Halving premature death and improving the quality of life at all ages

Background paper for THE LANCET COMMISSION ON INVESTING IN HEALTH (CIH3)

Version: May 6, 2024

(Word count: 5,550)

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Abstract

Background: We define premature death as death before age 70. The probability of premature death (PPD) is defined as the probability that a child born in the indicated year would die before age 70 if the age−specific death rates prevailing at the year of birth were to continue unchanged.

Aims of this study: to report on mortality trends in the last half century and explore whether halving premature death and improving quality of life at all ages by 2050 is feasible for each country in the world. We also explore the rate of improvement for the 30 most populous countries and 10 regions.

Data sources: All analyses on PPD were conducted using life tables from the World Population Prospects 2022. The analysis on morbidity was conducted using data from the Global Burden of Disease 2019.

Results: There have been remarkable improvements in the last half century but also disparities across regions, countries, and sex in levels and trends of PPD. Among the 30 most populous countries, seven countries with varying levels of baseline PPD and income did achieve a halving of PPD over three decades in the last half century. Among all countries in the world, 37 countries achieved a halving of PPD. Eight of the 30 most populous countries have an implied rate of improvement towards 2050 that, if sustained, would lead to a halving of PPD.

Interpretation: Halving the probability of premature death and improving quality of life at all ages by 2050 is feasible. Will it happen? Not without serious extra effort. Substantial investments in health are needed to sustain or accelerate the rate of improvement for high- and medium performing countries. Historical evidence indicates that a limited set of interventions that address a relatively small number of diseases, injuries, and risk factors can substantially boost progress on reducing PPD. Particular attention to "countries of concern" with very low or negative rate of improvement in PPD is needed.

Background

Ten years ago, in 2014, Peto, Norheim et al. reviewed national mortality trends to help quantify the United Nations Sustainable Development Goal for health.[1,2] They concluded that a 40% reduction in premature death could be achievable by 2030, or soon afterwards, "at least in areas free of war, other major effects of political disruption, or a major new epidemic".[2] The world has now been through a major pandemic and witnessed political disruption, deglobalization, inflation, climate change, and war in Europe, Africa, the Middle East and elsewhere. As background research for the third Lancet Commission on Investing in Health (CIH3)[3,4], we update the most recent mortality trends and ask if the substantial gains in health improvement and reductions in premature death observed in the last half century can be sustained and whether, after the pandemic, it is possible to get back on track.

The aims of this study are to report on mortality trends in the last half century and explore whether halving premature death and improving quality of life at all ages by 2050 is feasible for each country in the world. We also explore the rate of improvement for the 30 most populous countries and the 10 regions as defined by CIH3.

Methods

Levels in probability of premature death

We define premature death as death before age 70. The probability of premature death (PPD) is defined as the probability that a child born in the indicated year would die before age 70 if the age−specific death rates prevailing at the year of birth were to continue unchanged (${}_{70}q_0$). We use PPD is an indicator to measure trends in health improvement since 1970 – i.e. during the last half century. For each sex, country, and year, PPD was calculated from UN population division life tables as:

$$\dots_n q_x = \frac{l_x - l_{x+n}}{l_x}$$

where l_x and l_{x+n} are the number of people starting in the cohort at age x and at age x+n. For example, for ${}_{70}q_0$ is the number of people dying before age 70 over the starting population at age 0, or:

$$\text{PPD} = {}_{70}q_0 = \frac{l_0 - l_{70}}{l_0}$$

where ${}_{70}q_0$ is the probability of dying between age 0 and exact age 70, l_0 is the number of people alive at age 0 (100,000 in standard life tables), and l_{70} is the number of people alive at exact age 70 (i.e., those that did not die before their 70th birthday).

We also calculated the probabilities of dying between ages 0-14 (${}_{15}q_0$), 15-49 (${}_{35}q_{15}$), and 50-69 (${}_{20}q_{50}$) using the same equation. For example, for the age group 50-69, ${}_{20}q_{50}$ is the probability of death between age 50 and exact age 70, conditional on survival to exact age 50.

Trends in probability of premature death

To explore whether halving premature death by 2050 is feasible, we looked at variation in the rates of change in previous decades for the world's major regions and countries. We then assessed which countries, through improved and targeted health policies could or could not realistically achieve a halving of premature death. We did not make projections based on past rates of improvement in PPD. To calculate a 50% reduction in premature death we chose the year 2019 as our baseline. Levels in PPD for the period 2020-23 were substantially affected by the Covid-19 pandemic and are therefore inappropriate as baseline years for assessing progress. To determine feasibility of "50 by 50", a 50% reduction in the probability of premature death by 2050, we estimated changes in the probability from the latest decades, with particular emphasis on the period 2010 to 2019, and calculated rate of improvement in PPD (i.e. the average annual rate of change (AARC)) with the following equation:

$$q_{t+n} = q_t\,(1 - \text{AARC})^n$$

where q_t is the probability of premature death at time t and q_{t+n} is the probability after a further n years. The rate of improvement needed to reach a 50% reduction was estimated by setting the probability in year 2050 (q_{2050}) at half the level of the probability in 2019 (q_{2019}).

We also calculated the rate of improvement for each age group listed above. The required rate of improvement depends only on the level of PPD in our baseline year and the set target and does not depend upon past rate of improvement. We then compared the observed rate of improvement over the last few decades with required rate of improvement over the next three decades. Based on rate of improvement in the period 2010-19, we grouped countries into three categories: high (>2.2%), medium (2.2% - 1.0%), and low rate (<1.0%) of PPD change.

Decomposition of changes in PPD by age

To understand the contribution of the changes in the probability of death in each age group (0-14, 15-49, 50-69) to the overall PPD (0-69), we decomposed the change in PPD for each decade by the contribution of the age groups:

Let $q_0 = {}_{70}q_0$
$q_1 = {}_{15}q_0$
$q_2 = {}_{35}q_{15}$
$q_3 = {}_{20}q_{50}$

By definition, $q_0 = 1 - (1-q_1)(1-q_2)(1-q_3)$. Then, the change in q_0 can be expressed as:

$$\Delta q_0 = \frac{\partial q_0}{\partial q_1}\Delta q_1 + \frac{\partial q_0}{\partial q_2}\Delta q_2 + \frac{\partial q_0}{\partial q_3}\Delta q_3$$

By taking the partial derivative of the equation above, we can calculate the contribution of each age group. For example, the contribution of Δq_1 to Δq_0 is $\frac{\frac{\partial q_0}{\partial q_1}\Delta q_1}{\Delta q_0}$.

Morbidity

While reducing the probability of premature death is a worthy goal for global health, people also care about living healthy lives. Prevalence of morbidity, the number of people living with chronic disease, and health-related quality of life are therefore of substantial interest. There is a high correlation between life expectancy and health-adjusted life expectancy

(HALE) and change in mortality is a major driver for this summary measure.[5,6] There are some exceptions, in which diseases cause substantial health burden but do not result in high mortality. For this analysis, we aim to identify diseases which meet three criteria: (i) they have a high burden of disease globally; (ii) the primary driver of the global burden of this disease is morbidity, as opposed to mortality; and (iii) that the disease prevalence is increasing over time after accounting for population size and age.

For the first criterion, all 167 Level 3 causes from the 2019 Global Burden of Disease (GBD) study were ranked by the global age-standardized prevalence rate in 2019, and the top 1/3 of causes were retained (GBD 2019). This cut-off selects causes with an age-standardized prevalence greater than 740 per 100,000 for females and 1000 per 100,000 for males in 2019. For the second criterion, causes were retained if the majority of global age-standardized Disability-Adjusted Life Years (DALYs) were years lived with disability (YLDs) in 2019, indicating that morbidity is the primary driver of global burden. For the third criterion, prevalence in 1990 was age- and sex-standardized to the global 2019 population, and the annualized rate of change between 1990 and 2019 was calculated. Uncertainty was generated for criterion 3 by bootstrapping from a negative binomial distribution using the mean and upper and lower uncertainty intervals for prevalence reported in the GBD 2019 study. Causes with a positive growth rate and a lower uncertainty bound above 0 were retained. For all criteria, the prevalence, morbidity proportion, and growth rate were calculated for both sexes, and any cause which met the criteria for one or both sexes was retained.

Regions

Since we explore historical trends in health in the last half century and discuss feasibility of continued or improved rate of improvement for the next 30 years, standard regional classifications of countries by income are not appropriate. For example, a large number of countries have transitioned from low-income status, as by World Bank classification, to middle income status since 1970. In addition, the income classification cut-offs have changed. We therefore follow CIH3 and classify countries in geographical regions with somewhat similar characteristics in terms of disease burden and economic development as depicted in Figure 1.

[Figure 1 here]

Note that the world's three most populous countries (India, China, and USA) are separated out as "regions" since they would dominate all trends if included in other regions.

Data sources

All analyses on PPD were conducted using life tables from the World Population Prospects 2022 (later to update to 2024). The analysis on morbidity was conducted using data from the Global Burden of Disease 2019 (later to update using 2021).

Results

Remarkable improvements in PPD

There have been remarkable improvements in the last half century but also disparities across regions, countries, and sex in levels and trends of PPD. In 2019, PPD ranged from 52% in Sub-Saharan Africa to 15% in the North Atlantic (Table 1).

[Table 1 here]

In 2019, before the pandemic, Sub-Saharan Africa, Central Asia, and India had levels of PPD above the world average (31%) (Figure 2).

[Figure 2 here]

Central and Eastern Europe had little and even raised PPD between 1970 and 2005, but had the greatest improvement from 2010-19 (AARC, 2.2%). All the other regions had substantial improvements in PPD from 1970-2019, and five of the regions had equal or higher rate of improvement than world average (1.4%; Table 1). Of particular interest is the strong rate of improvement observed in China (AARC, 1.9%) and the negative trend in the US the last decade (AARC, -0.1%).

Levels and trends in PPD also vary within regions. Figures 3 show trends in probability of premature death for the 30 most populous countries in the world, and by age-groups: probability of dying between ages 0-14, 15-49, and 50-69.

[Figure 3 here]

We see from Figure 3 that there has been substantial change for all age groups, with interesting variations across countries. For example, South Korea, China, Ethiopia and Thailand have experienced impressive progress. Bangladesh stands out because the country had a civil war in 1971, with rapid improvements after that. Low-performing countries in terms of PPD include Nigeria, Mexico, South-Africa, and Kenya. There have been spectacular improvements in all countries in the probability of dying 0-14 and 15-49, although Nigeria, Kenya, and South Africa are less impressive.

In panels A-E we discuss in more details these trends for selected countries, possible reasons and whether halving PPD is feasible or not.

Panel A: China

China has achieved remarkable progress in population health over the last half-century, reducing its probability of premature deaths from 61% in 1970 to 21% in 2019 (Panel A Figure). Specifically, there have been substantial reductions in the probabilities of dying between ages 0-14, 15-39, and 50-69 during this period. The rate of progress has consistently remained about 2% or more, with the most significant progress occurring at 2.6% in the 1970s, followed by 2.3% in the 2000s.

China's initial achievement in reducing premature death is largely due to its success in reducing maternal and infant mortality.[7] Rapid economic growth, poverty alleviation efforts, and universal education programs have also contributed to health advancements. Notably, the government's commitment to universal access to basic health care, and increasing its funding from 1% to over 3% of GDP, to fund a universal health insurance

program, implementation of free national essential public health programs (including free care for HIV, TB, etc.) are significant in improving access to care and enhancing financial protection and people's health.[8] Gruber and colleagues estimated that rural health insurance has saved about one million lives per year.[9]

Despite China halving PPD within 30 years, it faces notable challenges in achieving another 50% reduction in PPD by 2050. With a rapidly aging population and increased incidence in non-communicable diseases, there is a pressing need to address existing health system gaps. In particular, China's hospital-centric delivery system with weak primary healthcare is ineffective and inefficient in preventing and managing NCDs. Inequality in quality of care by geographical and socioeconomic status presents another challenge.[10,11]

Panel B: Ethiopia

Ethiopia made significant progress in reducing the PPD between 1991 and 2019, and since 2000, the average annual rate of change is among the fastest in SSA (Panel B Figure). The largest contributions to PPD decline are from reductions in MCH conditions, and communicable diseases such as HIV, TB, and malaria.[12] These can be attributed to reforms within and outside the health sector, including a pro-poor health policy emphasizing rural communities and primary health care that resulted in the decentralization of health service delivery, community empowerment, and improvement in access to PHC. Between 1990 and 2019, GDP per capita (US$/capita) increased from 110 to 840[13], proportion of people living in poverty reduced from 48 to 23.5%[14], literacy increased from 27 to 52%[15], access to basic drinking water improved from 13 to 38%[16]; and the fertility rate was reduced from 7.2 to 4.3 children per woman.[17] The country has also enjoyed peace and security between 2000 to 2020.

Although AARC was -2.4% in the last decade, sustaining this trend and halving premature death by 20250 in Ethiopia could be challenging as the low-hanging fruits have already been largely accomplished, and the health system is being challenged by the growing burden of NCDs, both of which require a substantial increase in funding and health system readiness.

In addition, the ongoing civil conflicts in Ethiopia and the global crisis (such as COVID-19 and the Ukraine war) have a negative impact on macroeconomic growth and could have long-term impacts.

Panel C: Nigeria

From 1970 to 2019, Nigeria experienced a 13-percentage point decrease in PPD, with most of the progress occurring between 1970 and 1975 and between 2000 and 2019 (Panel C Figure). The AARC was -1.2% per year in the 1970s, but this was followed by a reversal in the 1980s and 1990, where PPD increased by 0.1% per year for two decades, leading to a loss of gains experienced in the 1970s. In the 2000s, PPD started to decline at an AARC of -0.6% per year. Currently, Nigeria's PPD (62.5%) is one of the highest in Africa and is largely driven by high under-five mortality, the unfinished infectious disease agenda, and the growing incidence of NCDs like diabetes, hypertension, and cancers. Emerging challenges also include rising rates of poverty and conflict-related decreased access to healthcare. Despite these challenges, it is still feasible to halve premature deaths in Nigeria by 2050. This will require bold, targeted reforms backed by sustained financial investments to reduce the main causes of PPD. Nigeria's current health reform seeks to address these issues. Key aspects of the reform include the expansion of geographic and financial access to primary healthcare through Nigeria's basic healthcare provision fund, strengthening of the health workforce, and improving access to essential medicines and devices. The reforms also include efforts to unlock the healthcare value chain through local manufacturing to lower costs and improve efficiencies. Sustaining these reforms will significantly reduce PPD and set Nigeria on the path to halving its 2019 PPD by 2050.

Panel D: Mexico

From 1970 until 2000, Mexico showed steady progress, with AARCs averaging between -1.2 and -2.0 per decade (Panel D Figure). However, gains stalled in the past two decades, and PPD has remained at around 31% since around 2003. A narrow set of three conditions, ischaemic heart disease, diabetes, and injuries resulting from interpersonal violence, accounted for the

largest share of premature deaths, offsetting health gains in infectious diseases, and explaining the poor performance in recent decades. Increased mortality from ischaemic heart disease and diabetes has mainly affected the 50-69 age group, while interpersonal violence is concentrated in ages 15-49.[18-21]

Addressing behavioural risks associated with poor diet and physical inactivity remains the most complex and pressing challenge. At 75.2 per cent in 2022, the combined prevalence of obesity and overweight among the adult population in Mexico is one of the highest in the world. An underfunded and fragmented primary health care system has been unable to contain over the past decades the rising prevalence of hypertension, dyslipidemia, and high blood sugar levels through cost-effective secondary prevention. On the other hand, the underlying determinants of deaths associated with violence remain a complex multifactorial agenda perceived beyond the traditional scope of health policy intervention.

Based on the 2010-2019 AARC trend of -0.1%, Mexico is not on track to halve PPD by 2050. To deliver the necessary 20-fold increase in the implied rate of change towards 2050, major health system restructuring to tackle the underlying risk factors through intersectoral interventions, and a more responsive and highly effective primary healthcare subsystem would need to be implemented.

Panel E: USA

In a disconcerting trend, adults in the United States are experiencing higher PPD and poorer health compared to their counterparts in other high-income nations. While similar countries continue to make strides in improving adult survival, the US has witnessed a stark stagnation in such progress, particularly since the 1970s.[22] PPD declined by an average of 2.0% annually in the 1970s, but subsequent decades saw this decline halved, or even dissipated in the 2010s (Panel E Figure).

This stagnation disproportionately affects younger Americans. Deaths before age 50 constitute a significant portion of the disparity in life expectancy between sexes in the US

and overall compared to other high-income nations.[22] The trend is most pronounced among White Americans whose deaths comprise about two-thirds of all deaths in the United States since 1990, and who have seen little improvement in reducing mortality since 1990. By contrast, Hispanics mortality trends have improved, driven partly by immigration.[23] Blacks have made notable strides in reducing premature mortality.[24] Among US Whites, stagnation has occurred in those with high-school education or less: those attending college continue to show overall decline in PPD.[25] The COVID-19 pandemic amplified these marked educational differences.[26]

The phenomenon has been termed "diseases of despair," citing increases in opioid-related deaths, cirrhosis, and suicides.[27] However, the narrative is incomplete, as rising mortality rates extend to vascular disease, chronic lung disease, injuries, and homicides. Analysis indicates that tobacco-related causes contribute to nearly half of the excess deaths among lower-educated White Americans from 1990 to 2019, a finding consistent with international comparisons.[28] Since 2010, the combined contribution of smoking, opioids, cirrhosis, suicide, and other external injuries has been approximately two-thirds of all excess deaths among whites.

The 2013 Institute of Medicine highlighted various contributing factors[22], some of which could theoretically be addressed by the expansion of the Affordable Care Act.[29] However, it remains imperative to reconsider national- and state-level public health goals and strategies, alongside further research efforts, to effectively tackle this concerning trend.

