How healthy will we be in 2040?

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A new scientific study of forecasts and alternative scenarios for life expectancy and major causes of death in 2040 shows all countries are likely to experience at least a slight increase in lifespans. In contrast, one scenario finds nearly half of all nations could face lower life expectancies.

The rankings of nations' life expectancies offer new insights into their health status.

For example, China, with an average life expectancy of 76.3 years in 2016, ranked 68th among 195 nations. However, if recent health trends continue it could rise to a rank of 39th in 2040 with an average life expectancy of 81.9 years, an increase of 5.6 years.

In contrast, the United States in 2016 ranked 43rd with an average lifespan of 78.7 years. In 2040, life expectancy is forecast to increase only 1.1 years to 79.8, but dropping in rank to 64th. By comparison, the United Kingdom had a lifespan of 80.8 years in 2016 and is expected to increase to 83.3, raising its rank from 26th to 23rd in 2040.

In addition, the study, published today in the international medical journal *The Lancet*, projects a significant increase in deaths from non-communicable diseases (NCDs), including diabetes, chronic obstructive pulmonary disease (COPD), chronic kidney disease, and lung cancer, as well as worsening health outcomes linked to obesity.

However, there is "great potential to alter the downward trajectory of health" by addressing key risk factors, levels of education, and per capita income, authors say.

"The future of the world's health is not pre-ordained, and there is a wide range of plausible trajectories," said Dr. Kyle Foreman, Director of Data Science at the Institute for Health Metrics and Evaluation (IHME) at the University of Washington, and lead author on the study. "But whether we see significant progress or stagnation depends on how well or poorly health systems address key health drivers."

The top five health drivers that explain most of the future trajectory for premature mortality are high blood pressure, high body mass index, high

blood sugar, tobacco use, and alcohol use, Foreman said. Air pollution ranked sixth.

In addition to China, several other nations are expected in 2040 to increase substantially in their rankings in terms of life expectancy, including:

- Syria is expected to rise most in rank globally—from 137th in 2016 to 80th in 2040 -likely, according to the authors, due to a conservative model for conflict;
- Nigeria from 157th to 123rd; and
- Indonesia from 117th to 100th

In contrast, Palestine is expected to drop the most in its life expectancy ranking—from 114th in 2016 to 152nd in 2040. Moreover, several high-income nations are forecast to drop substantially in their rankings, including:

- United States, dropping the most for high-income countries, from 43rd in 2016 to 64th in 2040;
- Canada from 17th to 27th ;
- Norway from 12th to 20th ;
- Taiwan (Province of China) from 35th to 42nd ;
- Belgium from 21st to 28th ;
- Netherlands from 15th to 21st ;

The rankings also find that Spain is expected to place first in the world in 2040 (average lifespan of 85.8 years), a rise from fourth in 2016 (average lifespan of 82.9 years). Japan, ranked first in 2016 (average lifespan 83.7 years), will drop to second place in 2040 (average lifespan 85.7 years).

Rounding out the top 10 for 2040 are:

1. Singapore (average lifespan 85.4 years) ranked third, as compared to 83.3 years in 2016 and ranking also of third
2. Switzerland (average lifespan 85.2 years), as compared to 83.3 years in 2016 and ranking of second
3. Portugal (average lifespan 84.5 years), as compared to 81.0 years in 2016 and ranking of 23rd
4. Italy (average lifespan 84.5 years), as compared to 82.3 years in 2016 and ranking of seventh
5. Israel (average lifespan 84.4 years), as compared to 82.1 years in 2016 and ranking of 13th
6. France (average lifespan 84.3 years), as compared to 82.3 years in 2016 and ranking also of eighth
7. Luxembourg (average lifespan 84.1 years) as compared to 82.2 years in 2016 and ranking of 10th
8. Australia (average lifespan 84.1 years), as compared to 82.5 years in 2016 and ranking of fifth.

Among those top 10 nations, even their 'worse' scenarios in 2040 remain above 80 years. In stark contrast, the bottom-ranked nations, which include Lesotho, Swaziland, Central African Republic, and South Africa, the "better" and "worse scenarios" in 2040 range from a high of 75.3 years in South Africa ("better" scenario) to a low of 45.3 years in Lesotho ("worse scenario"), a 30-year difference.

"Inequalities will continue to be large," said IHME Director Dr. Christopher Murray. "The gap between the 'better' and 'worse' scenarios will narrow but will still be significant. In a substantial number of countries, too many people will continue earning relatively low incomes, remain poorly educated, and die prematurely. But nations could make faster progress by helping people tackle the major risks, especially smoking and poor diet."

In a "worse" scenario, life expectancy decreases in nearly half of all

countries over the next generation. Specifically, 87 countries will experience a decline, and 57 will see an increase of one year or more. In contrast, in the "better" scenario, 158 countries will see life expectancy gains of at least five years, while 46 nations may see gains of 10 years or more.

The future shift toward increased premature mortality from NCDs and injuries and away from communicable diseases is apparent by the changing proportions of the top 10 causes of premature death.

In 2016, four of the top 10 causes of premature mortality were NCDs or injuries; in contrast, in 2040, that number increases to eight. The eight NCD or injury causes in the top ten in 2040 are expected to be ischemic heart disease, stroke, COPD, chronic kidney disease, Alzheimer's disease, diabetes, road injuries, and lung cancer.

The study is unprecedented in scope, Foreman said, and provides more robust statistical modeling and more comprehensive and detailed estimates of risk factors and diseases than previous forecasts from the United Nations and other population studies institutes.

IHME researchers leveraged data from the Global Burden of Disease (GBD) study to produce forecasts and alternative "better" and "worse" scenarios for life expectancy and mortality due to 250 causes of death for 195 countries and territories.

Researchers produced forecasts of independent drivers of health, including sociodemographic measurements of fertility, per capita income, and years of education, along with 79 independent drivers of health such as smoking, high body mass index, and lack of clean water and sanitation. They then used information on how each of these independent drivers affects specific causes of death to develop forecasts of mortality.

"The range of 'better' and 'worse' scenarios enables stakeholders to examine potential changes to improve health systems—locally, nationally, and globally," Murray said. "These scenarios offer new insights and help to frame health planning, especially regarding long lag periods between initial investments and their impacts, such as in the research and development of drugs."

In addition to calling attention to the growing importance of non-communicable diseases, the analysis exposes a substantial risk of HIV/AIDS mortality rebounding, which could undo recent life expectancy gains in several nations in sub-Saharan Africa.

Furthermore, while NCDs are projected to rise in many low-income countries, communicable, maternal, neonatal, and nutritional diseases are likely to remain among the leading causes of early death, thereby creating a "double burden" of disease.

The study is entitled "Forecasting life expectancy, years of life lost, and all-cause and cause-specific mortality for 250 causes of death: reference and alternative scenarios for 2016-40 for 195 countries and territories."

The study is available at http://www.healthdata.org.

Accompanying collateral materials, including comprehensive listings and supporting data of all nations' rankings, are available under embargo at https://cloud.ihme.washington.edu/index.php/s/AkAfRKXFaKwLpFr

More information: Kyle J Foreman et al, Forecasting life expectancy, years of life lost, and all-cause and cause-specific mortality for 250 causes of death: reference and alternative scenarios for 2016–40 for 195 countries and territories, *The Lancet* (2018). DOI: 10.1016/S0140-6736(18)31694-5