

The background of the slide is a dark blue gradient. In the center is a large, semi-transparent image of the Earth, showing the continents of Africa and Europe. Overlaid on the Earth is a network of thin white lines and dots, suggesting a global communication or data network. The title 'Report Methodology' is centered in a large, white, sans-serif font. The entire content is framed by a white rectangular border, which is further enclosed by a thick, yellow, L-shaped decorative border at the corners.

Report Methodology



Ranking Countries on the Strength, Scope and Relevance of their Government Longevity-Related Projects and Initiatives

POSITION	COUNTRY	COUNTRY SCORE
1	United Kingdom	5.29
2	Netherlands	4.36
3	Singapore	4.15
4	South Korea	4.00
5	Israel	3.94
6	Switzerland	3.93
7	Hong Kong	3.41
8	Japan	3.10
9	USA	3.07
10	Spain	1.94
11	European Union	1.88
12	China	1.85

Government Longevity Related Projects and Initiatives

Analytical 3-Dimensional Framework



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

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

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

- Indicators of potential (or lack thereof);
- Indicators of actual success (or lack thereof).

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

Some metrics indicators are directly interconnected, since the ratios are derived from single values which are parameters themselves.

Government Longevity Related Projects and Initiatives

Analytical 3-Dimensional Framework



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 the relative roles of different factors in the overall country ranking process.

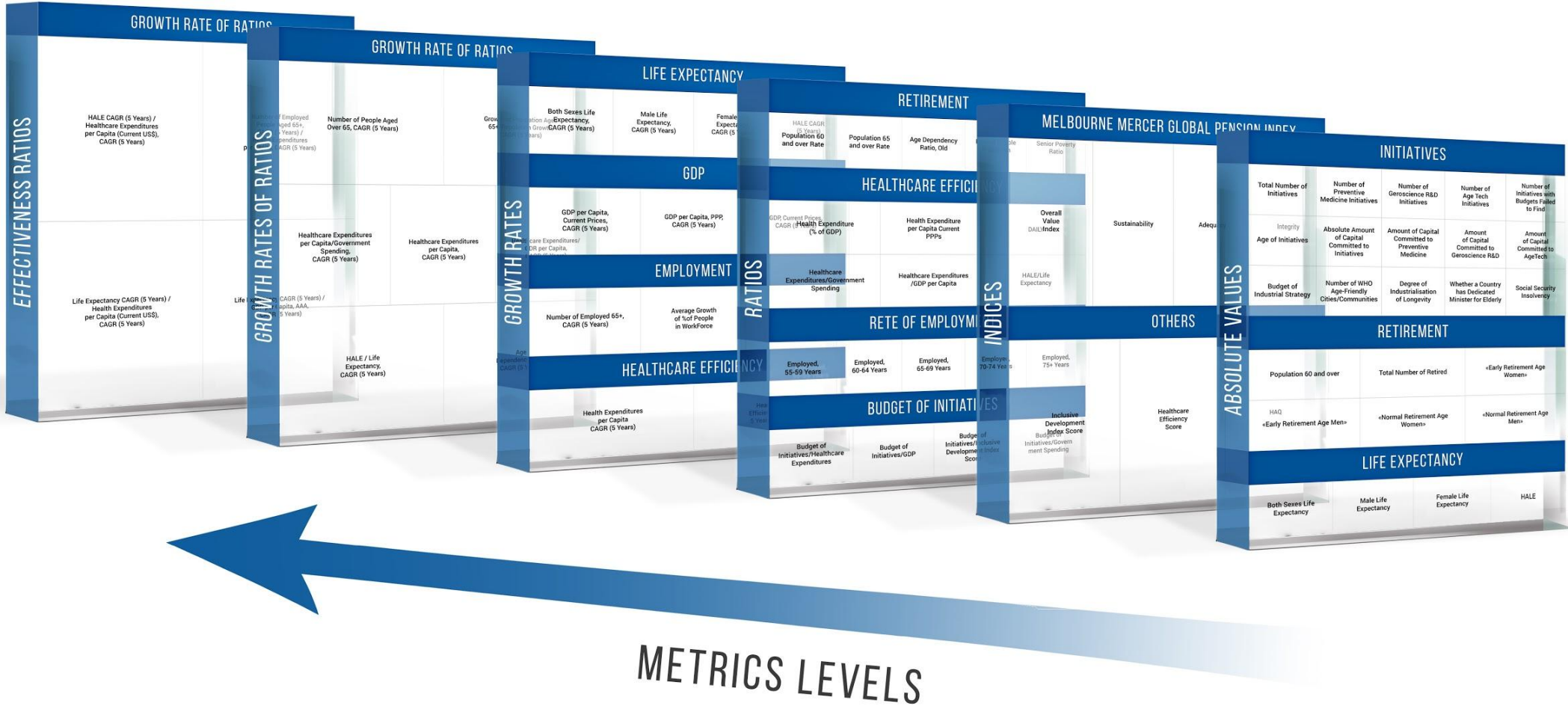
Each level of metrics is based upon the extension, further subdivision or comparative combination of the previous of the metrics in the preceding level, or is derived from insights provided by them.

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

All budget data is compared in US\$ translated by the change rate of the starting year of the initiative without inflation taken into account.



Government Longevity Related Projects and Initiatives Analytical Framework





Methodology for Ranking Countries Efforts on the Front of Government Longevity-Related Projects and Initiatives

To assess countries according to the number and relevance of their government-led longevity projects and initiatives, a sum of metrics parameters taking into account 75 metrics were used.

Metrics Values

Each metric's absolute value is recalculated into the *Relative Score* within the range [0.0-1.0]. To be more specific, if a metric is numeric, the formula for score calculation is the absolute value of a country divided by the maximal absolute value among the countries. If a metric is qualitative (yes/no), a value "yes" equals to 1.0 and a value "no" equals to 0.0. The qualitative metric "Degree of government industrialization of longevity" has 3 values according to the industrialization of Longevity in a country: *Industrial Strategies* (equals to 1.0); *National or metropolitan master plans* (equals to 0.5); *Independent or municipal government programs* (equals to 0.0).

Importance Factors

To equalize each metric in terms of significance among others the *Importance Factors* are applied. Each *Importance Factor* is in the range from -1.0 to 1.0, where 1.0 - the most favorable metric, -1.0 - the most detrimental metric and 0,0 - not an important metric at all (if the factor is negative, the higher positive magnitude of *Relative Score*, the worse for a country's score). The *Weighted Score* of a country for a particular metric is *Relative Score* multiplied by an *Importance Factor*.

Final Score

Consequently, the countries were ranked according to the sum of their *Weighted Scores* of each metric. The higher the final score the more advanced a country in terms of government Longevity-related projects and initiatives.