PPD in the 30 most populous countries

In the last decade (2010-2019), global rate of improvement in PPD was 1.4% for both sexes combined (Table 1). The required rate of improvement to reach a halving PPD in 31 years (i.e. by 2050) is the same for all regions and countries: 2.2%. For the 30 most populous countries, eight countries had a rate of improvement equal to or better than 2.2% over 2010-2019 (Table 2). This means that continuing this trend would lead to a halving or more

if sustained. At the other end, 10 out of 30 countries had a rate of improvement worse than 1.0%, meaning the implied change would be less than one-third.

[Table 2 here]

Countries of concern

The low-performing countries, i.e. those with minimal decline or increasing PPD, are highly unlikely to achieve a halving of PPD by 2050. These countries – Libya, Yemen, Syrian Arab Republic, USA, Costa Rica, Cuba, Jamaica, Mexico, and Venezuela – are marked by war, political conflict, or political disruption (Table 2).

Seven populous countries halved PPD over three decades in the last half century

We also looked historically at whether any country had actually achieved a halving of PPD in three decades or less (Figure 4).

[Figure 4 here]

Among the 30 most populous countries, seven countries made this remarkable achievement over a period of 31 years in the last half century (the required time to achieve halving between 2019 and 2050): Bangladesh (1988-2019), Iran (1976-2007), China (1970-2001), Italy (1979-2010), Japan (1970-2001), Viet Nam (1972-2003), and Republic of Korea (2000-2019). We also analysed countries beyond the most populous. Among all countries in the world, 37 countries accomplished this (appendix Table A2). These historical experiences from diverse countries show that halving PPD is feasible. Halving occurred from both initially high levels of PD (e.g. Viet Nam, Algeria) and from initially low levels (e.g. Italy, Norway).

Perhaps surprisingly, there is no statistically significant correlation between current levels of PPD and rates of change in the recent decade (Figure 5). For example, Republic of Korea had the highest rate of improvement but with low PPD, while Tanzania also had high rate of improvement but from a much higher level of PPD (Table 3).

PPD and trends by sex

In all countries, females had lower PPD than males in 2019. Global rate of improvements in PPD by sex are better for females than for males (females, 1.6%; males, 1.2%), and with better rate of improvement among females in most countries, but not in all. In a quarter of all countries, rate of improvements were better for males compared to females (for all disaggregated results, see appendix Table A3). There are relevant and interesting differences by sex in some countries. For example, the gap in PPD between males and females narrowed in the US between 1970 and 2010, while in Thailand the gap increased in the period 1985 - 2019 (appendix Figure A2).

Decomposition of changes in PPD by age group

For the world, changes in PPD since 1970 have largely been driven by improvements at ages 50-69 (appendix Figure A3). In the recent decade, about 50% of the improvements in PPD was due to this age group, followed by 0-14 (about 27%) and 15-49 (about 23%). In the North Atlantic, the proportion contributing to the fall in PPD has been about 70% from ages 50-69 since the 1970s, and even in sub-Saharan Africa this age group contributed the most (40%) to changes in PPD in the 2010s. This is largely because most deaths now occur in older age groups.

Morbidity

Progress in mortality is highly correlated with progress in health-related quality of life. Health-adjusted life expectancy (HALE) is a summary measure of population health promoted by the World Health Organization and the Global Burden of Disease Study.[5,30] HALE measures life expectancy adjusted for health-related quality of life in those years. As is well documented and as seen in the latest published figures from WHO (appendix Figure A4), mortality change is the main driver for changes in HALE.[5] Nevertheless, it is interesting to look especially at diseases associated primarily with morbidity, i.e. chronic diseases with reduced quality of life and low mortality rates.

Oral disorders, headache, and hemoglobinopathies and hemolytic anemias have the highest age-standardized prevalence for both sexes, and gynaecological disorders has a similarly high age-standardized prevalence rate when considering females alone (Table A3 in

appendix shows the age-standardized prevalence rate and YLD morbidity proportions for all causes which meet criteria 1 and 2 (high prevalence, mostly morbidity)). Many of the causes which meet these criteria have a YLD proportion of 1, indicating that they are diseases which do not directly contribute to mortality. Musculoskeletal disorders such as back pain, neck pain, and osteoarthritis are all entirely nonfatal but contribute a high burden of disease globally. Mental health disorders such as depression, anxiety, intellectual disability, alcohol use disorders, and attention deficit disorder also account for a substantial burden of disease combined. Although most diseases have similar prevalence and morbidity ratios across sexes, there are some notable exceptions which have meaningful sex disparities. Morbidity burden of hemoglobinopathies and hemolytic anemias is much higher in females than males, which could indicate either higher case fatality in males or greater severity of disease in females. Among the conditions we looked at, diabetes mellitus and hemoglobinopathies and hemolytic anemias are the only two which had increasing prevalence over time (Figure 6).

[Figure 6 here]

Figure 6a shows the age-standardized prevalence of diabetes mellitus from 1990-2019. In this plot, the age-standardized prevalence of diabetes is increasing steadily for males and females. The positive slopes in this plot indicate that the burden of diabetes is rising even after controlling for population aging and global population increase. Figure 6b shows the age-standardized prevalence of anemias over the same period. There is a substantial difference in the age-standardized prevalence of anemia by sex, where females experience a much higher burden of anemia than males. For both sexes, the prevalence of anemia is increasing over time, even when controlling for demographic change with age-standardization.

Despite increase in prevalence of some chronic conditions, it is clear that by reducing mortality, people will live longer and more healthy lives. The absolute numbers of years lived in good health (healthy life years) has increased in the last half century. In populations with high life expectancy, the relative proportion of time lived with reduced quality of life

tends to be somewhat higher compared to populations with lower life expectancy (appendix Figure A4).

Interpretation

The world has witnessed remarkable improvements in premature mortality and quality of life at all ages in the last half century, but there are also disparities across regions, countries and sex in levels and trends. Among the 30 most populous countries, seven countries with varying levels of baseline PPD and income did achieve a halving of PPD over three decades in the last half century. Among all countries in the world, 37 countries achieved a halving of PPD. In addition, eight of the 30 most populous countries have an implied rate of improvement towards 2050 that, if sustained, would lead to a halving of PPD. This suggests that halving PPD is feasible.

Countries with a rate of improvement better than 2.2% in the last decade (2010-19) not only include those with high PPD or high child mortality (such as Tanzania and Ethiopia), they also include higher-income countries with low PPD and predominantly NCD related mortality (such as Norway and Ireland). Indeed, changes in PPD since 1970 for the world have largely been driven by improvements in ages 50-69. In the recent decade, about 50% of the improvements in PPD was due to this age group. Sustained attention is needed to keep up with this remarkable progress.

If countries with medium rate of improvement (between 2.2% and 1.0%) can achieve the rate of improvement as their better performing regional neighbours through benchmarking, halving premature death by 2050 is feasible but requires sustained and substantial investments. These countries probably underinvest in medical technology and knowledge. To achieve their potential, they need to assign higher priority for health in government spending, improved implementation and access to high impact health programs, and achieve greater efficiency in budget execution of available resources for health.

Historically, countries that have made the most progress on reducing PPD did so by implementing a limited set of interventions that address a relatively small number of diseases, injuries, and risk factors. For example, about one-third of the gains in life

expectancy in LICs between 2002 and 2019 was attributable to mortality reductions from treatment of HIV, TB, and malaria.[31] At the other end of the spectrum, nearly half of the reduction in cardiovascular mortality in the USA between 1980 and 2000 was attributable to reductions in tobacco use, high systolic blood pressure, and high cholesterol.[32] Secondary prevention of cardiovascular disease, effective medicines for those who have experienced an event, can substantially reduce mortality.[33] In some cases, the mortality reductions can be massive and rapid. For example, following a 1995 ban on WHO Class I organophosphate pesticides, suicide mortality in Sri Lanka declined by about 50% in the following decade.[34]

A prioritized approach to health conditions and interventions could allow lower-resource countries to achieve considerable reductions in mortality at a reasonable cost. The Disease Control Priorities, 3rd Edition recommended a list of 141 cost-effective interventions that countries could choose from to address locally relevant causes of death. Fully implementing these interventions by 2030 could reduce under-70 mortality by about one-third compared to 2015, a 3% per year rate of decline in PPD.[35] About 5-6% of gross national income in LICs and 3-4% in LMICs would be required to implement these interventions.[36] While this would represent a substantial increase in health spending in these countries, it would bring health spending as a share of national income more in line with UMICs and HICs.

In addition, all countries need to look at other risks and invest in pandemic prevention, preparedness, and response, mitigating and adapting to climate change, as well as investing in research, development and innovation.

Lastly, some countries are unlikely to achieve “50 by 50” – even if a majority of other countries could do so. These countries of concern include Libya, Yemen, Syrian Arab Republic, USA, Costa Rica, Cuba, Jamaica, Mexico, and Venezuela. The number of countries from Latin America and Caribbean in this category is worth noticing.

Improving quality of life at all ages is possible. Progress in mortality is highly correlated with improved health-related quality of life. In countries with lower PPD, people live longer and more healthy lives. Yet, as people live longer lives, the relative increase in proportion of time lived with chronic disease will lead to higher demand for health services.

Positive or negative changes in prevalence of morbidity are hard to detect, largely due to data constraints, and unlike for mortality data, harder to measure. Prevalence data and severity of disease are not updated annually by countries, and annual statistics draws on surveys done at irregular intervals and with substantial data gaps in many countries. The striking global growing trend for diabetes mellitus is therefore worth noticing. Investments are clearly needed to prevent and treat chronic diseases. This will both reduce PPD and improve quality of life.

Limitations

The aim of this article is to look at the feasibility of halving the probability of premature death by 2050, not the absolute number of premature deaths. Halving the total number of deaths before age 70 will be even more difficult in most countries. This is so for the following reasons. First, according to the UN Population Division, the number of deaths globally is estimated to go up from below 60 million deaths per year in 2019 to more than 90 million deaths in 2050 (WPP 2022). Second, change in total number of deaths is a function of changes in age- and disease-specific mortality rates, changes in population size, and changes in age distribution of populations [Cross-reference to Bolongaita et al, WP 2024]. Third, for the world, the crude death rate (CDR) is also increasing. The CDR is simply the total number of deaths divided by the total population exposed to risk in that period. In 2019, the world experienced its lowest crude death rate in the recent millennium at 7.5 deaths per thousand population. In the past, CDR has declined due to impressive reductions in age-specific mortality rates. However, the world is now undergoing a remarkable reversal in CDR trends; the CDR is expected to continuously rise into the foreseeable future due to demographic shifts. Nearly all CIH regions have already experienced their point of lowest CDR, apart from Central Asia which is expected to hit its nadir in 2025 and sub-Saharan Africa in 2048. This reversal is driven primarily by population aging—a phenomenon in which the median age of populations increases—leading to more deaths even if age-specific mortality rates fall. Consequently, despite healthcare advancements, the CDR and age-adjusted mortality rates for NCDs, in particular, will rise, underscoring the dominant influence of demographic shifts on demands on the health system and health outcomes.

Our justification for exploring halving PPD, not the number of premature deaths, is that the probability of premature death is amenable to policies and health investments, while changes in population size and age distribution of populations are not. PPD is therefore a policy relevant outcome and easier to communicate to decision makers and citizens than many other indicators.

Implications

Despite the choice of measuring PPD, the rising CDR has clear implications for policy and planning. CDR can be used as a rough indicator of demands on the health system, indicating increasing demand and needs in most regions, especially in older age groups. This will inevitably lead to increasing health system costs so that increased investments are needed just to keep steady state of mortality reduction. In addition, the inversion of the population pyramid will shift the age dependence ratio (ratio of working age to dependent population), so that domestic resource mobilization through taxation on health insurance will be harder. This shift will also have an impact on labour markets, leading to relative shortage of health personnel of different kinds.

Conclusion

Is halving probability of premature death and improving quality of life at all ages by 2050 feasible? Yes. Will it happen? Not without serious extra effort.

In this study we found that among the 30 most populous countries, seven countries did accomplish halving PPD over three decades in the last half century and eight countries have an implied rate of improvement towards 2050 that, if sustained, would lead to a halving of premature death. This shows that “50 by 50” is feasible. Substantial investments in health are needed to sustain or accelerate the rate of improvement for high- and medium performing countries. Historical evidence indicates that a limited set of interventions that address a relatively small number of diseases, injuries, and risk factors can substantially boost progress on reducing PPD. Particular attention to “countries of concern” is needed. These countries with very low or negative rate of improvement in PPD include Syria, USA, Costa Rica, Cuba, Jamaica, Mexico, and Venezuela.

Figures

Figure 1: Regions as classified by the Third Commission on Investing in Health (CIH3).

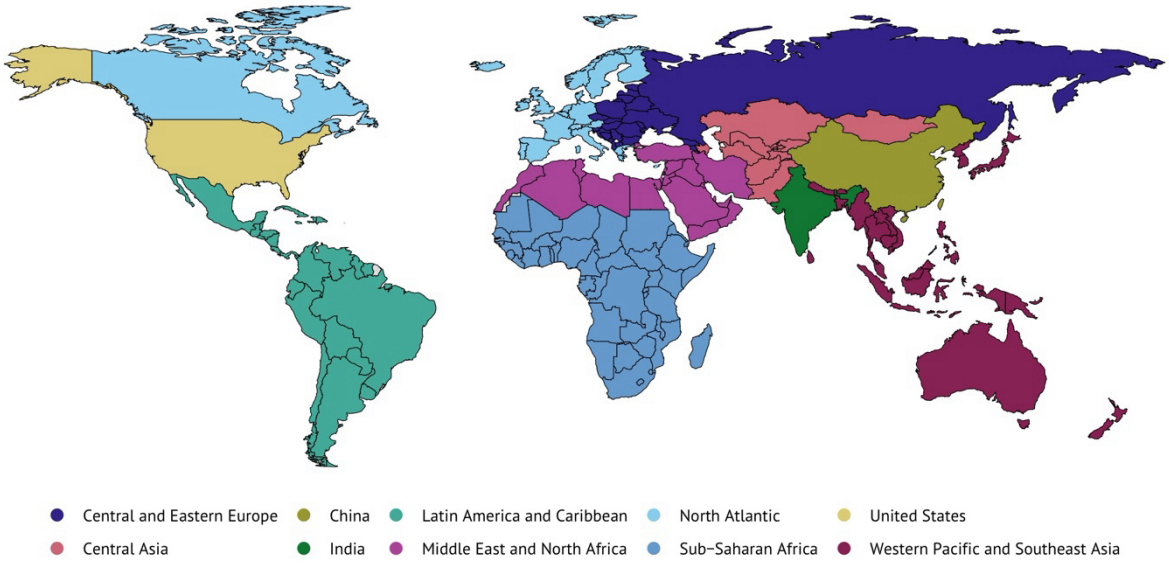
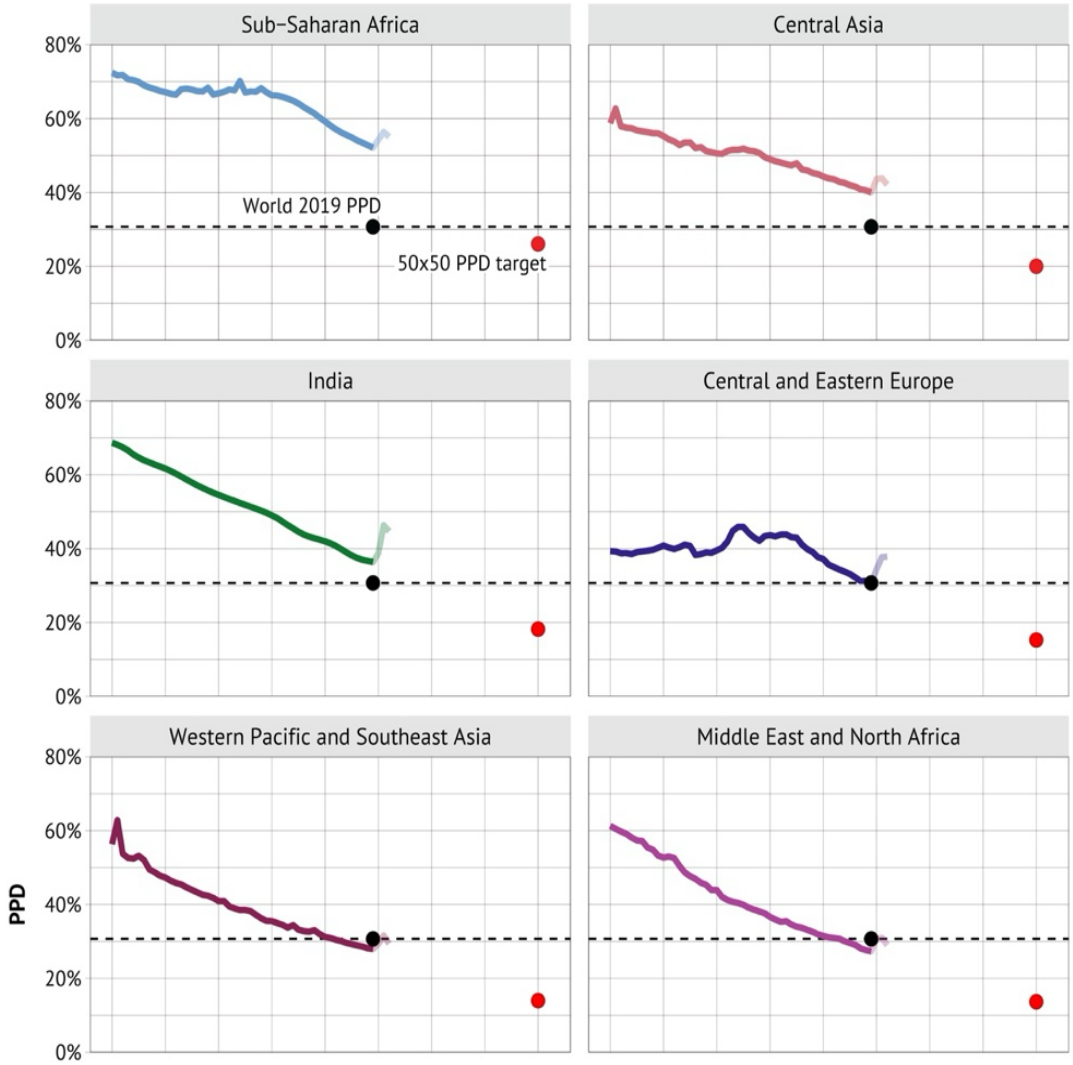
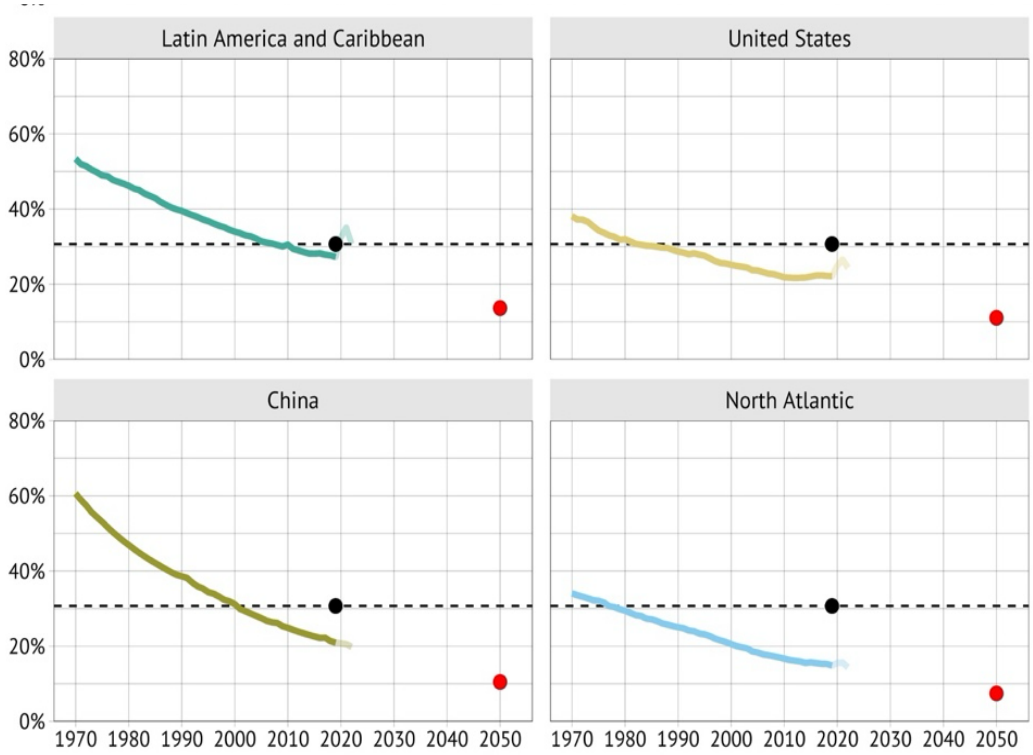


