-sectors of the healthcare industry, especially since 2004. Many international companies have established a strong presence production bases in the country to benefit from Turkey's geographical position, highly skilled human resources in production and management and the unsaturated domestic market with a high growth potential.

- According to the latest data released by the Ministry of Health, the greatest increase in disease burden in 15 years was observed in Alzheimer's disease (68.4% increase) and in stroke (57.4% increase), while the most significant reduction was observed in lower respiratory tract infections (63.7% decrease).
- Non-communicable diseases contribute to 87.5% of deaths in Turkey. The probability of premature death due to four non-communicable diseases is likely one sixth (16.8%) for an individual in Turkey.
- According to the limits set by the WHO, 80 out of 81 provinces of Turkey are exposed to polluted air; furthermore, based on the national air quality limits, 67% of the cities have poor air quality.
- Turkey has a significant refugee problem because of these conditions at the country's borders. The refugee population that escaped the war in Syria exceeds 3.6 million, of which 380,000 are babies born in Turkey.
- Remote location of the city hospitals significant increases travel time, especially for outpatient or unplanned visits, may hinder demand as well.

Recommendations for Turkey

- **There is need of a particular planning to increase medical workforce,** including well-trained staffs for a specific area. An urgent need is to acquire more accurate and reliable data from hospital and PHC centers in Turkey. Additional some attempts should be made to assess quality of healthcare in relation to services and process.
- **Promote programs and create government incentives to address shortcomings of health facilities and improve infrastructure.**
- **Combat migration problem.** For preventing the problems faced by more than 3 million Syrians in the places where they currently live and to ensure that health services are easily accessible to them, Migrant Health Units have been established wherein primary health care services are provided. Currently, 152 Migrant Health Centers are in service. Although a large number of Migrant Health Centers have been set up, they merely strengthen health systems to combat war and hunger and constitute a temporary solution without fixing the main problem. Unfortunately, the main problem can only be solved by the initiatives of the international community.
- **Create incentives for development of national medical devices market** as Turkey strives to decrease its dependency on imports.
- **Improve legislation on regenerative medicine.** Turkey has both the resources and tools to harvest and transplant stem cells to treat those suffering with diseases such as leukemia. The stem cells transplanted to such patients are sourced from bone marrow or cord blood.
- **Move from cure to prevention to combat with non communicable diseases risk factors.** Prevention faces two main barriers. First, most doctors worldwide are trained to diagnose, treat, and cure diseases, but not to prevent them. Incentive schemes in many health care settings reflect that emphasis. Second, the risk factors for these diseases – tobacco use, the harmful use of alcohol, unhealthy diets, and physical inactivity – lie in non-health sectors and are strongly influenced by the behaviours of powerful economic operators.

United Arab Emirates

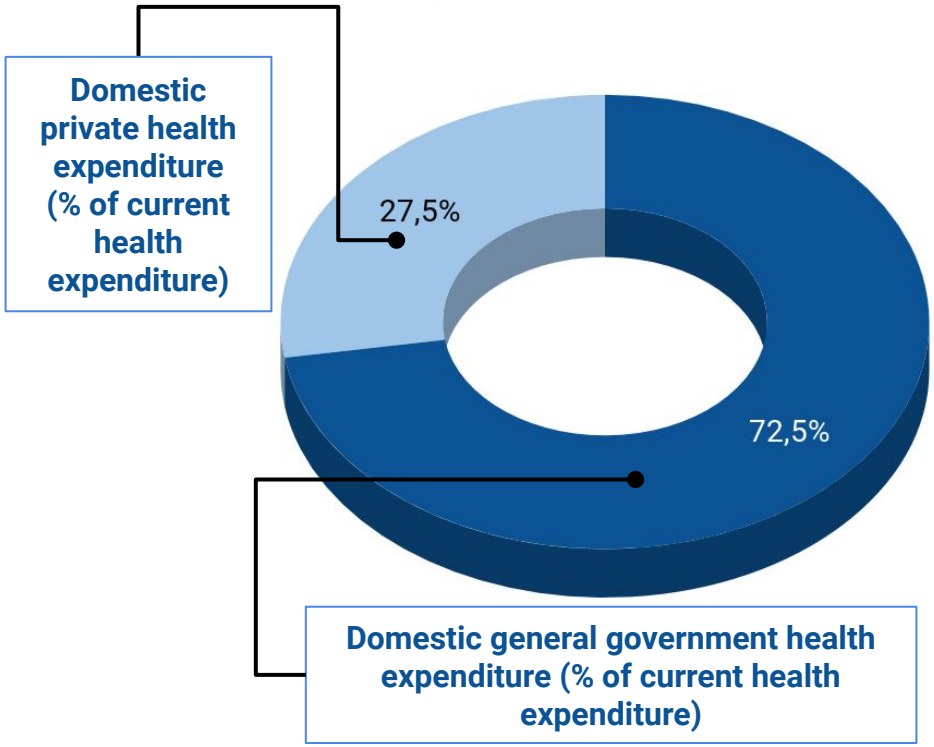
General metrics

HALE	Both Sexes HALE (2016)	66,7 years
	HALE/Life Expectancy Difference 2016	10.55
Economy	GDP per Capita, Current Prices (2016)	38.14 thousand ($)
	Annual GDP Growth (2016)	3 %
Healthcare	Current Health Expenditure per Capita (2016)	1.32 thousand ($)
	Public Health Care Expenditure 2016	3.52 % of GDP
Retirement	Age Dependency Ratio 2016	18
	Population over 65, 2016	1.1 %
	Number of WHO Age Friendly Cities and Communities	1
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	3.8
	Annual Cigarette Consumption (Units per Capita) 2016	748
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	67.8 % of adults

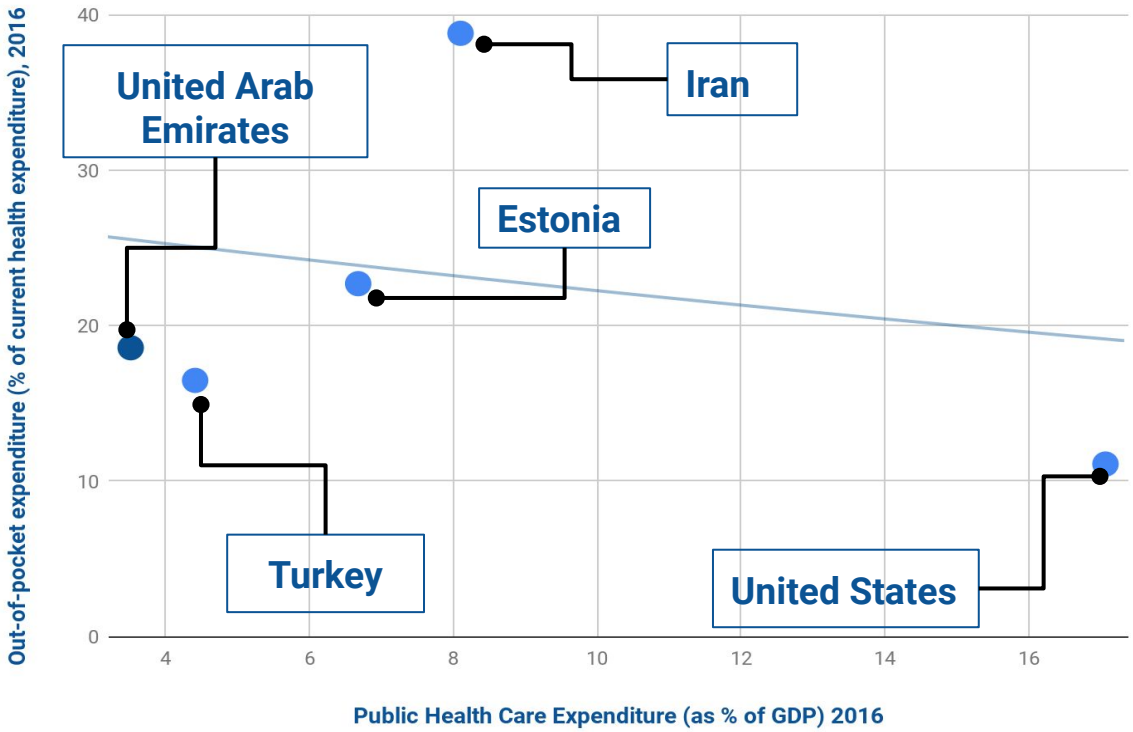
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **70**
- Human Development Index 2016: **0.86**
- E-Government Development Index 2016: **0.75**
- Corruption Perceptions Index 2016: **66**
- Global Gender Gap Index 2016: **0.64**
- Democracy Index 2016: **2.75**

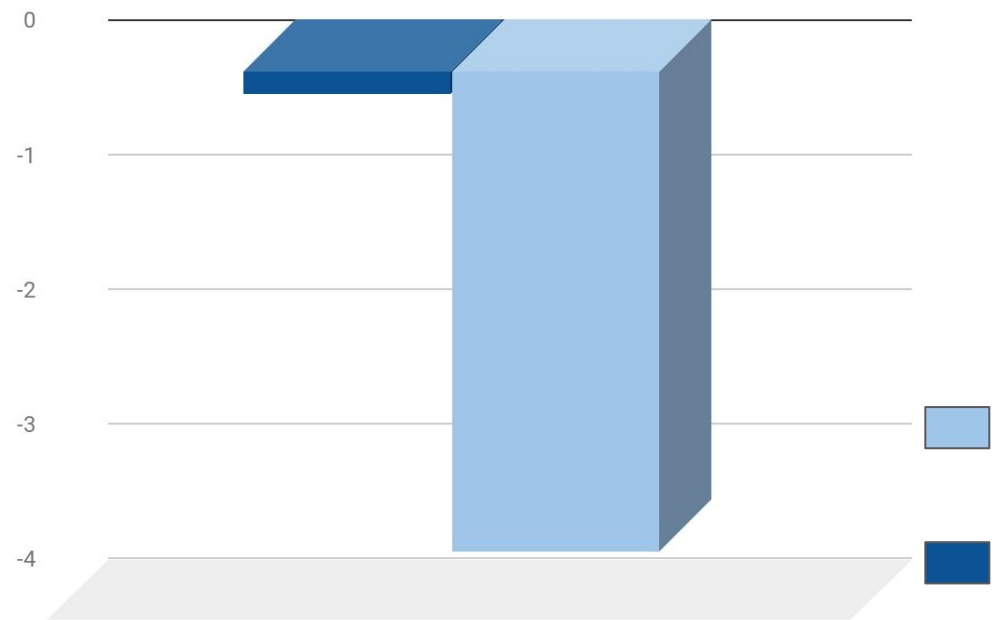
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and High Gap



Effectiveness ratios



As residents have high HALE than non-residents in the country it is needed to enhance the health of individuals a through the provision of comprehensive health services for both residents and non-residents in order to decrease gap between levels of HALE, through implementing policies, legislations, programs and effective partnerships.

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in the United Arab Emirates

STRENGTHS

- The UAE has a comprehensive, government-funded health service and a rapidly developing private health sector that delivers a high standard of health care to the population.
- Due to the success of this high standard of care across all stages of the health care system, life expectancy in the UAE is 76.8 years, reaching levels similar to those in Europe and North America.
- The UAE is renowned for its quality healthcare facilities, which has led to a rise in medical tourism over the past decade. Healthcare is so prevalent, there are an estimated 181 doctors per 100,000 residents.

WEAKNESSES

- Health care is expensive. There are more private hospitals and healthcare facilities than public. As of 2018, the UAE had 104 hospitals: 33 government and 71 private.
- Public health facilities are less expensive, but wait times are long.
- The World Health Organization has determined that a third of the adults in the UAE are obese, and one out of five people live with diabetes.

OPPORTUNITIES

- Rapidly growing spa market.
- Private health care services are increasing at a rapid rate everywhere in the UAE through clinics, private hospitals and medical cities.
- Government wants to boost the number of medical tourists coming to the UAE in order to establish Dubai as a center of healthcare excellence in the region.
- Since the population aging, there is a high demand for healthcare.

THREATS

- Rapidly growing population and the concurrent increasing demand on the healthcare sector.
- Higher demand for healthcare will surge healthcare costs.
- Overconsumption of medical services, increasing costs of medical equipment and competition for qualified professionals, and increase of chronic diseases.
- Increasing burden of socioeconomic inequality would contribute to bigger discrepancy in health status and worsening demographic situation in general.