Methodology for Ranking Countries Efforts on the Front of Government Longevity-Related Projects and Initiatives

Metric	Importance Factor
Number of initiatives focused on non-medical approaches that improve the quality of life	0.2
Number of initiatives focused on preventive healthcare and geroscience	0.3
Whether any of their projects/initiatives involve preventive medicine and healthcare approaches	0.5
Whether any of their projects/initiatives involve research or R&D of medicines that directly impact on ageing	0.55
How long ago the countries began implementing the initiatives	0.15
Absolute amount of capital committed to projects and initiatives	0.5
Capital committed to projects and initiatives divided by GDP	0.2
How much absolute capital was committed for the non-medical strategy	0.2
How much absolute capital was committed for preventive medicine and geroscience R&D	0.3
Whether they contain cities/communities which are WHO age-friendly	0.1
Number of WHO age-friendly cities and communities	0.1
Degree of government industrialization of longevity	1.0
Whether a country has dedicated minister for elderly	1.0
Social Security and/or Pension System insolvency	-1.0



Metrics Structure. 1st Level

Initiatives	Total Number of Initiatives	Amount of Capital Committed to Preventive Medicine
	Number of Preventive Medicine Initiatives	Amount of Capital Committed to Geroscience R&D
	Number of Geroscience R&D Initiatives	Amount of Capital Committed to AgeTech
	Number of AgeTech Initiatives	Budget of Industrial Strategy Number of WHO Age-Friendly Cities/Communities
	Number of Initiatives with Undisclosed Budgets	Degree of Industrialisation of Longevity
	Age of Initiatives	Whether a Country has Dedicated Minister for Elderly Social Security Insolvency
	Absolute Amount of Capital Committed to Initiatives	
Retirement	Population 60 and over	Early Retirement Age Men
	Total Number of Retired	Normal Retirement Age Women
	Early Retirement Age Women	Normal Retirement Age Men
Life Expectancy	Both Sexes Life Expectancy	Female Life Expectancy
	Male Life Expectancy	HALE



Metrics Structure. 2nd Level

Melbourne Mercer Global Pension Index	Overall Value Index
	Sustainability
	Adequacy
	Integrity
Retirement	Inclusive Development Index Score
	Healthcare Efficiency Score
	HAQ



Metrics Structure. 3rd Level

Retirement	Population 60 and over Rate	Retired People Proportion
	Population 65 and over Rate	Senior Poverty Ratio
	Age Dependency Ratio, Old	
Healthcare Efficiency	Health expenditure (% of GDP)	Healthcare Expenditure /GDP per Capita
	Health Expenditure per Capita Current PPPs DALY	HALE/Life Expectancy
	Healthcare Expenditure/Government Spending	
Life Expectancy	Employed, 55–59 Years	Employed, 70-74 Years
	Employed, 60–64 Years	Employed, 75+ Years
	Employed, 65–69 Years	
Budget of Initiatives	Budget of Initiatives/Healthcare Expenditure	Budget of Initiatives/Inclusive Development Index Score
	Budget of Initiatives/GDP	Budget of Initiatives/Government Spending



Metrics Structure. 4th Level

Life Expectancy	Both Sexes Life Expectancy, CAGR (5 Years)	Female Life Expectancy, CAGR (5 Years)
	Male Life Expectancy, CAGR (5 Years)	HALE CAGR (5 Years)
GDP	GDP per Capita, Current Prices, CAGR (5 Years)	GDP, Current Prices, CAGR (5 Years)
	GDP per Capita, PPP, CAGR (5 Years)	
Employment	Number of Employed 65+, CAGR (5 Years)	Rate of Population Aging (65+ Years)
	Average Growth of % of People in Workforce	
Healthcare Efficiency	Health Expenditure per Capita, CAGR (5 Years)	Healthcare Efficiency Score, 5 Years Growth



Metrics Structure. 5th and 6th Level

Growth Rate of Ratios	Number of People Aged Over 65, CAGR (5 Years)
	Growth of Population Aged 65+ / Population Growth, CAGR (5 Years)
	Healthcare Expenditure per Capita / Government Spending, CAGR (5 Years)
	Healthcare Expenditure per Capita, CAGR (5 Years)
	Healthcare Expenditure / GDP per Capita, CAGR (5 Years)
	HALE / Life Expectancy, CAGR (5 Years) Age Dependency Ratio, CAGR (5 Years)

Effectiveness Ratios	HALE CAGR (5 Years) / Health Expenditure per Capita (Current US\$), CAGR (5 Years)
	Number of Employed People Aged 65+, CAGR (5 Years) / Health Expenditure per Capita, CAGR (5 Years)
	Life Expectancy CAGR (5 Years) / Health Expenditure per Capita (Current US\$), CAGR (5 Years)
	Life Expectancy CAGR (5 Years)/GDP per Capita, AAA, CAGR (5 Years)



Metrics Weight Factors

1st Level												
Initiatives												
0.2	0.4	0.4	0.1	-0.1	0.15	0.5	0.3	0.3	0.1	1	0.1	1
Total Number of Initiatives	Number of Preventive Medicine Initiatives	Number of Geroscience R&D Initiatives	Number of AgeTech Initiatives	Number of Initiatives with Budgets Failed to Find	Age of Initiatives	Absolute Amount of Capital Committed to Initiatives	Amount of Capital Committed to Preventive Medicine	Amount of Capital Committed to Geroscience R&D	Amount of Capital Committed to AgeTech	Budget of Industrial Strategy	Number of WHO Age-Friendly Cities/Communities	Degree of Industrialisation of Longevity
Initiatives			Retirement				Life Expectancy					
1	-0.5	0.025	-0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05	0.1	
Whether a Country has Dedicated Minister for Elderly	Social Security Insolvency	Population 60 and over	Total Number of Retired	Early Retirement Age Women	Early Retirement Age Men	Normal Retirement Age Women	Normal Retirement Age Men	Both Sexes Life Expectancy	Male Life Expectancy	Female Life Expectancy	HALE	
2nd Level												
Melbourne Mercer Global Pension Index					Others							
0.05	0.05	0.05	0.05	1	0.05	0.05						
Overall Value Index	Sustainability	Adequacy	Integrity	Inclusive Development Index Score	Healthcare Efficiency Score	HAQ						

These levels of metrics define the score of the countries and initiatives through comparison of the Absolute values and Indexes.



