Epidemiological and demographic trends in global health 1970-2050: Analysis from the 3rd Lancet Commission on Investing in Health

Authors:

Angela Y. Chang[1,2]

Sarah A. Bolongaita[3]

Omar Karlsson[4,5]

Wenhui Mao[6]

Ole F. Norheim[3,7]

Dean T. Jamison[8]

[1] Danish Institute for Advanced Study, University of Southern Denmark, Denmark

[2] Danish Centre for Health Economics, University of Southern Denmark, Denmark

[3] Bergen Centre for Ethics and Priority Setting (BCEPS), Department of Global Public Health and Primary Care, University of Bergen, Norway

[4] Duke University Population Research Institute, Duke University, USA

[5] Centre for Economic Demography, School of Economics and Management, Lund University, Sweden

[6] Duke Global Health Innovation Center and Innovations in Healthcare, Duke University, USA

[7] Department of Global Health and Population, Harvard T.H. Chan School of Public Health, USA

[8] Institute for Global Health Sciences, University of California San Francisco, USA

Corresponding author: Angela Y. Chang, achang@health.sdu.dk

Abstract

Background: In an era of poly-crisis, systematic analyses of global health trends can provide an accurate narrative. We analysed the impact of changing age specific mortality (i.e., epidemiology) and age structure (i.e., demography) on crude death rates and causes with large or rising impact on premature mortality to inform the 3rd Lancet Commission on Investing in Health.

Methods: Data from United Nations World Population Prospects 2022 and the WHO Global Health Estimates 2019 were analysed to examine epidemiological and demographic trends, including crude death rates (CDR), all-cause age-specific and selected cause-specific mortality rates from 1970 to 2050.

Results: Mortality rates declined substantially across age groups in most regions, with the most rapid improvements observed in recent decades. However, the rate of mortality decline has slowed recently in certain regions for specific age groups. Further, mortality increased among the working age population in the United States in the 2010s. Globally, the lowest CDR was reported in 2019. In the past for all regions, CDR has declined primarily due to changes in age-specific mortality rates. Looking into the future, changing population age structure will drive a large increase in CDR. Mortality from the major diseases under study declined after accounting for demographic changes, except for diabetes mortality, which increased in many regions.

Interpretation: There is reason for optimism regarding global health progress, but we also underscore persisting disparities and emerging challenges. Falling age specific mortality rates are evidence of enormous progress in technology and rising living standards, while rapid population aging brings new challenges. Recent slowing of the mortality decline in some regions call for enhanced efforts to combat the most important health issues. Rising mortality among middle-aged Americans emphasizes that continuous improvements are not automatic but contingent on concerted efforts. Key recommendations include prioritizing interventions to address specific health challenges and acknowledging the imperative of adapting health systems to demographic transitions.

Introduction

We are in an era marked by unprecedented shifts in the global health landscape. In the period between 1970 and 2019, the world reached the lowest age-specific mortality rates in history. Life expectancy at birth increased from 56 in 1970 to 73 in 2019.[1] Advances in medical technology such as the development and distribution of vaccines have significantly reduced deaths from infectious diseases and new treatments for chronic conditions have both prolonged and improved the quality of life for millions. Public health initiatives focusing on clean water, sanitation, and nutrition continue to improve community health.[2]

However, recent narratives in global health are less optimistic. The COVID-19 pandemic, climate change, shrinking global health funding, and rising geopolitical tensions introduce uncertainty and dominate the current agenda. As pressing as these issues are, another more predictable challenge is rising: As a result of improvements in survival rates, we are witnessing shifts in demography, with median age increasing from 20 in 1970 to 30 in 2019 and projected to reach 36 by 2050, straining health budgets and increasing the burden from chronic conditions to population health.[1]

It is therefore timely that we conduct rigorous analyses of recent global and regional epidemiological and demographic trends to appropriately evaluate the past, plan for the future, and shape appropriate and constructive narratives about global health. Lessons from countries and regions evidencing particularly impressive improvements in health outcomes can guide policymakers in developing the appropriate policies and interventions. Likewise, the same analyses can pinpoint countries and regions that did not realize the expected health improvements.

This study summarizes the epidemiological and demographic analyses conducted to inform the 3rd Lancet Commission on Investing in Health (CIH). We first analyze the changes in all-cause mortality rates, in both age-specific and crude death rates. For crude death rates, we conduct a decomposition analysis to attribute the changes into demographic and epidemiological factors. Second, we analyze and decompose the trends of cause-specific mortality rates for selected priority conditions, namely eight infectious and maternal health conditions and seven non-communicable diseases (NCDs) and injuries.

Methods

Regional definition

We report results for the World and 10 CIH regions: Central and Eastern Europe, Central Asia, China, India, Latin America and Caribbean, Middle East and North Africa, North Atlantic, sub-Saharan Africa, United States, and Western Pacific and Southeast Asia (Figure 1). Countries were included in a CIH region if they were United Nations Member States with populations of at least 300,000 in 2022. For the CIH World region, if an input dataset contained a World region, those values were used for the CIH World region; if a dataset did not contain a World region, values for the CIH World region were calculated from all locations with available data, regardless of United Nations Member State status or population size. Mapping of countries to CIH regions is listed in Appendix Table A1.

Data

All-cause age-specific mortality rates, crude death rates and demographic data came from the United Nations World Population Prospects (WPP) 2022. For most analyses, we used data from 1970 to 2019 by age, sex, and location. For crude death rates, we included the median WPP projection to 2050. Cause-specific mortality data came from the World Health Organization (WHO) Global Health Estimates 2019, which provided age, sex, and cause-specific deaths for 183 countries for 2000 to 2019. For all analyses, we excluded data for 2020-2021 to avoid COVID-19 impacts, which were analyzed separately (Karlsson et al. 2024).

For WPP data, we divided the 1970-2050 time period into decades. For all periods except the 2020s, the first year of the decadal period is the first year of the decade (i.e., the year ending in -0; e.g., for the 1950s, the first year is 1950); for the 2020s, the first year of the decadal period is 2019, rather than 2020, to avoid COVID-19 impacts. For all periods except the 2010s, the last year of the decadal period is the first year of the subsequent decade (e.g., for the 1950s, the last year of the decade is 1960). For the 2010s, the last year of the decadal period is 2019, rather than 2020, to avoid COVID-19 impacts. For analyses using GHE data (i.e., cause-specific analyses), we looked at years between 2000 and 2019. We used the five-year age groups provided by GHE, with an open-ended group for 85 and older. For estimating decadal change in all-cause mortality rates, we combined the estimates for age groups 0-14, 15-49, 50-69, and 70+.

Crude death rate and decomposition of decadal change into changes due to population structure and age-specific mortality rates

Crude death rate (CDR) is defined as the total number of deaths divided by the total mid-year population, reported per 1000 population. Utilizing single age life tables for the years 1970-2050, we

decomposed decadal changes in regional CDRs using the Preston, Heuveline, and Guillot (2000) approach.

For projections into the future (2022-2050), the population structure can be assumed to evolve in a highly—although not completely—predictable way. The evolution of age-specific morality rates, and therefore CDR, is less predictable. Our decomposition of changes in CDR into the fractions due to changes in population age structure and changes in age-specific mortality rates simply takes as given the data from WPP.

We first calculated C_x , the proportion of the total population that is age x , for each region and year.

$$C_x = \frac{P_x}{\sum_x^{100+} P_x}$$

where P_x is the mid-year population that is single-age x. We then calculated the CDR for the first and final year of each decade for the period 1970-2050 and subtracted to calculate the decadal change in CDR, Δ.

$$\text{CDR}^{R,Y} = \sum_{x=0}^{100+} C_x^{R,Y} * M_x^{R,Y}$$

where R is the region, Y is the year, x is the single-year age, and M_x is the age-specific mortality rate.

$$\Delta = CDR^{R,Y_1} - CDR^{R,Y_0}$$

where Y_1 is the final year of the decade and Y_0 is the first year of the decade.

Lastly, we decomposed the decadal change in CDR into two components: the contribution of changes to the population structure and changes in age-specific mortality rates. The contribution of changes in population structure is represented by the decadal difference in population structure, $C_x^{R,Y_1} - C_x^{R,Y_0}$, multiplied by the decade average age-specific mortality rate, $(M_x^{R,Y_0} + M_x^{R,Y_1})/2$, summed across all ages. Similarly, the contribution of changes in age-specific mortality rates is represented by the decadal difference in age-specific mortality rates, $M_x^{R,Y_1} - M_x^{R,Y_0}$, multiplied by the decade average population structure, $(C_x^{R,Y_0} + C_x^{R,Y_1})/2$, summed across all ages.

$$\Delta = \sum_{x=0}^{100+} \left(C_x^{R,Y_1} - C_x^{R,Y_0}\right) * \left[\frac{M_x^{R,Y_0} + M_x^{R,Y_1}}{2}\right] + \sum_{x=0}^{100+} \left(M_x^{R,Y_1} - M_x^{R,Y_0}\right) * \left[\frac{C_x^{R,Y_0} + C_x^{R,Y_1}}{2}\right]$$

Priority conditions and decomposition of number of deaths

In the CIH report, we showed that in 2019 a relatively narrow set of conditions contribute to about 80% of the life expectancy gap between most regions and the best performing region, which was the North Atlantic (CIH3.0, 2024). We defined these 15 priority conditions to include eight infections and maternal health conditions (the "IMH-8") and seven non-communicable diseases and injuries (the "NCDI-7"). IMH-8 includes childhood-cluster diseases (including whooping cough, diphtheria, measles, and tetanus), diarrheal diseases, HIV and AIDS, lower respiratory infections, malaria, maternal conditions, neonatal conditions, and tuberculosis. NCDI-7 refers to atherosclerotic cardiovascular disease (CVD), diabetes, haemorrhagic stroke, infection-associated NCDs, road injury, strongly tobacco-associated NCDs, and suicide. The specific causes of death included in each NCDI-7 group are shown in Appendix Table A2.

For both IMH-8 and NCDI-7, first, we measured the levels and trends of cause- and age-specific mortality rates between 2000 and 2019 globally and by each CIH region. For IMH-8, we focused on the top 30 countries with the highest number of deaths, since not all regions have high burden of IMH-8. Second, for each condition, we decomposed the changes in the number of deaths over each decade. We measured the change in the number of deaths over each decade from the period 2000-2019. To understand the factors associated with the changes in the number of deaths during each decade, we conducted a decomposition analysis by expressing deaths as the product of three factors: (1) population size, (2) population age structure, and (3) cause- and age-specific mortality rates, which correspond to the three terms shown below:

$$Deaths_{c,y} = \sum_a pop\ size_y \cdot \frac{pop\ age_{a,y}}{pop\ size_y} \cdot \frac{death_{c,a,y}}{pop\ age_{a,y}}$$

where a is the 5-year age group, c is the cause of death, and y represents the year. The deaths associated with each of the three components sum to the total change in deaths over the decade. This

decomposition approach measures the additive contribution of each factor to changes in the number of deaths by cause and does not capture the interactions between factors (cite Das Gupta 1993). We then convert the changes in the number of deaths attributable to each component into annual growth rates by applying the AARC formula (below) to overall change in deaths due to each component over the period.

Calculation of average annual rate of change (AARC)

The average annual rate of change quantifies the consistent annual rate at which a particular health measure grows or declines across the period under consideration. AARC enables a smooth, annualized rate of change that helps in comparing the progress towards health goals over time. It is calculated by the following:

$$AARC = \sqrt[Y_1 - Y_0]{\frac{i_{Y_1}}{i_{Y_0}}} - 1$$

where *i* is a health measure (e.g., CDR) at two time periods, denoted 0 and 1 and *Y* is the year of the two time periods.

Role of the funding source
The funders had no role in the study design, data analysis, data interpretation, or writing the paper. The corresponding author had full access to all the data and had final responsibility for the submission.

Results

Levels and trends in age-specific all-cause mortality rates
Globally there has been large decreases in age-specific mortality rates since 1970 to 2019. Global age-specific mortality for ages 0-14 was 15 per 1000 population in 1970s and 3 in 2019, representing an 80% decline (Table A4). For the other age groups, the change between 1970 and 2019 were 56% for ages 15-49, 48% for ages 50-69, and 32% for ages 70 and above. Figure 2 depicts the rate of change by age group and decade for the world. The largest declines were observed in the younger age groups. For example, at age 0 the AARC were -3.2%, -3.3%, and -3.0% in 1970s, 2000s, and 2010s, respectively. Similar patterns are observed in other age groups (Figure 2). For many age groups, the

highest rates of mortality decline have occurred during the last two decades. This is despite the fact that age-specific mortality rates have mostly started at lower levels at the beginning of the recent decades. We present the results by region in Figure A2.

Focusing specifically on the recent two decades, we compare the growth rates of mortality rates in 2000-10 (2000s) and 2010-19 (2010s) in Figure 3. In the first decade, annual rates of change in global age-specific mortality ranged from -3.3% in age group 0-14 and -0.7% in age group 70+. In the second decade, AARC ranged from -3.7% in age group 0-14 and -0.9% in age group 70+. As points of references, AARC of -2.3% will lead to halving of mortality rates in 30 years, and -3.5% will halve mortality in 20 years. Comparing between the two decades broadly, we observed faster declines in mortality rates (i.e., mortality rate declining faster in 2010s than 2000s) in many regions and age groups, slower but still declining mortality rates in some regions and age groups, and positive increase in mortality rates in the middle age groups in United States. First, in ages 0-14, six CIH regions had faster declines in mortality rates in the 2010s than 2000s, while four regions had slower declines (Figure 3 Panel A). China and Central and Eastern Europe had the largest improvements, with -8.8% and -7.4% annual reduction in mortality rates in the younger age group in the 2010s. Western Pacific and Southeast Asia and sub-Saharan Africa had slightly slower declines in 2010s, although remaining at approximately -4% per year (as noted earlier, a -3.5% AARC will lead to halving mortality in 20 years). For age group 15-49, five regions had faster declines in 2010s, most notably sub-Saharan Africa and India, while four regions had slower declines (Panel B). The outlier is United States with a positive AARC, indicating an increase in age-specific mortality rates. In other words, while all other regions have continued to experience decreasing mortality rates, the United States has reversed its trajectory and now have increasing rates. For age group 50-69, only sub-Saharan Africa had a faster decline in the 2010s (Panel C). United States again shows a positive increase in mortality rates. For age group 70+, most regions have had faster declines in the 2010s, with India with the highest decline (Panel D). The three regions with slower declines are Central Asia, Central and Eastern Europe, and North Atlantic.

Levels, trends, and decomposition of changes in crude death rates

Global crude death rate (CDR) was 8.5 in 2000 and 7.5 in 2019, a reduction of 12%. Figure 4 shows the trend in CDR from 1970 to 2021, and the projection from 2022 to 2050. The lowest crude death rate in the recent millennium was reported in 2019 for the world. All regions, except Central Asia and Sub-Saharan Africa have already experienced their lowest crude death rate and are now experiencing rising crude death rates. Based on the median WPP projection, Central Asia is expected to hit its lowest

crude death rate in 2025, while Sub-Saharan Africa is not expected to reach its lowest crude death rate until 2048.

In the past for all regions, CDR has been declining largely due to decreases in age-specific mortality rates being greater than changes in population structure, as described in the previous section. The decomposition analysis presented in Figure 5 shows the changes in CDR that can be attributed to changes in age-specific mortality rates and changes in the population structure for the world. Since the 1980s until more recently, the impact of decreasing age-specific mortality rates had outweighed the impact of increased population structure (that leads to increasing death rates). Looking into the future, the WPP projects CDR to continue increasing from now to 2050, up to 9.4 per 1000 populations. According to our decomposition analysis, unless there are major acceleration of declines in age-specific mortality rates, CDR will continue to rise due to increasing population sizes and ages. The results of the regional decomposition analysis are presented in Appendix Figure A1 and Table A3.

Levels and trends of selected cause-specific deaths

Figure 6 shows the global age-standardized cause-specific death rates from 2000 to 2019. Death rates for the priority conditions have mostly decreased over time, with the exception of diabetes and childhood-cluster diseases (starting around 2017). Among IMH-8, childhood-cluster diseases had the highest proportional decrease of 67% over the period, followed by HIV and AIDS (62% decline), and diarrheal diseases and maternal conditions (both 58%). The lowest declines were in lower respiratory infections (39%), neonatal conditions (40%), and tuberculosis (49%). Among NCDI-7, hemorrhagic stroke had the highest proportional decrease of 37% during the time period, followed by 36% in suicide, and 35% for infection-associated NCDs.

Proportionally, the 15 priority conditions have accounted for a large share of all deaths globally (Figure 7). X% of all deaths in 2000 and Y% in 2019 were from the priority conditions. Across regions, the total proportion of deaths due to priority conditions has modestly declined from 2000-2019 except in the North Atlantic and the United States where the decline is more pronounced. In most regions, the relative share of deaths due to IMH-8 or NCDI-7 has changed over time with a reducing proportion of deaths due to IMH-8 conditions and a growing proportion of deaths due to NCDI-7 conditions. In the North Atlantic and the United States there has been a more pronounced decline in the proportion of deaths due to the priority conditions: 57 to 43% in the North Atlantic and 57 to 46% in the US. In these two regions, the proportion of deaths due to other causes has risen while the relative share of deaths due to IMH-8 and NCDI-7 (among deaths due to the priority conditions) seems to have remained relatively constant over time. While Central and Eastern Europe has seen more modest declines in the

proportion of deaths due to priority conditions (like most regions), its relative share of priority conditions due to IMH-8 or NCDI-7 has remained relatively constant (more similar to what is observed in the North Atlantic and the US).

The decomposition analysis of the priority conditions for the world is presented in Figure 7.

As shown in the figure, death numbers have been increasing over time for NCDI-7 largely due to changes in the population age structure (population aging) and population size. For all diseases except diabetes, age-specific mortality rates have in fact been decreasing over time, with the largest declines in atherosclerotic CVD and strongly tobacco-associated NCDs. Regionally, the largest decreases in deaths due to changes in age-specific mortality rates in the 2010s were found in hemorrhagic stroke (-5.1%) and suicide (-4.5%) in China, atherosclerotic CVD (-4.6%) in North Atlantic, and road injuries in Central and Eastern Europe (-4.4%) (Table A5). Increasing diabetes death rates are seen in Central Asia, Central and Eastern Europe, India, the United States, and Western Pacific and Southeast Asia. Beyond diabetes, we only see positive increases in death rates in the United States for infection-associated NCDs, road injuries, and suicide and in Latin America and the Caribbean for suicide.

Discussion

This study summarizes some of the key epidemiological and demographic trends in global health between 1970 and 2050, with deep dives into the recent two decades (2000s and 2010s).

Based on these results, we derived three key messages to inform the 3rd Lancet Commission on Investing in Health: optimism, inevitability, and focus.

First, there is a reason for being optimistic about the future of global health. Throughout the world we have observed impressive reductions in age- and cause-specific mortality rates across the geographical and income spectrum, as shown in Figures 2 and 3. This is consistent with the conclusions from the first and second Lancet Commission on Investing in Health.[3,4] There are, however, some caveats to be made. This paper analysed health outcomes for both sexes, but we observed large sex differences in some of the health outcomes in some regions and countries. In a companion paper, we observed that life expectancy among males in every country in Central and Eastern Europe is much lower than females. In Belarus and Ukraine in 2019, for example, male life expectancy was more than 10 years lower than for females (Chang et al. 2024). In Thailand, females had a life expectancy eight years higher than males. In contrast, we observed increasing cause-specific mortality rates of both

atherosclerotic cardiovascular diseases and diabetes among Indian females but not males. Second, even though the gaps in life expectancy and other health outcomes between regions and the best performing region have narrowed rapidly, the gaps remain high (Karlsson et al. 2024). For example, the gap in life expectancy between sub-Saharan Africa and North Atlantic decreased from 28 years in 2000 to 22 years in 2019. Despite the impressive reduction over time, the gap of 22 years in 2019 is still not acceptable. Third, the mortality and morbidity trends of certain conditions are concerning. While we observed declines in cause-specific mortality for most of the major conditions after isolating them from changes in population size and age, there are some exceptions, such as diabetes.