Analysis of Strengths and Weaknesses of Health Care System in the United Arab Emirates

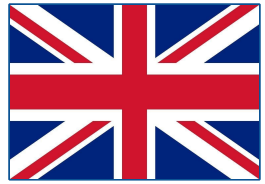
- According to World Health Organization Ranking: The World Health System, Health care system of the United Arab Emirates is 27.
- United Arab Emirates has a strong healthcare infrastructure.
- Most infectious diseases like malaria, measles and poliomyelitis that were once prevalent in the UAE have been eradicated. New vaccination campaigns are taking place to protect against chicken pox, pertusis and the rotavirus.
- Access to clean water in urban and rural areas is assured for 100% of the population, and close to 100% use modern sanitation facilities. The new-born (neonate) mortality rate has been reduced to 5.54 per 1000 and infant mortality to 7 per 1000. Maternal mortality rates have dropped to 0.01 for every 100,000.

- The UAE's health expenditure reached a value of $13.7 billion in 2018. This includes healthcare expenditure from the seven emirates in addition to their contribution to the federal budget. There is an expectation for this figure to reach $14.4 billion in 2019, a 5.4 percent increase comparing to 2018. The forecast on spending is to rise to $18.3 billion by 2023 (compound annual growth rate of 6%).
- The high number of expatriate workers have limited access to healthcare services, affecting demographics and healthcare situation in general.
- The fragmentation of the healthcare system led by Abu Dhabi and Dubai.
- The shortage of hospital beds in the country, lack of medical professional staff and the rise in the number of people suffering from chronic diseases. The number of people suffering from chronic diseases was especially startling. The UAE is ranked second world-wide in diabetes. Nearly 37 per cent of Emiratis suffer from hypertension that goes on to take a toll on the heart.
- The high cost of prescription medication makes healthcare unaffordable for population with relatively low income.

Recommendations for the United Arab Emirates

- **Consideration of age and sex distribution when planning and implementing health services.** The United Arab Emirates has a rapidly growing population with a unique age and sex distribution. There is an unusually high proportion of young people and expatriates of working age, small numbers of older persons and rapid year on year growth due to high net in-migration.
- **Prioritise the dealing with a number of healthcare burdens** . Some the same as in many other parts of the world – like rising incidence of heart disease and cancer – and coping with them with innovative use of technology, partnerships and initiatives.
- **Move to a life-course perspective in tackling the rising epidemic of "metabesity."** The United Arab Emirates is tackling more unusual challenges, such as a high incidence of congenital diseases due the large number of consanguineous marriages, as well as an explosion in the prevalence of obesity and metabolic syndrome due to a rapidly changing lifestyle to one that is more affluent and sedentary.
- **Move from sick care to preventive health**. Health screening program can enable rapidly extract data from the results of the screening for various whole population epidemiological studies. Providing individuals with opportunities to check their health status and get proper follow-up consultations can minimise the risk of developing cardiovascular disease and diabetes, for example.
- **The important role of implementation of new technology into healthcare systems.** Government should provide opportunities for wider technologically connected healthcare that empowers doctors and patients and reduces growing pressure on the healthcare system.
- **Provide incentives for investments in home care services and private providers.** Due to the increasing population of the elderly and the abundance of chronic diseases, long-term care facilities are being continuously demanded by the market.

United Kingdom of Great Britain and Northern Ireland



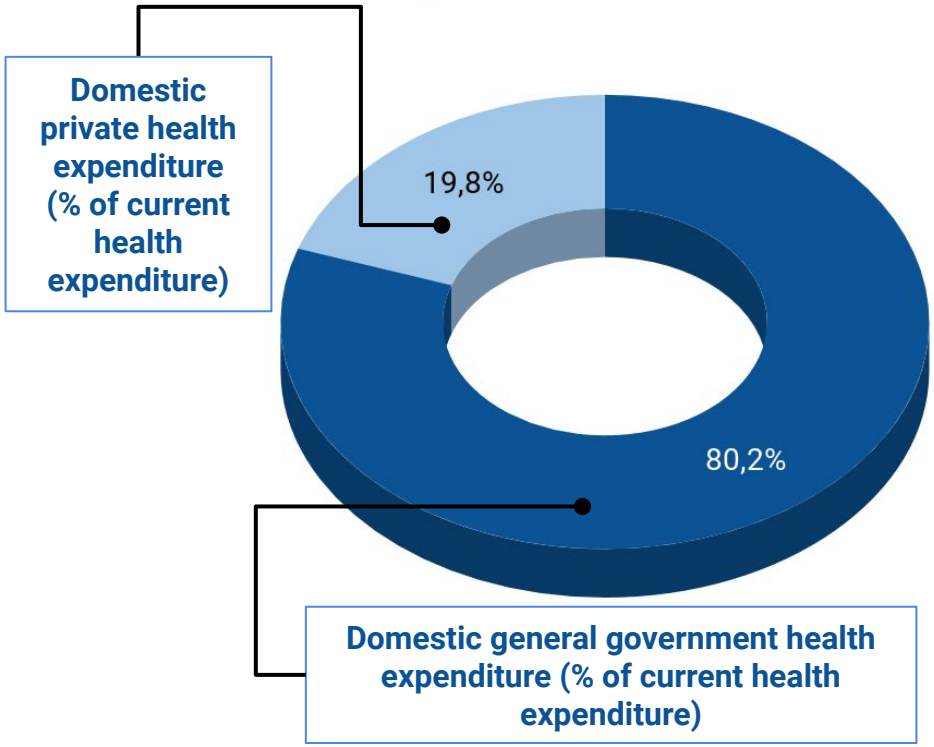
General metrics

HALE	Both Sexes HALE (2016)	71.9 years
	HALE/Life Expectancy Difference 2016	9.2
Economy	GDP per Capita, Current Prices (2016)	40.54 thousand ($)
	Annual GDP Growth (2016)	1.8 %
Healthcare	Current Health Expenditure per Capita (2016)	3.96 thousand ($)
	Public Health Care Expenditure 2016	9.76 % of GDP
Retirement	Age Dependency Ratio 2016	56
	Population over 65, 2016	18.4 %
	Number of WHO Age Friendly Cities and Communities	24
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	11.5
	Annual Cigarette Consumption (Units per Capita) 2016	827
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	63.7 % of adults

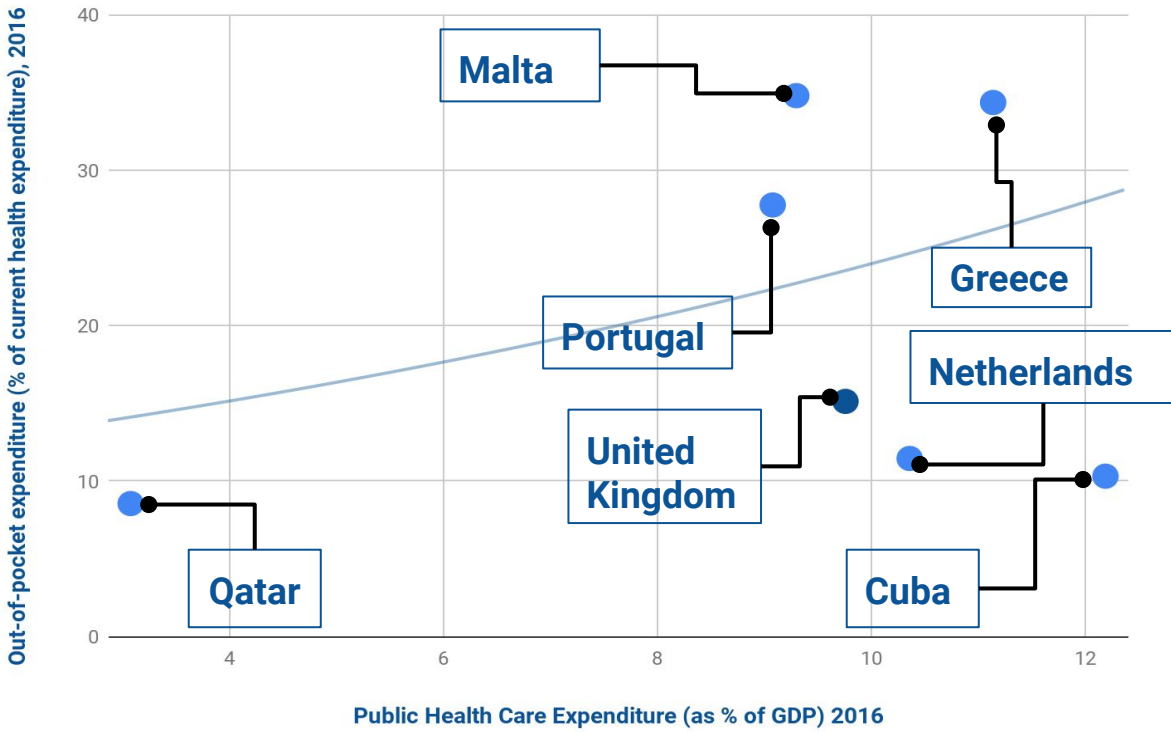
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **90**
- Human Development Index 2016: **0.92**
- E-Government Development Index 2016: **0.92**
- Corruption Perceptions Index 2016: **81**
- Global Gender Gap Index 2016: **0.75**
- Democracy Index 2016: **8.36**

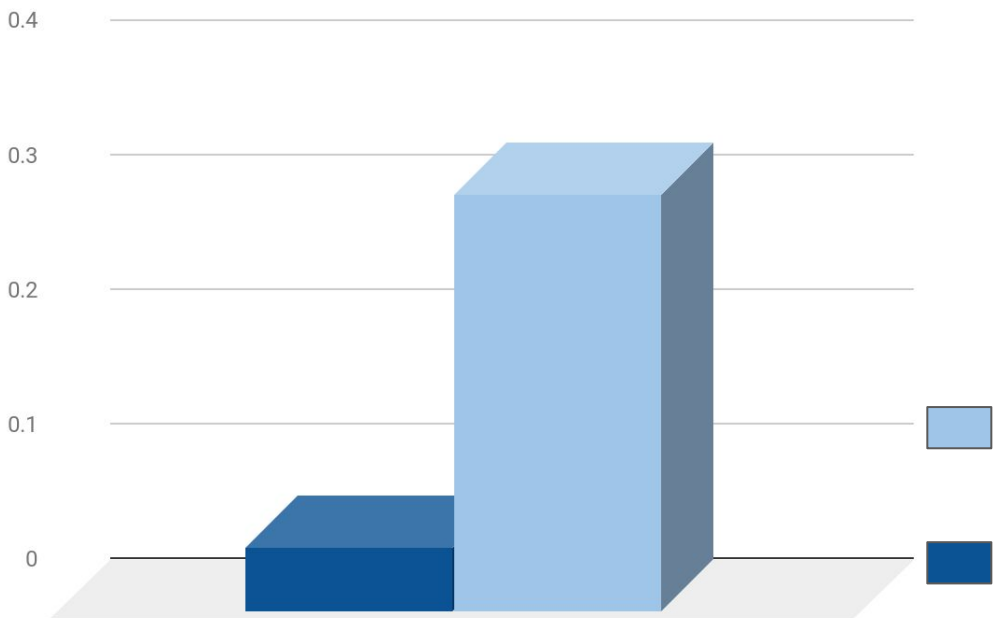
Current Healthcare Expenditure



Countries with Medium HALE and Life Expectancy and Medium Gap



Effectiveness ratios



The United Kingdom should address inequalities in health by socio-economic status as bad health is more prevalent among population with lower income and education

HALE and Life Expectancy Difference CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

HALE CAGR (6 years)/Current health expenditures per capita (current US$), CAGR (6 years)

SWOT Analysis of Healthcare in the United Kingdom

STRENGTHS

- Healthcare in the United Kingdom is publicly funded, generally paid for by taxation. However, the UK also has a private healthcare sector, in which healthcare is acquired by means of private health insurance.
- Accessibility and affordability of healthcare services: everybody has access to exactly the same health care. Universal health care does not discriminate on any basis.
- Information on patients is shared between medical establishments in the form of electronic health care records.

WEAKNESSES

- The most common causes of premature death in 2016 are similar the UK: heart disease; lung cancer; stroke. Deaths due to dementia and Alzheimer disease increased again in 2017 and it remained the leading cause of death in England and Wales, accounting for 12.7% of all deaths registered.
- High level of cancer incidence. UK incidence is ranked higher than 90% of the world.
- The long waiting times becomes the main problem in other universal health care.

OPPORTUNITIES

- The digital transformation of the health and social care system. It is part of the ongoing commitment to introducing new technologies into the NHS in order to reduce the burden on clinicians and to enable staff to provide enhanced levels of care.
- Growing longevity economy. The ageing market is increasingly significant. In the UK alone, consumers aged 50+ spend over £500bn each year. This market segment is also growing faster than any other – both in absolute terms, as the number of older people rises, and as a proportion of total consumer spending.

THREATS

- An ageing population: health inequality is growing, the population is ageing and the NHS will need to adapt.
- Evolving healthcare needs that lead to increase in healthcare costs, such as the increase in cases of obesity and diabetes, antibiotic resistance, high level of cancer incidence.
- Estimated costs of progress in medical technology equal at least an extra £10bn a year.