Metrics Weight Factors

3rd Level											
Healthcare Efficiency						Retirement					
0.01	0.01	-0.01	0.05	0.05	0.1	0.01	0.01	-0.01	-0.01	-0.01	
Health expenditure (% of GDP)	Health Expenditure per Capita Current PPPs	DALY	Healthcare Expenditure/ Government Spending	Healthcare Expenditure /GDP per Capita	HALE/Life Expectancy	Population 60 and over Rate	Population 65 and over Rate	Age Dependency Ratio, Old	Retired People Proportion	Senior Poverty Ratio	
Budget of Initiatives					Rate of employment						
0.1	0.1	0.15	0.1	0.01	0.15	0.15	0.15	0.15			
Budget of Initiatives/ Healthcare Expenditure	Budget of Initiatives/ GDP	Budget of Initiatives/ Inclusive Development Index Score	Budget of Initiatives/ Government Spending	Employed, 55–59 Years	Employed, 60–64 Years	Employed, 65–69 Years	Employed, 70-74 Years	Employed, 75+ Years			
4th Level											
Life Expectancy				GDP			Employment		Healthcare Efficiency		
0.01	0.01	0.01	0.1	0.01	0.01	0.01	0.1	0.3	0.01	0.02	0.02
Both Sexes Life Expectancy, CAGR (5 Years)	Male Life Expectancy, CAGR (5 Years)	Female Life Expectancy, CAGR (5 Years)	HALE CAGR (5 Years)	GDP per Capita, Current Prices, CAGR (5 Years)	GDP per Capita, PPP, CAGR (5 Years)	GDP, Current Prices, CAGR (5 Years)	Number of Employed 65+, CAGR (5 Years)	Average Growth of % of People in Workforce	Rate of Population Aging (65+ Years)	Health Expenditure per Capita, CAGR (5 Years)	Healthcare Efficiency Score, 5 Years Growth

The third and fourth levels define the score of the countries through comparison of open data ratios and growth rates, mostly provided by WHO, OECD, The World Bank and Governmental institutions of each country.

5th Level						
Growth Rate of Ratios						
0.01	0.05	0.05	0.05	0.05	0.05	-0.01
Number of People Aged Over 65, CAGR (5 Years)	Growth of Population Aged 65+ / Population Growth, CAGR (5 Years)	Healthcare Expenditure per Capita / Government Spending, CAGR (5 Years)	Healthcare Expenditure per Capita, CAGR (5 Years)	Healthcare Expenditure / GDP per Capita, CAGR (5 Years)	HALE / Life Expectancy, CAGR (5 Years)	Age Dependency Ratio, CAGR (5 Years)
6th Level						
Effectiveness ratios						
0.2	0.2	0.2	0.2	0.2	0.2	0.2
HALE CAGR (5 Years) / Health Expenditure per Capita (Current US\$), CAGR (5 Years)	Number of Employed People Aged 65+, CAGR (5 Years) / Health Expenditure per Capita, CAGR (5 Years)	Life Expectancy CAGR (5 Years) / Health Expenditure per Capita (Current US\$), CAGR (5 Years)	Life Expectancy CAGR (5 Years)/GDP per Capita, AAA, CAGR (5 Years)			

The fifth and sixth levels define the score of the countries through the comparison of calculated growth rates of ratios and ratios of effectiveness. These two levels are based on the previous levels and mostly represent the changes of metrics of a specific country on a 5 year period of time compared to other countries.

Total Number of Initiatives
Number of Preventive Medicine Initiatives
Number of AgeTech Initiatives
Number of Initiatives with Closed Budgets
Degree of Industrialisation of Longevity
Age of Initiatives
Social Security Insolvency
Budget of Industrial Strategy
Amount of Capital Committed to AgeTech
Amount of Capital Committed to Geroscience R&D
Absolute Amount of Capital Committed to Initiatives
Amount of Capital Committed to Preventive Medicine
Whether a Country has Dedicated Minister for Elderly
Number of WHO Age-Friendly Cities/Communities
Initiatives
1st Level

The metrics used in this report’s proprietary analysis are divided into 6 levels, according to their complexity and importance:

1st level – **absolute values** – primary values of analysed parameters, both economic and health-related;

2nd level – **indexes** – includes Inclusive Development Index (IDI), Healthcare Indexes and Melbourne Mercer Global Pension Index.

3rd level – **ratios** – includes ratios in 4 main categories: Retirement, Healthcare efficiency, Life Expectancy and Budget of initiatives;

4th level – **growth rate of the values**– calculated compound annual growth rates of five to six years for the used indexes;

5th level - **growth rate of ratios** - compound annual growth rates of Ageing Population, Healthy Life Expectancy and Healthcare Expenditures;

6th level - **effectiveness ratios** - ratios that use growth rates of parameters to analyse cost-effectiveness of expenditures on healthcare.

Government Longevity
National Development Plans:
Analytic Framework Metrics

You can review this framework in a bigger scale by this link - [Aging Analytics Agency Aprocah and Methodology.](#)



Budget of Industrial Strategy	cost-effectiveness of expenditures on healthcare.											Age Dependency Ratio, CAGR (5 Years)			
Amount of Capital Committed to AgeTech	Normal Retirement Age Men					HALE/Life Expectancy								HALE / Life Expectancy, CAGR (5 Years)	
Amount of Capital Committed to Geroscience R&D	Normal Retirement Age Women					Senior Poverty Ratio	DALY	Employed, 75+ Years							Healthcare Expenditure / GDP per Capita, CAGR (5 Years)
Absolute Amount of Capital Committed to Initiatives	Early Retirement Age Men	HALE	Integrity			Retired People Proportion	Healthcare Expenditure /GDP per Capita	Employed, 70-74 Years	Budget of Initiatives/ Government Spending				HALE CAGR (5 Years)	Healthcare Expenditure per Capita, CAGR (5 Years)	Life Expectancy CAGR (5 Years)/GDP per Capita, AAA, CAGR (5 Years)
Amount of Capital Committed to Preventive Medicine	Early Retirement Age Women	Female Life Expectancy	Adequacy	HAQ	Age Dependency Ratio, Old	Healthcare Expenditure/Go vernment Spending	Employed, 65–69 Years	Budget of Initiatives/GDP			GDP, Current Prices, CAGR (5 Years)	Rate of Population Aging (65+ Years)	Female Life Expectancy, CAGR (5 Years)	Healthcare Expenditure per Capita / Government Spending, CAGR (5 Years)	Life Expectancy CAGR (5 Years) / Health Expenditure per Capita (Current US\$), CAGR (5 Years)
Whether a Country has Dedicated Minister for Elderly	Total Number of Retired	Male Life Expectancy	Sustainability	Inclusive Development Index Score	Population 65 and over Rate	Health Expenditure per Capita Current PPPs	Employed, 60–64 Years	Budget of Initiatives/ Inclusive Development Index Score	Healthcare Efficiency Score, 5 Years Growth	GDP per Capita, PPP, CAGR (5 Years)	Average Growth of % of People in Workforce	Male Life Expectancy, CAGR (5 Years)	Growth of Population Aged 65+ / Population Growth, CAGR (5 Years)	Employed People Aged 65+, CAGR (5 Years) / Health Expenditure per Capita, CAGR (5 Years)	
Number of WHO Age-Friendly Cities/ Communities	Population 60 and Over	Both Sexes Life Expectancy	Overall Value Index	Healthcare Efficiency Score	Population 60 and over Rate	Health expenditure (% of GDP)	Employed, 55–59 Years	Budget of Initiatives/ Healthcare Expenditure	Health Expenditure per Capita, CAGR (5 Years)	GDP per Capita, Current Prices, CAGR (5 Years)	Number of Employed 65+, CAGR (5 Years)	Both Sexes Life Expectancy, CAGR (5 Years)	Number of People Aged Over 65, CAGR (5 Years)	HALE CAGR (5 Years) / Health Expenditure per Capita (Current US\$), CAGR (5 Years)	
Initiatives	Retirement	Life Expectancy	Melbourne Mercer Global Pension Index	Others	Retirement	Healthcare Efficiency	Rate of employment	Budget of Initiatives	Healthcare Efficiency	GDP	Employment	Life Expectancy	Growth Rate of Ratios	Effectiveness ratios	
1st Level			2nd Level		3rd Level				4th Level				5th Level	6th Level	