Figure 2. Progress in probability of premature death (PPD) by CIH region, both sexes, 1970-2021.





Pandemic years 2019-21 marked in lighter tone. The horizontal dashed line shows PPD for the world in 2019. The red dot indicates halved PPD in year 2050 compared to 2019.

Figure 3: Age-specific mortality trends, both sexes, 1970-2019, 30 most populous countries

Panel A: Probability of premature death (dying between ages 0 and 69)

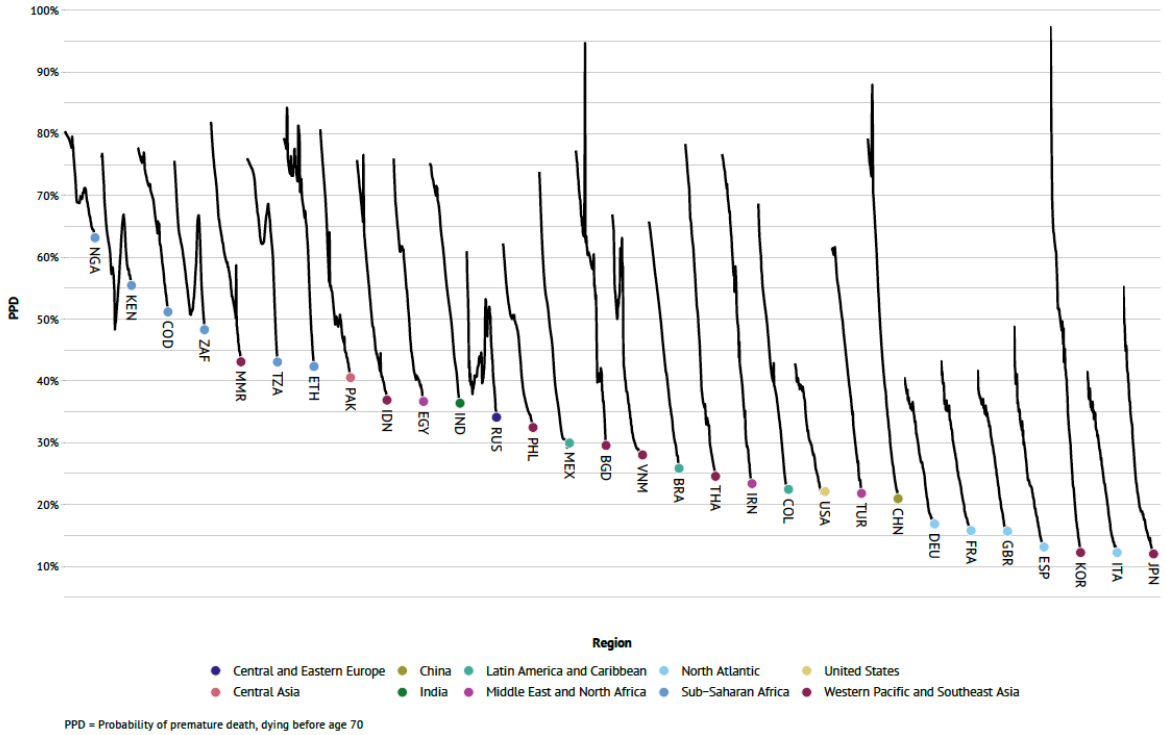
Panel B: Probability of dying between ages 0 and 14

Panel C: Probability of dying between ages 15 and 49, conditional on being alive at 15

Panel D: Probability of dying between ages 50 and 69, conditional on being alive at 50

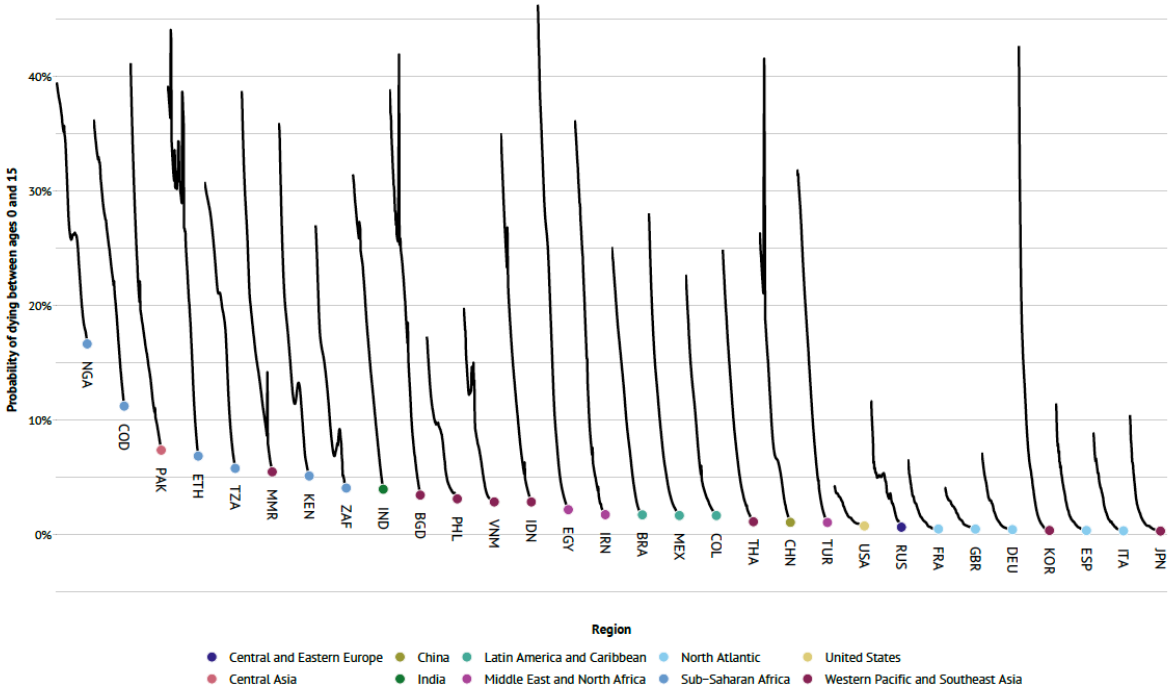
Countries are ranked by Probability of Premature Death (PPD) in 2019.

Panel A: Probability of premature death (dying between ages 0 and 69)

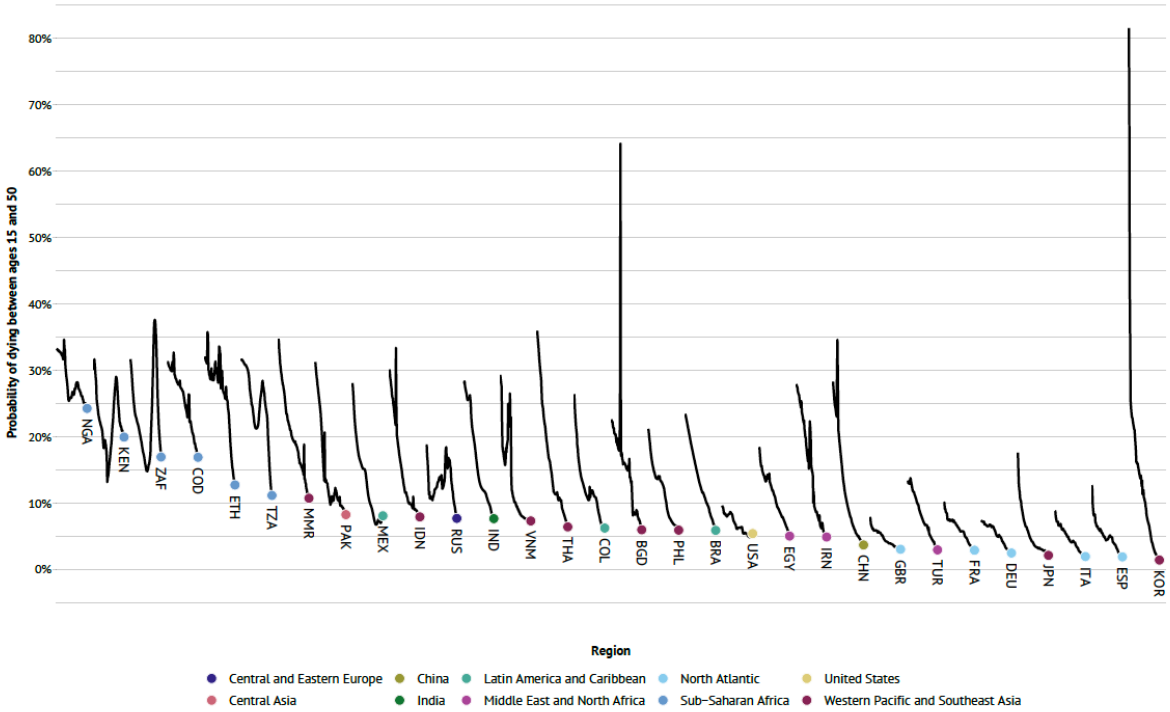


(Note: Bangladesh had civil war in 1971, we may want to change to five-year averages)

Panel B: Probability of dying between ages 0 and 14



Panel C: Probability of dying between ages 15 and 49, conditional on being alive at 15



Panel D: Probability of dying between ages 50 and 69, conditional on being alive at 50

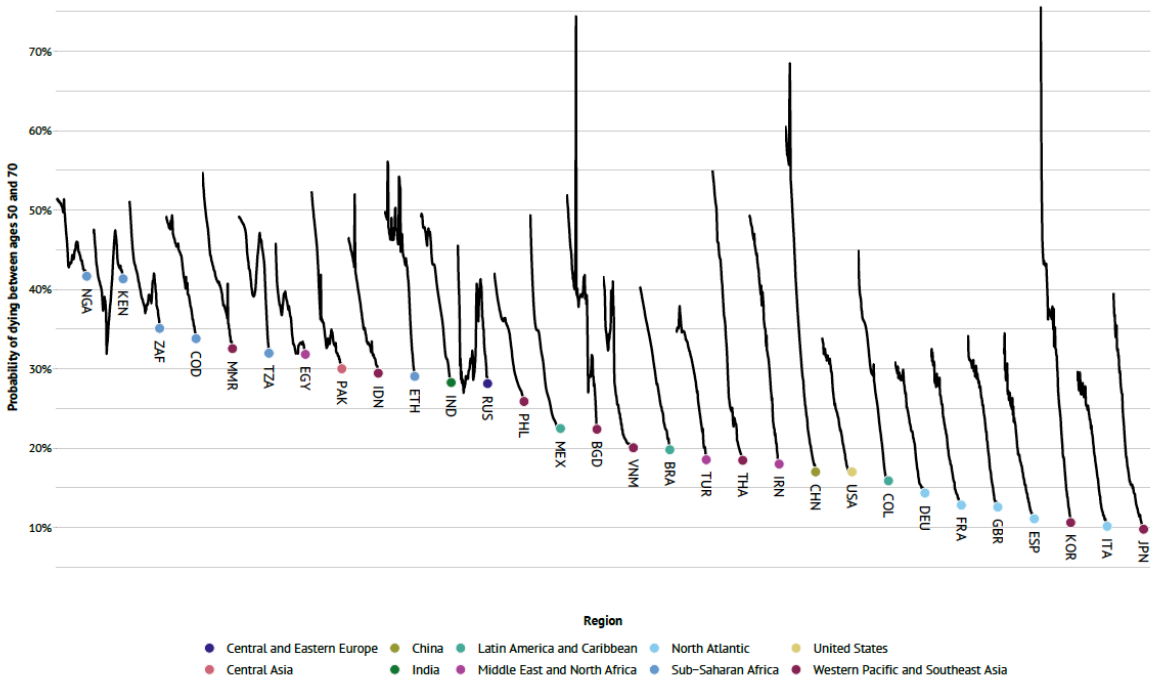


Figure 4. Seven of the 30 most populous countries achieved halving of Probability of Premature Death (PPD) over a period of 31 years or less in the last half century.