Analysis of Strengths and Weaknesses of Healthcare in the United Kingdom

- Health care system is government-sponsored, and it is dependent on need to be cured, not ability to pay. Government through legislation initiatives protects people from the heavy financial costs of healthcare.
- Access to care is generally good. The health service provision is with relatively low administrative costs using cheaper generic medicines.
- It performs well in managing certain long-term health problems such as diabetes.
- Out-of-pocket payments are low, and few people report skipping consultations due to the cost of care (4.2% compared to an average of 10.5% among 17 OECD countries with comparable data).
- More than half of the English population successfully met the government guideline of five portions of fruit and vegetables per day. As well as maintaining a healthy diet, the government recommends at least 150 minutes of moderate intensity physical activity per week.

- Their active government's role in healthcare weakens the functionality of market mechanisms.
- The tight control undertaken by government in regards to medical expenses has resulted in a lack of medical resources, such as equipment, doctors and nurses in public hospitals.
- Although the gap has closed over the last decade for stroke and several forms of cancer, the mortality rate in the UK among people treated for some of the biggest causes of death, including cancer, heart attacks and stroke, is higher than average among comparable countries. The UK also has high rates of child mortality around birth.
- Unhealthy lifestyles are reducing the quality of life for many British adults and adolescents. Smoking and alcohol consumption among adults have declined over time, but drunkenness among adolescents remains an important concern. Among 15-year olds, 30.5% have been drunk at least twice in their life. Prevalence of obesity in the UK is 27%, the sixth highest in OECD countries and the highest in Western Europe. A further 36% of the population are overweight but not obese.

Recommendations for the United Kingdom

- **Implement more widely and deeply approaches to monitoring and improving health care quality.** OECD reports that many quality of care indicators are close to or just below the OECD average. Avoidable hospital admissions are also high.
- **Modifying or avoiding key risk factors, including tobacco use, unhealthy diet and physical activity.** Initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of behavioral factors.
- **Improving the quality of care and reducing waste elsewhere in the system.** From drugs and pharmaceutical waste to biological and radioactive materials, healthcare waste demands expert disposal.
- **Undertake sustained effort to reduce risk factors** such as high body mass index, high fasting glucose, high blood pressure and high cholesterol that increases with ageing population.
- **Initiate more education and training programmes to to sustain improvements in health services.** The knowledge and skills of the health and public health workforce needs to be kept up to date and developed.
- **Promote research and initiate wider utilization of Artificial Intelligence for preventive medicine.** Research is vital in providing the knowledge needed to improve health outcomes and reduce inequalities.
- **Dealing with regional inequality.** The north of England generally suffers much poorer health than the rest of England, with lower life expectancy and earlier onset of chronic illness and disability. There is a need for economic development and regeneration of poorer parts of the country, and for high-quality health improvement programmes and care services in these areas.
- **Health records and linkage to survey data should be used more extensively** to refine disease prevalence estimates, and provide more reliable data to guide policy and programmes to address these causes of ill health.

United States of America

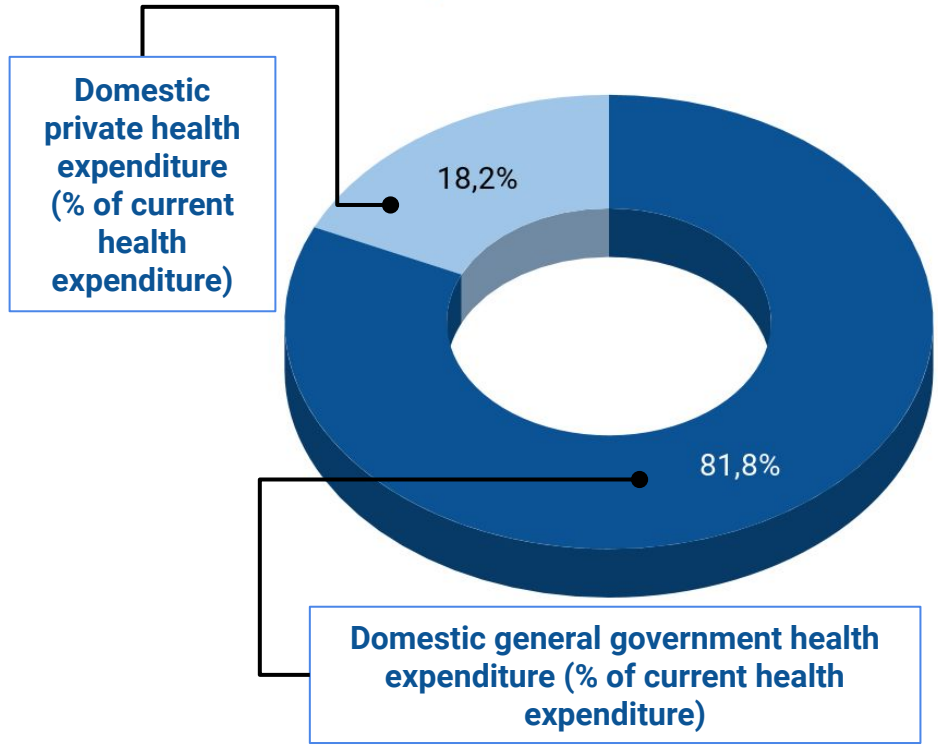
General metrics

HALE	Both Sexes HALE (2016)	68.5 years
	HALE/Life Expectancy Difference 2016	10
Economy	GDP per Capita, Current Prices (2016)	57.90 thousand ($)
	Annual GDP Growth (2016)	1.6 %
Healthcare	Current Health Expenditure per Capita (2016)	9.87 thousand ($)
	Public Health Care Expenditure 2016	17.07 % of GDP
Retirement	Age Dependency Ratio 2016	52
	Population over 65, 2016	15 %
	Number of WHO Age Friendly Cities and Communities	357
General Health Status	Alcohol Consumption per Capita (Litres of Pure Alcohol) 2016	9.8
	Annual Cigarette Consumption (Units per Capita) 2016	1016
	Prevalence of Overweight among Adults 2016 (Age-Standardized Estimate)	67.9 % of adults

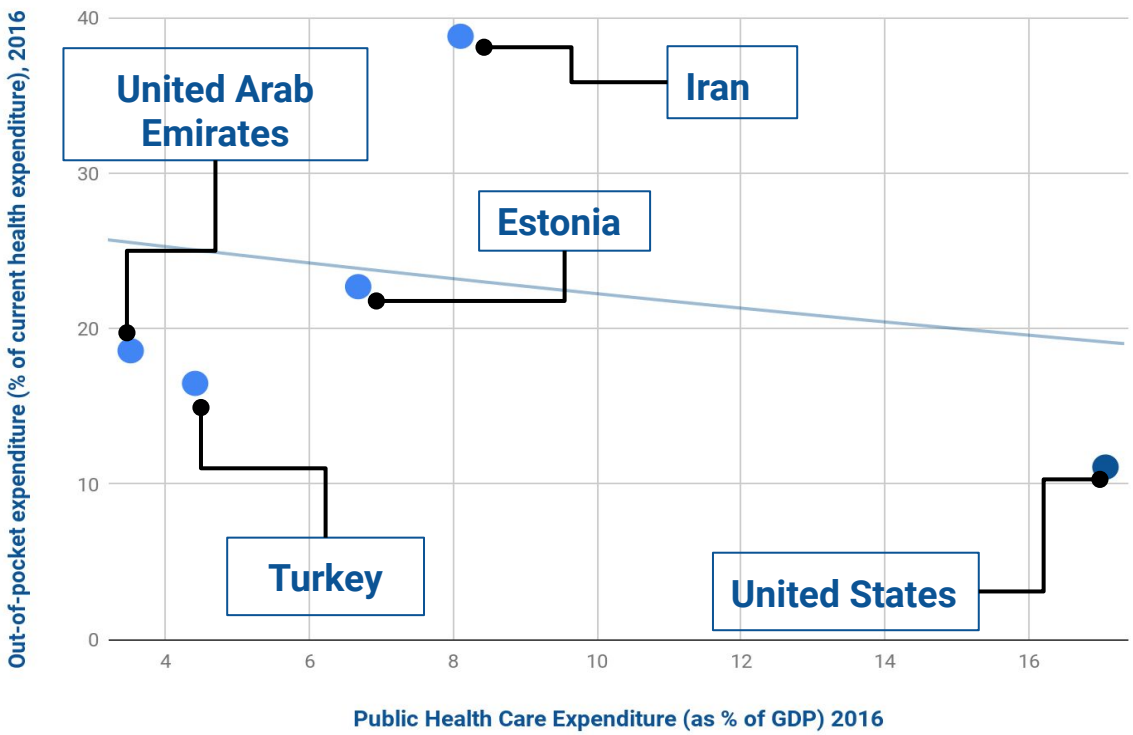
Longevity-Related Indices

- The Healthcare Access and Quality Index -2016: **89**
- Human Development Index 2016: **0.92**
- E-Government Development Index 2016: **0.84**
- Corruption Perceptions Index 2016: **74**
- Global Gender Gap Index 2016: **0.72**
- Democracy Index 2016: **7.98**

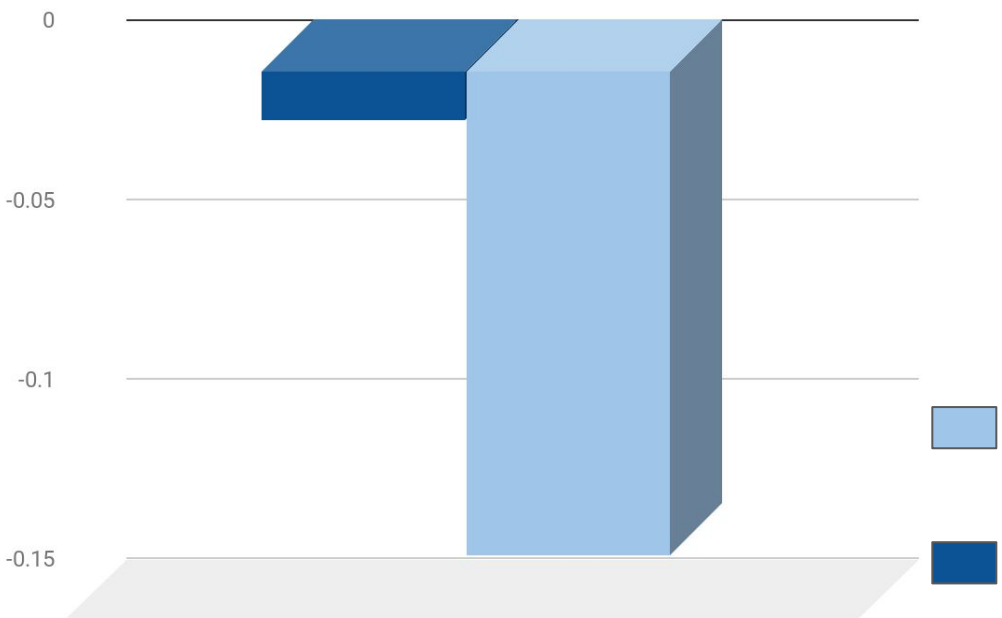
Current Healthcare Expenditure



Countries with Low HALE and Life Expectancy and High Gap



Effectiveness ratios



In order to improve HALE the government of United States should improve health insurance for poor population as there is big income inequality and reduce high administrative costs for cost efficiency. The government should focus on medical advances, some improvements in lifestyle, and screening and diagnosis.

SWOT Analysis of Healthcare in the United States

STRENGTHS

- Highly dedicated professional on all levels of health care system.
- Research, innovation and entrepreneurship.
- Healthcare system runs like a business system. Healthcare providers compete to get the most business to provide the best care, providing the choice for patients.
- In recent years the U.S. showed promise in the control of chronic conditions, smoking rates, the use of electronic files for record keeping, and in certain aspects of hospital and long-term care.

WEAKNESSES

- Roughly 20 to 25 % of American health care spending is wasteful.
- Poor access and affordability of healthcare insurance. People with lower incomes spend a significantly higher share of their family income towards premium contributions and out-of-pocket medical expenses.
- There are wide differences in the burden of disease at the state level. Specific diseases and risk factors, such as drug use disorders, high BMI, poor diet, high fasting plasma glucose level, and alcohol use disorders are increasing and warrant increased attention.

OPPORTUNITIES

- Prioritize and leverage the potential of specialty-specific analytics solutions to investigate drug utilization, treatment variability, clinical trial eligibility.
- Participatory medicine: empower individuals to be able to manage their own health.
- Utilization of Artificial Intelligence in longevity industry.
- Growth of regenerative medicine.
- Legislation to provide for comprehensive health insurance coverage for all United States residents and improved health care delivery.