Methodology for Health-Adjusted Life Expectancy Countries Analysis

HALE (Health-Adjusted life expectancy) refers specifically to the healthy number of years someone is expected to live at birth, which equals to 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. **Therefore, HALE is a more useful and revealing metric compared with average life expectancy.** The following metrics were used in this report to identify leaders in longevity government planning:

- CAGR (the Compound Annual Growth Rate) HALE is calculated as follows:

$$\text{CAGR HALE} = (\text{HALE 2016 value} / \text{HALE 2000 value})^{(1/(16-1))} - 1$$
, where 16 is the number of years between the start and finish values;

- HALE/Life expectancy ratio shows the gap between HALE and life expectancy, and is calculated as follows:

$$\text{HALE/Life expectancy ratio} = \text{HALE value} / \text{Life expectancy value};$$

- CAGR HALE/Life expectancy ratio illustrates whether HALE and life expectancy are converging (approaching each other), or diverging (e.g. life expectancy rising without an increase in HALE), and is calculated as follows:

$$\text{CAGR HALE/Life expectancy ratio} = (\text{HALE Life expectancy ratio 2016 value} / \text{HALE Life expectancy ratio 2000 value})^{(1/(16-1))} - 1;$$

For the country to be considered as a leader in HALE, it should have the maximum possible values in all three aforementioned metrics, i.e. CAGR HALE must be at least greater than zero, HALE/Life expectancy ratio should be as close to 100% as possible, and CAGR HALE/Life expectancy ratio must be greater than zero. The source for all the data for the analysis is WHO Life tables. Hong Kong is not included in the analysis because there is no HALE data for the country.



Initiatives in Ageing, Longevity and Health are considered to be considered to crucial metrics in assessment leading positions of countries in longevity development. In report, the targeted initiatives are that focus on meeting the challenges of worldwide aging with groundbreaking market solutions and progressive public policies. The greatest attention is paid to public actions and governmental programmes that are aimed on P3 Medicine and Geroscience.

For the report there were used the following metrics that helped us identify the leaders in longevity:

Metric definition	Formula
Total Number of Initiatives	Based on own research
Number of Preventive Medicine Initiatives	Based on own research
Number of Geroscience R&D Initiatives	Based on own research
Number of AgeTech Initiatives	Based on own research
Number of Initiatives with Closed Budgets	Based on own research
Age of Initiatives	Based on own research
Absolute Amount of Capital Committed to Initiatives	Based on own research



For the report there were used the following metrics that helped us identify the leaders in longevity:

Metric definition	Formula
Amount of Capital Committed to Preventive Medicine	Based on own research
Amount of Capital Committed to Geroscience R&D	Based on own research
Amount of Capital Committed to AgeTech	Based on own research
Budget of Industrial Strategy	Based on own research
Number of WHO Age-Friendly Cities/Communities	Based on own research
Degree of Industrialisation of Longevity	Based on own research
Whether a Country has Dedicated Minister for Elderly	Based on own research
Social Security Insolvency	Based on own research

For the country to be considered as a leader in retirement, it should have the maximum possible values in total number of initiatives. The only one minimum value must be for the metric “Number of Initiatives with Closed Budgets” as it indicates less effectiveness of government.

The source for all the data for the analysis is Governments reports, National Bureaus of Statistics.



Methodology for Absolute Values: Retirement

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. For the report there were used the following metrics that helped us identify the leaders in longevity:

Metric definition	Formula
Population 60 and over - an indicator that defines the elderly population in a country.	An absolute value that is derived from sourcing the data
Total Number of Retired - an indicator that defines the total number of retired people in a particular country.	An absolute value that is derived from sourcing the data
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 female the lowest normal statutory pension age.	An absolute value that is derived from sourcing the data
Normal Retirement Age Men - - an indicator of male the lowest normal statutory pension age.	An absolute value that is derived from sourcing the data

For the country to be considered as a leader in retirement, it should have the minimum possible values in total number of retired, and the maximum values in other five aforementioned metrics. The source for all the data for the analysis is WHO Life tables, National Bureaus of Statistics.

Methodology for Absolute Values: Life Expectancy

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. For the report there were used the following metrics that helped us identify the leaders in longevity:

Metric definition	Formula
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
HALE - an indicator of healthy life expectancy.	An absolute value that is derived from sourcing the data

For the country to be considered as a leader in life expectancy, it should have the maximum possible values in all four aforementioned metrics, i.e. both sexes life expectancy, HALE must be equal to the greatest possible number, as it is the most important metric in the category.

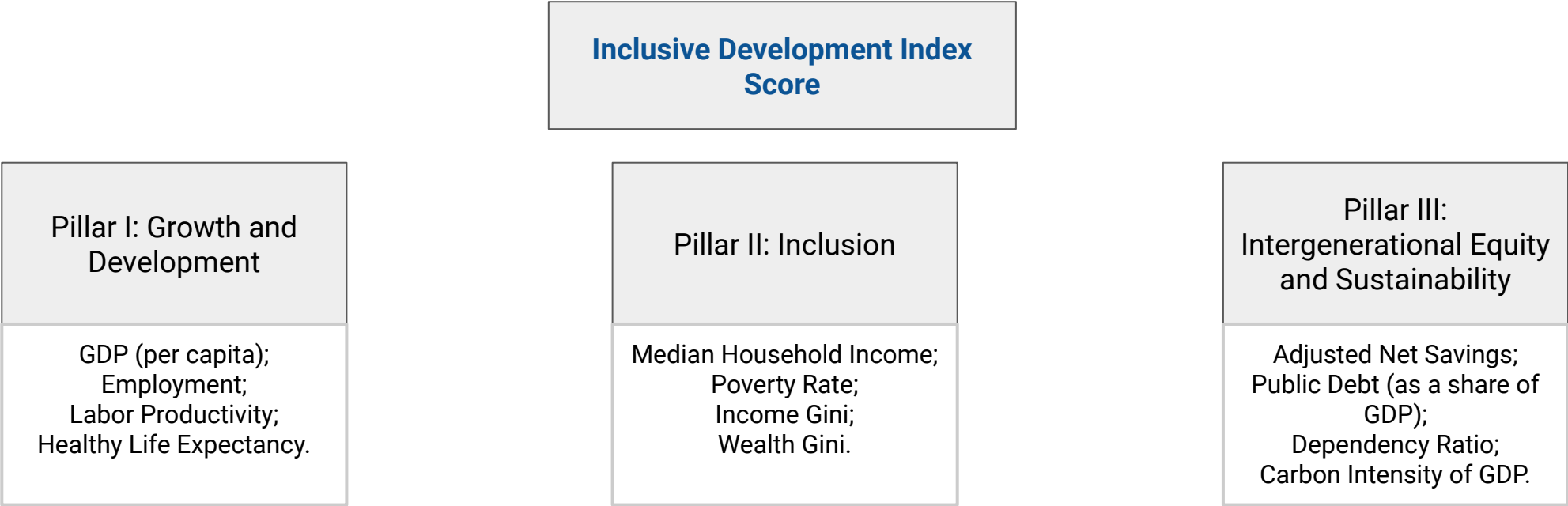
The source for all the data for the analysis is WHO Life tables, National National Bureaus of Statistics. Hong Kong is not included in the HALE analysis because there is no HALE data for the country.



