Methodology Guide

General Overview

The Longevity Industry has reached a point where politics has become one of the most important factors for its future. The political, economic, and industrial capital that municipal and national government control and dispense is larger than any other industry stakeholder. The stakes are proportionately higher, given that they are tasked with maintaining and optimizing the wellbeing and quality of life of their national population and the size, integrity, and stability of their national economy - or, in other words, the health and wealth of their nation.

Aging Analytics Agency, the world's premier provider of industry analytics on the topics of Longevity, Precision Preventive Medicine and Economics of Aging, and the convergence of technologies such as AI, Blockchain, Digital Health and their impact on the healthcare industry, has created its tool for assessing the level of development of the country's longevity infrastructure. Users of the tool, government officials or stakeholders, can assess the current level of longevity development within a particular economy and obtain appropriate recommendations.

Today Longevity infrastructure is taken into account by most of the developed countries. Many different processes cause aging. That is why healthy Longevity goes far beyond demographic characteristics and medical research problems on how to increase the quantity of life.

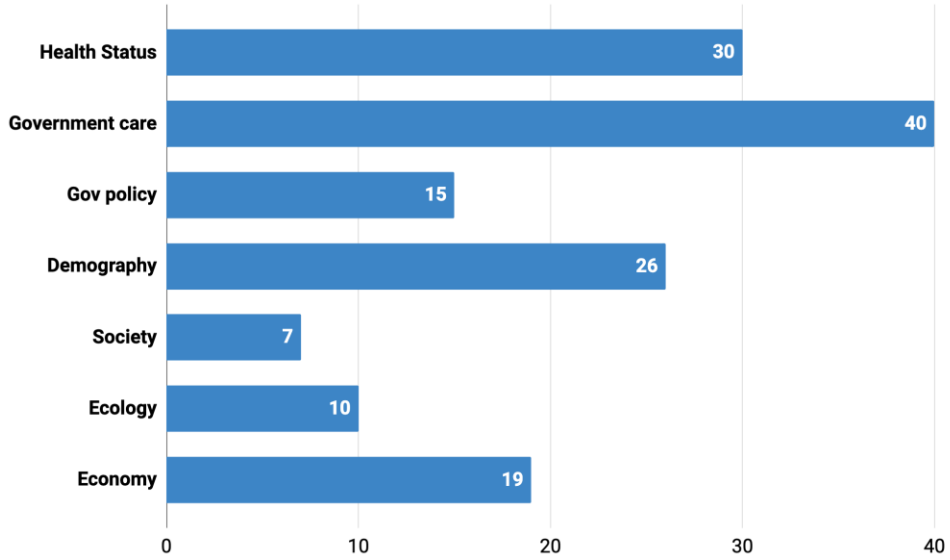
Healthy Longevity progressiveness is essential for driving economic progress and competitiveness—both for developed and developing economies. Today Longevity is about social inclusiveness, high quality of life, technical innovations in care delivery and medical treatment, and modified business and governmental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

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 behaviors 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.

The methodology for providing recommendations to governments on the development of the Longevity Industry includes consistent and logical assessments of quantitative and qualitative indicators of the evaluated country. It further entails appropriate recommendations depending on the level of assessment that the country receives in each of the categories.

The Assessment Table includes quantitative and qualitative indicators by which the country is evaluated and contains 147 metrics divided into seven categories.

Diagram 1. Number of Metrics by Category



All indicators have been carefully researched, analyzed, and chosen by Aging Analytics Agency's experts. Each category was provided with recommendations for the development of the Longevity Industry. Depending on the assessment of the country in each category, a number of recommendations are selected that can be applied to this country. The final decision on whether to adopt or not to adopt a country-specific recommendation is provided in the Decision Table tab.

This methodology seeks to identify which health system characteristics, socio-economic factors, and environmental conditions define Longevity related aspects of a country's infrastructure and what recommendations must be applied to achieve higher results and benefits in the Longevity area.

Methodology Manual

The methodology for providing recommendations to the country on the development of the Longevity Industry is a simple, easy-to-use, logically structured tool.

A simplified model of use is described below:

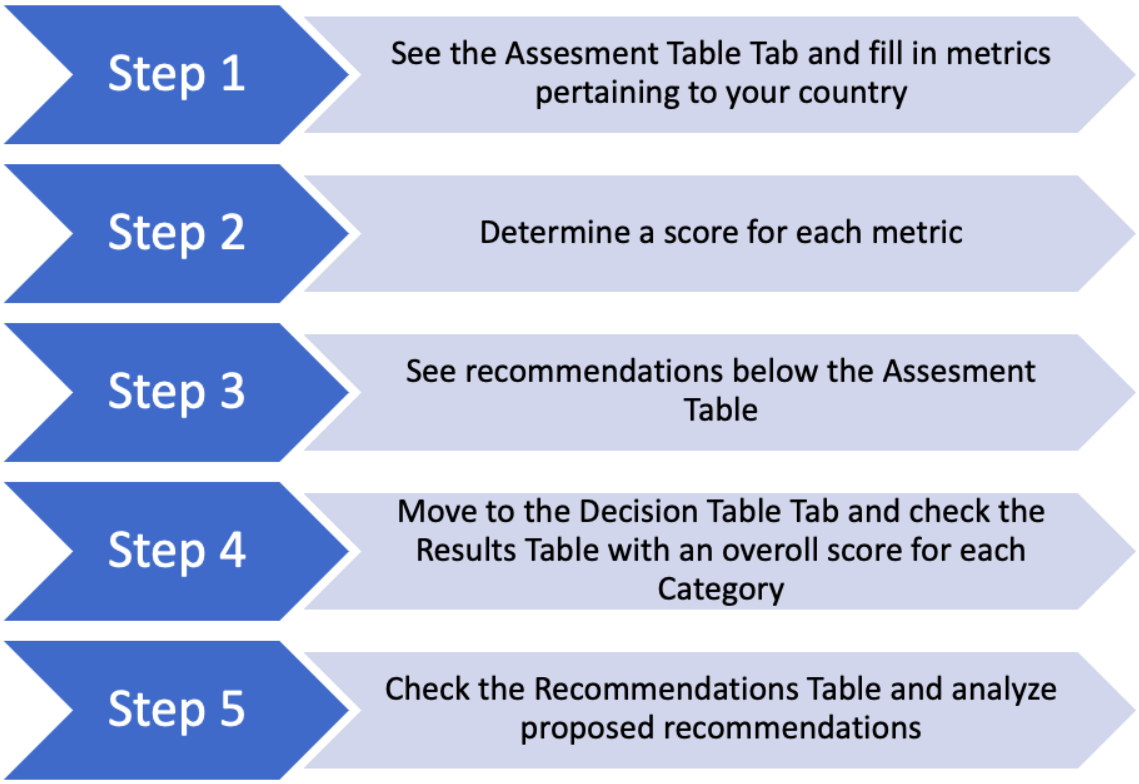


Figure 1. Steps in using the methodology

1. Assessment Table

The Assessment Table is used to analyze and evaluate the quantitative and qualitative indicators of the country to which the recommendations for the development of Longevity will be applied. The table is structured into seven main categories, mentioned before, as follows:

- Health Status
- Government care
- Gov policy
- Demography
- Society
- Ecology
- Economy

There are subcategories within each category that determine a more precise area of each metric. A total of 147 evaluation metrics selected by the Aging Analytics Agency's experts are given in the table under the column "Metrics". Justifications for some metrics are given in the table below:

Table 1. Examples of Metrics Used in the Methodology

Metrics	Correlation to Longevity
Gross Domestic Product (GDP) per capita, level of disposable income	Low GDP per capita correlates with low HALE, and LE 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 a lower level of GDP per capita increase in healthcare, expenditures correlate with an increase in HALE. But for countries with a high level of wealth, an increase in healthcare spendings does not lead to the growth of HALE because higher spendings are caused by high medical prices.

Urban Population, age-friendly cities, and communities, population density	Countries with a high level of urbanization have high HALE as more people have better access to medical treatment and appropriate infrastructure.
Consumer Price Index	Countries with stable economic conditions have higher HALE. In contrast, economic instability negatively affects the level of life and HALE.
Mental health and diseases	A high level of disease corresponds to a decrease in health and a decrease in HALE. Non-communicable diseases are considered to be "slow-motion disasters" and prevail among major causes of premature death.
Total fertility rate, the 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. The development of antibiotics and immunizations has helped push the average life expectancy higher.
Obesity	Major developed countries have a high level of obesity and a bigger gap between life expectancy and HALE. Overweight increases the risk of other diseases and health problems.

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.
Socio-economic status	As socio-economic status decreases, so do 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.
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, and food safety.

The data for all metrics may be found in open-source databases of international organizations related to Healthcare and Longevity respectfully, such as World Health Organization, World Bank, Organisation for Economic Co-operation and Development, etc.

Figure 2. Main Data-sources

During the country analysis, each metric receives a certain score, depending on the level of the metric shown by the country being analyzed.

In the column "Calculation," the user of the methodology can see where the data for a particular metric comes from or how to calculate it.

The "Instruction" column shows ranges for a particular metric to determine which score should be assigned for a particular value. It is represented as a division of indicators into three groups by the standard normal distribution method. According to the group in which a certain metric of the analyzing country falls, it is given the following scores: (1), 0, 1 for the bad, normal, and good condition of the indicator, respectively. For example, If health-adjusted life expectancy (HALE) is less than 63 years, then the score is (1). If HALE is more than 63 but less than 70, the score will be 0, and if HALE is higher than 70, then +1 must be assigned.