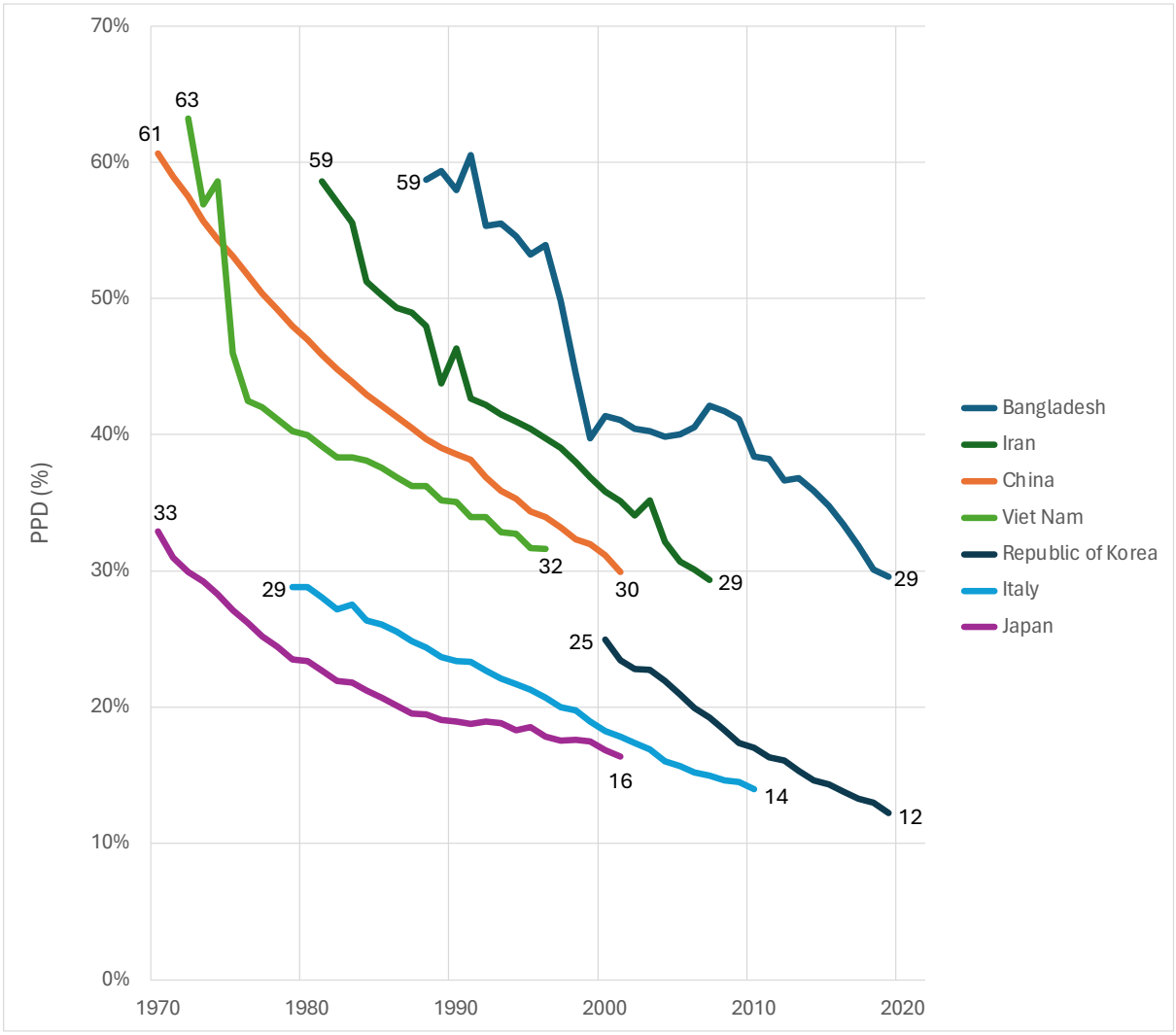
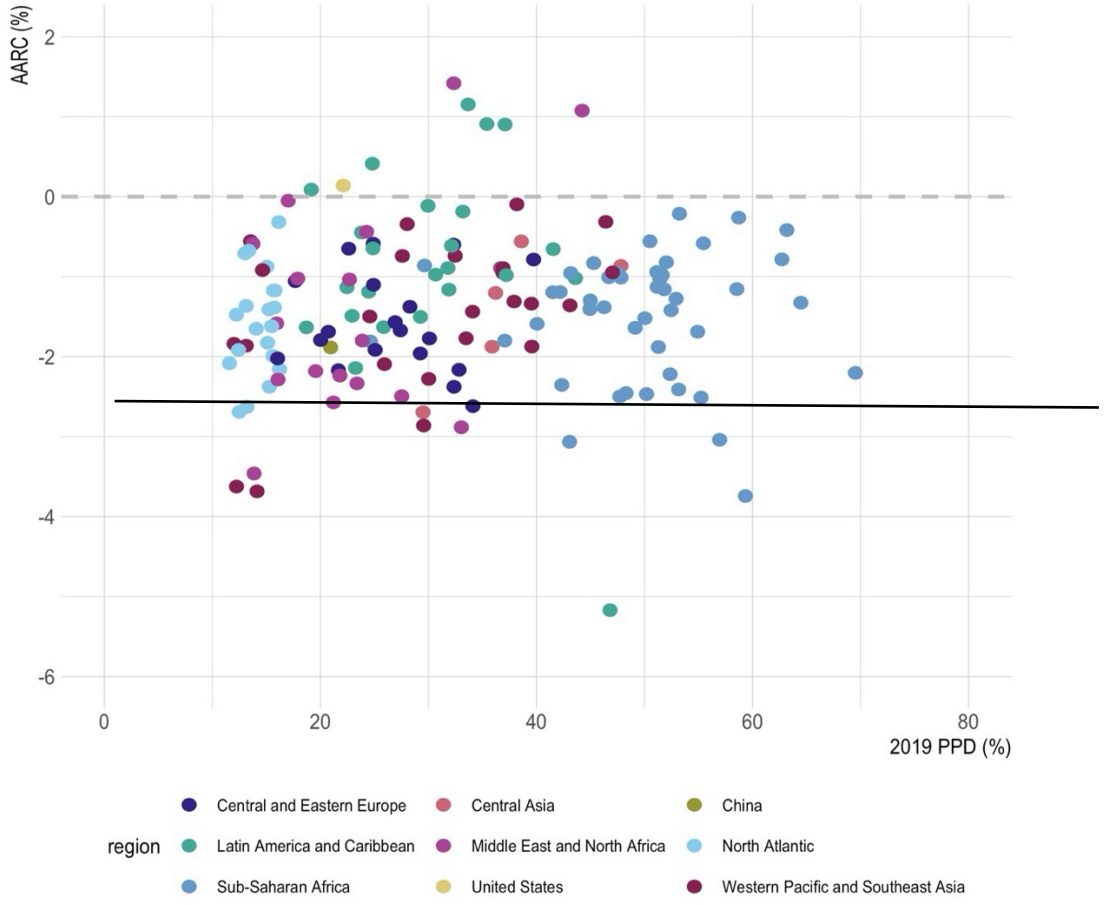


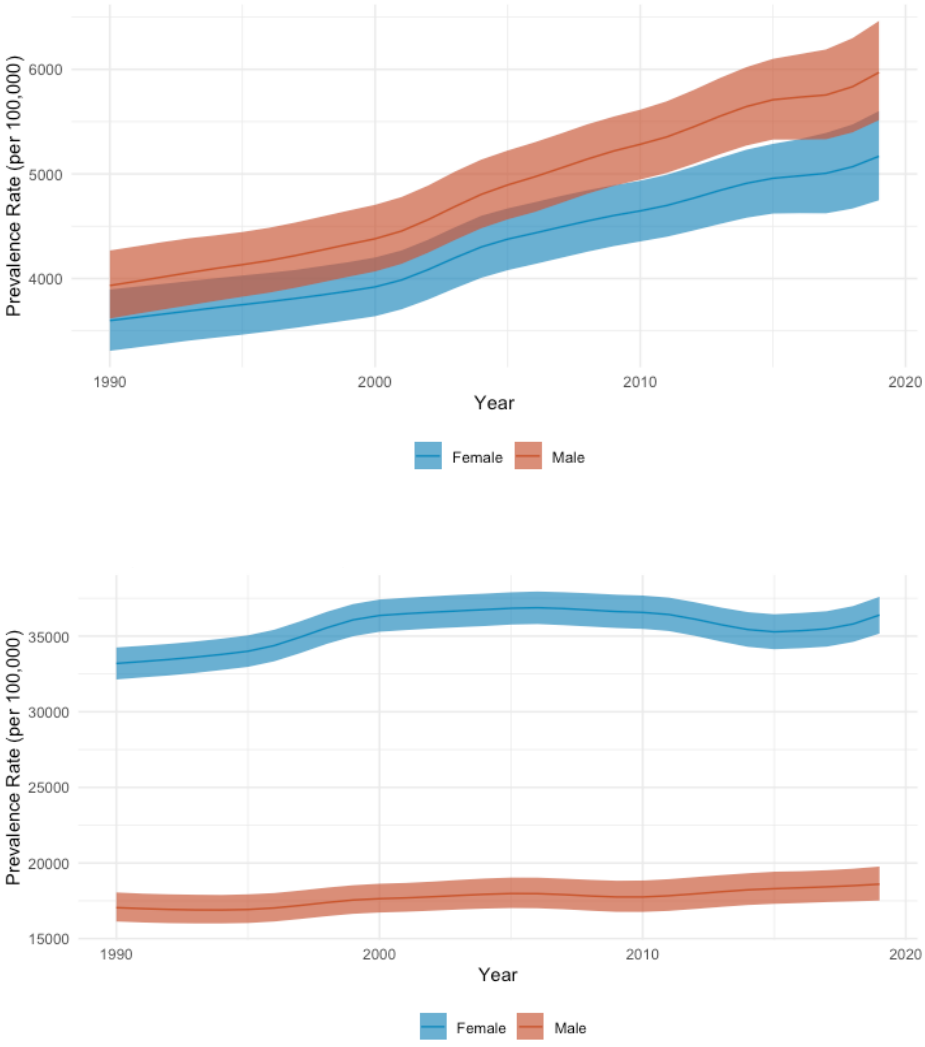
Figure 5. Scatterplot of level of probability of premature death (PPD) in 2019 and average annual rate of change (AARC) between 2010-2019.



Colour coded by CIH3 region.

Horizontal dotted line at 0% AARC and solid line at -2.2% (required to achieve halving in 31 years from 2109-2050).

Figure 6. Age-Standardized Prevalence between 1990-2019 for (A) Diabetes Mellitus (B) Anemia.



Tables

Table 1: Probability of premature death (PPD) and average annualized rate of change (AARC) 2010-2019 in CIH regions and for the World, both sexes combined, 2019. Regions ranked by level of PPD.

Region	PPD	AARC
Sub-Saharan Africa	52%	1.4%
Central Asia	40%	1.1%
India	36%	1.6%
Central and Eastern Europe	31%	2.2%
Western Pacific and Southeast Asia	28%	1.2%
Middle East and North Africa	27%	1.6%
Latin America and Caribbean	27%	1.2%
United States	22%	-0.1%
China	21%	1.9%
North Atlantic	15%	1.3%
World	**31%**	**1.4%**

Table 2: Level of PPD in 2019, average annual rate of change in the period 2010-19, and implied rate of change by 2050 (if AARC is sustained) in the 30 most populous countries

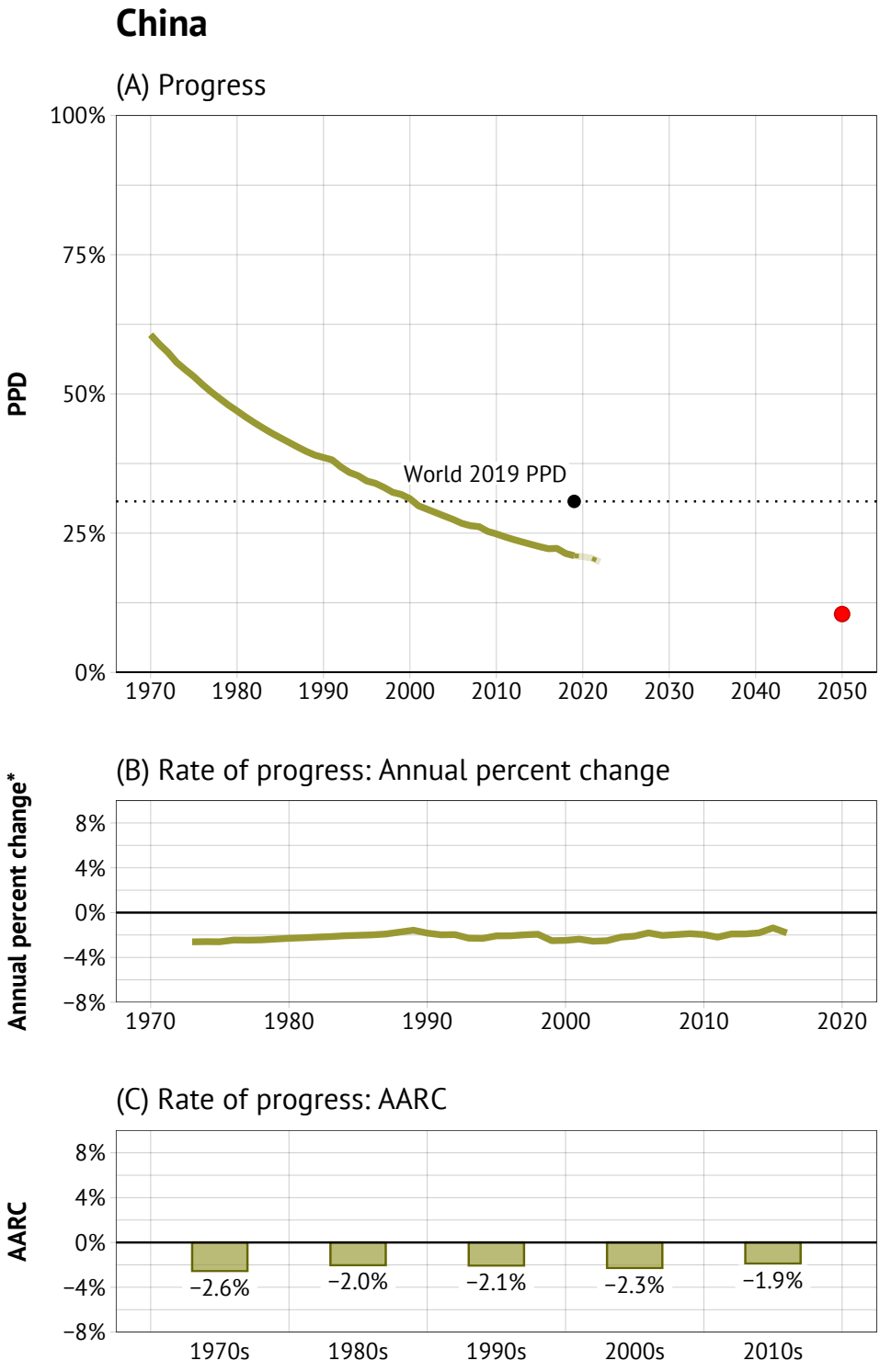
Country	PPD in 2019	AARC in 2010-19	Implied reduction in PPD in 2050, compared to 2019 level
Republic of Korea*	12%	3.7%	69%
United Republic of Tanzania*	43%	3.1%	62%
Bangladesh*	30%	2.9%	60%
Russia*	34%	2.7%	57%
South Africa*	48%	2.5%	54%
Ethiopia*	42%	2.4%	53%
Iran*	23%	2.4%	52%
Turkey*	22%	2.3%	51%
China**	21%	1.9%	45%
Japan**	12%	1.9%	44%
Brazil**	26%	1.6%	40%
India**	36%	1.6%	39%
Thailand**	25%	1.5%	38%
Italy**	12%	1.5%	37%
Spain**	13%	1.4%	35%
Myanmar**	43%	1.4%	35%
United Kingdom**	16%	1.2%	31%
France**	16%	1.2%	31%
Colombia**	23%	1.1%	30%
Democratic Republic of the Congo**	51%	1.1%	30%
Pakistan***	41%	0.9%	25%
Indonesia***	37%	0.9%	24%
Egypt***	37%	0.9%	24%
Germany***	17%	0.9%	23%
Philippines***	33%	0.7%	21%
Kenya***	55%	0.6%	17%
Nigeria***	63%	0.4%	12%
Viet Nam***	28%	0.3%	10%
Mexico***	30%	0.1%	3%

United States of America***	22%	-0.1%	-4%
World	**31%**	**1.4%**	**35%**

Ranked according to AARC in 2010-19. * = countries with AARC better than 2.2%; ** = countries with AARC between 2.2% and 1.0%; *** = Countries with AARC worse than 1.0%. Implied reduction in PPD in 2050 was calculated by assuming the same AARC in 2010-19 for the next 31 years until 2050.

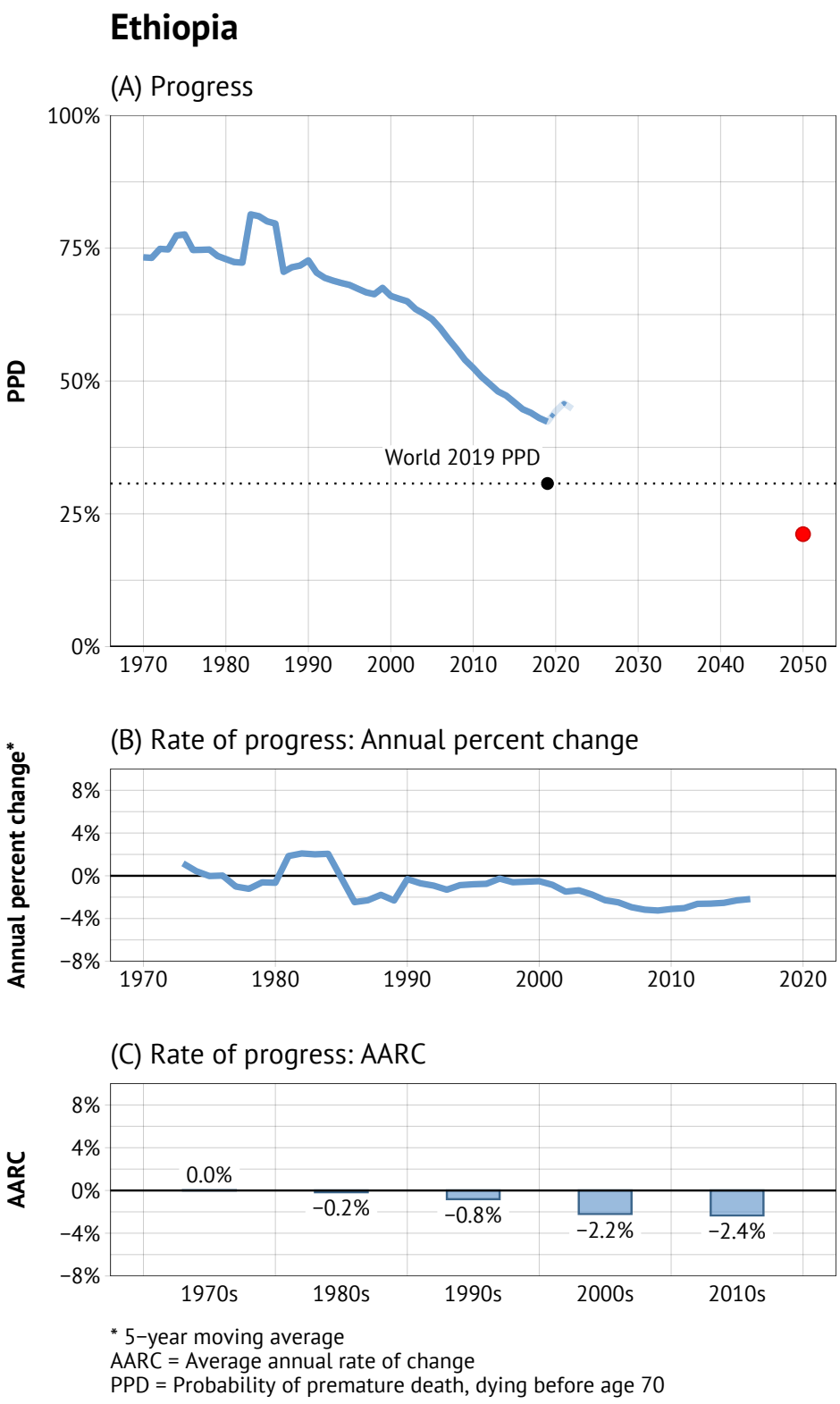
Panel Figures A-E

Figure A: PPD in China (1970-2019), annual percent change (5-year moving average), and AARC per decade, both sexes combined.