Methodology for Indexes: Inclusive Development Index (IDI)

The Inclusive Development Index (IDI) was introduced 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. The Inclusive Development Index captures a more integrated picture of the relative state of economic development than GDP 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** . **IDI is therefore a more relevant metric for government longevity planning than GDP alone.**

The following **index** metric was used in this report to identify leaders in longevity government planning:



For the country to be considered as a leader in Inclusive Growth and Development, the score should be equal to the biggest possible number within the interval [1;7] . The source for all the data for the analysis is World Economic Forum.



Methodology for Indexes: Healthcare Indexes

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 labour, 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 following **indexes** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Health-Efficiency Index score - an indicator of the efficiency of the country's healthcare system.	Weighted average of Life Expectancy, Relative Healthcare Cost, Absolute Healthcare Cost
Global Healthcare Access and Quality Index score	Based on 32 causes from which death should not occur in the presence of effective care to approximate personal health-care access

For the country to be considered as a leader in Healthcare Indexes, all two aforementioned metrics should have the biggest possible value, i.e. Health-Efficiency Index score and Global Healthcare Access and Quality Index score should be equal to the greatest possible number on the scale of 0 to 100, as 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 ageing 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.

The following **indexes** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Overall Value Index	Weighted average of Sustainability, Adequacy, Integrity sub-indexes.
Sustainability sub-index - considers a number of indicators which influence the long-term sustainability of current retirement income systems.	Based on economic importance of the private pension system, its level of funding, the length of expected retirement both now and in the future etc.
Adequacy sub-index- 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 home ownership rate are also included as non-pension savings represent an important source of financial security during retirement.
Integrity sub-index - 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.

For the country to be considered as a leader in Melbourne Mercer Global Pension Index, all four aforementioned metrics should have the biggest possible score in the range of 0-100. The source for all the data for the analysis is The Australian Centre for Financial Studies.



Methodology for Ratios: Budget of Initiatives

In these metrics the budget of initiatives refers to the sum total of money allocated by a particular government to all of its longevity-relevant initiatives. Although some of the initiatives in this report, such as simple policy changes, require no upfront investment, the majority, which range from urban developments to geroscience investments, have a significant monetary value attached. The ratio of money allocated to government initiatives relative to other revenues and Expenditure reflects a degree of commitment from government. We include separate metrics for budgets for preventive medicine projects, longevity industrial strategy, and geroscience R&D, as these represent differences in priority (long-termism etc) in government strategy. The following **ratio** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Budget of initiatives /Healthcare Expenditure - an indicator of the share of longevity-related initiatives in the public healthcare spending.	Budget of initiatives value/Healthcare Expenditure value
Budget of initiatives/GDP - an indicator of the share of longevity-related initiatives in the country's GDP.	Budget of initiatives value/GDP value
Budget of initiatives/Government spending - an indicator of the share of longevity-related initiatives in the general government spending	Budget of initiatives value/Government spending value
Budget of Initiatives/Inclusive Development Index Score - an indicator of the share of longevity-related initiatives budget in the country's Inclusive Development Index Score.	Budget of Initiatives value/Inclusive Development Index Score

For the country to be considered as a leader in Funding of longevity-related initiatives, all three aforementioned metrics should have the greatest possible values, i.e. budget of initiatives/healthcare. Expenditure should be as close as possible to 1, as it will be indicative of the country's commitment to longevity. The source for all the data for the analysis is World Bank, Governments' reports, World Economic Forum.



Methodology for Ratios: Rate of Employment

Employment rates are defined as a measure of the extent to which available labour resources (people available to work) are being used. Employment rates are sensitive to the economic cycle, but in the longer term they are significantly affected by governments' higher education and income support policies and by policies that facilitate employment of elders, women and disadvantaged groups.

The following **ratio** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Employed, 55–59 (1=100%) - an indicator of employed people in the age group of 55-59 years.	Number of employed people of the age group/ total number of people in the age group of 55-59 years.
Employed, 60–64 (1=100%)- an indicator of employed people in the age group of 60-64 years.	Number of employed people of the age group/ total number of people in the age group of 60-64 years.
Employed, 65–69(1=100%)- an indicator of employed people in the age group of 65-69 years.	Number of employed people of the age group/ total number of people in the age group of 65-69 years.
Employed, 70-74 (1=100%)- an indicator of employed people in the age group of 70-74 years.	Number of employed people of the age group/ total number of people in the age group of 70-74 years.
Employed, 75+ (1=100%)- an indicator of employed people in the age group of 75 and older.	Number of employed people of the age group/ total number of people in the age group of 75 and older.

For the country to be considered as a leader in Employment among elderly, all five aforementioned metrics should as close to 1 as possible, which would mean that most of the people in the age group are employed and actively contributing to GDP growth.

The source for all the data for the analysis is National Bureaus of Statistics.



Retirement is when a person chooses to leave the workforce. The concept of full retirement – being able 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.

The following **ratio** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Retired people proportion, % - an indicator of the share of retirees in the workforce	Number of persons not engaged in work aged 65 over/Value of population aged 15 over
Age dependency ratio, old, % - an indicator of older dependents--people older than 64--to the working-age population--those ages 15-64	Number of people older than 64/Value of working-age population
Population aged 65 and over, % - and indicator of the size of aged demographic segment of the population	Number of people aged 65 and over/Population value
Population aged 60 and over, % - and indicator of the size of aged demographic segment of the population	Number of people aged 60 and over/Population value

For the country to be considered as a leader in Retirement, the first two metrics should be valued as low as possible, i.e. retired people proportion should be as close to zero percent as possible, age dependency ratio, old must be as close to zero percent as possible as well, and the 3rd and 4th metrics should not be valued close to zero but, at the same time, should not be valued close to 100%, as it would cause a significant disruption in the economy and society.