Further, the sum of scores of metrics makes the general score on a category.

Each category ends up with the line "Category score", reflecting the total score of the country in that category. Results interpreted as "weak", "satisfactory" or "strong". These scores were determined by applying a uniform distribution method to a number of possible values of the overall score of the category. According to the assessment of the category, the country under analysis is provided with a number of recommendations that were developed by the Aging Analytics Agency team.

2. Recommendations

The pool of recommendations was developed by Aging Analytics Agency professionals for governments varying in level of economic development. The full list of recommendations consists of 107 recommendations divided into groups applicable for each early mentioned category and divided by the level of development of the longevity in the category.

Depending on the category score, the relevant recommendations appear on the Decision table tab. The assessment of the categories results in "weak", "satisfactory", or "strong" estimates.

If the score for the category is less than 33% of the maximum possible result, then the category is rated as weak. Consequently, fundamental issues are to be solved. In this case, we will point out the modernization of equipment in public hospitals, even distribution of medicines and progressive equipment among the regions or similar. If the category result is within 33-67%, then recommendations from the "satisfactory" pool are applied mostly. It includes the development of government-led longevity plans, the Creation of an effective network of primary care services, and others. For the categories, which received above 67% of points, and are rated as strong, most of our recommendations come from a respective list, including the Development of AI centers, Broadening the infrastructure of financial institutions that contribute to Longevity, Behavioral based health advising, etc.

Some recommendations are relevant and applied for both "weak" - "satisfactory" or "satisfactory" - "strong" estimations of the country's longevity. Examples of such recommendations are improvement of engagement of high-qualified staff in healthcare, provision of more freedom for private sector healthcare development, support of healthy and disease-free lifestyles with an emphasis on the health status of the elderly.

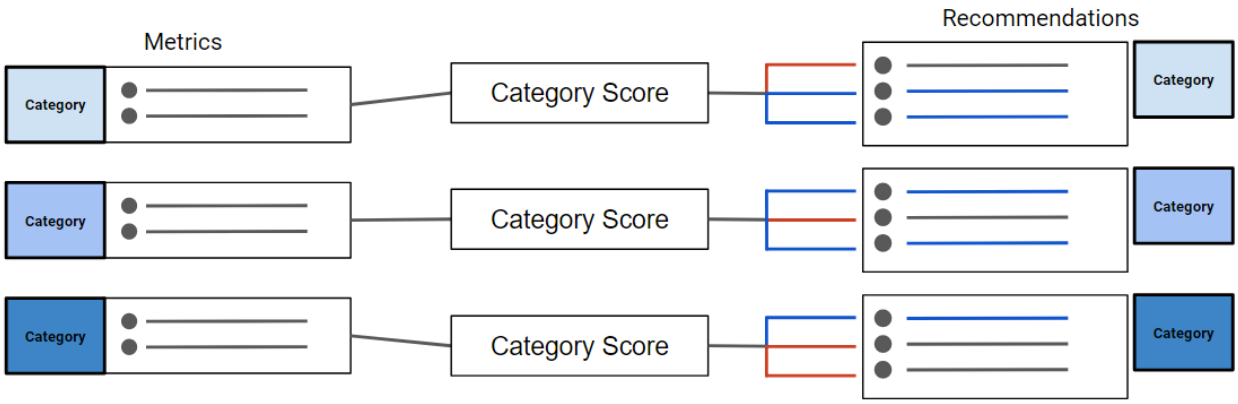


Figure 3. Recommendation Selection Mechanism

3. Decision Table

The end-product of the Longevity Governance Methodology is the Decision Table tab. This tab shows summary statistics on the level of the development of Longevity by categories and presents the list of relevant improvements.

Summary statistics are presented in the table named "Results", showing the actual estimations as a number of points per category out of a maximum possible and its wording variant (weak, satisfactory, strong). Since each metric can get from -1 to 1 point, the category score can result in a negative figure. An exception is the Government policy category, where each entry obtains 1 or 0 for the existence or non-existence of a particular policy.

Below the summary table, the full list of Aging Analytics Agency recommendations is placed. The list consists of 107 recommendations divided into the same seven categories as it was mentioned above. It is organized in such a way that each recommendation has its number (ID), the recommendation itself, and a detailed description of the actions that are to be taken.

The decision table is the final tab in our methodology, and it already shows personalized recommendations to the user by highlighting the relevant ones in blue color. Those that are not applicable are colored in red.

In other words, the Decision Table provides a user with a full list of developed recommendations with explanations and indicators of whether to apply or not to apply them for the country being analyzed.

However, the full scope of recommendations should be carefully revised and might be reconsidered in order to meet the specific needs of a particular country.