THREATS

- Further increase in healthcare costs.
- Insolvency predictions for government-funded schemes
- Increase in financial burden on the patient, leading to larger medical debt
- Rise of systemic issues such as sick care. The health care delivery system reflects society's ills and reinforces them
- Income inequality continues to grow. In 2015, the top 1 percent of families in the United States made more than 25 times what families in the bottom 99 percent did.

Analysis of Strengths and Weaknesses of Health Care System in the United States

- The United States is renowned for its leadership in biomedical research, its cutting-edge medical technology, and its hospitals and specialists.
- The mortality rate for all cancers has fallen steadily, overall cancer death rate fell by 26% during 1991-2015.
- Dramatic progress in lowering mortality from diseases of the circulatory system. In the U.S., the mortality rate has fallen from 629 deaths per 100,000 population in 1980 to 257 in 2015.
- Strong private sector orientation facilitates ready access to all manner of services for those with stable coverage and strongly encourages on-going medical innovation by product manufacturers.
- High-quality services are available for those with good insurance.
- Major technological breakthroughs have occurred in treating numerous diseases.

- According to World Health Organization Ranking: The World Health System, Health care system of the United States is 37.
- The United States is one of the few developed nations that lacks universal healthcare.
- Problems with ensuring Americans' access to the system and providing quality care are a long-standing concern of policy makers and the public.
- High out-of-pocket expenses ($1,813 or 11% of current healthcare expenditures in 2017) make health care services, pharmaceuticals, and medical supplies increasingly unaffordable.
- In the United States, health care delivery and financing are fragmented across thousands of health systems and payers and across government and the private sector, creating inefficiencies and coordination problems.
- Many Americans rely on emergency departments for acute, chronic, and even preventive care but not on preventive care itself. According to a recent survey by the Commonwealth Fund, patients in the U.S. visit the emergency department for conditions that could have been treated by a regular doctor or place of care nearly.

Recommendations for the United States

- **Move to a life-course perspective in tackling the rising epidemic of "metabesity."** Initiate strategies to improve the health of the nation, promote the importance of focusing on socio-demographic factors to ensure delivery of healthy newborns and decrease the burden of behavioral factors such as insufficient physical ability, overweight, alcohol abuse, smoking. This will stimulate policy initiatives that supplement income and improve educational opportunities, housing prospects, and social mobility as income is strongly associated with morbidity and mortality.
- **This shift from treatment to prevention is ultimately leading to a coming age of precision health.** Health care leaders must shift the nation's "sick care" approach to care that is preventive and comprehensive. "Precision health" denotes the continuous stabilization of health and the maximum-obtainable maintenance of a young biological age via the routine application of micro-interventions in response to ongoing fluctuations in biomarkers of aging and health.
- **Holding health insurers accountable.** By focusing on insurers' payment strategies and quantitative goals and results, closer scrutiny of health insurers can drive systemic reforms to improve safety, increase care coordination, boost prevention, and bring down costs for consumers and small businesses.
- **Utilizing strength of the United States in artificial intelligence industry leads to meaningful improvements in medical care.** Translating the tremendous growth in data into clinical insights falls into the hands of AI (artificial intelligence)/ML (machine learning) platforms. The rapid growth in investment in AI and cloud computing are beginning to create the foundations for the precision health market of the future. But apart from advanced research it is important to provide effective, low-cost treatments that work, triggering unnecessary treatments and higher costs down the line.
- **A public option health plan**. Providing Americans under 65 with the option of buying into Medicare or Medicaid could provide consumers with a cheaper alternative to commercial health insurance and ensure that there are coverage options for consumers who lose their employer-based coverage.

Report Methodology and Data

Metrics Structure. 1st Level

1. Absolute values						
General Health Status						Government Healthcare Policies
Both Sexes HALE	Male HALE	Female HALE	Both Sexes Life Expectancy	Male Life Expectancy	Female Life Expectancy	Existence of an Operational Policy that Integrates Several NCDs and Their Risk Factors
Government Healthcare Policies						
Existence of a Set of Time-Bound National Targets Based on WHO Guidance for NCDs	Existence of any Policies to Reduce Population Salt Consumption	Implementation of Physical Activity Public Awareness Program	Existence of Operational Policy/Strategy/Action Plan for Cancer	Existence of Operational Policy/Strategy/Action Plan for Cardiovascular Diseases	Existence of Operational Policy/Strategy/Action Plan for Diabetes	Existence of Operational Policy/Strategy/Action Plan for Chronic Respiratory Diseases
Government Healthcare Policies						
Existence of Operational Policy/Strategy/Action Plan to Decrease Tobacco Use	Existence of Operational Policy/Strategy/Action Plan to Reduce Physical Inactivity	Existence of Operational Policy/Strategy/Action Plan to Reduce the Harmful Use of Alcohol	Existence of Operational Policy/Strategy/Action Plan to Reduce Unhealthy Diet Related to NCDs	Existence of Operational Policy/Strategy/Action Plan for Oral Health	Stand-Alone Law for Mental Health	Stand-Alone Policy or Plan for Mental Health
Retirement and Ageing					Demography	
Number of WHO Age Friendly Cities and Communities	Early Retirement Age Women	Early Retirement Age Men	Normal Retirement Age Women	Normal Retirement Age Men	Total Population	Population 65 +
Demography	Temperature Conditions		Solar Radiation	Humidity		
Net Migration	Diurnal Temperature Variation, °C	Daily Mean Air Temperature, °C	Sunshine Hours, Mean Monthly Number of Hours	Relative Humidity, %	Dew Point, °C	

The first level of metrics is used predominantly as a basis for the following more complicated levels of analysis.

Metrics Structure. 2nd Level

2. Indices								
Healthcare		**Melbourne Mercer Global Pension Index**				**Economy**		
Healthcare Efficiency Index	HAQ (The Healthcare Access and Quality Index)	Overall Value Index	Sustainability	Adequacy	Integrity	Inclusive Development Index	Global CompetitiveneSs Index	Consumer Price Index
International Health Regulations (2005) Monitoring Framework								
Legislation	Coordination	Surveillance	Response	Preparedness	Risk Communication	Human Resources	Laboratory	Points of Entry
International Health Regulations (2005) Monitoring Framework				**Society**				
Zoonosis	Food Safety	Chemical	Radionuclear	Education Index	Democracy Index	Human Development Index	Global Gender Gap Index	Corruption Perceptions Index 2016

The second level of metrics comprises a number of indices developed by international organizations and respected publications, such as WHO, The World Bank, Bloomberg, etc.

Metrics Structure. 3nd Level (1)

3. Ratios								
Mental Health			**Immunization**					
Mental Hospitals (per 100 000 Population)	Mental Health Units in General Hospitals (per 100 000 Population)	Mental Health Outpatient Facilities (per 100 000 Population)	BCG Immunization Coverage among 1-Year-Olds (%)	Diphtheria Tetanus Toxoid and Pertussis (DTP3) Immunization Coverage among 1-Year-Olds (%)	Hepatitis B (HepB3) Immunization Coverage among 1-Year-Olds (%)	Hib (Hib3) Immunization Coverage among 1-Year-Olds (%)	Measles-Containing-Vaccine First-Dose (MCV1) Immunization Coverage among 1-Year-Olds (%)	Measles-Containing-Vaccine Second-Dose (MCV2) Immunization Coverage by the Recommended Age (%)
Immunization				**Economy**				
Neonates Protected at Birth against Neonatal Tetanus (%)	Pneumococcal Conjugate Vaccines (PCV3) Immunization Coverage among 1-Year-Olds (%)	Polio (Pol3) Immunization Coverage among 1-Year-Olds (%)	Rotavirus Vaccines Completed Dose (RotaC) Immunization Coverage among 1-Year-Olds (%)	GDP per Capita (Current US$)	Adjusted Savings: Net National Savings (% of GNI)	Unemployment Rate, %	Net ODA Received (% of GNI)	% of People 65+ in Employment
Economy	**Healthcare**							
Income Gini Coefficient	Current Health Expenditure per Capita (Current US$)	Public Health Care Expenditure (as % of GDP)	Domestic Private Health Expenditure (% of Current Health Expenditure)	Out-of-Pocket Expenditure (% of Current Health Expenditure)	Risk of Catastrophic Expenditure for Surgical Care (% of People at Risk)	Medical Equipment (per 1.000.000 People)	Biomedical Engineers Density (per 10 000 Population)	

The third level of metrics includes open data ratios mostly provided by WHO, OECD, The World Bank and Governmental institutions of each country, that are subsequently used for countries comparison and advanced calculations of growth rates of ratios and effectiveness ratios.

Metrics Structure. 3nd Level (2)

3. Ratios							
General Health Status							
Population of Adults with AIDs (%)	Annual Cigarette Consumption per Capita	Alcohol Consumption per Capita (Litres of Pure Alcohol)	DALY Rates per 100 000 Population	Incidence of Tuberculosis (per 100 000 Population per year)	Prevalence of Overweight among Adults, BMI ≥ 25 (Age-Standardized Estimate) (%)	Prevalence of Undernourishment (% of Population)	Prevalence of Insufficient Physical Activity Among Adults aged 18+ Years (Age-Standardized Estimate) (%)
Environment and Infrastructure					**Demography**		
People Using Safely Managed Sanitation Services (% of Population)	Population Using Improved Water Sources (%))	Ambient Air Pollution, Concentration of Fine Particulate Matter (PM2.5)	Ambient Air Pollution, Concentration of Fine Particulate Matter PM2.5 (Ug/M3)	Ambient and Household Air Pollution Attributable Death Rate (per 100 000 Population)	Population Growth Rate, %	Total Fertility Rate (per Woman)	Crude Birth Rate (per 1 000 People)
Demography							
Crude Death Rate (per 1 000 People)	Population Density, Number of People/km2	Age Dependency Ratio	Total Age Dependency Ratio (per 1000 of Working-Age Population)	Population Over 65 (%)	Age Dependency Ratio, Old	Urban Population (% of Total)	Senior Poverty Ratio
Demography							
Murder rates 2016 per 100 000 population							

The third level of metrics includes open data ratios mostly provided by WHO, OECD, The World Bank and Governmental institutions of each country, that are subsequently used for countries comparison and advanced calculations of growth rates of ratios and effectiveness ratios.

Metrics Structure. 4th Level

4. Growth Rates				
Life Expectancy and HALE				
Both Sexes Life Expectancy, CAGR (6 years)	Male Life Expectancy, CAGR (6 years)	Female Life Expectancy, CAGR (6 years)	Both Sexes HALE CAGR (6 Years)	Male HALE CAGR (6 Years)
Life Expectancy and HALE				**Other**
Female HALE CAGR (6 Years)	Both Sexes HALE and Life Expectancy Difference, CAGR (6 Years)	Male HALE and Life Expectancy Difference, CAGR (6 Years)	Female HALE and Life Expectancy Difference, CAGR (6 Years)	Human Development Index Score, CAGR (6 Years)

The fourth level of metrics is based on the first two levels and mostly represent the average percentage changes of metrics of a certain country.

Growth rates refer to the percentage change of a specific variable within a 6 year period. A compound annual growth rate (CAGR) is used to measure country's performance in a certain area. Its calculation assumes that growth is steady over a specified period of time. CAGR is a widely used metric due to its simplicity and flexibility to forecast further growth.

Both sexes life expectancy growth rate, for example, is derived as the average annual rate of change at which a country's life expectancy increases or decreases. This rate of growth is used to measure country's overall changes in mortality level of a population.

Metrics Structure. 5th and 6th Level

5. Growth Rates of Ratios					
Economy			**Healthcare Expenditure**		
GDP (per Capita), CAGR (6 Years)	Adjusted Savings: Net National Savings (% of GNI), CAGR (6 Years)	Income Gini Coefficient, CAGR (6 Years)	Current Health Expenditure per Capita (Current US$), CAGR (6 Years)	Public Health Care Expenditure (as % of GDP), CAGR (6 Years)	Domestic Private Health Expenditure (% of Current Health Expenditure), CAGR (6 Years)
Healthcare Expenditure	**General Health State**				**Environment**
Out-of-Pocket Expenditure (% of Current Health Expenditure), CAGR (6 Years)	Population of Adults with AIDs (%), CAGR (6 Years)	Alcohol Consumption (per Capita), CAGR (6 Years)	Prevalence of Overweight among Adults, BMI ≥ 25 (Age-Standardized Estimate) (%), CAGR (6 Years)	Prevalence of Undernourishment (% of Population), CAGR (6 Years)	Ambient Air Pollution, Concentration of Fine Particulate Matter (PM2.5), CAGR (6 Years)
6. Effectiveness Ratios					
HALE CAGR (6 Years)/Current Health Expenditures per Capita (Current US$), CAGR (6 Years)		HALE and Life Expectancy Difference CAGR (6 Years)/Current Health Expenditures per Capita (Current US$), CAGR (6 Years)		HALE CAGR (6 Years)/GDP per Capita CAGR (6 Years)	HALE CAGR (6 Years)/Prevalence of Overweight among Adults, BMI ≥ 25 CAGR (6 Years)

The fifth and sixth levels are also based on the previous levels and are the main indicators of a country's position in the analysis of Global Healthy Longevity.