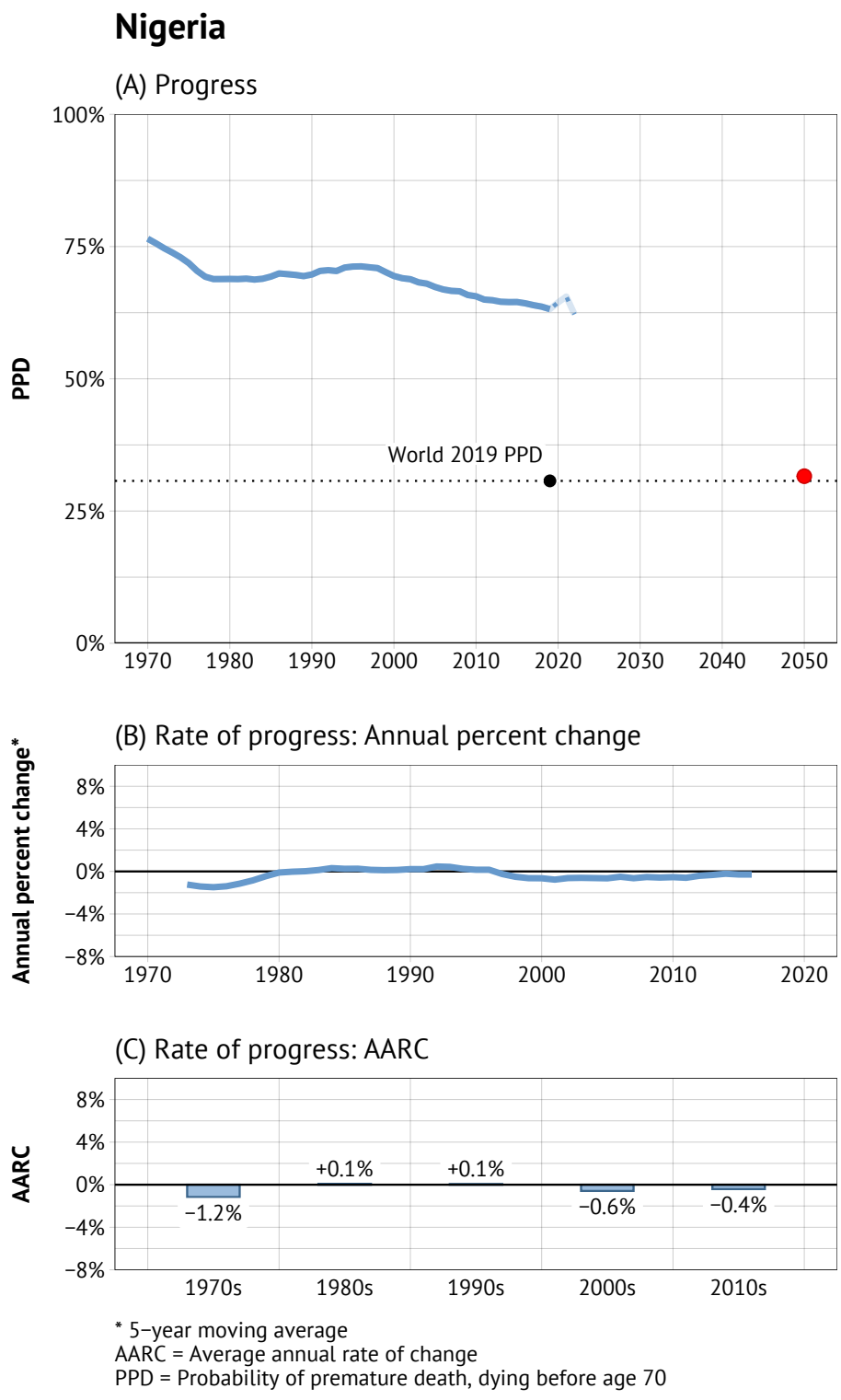
* 5−year moving average
AARC = Average annual rate of change
PPD = Probability of premature death, dying before age 70

Figure B: PPD in Ethiopia (1970-2019), annual percent change (5-year moving average), and AARC per decade, both sexes combined.



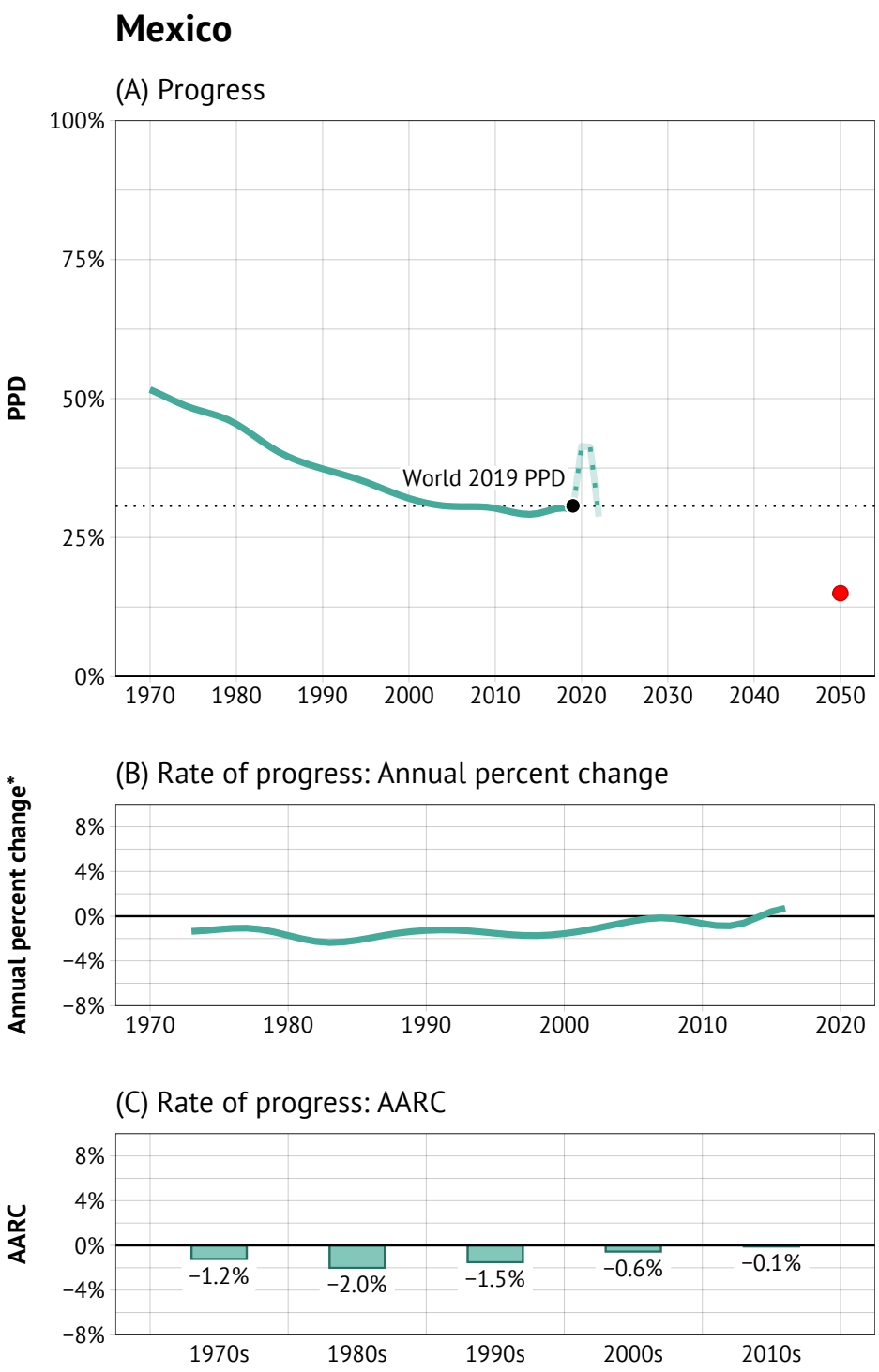
* 5−year moving average
AARC = Average annual rate of change
PPD = Probability of premature death, dying before age 70

Figure C: PPD in Nigeria (1970-2019), annual percent change (5-year moving average), and AARC per decade, both sexes combined.



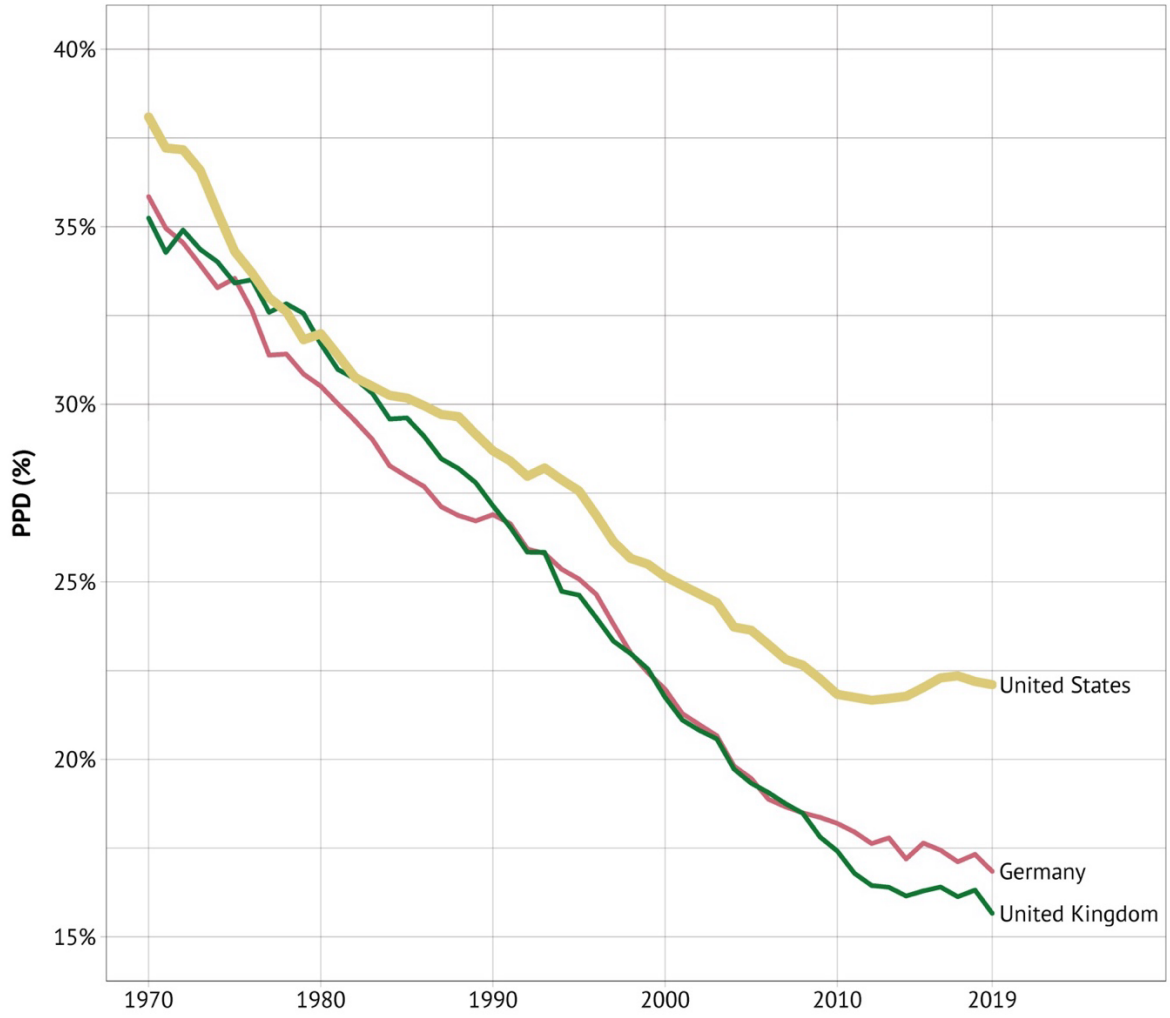
* 5−year moving average
AARC = Average annual rate of change
PPD = Probability of premature death, dying before age 70

Figure D: PPD in Mexico (1970-2019), annual percent change (5-year moving average), and AARC per decade, both sexes combined.



* 5−year moving average
AARC = Average annual rate of change
PPD = Probability of premature death, dying before age 70

Figure E: United States versus Germany and UK country progress in PPD and average rates of progress during various decades.



Average annual rate of progress in % in reducing PPD by decade

	1970-1980	1980-1990	1990-2000	2000-2010	2010-2019
United States	1.7	1.1	1.3	1.4	-0.1
Average of Germany and the United Kingdom	1.3	1.4	2.1	2.0	1.0

References

1. Peto R, Lopez AD, Norheim OF. Halving premature death. *Science* 2014; **345**(6202): 1272.
2. Norheim OF, Jha P, Admasu K, et al. Avoiding 40% of the premature deaths in each country, 2010-30: review of national mortality trends to help quantify the UN sustainable development goal for health. *Lancet* 2015; **385**(9964): 239-52.
3. Jamison DT, Summers LH, Alleyne G, et al. Global health 2035: a world converging within a generation. *Lancet* 2013; **382**(9908): 1898-955.
4. Watkins DA, Yamey G, Schaferhoff M, et al. Alma-Ata at 40 years: reflections from the Lancet Commission on Investing in Health. *Lancet* 2018; **392**(10156): 1434-60.
5. Salomon JA, Wang H, Freeman MK, et al. Healthy life expectancy for 187 countries, 1990-2010: a systematic analysis for the Global Burden Disease Study 2010. *Lancet* 2012; **380**(9859): 2144-62.
6. Chang AY, Skirbekk VF, Tyrovolas S, Kassebaum NJ, Dieleman JL. Measuring population ageing: an analysis of the Global Burden of Disease Study 2017. *Lancet Public Health* 2019; **4**(3): e159-e67.
7. Qiao J, Wang Y, Li X, et al. A Lancet Commission on 70 years of women's reproductive, maternal, newborn, child, and adolescent health in China. *Lancet* 2021; **397**(10293): 2497-536.
8. Yip W, Fu H, Chen AT, et al. 10 years of health-care reform in China: progress and gaps in Universal Health Coverage. *Lancet* 2019; **394**(10204): 1192-204.
9. Gruber J, Lin M, J. Y. The largest insurance expansion in history: saving one million lives per year in china: NBER, 2023.
10. Yip W, Fu H, Jian W, et al. Universal health coverage in China part 1: progress and gaps. *Lancet Public Health* 2023; **8**(12): e1025-e34.
11. Yip W, Fu H, Jian W, et al. Universal health coverage in China part 2: addressing challenges and recommendations. *Lancet Public Health* 2023; **8**(12): e1035-e42.
12. Assefa Y, Damme WV, Williams OD, Hill PS. Successes and challenges of the millennium development goals in Ethiopia: lessons for the sustainable development goals. *BMJ Glob Health* 2017; **2**(2): e000318.
13. The World Bank. GDP per capita (current US$) - Ethiopia. https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=ET (accessed March 21st 2024).
14. Federal Democratic Republic of Ethiopia National Planning Commission. Ethiopia's progress towards erradicating poverty: an interim report on 2015/16 poverty analysis study. 2017.
15. The World Bank. Literacy rate, adult total (% of people ages 15 and above) - Ethiopia. https://data.worldbank.org/indicator/SE.ADT.LITR.ZS?locations=ET (accessed March 21st 2024).
16. WHO and UNICEF JMP. WASH Data-Ethiopia https://washdata.org/data/household#!/table?geo0=country&geo1=ETH (accessed March 21st 2024).
17. The World Bank. Fertility rate, total (births per woman) - Ethiopia. https://data.worldbank.org/indicator/SP.DYN.TFRT.IN?locations=ET (accessed March 21st 2024).
18. Gonzalez-Pier E, Barraza-Llorens M, Beyeler N, et al. Mexico's path towards the Sustainable Development Goal for health: an assessment of the feasibility of reducing premature mortality by 40% by 2030. *Lancet Glob Health* 2016; **4**(10): e714-25.