The United Kingdom Methodology Evaluation Case

After the UK House of Lords Science and Technology Select Committee released their 'Ageing: Science, Technology and Healthy Living' Report, the Aging Analytics Agency came up with a response to demonstrate the strength and relevance of our supplementary advice, Aging Analytics Agency has subjected its own Methodology which provided an updated set of recommendations to the UK government on how to optimize the execution of the Healthy Ageing Industrial Strategy to the same ranking framework used to benchmark the House of Lords Science and Technology Committee's report recommendations.

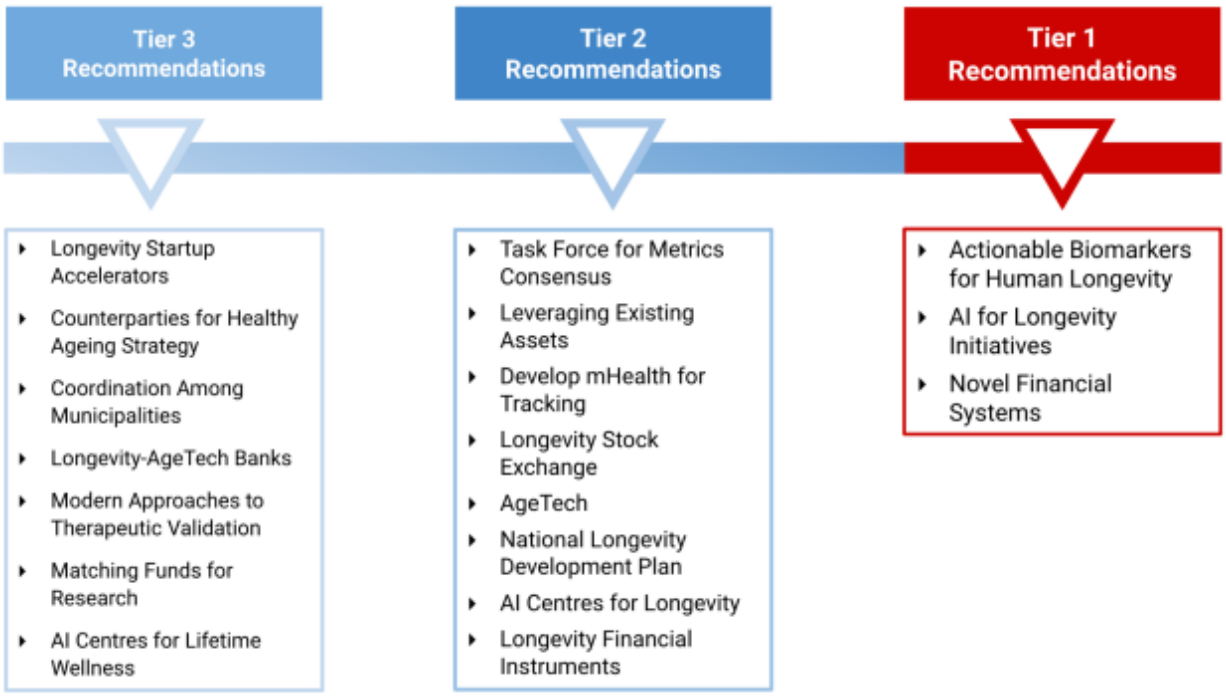


Figure 4. Benchmarking of Aging Analytics Agency's Healthy Ageing Industrial Strategy Recommendations for UK Government

After going through the Methodology and evaluating all metrics, Aging Analytics Agency's experts suggested a set of specific recommendations. Each recommendation is organized according to Tier (i.e., Tier 1, 2, or 3).

The United Kingdom, as one of the most developed countries, shows expected good scores in the Result Table, obtaining "Satisfactory" and "Strong" evaluations among all categories, which means that the UK has already solved fundamental problems regarding Longevity Infrastructure and can proceed to more sophisticated ones.

Table 2. The UK's Assessment Results

Results			
Category	**Score**		**Estimation**
Health Status	19	/30	strong
Government care	7	/40	satisfactory
Government policy	13	/15	strong
Demography	2	/26	satisfactory
Society	-1	/7	satisfactory
Ecology	3	/10	satisfactory
Economy	8	/19	strong

"Satisfactory" results in Government care, Demography, Society, Ecology let the UK government engage in creating National Longevity Development Plan and opening AI Centres for Lifetime Wellness. "Strong" results in Healthcare, Gov policy, and Economy categories allow the UK government to move to such challenges as developing Actionable Biomarkers for Human Longevity and AI Centres for Longevity, creating Counterparties for Healthy Ageing Strategy and Longevity-AgeTech Banks.

Overall, the United Kingdom is ready to face the most complex and promising objectives regarding Longevity Infrastructure development. Implementation of proposed recommendations will help the United Kingdom to achieve higher rates of HALE, LE, and dozens of other Longevity-related indicators among the population, as well as bring the country's Longevity Infrastructure to the next level.