Methodology for Absolute Values: General Health Status

HALE (Health-Adjusted life expectancy) refers specifically to the healthy number of years someone is expected to live at birth, which equals their life expectancy minus the number of years expected to be lived in a state of illness or disability as opposed to life expectancy at birth that is defined as how long, on average, a newborn can expect to live, if current death rates do not change. It takes into account both fatal and nonfatal outcomes and has a summary measure of population health. An important measure for HALE is disease prevalence, which is a combination of the number of people living with the disease and the overall impact of the severity of this disease on the affected people. Therefore, HALE is a more useful and revealing metric compared with average life expectancy.

The following metrics were used in this report:

Metric definition	Calculation
Both Sexes HALE - an indicator of both sexes healthy life expectancy.	An absolute value that is derived from sourcing the data.
Male HALE - an indicator of men healthy life expectancy.	An absolute value that is derived from sourcing the data.
Female HALE - an indicator of female healthy life expectancy.	An absolute value that is derived from sourcing the data.

To be regarded as a country with high HALE, it should have the maximum possible values in all three aforementioned metrics, i.e. HALE must be equal or tend to the largest possible number. HALE is measured in years, and the greater is the metric value, the longer is expected health-adjusted life duration in the country.

The source for all the data for the analysis is WHO Life tables.

Methodology for Absolute Values: General Health Status

Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. Life expectancy could be considered as one of the most important measures of health. It is readily comparable across countries and indicates how well a government is doing in terms of healthcare improvements. It reflects the mortality level and pattern that prevails across different age groups of population - children, adolescents, adults, and elderly people.

For the report, the following metrics were used:

Metric definition	Calculation
Both sexes Life Expectancy - is a statistical measure of the average time a person is expected to live, based on the year of its birth, its current age and other demographic factors.	An absolute value that is derived from sourcing the data.
Male Life Expectancy - is a statistical measure of the average time men are expected to live.	An absolute value that is derived from sourcing the data.
Female Life Expectancy - is a statistical measure of the average time women are expected to live.	An absolute value that is derived from sourcing the data.

To be regarded as a country with high Life Expectancy, it should have the maximum possible values in all three aforementioned metrics, i.e. life expectancy must be equal or tend towards the largest possible number. Life Expectancy is measured in years, so the greater is the metric value, the longer is expected life duration in the country.

The source for all the data for the analysis is WHO Life tables.

Methodology for Absolute Values: Government Healthcare Policies

Existence of an Operational Policy that Integrates Several NCDs (Noncommunicable diseases) and Their Risk Factors defines that country has a policy, strategy or action plan which is being used and implemented, has resources and funding available to implement it, and one or more government sectors outside of health are engaged.

Existence of a physical activity program, plan for cancer and policies to reduce population salt consumption, as well as a set of time-bound national targets for NCDs (based on the 9 voluntary global targets from the WHO Global Monitoring Framework for NCDs), along with other policies, are aimed to create the conditions that ensure good health for the entire population. For the report, the following metrics were used:

Metric definition	Calculation
Existence of an Operational Policy that Integrates Several NCDs and Their Risk Factors	Existence or non-existence of an Operational, Policy that Integrates Several NCDs and Their Risk Factors.
Existence of a Set of Time-Bound National Targets Based on WHO Guidance for NCDs	Existence or non-existence of a Set of Time-Bound National Targets Based on WHO Guidance for NCDs.
Existence of any Policies to Reduce Population Salt Consumption	Existence or non-existence of any Policies to Reduce Population Salt Consumption.
Implementation of Physical Activity Public Awareness Program	Existence or non-existence of Physical Activity Public Awareness Program.
Existence of Operational Policy/Strategy/Action Plan for Cancer	Existence or non-existence of Operational Policy/Strategy/Action Plan for Cancer.

If the country has an operational policy, strategy, action plan or program from listed metrics, the metric takes on a value of 1, and if the aforementioned operational policy, strategy, action plan or program is not used and implemented, the metric takes on a value of 0. The source for all the data for the analysis is WHO Life tables.

Methodology for Absolute Values: Government Healthcare Policies

The main objective of national health policy is to provide them access to quality healthcare with optimal conditions for the entire population of the country. Proposed metrics indicate whether the country has an operational policy, strategy, or action plan for cardiovascular and chronic respiratory diseases, diabetes, tobacco use, and physical inactivity reduction.

For the report, the following metrics were used:

Metric definition	Calculation
Existence of Operational Policy/Strategy/Action Plan for Cardiovascular Diseases	Existence or non-existence of Operational Policy/Strategy/Action Plan for Cardiovascular Diseases.
Existence of Operational Policy/Strategy/Action Plan for Diabetes	Existence or non-existence of Operational Policy/Strategy/Action Plan for Diabetes.
Existence of Operational Policy/Strategy/Action Plan for Chronic Respiratory Diseases	Existence or non-existence of Operational Policy/Strategy/Action Plan for Chronic Respiratory Diseases.
Existence of Operational Policy/Strategy/Action Plan to Decrease Tobacco Use	Existence or non-existence of Operational Policy/Strategy/Action Plan to Decrease Tobacco Use.
Existence of Operational Policy/Strategy/Action Plan to Reduce Physical Inactivity	Existence or non-existence of Operational Policy/Strategy/Action Plan to Reduce Physical Inactivity.

If the country has an operational policy, strategy, action plan or program from listed metrics, the metric takes on a value of 1, and if the aforementioned operational policy, strategy, action plan or program is not used and implemented, the metric takes on a value of 0. The source for all the data for the analysis is WHO Life tables.

Methodology for Absolute Values: Government Healthcare Policies

The main objective of national health policy is to provide them access to quality healthcare with optimal conditions for the entire population of the country. Proposed metrics indicate whether the country has an operational policy, strategy, or action plan to reduce the harmful use of alcohol and unhealthy diet-related to NCDs, and plan for oral health. It is also important to determine the presence of stand-alone law and policy for mental health, as mental disorders take place among the leading causes of ill-health and disability worldwide.

For the report, the following metrics were used:

Metric definition	Calculation
Existence of Operational Policy/Strategy/Action Plan to Reduce the Harmful Use of Alcohol	Existence or non-existence of Operational Policy/ Strategy/Action Plan to Reduce the Harmful Use of Alcohol.
Existence of Operational Policy/Strategy/Action Plan to Reduce Unhealthy Diet Related to NCDs	Existence or non-existence of Operational Policy/Strategy/Action Plan to Reduce Unhealthy Diet Related to NCDs.
Existence of Operational Policy/Strategy/Action Plan for Oral Health	Existence or non-existence of Operational Policy/Strategy/ Action Plan for Oral Health.
Stand-Alone Law for Mental Health	Existence or non-existence of Stand-Alone Law for Mental Health.
Stand-Alone Policy or Plan for Mental Health	Existence or non-existence of Stand-Alone Policy or Plan for Mental Health.

If the country has an operational policy, strategy, action plan or program from listed metrics, the metric takes on a value of 1, and if the aforementioned operational policy, strategy, action plan or program is not used and implemented, the metric takes on a value of 0. The source for all the data for the analysis is WHO Life tables.

Methodology for Absolute Values: Retirement and Ageing

Retirement is defined when a person chooses to leave the workforce. Many people choose to retire when they are eligible for private or public pension benefits, although some are forced to retire when bodily conditions no longer allow the person to work any longer (by illness or accident) or as a result of legislation concerning their position.

Age-friendly cities/communities indicate whether cities and communities adapt their structures and services to the needs of older people. For the report, the following metrics were used:

Metric definition	Calculation
Number of WHO Age-Friendly Cities/Communities	Based on own research
Early retirement age Women - an indicator of female early pension withdrawal before age 60 that is possible in occupational and private pension plans.	An absolute value that is derived from sourcing the data.
Early retirement age Men - an indicator of male early pension withdrawal before age 60 that is possible in occupational and private pension plans.	An absolute value that is derived from sourcing the data.
Normal retirement age Women - an indicator of females the lowest normal statutory pension age.	An absolute value that is derived from sourcing the data.
Normal retirement age Men - an indicator of males the lowest normal statutory pension age.	An absolute value that is derived from sourcing the data.

To be regarded as a country with high Retirement, it should have the maximum possible values in a total number of retired. Countries with a high number of WHO age-friendly cities/communities have a metric value that tends towards the largest possible number.

The source for all the data for the analysis is WHO Life tables, World Bank, National Bureaus of Statistics.

Methodology for Absolute Values: Demography

Demography is an important part of public policy analysis and development. Furthermore, it can provide explanations of observed economic and social trends in the country. An increase in the number of people of retirement age (65+) in the total number of the country's population will lead to an increase in the burden on those of working age to cover expenses for social expenditure that provide comfortable conditions for the elderly.

Net migration is the difference between immigration into and emigration from the area during the year. If the number of emigrants exceeds the number of immigrants, it can cause problems relating to unemployment and, in some areas, a reduction or glut in a particular labor force.

For the report, the following metrics were used:

Metric definition	Calculation
Total population	An absolute value that is derived from sourcing the data.
Population 65+	An absolute value that is derived from sourcing the data.
Net migration	An absolute value that is derived from sourcing the data.

The total population is an absolute value that describes the total amount of people living in a specific country, the larger is value, the more people are living in the country. Population 65+ metric defines the elderly population in a country. Net migration value is positive when the number of immigrants exceeds the number of emigrants.

The source for all the data for the analysis is WHO Life tables, The World Bank, National Bureaus of Statistics.

Methodology for Meteorological Analysis: Temperature Conditions

Temperature conditions are major indicators of weather patterns and are one of the most well-known rates to the general public. Furthermore, diurnal temperature variation or diurnal temperature range (DTR) is a well-known risk factor of weather-related human health. Numerous studies have described a positive association between DTR and mortality (Caoet al. 2009; Limet al. 2015; Tamet al. 2009; Vutcoviciet al. 2014; Yanget al. 2013a), and have reported that people who are elderly, less educated, female or have cardiovascular or respiratory disease are more susceptible to DTR than others (Kan et al. 2007b; Lim et al. 2012a; Yang et al. 2013b).

For the report, the following metrics were used:

Metric definition	Formula
Diurnal Temperature Variation, °C is the difference between the daily maximum and minimum temperature.	$(1/n \sum^{n}_{i=1}(T_{max\,i} - T_{min\,i})*P_i + 1/n \sum^{n}_{j=1}(T_{max\,j} - T_{min\,j})*P_j + 1/n \sum^{n}_{k=1}(T_{max\,k} - T_{min\,k})*P_k + 1/n \sum^{n}_{l=1}(T_{max\,l} - T_{min\,l})*P_l)/(P_i + P_j + P_k + P_l)$, where i-l stand for the respective weather station, P_i-P_l stand for 2016 population value of the city weather station is situated in, $T_{max\,i}$ is monthly mean maximum temperature observed at the respective weather station, $T_{min\,i}$ is monthly mean minimum temperature observed at the respective weather station.
Daily Mean Air Temperature, °C is daily average air temperature value.	$(1/n \sum^{n}_{i=1}T_i*P_i + 1/n \sum^{n}_{j=1}T_j*P_j + 1/n \sum^{n}_{k=1}T_k*P_k + 1/n \sum^{n}_{l=1}(T_l*P_l)/(P_i + P_j + P_k + P_l)$, where i-l stand for the respective weather station, P_i-P_l stand for 2016 population value of the city weather station is situated in, T_i is monthly mean temperature observed at the respective weather station.

There are no definite “best” values, but scientific evidence suggests that for the country to have a comfortable temperature condition, Diurnal Temperature Variation should have the least possible value, Daily Mean Air Temperature should have the value close to 15°C. The source for all the data for the analysis is Ogimet, RP5.

Methodology for Meteorological Analysis: Solar Radiation

Sunlight, an essential prerequisite for life, may be extremely dangerous to human health. Excessive exposure to the sun is known to be associated with increased risks of various skin cancers, cataracts, and other eye diseases, as well as accelerated skin ageing. It may also adversely affect people's ability to resist infectious diseases and compromise the effectiveness of vaccination programmes. Within the Bureau of Meteorology network, bright sunshine has generally been recorded with a Campbell-Stokes recorder. This device only measures the duration of “bright” sunshine, which is less than the amount of “visible” sunshine. For example, sunshine immediately after sunrise and just before sunset is visible, but would not be bright enough to register on the Campbell-Stokes recorder.