Second, as shown in Figure 5, we need to confront the inevitability of demographic change. The combination of significant improvements in survival and decline in fertility rates lead to shifts in population size and age structure, with large increases in the proportion of older age groups and older deaths. All regions except sub-Saharan Africa and Central Asia have passed their lowest crude death rates and will only be experiencing increased crude number of deaths for the foreseeable future. The global median age of death in 2019 was 76 and is projected by WPP to increase to 82 in 2050. Nearly 50% of deaths in 2019 occurred after age 70, and this share is projected to increase to nearly 70% in 2050 (65% in India, close to 90% in China and the North Atlantic by 2050) (Appendix Table A6). This phenomenon has large implications for health financing and health care provision. Even with continuing healthcare advancements, cause-specific mortality rates for NCDs, in particular, will likely rise, underscoring the dominant influence of demographic shifts on demands on the health system into the future. Furthermore, the narrowing base of the population structure due to the decline in fertility rates mean that there may be insufficient tax base to support a growing older age population (Mao et al. 2024).

Third, and related to the second point, with increasing demands on health financing and health care provision due to the inevitable shifts in the population age structure, there is a need for the health sector to focus. We propose several areas to focus on. First, IMH-8 and NCDI-7 account for a large proportion of all deaths (Figure 7) and the gap between each region and the frontier region (North Atlantic) (Karlsson et al. 2024). Focusing on the prevention and treatment of these conditions will lead to large reductions in health inequality. Second, we have identified several causes with large disease burden and with increasing cause-age-specific mortality, such as diabetes. Focusing on reversing these detrimental trends will contribute to reducing disease burden as well as financing and health care burdens.

This study has several limitations. First, we have relied on different data sources for different sets of analyses: WPP2022 for all-cause mortality and demographic analyses and GHE2019 for cause-specific mortality analysis. One data source is preferred to ensure consistency, however due to the scope and limitation of each, our different sets of analyses may not sum up. We have projected the GHE data onto the WPP data to ensure consistency. Second, our analyses are descriptive and not inferential, i.e., we do not seek to explain the reasons why these trends exist. It would be more powerful if we can pinpoint, for example, how certain regions reduced their mortality rates by introducing certain health policies or interventions.

Conclusion

There is reason for optimism regarding global health progress, but we also underscore persisting disparities and emerging challenges. Key recommendations include prioritizing interventions to address specific health challenges and acknowledging the imperative of adapting health systems to demographic transitions.

Epidemiological and demographic trends in global health 1970-2050: Analysis from the 3rd Lancet Commission on Investing in Health

Third Commission on Investing in Health

Contents

Manuscript Tables and Figures

Figure 1. Map of CIH regions.

Figure 2. Global annual rate of change in all-cause mortality by decade and age.
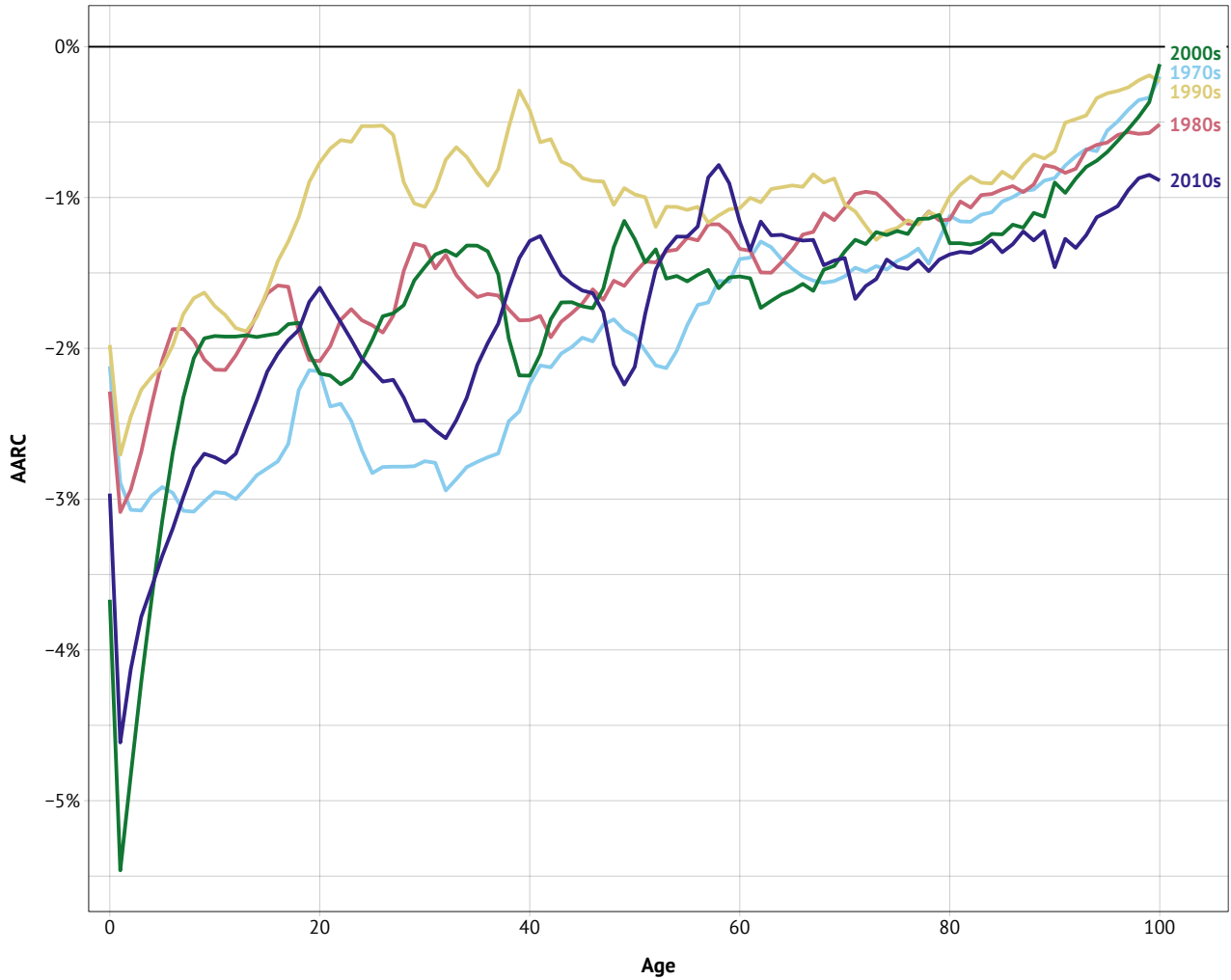
1970s = 1970-1980; 1980s = 1980-1990; 1990s = 1990-2000; 2000s = 2000-2010; 2010s = 2010-2019 (note the last year is 2019 and not 2020). AARC = average annual rate of change.

Figure 3. Average annual rate of change (AARC) by decade and age group.
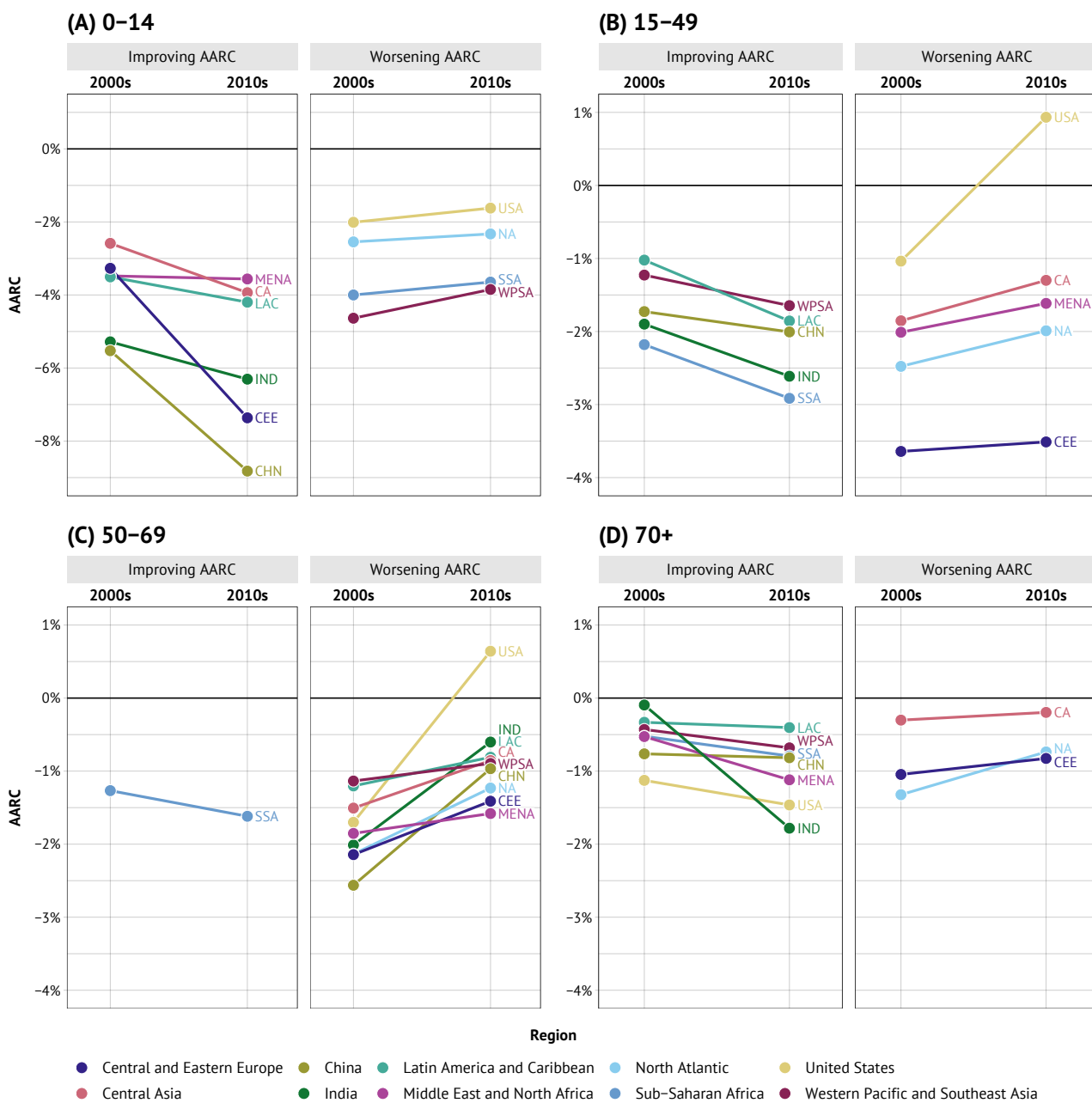
2000s = 2000-2010; 2010s = 2010-2019 (note the last year is 2019 and not 2020)

Figure 4. Crude death rate by region, 1970-2050.

Figure 5. Decomposition of decadal changes in crude death rate per 1000 per year into component (changes in population structure, changes in age-specific mortality rates) contributions, World, 1970-2050.

| 1970s | 1980s | 1990s | 2000s | 2010s | 2020s | 2030s | 2040s |

Legend: Changes in age–specific mortality rates · Changes in population structure · Total change

CDR = Crude death rate

Figure 6. Age-standardized death rates of IMH-8 and NCDI-7 conditions for the World, 2000-2019.
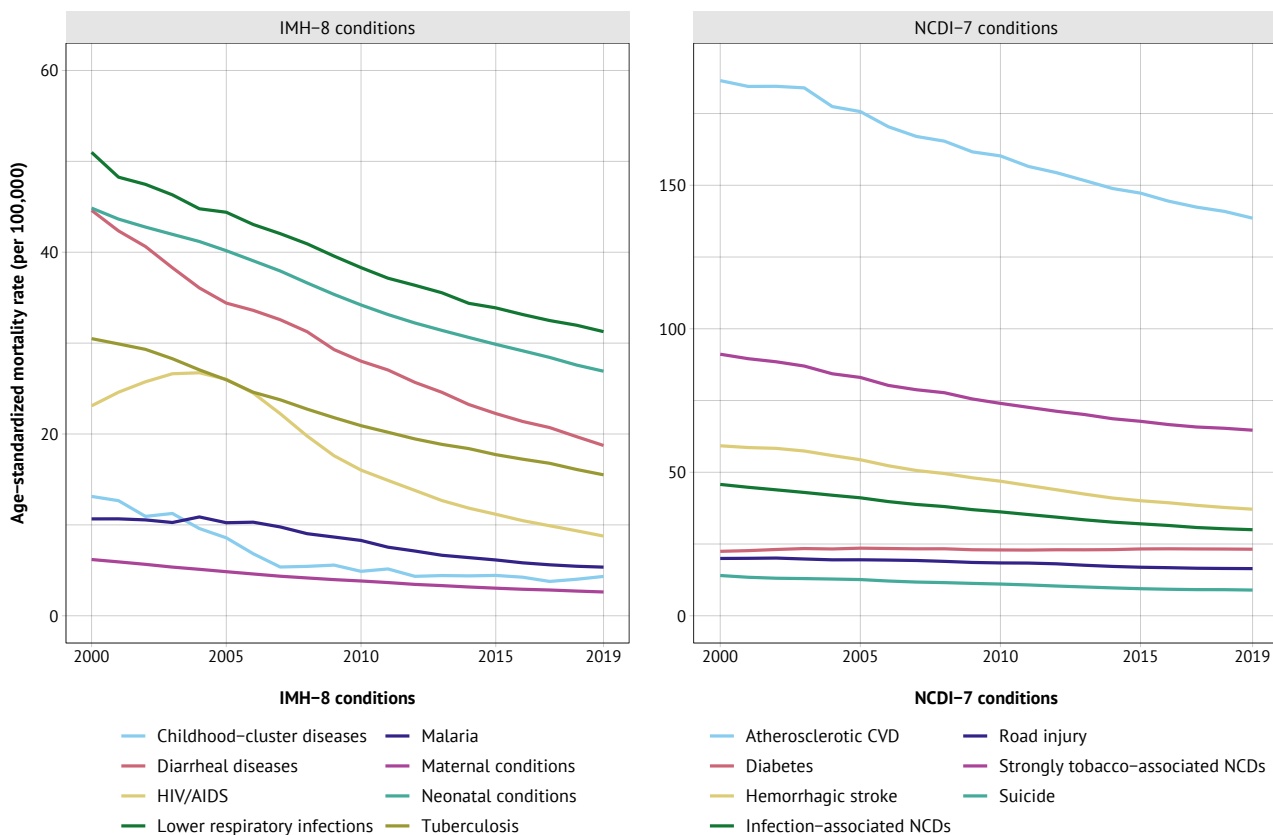
Figure 7. Number of IMH-8 and NCDI-7 deaths.
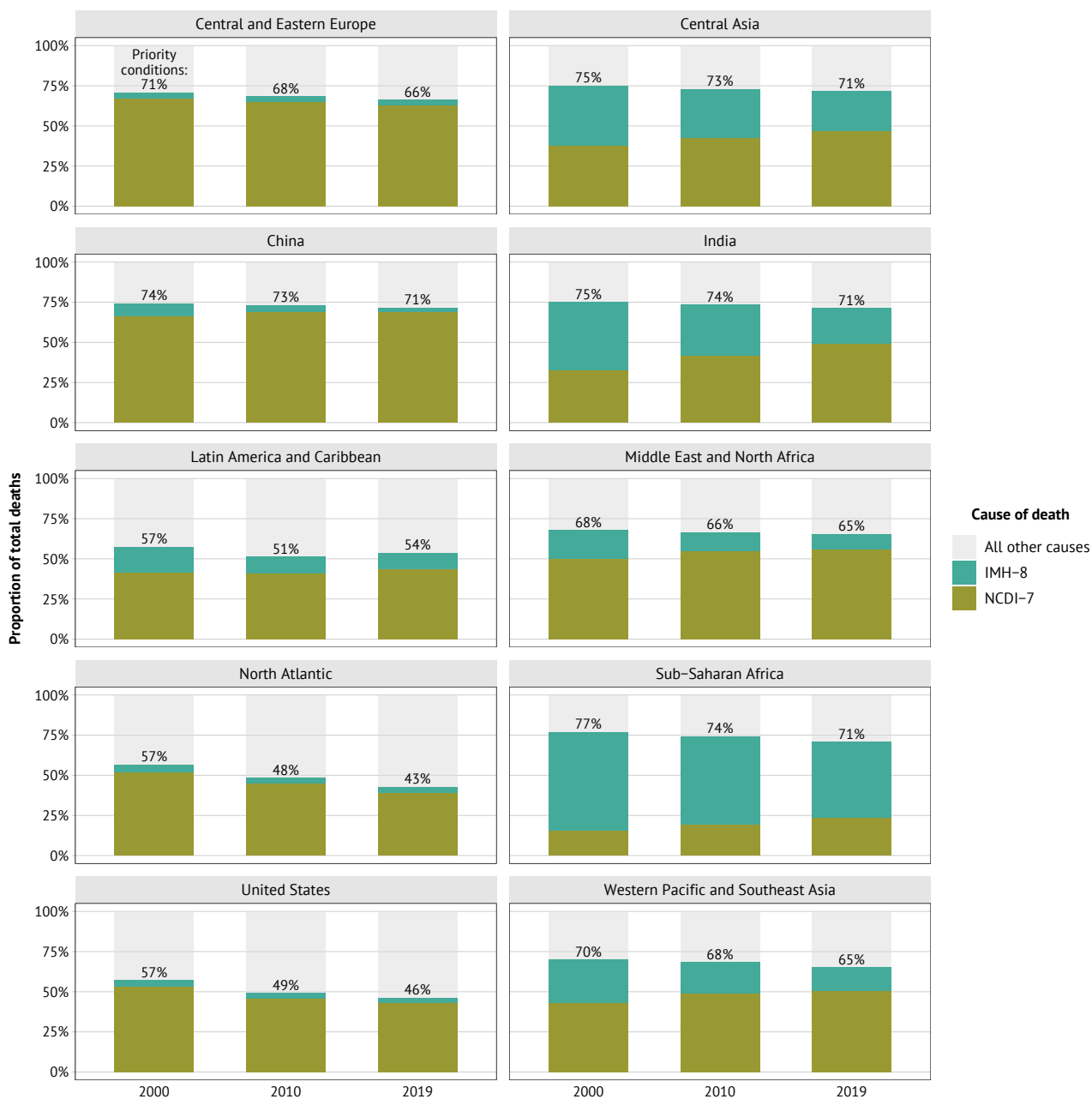
Figure 6. Decomposition of the 15 priority conditions into component (changes in population growth, changes in population structure, changes in age-specific mortality rates), World, 2000-2010, 2010-2019.