19. Campos-Nonato I, Galván-Valencia O, Hernández-Barrera L, Oviedo-Solís C, S. B. Prevalence of obesity and associated risk factors in Mexican adults: results of the Ensanut 2022. *Salud Publica Mexico* 2023; (65): S238-S47.
20. Basto-Abreu A L-ON, Rojas-Martínez R, Aguilar-Salinas CA, Moreno-Banda GL, Carnalla M, Rivera JA, Romero-Martínez M, Barquera S, Barrientos-Gutiérrez T. Prevalence of prediabetes and diabetes in Mexico: Ensanut 2022. *Salud Publica Mexico* 2023; (65): S163-S8.
21. Campos-Nonato I, Oviedo-Solís C, Vargas-Meza J, et al. Prevalence, treatment and control of hypertension in Mexican adults: results of the Ensanut 2022. *Salud Publica Mexico* 2023; (65): S169-S80.
22. Institute of Medicine and National Research Council. U.S. Health in International Perspective: Shorter Lives, Poorer Health. Washington (DC); 2013.
23. Reynales-Shigematsu LM, Guerrero-Lopez CM, Hernandez Avila M, Irving H, Jha P. Divergence and convergence in cause-specific premature adult mortality in Mexico and US Mexican Hispanics from 1995 to 2015: analyses of 4.9 million individual deaths. *Int J Epidemiol* 2018; **47**(1): 97-106.
24. Chen Y, Freedman ND, Rodriquez EJ, et al. Trends in Premature Deaths Among Adults in the United States and Latin America. *JAMA Netw Open* 2020; **3**(2): e1921085.
25. Hummer RA, Hernandez EM. The Effect of Educational Attainment on Adult Mortality in the United States. *Popul Bull* 2013; **68**(1): 1-16.
26. Feldman JM, Bassett MT. Variation in COVID-19 Mortality in the US by Race and Ethnicity and Educational Attainment. *JAMA Netw Open* 2021; **4**(11): e2135967.
27. Case A, Deaton A. The Great Divide: Education, Despair, and Death. *Annu Rev Econom* 2022; **14**: 1-21.
28. Jha P, Peto R, Zatonski W, Boreham J, Jarvis MJ, Lopez AD. Social inequalities in male mortality, and in male mortality from smoking: indirect estimation from national death rates in England and Wales, Poland, and North America. *Lancet* 2006; **368**(9533): 367-70.
29. Obama B. United States Health Care Reform: Progress to Date and Next Steps. *JAMA* 2016; **316**(5): 525-32.
30. Mathers CD, Sadana R, Salomon JA, Murray CJ, Lopez AD. Healthy life expectancy in 191 countries, 1999. *Lancet* 2001; **357**(9269): 1685-91.
31. Haacker M. Contributions of declining mortality, overall and from HIV, TB and malaria, to reduced health inequality and inequity across countries. *Health Policy Plan* 2023; **38**(8): 939-48.
32. Ford ES, Ajani UA, Croft JB, et al. Explaining the decrease in U.S. deaths from coronary disease, 1980-2000. *N Engl J Med* 2007; **356**(23): 2388-98.
33. Prabhakaran D, Anand S, Watkins D, et al. Cardiovascular, respiratory, and related disorders: key messages from Disease Control Priorities, 3rd edition. *Lancet* 2018; **391**(10126): 1224-36.
34. Gunnell D, Fernando R, Hewagama M, Priyangika WD, Konradsen F, Eddleston M. The impact of pesticide regulations on suicide in Sri Lanka. *Int J Epidemiol* 2007; **36**(6): 1235-42.
35. Jamison DT, Alwan A, Mock CN, et al. Universal health coverage and intersectoral action for health: key messages from Disease Control Priorities, 3rd edition. *Lancet* 2018; **391**(10125): 1108-20.
36. Watkins DA, Qi J, Kawakatsu Y, Pickersgill SJ, Horton SE, Jamison DT. Resource requirements for essential universal health coverage: a modelling study based on findings from Disease Control Priorities, 3rd edition. *Lancet Glob Health* 2020; **8**(6): e829-e39.

Appendix Figures and Tables

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Version: May 6, 2024

Figure A1: Probability of dying between ages 0 – 4, both sexes combined, 29170-2019

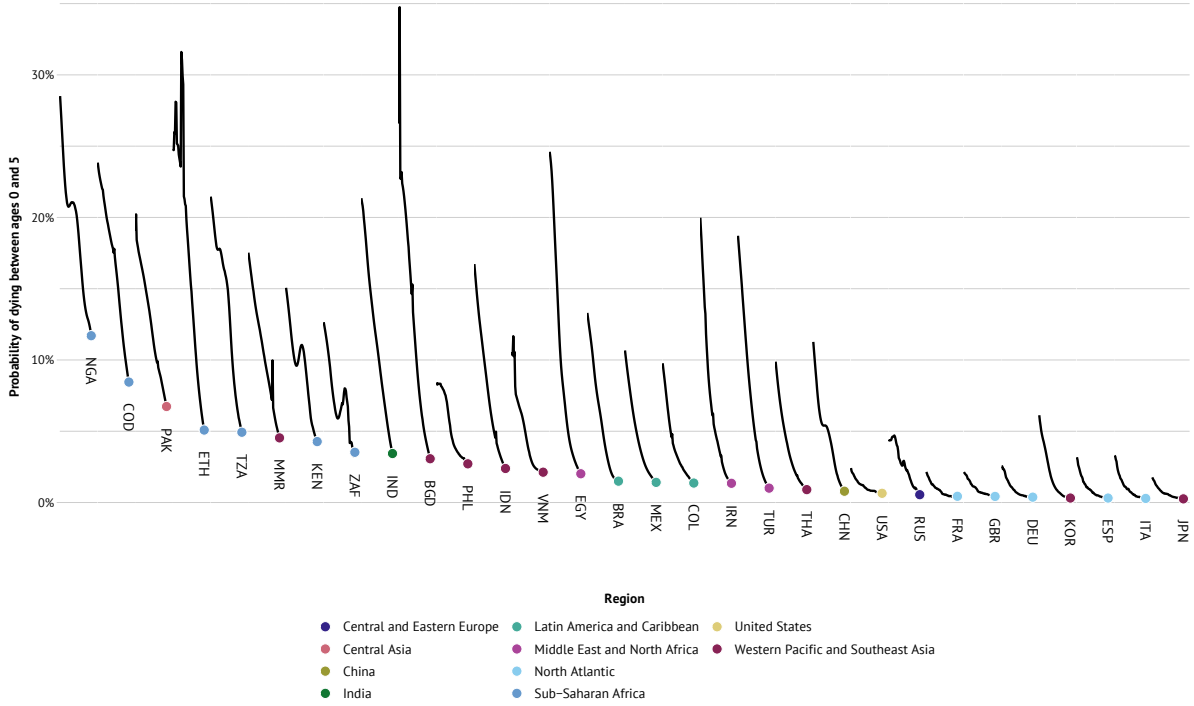


Figure A2. PPD by sex, 1970-2019: (a) USA and (b) Thailand.

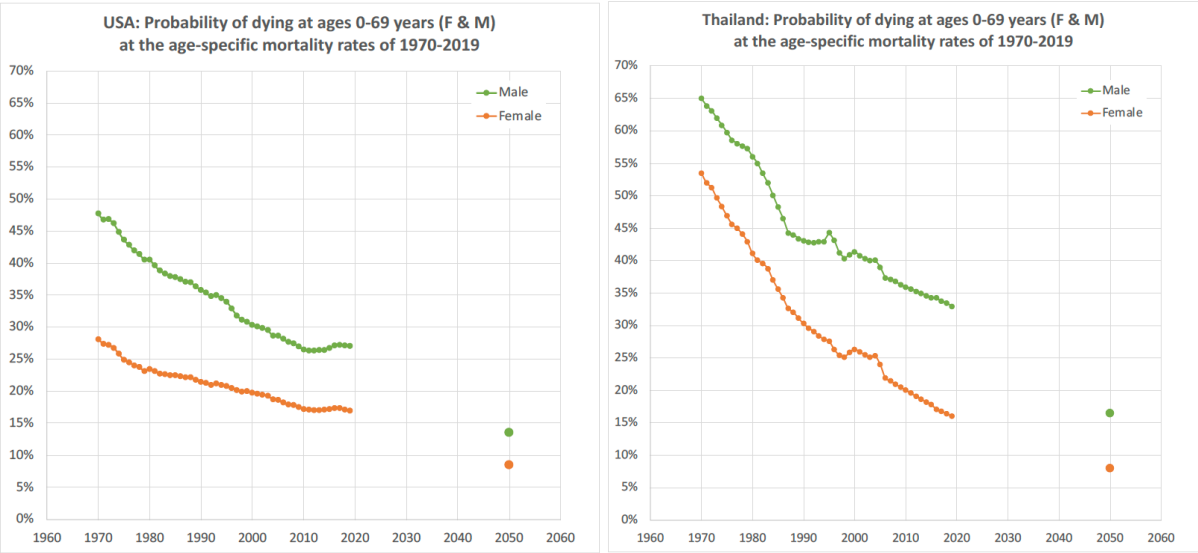


Figure A3: Decomposition of changes in PPD by age groups for the world, both sexes, by decade

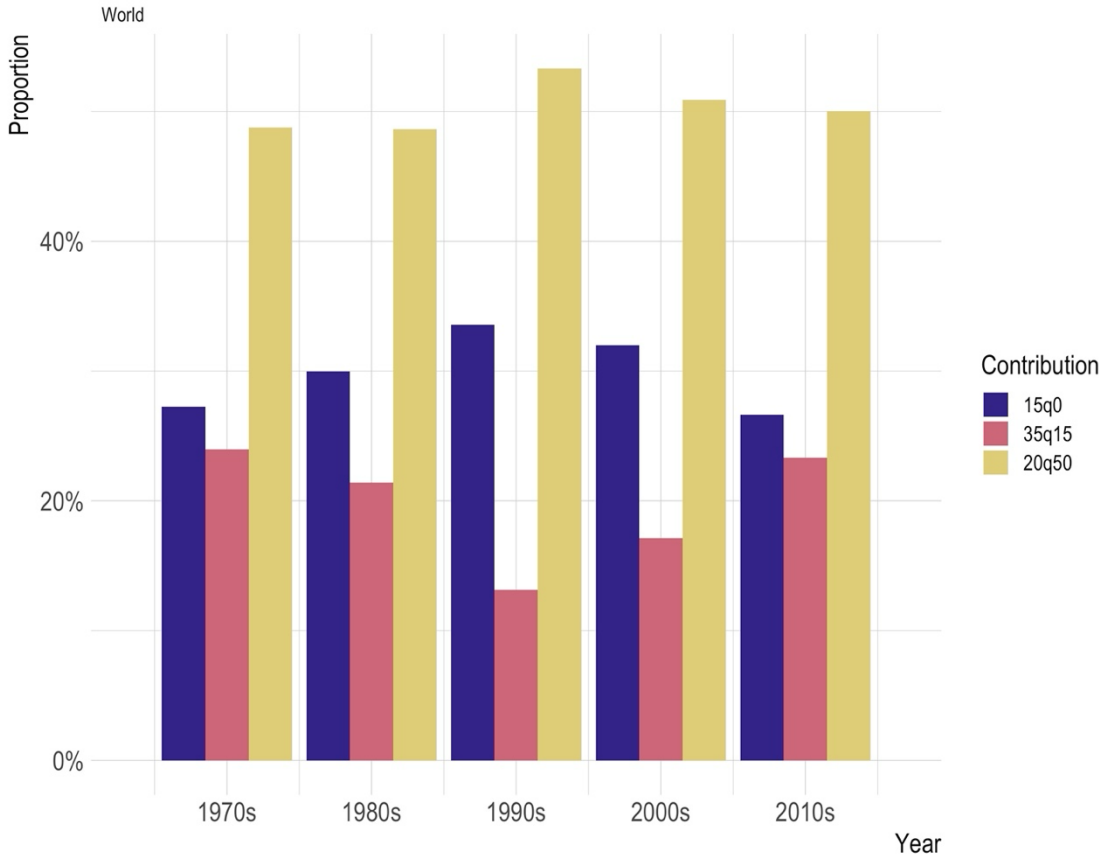
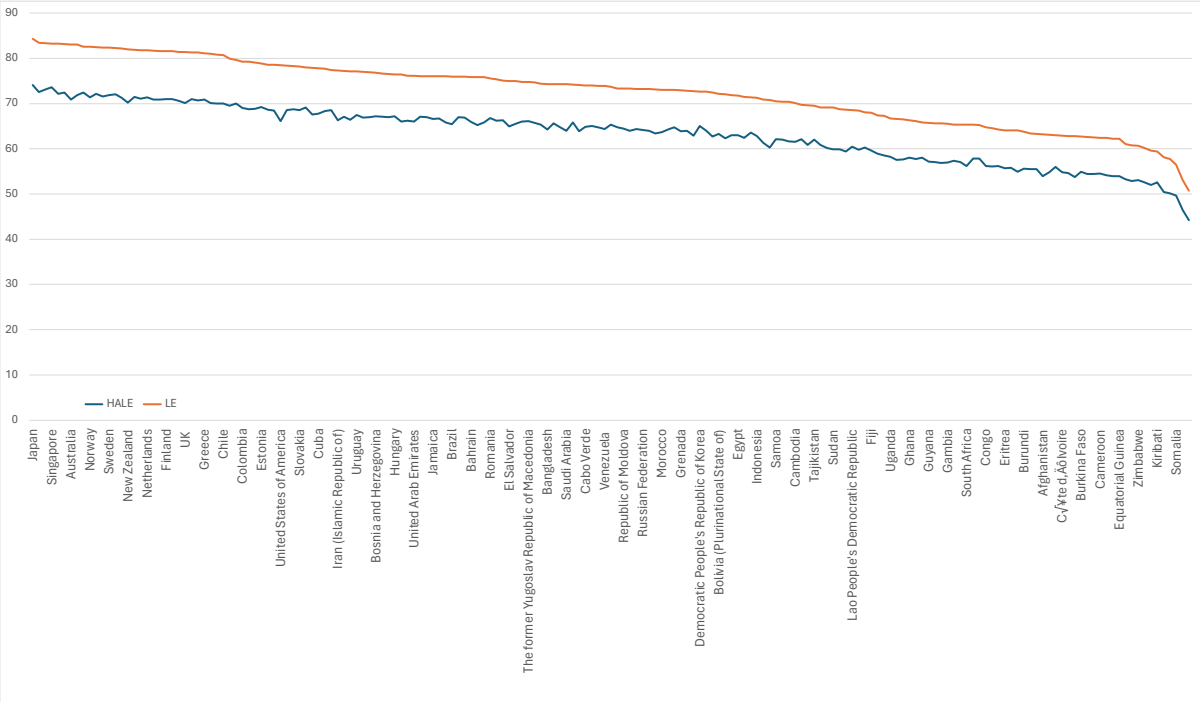


Figure A4. Life expectancy and health-adjusted life expectancy (HALE) at birth, both sexes combined, in 2019.



Ranked from highest to lowest life expectancy (Source WHO, 2020). [All countries are represented in the graph, but not all names are visible. Delete names?]

Table A1. High- and low-performing countries in terms of average annual rate of change (AARC) for PPD.

CIH Regions	Country	Average annual rate of change (2010-19)
Central Asia	Azerbaijan*	-2.7%
	Mongolia*	-2.6%
	Tajikistan*	-2.2%
Central and Eastern Europe	Russian Federation*	-2.7%
	Ukraine*	-2.4%
	Estonia*	-2.3%
Middle East and North Africa	Qatar*	-3.5%
	Iraq*	-2.9%
	Algeria*	-2.6%
	Morocco*	-2.5%
	Iran*	-2.4%
	Kuwait*	-2.3%
	Turkey*	-2.3%
	Oman*	-2.2%
	Libya§	0.0%
	Yemen§	1.1%
	Syrian Arab Republic§	1.4%
Sub-Saharan Africa	Eswatini*	-3.8%
	United Republic of Tanzania*	-3.1%
	Zimbabwe*	-3.1%
	Namibia*	-2.5%
	Botswana*	-2.5%
	Zambia*	-2.5%
	South Africa*	-2.5%
	Mozambique*	-2.4%
	Ethiopia*	-2.4%
	Malawi*	-2.3%
	Lesotho*	-2.2%
North Atlantic	Norway*	-2.7%
	Ireland*	-2.7%
	Finland*	-2.4%

Latin America and Caribbean	Haiti*	-5.3%
	Peru*	-2.2%
	Costa Rica§	0.1%
	Cuba§	0.4%
	Jamaica§	0.9%
	Venezuela§	1.2%
Western Pacific and Southeast Asia	Republic of Korea*	-3.7%
	Bangladesh*	-2.9%
	Dem. People's Republic of Korea*	-2.3%
Other	United States of America§	0.1%

* = Countries with AARC better than -2.2%; § = Countries with equal or worse AARC than zero in the period 2010-19, listed by CIH region.

Table A2. The 37 countries that achieved halving of premature death in the last half century (over 31 years or less in the period 1970-2019). Both sexes combined.

	location	Initial year	Initial PPD
1	Algeria	1970	76%
2	Armenia	1988	64%
3	Australia	1970	38%
4	Bahrain	1988	32%
5	Bangladesh	1971	95%
6	Cabo Verde	1986	48%
7	Cambodia	1975	100%
8	Chile	1970	49%
9	China	1970	61%
10	Costa Rica	1970	42%
11	Cyprus	1974	64%
12	El Salvador	1980	71%
13	Iceland	1974	29%
14	Iran	1976	58%
15	Ireland	1978	34%
16	Israel	1973	33%
17	Italy	1973	32%
18	Japan	1970	33%
19	Lebanon	1975	57%
20	Luxembourg	1974	38%
21	Maldives	1970	71%
22	Malta	1970	38%
23	New Zealand	1977	34%
24	Nicaragua	1979	67%
25	Norway	1987	25%

26	Oman	1970	66%
27	Peru	1970	69%
28	Qatar	1982	33%
29	Republic of Korea	2000	25%
30	Saudi Arabia	1970	60%
31	Singapore	1970	43%
32	State of Palestine	1973	91%
33	Sudan	1988	87%
34	Timor-Leste	1976	94%
35	Tunisia	1970	60%
36	United Arab Emirates	1972	50%
37	Viet Nam	1972	63%

Table A3: Age-standardized prevalence and proportions of DALYs due to YLDs, global, 2019

Cause	Global age-standardized prevalence rate per 100k, 2019			Proportion of DALYs from YLDs, age-standardized, global, 2019		
	Both sexes	Female	Male	Both sexes	Female	Male
Oral disorders	44510	45043	43956	1.00	1.00	1.00
Headache disorders	32717	35671	29761	1.00	1.00	1.00
Hemoglobinopathies and hemolytic anemias	27444	36394	18604	0.61	0.68	0.50
Gynaecological diseases	19025	38199	0	0.99	0.99	
Age-related and other hearing loss	17756	16809	18744	1.00	1.00	1.00
Dietary iron deficiency	14106	15319	12945	1.00	1.00	1.00
Intestinal nematode infections	12096	12177	12023	0.92	0.93	0.90
Blindness and vision loss	8687	9096	8246	1.00	1.00	1.00
Fungal skin diseases	7528	7142	7904	1.00	1.00	1.00
Low back pain	6973	7949	5942	1.00	1.00	1.00
Vitamin A deficiency	6956	5999	7886	1.00	1.00	1.00
Endocrine, metabolic, blood, and immune disorders	6420	8441	4372	0.79	0.84	0.70
Osteoarthritis	6348	7278	5324	1.00	1.00	1.00
Anxiety disorders	3780	4695	2860	1.00	1.00	1.00
Dermatitis	3653	4152	3161	1.00	1.00	1.00
Depressive disorders	3440	4158	2713	1.00	1.00	1.00
Upper respiratory infections	3102	3056	3148	0.92	0.93	0.91

Acne vulgaris	3073	3486	2676	1.00	1.00	1.00
Neck pain	2697	3032	2352	1.00	1.00	1.00
Scabies	2458	2451	2464	1.00	1.00	1.00
Gallbladder and biliary diseases	2351	3237	1447	0.64	0.69	0.54
Iodine deficiency	2216	2872	1563	1.00	1.00	1.00
Viral skin diseases	2075	2045	2105	1.00	1.00	1.00
Schistosomiasis	1805	1754	1856	0.75	0.80	0.70
Otitis media	1600	1477	1719	0.98	0.99	0.98
Idiopathic developmental intellectual disability	1427	1415	1436	1.00	1.00	1.00
Alcohol use disorders	1326	602	2056	0.63	0.73	0.61
Attention-deficit/hyperactivity disorder	1132	631	1612	1.00	1.00	1.00
Pruritus	934	1050	816	1.00	1.00	1.00
Lymphatic filariasis	910	804	1015	1.00	1.00	1.00
Urticaria	866	1029	705	1.00	1.00	1.00
Gout	652	304	1032	1.00	1.00	1.00

DALYs = Disability-Adjusted Life Years. YLD = Years Lived with Disability. Source: GBD.