For the report, the following metrics were used:

Metric definition	Formula
Sunshine Hours, Mean Monthly Number of Hours is an average number of hours of bright sunshine each month in a calendar year. Hours of bright sunshine is measured from midnight to midnight.	$(1/n \sum^{n}_{i=1} H_i * P_i + 1/n \sum^{n}_{j=1} H_j * P_j + 1/n \sum^{n}_{k=1} H_k * P_k + 1/n \sum^{n}_{l=1} H_l * P_l)/(P_i + P_j + P_k + P_l)$, where i-l stand for the respective weather station, P_i-P_l stand for 2016 population value of the city weather station is situated in, H_i is monthly mean number of sunshine hours observed at the respective weather station.

There are no definite “best” values, but scientific evidence suggests that for the country to have comfortable levels of solar radiation, Sunshine Hours, Mean Monthly Number of Hours should not have extreme values, i.e. the function should avoid its maximum and minimum values.

The source for all the data for the analysis is Ogimet, RP5.

Methodology for Meteorological Analysis: Humidity

Humidity affects human health in various ways. Humid conditions disrupt the human body temperature regulation system: the sweat evaporates more slowly, making it hard for our bodies to cool off, so they get more stressed and over-exercised. When combined with high temperatures, high humidity levels can cause several symptoms including dehydration, muscle cramps, fatigue, heat exhaustion, fainting, and heatstroke.

For the report, the following metrics were used:

Metric definition	Formula
Relative Humidity, % is a measure of the actual amount of water vapor in the air compared to the total amount of vapor that can exist in the air at its current temperature.	$(1/n \sum^{n}_{i=1} RH_i * P_i + 1/n \sum^{n}_{j=1} RH_j * P_j + 1/n \sum^{n}_{k=1} RH_k * P_k + 1/n \sum^{n}_{l=1} RH_l * P_l)/(P_i + P_j + P_k + P_l)$, where i-l stand for the respective weather station, P_i-P_l stand for 2016 population value of the city weather station is situated in, RH_i is monthly mean relative humidity value observed at the respective weather station.
Dew Point, °C provides a measure of the actual amount of water vapor in the air, is the temperature to which the air must be cooled for air to be saturated.	$(1/n \sum^{n}_{i=1} T_{d\,i} * P_i + 1/n \sum^{n}_{j=1} T_{dj} * P_j + 1/n \sum^{n}_{k=1} T_{d\,k} * P_k + 1/n \sum^{n}_{l=1} T_{d\,l} * P_l)/(P_i + P_j + P_k + P_l)$, where i-l stand for the respective weather station, P_i-P_l stand for 2016 population value of the city weather station is situated in, $T_{d\,i}$ is monthly mean dew point value observed at the respective weather station.

There are no definite best values, but scientific evidence suggests that for the country to have comfortable levels of humidity, Relative Humidity and Dew Point should not have extreme values, i.e. the function should avoid its maximum and minimum values.

The source for all the data for the analysis is Ogimet, RP5.

Methodology for Indexes: Healthcare

Healthcare efficiency measures whether healthcare resources are being used to get the best value for money, where the value of healthcare is as a means to improve health. Efficiency is concerned with the relation between resource inputs (costs, in the form of labor, capital, or equipment) and either intermediate outputs (numbers treated, waiting time, etc) or final health outcomes (lives saved, life years gained, quality-adjusted life-years (QALYs)).

The HAQ Index encompasses 32 causes of death considered to be avoidable provided that quality healthcare is available. The general trend shows that country index values improved in nearly all countries compared to 1990.

For the report, the following metrics were used:

Metric definition	Calculation
Healthcare Efficiency Index	A weighted average of Life Expectancy, Relative Healthcare Cost, Absolute Healthcare Cost.
HAQ (The Healthcare Access and Quality Index)	Based on 32 causes from which death should not occur in the presence of effective care to approximate personal health-care access.

To be regarded as a country with high Healthcare, two aforementioned metrics should have the largest possible value, i.e. Health-Efficiency Index and Global Healthcare Access and Quality Index should be equal to the largest possible number on the scale of 0 to 100, with 0 as the first percentile (worst) and 100 as the best. It would indicate that the country's healthcare system is not just of high quality but affordable and cost-effective as well.

The source for all the data for the analysis is Bloomberg, The Lancet.

Methodology for Indexes: Melbourne Mercer Global Pension Index

The Melbourne Mercer Global Pension Index (MMGPI) compares retirement income systems around the world based on their adequacy, sustainability, and integrity. The provision of financial security in retirement is critical for both individuals and societies as countries grapple with the social and economic effects of aging populations. The Index provides a valuable contribution to the global debate about how best to support older members of our societies. It is encouraging to see governments responding to their Index ranking as they develop their national schemes.

For the report, the following metrics were used:

Metric definition	Formula
Overall Value Index	A weighted average of Sustainability, Adequacy, Integrity sub-indexes.
Sustainability - considers a number of indicators which influence the long-term sustainability of current retirement income systems.	Based on the economic importance of the private pension system, its level of funding, the length of expected retirement both now and in the future, etc.
Adequacy - considers the benefits provided to the poor and the average-income earner as well as several design features and characteristics which enhance the efficacy of the overall retirement income system.	Based on the net household saving rate, the level of household debt and the homeownership rate are also included as non-pension savings represent an important source of financial security during retirement.
Integrity - defines the requirements that apply to the funded pension plans which normally exist in the private sector.	Based on three broad areas of the pension system, namely regulation and governance, protection and communication for members, and costs.

Melbourne Mercer Global Pension Index in all four aforementioned metrics has a range of values of 0-100. The source for all the data for the analysis is the Australian Centre for Financial Studies.

Methodology for Indexes: Retirement

Retirement is when a person chooses to leave the workforce. The concept of full retirement as an ability to permanently leave the workforce later in life is relatively new, and for the most part, only culturally widespread in first-world countries. Dramatic advances in healthcare have extended the lives of people in predominantly first-world and developed countries. That means that an increasing number of people are going to become retirees, which will pose a significant burden on the government and the workforce.

For the report, the following metrics were used:

Metric definition	Formula
Global Retirement Index (%)	Based on Health, Material well-being, Quality of life/environment, and Finances in retirement.
Global AgeWatch Index	Based on Income security, Health status, Capability, and Enabling environment .

Global Retirement Index and the Global AgeWatch Index are indicating a good state of retirement in the country when two aforementioned metrics are equal or tend towards the largest possible number on the scale of 0 to 100.

Global Retirement Index value of 0 means that the state of retirement in the country is the lowest possible, and 100 means that the state of retirement in the country is the largest possible. The bigger is the Global AgeWatch Index value, the better the fare older people have in the country.

The source for all the data for the analysis is Naxitis, Global AgeWatch Index.

Methodology for Indexes: Society

The Human Development Index (HDI) is a summary measure of average achievement in key aspects of human development: a long and healthy life, being knowledgeable and have a decent standard of living. Well-being, population development level, and capabilities should be the ultimate criteria for assessing the development of a country. For the report, the following metrics were used:

Metric definition	Formula
Education Index	Based on Mean Years of Schooling and Expected Years of Schooling.
Democracy Index	Based on the Electoral Process and Pluralism, Civil Liberties, the Functioning of Government, Political Participation, and Political Culture.
Human Development Index (HDI)	Based on Life expectancy at birth, Expected Years of Schooling and Mean Years of Schooling, and GNI (Gross national income) per capita (PPP $).
Global Gender Gap Index	Based on Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment.
Corruption Perceptions Index 2016	Based on data from 13 different sources, which is rescaled and averaged

Society indexes are indicating a healthy state of society in the country when two aforementioned metrics are equal or tend towards the largest possible number. Education Index, Human Development Index, and the Global Gender Gap Index have a range of values of 0 to 1. Democracy Index has a range of values of 0 to 10.

Methodology for Indexes: International Health Regulations (2005) Monitoring Framework

International Health Regulations (2005) Monitoring Framework use listed metrics to detect, assess, and respond to public health events in the country and international levels. For each capacity, one to three indicators is used to measure the country's progress towards fully developed and functional IHR capacities.

For the report, the following metrics were used:

Metric definition	Formula
Legislation	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of Core Capacity 1: National legislation, policy, and financing.
Coordination	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of Core Capacity 2: Coordination and NFP Communication.
Surveillance	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of Core Capacity 3: Surveillance.
Response	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of Core Capacity 4: Response.

Methodology for Indexes: International Health Regulations (2005) Monitoring Framework

International Health Regulations (2005) Monitoring Framework use listed metrics to detect, assess, and respond to public health events in the country and international levels. For each capacity, one to three indicators is used to measure the country's progress towards fully developed and functional IHR capacities.

For the report, the following metrics were used:

Metric definition	Formula
Preparedness	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of Core Capacity 5: Preparedness.
Risk Communication	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of Core Capacity 6: Risk communication.
Human Resources	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of Core Capacity 7: Human resources.
Laboratory	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of Core Capacity 8: Laboratory.
Points of Entry	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of Points of Entry.

Methodology for Indexes: International Health Regulations (2005) Monitoring Framework

International Health Regulations (2005) Monitoring Framework use listed metrics to detect, assess, and respond to public health events in the country and international levels. For each capacity, one to three indicators is used to measure the country's progress towards fully developed and functional IHR capacities.

For the report, the following metrics were used:

Metric definition	Formula
Zoonosis	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of IHR Potential hazards 1: Zoonotic events.
Food Safety	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of IHR Potential hazards 2: Food safety.
Chemical	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of IHR Potential hazards 3: Chemical events.
Radionuclear	Based on the proportion/percentage of a set of specific elements or functions which reflect the level of performance or achievement of IHR Potential hazards 4: Radionuclear emergencies.

To be regarded as a country with high International Health Regulations (2005) Monitoring Framework Indexes, value of the aforementioned metrics should be equal or tend to the largest possible number on the scale of 0 to 100.

The source for all the data for the analysis is WHO Life tables, World Bank.

Methodology for Indexes: Economy

The **Inclusive Development Index** (IDI) was submitted in 2017 as part of the World Economic Forum's System Initiative. It is a new, annual economic index that recognize broad-based and sustained progress in living standards as the key measure for national economic performance, rather than GDP growth alone. A comparison between a country's IDI and GDP rank reveals to what extent economic growth has been inclusive, meaning it is distributed fairly across society and creates opportunities for all. The **Consumer Price Index** (CPI) is a measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food, and medical care. CPI is one of the most common indexes which is used to identify inflation and deflation processes in the country.

For the report, the following metrics were used:

Metric definition	**Formula**
Inclusive Development Index	Based on Growth and Development, Inclusion, Intergenerational Equity, and Sustainability.
Global Competitiveness Index	Based on 12 pillars of competitiveness, which are grouped into the Basic requirements subindex, Efficiency enhancers subindex, Innovation, and Sophistication factors subindex.
Consumer Price Index	(Cost of Market Basket in Given Year/Cost of Market Basket in Base Year)* 100

Inclusive Development Index and Global Development Index scores are limited to a scale of 1 to 7, and 1 means the country has the lowest index score, and 7 is the largest score the country can get.

The source for all the data for the analysis is the National Bureaus of Statistics, WEF.

Methodology for Ratios: Mental Health

Mental health includes emotional, psychological, and social well-being. According to the World Health Organization (WHO), mental health includes "subjective well-being, perceived self-efficacy, autonomy, competence, intergenerational dependence, and self-actualization of one's intellectual and emotional potential, among others."

The WHO further states that the well-being of an individual is encompassed in the realization of their abilities, coping with normal stresses of life, productive work, and contribution to their community. Cultural differences, subjective assessments, and competing professional theories all affect how one defines mental health.

The following Mental Health metrics were used in this report:

Metric definition	Formula
Mental Hospitals (per 100 000 Population)	(Number of Mental Hospitals*Total population) 100 000 population
Mental Health Units in General Hospitals (per 100 000 Population)	(Number of Mental Health Units in General Hospitals*Total population)/100 000 population
Mental Health Outpatient Facilities (per 100 000 Population)	(Number of Mental Health Outpatient Facilities*Total population)/100 000 population

To be regarded as a country with high Mental Health ratios, it should have the maximum values in all aforementioned metrics, e.g. amount of mental hospitals, mental health units in general hospitals and mental health outpatient facilities per 100 000 population should tend towards the largest possible number.

The source for all the data for the analysis is WHO Life tables.