2000s = 2000–2010
2010s = 2010–2019

Component contribution to changes in deaths over the period

Population size   Population age   Age-specific mortality rates   Net deaths
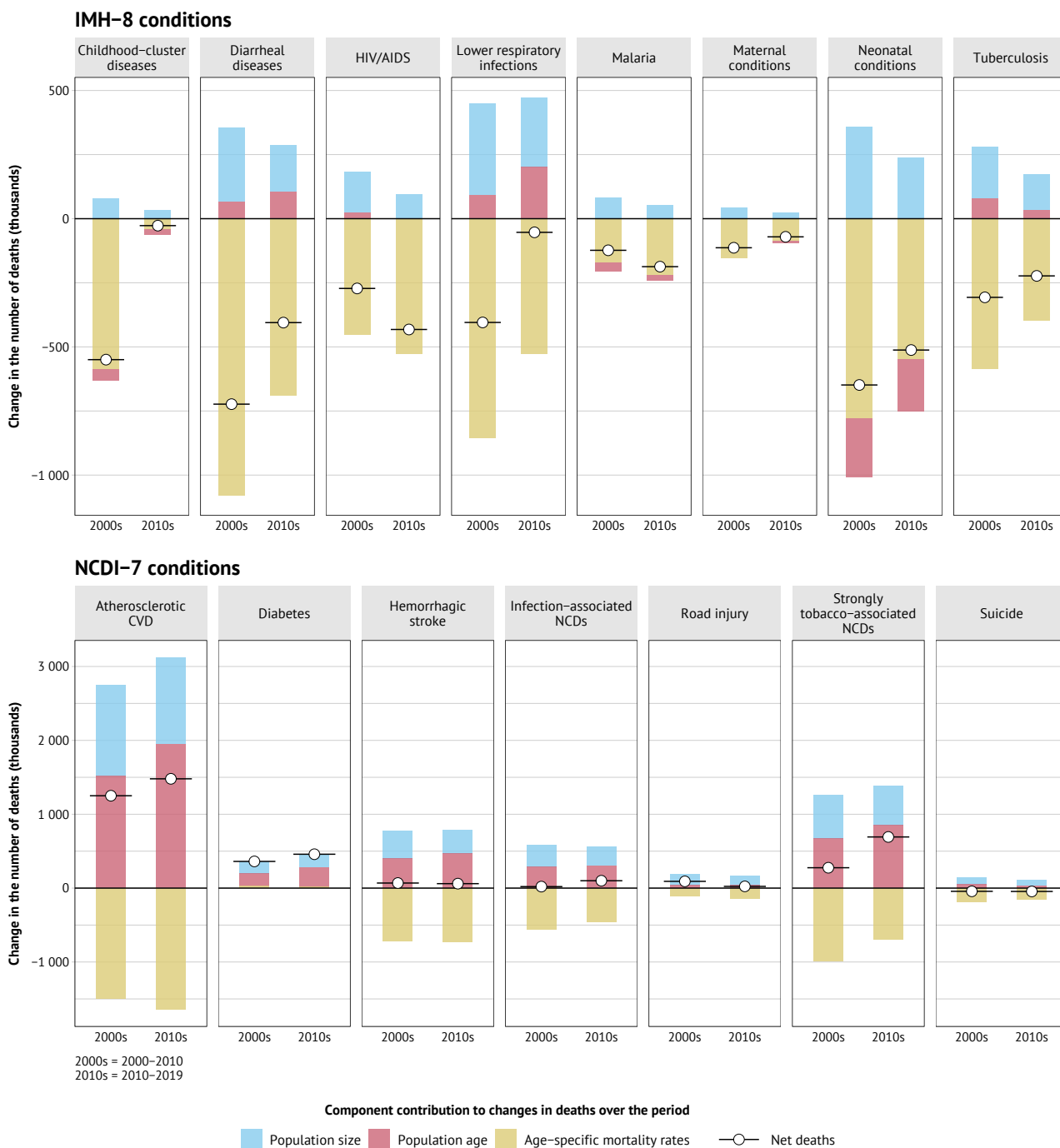
Table 1. Decomposition of IMH-8 into component (changes in population size, population structure, and age-specific mortality rates), globally 2000-2010, 2010-2019.

	Deaths, Year 1 (thousands)	Deaths, Year 2 (thousands)	AARC (% per year)	AARC of component contribution to changes in deaths (% per year)			
				Population size	Population structure	Total demographic shifts	Age-specific mortality rates
2000s							
Childhood-cluster diseases	910	360	-8.9	0.85	-0.48	0.41	-9.9
Diarrheal diseases	2600	1900	-3.1	1.0	0.25	1.3	-5.1
HIV/AIDS	1400	1100	-2.2	1.1	0.18	1.2	-3.9
Lower respiratory infections	3100	2600	-1.4	1.1	0.30	1.4	-3.2
Malaria	720	600	-1.9	1.1	-0.49	0.64	-2.7
Maternal conditions	380	270	-3.5	1.0	0.024	1.0	-5.1
Neonatal conditions	3200	2500	-2.2	1.1	-0.74	0.40	-2.8
Tuberculosis	1700	1400	-1.9	1.1	0.45	1.5	-4.0
2010s							
Childhood-cluster diseases	360	330	-0.87	1.1	-0.68	0.44	-1.4
Diarrheal diseases	1900	1500	-2.6	1.0	0.60	1.6	-4.8
HIV/AIDS	1100	670	-5.4	0.91	0.031	0.93	-7.0
Lower respiratory infections	2600	2600	-0.23	1.1	0.82	1.8	-2.4
Malaria	600	410	-4.1	0.94	-0.38	0.59	-5.0
Maternal conditions	270	200	-3.4	0.97	-0.31	0.68	-4.3
Neonatal conditions	2500	2000	-2.5	1.0	-0.91	0.16	-2.7
Tuberculosis	1400	1200	-1.9	1.0	0.27	1.3	-3.5

Year 1 = The first year of the decadal period (2000 for 2000s, 2010 for 2010s)
Year 2 = The last year of the decadal period (2010 for 2000s, 2019 for 2010s)

Total demographic shifts = Deaths due to population size + deaths due to population structure

Table 2. Decomposition of NCDI-7 into component (changes in population size, population structure, and age-specific mortality rates), globally 2000-2010, 2010-2019.

	Deaths, Year 1 (thousands)	Deaths, Year 2 (thousands)	AARC (% per year)	AARC of component contribution to changes in deaths (% per year)			
				Population size	Population structure	Total demographic shifts	Age-specific mortality rates
2000s							
Atherosclerotic CVD	9200	10 000	1.3	1.3	1.5	2.6	-1.8
Diabetes	1100	1500	2.8	1.4	1.4	2.6	0.23
Hemorrhagic stroke	3000	3100	0.23	1.2	1.3	2.3	-2.7
Infection-associated NCDs	2400	2400	0.086	1.2	1.1	2.2	-2.7
Road injury	1200	1300	0.76	1.2	0.36	1.6	-0.92
Strongly tobacco-associated NCDs	4500	4800	0.59	1.2	1.4	2.5	-2.4
Suicide	790	750	-0.56	1.2	0.57	1.7	-2.7
2010s							
Atherosclerotic CVD	10 000	12 000	1·5	1·2	1·9	2·9	-1·9
Diabetes	1500	2000	3·0	1·3	1·8	2·9	0·1
Hemorrhagic stroke	3100	3100	0·2	1·1	1·6	2·6	-3·0
Infection-associated NCDs	2400	2500	0·5	1·1	1·4	2·4	-2·3
Road injury	1300	1300	0·2	1·1	0·3	1·4	-1·3
Strongly tobacco-associated NCDs	4800	5500	1·5	1·2	1·8	2·9	-1·7
Suicide	750	700	-0·7	1·1	0·5	1·5	-2·5

Year 1 = The first year of the decadal period (2000 for 2000s, 2010 for 2010s)
Year 2 = The last year of the decadal period (2010 for 2000s, 2019 for 2010s)
Total demographic shifts = Deaths due to population size + deaths due to population structure

Appendix Tables and Figures

Table A1. CIH locations by region.

Central Asia		
Afghanistan	Azerbaijan	Kazakhstan
Kyrgyz Republic	Mongolia	Pakistan
Tajikistan	Turkmenistan	Uzbekistan
Central and Eastern Europe		
Albania	Armenia	Belarus
Bosnia and Herzegovina	Bulgaria	Croatia
Czech Republic	Estonia	Georgia
Hungary	Latvia	Lithuania
Moldova	Montenegro	North Macedonia
Poland	Romania	Russian Federation
Serbia	Slovak Republic	Slovenia
Ukraine		
China		
India		
Latin America and Caribbean		
Argentina	Bahamas, The	Belize
Bolivia	Brazil	Chile
Colombia	Costa Rica	Cuba
Dominican Republic	Ecuador	El Salvador
Guatemala	Guyana	Haiti
Honduras	Jamaica	Mexico
Nicaragua	Panama	Paraguay
Peru	Suriname	Trinidad and Tobago
Uruguay	Venezuela, RB	
Middle East and North Africa		
Algeria	Bahrain	Egypt, Arab Rep.
Iran, Islamic Rep.	Iraq	Israel
Jordan	Kuwait	Lebanon
Libya	Morocco	Oman
Qatar	Saudi Arabia	Syrian Arab Republic
Tunisia	Türkiye	United Arab Emirates
Yemen, Rep.		

North Atlantic		
Austria	Belgium	Canada
Cyprus	Denmark	Finland
France	Germany	Greece
Iceland	Ireland	Italy
Luxembourg	Malta	Netherlands
Norway	Portugal	Spain
Sweden	Switzerland	United Kingdom
Sub-Saharan Africa		
Angola	Benin	Botswana
Burkina Faso	Burundi	Cabo Verde
Cameroon	Central African Republic	Chad
Comoros	Congo, Dem. Rep.	Congo, Rep.
Côte d'Ivoire	Djibouti	Equatorial Guinea
Eritrea	Eswatini	Ethiopia
Gabon	Gambia, The	Ghana
Guinea	Guinea-Bissau	Kenya
Lesotho	Liberia	Madagascar
Malawi	Mali	Mauritania
Mauritius	Mozambique	Namibia
Niger	Nigeria	Rwanda
Senegal	Sierra Leone	Somalia
South Africa	South Sudan	Sudan
Tanzania	Togo	Uganda
Zambia	Zimbabwe	
United States		
Western Pacific and Southeast Asia		
Australia	Bangladesh	Bhutan
Brunei Darussalam	Cambodia	Fiji
Indonesia	Japan	Korea, Dem. People's Rep.
Korea, Rep.	Lao PDR	Malaysia
Maldives	Myanmar	Nepal
New Zealand	Papua New Guinea	Philippines
Singapore	Solomon Islands	Sri Lanka
Thailand	Timor-Leste	Vanuatu
Vietnam		

Countries were included in a CIH region if they were United Nations Member States with populations of at least 300 000 in 2022. For the CIH World region, if an input dataset contained a World region, those values were used

for the CIH World region; if a dataset did not contain a World region, values for the CIH World region were calculated from all locations with available data, regardless of UN Member State status or population size.

Table A2. Causes of death, according to the World Health Organization's Global Health Estimates (GHE) 2019, included in the IMH-8 and NCDI-7 conditions.

IMH-8	GHE causes of death
1 Childhood-cluster diseases	Childhood-cluster diseases (whooping cough, diphtheria, measles, tetanus)
2 Diarrheal diseases	Diarrheal diseases
3 HIV/AIDS	HIV/AIDS
4 Lower respiratory infections	Lower respiratory infections
5 Malaria	Malaria
6 Maternal conditions	Maternal conditions
7 Neonatal conditions	Neonatal conditions
8 Tuberculosis	Tuberculosis
NCDI-7	**GHE causes of death**
1 Atherosclerotic CVD[a]	Ischemic heart disease Ischemic stroke
2 Diabetes	Chronic kidney disease due to diabetes Diabetes mellites
3 Hemorrhagic stroke	Hemorrhagic stroke
4 Infection-associated NCDs[b]	Cervical cancer Cirrhosis due to hepatitis B Cirrhosis due to hepatitis C Liver cancer secondary to hepatitis B Liver cancer secondary to hepatitis C Rheumatic heart disease Stomach cancer
5 Road injury	Road injury
6 Strongly tobacco-associated NCDs[b]	Chronic obstructive pulmonary disease Larynx cancer Mouth and oropharynx cancer Trachea, bronchus, and lung cancer
7 Suicide	Self-harm

[a] Cardiovascular disease

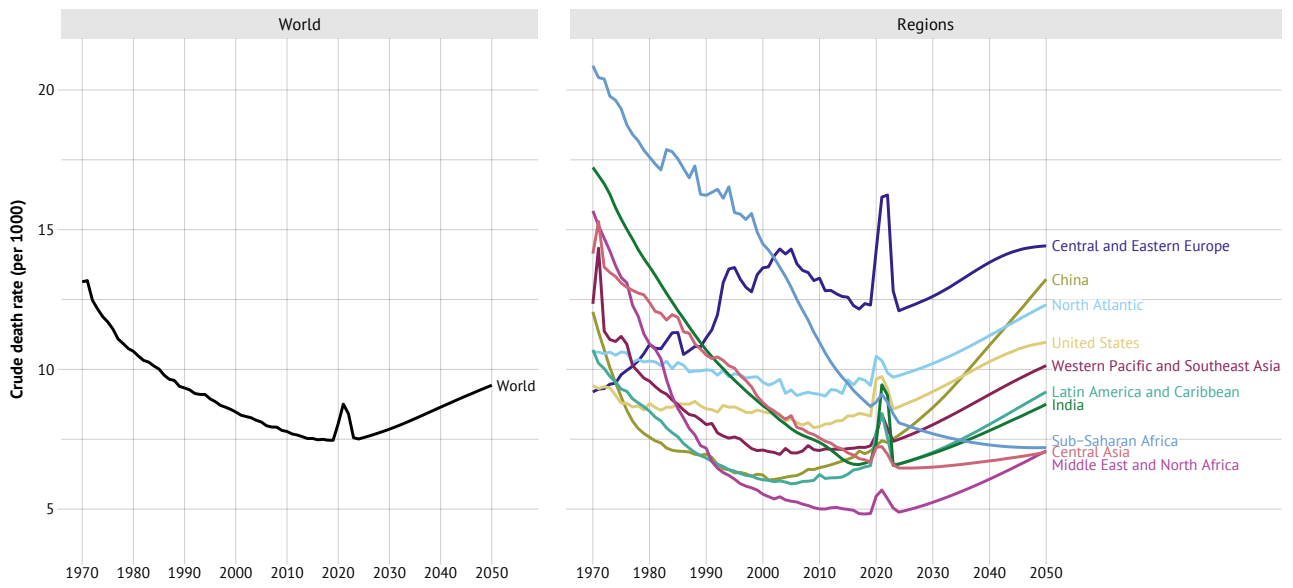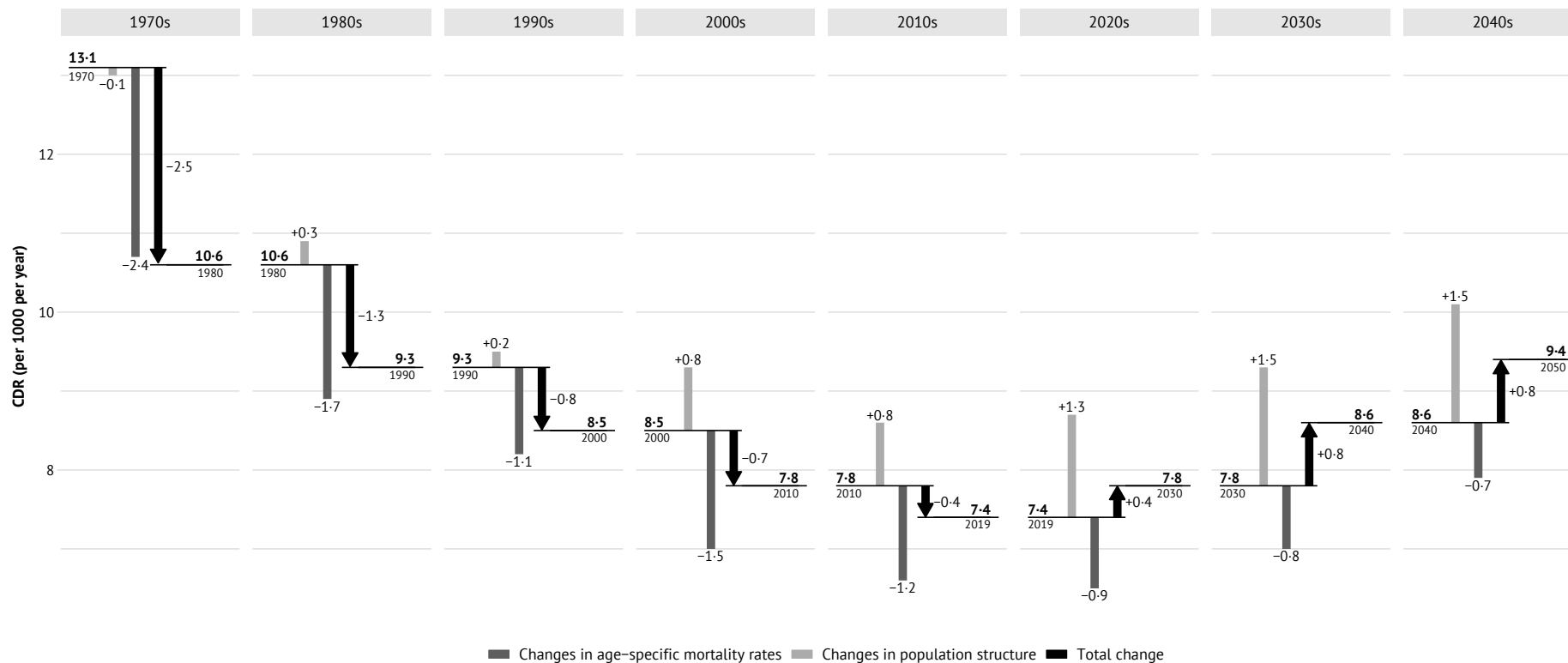[b] Noncommunicable diseases

26

Figure A1. Decomposition of decadal changes in crude death rate per 1000 per year into component (changes in population structure, changes in age-specific mortality rates) contributions by region, 1970-2050.