Table A3 Probability of premature death in 2019 for all countries and average annual rate of change (AARC) in the period 2010-19, by age group and sex.

	Female								Male							
	Probability of death in 2019				AARC (2010-19)				Probability of death In 2019				AARC (2010-19)			
	0-14	15-49	50-69	0-69	0-14	15-49	50-69	0-69	0-14	15-49	50-69	0-69	0-14	15-49	50-69	0-69
World	4%	6%	17%	25%	-3.3%	-2.0%	-1.2%	-1.6%	5%	9%	27%	36%	-3.0%	-1.7%	-1.0%	-1.2%
Afghanistan	7%	10%	29%	41%	-4.6%	-2.9%	-1.2%	-1.7%	7%	19%	39%	55%	-4.1%	1.6%	-0.4%	-0.3%
Albania	1%	2%	10%	13%	-3.2%	-2.8%	-0.5%	-1.0%	1%	3%	19%	22%	-3.9%	-4.3%	-0.4%	-1.0%
Algeria	3%	3%	13%	18%	-2.1%	-3.9%	-3.4%	-3.2%	3%	5%	18%	24%	-2.0%	-3.0%	-2.3%	-2.2%
Angola	8%	12%	31%	44%	-5.6%	-3.4%	-1.2%	-1.9%	10%	18%	41%	56%	-5.2%	-2.4%	-0.7%	-1.3%
Argentina	1%	3%	14%	17%	-3.3%	-3.2%	-1.5%	-1.8%	1%	6%	26%	31%	-3.4%	-1.7%	-0.7%	-0.9%
Armenia	1%	2%	14%	17%	-5.1%	-3.4%	-2.2%	-2.4%	1%	7%	35%	40%	-5.3%	-2.2%	-0.9%	-1.1%
Australia	0%	2%	8%	10%	-2.6%	-0.1%	-0.5%	-0.5%	0%	4%	13%	17%	-3.7%	0.3%	-0.6%	-0.5%
Austria	0%	2%	9%	11%	-2.9%	-1.9%	-1.0%	-1.2%	1%	3%	16%	19%	-1.7%	-2.8%	-2.2%	-2.2%
Azerbaijan	2%	4%	18%	22%	-6.9%	-1.8%	-2.6%	-2.7%	3%	8%	30%	37%	-6.6%	-2.3%	-2.8%	-2.7%
Bahamas	4%	9%	22%	31%	8.4%	2.0%	1.2%	1.7%	4%	13%	32%	43%	6.7%	-0.4%	0.4%	0.4%
Bahrain	1%	2%	11%	14%	-2.5%	-2.9%	-1.7%	-1.8%	1%	2%	15%	18%	-2.2%	-2.2%	-1.5%	-1.6%
Bangladesh	3%	5%	17%	24%	-5.6%	-3.9%	-4.0%	-3.8%	4%	7%	27%	35%	-5.5%	-2.4%	-2.0%	-2.1%
Barbados	1%	4%	12%	17%	-2.1%	-1.2%	-1.1%	-1.1%	2%	6%	20%	26%	-1.9%	-1.3%	-1.1%	-1.1%
Belarus	0%	3%	16%	18%	-6.8%	-4.2%	-2.1%	-2.4%	0%	10%	42%	48%	-7.1%	-4.4%	-1.7%	-1.9%
Belgium	0%	2%	10%	12%	-0.1%	-3.0%	-1.4%	-1.6%	1%	3%	16%	19%	-1.9%	-2.7%	-2.3%	-2.2%
Belize	1%	4%	20%	24%	-4.5%	-3.7%	-0.9%	-1.4%	2%	9%	33%	40%	-4.7%	-2.4%	0.6%	-0.1%
Benin	11%	15%	31%	48%	-2.1%	-0.8%	-0.4%	-0.7%	12%	17%	36%	53%	-1.9%	-0.6%	-0.3%	-0.5%
Bhutan	3%	5%	22%	28%	-4.7%	-3.7%	-1.8%	-2.2%	4%	7%	31%	38%	-4.2%	-3.1%	-1.1%	-1.5%
Bolivia	4%	7%	26%	34%	-3.3%	-1.1%	-0.6%	-0.9%	5%	11%	39%	49%	-2.8%	-0.9%	-0.3%	-0.5%
Bosnia and Herzegovina	1%	1%	15%	17%	-2.0%	-2.8%	0.3%	0.0%	1%	2%	27%	29%	-2.7%	-4.9%	-0.8%	-1.1%
Botswana	5%	11%	31%	42%	-1.4%	-7.0%	-3.0%	-3.2%	6%	17%	42%	54%	-1.4%	-5.0%	-1.7%	-1.9%
Brazil	2%	4%	14%	18%	-2.9%	-3.0%	-1.9%	-2.0%	2%	8%	26%	33%	-3.2%	-3.0%	-1.0%	-1.3%
Brunei Darussalam	1%	4%	18%	23%	1.3%	-0.7%	0.0%	-0.1%	1%	6%	28%	33%	1.7%	-0.5%	0.0%	0.0%
Bulgaria	1%	3%	16%	19%	-4.0%	-1.5%	-0.3%	-0.6%	1%	7%	34%	40%	-6.4%	-1.0%	-0.2%	-0.4%
Burkina Faso	10%	14%	31%	47%	-3.5%	-1.7%	-0.9%	-1.3%	11%	18%	40%	57%	-3.2%	-0.9%	-0.5%	-0.8%
Burundi	8%	14%	30%	45%	-5.2%	-3.2%	-1.8%	-2.1%	9%	19%	37%	53%	-4.4%	-1.8%	-1.0%	-1.3%
Cabo Verde	2%	3%	11%	15%	-5.7%	-3.0%	-1.9%	-2.4%	2%	9%	27%	35%	-6.0%	-3.0%	-1.2%	-1.6%
Cambodia	3%	7%	21%	29%	-5.6%	-2.7%	-1.2%	-1.8%	4%	11%	28%	39%	-4.9%	-1.8%	-0.9%	-1.3%
Cameroon	8%	15%	35%	49%	-4.5%	-3.0%	-1.1%	-1.6%	10%	18%	40%	56%	-4.2%	-2.5%	-1.0%	-1.3%
Canada	1%	2%	9%	12%	-1.6%	-0.1%	-1.2%	-1.0%	1%	4%	14%	18%	-1.5%	0.3%	-1.1%	-0.8%
Central African Republic	12%	23%	42%	60%	-3.6%	-3.4%	-1.8%	-1.7%	13%	28%	50%	68%	-3.3%	-2.1%	-0.8%	-1.0%
Chad	16%	22%	38%	59%	-2.6%	-1.4%	-1.0%	-1.0%	17%	26%	45%	66%	-2.4%	-0.8%	-0.5%	-0.6%
Chile	1%	3%	11%	14%	-1.5%	-1.5%	-1.8%	-1.7%	1%	5%	18%	23%	-1.7%	-1.6%	-1.8%	-1.7%
China	1%	3%	12%	15%	-7.7%	-2.8%	-2.1%	-2.6%	1%	5%	22%	27%	-7.7%	-2.5%	-1.0%	-1.5%

China, Taiwan Province of China	1%	2%	9%	12%	-1.1%	-1.5%	-1.8%	-1.7%		1%	6%	20%	25%	-1.7%	-2.0%	-0.9%	-1.1%
Colombia	1%	4%	12%	17%	-2.8%	-0.4%	-1.1%	-1.1%		2%	9%	20%	28%	-3.0%	-1.9%	-0.8%	-1.2%
Comoros	7%	10%	30%	42%	-3.4%	-2.4%	-1.0%	-1.4%		8%	14%	42%	54%	-3.0%	-1.6%	-0.5%	-0.7%
Congo	6%	15%	35%	48%	-1.1%	-1.1%	-0.7%	-0.7%		7%	18%	43%	56%	-2.1%	-0.2%	0.4%	0.1%
Costa Rica	1%	2%	11%	14%	-2.8%	-2.8%	0.1%	-0.4%		1%	5%	20%	24%	-3.2%	-2.4%	1.3%	0.4%
Croatia	0%	1%	12%	13%	-2.1%	-4.3%	-1.3%	-1.6%		1%	3%	25%	28%	-2.0%	-5.4%	-1.5%	-1.8%
Cuba	1%	3%	16%	19%	-1.3%	0.1%	0.2%	0.1%		1%	5%	26%	30%	-1.8%	0.1%	0.8%	0.6%
Cyprus	0%	1%	11%	12%	-2.2%	-4.1%	-0.6%	-1.0%		0%	2%	17%	19%	-2.9%	-4.4%	-1.7%	-2.0%
Czechia	0%	2%	11%	13%	-1.5%	-1.1%	-1.7%	-1.6%		0%	4%	23%	26%	-0.9%	-2.2%	-2.0%	-1.9%
Cóte d'Ivoire	8%	20%	41%	57%	-3.2%	-2.5%	-1.0%	-1.2%		10%	20%	44%	60%	-3.1%	-2.4%	-0.9%	-1.1%
Dem. People's Republic of Korea	2%	6%	18%	24%	-5.3%	-1.1%	-1.8%	-1.8%		3%	10%	26%	36%	-3.5%	2.1%	-4.3%	-2.8%
Democratic Republic of the Congo	10%	15%	31%	47%	-3.3%	-2.1%	-1.2%	-1.4%		12%	19%	37%	55%	-2.9%	-1.2%	-0.7%	-0.9%
Denmark	0%	2%	11%	13%	-1.8%	-4.1%	-2.3%	-2.4%		0%	3%	17%	20%	-0.8%	-3.8%	-1.8%	-2.0%
Djibouti	7%	13%	28%	42%	-3.2%	-2.0%	-1.1%	-1.3%		9%	18%	36%	53%	-2.5%	-0.9%	-0.5%	-0.7%
Dominica	1%	5%	18%	23%	-9.4%	1.2%	-0.9%	-1.1%		2%	8%	32%	38%	-3.2%	-1.5%	-0.9%	-1.0%
Dominican Republic	3%	5%	17%	24%	-0.5%	-0.8%	-1.2%	-1.0%		4%	10%	27%	37%	-0.8%	-1.2%	-1.0%	-0.9%
Ecuador	1%	4%	14%	18%	-3.7%	-2.0%	-1.2%	-1.4%		2%	8%	19%	27%	-3.9%	-2.3%	-1.2%	-1.5%
Egypt	2%	4%	25%	29%	-4.1%	-3.6%	-0.4%	-0.9%		2%	6%	39%	44%	-4.1%	-3.1%	-0.6%	-0.9%
El Salvador	2%	5%	19%	24%	-3.8%	-2.2%	0.3%	-0.4%		2%	16%	31%	43%	-3.9%	-1.5%	1.1%	0.1%
Equatorial Guinea	9%	13%	33%	47%	-3.7%	-2.3%	-0.9%	-1.3%		10%	16%	40%	55%	-3.4%	-1.8%	-0.6%	-0.9%
Eritrea	5%	10%	25%	36%	-4.0%	-3.0%	-1.6%	-1.9%		6%	14%	31%	45%	-3.3%	-2.1%	-1.1%	-1.3%
Estonia	0%	2%	12%	14%	-10.6%	-3.4%	-1.5%	-1.9%		0%	6%	29%	34%	-8.4%	-4.3%	-2.3%	-2.5%
Eswatini	5%	17%	37%	50%	-6.3%	-11.0%	-5.4%	-5.2%		6%	30%	52%	68%	-6.3%	-6.6%	-3.1%	-2.7%
Ethiopia	6%	10%	25%	36%	-6.3%	-5.1%	-2.7%	-3.2%		8%	16%	33%	48%	-4.9%	-2.7%	-1.5%	-1.8%
Fiji	3%	7%	34%	41%	1.1%	-1.4%	-0.1%	-0.2%		3%	9%	45%	52%	1.3%	-1.9%	-0.3%	-0.3%
Finland	0%	2%	8%	11%	-1.6%	-1.7%	-1.7%	-1.6%		0%	4%	16%	20%	-1.7%	-2.9%	-2.9%	-2.7%
France	0%	2%	9%	11%	-0.2%	-1.9%	-0.5%	-0.7%		1%	4%	17%	21%	0.0%	-2.5%	-1.2%	-1.3%
Gabon	5%	10%	29%	39%	-4.2%	-2.4%	-0.9%	-1.3%		5%	14%	39%	51%	-4.4%	-1.3%	0.0%	-0.5%
Gambia	7%	14%	30%	44%	-3.8%	-1.9%	-1.0%	-1.3%		8%	16%	35%	50%	-3.2%	-0.9%	-0.5%	-0.7%
Georgia	1%	3%	16%	19%	-4.6%	-2.7%	-1.4%	-1.7%		1%	10%	40%	46%	-5.0%	-1.5%	0.3%	-0.1%
Germany	0%	2%	10%	12%	-1.2%	-1.9%	-0.3%	-0.6%		1%	3%	18%	21%	-1.0%	-2.2%	-0.9%	-1.0%
Ghana	6%	12%	28%	41%	-4.5%	-2.8%	-1.5%	-1.8%		8%	16%	35%	49%	-3.5%	-1.1%	-0.6%	-0.8%
Greece	0%	1%	9%	10%	0.2%	-2.6%	0.3%	0.0%		1%	3%	19%	22%	-0.2%	-3.4%	0.1%	-0.3%
Guatemala	3%	6%	21%	28%	-3.8%	-1.6%	0.0%	-0.5%		3%	12%	27%	38%	-3.8%	-3.2%	-0.1%	-1.1%
Guinea	12%	15%	31%	49%	-2.1%	-1.6%	-0.8%	-1.0%		13%	17%	36%	54%	-2.0%	-1.5%	-0.8%	-0.9%
Guinea-Bissau	9%	14%	34%	49%	-4.2%	-2.4%	-0.8%	-1.3%		10%	19%	42%	58%	-4.0%	-2.4%	-0.8%	-1.2%
Guyana	3%	8%	28%	35%	-2.8%	-1.9%	-1.3%	-1.3%		4%	14%	42%	52%	-2.6%	-1.6%	-0.6%	-0.8%
Haiti	7%	9%	28%	39%	-12.9%	-14.5%	-6.2%	-7.0%		8%	15%	41%	54%	-10.3%	-8.7%	-3.7%	-4.0%
Honduras	2%	5%	20%	25%	-3.8%	-2.3%	-1.4%	-1.6%		2%	7%	32%	38%	-3.6%	-1.1%	-0.7%	-0.8%
Hungary	0%	2%	17%	19%	-3.6%	-3.3%	-0.7%	-1.1%		1%	5%	34%	38%	-2.0%	-4.8%	-1.3%	-1.5%
Iceland	0%	2%	9%	10%	-9.2%	-0.4%	-0.2%	-0.4%		0%	3%	13%	16%	-2.1%	-1.9%	-0.8%	-1.0%