The source for all the data for the analysis is World Bank, National Bureaus of Statistics.



Methodology for 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.

The following ratio metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Healthcare Expenditure per capita - estimates current Expenditure on health per capita expressed in US dollars at purchasing power parity (PPP).	Healthcare Expenditure 2017 value/Population 2017 value
Healthcare Expenditure/Government spending - estimates a share of health spending in general government spending.	Healthcare Expenditure 2017 value/Government spending 2017 value
Healthcare Expenditure/GDP per capita - an indicator of healthcare spending in relation to GDP per capita.	Health Expenditure 2017 value/GDP per capita 2017 value

For the country to be considered as a leader in Healthcare Expenditure, all three aforementioned metrics should have the greatest possible values, i.e. Healthcare Expenditure per capita must be equal to the greatest possible number, Healthcare Expenditure/Government spending should be as as bigger than 0% as possible, Healthcare Expenditure/GDP per capita must be equal to the greatest possible number.

The source for all the data for the analysis is National National Bureaus of Statistics, World Bank.



Methodology for Ratios: Healthcare Efficiency

Healthcare efficiency measures whether healthcare resources are being used to get the best value for money, where healthcare is a means to the end of improved health. Efficiency is concerned with the relation between resource inputs (costs, in the form of labour, 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 following ratio metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Health expenditure (% of GDP) - an indicator of level of current health expenditure expressed as a percentage of GDP.	Health expenditure 2017 value/GDP 2017 value
HALE/life expectancy - an indicator of the gap between HALE and Life Expectancy.	HALE 2016 value/Life expectancy 2016 value

For the country to be considered as a leader in Healthcare Efficiency, all two aforementioned metrics should have the greatest possible values, i.e. Health expenditure (% of GDP) should be as close to 100 percent as possible, as it would demonstrate the country's willingness and commitment to spend on health preservation and improvement of its citizens. HALE/life expectancy ratio should be equal as close to 1 as possible, as it would demonstrate that the gap between HALE and life expectancy is small.

The source for all the data for the analysis is World Bank, OECD, National National Bureaus of Statistics.



According to the WHO, 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. DALYs for a disease or health condition are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD) for people living with the health condition or its consequences. The official calculation of DALY is $YLL + YLD$, where YLL corresponds to the number of deaths multiplied by the standard life expectancy at the age at which death occurs. The basic formula for YLL for a given cause, age and sex is $YLL = N * L$, where where N = number of deaths and L = standard life expectancy at age of death in years.

The following ratio metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
DALY rates per 100 000 population (2012 - WHO)	Disability-Adjusted Life Year/100 000 population

For the country to be considered as a leader in DALY the aforementioned metric should have the lowest possible value. Low DALY signifies a reduced tradeoff between longevity and health, also known as the ‘compression of morbidity’, is also an intended outcome of the longevity industry.

The source for all the data for the analysis is World Health Organization, Lancet reports.

Methodology for Ratios: Negative Factors

It is necessary to create negative metrics to ensure that large failures in outcomes of government planning are recognised. An obvious example is senior poverty, which is an outcome which multiple government initiatives in each country are intended to prevent. The following **ratio** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Senior poverty ratio (66 years-old or more, 2017)	Number of senior people whose income falls below the poverty line/total number of senior people
Number of initiatives with budgets failed to find	Number of initiatives with budgets failed to find
Social Security Insolvency	If a system has already run out of money or will run out till 2020, the value is 0.3. If a system is pointed toward insolvency between 2021 and 2040, the value is 0.2. If a system could become insolvent after 2041, the value is 0.1. Final Insolvency is the sum of all values of a particular country.
Total number retired	Total number retired
Retired people proportion, %	Retired people/population
DALY rates per 100 000 population (2012 - WHO)	Disability-Adjusted Life Year/100 000 population

For the country to be considered as a leader in planning for these potential negative outcomes, the aforementioned metric should have the lowest possible value (potentially 0). The ratio of over 65s in poverty should be as near to 0% as possible. The source for all the data for the analysis is World Bank, National Bureaus of Statistics.

Methodology for Growth Rates: Life Expectancy

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. For the report there were used the following metrics that helped us identify the leaders in longevity:

Metric definition	Formula
Both sexes life expectancy, CAGR (5 years) - an indicator of life expectancy average annual growth over the last 5 years.	$(\text{Life expectancy 2018 value} / \text{Life expectancy 2013 value})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values
Male life expectancy, CAGR (5 years) - an indicator of male life expectancy average annual growth over the last 5 years.	$(\text{Male life expectancy 2018 value} / \text{Male life expectancy 2013 value})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values
Female life expectancy, CAGR (5 years) - an indicator of female life expectancy average annual growth over the last 5 years.	$(\text{Female life expectancy 2018 value} / \text{Female life expectancy 2013 value})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values
HALE CAGR (6 years) - 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.	$(\text{HALE 2016 value} / \text{HALE 2010 value})^{(1/6)} - 1$, where 6 is the number of years between the start and finish values

For the country to be considered as a leader in life expectancy, it should have the maximum possible values in all four aforementioned metrics, i.e. both sexes life expectancy, CAGR (5 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. Hong Kong is not included in the HALE analysis because there is no HALE data for the country.



Methodology for Growth Rates: Healthcare Efficiency

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 labour, 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 following **growth** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Health Expenditure, CAGR (5 years) - an indicator of public health spending average annual growth increase for the last 5 years	$(\text{Health expenditure 2018 value} / \text{Health expenditure 2013 value})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values
Healthcare efficiency score, 5 years growth - an indicator of growth rate increase of a country's healthcare efficiency score for the last 5 years	$(\text{Efficiency score 2018 value} - \text{Efficiency score 2013 value}) / \text{Efficiency score 2013} - 1$

For the country to be considered as a leader in healthcare efficiency, it should have the maximum possible values in all two aforementioned metrics, i.e. Health Expenditure, CAGR (5 years) must be greater than zero, Healthcare efficiency score, 5 years growth must be equal to the greatest possible number, as it comprises the growth of life expectancy, relative and absolute cost of healthcare.

The source for all the data for the analysis is OECD, National National Bureaus of Statistics, Bloomberg Health Care Efficiency Index.