Central Asia, 1970–2050

Legend:
- Changes in age–specific mortality rates
- Changes in population structure
- Total change

CDR = Crude death rate

Central and Eastern Europe, 1970–2050

| 1970s | 1980s | 1990s | 2000s | 2010s | 2020s | 2030s | 2040s |

CDR (per 1000 per year)

Legend: Changes in age–specific mortality rates / Changes in population structure / Total change

CDR = Crude death rate

China, 1970–2050

| 1970s | 1980s | 1990s | 2000s | 2010s | 2020s | 2030s | 2040s |

12·0 1970
−0·4
−4·4
−4·0
7·6 1980

+1·0
7·6 1980
−0·6
−1·6
7·0 1990

+0·9
7·0 1990
−0·8
−1·6
6·2 2000

+1·7
6·2 2000
+0·3
−1·4
6·5 2010

+1·7
6·5 2010
+0·6
−1·1
7·1 2019

+3·1
7·1 2019
+1·5
−1·5
8·6 2030

+3·9
8·6 2030
+2·3
−1·7
10·9 2040

+4·3
10·9 2040
+2·3
−1·9
13·2 2050

CDR (per 1000 per year)

■ Changes in age–specific mortality rates   ■ Changes in population structure   ■ Total change

CDR = Crude death rate

29

India, 1970–2050

1970s	1980s	1990s	2000s	2010s	2020s	2030s	2040s

CDR (per 1000 per year)

1970s:
17·2 1970, −0·1, −3·5, −3·5, **13·7** 1980

1980s:
13·7 1980, −0·2, −3·0, −2·7, **10·7** 1990

1990s:
10·7 1990, −2·0, −2·0, **8·7** 2000

2000s:
8·7 2000, +0·4, −1·3, −1·7, **7·4** 2010

2010s:
7·4 2010, +1·0, −0·7, −1·6, **6·7** 2019

2020s:
6·7 2019, +1·5, +0·3, −1·2, **7·0** 2030

2030s:
7·0 2030, +1·8, +0·8, −1·0, **7·8** 2040

2040s:
7·8 2040, +2·0, +1·0, −1·1, **8·8** 2050

15

10

5

■ Changes in age-specific mortality rates ■ Changes in population structure ■ Total change

CDR = Crude death rate

Latin America and Caribbean, 1970–2050

Legend:
- Changes in age–specific mortality rates
- Changes in population structure
- Total change
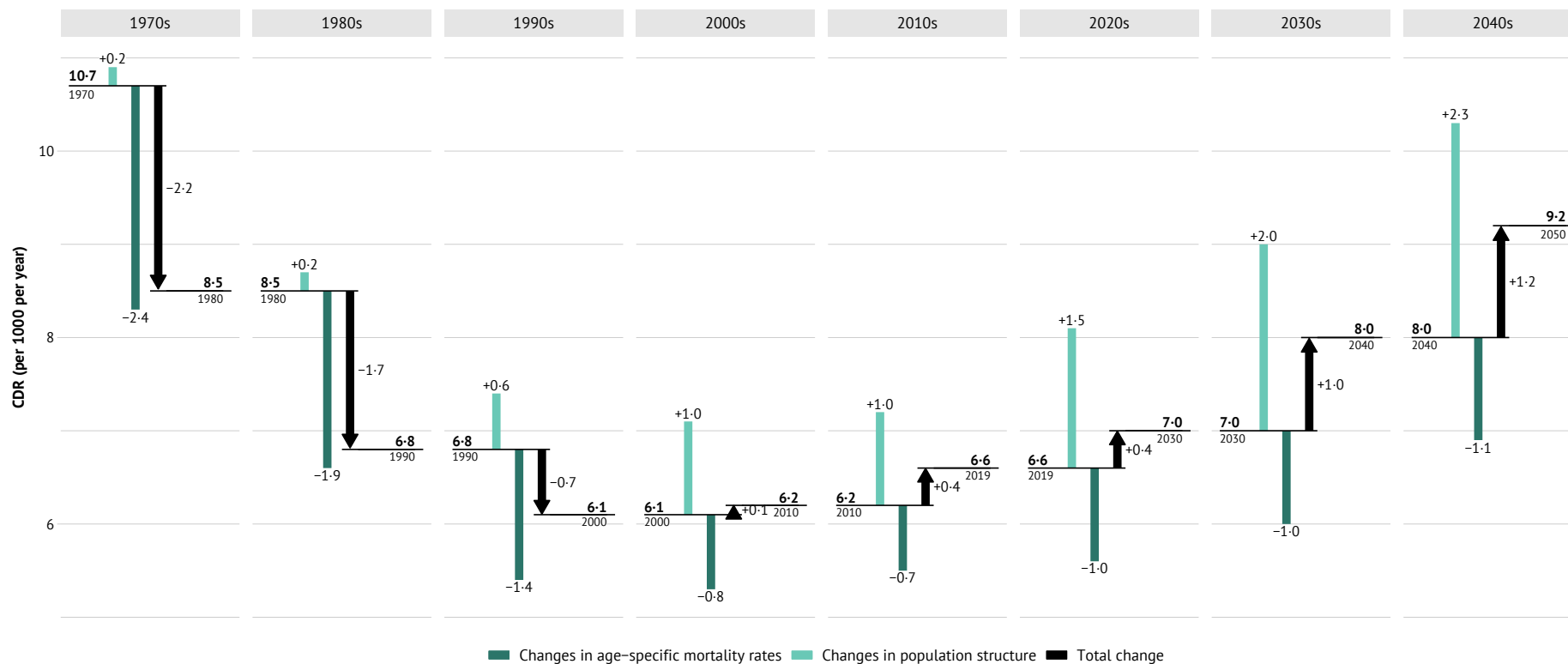
CDR = Crude death rate

Middle East and North Africa, 1970–2050

| 1970s | 1980s | 1990s | 2000s | 2010s | 2020s | 2030s | 2040s |

15·7 1970
−0·3
−4·8
−4·5
10·9 1980

10·9 1980
−0·6
−3·7
−3·2
7·2 1990

7·2 1990
−1·7
−1·7
5·5 2000

5·5 2000
+0·5
−0·5
−1·0
5·0 2010

5·0 2010
+0·6
−0·2
−0·8
4·8 2019

4·8 2019
+1·2
+0·4
−0·8
5·2 2030

5·2 2030
+1·7
+0·9
−0·8
6·1 2040

6·1 2040
+1·9
+1·0
−0·9
7·1 2050

CDR (per 1000 per year)

■ Changes in age–specific mortality rates ■ Changes in population structure ■ Total change
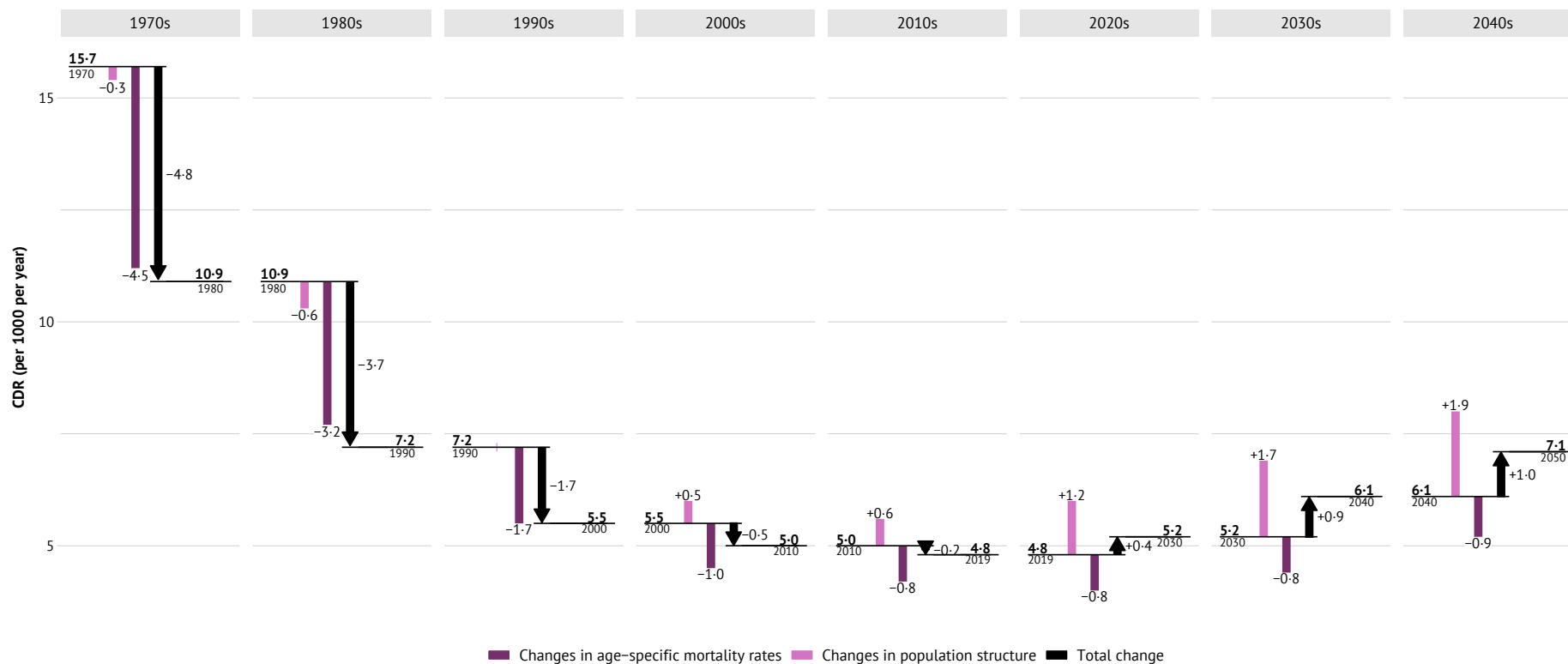
CDR = Crude death rate

North Atlantic, 1970–2050

| 1970s | 1980s | 1990s | 2000s | 2010s | 2020s | 2030s | 2040s |
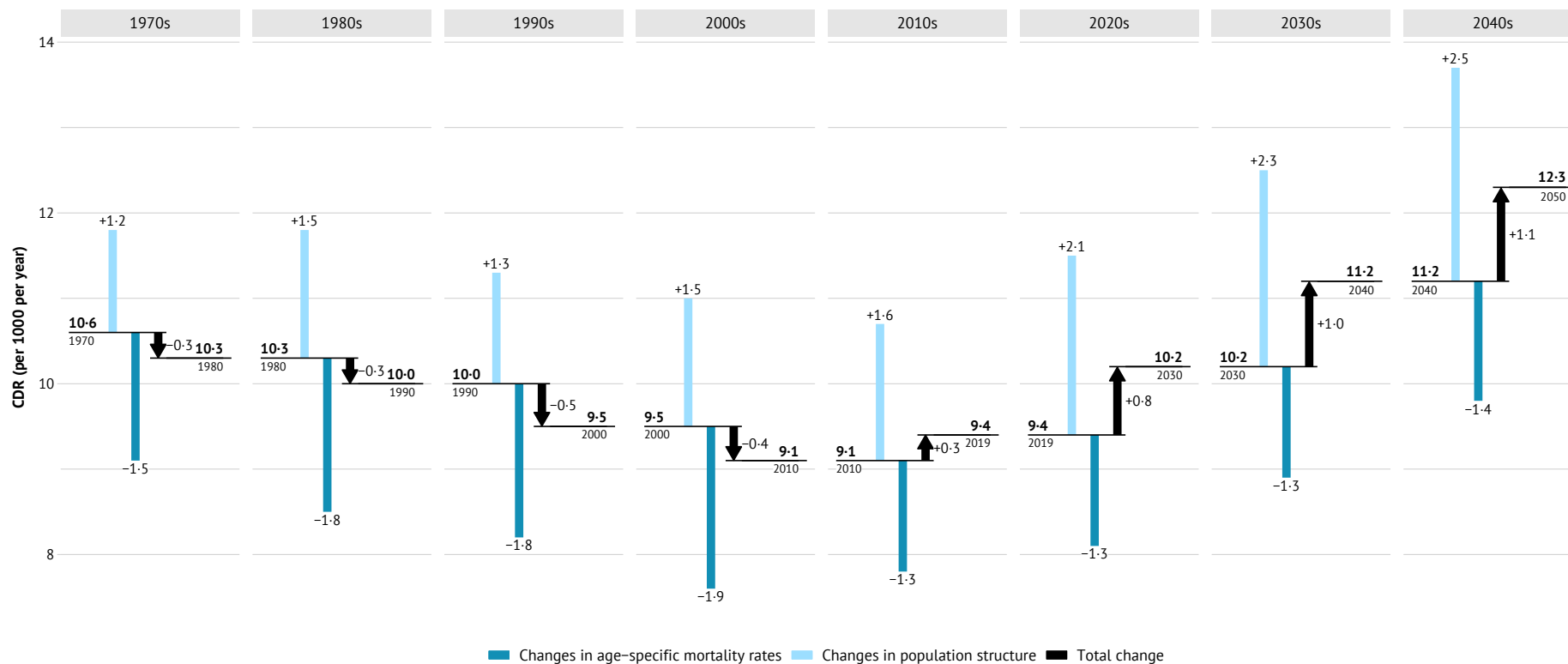
CDR = Crude death rate

Sub−Saharan Africa, 1970−2050

| 1970s | 1980s | 1990s | 2000s | 2010s | 2020s | 2030s | 2040s |

CDR (per 1000 per year)

20

15

10

20·9
1970

−3·3

−3·2

17·6
1980

17·6
1980

−0·3

−1·1

−1·4

16·2
1990

16·2
1990

−0·4

−1·4

−1·7

14·5
2000

14·5
2000

−3·5

−3·5

11·0
2010

11·0
2010

−0·1

−2·2

−2·3

8·7
2019

8·7
2019

+0·1

−1·1

−1·0

7·7
2030

7·7
2030

+0·4

−0·8

−0·4

7·3
2040

7·3
2040

+0·6

−0·7

−0·1

7·2
2050

■ Changes in age−specific mortality rates   ■ Changes in population structure   ■ Total change
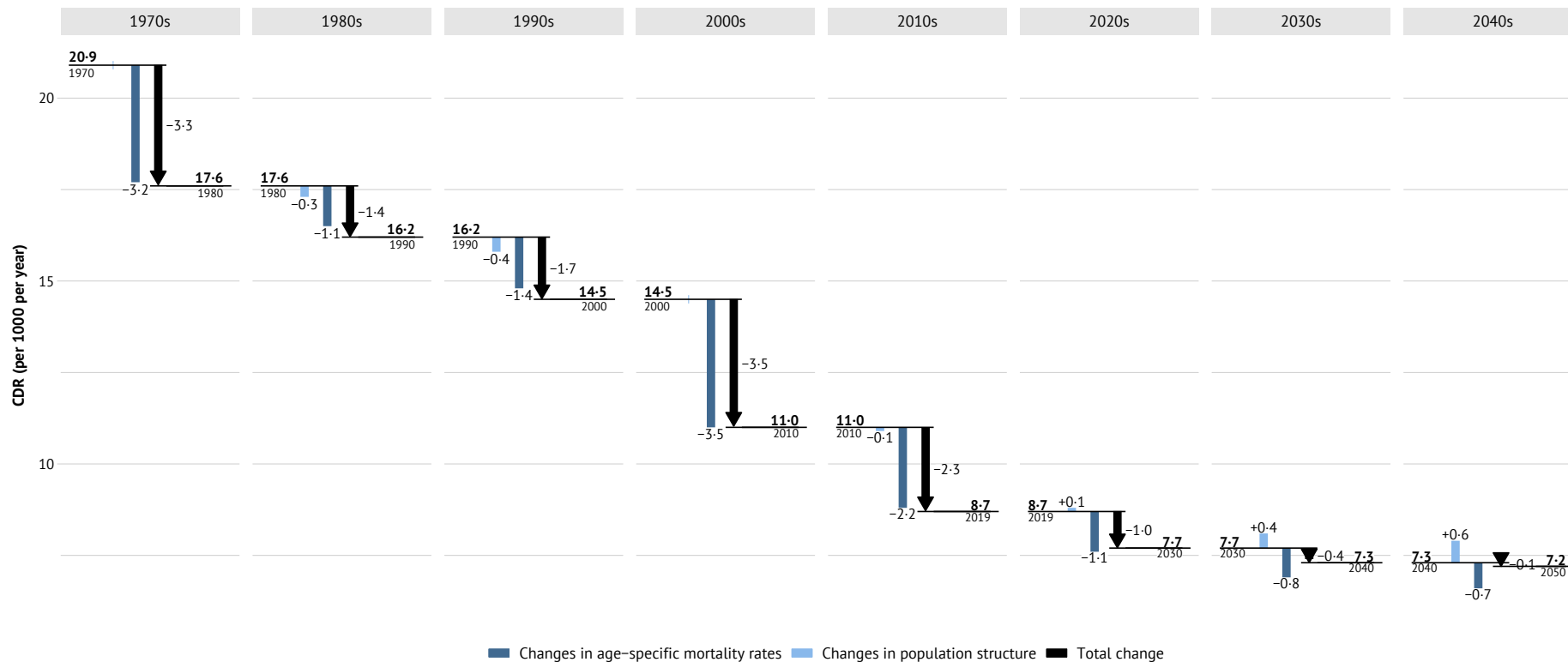
CDR = Crude death rate

United States, 1970–2050

| 1970s | 1980s | 1990s | 2000s | 2010s | 2020s | 2030s | 2040s |

CDR (per 1000 per year)

1970s:
- +1·1 (population structure)
- 9·4 / 1970
- −0·6
- 8·8 / 1980
- −1·7 (age-specific mortality)

1980s:
- +0·8
- 8·8 / 1980
- −0·2
- 8·6 / 1990
- −1·0

1990s:
- +0·5
- 8·6 / 1990
- −0·1
- 8·5 / 2000
- −0·6

2000s:
- +0·9
- 8·5 / 2000
- −0·6
- 7·9 / 2010
- −1·4

2010s:
- +0·8
- 7·9 / 2010
- +0·4
- 8·3 / 2019
- −0·5

2020s:
- +2·0
- 8·3 / 2019
- +0·9
- 9·2 / 2030
- −1·1

2030s:
- +2·3
- 9·2 / 2030
- +1·1
- 10·3 / 2040
- −1·2

2040s:
- +1·9
- 10·3 / 2040
- +0·7
- 11·0 / 2050
- −1·2

Legend: ■ Changes in age–specific mortality rates ■ Changes in population structure ■ Total change

CDR = Crude death rate

Western Pacific and Southeast Asia, 1970–2050

| 1970s | 1980s | 1990s | 2000s | 2010s | 2020s | 2030s | 2040s |

CDR (per 1000 per year)

12·4 +0·1
1970
−2·8
−2·9
9·6
1980

+0·4
9·6
1980
−1·6
−1·9
8·0
1990

+0·7
8·0
1990
−0·9
−1·6
7·1
2000

+1·1
7·1
2000
7·1
2010
−1·1

+1·1
7·1
2010
+0·2 **7·3**
2019
−1·0

+1·5
7·3
2019
+0·7 **8·0**
2030
−0·7

+1·7
8·0
2030
+1·1 **9·1**
2040
−0·6

+1·7
9·1
2040
+1·0 **10·1**
2050
−0·7

■ Changes in age–specific mortality rates   ■ Changes in population structure   ■ Total change
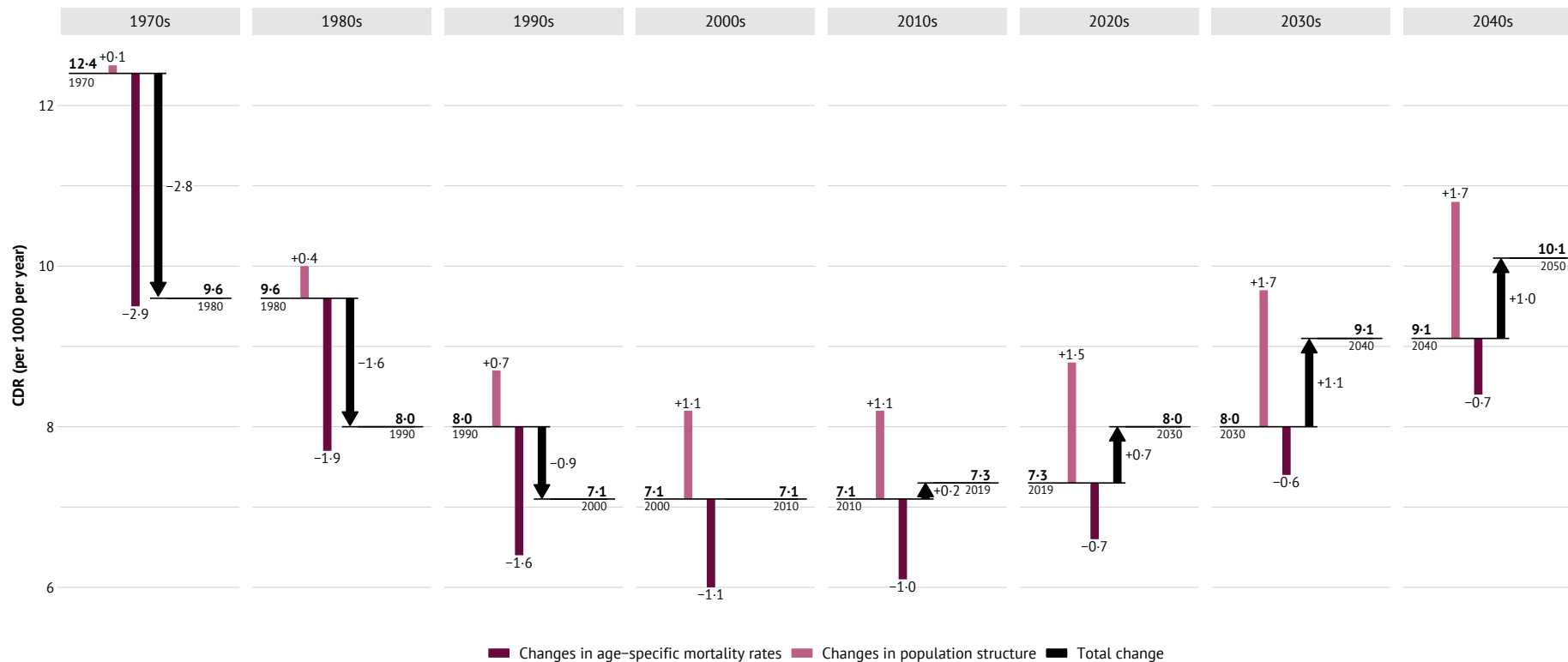
CDR = Crude death rate

Table A3. Decomposition of decadal changes crude death rate (CDR) per 1000 per year into component (changes in population structure, changes in age-specific mortality rates) contributions by region, 1970-1950.