India	4%	6%	25%	32%	-6.1%	-2.3%	-0.5%	-1.3%		4%	9%	31%	40%	-5.5%	-2.7%	-1.5%	-1.8%
Indonesia	3%	7%	24%	31%	-3.9%	-1.8%	-1.1%	-1.3%		3%	9%	35%	43%	-3.6%	-0.9%	-0.5%	-0.6%
Iran	2%	3%	14%	18%	-3.8%	-4.4%	-2.8%	-3.0%		2%	7%	22%	29%	-3.6%	-3.0%	-1.8%	-2.0%
Iraq	3%	5%	22%	28%	-3.7%	-4.5%	-2.2%	-2.5%		3%	8%	31%	38%	-4.6%	-7.1%	-2.7%	-3.1%
Ireland	0%	2%	9%	10%	-2.6%	-2.1%	-2.6%	-2.5%		0%	3%	13%	16%	-4.7%	-3.2%	-2.7%	-2.7%
Israel	0%	1%	9%	10%	-2.8%	-2.5%	-0.4%	-0.7%		1%	2%	15%	18%	-1.6%	-2.6%	-0.2%	-0.5%
Italy	0%	1%	7%	9%	-3.1%	-1.7%	-0.9%	-1.1%		0%	3%	13%	15%	-2.8%	-2.1%	-1.7%	-1.7%
Jamaica	1%	5%	25%	30%	-2.4%	1.0%	1.2%	0.9%		2%	9%	34%	41%	-2.6%	1.8%	1.1%	0.9%
Japan	0%	2%	6%	8%	-1.7%	-2.1%	-1.4%	-1.5%		0%	3%	13%	16%	-2.8%	-3.1%	-1.8%	-2.0%
Jordan	2%	3%	14%	18%	-2.8%	-2.8%	-2.5%	-2.4%		2%	4%	24%	29%	-3.0%	-2.5%	-1.3%	-1.4%
Kazakhstan	1%	5%	21%	26%	-7.7%	-3.1%	-2.1%	-2.3%		1%	12%	40%	48%	-7.7%	-3.6%	-1.7%	-1.9%
Kenya	5%	17%	36%	50%	-2.8%	-1.7%	-0.9%	-1.0%		5%	23%	47%	61%	-3.3%	-0.7%	0.0%	-0.2%
Kuwait	1%	1%	9%	11%	-2.4%	-7.4%	-3.6%	-3.8%		1%	2%	16%	19%	-1.9%	-4.3%	-2.3%	-2.4%
Kyrgyzstan	2%	4%	19%	24%	-5.5%	-3.2%	-2.7%	-2.8%		2%	12%	39%	48%	-5.3%	-2.2%	-1.2%	-1.3%
Lao People's Democratic Republic	5%	7%	26%	34%	-4.8%	-4.2%	-1.6%	-2.2%		6%	10%	35%	45%	-4.4%	-3.8%	-1.3%	-1.7%
Latvia	1%	3%	16%	19%	-5.8%	-2.9%	-1.1%	-1.4%		1%	9%	36%	42%	-6.5%	-3.8%	-1.8%	-1.9%
Lebanon	1%	2%	11%	14%	-3.3%	-1.2%	-1.2%	-1.3%		1%	3%	19%	22%	-3.4%	-1.3%	-1.0%	-1.1%
Lesotho	10%	26%	47%	64%	-1.1%	-6.3%	-2.9%	-2.5%		11%	34%	57%	75%	-0.8%	-5.6%	-2.4%	-1.9%
Liberia	9%	15%	37%	51%	-2.5%	-0.4%	0.1%	-0.2%		10%	17%	41%	56%	-2.3%	-0.3%	0.1%	-0.2%
Libya	2%	6%	20%	25%	-2.2%	-0.1%	-0.6%	-0.5%		2%	10%	33%	41%	-2.5%	3.2%	0.1%	0.5%
Lithuania	0%	3%	15%	18%	-6.1%	-3.4%	-1.0%	-1.4%		1%	9%	35%	41%	-5.2%	-4.4%	-1.9%	-2.1%
Luxembourg	0%	1%	9%	11%	-2.2%	-2.9%	-1.0%	-1.3%		1%	2%	17%	19%	2.8%	-3.8%	-1.4%	-1.5%
Madagascar	6%	10%	25%	37%	-3.6%	-2.6%	-1.4%	-1.7%		8%	15%	33%	47%	-2.8%	-1.1%	-0.6%	-0.8%
Malawi	5%	13%	32%	43%	-7.7%	-6.9%	-3.1%	-3.6%		5%	22%	47%	61%	-8.1%	-2.7%	-0.6%	-1.2%
Malaysia	1%	3%	18%	21%	0.3%	-2.8%	-0.8%	-0.9%		1%	6%	29%	34%	-0.5%	-2.8%	-0.2%	-0.6%
Maldives	1%	2%	10%	12%	-7.4%	-3.9%	-3.9%	-4.0%		1%	2%	13%	16%	-7.8%	-3.7%	-3.6%	-3.7%
Mali	11%	15%	32%	49%	-3.3%	-1.2%	-0.7%	-1.0%		12%	17%	39%	55%	-3.2%	-0.6%	-0.4%	-0.7%
Malta	1%	1%	9%	10%	3.0%	-3.6%	-1.0%	-0.9%		1%	2%	14%	16%	-2.3%	-2.8%	-0.3%	-0.6%
Mauritania	7%	8%	28%	38%	-3.1%	-2.3%	-1.0%	-1.3%		8%	11%	37%	48%	-2.8%	-1.4%	-0.3%	-0.7%
Mauritius	2%	3%	17%	21%	0.9%	-2.5%	-0.9%	-1.0%		2%	6%	32%	38%	0.7%	-2.9%	-0.6%	-0.8%
Mexico	2%	4%	18%	23%	-3.1%	0.0%	-0.7%	-0.7%		2%	12%	27%	37%	-3.2%	1.1%	0.2%	0.3%
Mongolia	2%	5%	19%	24%	-5.7%	-4.2%	-4.3%	-4.1%		2%	11%	44%	51%	-6.2%	-3.8%	-1.4%	-1.6%
Montenegro	0%	2%	15%	17%	-9.7%	-3.3%	-0.8%	-1.3%		0%	4%	29%	33%	-8.1%	-2.7%	0.1%	-0.3%
Morocco	2%	4%	17%	22%	-5.4%	-4.8%	-3.3%	-3.5%		2%	5%	27%	33%	-5.1%	-4.0%	-1.6%	-2.0%
Mozambique	8%	12%	34%	46%	-4.2%	-7.3%	-3.2%	-3.4%		9%	20%	46%	61%	-3.9%	-3.9%	-1.4%	-1.6%
Myanmar	5%	8%	26%	35%	-4.2%	-3.7%	-1.4%	-1.9%		6%	14%	39%	51%	-3.5%	-2.0%	-0.7%	-1.0%
Namibia	5%	16%	34%	47%	-1.9%	-7.0%	-3.0%	-3.2%		5%	25%	49%	64%	-1.9%	-4.8%	-1.9%	-1.9%
Nepal	3%	7%	25%	33%	-5.0%	-2.7%	-1.1%	-1.5%		4%	9%	34%	43%	-4.5%	-2.2%	-0.8%	-1.1%
Netherlands	0%	2%	10%	12%	-1.3%	-1.7%	-1.1%	-1.2%		1%	3%	14%	16%	-1.2%	-1.3%	-2.2%	-2.0%
New Zealand	0%	2%	9%	12%	-3.3%	-1.1%	-0.9%	-1.0%		1%	4%	14%	17%	-3.7%	-0.7%	-0.8%	-0.9%
Nicaragua	2%	4%	18%	23%	-4.2%	-2.2%	-1.5%	-1.7%		2%	10%	27%	36%	-4.4%	-1.8%	-1.2%	-1.3%

Niger	9%	12%	29%	43%	-4.5%	-2.4%	-1.3%	-1.7%		10%	13%	35%	49%	-4.3%	-1.7%	-0.7%	-1.2%
Nigeria	17%	24%	41%	62%	-1.3%	-0.5%	-0.3%	-0.4%		17%	24%	43%	64%	-1.5%	-0.7%	-0.4%	-0.5%
North Macedonia	1%	2%	14%	16%	-4.6%	-5.3%	-2.0%	-2.4%		1%	2%	25%	27%	-3.3%	-6.4%	-1.7%	-2.0%
Norway	0%	1%	8%	10%	-3.2%	-3.2%	-2.6%	-2.7%		0%	3%	12%	15%	-2.0%	-2.7%	-2.9%	-2.8%
Oman	1%	2%	13%	15%	-1.2%	-4.5%	-2.0%	-2.2%		1%	3%	19%	22%	-0.9%	-4.5%	-2.2%	-2.3%
Pakistan	7%	7%	25%	35%	-3.0%	-1.3%	-0.6%	-1.0%		8%	10%	35%	46%	-2.7%	-1.4%	-0.5%	-0.8%
Panama	2%	4%	13%	18%	-2.5%	-0.1%	-0.1%	-0.3%		2%	9%	20%	29%	-1.3%	-0.3%	-0.6%	-0.5%
Papua New Guinea	5%	9%	28%	38%	-3.2%	-3.5%	-1.5%	-1.8%		6%	14%	43%	54%	-2.5%	-1.0%	-0.3%	-0.5%
Paraguay	2%	5%	20%	25%	-3.2%	-2.1%	-0.9%	-1.2%		3%	9%	30%	38%	-3.2%	-1.8%	-0.3%	-0.6%
Peru	2%	4%	14%	19%	-4.0%	-2.5%	-2.6%	-2.5%		2%	8%	20%	28%	-3.8%	-1.8%	-2.0%	-1.9%
Philippines	3%	5%	21%	27%	-1.8%	-1.6%	-1.0%	-1.1%		3%	7%	30%	37%	-1.5%	-1.1%	-0.4%	-0.5%
Poland	1%	2%	13%	16%	-2.2%	-1.6%	-0.8%	-0.9%		1%	7%	29%	34%	-3.4%	-1.9%	-1.1%	-1.2%
Portugal	0%	2%	8%	10%	-0.8%	-2.9%	-1.1%	-1.4%		0%	4%	19%	22%	0.1%	-4.4%	-0.8%	-1.3%
Puerto Rico	1%	2%	12%	14%	1.6%	-4.0%	-1.3%	-1.4%		1%	7%	26%	32%	1.2%	-2.5%	0.1%	-0.3%
Qatar	1%	1%	9%	11%	-4.4%	-4.5%	-2.8%	-3.0%		1%	2%	13%	15%	-4.5%	-5.5%	-3.5%	-3.6%
Republic of Korea	0%	1%	6%	7%	-3.5%	-5.3%	-3.7%	-3.9%		0%	2%	15%	17%	-3.4%	-6.5%	-3.4%	-3.6%
Republic of Moldova	1%	3%	23%	26%	-1.8%	-3.9%	-1.5%	-1.7%		2%	11%	47%	53%	-1.9%	-2.7%	0.0%	-0.3%
Romania	1%	2%	14%	17%	-5.8%	-5.2%	-1.7%	-2.3%		1%	5%	33%	37%	-6.5%	-4.9%	-0.7%	-1.2%
Russian Federation	1%	3%	18%	21%	-6.9%	-4.6%	-2.4%	-2.7%		1%	12%	41%	48%	-7.6%	-4.6%	-2.3%	-2.4%
Rwanda	5%	10%	29%	40%	-4.7%	-3.5%	-1.7%	-2.0%		5%	15%	39%	51%	-4.9%	-2.5%	-0.3%	-0.9%
Saudi Arabia	1%	4%	15%	19%	-4.7%	0.2%	-0.9%	-0.8%		1%	4%	21%	25%	-5.3%	-0.2%	-1.3%	-1.2%
Senegal	4%	7%	22%	31%	-5.9%	-4.2%	-2.1%	-2.6%		5%	11%	33%	44%	-4.8%	-1.7%	-0.7%	-1.1%
Serbia	1%	2%	15%	17%	-3.3%	-5.0%	-2.3%	-2.6%		1%	4%	30%	33%	-3.9%	-5.0%	-1.1%	-1.4%
Seychelles	2%	3%	15%	19%	0.2%	-2.9%	-1.4%	-1.5%		2%	8%	34%	40%	0.1%	-2.6%	-1.2%	-1.3%
Sierra Leone	12%	12%	33%	48%	-4.5%	-4.7%	-1.7%	-2.2%		13%	14%	40%	55%	-4.0%	-3.8%	-1.1%	-1.6%
Singapore	0%	1%	8%	10%	-2.1%	-4.2%	-1.8%	-2.0%		0%	2%	14%	16%	-2.3%	-4.3%	-1.8%	-2.0%
Slovakia	1%	2%	13%	15%	-1.8%	-0.9%	-1.5%	-1.4%		1%	5%	28%	32%	-1.6%	-2.6%	-1.9%	-1.8%
Slovenia	0%	1%	9%	10%	-5.7%	-4.9%	-1.1%	-1.6%		0%	2%	19%	21%	-0.9%	-6.0%	-2.0%	-2.3%
Solomon Islands	2%	7%	26%	33%	-2.9%	-1.4%	-0.6%	-0.8%		3%	9%	33%	41%	-3.1%	-2.2%	-0.8%	-1.0%
Somalia	14%	16%	32%	51%	-4.1%	-2.8%	-1.7%	-1.9%		15%	21%	38%	59%	-3.8%	-2.5%	-1.5%	-1.6%
South Africa	4%	14%	29%	41%	-5.2%	-7.3%	-1.3%	-3.0%		4%	20%	43%	57%	-4.8%	-5.6%	-1.4%	-2.1%
South Sudan	14%	20%	36%	56%	-1.0%	-0.6%	-0.3%	-0.4%		14%	24%	42%	62%	-0.9%	0.1%	-0.1%	-0.1%
Spain	0%	1%	7%	9%	-2.8%	-2.6%	-0.2%	-0.7%		0%	2%	15%	18%	-2.0%	-3.7%	-1.4%	-1.7%
Sri Lanka	1%	3%	14%	17%	-5.0%	-2.9%	-1.6%	-1.9%		1%	7%	29%	35%	-5.2%	-3.9%	-1.8%	-2.0%
State of Palestine	2%	3%	16%	20%	-2.7%	-2.8%	-2.2%	-2.2%		2%	5%	26%	31%	-2.7%	-4.4%	-1.2%	-1.6%
Sudan	7%	10%	25%	36%	-3.1%	-2.0%	-1.0%	-1.3%		8%	14%	32%	47%	-2.6%	-1.5%	-0.8%	-1.0%
Suriname	2%	6%	23%	29%	-2.7%	-2.3%	-0.7%	-1.0%		2%	10%	37%	45%	-2.8%	-2.6%	-0.7%	-1.0%
Sweden	0%	2%	8%	10%	-2.5%	-0.5%	-2.0%	-1.8%		0%	3%	12%	15%	-2.7%	-1.5%	-2.2%	-2.0%
Switzerland	0%	1%	7%	9%	-2.4%	-3.0%	-1.7%	-1.9%		0%	2%	12%	14%	-0.7%	-3.0%	-2.3%	-2.3%
Syrian Arab Republic	2%	4%	18%	23%	2.0%	1.8%	0.8%	1.0%		3%	11%	31%	41%	1.8%	7.2%	0.8%	1.7%
Tajikistan	3%	5%	23%	29%	-3.2%	-3.1%	-2.2%	-2.2%		4%	8%	33%	40%	-3.0%	-4.0%	-2.0%	-2.1%

Thailand	1%	3%	12%	16%	-4.7%	-3.6%	-2.1%	-2.5%		1%	9%	25%	33%	-5.0%	-2.8%	-0.3%	-1.0%
Timor-Leste	5%	8%	26%	35%	-4.0%	-2.9%	-1.1%	-1.5%		5%	9%	34%	44%	-3.7%	-2.6%	-0.9%	-1.2%
Togo	9%	16%	34%	50%	-3.3%	-2.3%	-1.3%	-1.4%		9%	16%	39%	54%	-3.0%	-1.6%	-0.7%	-0.9%
Tonga	2%	8%	23%	31%	-1.0%	0.1%	-0.2%	-0.1%		2%	11%	37%	45%	-1.3%	-0.5%	-0.4%	-0.4%
Trinidad and Tobago	2%	5%	19%	25%	-2.3%	-1.4%	-0.8%	-0.9%		2%	10%	31%	39%	-2.6%	-0.9%	-0.3%	-0.4%
Tunisia	2%	3%	13%	17%	-1.1%	-1.3%	-1.0%	-1.0%		2%	6%	25%	31%	-1.2%	-0.4%	-0.1%	-0.2%
Turkmenistan	4%	5%	22%	29%	-0.3%	-1.3%	-1.0%	-0.9%		5%	11%	39%	48%	-0.4%	-0.9%	-0.2%	-0.3%
Türkiye	1%	2%	12%	14%	-6.8%	-3.8%	-2.4%	-2.8%		1%	4%	25%	29%	-6.5%	-3.6%	-1.7%	-2.0%
Uganda	5%	14%	35%	46%	-5.7%	-5.4%	-2.1%	-2.6%		6%	19%	45%	58%	-6.3%	-3.8%	-0.8%	-1.4%
Ukraine	1%	3%	16%	19%	-4.2%	-5.8%	-3.6%	-3.7%		1%	10%	40%	47%	-4.7%	-4.1%	-1.5%	-1.7%
United Arab Emirates	1%	2%	11%	13%	-2.9%	-4.1%	-2.3%	-2.5%		1%	3%	17%	20%	-2.8%	-2.9%	-1.9%	-2.0%
United Kingdom	0%	2%	10%	13%	-2.4%	-0.4%	-1.1%	-1.0%		1%	4%	15%	19%	-1.9%	-0.8%	-1.4%	-1.3%
United Republic of Tanzania	5%	10%	28%	38%	-4.2%	-7.1%	-3.4%	-3.6%		6%	13%	36%	48%	-4.4%	-6.1%	-2.2%	-2.6%
United States of America	1%	4%	13%	17%	-1.0%	0.8%	-0.3%	-0.1%		1%	7%	21%	27%	-1.0%	1.2%	0.0%	0.2%
Uruguay	1%	4%	14%	18%	-5.1%	-0.1%	0.0%	-0.2%		1%	7%	26%	32%	-5.7%	0.4%	-1.1%	-0.9%
Uzbekistan	1%	5%	24%	29%	-7.1%	-2.2%	-1.1%	-1.4%		2%	8%	37%	44%	-7.2%	-1.8%	-0.7%	-1.0%
Vanuatu	3%	7%	24%	31%	-1.3%	0.2%	-0.1%	-0.1%		3%	10%	36%	44%	-1.3%	0.2%	0.1%	0.0%
Venezuela	2%	4%	18%	23%	0.7%	-0.3%	1.3%	1.0%		2%	13%	34%	44%	0.2%	0.3%	1.9%	1.3%
Viet Nam	2%	4%	13%	18%	-0.8%	-0.6%	-0.6%	-0.6%		4%	11%	28%	38%	-1.0%	-0.5%	-0.2%	-0.3%
Yemen	6%	8%	26%	36%	0.7%	1.1%	0.3%	0.5%		7%	17%	37%	52%	0.6%	5.7%	0.7%	1.4%
Zambia	7%	12%	32%	44%	-2.5%	-7.2%	-3.1%	-3.3%		8%	19%	42%	57%	-2.4%	-4.3%	-1.8%	-1.9%
Zimbabwe	6%	18%	37%	52%	-5.4%	-8.0%	-3.5%	-3.7%		7%	24%	47%	63%	-5.5%	-6.2%	-2.0%	-2.4%

AARC = Average annual rate of change.