Methodology for Growth Rates: Employment

Employment is defined as persons of working age who were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period or not at work due to temporary absence from a job, or to working-time arrangement. With an ageing society and increasing retirement age, more elders have to work. For older people to be able to work, they have to be in good health state. Furthermore, seniors are considered as a more qualified labor force than younger workers, and with upcoming “silver tsunami”, it is essential to utilize available resources in the most efficient way. The following **growth** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Number of people 65+ employed, CAGR (5 years) - an indicator of people aged 65+ employment annual growth rate increase for the last 5 years.	$(\text{Number of people 65+ employed in 2018} / \text{Number of people 65+ employed in 2013})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values
Average Growth of % of People in Workforce - an indicator of the country's labour force increase.	$(\% \text{ of People in Workforce 2017 value} - \% \text{ of People in Workforce 2007 value}) / \% \text{ of People in Workforce 2007 value}$
Rate of Population Aging (65+ Years), p.p. - an indicator of the country's older population growth	$(\text{Share of population aged 65+ in 2017} - \text{Share of population aged 65+ in 2007})$

For the country to be considered as a leader in employment among elderly, all three aforementioned metrics should have the greatest possible values, i.e. number of people 65+ employed, CAGR (5 years) must be greater than zero, average growth of % of people in workforce should be equal to the greatest possible number.

The source for all the data for the analysis is National National Bureaus of Statistics.



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 time 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. It is still one of the primary indicators used to gauge the health of a country's economy.

The following **growth** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
GDP per Capita, Current Prices, CAGR (5 Years)	$(\text{GDP per capita, Current Prices 2018 value} / \text{GDP per capita, Current Prices 2013 value})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values
GDP per Capita, PPP, CAGR (5 Years)	$(\text{GDP per capita, PPP 2018 value} / \text{GDP per capita, PPP 2013 value})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values
GDP, Current Prices, CAGR (5 Years)	$(\text{GDP, Current Prices 2018 value} / \text{GDP, Current Prices 2013 value})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values

For the country to be considered as a leader in GDP, all three aforementioned metrics should have the greatest possible values, i.e. GDP per Capita, Current Prices, CAGR (5 Years) must be greater than zero, as it would indicate the growing average living standards and economic well being.

The source for all the data for the analysis is World Bank.

Methodology for Growth Rate of Ratios: Ageing Population

Population aging is a shift in the distribution of a country's population towards older ages. This is usually reflected in an increase in the population's mean and median ages, a decline in the proportion of the population composed of children, and a rise in the proportion of the population composed of elderly.

The following **growth rate of ratio** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Age Dependency Ratio, CAGR (5 Years) - a compound annual growth rate of the ratio of older dependents--people older than 64--to the working-age population--those ages 15-64, for the last 5 years	$(\text{Age dependency ratio 2018 value} / \text{Age dependency ratio 2013 value})^{1/(5-1)} - 1$, where 5 is the number of years between the start and finish values
Number of People Aged Over 65, CAGR (5 Years) - an indicator of aging population annual growth rate for the last 5 years	$(\text{Aged over 65 2018 value} / \text{Aged over 65 2013 value})^{1/(5-1)} - 1$, where 5 is the number of years between the start and finish values
Growth of Population Aged 65+ / Population Growth, CAGR (5 Years) - an indicator of the relative growth rate of the aged population with regards to overall population growth.	$((\text{Population Aged 65+ 2018 value} / \text{Population 2018 value}) / (\text{Population Aged 65+ 2013 value} / \text{Population 2013 value}))^{1/5} - 1$, where 5 is the number of years between the start and finish values

For the country to be considered as a leader in population ageing, the all three aforementioned metrics should have the least possible value, i.e. egd over 65, CAGR should be as close to zero as possible or even negative, age dependency ratio, CAGR should be as close to zero as possible or even negative, as this dependency ratio captures variations in the proportions of elderly people in the population that imply the dependency burden that the working-age population bears in relation to the elderly. The source for all the data for the analysis is World Bank, National Bureaus of Statistics.



Methodology for Growth Rate of Ratios: Healthy Life Expectancy

HALE (health-adjusted life expectancy) refers specifically to the healthy number of years someone is expected to live at birth, which equals to 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. **Therefore, HALE is a more useful and revealing metric compared with average life expectancy.**

The following **growth rate of ratio** metric was used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
HALE / Life Expectancy, CAGR (5 Years) - an indicator of whether HALE and life expectancy are converging (approaching each other), or diverging (i.e. life expectancy rising without an increase in HALE)	$(\text{HALE Life expectancy ratio 2015 value} / \text{HALE Life expectancy ratio 2010 value})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values

For the country to be considered as a leader in HALE, it should have the maximum possible values in the aforementioned metric, i.e. CAGR HALE/Life expectancy ratio must be greater than zero. It would indicate that HALE is growing at a faster rate than life expectancy, which means that the country is taking successful steps to enhance the health of its citizens by promoting a healthy lifestyle, implementing preventive, precision and personalized medicine.

The source for all the data for the analysis is WHO Life tables.

Methodology for Growth Rate 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. The following **growth rate of ratio** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Healthcare Expenditure per capita, CAGR (5 years) - estimates compound annual growth rate of current Expenditure on health per capita for the last 5 years.	$(\text{Healthcare Expenditure per capita 2017 value} / \text{Healthcare Expenditure per capita 2012 value})^{(1/5)} - 1$, where 5 is the number of years between the start and finish values
Healthcare Expenditure per capita/Government spending, CAGR (5 years) - estimates the annual growth rate of share of health spending in general government spending.	$((\text{Healthcare Expenditure per capita 2017 value} / \text{Government spending 2017 value}) / (\text{Healthcare Expenditure per capita 2012 value} / \text{Government spending 2012 value}))^{(1/5)} - 1$, where 5 is the number of years between the start and finish values
Healthcare Expenditure/GDP per capita, CAGR (5 years) - an indicator of annual growth rate of healthcare spending in relation to GDP per capita.	$((\text{Healthcare Expenditure 2017 value} / \text{GDP per capita 2017 value}) / (\text{Healthcare Expenditure 2012 value} / \text{GDP per capita 2012 value}))^{(1/5)} - 1$, where 5 is the number of years between the start and finish values

For the country to be considered as a leader in Healthcare Expenditure, all three aforementioned metrics must be bigger than zero, as that would indicate a country's commitment to an increasing health spending. The source for all the data for the analysis is National National Bureaus of Statistics, World Bank.



Methodology for Effectiveness Ratios: Healthy Life Expectancy

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. This is calculated by subtracting from the life expectancy a figure which is the number of years lived with disability multiplied by a weighting to represent the effect of the disability.

The following **effectiveness ratio** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
HALE CAGR (5 years)/Health Expenditure per capita (current US\$), CAGR (5 years)	$\frac{((\text{HALE Life expectancy ratio 2015 value} / \text{HALE Life expectancy ratio 2010 value})^{(1/5)} - 1)}{((\text{Healthcare Expenditure per capita 2017 value} / \text{Healthcare Expenditure per capita 2012 value})^{(1/5)} - 1)}$

The comparison of HALE CAGR to the one of Health Expenditure per capita CAGR is crucial for understanding what value of health Expenditure is needed for the increase of Healthy Life expectancy. Also, it allows to compare the growth of these two indicators.

For the country to be considered as a leader in HALE, the aforementioned metric 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.**

The source for all the data for the analysis is World Health Organization.