Decade	CDR (per 1000 per year)			Changes in population structure		Changes in age-specific mortality rates	
	First year	Last year	Difference	Per 1000 per year	Net contribution to CDR difference	Per 1000 per year	Net contribution to CDR difference
World							
1970s	13·1	10·6	-2·5	-0·1	4%	-2·4	96%
1980s	10·6	9·3	-1·3	+0·3	0%	-1·6	100%
1990s	9·3	8·5	-0·8	+0·2	0%	-1·0	100%
2000s	8·5	7·8	-0·7	+0·8	0%	-1·5	100%
2010s	7·8	7·4	-0·4	+1·0	0%	-1·4	100%
2020s	7·4	7·8	0·4	+1·3	100%	-0·9	0%
2030s	7·8	8·6	0·8	+1·6	100%	-0·8	0%
2040s	8·6	9·4	0·8	+1·6	100%	-0·8	0%
Central Asia							
1970s	14·1	12·5	-1·6	-0·1	6%	-1·5	94%
1980s	12·5	10·6	-1·9	+0·1	0%	-2·0	100%
1990s	10·6	8·8	-1·8	-0·8	44%	-1·0	56%
2000s	8·8	7·6	-1·2	+0·1	0%	-1·3	100%
2010s	7·6	6·7	-0·9	+0·3	0%	-1·2	100%
2020s	6·7	6·5	-0·2	+0·5	0%	-0·7	100%
2030s	6·5	6·7	0·2	+0·7	100%	-0·5	0%
2040s	6·7	7·0	0·3	+0·8	100%	-0·5	0%

Decade	CDR (per 1000 per year)			Changes in population structure		Changes in age-specific mortality rates	
	First year	Last year	Difference	Per 1000 per year	Net contribution to CDR difference	Per 1000 per year	Net contribution to CDR difference
Central and Eastern Europe							
1970s	9·2	10·9	1·7	+1·4	82%	+0·3	18%
1980s	10·9	11·1	0·2	+0·8	100%	-0·6	0%
1990s	11·1	13·6	2·5	+1·2	48%	+1·3	52%
2000s	13·6	13·3	-0·3	+1·8	0%	-2·1	100%
2010s	13·3	12·3	-1·0	+2·1	0%	-3·1	100%
2020s	12·3	12·6	0·3	+1·9	100%	-1·6	0%
2030s	12·6	13·8	1·2	+2·7	100%	-1·5	0%
2040s	13·8	14·4	0·6	+2·3	100%	-1·7	0%
China							
1970s	12·0	7·6	-4·4	-0·4	9%	-4·0	91%
1980s	7·6	7·0	-0·6	+1·0	0%	-1·6	100%
1990s	7·0	6·2	-0·8	+1·0	0%	-1·8	100%
2000s	6·2	6·5	0·3	+1·9	100%	-1·6	0%
2010s	6·5	7·1	0·6	+1·7	100%	-1·1	0%
2020s	7·1	8·6	1·5	+3·0	100%	-1·5	0%
2030s	8·6	10·9	2·3	+4·0	100%	-1·7	0%
2040s	10·9	13·2	2·3	+4·1	100%	-1·8	0%

	CDR (per 1000 per year)			Changes in population structure		Changes in age-specific mortality rates	
Decade	First year	Last year	Difference	Per 1000 per year	Net contribution to CDR difference	Per 1000 per year	Net contribution to CDR difference
India							
1970s	17·2	13·7	-3·5	-0·1	3%	-3·4	97%
1980s	13·7	10·7	-3·0	-0·2	7%	-2·8	93%
1990s	10·7	8·7	-2·0	0·0	0%	-2·0	100%
2000s	8·7	7·4	-1·3	+0·4	0%	-1·7	100%
2010s	7·4	6·7	-0·7	+1·0	0%	-1·7	100%
2020s	6·7	7·0	0·3	+1·6	100%	-1·3	0%
2030s	7·0	7·8	0·8	+1·8	100%	-1·0	0%
2040s	7·8	8·8	1·0	+2·2	100%	-1·2	0%
Latin America and Caribbean							
1970s	10·7	8·5	-2·2	+0·2	0%	-2·4	100%
1980s	8·5	6·8	-1·7	+0·2	0%	-1·9	100%
1990s	6·8	6·1	-0·7	+0·5	0%	-1·2	100%
2000s	6·1	6·2	0·1	+0·5	100%	-0·4	0%
2010s	6·2	6·6	0·4	+1·3	100%	-0·9	0%
2020s	6·6	7·0	0·4	+1·3	100%	-0·9	0%
2030s	7·0	8·0	1·0	+2·0	100%	-1·0	0%
2040s	8·0	9·2	1·2	+2·3	100%	-1·1	0%

	CDR (per 1000 per year)			Changes in population structure		Changes in age-specific mortality rates	
Decade	First year	Last year	Difference	Per 1000 per year	Net contribution to CDR difference	Per 1000 per year	Net contribution to CDR difference
Middle East and North Africa							
1970s	15·7	10·9	-4·8	-0·3	6%	-4·5	94%
1980s	10·9	7·2	-3·7	-0·6	16%	-3·1	84%
1990s	7·2	5·5	-1·7	0·0	0%	-1·7	100%
2000s	5·5	5·0	-0·5	+0·5	0%	-1·0	100%
2010s	5·0	4·8	-0·2	+0·8	0%	-1·0	100%
2020s	4·8	5·2	0·4	+1·2	100%	-0·8	0%
2030s	5·2	6·1	0·9	+1·8	100%	-0·9	0%
2040s	6·1	7·1	1·0	+1·9	100%	-0·9	0%
North Atlantic							
1970s	10·6	10·3	-0·3	+1·2	0%	-1·5	100%
1980s	10·3	10·0	-0·3	+1·4	0%	-1·7	100%
1990s	10·0	9·5	-0·5	+1·5	0%	-2·0	100%
2000s	9·5	9·1	-0·4	+1·3	0%	-1·7	100%
2010s	9·1	9·4	0·3	+1·5	100%	-1·2	0%
2020s	9·4	10·2	0·8	+2·1	100%	-1·3	0%
2030s	10·2	11·2	1·0	+2·3	100%	-1·3	0%
2040s	11·2	12·3	1·1	+2·5	100%	-1·4	0%

Decade	CDR (per 1000 per year)			Changes in population structure		Changes in age-specific mortality rates	
	First year	Last year	Difference	Per 1000 per year	Net contribution to CDR difference	Per 1000 per year	Net contribution to CDR difference
Sub-Saharan Africa							
1970s	20·9	17·6	-3·3	0·0	0%	-3·3	100%
1980s	17·6	16·2	-1·4	-0·3	21%	-1·1	79%
1990s	16·2	14·5	-1·7	-0·4	24%	-1·3	76%
2000s	14·5	11·0	-3·5	0·0	0%	-3·5	100%
2010s	11·0	8·7	-2·3	-0·1	4%	-2·2	96%
2020s	8·7	7·7	-1·0	+0·1	0%	-1·1	100%
2030s	7·7	7·3	-0·4	+0·4	0%	-0·8	100%
2040s	7·3	7·2	-0·1	+0·6	0%	-0·7	100%
United States							
1970s	9·4	8·8	-0·6	+1·0	0%	-1·6	100%
1980s	8·8	8·6	-0·2	+0·8	0%	-1·0	100%
1990s	8·6	8·5	-0·1	+0·5	0%	-0·6	100%
2000s	8·5	7·9	-0·6	+1·0	0%	-1·6	100%
2010s	7·9	8·3	0·4	+1·0	100%	-0·6	0%
2020s	8·3	9·2	0·9	+2·0	100%	-1·1	0%
2030s	9·2	10·3	1·1	+2·3	100%	-1·2	0%
2040s	10·3	11·0	0·7	+1·9	100%	-1·2	0%

Decade	CDR (per 1000 per year)			Changes in population structure		Changes in age-specific mortality rates	
	First year	Last year	Difference	Per 1000 per year	Net contribution to CDR difference	Per 1000 per year	Net contribution to CDR difference
Western Pacific and Southeast Asia							
1970s	12·4	9·6	-2·8	+0·1	0%	-2·9	100%
1980s	9·6	8·0	-1·6	+0·4	0%	-2·0	100%
1990s	8·0	7·1	-0·9	+0·7	0%	-1·6	100%
2000s	7·1	7·1	0·0	0·0	50%	0·0	50%
2010s	7·1	7·3	0·2	+1·4	100%	-1·2	0%
2020s	7·3	8·0	0·7	+1·4	100%	-0·7	0%
2030s	8·0	9·1	1·1	+1·7	100%	-0·6	0%
2040s	9·1	10·1	1·0	+1·7	100%	-0·7	0%

First year = The first year of the decadal period. For all periods except the 2020s, the first year of the decadal period is the first year of the decade (i.e., the year ending in -0; e.g., for the 1970s, the first year is 1970). For the 2020s, the first year of the decadal period is 2019, rather than 2020, to avoid COVID-19 impacts.

Last year = The last year of the decadal period. For all periods except the 2010s, the last year of the decadal period is the first year of the subsequent decade (e.g., for the 1970s, the last year is 1980). For the 2010s, the last year of the decadal period is 2019, rather than 2020, to avoid COVID-19 impacts.

Difference = The change in CDR between the last year and first year of the decade as defined above.

Table A4. All-cause mortality rates and decade average annual rates of change (AARC) by age group and region, 1970-2019.

	0-14		15-49		50-69		70+	
	First year mortality rate	Decade AARC	First year mortality rate	Decade AARC	First year mortality rate	Decade AARC	First year mortality rate	Decade AARC
World								
1970s	15	-3.2%	4.5	-2.5%	21	-1.7%	90	-1.1%
1980s	11	-2.1%	3.5	-1.7%	18	-1.2%	81	-0.40%
1990s	8.6	-3.0%	2.9	-0.44%	16	-0.99%	78	-0.90%
2000s	6.4	-3.3%	2.8	-1.5%	14	-1.8%	71	-0.70%
2010s	4.6	-3.7%	2.4	-1.7%	12	-0.93%	66	-0.91%
2019	3.2		2.0		11		61	
Central and Eastern Europe								
1970s	3.3	-0.24%	2.9	+1.2%	16	-0.02%	82	-0.08%
1980s	3.2	-5.1%	3.2	-0.48%	16	+0.21%	81	+0.42%
1990s	1.9	-4.5%	3.1	+2.1%	17	+2.0%	84	+0.02%
2000s	1.2	-3.3%	3.8	-3.6%	20	-2.1%	85	-1.0%
2010s	0.86	-7.4%	2.6	-3.5%	16	-1.4%	76	-0.83%
2019	0.43		1.9		14		71	
Central Asia								
1970s	18	-1.3%	4.6	-1.5%	22	-1.0%	97	-0.51%
1980s	16	-2.3%	3.9	-2.2%	20	-0.59%	93	+0.08%
1990s	13	-3.5%	3.1	-0.41%	19	+0.36%	93	-0.32%
2000s	8.8	-2.6%	3.0	-1.9%	19	-1.5%	90	-0.30%
2010s	6.8	-3.9%	2.5	-1.3%	17	-0.86%	88	-0.20%
2019	4.7		2.2		15		86	

China								
1970s	12	-8.4%	4.2	-4.3%	27	-3.3%	110	-2.2%
1980s	5.2	+0.11%	2.7	-3.1%	19	-2.3%	88	-0.88%
1990s	5.2	-6.4%	2.0	-2.0%	15	-2.3%	81	-1.4%
2000s	2.7	-5.5%	1.6	-1.7%	12	-2.6%	70	-0.76%
2010s	1.5	-8.8%	1.4	-2.0%	9.2	-0.97%	65	-0.82%
2019	0.67		1.1		8.4		60	
India								
1970s	23	-2.7%	6.2	-3.1%	28	-1.2%	110	-1.1%
1980s	17	-3.5%	4.5	-3.0%	25	-1.4%	94	-0.10%
1990s	12	-3.9%	3.3	-0.54%	22	-1.2%	93	-1.3%
2000s	8.1	-5.3%	3.2	-1.9%	19	-2.0%	82	-0.09%
2010s	4.7	-6.3%	2.6	-2.6%	16	-0.60%	81	-1.8%
2019	2.6		2.1		15		69	
Latin America and Caribbean								
1970s	12	-4.1%	4.3	-1.9%	20	-1.6%	86	-0.59%
1980s	7.9	-4.8%	3.5	-2.0%	17	-1.4%	82	-0.93%
1990s	4.8	-5.5%	2.9	-1.6%	14	-1.4%	74	-0.82%
2000s	2.7	-3.5%	2.4	-1.0%	13	-1.2%	68	-0.33%
2010s	1.9	-4.2%	2.2	-1.9%	11	-0.81%	66	-0.40%
2019	1.3		1.9		10		64	
Middle East and North Africa								
1970s	21	-5.0%	4.8	-2.8%	23	-1.6%	97	-0.70%
1980s	12	-6.8%	3.6	-3.3%	20	-1.4%	91	-0.68%
1990s	6.1	-6.0%	2.6	-3.3%	17	-1.7%	85	-0.69%
2000s	3.3	-3.5%	1.9	-2.0%	15	-1.9%	79	-0.53%

2010s	2.3	-3.6%	1.5	-1.6%	12	-1.6%	75	-1.1%
2019	1.7		1.3		10		68	
North Atlantic								
1970s	2.0	-5.9%	1.8	-1.7%	16	-1.9%	82	-1.0%
1980s	1.1	-3.8%	1.5	-1.3%	13	-1.6%	74	-0.41%
1990s	0.75	-4.8%	1.3	-1.3%	11	-2.4%	71	-1.4%
2000s	0.46	-2.5%	1.2	-2.5%	8.6	-2.1%	62	-1.3%
2010s	0.35	-2.3%	0.91	-2.0%	6.9	-1.2%	54	-0.74%
2019	0.29		0.76		6.2		50	
Sub-Saharan Africa								
1970s	29	-2.0%	8.6	-1.8%	27	-1.0%	110	-0.75%
1980s	24	-1.5%	7.1	+0.30%	25	+0.26%	100	-0.02%
1990s	20	-2.0%	7.3	+0.38%	25	+0.12%	100	-0.33%
2000s	16	-4.0%	7.6	-2.2%	26	-1.3%	97	-0.52%
2010s	11	-3.6%	6.1	-2.9%	22	-1.6%	92	-0.79%
2019	7.8		4.7		19		86	
United States								
1970s	1.8	-3.6%	2.4	-2.8%	17	-1.7%	75	-1.1%
1980s	1.3	-2.0%	1.8	-0.28%	14	-1.0%	67	-0.64%
1990s	1.0	-4.0%	1.7	-0.84%	13	-2.2%	63	+0.19%
2000s	0.69	-2.0%	1.6	-1.0%	10	-1.7%	64	-1.1%
2010s	0.56	-1.6%	1.4	+0.93%	8.5	+0.64%	57	-1.5%
2019	0.48		1.6		9.0		50	
Western Pacific and Southeast Asia								
1970s	14	-3.5%	4.8	-3.4%	21	-2.2%	91	-1.4%
1980s	10	-3.7%	3.4	-2.1%	17	-1.4%	79	-0.75%

1990s	6.9	-4.5%	2.7	-1.6%	14	-1.0%	73	-1.2%
2000s	4.3	-4.6%	2.3	-1.2%	13	-1.1%	65	-0.43%
2010s	2.7	-3.8%	2.1	-1.6%	12	-0.90%	62	-0.68%
2019	1.9		1.8		11		59	

First year mortality rate = The mortality rate, reported per 1000 population, during the first year of the decadal period (i.e., the year ending in -0; e.g., for the 1970s, the first year is 1970).