Methodology for Indexes: Immunization

For the report, the following metrics were used:

Metric definition	Formula
Measles-Containing-Vaccine Second-Dose (MCV2) Immunization Coverage by the Recommended Age (%)	Number of people who have received the second dose of Measles-Containing-Vaccine/ Population (total number)
Neonates Protected at Birth against Neonatal Tetanus (%) - the proportion of neonates in a given year that can be considered as having been protected against tetanus as a result of maternal immunization.	Number of neonates that can be considered as having been protected against tetanus as a result of maternal immunization/ Total number of neonates
Pneumococcal Conjugate Vaccines (PCV3) Immunization Coverage among 1-Year-Olds (%) - the percentage of one-year-olds who have received three doses of pneumococcal conjugate vaccine (PCV3) in a given year.	Number of one-year-olds who have received three doses of pneumococcal conjugate vaccine/ Population aged under 12 months
Polio (Pol3) Immunization Coverage among 1-Year-Olds (%) - the percentage of one-year-olds who have received three doses of polio vaccine in a given year.	Number of one-year-olds who have received three doses of polio vaccine/ Population aged under 12 months
Rotavirus Vaccines Completed Dose (RotaC) Immunization Coverage among 1-Year-Olds (%) - the percentage of surviving infants who received the final recommended dose of rotavirus vaccine, which can be either the 2nd or the 3rd dose depending on the vaccine in a given year.	Number of surviving infants who received the final recommended dose of rotavirus vaccine/ Total number of surviving infants

To be regarded as a country with high Immunization, it should have the maximum possible values in all ten aforementioned metrics, i.e. percentile must be equal or tend to the greatest value of 100%. The source for all the data for the analysis is WHO.

Methodology for Indexes: Healthcare

Immunization is a proven tool for controlling and eliminating life-threatening infectious diseases and is estimated to avert 2-3 million deaths each year. It is one of the most cost-effective health investments, with proven strategies that make it accessible to even the most hard-to-reach and vulnerable populations. For the report, the following metrics were used:

Metric definition	Formula
BCG Immunization Coverage among 1-Year-Olds (%) - the percentage of one-year-olds who have received 1 dose of bacilli Calmette-Guérin (BCG) vaccine in a given year.	Number of one-year-olds who have received one dose of bacilli Calmette-Guérin/ Population aged under 12 months
Diphtheria Tetanus Toxoid and Pertussis (DTP3) Immunization Coverage among 1-Year-Olds (%) - the percentage of one-year-olds who have received 3 doses of the combined DTP vaccine in a given year.	Number of one-year-olds who have received three doses of the combined diphtheria, tetanus toxoid and pertussis vaccine/ Population aged under 12 months
Hepatitis B (HepB3) Immunization Coverage among 1-Year-Olds (%) - the percentage of one-year-olds who have received 3 doses of hepatitis B vaccine in a given year.	Number of one-year-olds who have received three doses of hepatitis B vaccine/ Population aged under 12 months
Hib (Hib3) Immunization Coverage among 1-Year-Olds (%) - the percentage of one-year-olds who have received 3 doses of Haemophilus influenzae type B vaccine in a given year.	Number of one-year-olds who have received three doses of Haemophilus influenzae type B vaccine/ Population aged under 12 months
Measles-Containing-Vaccine First-Dose (MCV1) Immunization Coverage among 1-Year-Olds (%) - the percentage of children under one year of age who have received at least one dose of measles-containing vaccine in a given year.	Number of one-year-olds who have received at least one dose of measles-containing vaccine/ Population aged under 12 months

Methodology for Indexes: Economy

The impacts of the economy are measured using the following key indicators: gross domestic product (GDP), worker headcount in the employment pool, and wages and salaries earned workers as a result of the spending of those aged 50 years or older. Therefore, for the report, there were used the following metrics:

Metric definition	**Formula**
GDP per Capita (Current US$)	GDP, Current Prices 2016 value/Population (total number)
Adjusted Savings: Net National Savings (% of GNI)	Net savings volume/Gross national income
Unemployment Rate, %	Number of unemployed people/Population (total number)
Net ODA Received (% of GNI)	Net official development assistance volume/Gross national income
% of People 65+ in Employment	Number of employed people of the age group/ Population aged over 65 years
Income Gini Coefficient	$G = 1 - 2\sum_{i=1}^{n} x_i cumy_i + \sum_{i=1}^{n} x_i y_i$ X_i - share of the group in the population; Y_i - group share in revenue.

To be regarded as a country with high Economy ratios, GDP per capita and Adjusted savings should tend towards the largest possible value. Net ODA and Unemployment rate should tend towards the lowest possible value. Gini Coefficient should be as close to 0 as possible. The source for all the data for the analysis is WHO, National National Bureaus of Statistics and World Bank.

Methodology for Ratios: Healthcare

Health spending measures the final consumption of health care goods and services (i.e. current health expenditure) including personal health care (curative care, rehabilitative care, long-term care, ancillary services, and medical goods) and collective services (prevention and public health services as well as health administration), but excluding spending on investments. The following ratio metrics were used in this report:

Metric definition	Formula
Current Health Expenditure per Capita (Current US$)	Total health expenditure in US$/Total number of population
Public Health Care Expenditure (as % of GDP)	Total Public Health Care Expenditure/GDP
Domestic Private Health Expenditure (% of Current Health Expenditure)	Total Domestic Private Health Expenditure/Total health expenditure in US$
Out-of-Pocket Expenditure (% of Current Health Expenditure)	Out-of-Pocket payments volume/Total health expenditure in US$
Risk of Catastrophic Expenditure for Surgical Care (% of People at Risk)	The proportion of population at risk of catastrophic expenditure (direct out of pocket payments for surgical and anaesthesia care exceeding 10% of total income) when surgical care is required.
Medical Equipment (per 1.000.000 People)	Number of medical devices/1 000 000 population
Biomedical Engineers Density (per 10 000 Population)	Number of biomedical engineers (holding the corresponding university degree) and biomedical technicians/10 000 population

To be regarded as a country with high Healthcare ratios, all aforementioned metrics (besides out-of-pocket expenditures and risks of catastrophic expenditure for surgical care) should have the largest possible values.

Methodology for Ratios: General Healthcare Status

The prevalence of HIV refers to the percentage of people aged 15-49 who are infected with HIV. HIV prevalence rates reflect the rate of HIV infection in each country's population.

Low national prevalence rates can be misleading, however. They often disguise epidemics that are initially concentrated in certain localities or population groups and threaten to spill over into the wider population. In many developing countries most new infections occur in young adults, with young women especially vulnerable. Tobacco use causes significant economic damage, which, in particular, is expressed in the form of significant health care costs associated with the treatment of diseases caused by tobacco use, as well as in the loss of human capital due to tobacco morbidity and mortality. The following ratio metrics were used in this report:

Metric definition	**Formula**
Population of Adults with AIDs (% of total) - percentage of population ages 15-49 with HIV .	N/(defined population)*100%, where N - the number of adults with AIDs.
Alcohol Consumption per Capita (litres of pure alcohol) - litres of pure Alcohol are consumed by one person per year.	Total (sum of recorded and unrecorded alcohol, over a calendar year) amount of alcohol / Population 15 and over years old, adjusted for tourist consumption.
Annual Cigarette Consumption (per Capita) - the number of cigarettes that a person consumes per year.	Total (sum of legally-sold machine-made and roll-your-own, over a calendar year) amount of cigarettes/ Population 15 and over years old.

To be regarded as a country with high General Healthcare status basing on population of adults with AIDs, alcohol and cigarette consumption, three aforementioned metrics should have the lowest possible value.

Methodology for Ratios: General Healthcare Status

One DALY represents the loss of the equivalent of one year of full health. DALYs for a disease or health condition are the sum of the years of life lost due to premature mortality (YLLs) and the years lived with a disability (YLDs) due to prevalent cases of the disease or health condition in a population. Using DALYs, the burden of diseases that cause premature death but little disability (such as drowning or measles) can be compared to that of diseases that do not cause death but do cause disability (such as cataract causing blindness).

Incidence of tuberculosis is the estimated number of new and relapse tuberculosis cases arising in a given year, expressed as the rate per 100,000 population. All forms of TB are included, including cases in people living with HIV. For the report, the following metrics were used:

Metric definition	**Formula**
Disability-adjusted life years (DALY) Rates per 100 000 Population - years of healthy life lost to premature death and disability per 100 000 Population (2016 - WHO).	(YLL + YLD)/100 000 Population where YLLs - years of life lost due to premature mortality, years of healthy life lost due to disability (YLDs) .
Incidence of tuberculosis (per 100,000 people) - new cases per 100 000 population per year.	N/100 000 Population, where N - the number of new cases.

To be regarded as a country with high General Healthcare status basing on DALY and Incidence of tuberculosis data, both aforementioned metrics should have the lowest possible value. The source for all the data for the analysis is WHO and World Data Bank.

Methodology for Ratios: General Healthcare Status

Underweight, overweight, and obesity in childhood and adolescence are associated with adverse health consequences throughout the life-course. The given data helps to estimate worldwide trends in mean body-mass index (BMI) and a comprehensive set of BMI categories that cover underweight to obesity in children and adolescents and to compare trends with those of adults.

Population below minimum level of dietary energy consumption (also referred to as the prevalence of undernourishment) shows the percentage of the population whose food intake is insufficient to meet dietary energy requirements continuously. Prevalence of insufficient physical activity among adults aged 18+ years is a percent of defined population attaining less than 150 minutes of moderate-intensity physical activity per week, or less than 75 minutes of vigorous-intensity physical activity per week, or equivalent. Therefore, for the report, there were used the following metrics:

Metric definition	Formula
Prevalence of overweight among adults, BMI ≥ 25, percentage of defined population with a body mass index (BMI) of 25 kg/m2 or higher.	N/(defined population)*100%, where N - the number of adults with a body mass index (BMI) of 25 kg/m2 or higher.
Prevalence of undernourishment (% of population), population (in percentage) below minimum level of dietary energy consumption.	N/(defined population)*100%, where N - the number of persons below minimum level of dietary energy consumption.
Prevalence of insufficient physical activity among adults aged 18+ years (age-standardized estimate).	N/(defined population)*100%, Where N- the number of adults attaining less than 150 minutes of moderate-intensity physical activity per week.

To be regarded as a country with high General Healthcare status basing on the prevalence of overweight among adults, undernourishment, and insufficient physical activity among adults, three aforementioned metrics should have the lowest possible value. The source for all the data for the analysis is WHO and World Data Bank.

Methodology for Ratios: Environment and Infrastructure

Global access to safe water and proper hygiene education can reduce illness and death from disease, leading to improved health, poverty reduction, and socio-economic development. However, many countries are challenged to provide these necessities to their populations, leaving people at risk for water, sanitation, and hygiene (WASH)-related diseases.

Improved sanitation facilities include flush/pour flush to piped sewer systems, septic tanks or pit latrines: ventilated improved pit latrines, composting toilets or pit latrines with slabs. Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and feces. Inadequate sanitation is a major cause of disease worldwide, and improving sanitation is known to have a significant beneficial impact on people's health. Basic and safely managed sanitation services can reduce diarrheal disease, and can significantly lessen the adverse health impacts of other disorders responsible for death and disease among millions of children.

For the report, the following metrics were used:

Metric definition	Formula
Population using improved water sources (%) - percentage of the country population that uses improved water sources.	N/(country Population)*100%, Where N - the number of persons that uses improved water sources.
People using safely managed sanitation services (% of population)	N/(country Population)*100%, Where N - the number of persons that uses managed sanitation services.

To be regarded as a country with wide access to Improved water sources and Safely managed sanitation services, both aforementioned metrics should have the largest possible value.

The source for all the data for the analysis is World Data Bank.

Methodology for Ratios: Environment and Infrastructure

Ambient air pollution results from emissions from industrial activity, households, cars, and trucks which are complex mixtures of air pollutants, many of which are harmful to health. Of all of these pollutants, fine particulate matter has the greatest effect on human health. The majority of the burden is borne by the populations in low and middle-income countries.

Air pollution consists of many pollutants, among other particulate matter. These particles can penetrate deeply into the respiratory tract and therefore constitute a risk for health by increasing mortality from respiratory infections and diseases, lung cancer, and selected cardiovascular diseases. The mean annual concentration of fine suspended particles of less than 2.5 microns in diameters is a common measure of air pollution. The mean is a population-weighted average for the urban population in a country.

For the report, the following metrics were used:

Metric definition	Formula
Ambient and Household Air Pollution Attributable Death Rate (per 100 000 Population) - the country deaths are summed according to the region of interest and divided by the corresponding regional population.	N/100 000 Population, N - the number of deaths caused by ambient and household air pollution.
Ambient Air Pollution, Concentration of Fine Particulate Matter PM2.5 (µg/M3)	Concentration of Fine Particulate matter PM2.5 measured in 3000 cities (µg/m3)

To be regarded as a country with low air pollution, both aforementioned metrics should have the lowest possible value.
The source for all the data for the analysis is WHO.