Methodology for Effectiveness Ratios: Life Expectancy

The term "life expectancy" refers to the number of years a person can expect to live. By definition, life expectancy is based on an estimate of the average age that members of a particular population group will be when they die.

Life expectancy is one of the key measures of a population's health, and an indicator used widely by policymakers and researchers to complement economic measures of prosperity, such as GDP per capita.

The following **effectiveness ratio** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Life expectancy CAGR (5 years)/Health expenditure per capita (current US\$), CAGR (5 years)	$\left(\frac{\text{Healthcare Expenditure per capita 2017 value}}{\text{Healthcare Expenditure per capita 2012 value}} \right)^{\frac{1}{5}} - 1 \div \left(\frac{\text{Life expectancy 2018 value}}{\text{Life expectancy 2013 value}} \right)^{\frac{1}{5-1}} - 1$
Life expectancy CAGR (5 years)/GDP per capita, PPP, CAGR (5 years)	$\left(\frac{\text{Life expectancy 2018 value}}{\text{Life expectancy 2013 value}} \right)^{\frac{1}{5-1}} - 1 \div \left(\frac{\text{GDP per capita 2017 value}}{\text{GDP per capita 2012 value}} \right)^{\frac{1}{5}} - 1$

The growth of life expectancy is compared with two major economic indicators - health expenditure per capita and GDP per capita. This allows to evaluate the cost of the increase in life expectancy. For the country to be considered as a leader in government planning for life expectancy, the aforementioned two metrics must be as high as possible.

Special weighting is given to this metric as the outcome of increased life expectancy is a key part of the end product of the longevity industry.

The source for all the data for the analysis is World Bank, World Health Organization.

Methodology for Effectiveness Ratios: Employment

Dramatic advances in healthcare have extended the lives of people in, predominantly, first-world and developed countries. That means that without adequate personal savings and/or pensions, people could easily outlive their retirement funds. In times of economic downturn retirees may choose to "come out of retirement" and re-enter the workforce on a seasonal, part-time or full-time basis to earn income and obtain benefits, especially costly health insurance coverage.

The following **effectiveness ratio** metrics were used in this report to identify the leaders in longevity government planning.

Metric definition	Formula
Number of Employed People Aged 65+, CAGR (5 Years) / Health Expenditures per Capita, CAGR (5 Years) - an indicator of relative growth rate of elders employed with regards to health expenditures per capita	$\frac{((\text{Number of Employed People Aged 65+ in 2017} / \text{Number of Employed People Aged 65+ in 2012})^{(1/5)} - 1)}{((\text{Health Expenditures per Capita 2017 value} / \text{Health Expenditures per Capita 2012 value})^{(1/5)} - 1)}$

For the country to be considered as a leader in employment among the aging population, the aforementioned metric should have the greatest possible value, i.e. HALE CAGR (5 years)/Health Expenditure per capita (current US\$) should be greater than one, as it would indicate that employment among elderly is rising at a faster rate than health expenditures, which, in turn, means that the country's economy is benefitting and the elders are in a good health condition to be able to work after retirement. **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.**

The source for all the data for the analysis is National Bureaus of Statistics, OECD, World Bank.



Weighting factors were chosen according to the relative importance of different ranking parameters, which was evaluated both quantitatively and qualitatively.

Weightings values vary from 1 to -0,5, where value of 1 reflects high importance of factor and -0,5 reflects high negative impact of a factor on the ranking. More specifically, weightings values can be described as following:

Weight factor value	Description
1	Extremely high importance, factors of strategic influence, parameters that enable countries to make fast and strong progress in Longevity Development Initiatives.
0,5	Factors which are also extremely essential for successful and tangibly effective Longevity Development Initiatives but cannot be described as the most important ones.
0,2 - 0,4	Factors that reflect high level of positive impact on Longevity Development Initiatives or the results thereof.
0,1 - 0,2	Factors that reflect high level of positive impact on Longevity Development Initiatives or the results of the development but do not have strategic importance.
0,05 - 0,01	Positive factors with slightly observable impact.
0,01 - 0	Positive factors which impact cannot be described as definitely observable.
-0,01 - (-0,05)	Negative factors which impact cannot be described as definitely observable.
<-0,05	Negative factors with essential negative impact on Longevity Development Initiatives.



Process of weight factors evaluation can be described in general as combination and integration of qualitative research, data analysis, statistical and econometric methods and adjustments of these results based on the logical and empirical consistency considerations. Methodology for the evaluation of weight factors can be described in the following way.

Stage	Description
1	Analysis of government longevity national plans. Investigation of strengths, weaknesses, threats and opportunities of different countries and regions regarding longevity national development. Analysis of social, economic and technological prospects of the countries in the scope of the topic.
2	Qualitative estimation of the importance of weight factors based on the investigation of evidence of longevity national development. Segregation of factor types. Determination of different levels of importance.
3	Assignment of quantitative values to the factors based on the qualitative results of the analysis of their importance.
4	Adjustment of the values based on the statistical data on countries.
5	Adjustment of the values based on historical development trends.
6	Comparison and integration of different approaches for the development of the final weight factors distribution.
7	Weight factors testing through the development of the final ranking of the countries.

Further adjustment and expansion of weight factors can be conducted through the analysis of statistics on additional countries, more comprehensive analysis of historical data and applying new approaches for the estimation of final country scores in order to compare them with the results provided by implementation of the weight factors.



Planned Methodology Additions for Second Edition of the Report in Q3 2019

Further extensions in methodology will relate to all aspects of our proprietary ranking system, namely:

- Expanding the number of metrics parameters, as well as their categorization.
- Adjustment of weight factors in accordance with new statistics on investigated countries.
- Expanding the final ranking of countries and dividing them also into specific categories.
- Improving the distributions of the parameters, creating new levels and categories of metrics.

First edition	Second edition
12 countries or regions	More than 30 countries or regions
77 metrics and parameters	More than 100 metrics and parameters
6 levels of parameters	8 levels of parameters, some of which are regrouped
1 approach for weights assignment	3 approaches for weights assignment

One of the foremost challenges faced during the production of this first edition of the report was the large volume of data, as well as gaps in data for different countries, which necessitated in many cases the manual aggregation and parsing of data, due to a lack consistent resources for the standardization of statistical data across many countries. To overcome these challenges and enable an even deeper level of analysis, from the third edition and onward advanced statistics and machine learning tools will be applied to automate aggregation of data, increase the scope and tangibility of insights derived from the analysis and to reveal trends otherwise hidden underneath the large volumes of unstructured data. This will enable aggregation of even larger quantities of data without burdening the clear and pragmatic analysis of that data, allowing sophisticated cross-sector analysis of tens of different countries and regions in an efficient manner.



Link to the Report: <https://www.aginganalytics.com/longevity-development-plans>

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Website: www.aginganalytics.com

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