Figure A2. Annual rate of change in all-cause mortality by decade, age, and region.
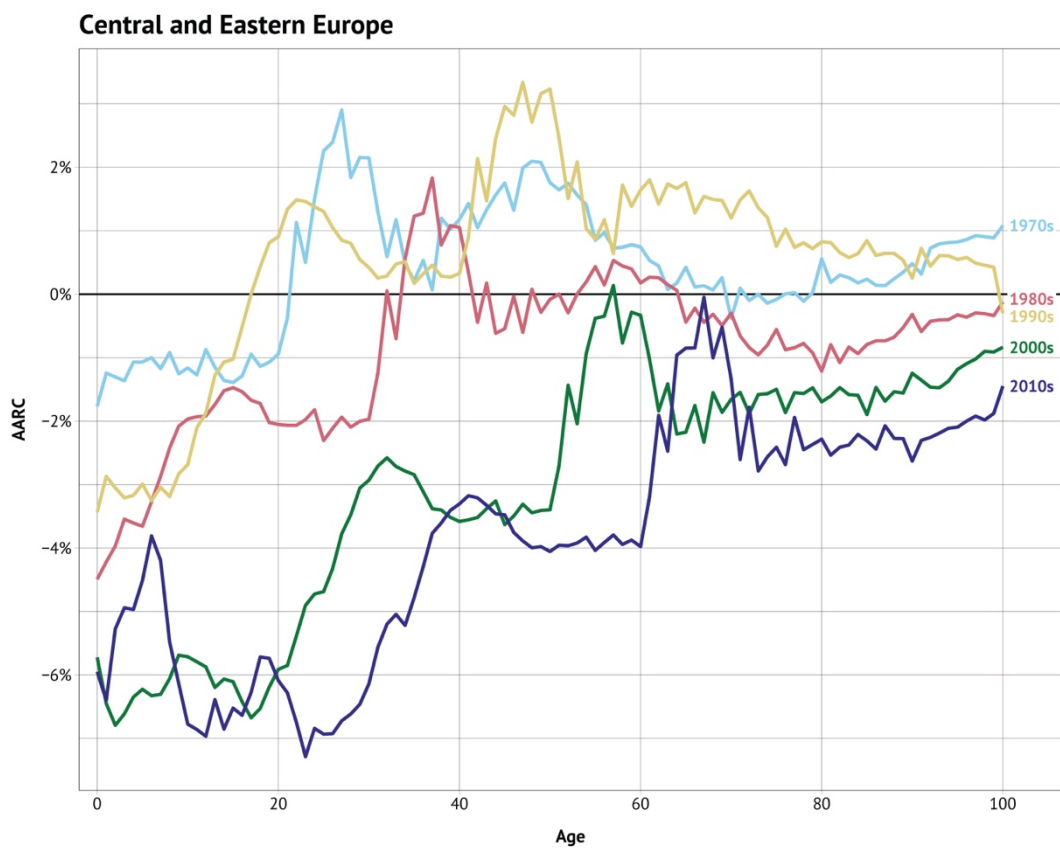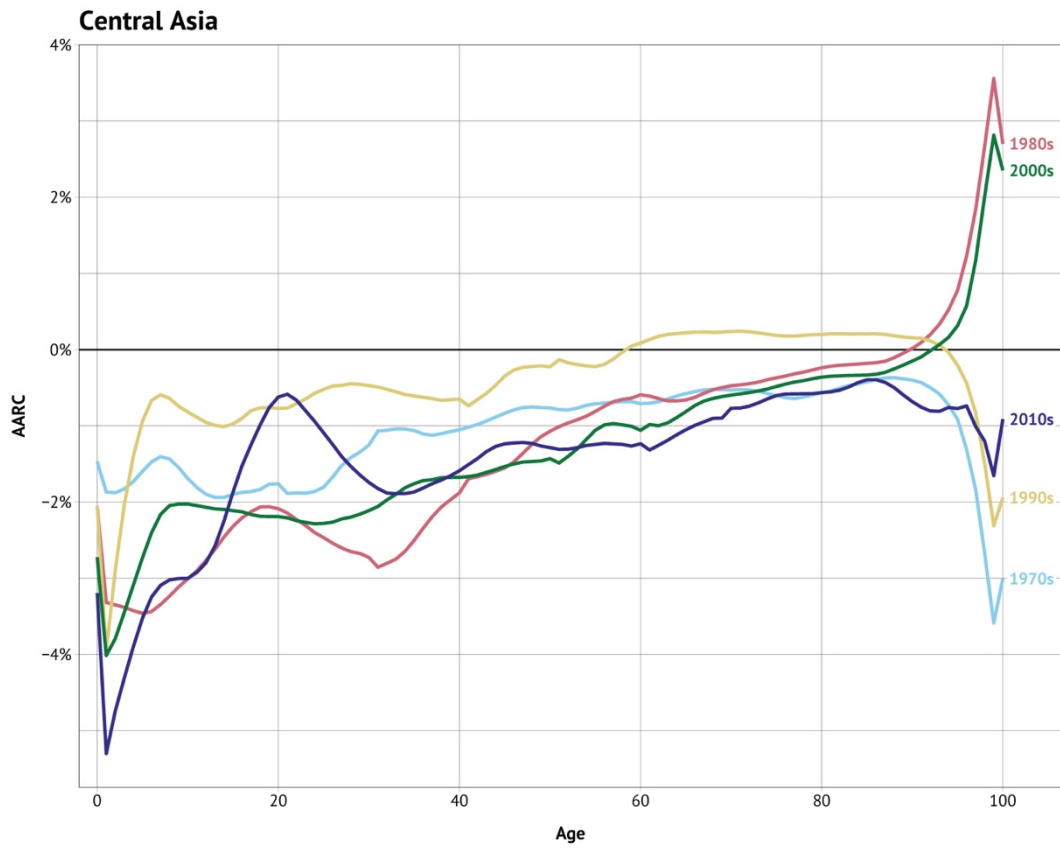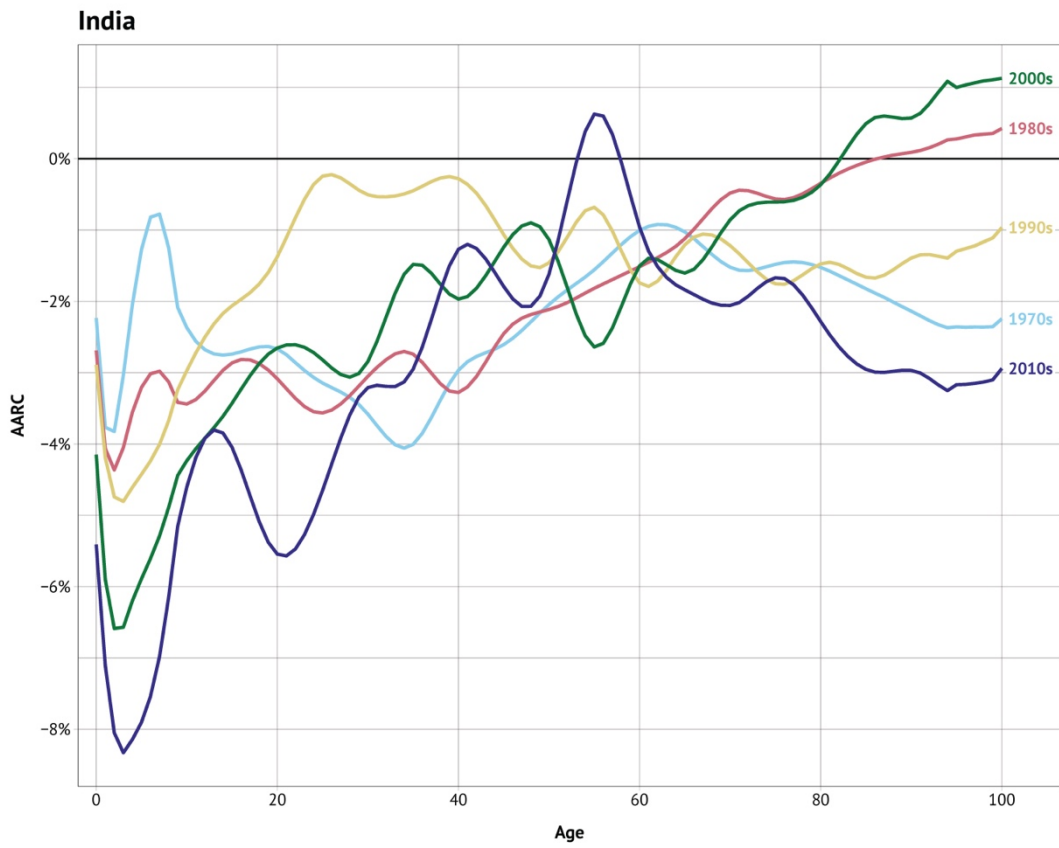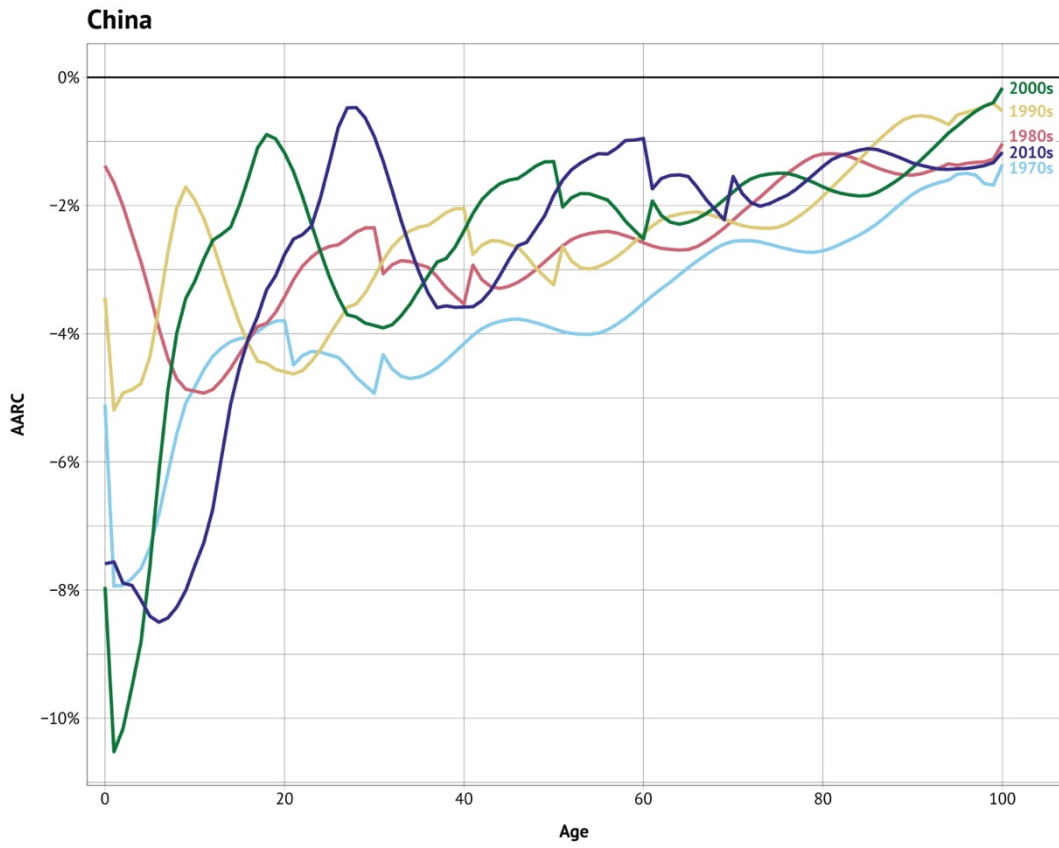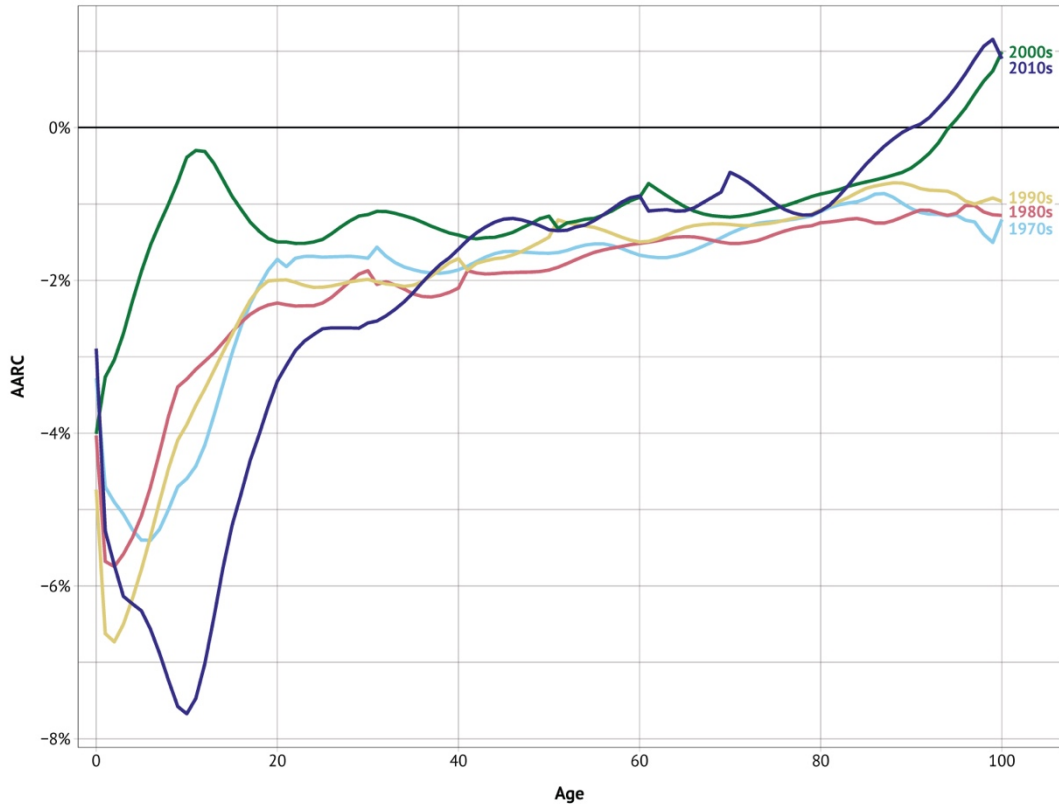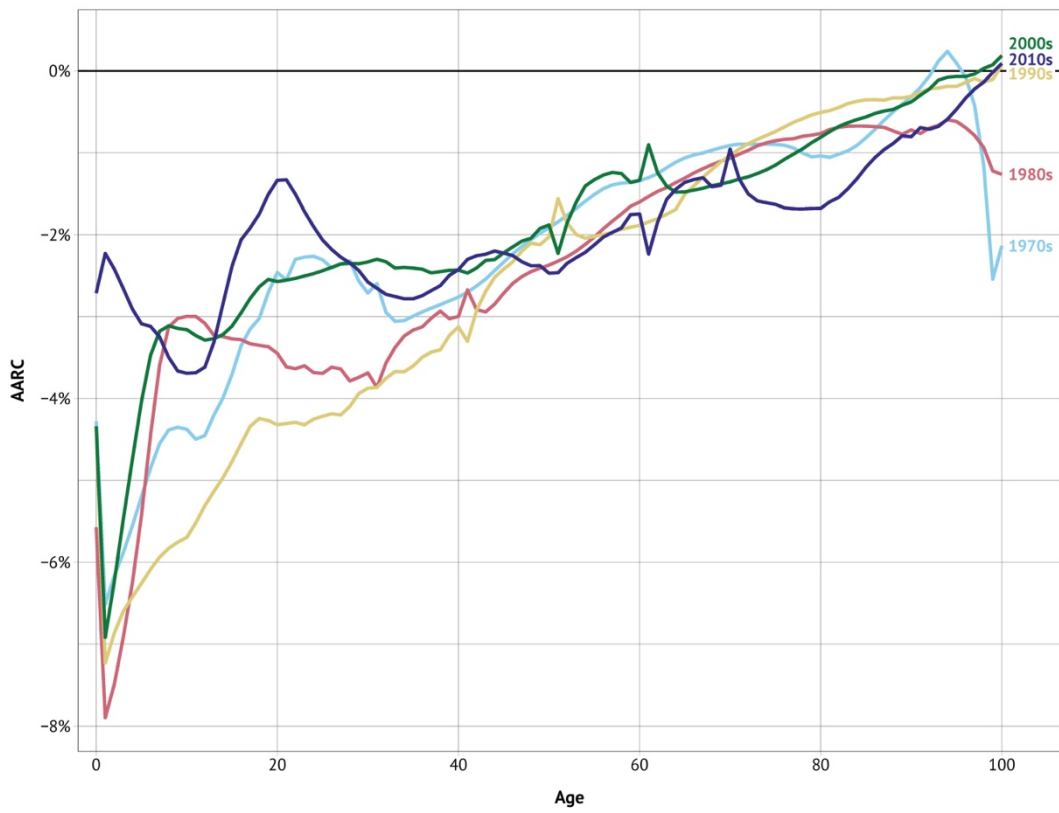
Central Asia