Methodology for Ratios: Demography

One of the tasks of demography is the development of a demographic policy based on the study of the laws of population reproduction. The demographic policy is a system of measures aimed at bringing the course of demographic processes as close as possible to the optimal one. Since demographic processes influence socio-economic development, in particular, economics, the task is to determine the most favorable (optimal) course of these demographic processes. The policy should influence all demographic processes, not only population changes. It is also important to assess the possible effect of certain measures, as well as their consequences.

For the report, the following metrics were used:

Metric definition	Formula
Murder rates 2016 per 100 000 population	(Amount of homicides* Total population)/100 000
Population Growth Rate, %	Ln (the end period population / the beginning period population) / the number of years in between
Total Fertility Rate (per Woman)	A measure of the fertility of an imaginary woman who passes through her reproductive life subject to all the age-specific fertility rates for ages 15–49 that were recorded for a given population in a given year.
Crude Birth Rate (per 1 000 People)	(Number of live births / Total midyear population)*1000
Crude Death Rate (per 1 000 People)	(Number of deaths / Total midyear population)*1000
Population Density, Number of People/km2	Population / Area

Methodology for Ratios: Demography

For the report, the following metrics were used:

Metric definition	Formula
Age Dependency Ratio	((Percentage of children aged under 15 years + Percentage of older population aged 65+)/ Percentage of working-age population aged 15-64 years)* 100
Total Age Dependency Ratio (per 1000 of Working-Age Population)	((Percentage of children aged under 15 years + Percentage of older population aged 65+)/ Percentage of working-age population aged 15-64 years)* 1000
Population Over 65 (%)	Population over 65 years / Population (total number)
Age Dependency Ratio, Old	(Percentage of older population aged 65+/ Percentage of working-age population aged 15-64 years)* 1000
Urban Population (% of Total)	The numbers of persons residing in an area defined as "urban"/Population (total number)
Senior Poverty Ratio	Number of senior people whose income falls below the poverty line / Total number of senior people.

To be regarded as a country with high demography ratios, the Senior poverty ratio should be as near to 0 as possible. Age dependency ratios and Crude death rates should tend towards the lowest possible value and crude birth rate - towards the largest.

Methodology for Growths Rates: Life Expectancy and HALE

Healthy life expectancy (HALE) is a form of health expectancy that applies disability weights to health states to compute the equivalent number of years of good health that a newborn can expect. It adjusts overall life expectancy by the amount of time lived in less than perfect health. This is calculated by subtracting from the life expectancy a figure which is the number of years lived with disability multiplied by weighting to represent the effect of the disability. If: A = years lived healthily, B = years lived with a disability; then A+B = life expectancy; A+fB = healthy life expectancy, where f is a weighting to reflect disability level.

For the report, the following metrics were used:

Metric definition	Formula
Both Sexes Life Expectancy, CAGR - an indicator of life expectancy average annual growth over the last 6 years.	(Life expectancy 2016 value/Life expectancy 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Male Life Expectancy, CAGR - an indicator of male life expectancy average annual growth over the last 6 years.	(Male life expectancy 2016 value/Male life expectancy 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Female Life Expectancy, CAGR - an indicator of female life expectancy average annual growth over the last 6 years.	(Female life expectancy 2016 value/Female life expectancy 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Both Sexes HALE CAGR - an indicator of healthy life expectancy average annual growth over the last 6 years. It is a more useful and revealing metric compared with life expectancy CAGR.	(HALE 2016 value/HALE 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.

Methodology for Growths Rates: Life Expectancy and HALE

Metric definition	Formula
Male HALE CAGR - an indicator of male healthy life expectancy average annual growth over the last 6 years.	(Male HALE 2016 value/Male HALE 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Female HALE CAGR - an indicator of female healthy life expectancy average annual growth over the last 6 years.	(Female HALE 2016 value/Female HALE 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Both Sexes HALE and Life Expectancy Difference, CAGR - an indicator of years of healthy life lost to disability average annual growth over the last 6 years.	((HALE 2016 value-Life expectancy 2016 value)/(HALE 2010 value-Life expectancy 2010 value))^(⅙)-1, where 6 is the number of years between the start and finish values.
Male HALE and Life Expectancy Difference, CAGR - an indicator of years of healthy male life lost to disability average annual growth over the last 6 years.	((Male HALE 2016 value-Male Life expectancy 2016 value)/(Male HALE 2010 value-Male Life expectancy 2010 value))^(⅙)-1, where 6 is the number of years between the start and finish values.
Female HALE and Life Expectancy Difference, CAGR - an indicator of years of healthy female life lost to disability average annual growth over the last 6 years.	((Female HALE 2016 value-Female Life expectancy 2016 value)/(Female HALE 2010 value-Female Life expectancy 2010 value))^(⅙)-1, where 6 is the number of years between the start and finish values.

To be regarded as a country with high life expectancy and HALE, it should have the maximum possible values in all aforementioned metrics, i.e. both sexes life expectancy, CAGR (6 years) must be greater than zero, HALE CAGR (6 years) must be equal to the greatest possible number, as it is the most important metric in the category.

The source for all the data for the analysis is WHO Life tables, National National Bureaus of Statistics.

Methodology for Growths Rates: Other

The HDI was created to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone. The HDI can also be used to question national policy choices, asking how two countries with the same level of GNI per capita can end up with different human development outcomes. These contrasts can stimulate debate about government policy priorities.

The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.

Metric definition	Formula
Human Development Index Score, CAGR - a composite indicator of life expectancy, education, and per capita income average annual growth over the last 6 years.	(HDI 2016 value/HDI 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.

To be regarded as a country with a high Human Development Index, it should have the maximum possible value in the corresponding CAGR (>0). Countries with a high HDI value demonstrate efficient results and achievement in its social and economic dimensions.

The source for all the data for the analysis is Human Development Reports by the United Nations Development Programme.

Methodology for Growths Rates of Ratios: Economy

Gross Domestic Product (GDP) is a broad measurement of a nation's overall economic activity. GDP is the monetary value of all the finished goods and services produced within a country's borders in a specific period. GDP includes all private and public consumption, government outlays, investments, additions to private inventories, paid-in construction costs, and the foreign balance of trade. **Adjusted net saving** is a relatively new measure of economic sustainability. It monitors whether savings and investment in a country compensate for the depreciation and depletion of physical and natural capital and pollution damages. **The Gini coefficient** measures the deviation of the distribution of income among individuals or households within a country from a perfectly equal distribution. A value of 0 represents absolute equality, a value of 100 absolute inequality.

Metric definition	Formula
GDP (per Capita, Current Prices), CAGR	(GDP per capita, Current Prices 2016 value/GDP per capita, Current Prices 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Adjusted Savings: Net National Savings (% of GNI), CAGR	(Net National Savings 2016 value/Net National Savings 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Income Gini Coefficient, CAGR	(Income Gini Coefficient 2016 value/Income Gini Coefficient 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.

For the country to be considered as a leader in economic development, two of the above metrics (GDP and Net Savings) should have the greatest possible values, i.e. GDP per Capita, Current Prices, CAGR (6 Years) must be greater than zero, as it would indicate the growing average living standards and economic well being. Income Gini Index CAGR inversely affects the income mobility and economic development (indicator should be minimized).

Methodology for Growths Rates of Ratios: Healthcare Expenditure

Health spending measures the final consumption of health care goods and services (i.e. current health expenditure) including personal health care (curative care, rehabilitative care, long-term care, ancillary services, and medical goods) and collective services (prevention and public health services as well as health administration), but excluding spending on investments.

Metric definition	Formula
Current Health Expenditure per Capita (Current US$), CAGR	(Healthcare Expenditure per capita 2016 value/Healthcare Expenditure per capita 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Public Health Care Expenditure (as % of GDP), CAGR	(Public Health Care Expenditure 2016 value/Public Health Care Expenditure 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Domestic Private Health Expenditure (% of Current Health Expenditure), CAGR	(Domestic Private Health Expenditure 2016 value/Domestic Private Health Expenditure 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Out-of-Pocket Expenditure (% of Current Health Expenditure), CAGR	(Out-of-Pocket Expenditure 2016 value/Out-of-Pocket Expenditure 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.

To be regarded as a country with high Healthcare Expenditure, all aforementioned metrics should tend towards the largest possible values. The sources for all the data for the analysis are OECD, National National Bureaus of Statistics, World Bank, WHO.

Methodology for Growths Rates of Ratios: General health State

Measures of general health status provide information on the health of a population. Tracking trends in general health status can help identify where interventions have improved the health of a population or where interventions may be needed (e.g., by exploring causative factors and preventive measures).

Metric definition	Formula
Population of Adults with AIDs (%), CAGR	(Population of Adults with AIDs 2016 value/Population of Adults with AIDs 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Alcohol Consumption (per Capita), CAGR	(Alcohol Consumption per Capita 2016 value/Alcohol Consumption per Capita 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Prevalence of Overweight among Adults, BMI ≥ 25 (Age-Standardized Estimate) (%), CAGR	(Prevalence of Overweight among Adults Index 2016 value/Prevalence of Overweight among Adults Index 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.
Prevalence of Undernourishment (% of Population), CAGR.	(Prevalence of Undernourishment 2016 value/Prevalence of Undernourishment 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.

To be considered a country that provides for the above potential negative results, the above indicators should have the lowest possible value (potentially 0).

The source of all data for analysis is the World Bank, the National Bureau of Statistics.

Methodology for Growths Rates of Ratios: Environment

Industries, households, cars, and trucks emit complex mixtures of air pollutants, many of which are harmful to health. Of all of these pollutants, fine particulate matter has the greatest effect on human health. Most fine particulate matter comes from fuel combustion, both from mobile sources such as vehicles and from stationary sources such as power plants, industry, households or biomass burning.

Air pollution is associated with a broad spectrum of acute and chronic illness, such as lung cancer, chronic obstructive pulmonary disease (COPD) and cardiovascular diseases. “By reducing particulate matter (PM) pollution from 70 to 20 micrograms per cubic metre (µg/m), we can cut air pollution-related deaths by around 15%”, - WHO says. Particulate matter pollution is an environmental health problem that affects people worldwide, but low- and middle-income countries disproportionately experience this burden.

Metric definition	Formula
Ambient Air Pollution, Concentration of Fine Particulate Matter (PM2.5), CAGR	(Ambient air pollution, concentration of fine particulate matter PM2.5 (ug/m3) 2016 value/Ambient air pollution, concentration of fine particulate matter PM2.5 (ug/m3) 2010 value)^(⅙)-1, where 6 is the number of years between the start and finish values.

To be considered a country that provides for the above potential negative outcome, the indicator should have the lowest possible value (potentially 0).

The source for all the data for the analysis is WHO.

Methodology for Effectiveness Ratios

HALE (health-adjusted life expectancy) is a measure of population health that takes into account mortality and morbidity. It adjusts overall life expectancy by the amount of time lived in less than perfect health. It is calculated by subtracting from the life expectancy a figure which is the number of years lived with disability multiplied by weighting to represent the effect of the disability. The comparison of HALE CAGR to the financial indicators CAGR is crucial for understanding what value of health Expenditure is needed for the increase of Healthy Life expectancy. Also, it allows comparing the growth of these two indicators.

Metric definition	Formula
HALE CAGR/Current Health Expenditures per Capita (Current US$), CAGR	((HALE 2016 value/HALE 2010 value)^(⅙)-1) / ((Healthcare Expenditure per capita 2016 value/Healthcare Expenditure per capita 2010 value)^(⅙)-1)
HALE and Life Expectancy Difference CAGR/Current Health Expenditures per Capita (Current US$), CAGR	(((HALE 2016 value-Life expectancy 2016 value)/(HALE 2010 value-Life expectancy 2010 value))^(⅙)-1) / ((Healthcare Expenditure per capita 2016 value/Healthcare Expenditure per capita 2010 value)^(⅙)-1)
HALE CAGR/GDP per Capita CAGR.	((HALE 2016 value/HALE 2010 value)^(⅙)-1) / ((GDP per capita, Current Prices 2016 value/GDP per capita, Current Prices 2010 value)^(⅙)-1)
HALE CAGR/Prevalence of Overweight among Adults, BMI ≥ 25 CAGR	((HALE 2016 value/HALE 2010 value)^(⅙)-1) / ((Prevalence of Overweight among Adults Index 2016 value/Prevalence of Overweight among Adults Index 2010 value)^(⅙)-1)

To be regarded as a country with high HALE, the aforementioned metrics should have the greatest possible value, i.e. HALE CAGR (5 years)/Health Expenditure per capita (current US$) should have the highest ratio. Special weighting is given to this metric as it signifies the extent to which increased health is producing longer lives, and it is, therefore, a crucial metric in the ranking of longevity national development plans.

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Link to the Report: https://www.aginganalytics.com/global-longevity-governance

E-mail: info@aginganalytics.com | Website: www.aginganalytics.com