Central and Eastern Europe

China

India

Latin America and Caribbean

Middle East and North Africa

North Atlantic

Sub−Saharan Africa

50

United States

Western Pacific and Southeast Asia

51
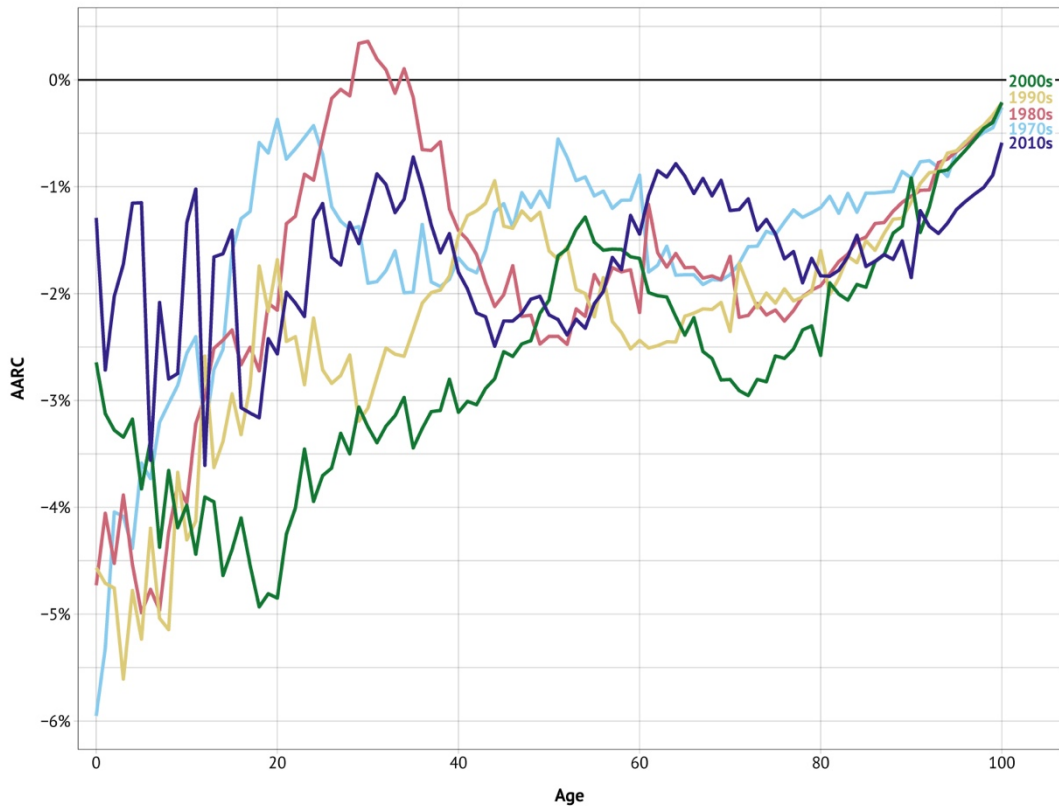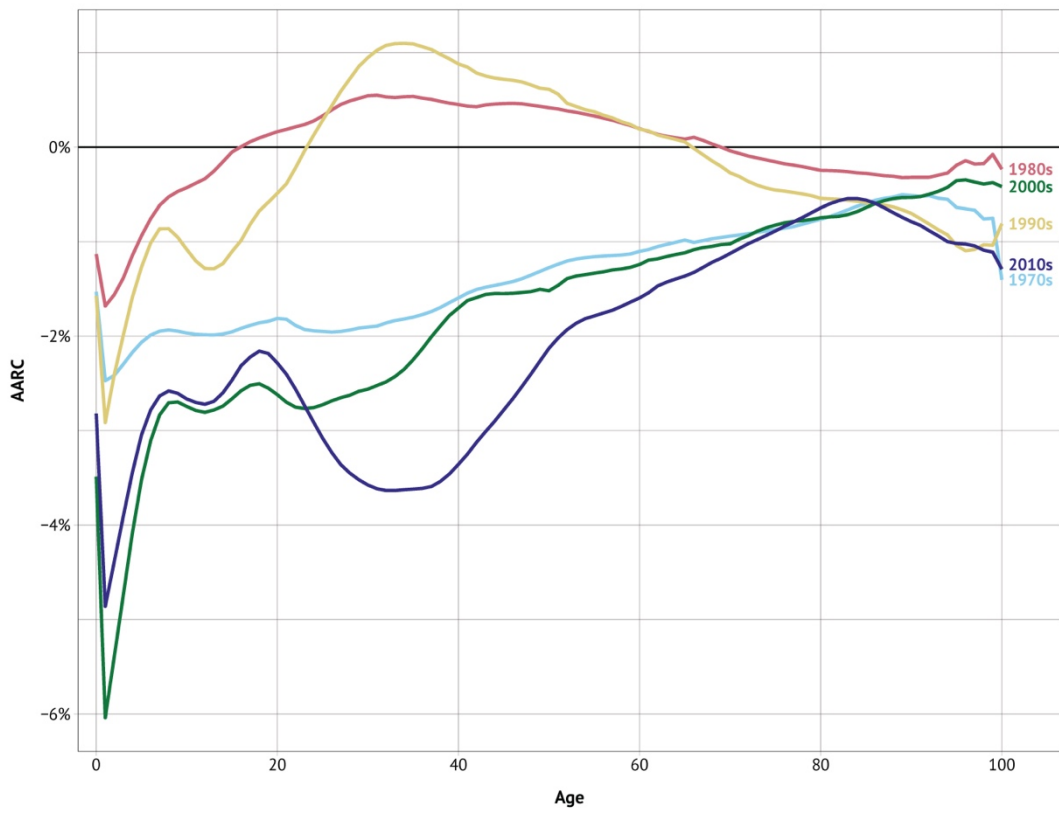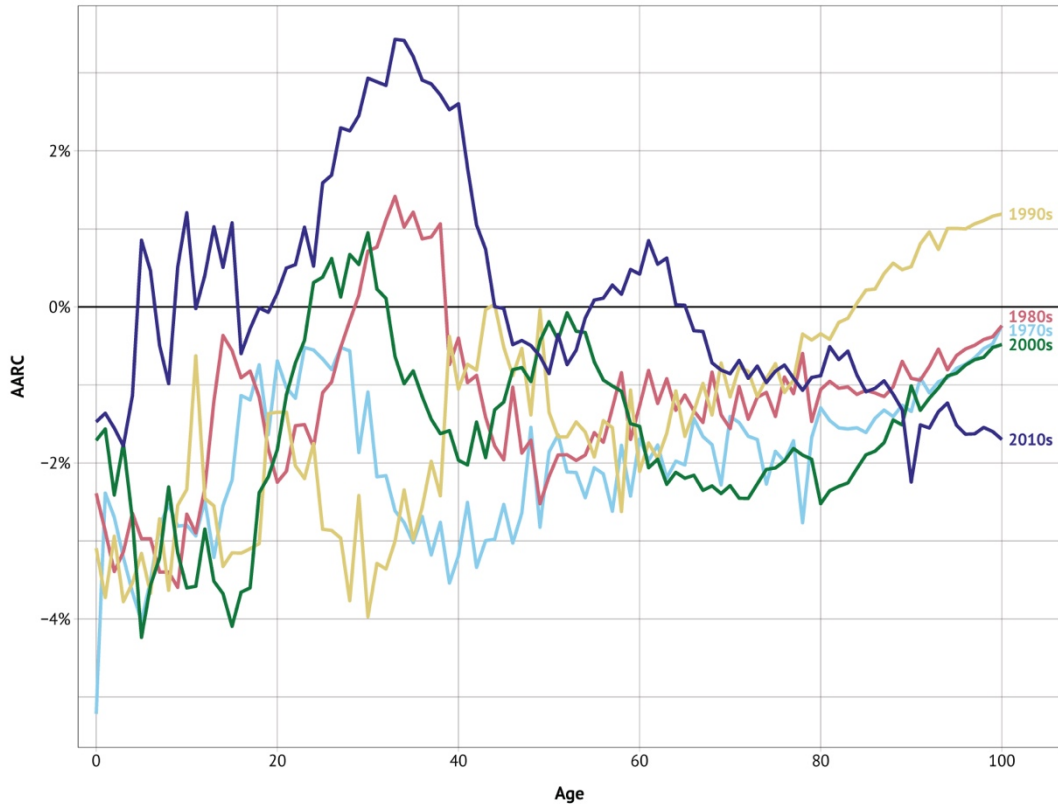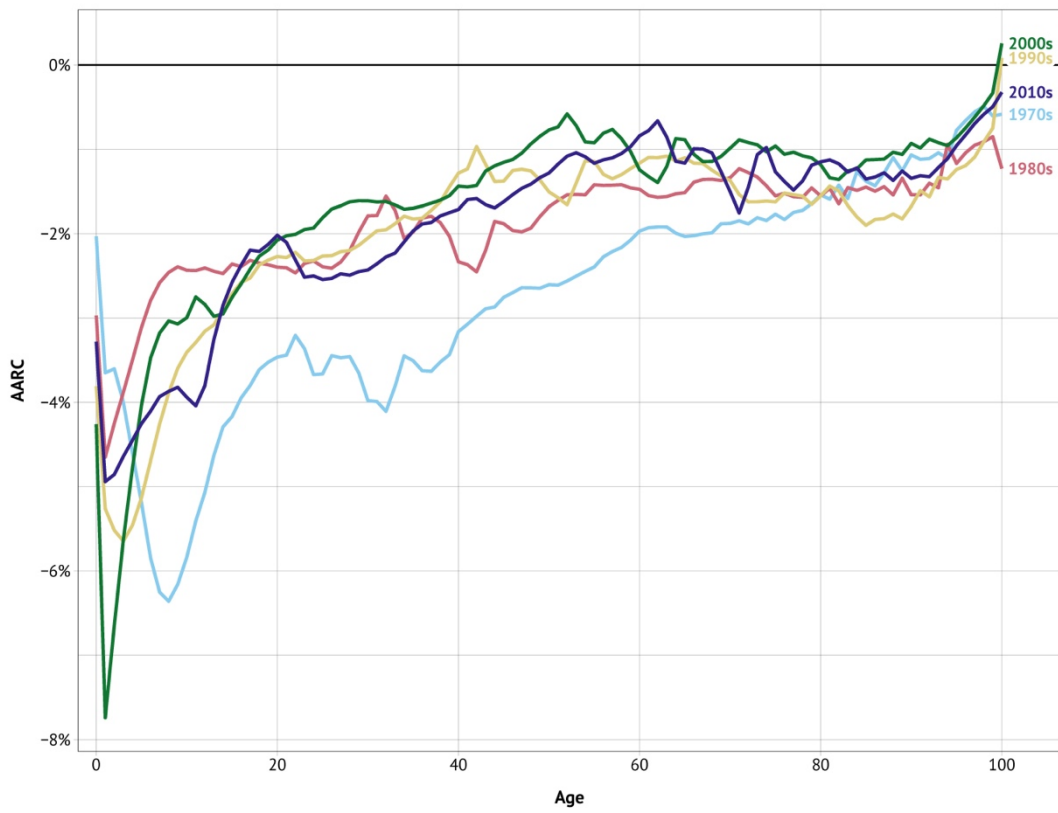
Table A5. Decomposition IMH-8 deaths, 2000-2010 and 2010-2019.

	Total deaths						Deaths due to changes in population size				Deaths due to changes in population structure				Deaths due to changes in age-specific mortality rates			
	2000	2019	Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019	
	N	N	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC
World																		
Childhood-cluster diseases	910	330	-550	-89%	-27	-8.7%	+80	+8.5%	+36	+11%	-42	-4.8%	-21	-6.8%	-590	-99%	-42	-14%
Diarrheal diseases	2600	1500	-720	-31%	-410	-26%	+290	+10%	+180	+10%	+67	+2.5%	+110	+6.0%	-1100	-51%	-690	-48%
HIV/AIDS	1400	670	-270	-22%	-430	-54%	+160	+11%	+94	+9.1%	+25	+1.8%	+3.1	+0.31%	-450	-39%	-530	-70%
Lower respiratory infections	3100	2600	-400	-14%	-53	-2.3%	+360	+11%	+270	+11%	+94	+3.0%	+200	+8.2%	-860	-32%	-530	-24%
Malaria	720	410	-120	-19%	-190	-41%	+83	+11%	+53	+9.4%	-35	-4.9%	-20	-3.8%	-170	-27%	-220	-50%
Maternal conditions	380	200	-110	-35%	-71	-34%	+41	+10%	+24	+9.7%	+0.90	+0.24%	-7.4	-3.1%	-160	-51%	-88	-43%
Neonatal conditions	3200	2000	-650	-22%	-510	-25%	+360	+11%	+240	+10%	-230	-7.4%	-200	-9.1%	-780	-28%	-550	-27%
Tuberculosis	1700	1200	-310	-19%	-220	-19%	+200	+11%	+140	+10%	+80	+4.5%	+36	+2.7%	-590	-40%	-400	-35%
IMH-8	14 000	9000	-3100	-25%	-1900	-21%	+1600	+11%	+1000	+10%	-41	-0.29%	+96	+0.97%	-4700	-40%	-3000	-36%
Central Asia																		
Childhood-cluster diseases	72	21	-35	-66%	-16	-61%	+12	+15%	+5.5	+16%	-3.5	-4.9%	-1.4	-4.3%	-44	-90%	-20	-83%
Diarrheal diseases	180	110	-45	-29%	-19	-17%	+33	+17%	+23	+18%	-3.6	-2.0%	-0.05	-0.04%	-74	-53%	-42	-42%
HIV/AIDS	0.62	12	+4.5	+230%	+7.1	+100%	+0.56	+66%	+1.5	+30%	+0.10	+15%	+0.44	+9.2%	+3.8	+220%	+5.2	+81%
Lower respiratory infections	180	110	-35	-22%	-28	-25%	+34	+18%	+24	+18%	-7.6	-4.4%	-3.7	-2.9%	-62	-42%	-49	-46%
Malaria	2.0	0.77	-0.18	-9.5%	-1.0	-89%	+0.41	+19%	+0.25	+15%	-0.04	-2.3%	-0.01	-0.66%	-0.54	-32%	-1.3	-130%
Maternal conditions	30	21	-4.8	-18%	-4.2	-21%	+5.9	+18%	+4.3	+18%	+1.7	+5.7%	+0.74	+3.2%	-13	-53%	-9.3	-51%
Neonatal conditions	290	260	+0.72	+0.25%	-34	-14%	+62	+20%	+51	+18%	-15	-5.3%	-21	-8.5%	-46	-17%	-63	-27%
Tuberculosis	81	56	-13	-18%	-11	-20%	+16	+18%	+12	+18%	+2.8	+3.4%	+2.2	+3.5%	-32	-49%	-25	-51%
IMH-8	830	590	-130	-17%	-110	-18%	+160	+18%	+120	+18%	-25	-3.1%	-23	-3.7%	-270	-38%	-200	-38%
Central and Eastern Europe																		
Childhood-cluster diseases	0.19	0.11	-0.11	-76%	+0.02	+20%	0.00	-2.4%	0.00	-1.1%	+0.02	+8.1%	0.00	+5.8%	-0.12	-89%	+0.01	+16%
Diarrheal diseases	2.1	2.6	-0.73	-42%	+1.3	+79%	-0.06	-2.7%	-0.02	-1.4%	+0.24	+11%	+0.28	+21%	-0.91	-57%	+1.0	+66%
HIV/AIDS	12	28	+13	+75%	+3.7	+16%	-0.59	-5.1%	-0.23	-1.0%	+0.43	+3.5%	+0.38	+1.7%	+13	+75%	+3.5	+15%
Lower respiratory infections	85	88	-4.1	-5.0%	+7.4	+9.9%	-2.7	-3.2%	-0.72	-1.0%	+11	+12%	+11	+14%	-12	-16%	-2.5	-3.5%
Malaria	0.00	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Maternal conditions	1.2	0.45	-0.45	-46%	-0.30	-56%	-0.03	-2.6%	-0.01	-0.76%	+0.02	+1.6%	-0.05	-7.1%	-0.44	-44%	-0.25	-44%
Neonatal conditions	20	8.2	-7.0	-41%	-5.2	-53%	-0.55	-2.7%	-0.09	-0.77%	+2.9	+13%	-0.59	-5.0%	-9.3	-59%	-4.5	-45%

	Total deaths						Deaths due to changes in population size				Deaths due to changes in population structure				Deaths due to changes in age-specific mortality rates			
	2000	2019	Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019	
	N	N	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC
Tuberculosis	46	15	-13	-32%	-18	-86%	-1.3	-2.8%	-0.21	-0.70%	+2.5	+5.3%	+0.85	+2.8%	-14	-35%	-19	-91%
IMH-8	170	140	-12	-7.7%	-11	-8.6%	-5.2	-3.2%	-1.3	-0.93%	+17	+9.7%	+12	+8.1%	-24	-16%	-22	-17%
China																		
Childhood-cluster diseases	18	1.5	-14	-140%	-2.2	-93%	+0.62	+3.5%	+0.12	+3.6%	-1.2	-7.3%	-0.06	-1.7%	-13	-130%	-2.2	-98%
Diarrheal diseases	42	8.7	-28	-100%	-5.3	-51%	+1.6	+3.9%	+0.53	+4.1%	-2.3	-5.8%	+0.39	+3.1%	-27	-99%	-6.2	-63%
HIV/AIDS	20	29	+28	+91%	-19	-54%	+1.9	+9.3%	+1.8	+4.1%	+3.9	+18%	+0.69	+1.6%	+22	+76%	-21	-63%
Lower respiratory infections	290	180	-100	-44%	-3.0	-1.8%	+14	+4.8%	+8.7	+5.1%	+22	+7.2%	+48	+26%	-140	-64%	-60	-42%
Malaria	0.03	0.00	-0.01	-48%	-0.02	-1000%	0.00	+4.7%	0.00	+2.6%	0.00	-0.63%	0.00	-0.79%	-0.01	-54%	-0.02	-
Maternal conditions	13	3.6	-7.2	-78%	-2.2	-51%	+0.55	+4.2%	+0.22	+4.1%	-0.73	-5.8%	-0.56	-11%	-7.0	-75%	-1.8	-41%
Neonatal conditions	240	47	-130	-79%	-57	-85%	+9.9	+4.1%	+3.5	+3.7%	-37	-17%	-7.7	-8.5%	-110	-58%	-53	-76%
Tuberculosis	110	35	-58	-73%	-16	-42%	+4.9	+4.4%	+2.1	+4.4%	+14	+13%	+9.1	+18%	-77	-120%	-28	-82%
IMH-8	730	310	-320	-55%	-100	-32%	+34	+4.5%	+17	+4.5%	-0.85	-0.12%	+50	+13%	-350	-63%	-170	-58%
India																		
Childhood-cluster diseases	200	29	-96	-63%	-76	-130%	+24	+11%	+6.8	+7.0%	-21	-11%	-11	-12%	-99	-65%	-72	-120%
Diarrheal diseases	1200	670	-350	-33%	-220	-30%	+170	+13%	+81	+9.7%	+86	+6.8%	+110	+13%	-600	-65%	-410	-66%
HIV/AIDS	110	44	-19	-19%	-45	-75%	+16	+14%	+7.0	+8.4%	+5.5	+5.0%	+5.2	+6.3%	-40	-45%	-57	-110%
Lower respiratory infections	690	390	-210	-36%	-85	-22%	+92	+13%	+44	+9.9%	-24	-3.6%	+24	+5.5%	-280	-51%	-150	-42%
Malaria	30	7.7	+1.0	+3.4%	-23	-140%	+4.7	+15%	+2.0	+7.0%	-1.4	-4.9%	-0.66	-2.4%	-2.2	-7.8%	-24	-160%
Maternal conditions	110	26	-53	-67%	-27	-76%	+13	+11%	+4.1	+8.3%	+2.4	+2.2%	+0.71	+1.5%	-68	-98%	-31	-96%
Neonatal conditions	1000	430	-330	-37%	-270	-52%	+140	+12%	+58	+8.8%	-160	-17%	-94	-16%	-300	-34%	-230	-43%
Tuberculosis	610	440	-120	-22%	-58	-14%	+88	+13%	+48	+10%	+28	+4.5%	+20	+4.5%	-240	-47%	-130	-32%
IMH-8	4000	2000	-1200	-34%	-800	-36%	+540	+13%	+250	+9.4%	-84	-2.1%	+56	+2.2%	-1600	-51%	-1100	-53%
Latin America and Caribbean																		
Childhood-cluster diseases	4.2	1.8	-1.8	-52%	-0.73	-38%	+0.43	+9.7%	+0.20	+8.6%	-0.45	-11%	-0.15	-7.0%	-1.7	-51%	-0.77	-41%
Diarrheal diseases	47	22	-21	-58%	-3.3	-15%	+4.6	+9.5%	+2.3	+9.4%	-1.2	-2.6%	+2.2	+9.3%	-24	-71%	-7.7	-39%
HIV/AIDS	55	42	-12	-23%	-1.9	-5.0%	+6.3	+11%	+4.0	+9.8%	+3.3	+5.9%	+2.6	+6.5%	-21	-47%	-8.5	-24%
Lower respiratory infections	150	250	+29	+18%	+67	+35%	+21	+13%	+20	+12%	+21	+13%	+43	+24%	-13	-9.0%	+3.3	+2.0%
Malaria	0.98	0.58	-0.46	-62%	+0.06	+13%	+0.10	+9.4%	+0.05	+10%	0.00	0.00%	+0.02	+3.2%	-0.56	-82%	0.00	-0.34%
Maternal conditions	9.9	6.6	-1.4	-15%	-1.9	-27%	+1.2	+11%	+0.71	+9.0%	+0.13	+1.3%	-0.07	-0.97%	-2.7	-31%	-2.5	-38%
Neonatal conditions	150	74	-57	-46%	-21	-27%	+16	+9.8%	+7.9	+8.9%	-24	-17%	-9.3	-11%	-49	-38%	-20	-25%
Tuberculosis	28	17	-7.9	-33%	-2.9	-17%	+3.1	+11%	+1.8	+9.4%	+2.9	+9.9%	+2.0	+10%	-14	-67%	-6.6	-43%

	Total deaths						Deaths due to changes in population size				Deaths due to changes in population structure				Deaths due to changes in age-specific mortality rates			
	2000	2019	Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019	
	N	N	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC
IMH-8	450	410	-72	-17%	+35	+9.9%	+52	+11%	+37	+10%	+1.7	+0.39%	+41	+11%	-130	-32%	-42	-13%
Middle East and North Africa																		
Childhood-cluster diseases	21	8.6	-15	-120%	+3.0	+49%	+2.6	+12%	+1.1	+21%	-0.95	-4.7%	-0.33	-6.7%	-17	-150%	+2.2	+37%
Diarrheal diseases	38	18	-16	-55%	-3.4	-19%	+5.8	+14%	+3.3	+16%	-1.0	-2.7%	-0.39	-2.0%	-21	-79%	-6.3	-38%
HIV/AIDS	1.4	4.8	+2.5	+110%	+0.95	+24%	+0.47	+30%	+0.71	+19%	+0.32	+22%	+0.40	+11%	+1.8	+87%	-0.17	-4.8%
Lower respiratory infections	97	94	-12	-13%	+9.0	+11%	+18	+17%	+15	+18%	+3.1	+3.1%	+6.4	+8.1%	-33	-41%	-12	-17%
Malaria	1.4	1.7	+1.5	+78%	-1.1	-55%	+0.39	+26%	+0.38	+14%	0.00	-0.02%	-0.08	-3.2%	+1.1	+62%	-1.4	-75%
Maternal conditions	6.8	5.1	-1.2	-18%	-0.59	-12%	+1.2	+17%	+0.89	+16%	+0.58	+8.1%	-0.08	-1.7%	-3.0	-55%	-1.4	-31%
Neonatal conditions	160	100	-33	-23%	-19	-19%	+27	+16%	+19	+16%	-5.6	-3.7%	-11	-11%	-54	-42%	-27	-27%
Tuberculosis	15	12	-3.0	-21%	-0.44	-3.9%	+2.7	+16%	+2.0	+17%	+1.4	+8.9%	+0.82	+7.2%	-7.1	-60%	-3.3	-33%
IMH-8	340	250	-77	-26%	-12	-5.3%	+58	+16%	+42	+17%	-2.2	-0.65%	-4.7	-2.0%	-130	-49%	-49	-23%
North Atlantic																		
Childhood-cluster diseases	0.11	0.05	-0.04	-49%	-0.01	-27%	+0.01	+4.6%	0.00	+3.7%	+0.01	+9.9%	+0.01	+10%	-0.06	-76%	-0.02	-46%
Diarrheal diseases	3.0	13	+7.8	+140%	+2.3	+22%	+0.38	+12%	+0.45	+4.5%	+1.2	+34%	+2.3	+21%	+6.3	+120%	-0.38	-3.9%
HIV/AIDS	7.3	2.7	-2.6	-42%	-2.1	-61%	+0.35	+4.7%	+0.14	+3.2%	-0.03	-0.47%	-0.03	-0.62%	-2.9	-49%	-2.2	-66%
Lower respiratory infections	170	160	-45	-31%	+36	+30%	+8.5	+5.0%	+5.2	+4.7%	+27	+15%	+27	+23%	-81	-65%	+3.8	+3.5%
Malaria	0.00	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Maternal conditions	0.35	0.25	-0.03	-7.5%	-0.08	-30%	+0.02	+5.4%	+0.01	+3.6%	-0.03	-8.5%	-0.02	-7.8%	-0.02	-4.8%	-0.07	-25%
Neonatal conditions	11	8.8	-0.82	-7.8%	-1.1	-13%	+0.60	+5.4%	+0.35	+3.9%	+0.42	+3.8%	-1.1	-13%	-1.8	-18%	-0.40	-4.5%
Tuberculosis	4.6	2.3	-1.7	-44%	-0.63	-27%	+0.22	+4.7%	+0.10	+3.7%	+0.54	+11%	+0.37	+13%	-2.4	-73%	-1.1	-51%
IMH-8	190	180	-42	-25%	+35	+24%	+10	+5.1%	+6.2	+4.5%	+30	+14%	+29	+20%	-82	-54%	-0.34	-0.25%
Sub-Saharan Africa																		
Childhood-cluster diseases	500	240	-330	-100%	+66	+37%	+95	+18%	+49	+28%	-7.8	-1.6%	-15	-10%	-410	-160%	+32	+19%
Diarrheal diseases	870	520	-210	-27%	-140	-27%	+210	+22%	+150	+22%	-14	-1.6%	-16	-2.6%	-400	-61%	-270	-57%
HIV/AIDS	1100	440	-280	-29%	-370	-65%	+260	+22%	+160	+20%	+12	+1.1%	+13	+1.8%	-550	-69%	-540	-120%
Lower respiratory infections	930	800	-16	-1.7%	-110	-14%	+250	+24%	+210	+23%	-20	-2.2%	-32	-4.0%	-240	-30%	-290	-41%
Malaria	670	400	-120	-20%	-150	-36%	+170	+22%	+120	+22%	-12	-1.8%	-26	-5.3%	-280	-52%	-250	-64%
Maternal conditions	180	110	-34	-21%	-27	-23%	+43	+22%	+32	+23%	+3.8	+2.2%	+4.1	+3.2%	-81	-60%	-62	-63%
Neonatal conditions	930	920	+22	+2.4%	-31	-3.6%	+250	+24%	+230	+24%	-35	-3.9%	-92	-11%	-200	-23%	-170	-21%
Tuberculosis	360	390	+24	+6.3%	+2.1	+0.61%	+100	+25%	+95	+25%	+2.7	+0.74%	+9.0	+2.6%	-80	-25%	-100	-33%
IMH-8	5500	3800	-940	-19%	-760	-20%	+1400	+23%	+1000	+23%	-70	-1.3%	-150	-3.8%	-2200	-51%	-1600	-48%

	Total deaths						Deaths due to changes in population size				Deaths due to changes in population structure				Deaths due to changes in age-specific mortality rates			
	2000	2019	Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019	
	N	N	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC
United States																		
Childhood-cluster diseases	0.02	0.02	0.00	+22%	0.00	-14%	0.00	+9.9%	0.00	+6.4%	0.00	+4.5%	0.00	-6.5%	0.00	+9.3%	0.00	-15%
Diarrheal diseases	2.0	10	+8.7	+180%	-0.71	-7.6%	+0.56	+25%	+0.65	+6.6%	+0.52	+24%	+1.3	+13%	+7.6	+170%	-2.7	-32%
HIV/AIDS	15	5.7	-6.6	-56%	-2.9	-44%	+1.1	+7.0%	+0.45	+5.7%	-0.13	-0.87%	-0.02	-0.32%	-7.6	-67%	-3.3	-53%
Lower respiratory infections	67	60	-15	-26%	+8.7	+17%	+5.6	+8.0%	+3.5	+7.3%	+6.4	+9.1%	+7.3	+15%	-27	-51%	-2.1	-4.6%
Malaria	0.00	0.00	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Maternal conditions	0.47	0.78	+0.12	+24%	+0.18	+30%	+0.05	+10%	+0.04	+7.8%	-0.04	-9.4%	-0.01	-2.6%	+0.12	+22%	+0.15	+26%
Neonatal conditions	15	11	-2.0	-15%	-1.1	-11%	+1.3	+8.3%	+0.75	+6.5%	+0.38	+2.6%	-1.5	-14%	-3.7	-29%	-0.36	-3.3%
Tuberculosis	0.92	0.55	-0.30	-39%	-0.07	-14%	+0.07	+7.6%	+0.04	+6.5%	+0.06	+6.5%	+0.07	+12%	-0.43	-62%	-0.18	-37%
IMH-8	100	89	-16	-17%	+4.1	+5.2%	+8.6	+8.3%	+5.4	+7.0%	+7.1	+6.9%	+7.1	+9.0%	-31	-37%	-8.5	-12%
Western Pacific and Southeast Asia																		
Childhood-cluster diseases	96	31	-63	-100%	-1.6	-5.6%	+7.1	+7.2%	+2.7	+8.8%	-5.8	-6.3%	-2.2	-7.7%	-64	-100%	-2.1	-7.3%
Diarrheal diseases	240	140	-74	-37%	-20	-14%	+22	+9.0%	+13	+8.5%	+15	+5.9%	+18	+12%	-110	-61%	-51	-40%
HIV/AIDS	79	69	-2.4	-3.1%	-8.0	-12%	+8.5	+10%	+6.1	+8.5%	+2.9	+3.6%	+0.04	+0.06%	-14	-19%	-14	-22%
Lower respiratory infections	400	450	+12	+3.0%	+44	+12%	+44	+11%	+36	+9.4%	+60	+14%	+82	+20%	-92	-26%	-73	-22%
Malaria	12	4.1	-0.02	-0.14%	-8.1	-110%	+1.3	+10%	+0.70	+6.2%	-0.22	-1.8%	-0.06	-0.55%	-1.1	-9.7%	-8.7	-130%
Maternal conditions	38	18	-12	-37%	-8.5	-43%	+3.6	+9.0%	+1.8	+7.6%	+0.09	+0.23%	-0.67	-2.9%	-16	-51%	-9.7	-50%
Neonatal conditions	360	170	-110	-36%	-75	-39%	+34	+8.9%	+18	+7.7%	-34	-9.7%	-26	-12%	-110	-36%	-67	-34%
Tuberculosis	470	240	-110	-27%	-120	-43%	+46	+9.4%	+26	+7.7%	+28	+5.8%	+17	+5.0%	-190	-49%	-160	-63%
IMH-8	1700	1100	-360	-24%	-190	-17%	+170	+9.4%	+100	+8.4%	+66	+3.8%	+87	+7.1%	-600	-42%	-390	-37%

Notes:

Δ 2000-2010 = Change over the period 2000-2010

Δ 2010-2019 = Change over the period 2010-2019

AARC = Average annual rate of change, percent per year

N = Number of deaths, thousands

Table A6. Decomposition NCDI-7 deaths, 2000-2010 and 2010-2019.

	Total deaths						Deaths due to changes in population size				Deaths due to changes in population structure				Deaths due to changes in age-specific mortality rates			
	2000	2019	Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019	
	N	N	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC
World																		
Atherosclerotic CVD	9200	12 000	+1300	+13%	+1500	+15%	+1200	+13%	+1200	+12%	+1500	+15%	+2000	+19%	-1500	-18%	-1600	-19%
Diabetes	1100	2000	+360	+28%	+460	+30%	+160	+14%	+180	+13%	+170	+14%	+260	+18%	+26	+2.3%	+20	+1.5%
Hemorrhagic stroke	3000	3100	+69	+2.3%	+60	+2.2%	+380	+12%	+320	+11%	+400	+13%	+460	+16%	-710	-27%	-730	-30%
Infection-associated NCDs	2400	2500	+20	+0.86%	+100	+4.6%	+300	+12%	+250	+11%	+280	+11%	+310	+14%	-560	-27%	-460	-23%
Road injury	1200	1300	+92	+7.6%	+24	+2.1%	+150	+12%	+130	+11%	+43	+3.6%	+36	+3.2%	-100	-9.2%	-140	-13%
Strongly tobacco-associated NCDs	4500	5500	+280	+5.9%	+690	+15%	+590	+12%	+540	+12%	+680	+14%	+850	+18%	-990	-24%	-700	-17%
Suicide	790	700	-43	-5.6%	-45	-6.9%	+97	+12%	+76	+11%	+47	+5.7%	+32	+4.7%	-190	-27%	-150	-25%
NCDI-7	22 000	27 000	+2000	+8.8%	+2800	+12%	+2900	+12%	+2700	+12%	+3100	+13%	+3900	+17%	-4000	-20%	-3800	-19%
Central Asia																		
Atherosclerotic CVD	400	550	+80	+18%	+73	+16%	+93	+21%	+96	+21%	+20	+4.9%	+39	+8.7%	-33	-8.7%	-62	-15%
Diabetes	48	110	+29	+49%	+28	+35%	+13	+24%	+17	+22%	+2.6	+5.3%	+7.4	+10%	+14	+26%	+3.8	+5.4%
Hemorrhagic stroke	120	140	+11	+8.8%	+9.5	+8.0%	+26	+20%	+25	+20%	+5.1	+4.2%	+11	+9.1%	-21	-19%	-26	-25%
Infection-associated NCDs	89	110	+8.9	+9.6%	+7.7	+8.5%	+20	+20%	+19	+20%	+5.1	+5.6%	+8.0	+8.7%	-16	-20%	-19	-24%
Road injury	31	45	+12	+33%	+2.1	+5.2%	+7.8	+23%	+8.2	+20%	+1.5	+4.8%	+1.4	+3.6%	+2.5	+7.7%	-7.5	-21%
Strongly tobacco-associated NCDs	120	150	+12	+9.6%	+19	+15%	+27	+20%	+26	+20%	+5.5	+4.5%	+11	+8.7%	-20	-18%	-18	-16%
Suicide	24	29	+2.5	+9.9%	+2.4	+9.7%	+5.4	+20%	+5.2	+20%	+1.7	+6.9%	+0.83	+3.4%	-4.6	-21%	-3.6	-16%
NCDI-7	830	1100	+160	+17%	+140	+15%	+190	+21%	+200	+20%	+42	+4.9%	+78	+8.5%	-79	-9.9%	-130	-16%
Central and Eastern Europe																		
Atherosclerotic CVD	2100	1800	-84	-4.0%	-240	-14%	-68	-3.2%	-17	-0.91%	+390	+17%	+350	+18%	-410	-21%	-580	-36%
Diabetes	41	63	+5.0	+11%	+16	+34%	-1.4	-3.5%	-0.47	-1.1%	+6.0	+14%	+7.5	+17%	+0.42	+1.0%	+9.4	+21%
Hemorrhagic stroke	240	160	-57	-26%	-27	-18%	-7.0	-2.9%	-1.5	-0.90%	+29	+11%	+22	+12%	-79	-39%	-48	-32%
Infection-associated NCDs	180	130	-21	-13%	-26	-20%	-5.4	-3.1%	-1.2	-0.89%	+18	+10%	+13	+8.7%	-34	-21%	-37	-30%
Road injury	71	34	-17	-27%	-19	-48%	-2.0	-2.9%	-0.38	-0.79%	+2.2	+3.1%	-1.2	-2.5%	-17	-27%	-18	-44%
Strongly tobacco-associated NCDs	330	290	-37	-12%	-1.0	-0.39%	-10	-3.1%	-2.5	-0.96%	+40	+12%	+35	+13%	-67	-23%	-34	-14%
Suicide	130	64	-36	-32%	-28	-40%	-3.5	-2.8%	-0.67	-0.81%	+6.0	+4.6%	-0.03	-0.04%	-38	-35%	-27	-38%
NCDI-7	3100	2500	-250	-8.2%	-330	-13%	-97	-3.2%	-23	-0.91%	+500	+15%	+420	+15%	-650	-23%	-730	-32%

	Total deaths						Deaths due to changes in population size				Deaths due to changes in population structure				Deaths due to changes in age-specific mortality rates			
	2000	2019	Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019	
	N	N	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC
China																		
Atherosclerotic CVD	1400	2700	+760	+46%	+610	+29%	+100	+7.2%	+110	+5.8%	+410	+27%	+730	+33%	+250	+17%	-230	-12%
Diabetes	140	230	+41	+25%	+48	+26%	+9.7	+6.5%	+9.8	+5.7%	+36	+23%	+55	+29%	-5.0	-3.5%	-17	-10%
Hemorrhagic stroke	1200	1100	-25	-2.1%	-66	-6.6%	+70	+5.8%	+53	+5.0%	+280	+21%	+310	+27%	-370	-37%	-430	-51%
Infection-associated NCDs	820	740	-75	-9.5%	-1.6	-0.24%	+47	+5.6%	+35	+5.1%	+180	+20%	+180	+24%	-300	-45%	-210	-37%
Road injury	280	250	+1.6	+0.58%	-29	-12%	+16	+5.7%	+12	+4.8%	+23	+7.9%	+14	+5.3%	-37	-14%	-55	-24%
Strongly tobacco-associated NCDs	1700	1800	-89	-5.3%	+110	+7.3%	+100	+5.7%	+80	+5.3%	+410	+22%	+500	+30%	-600	-42%	-470	-37%
Suicide	190	120	-45	-27%	-25	-21%	+9.7	+5.1%	+6.1	+4.7%	+21	+11%	+17	+13%	-75	-50%	-48	-45%
NCDI-7	5700	6900	+570	+9.6%	+650	+11%	+350	+6.1%	+310	+5.4%	+1400	+22%	+1800	+28%	-1100	-22%	-1500	-29%
India																		
Atherosclerotic CVD	1100	1800	+300	+25%	+420	+30%	+190	+16%	+160	+12%	+200	+18%	+310	+23%	-90	-8.8%	-58	-4.8%
Diabetes	180	350	+63	+30%	+100	+40%	+33	+17%	+30	+13%	+35	+18%	+59	+24%	-5.7	-3.1%	+14	+6.1%
Hemorrhagic stroke	350	430	+25	+6.9%	+56	+16%	+57	+15%	+41	+12%	+55	+15%	+75	+21%	-87	-28%	-61	-19%
Infection-associated NCDs	340	420	+46	+13%	+36	+10%	+56	+16%	+41	+11%	+46	+13%	+61	+17%	-56	-18%	-66	-21%
Road injury	180	210	+34	+18%	+0.50	+0.26%	+30	+16%	+22	+11%	+12	+6.3%	+16	+8.1%	-7.9	-4.5%	-37	-21%
Strongly tobacco-associated NCDs	760	1100	+120	+15%	+260	+29%	+130	+16%	+100	+12%	+150	+18%	+220	+25%	-160	-23%	-62	-8.1%
Suicide	180	170	+1.1	+0.63%	-7.4	-4.6%	+28	+15%	+18	+11%	+10	+5.6%	+11	+6.3%	-37	-23%	-36	-24%
NCDI-7	3100	4500	+590	+18%	+860	+24%	+520	+16%	+410	+12%	+510	+15%	+750	+21%	-440	-15%	-310	-9.7%
Latin America and Caribbean																		
Atherosclerotic CVD	490	710	+110	+20%	+110	+20%	+69	+13%	+61	+11%	+130	+24%	+160	+27%	-94	-21%	-110	-21%
Diabetes	140	280	+73	+42%	+66	+30%	+22	+15%	+23	+11%	+37	+23%	+53	+25%	+14	+9.3%	-10	-5.5%
Hemorrhagic stroke	120	140	+4.6	+3.6%	+9.7	+8.1%	+16	+12%	+13	+10%	+25	+18%	+27	+21%	-37	-34%	-30	-28%
Infection-associated NCDs	110	140	+9.4	+7.9%	+17	+14%	+15	+13%	+12	+11%	+23	+18%	+24	+20%	-28	-28%	-20	-19%
Road injury	91	110	+21	+21%	-1.2	-1.1%	+13	+13%	+10	+9.9%	+5.8	+6.2%	+5.6	+5.5%	+2.7	+3.0%	-17	-18%
Strongly tobacco-associated NCDs	190	280	+45	+22%	+44	+19%	+26	+13%	+24	+11%	+49	+24%	+60	+26%	-30	-17%	-40	-21%
Suicide	28	40	+5.4	+18%	+6.7	+21%	+3.8	+13%	+3.4	+11%	+2.3	+8.1%	+2.0	+6.7%	-0.72	-2.6%	+1.3	+4.2%
NCDI-7	1200	1700	+270	+21%	+260	+18%	+170	+13%	+150	+11%	+270	+21%	+330	+23%	-170	-16%	-220	-18%
Middle East and North Africa																		
Atherosclerotic CVD	550	860	+130	+21%	+190	+28%	+120	+19%	+130	+19%	+99	+17%	+130	+20%	-89	-18%	-67	-12%

	Total deaths						Deaths due to changes in population size				Deaths due to changes in population structure				Deaths due to changes in age-specific mortality rates			
	2000	2019	Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019	
	N	N	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC
Diabetes	64	120	+28	+37%	+31	+33%	+15	+21%	+17	+20%	+11	+16%	+17	+20%	+1.9	+2.9%	-3.4	-4.2%
Hemorrhagic stroke	71	83	+4.5	+6.1%	+7.6	+11%	+14	+18%	+13	+18%	+9.7	+13%	+11	+15%	-19	-31%	-16	-27%
Infection-associated NCDs	91	140	+23	+23%	+22	+20%	+20	+20%	+20	+19%	+15	+16%	+20	+18%	-12	-14%	-18	-19%
Road injury	68	92	+21	+27%	+2.6	+3.2%	+15	+20%	+15	+17%	+4.3	+6.1%	+3.3	+4.0%	+1.7	+2.4%	-16	-21%
Strongly tobacco-associated NCDs	83	160	+42	+42%	+38	+30%	+19	+21%	+23	+19%	+15	+17%	+23	+19%	+7.6	+8.8%	-8.7	-8.0%
Suicide	19	21	+1.3	+6.9%	+1.2	+6.6%	+3.7	+18%	+3.4	+17%	+1.6	+8.4%	+0.34	+1.9%	-4.0	-24%	-2.5	-15%
NCDI-7	940	1500	+250	+24%	+290	+25%	+200	+20%	+220	+19%	+160	+16%	+210	+18%	-110	-13%	-130	-13%
North Atlantic																		
Atherosclerotic CVD	1200	810	-250	-23%	-120	-16%	+62	+5.1%	+33	+3.9%	+190	+15%	+160	+18%	-500	-54%	-320	-46%
Diabetes	92	100	+8.1	+8.5%	+2.9	+3.2%	+5.6	+5.9%	+3.8	+4.2%	+16	+16%	+17	+17%	-13	-15%	-18	-21%
Hemorrhagic stroke	130	100	-12	-9.9%	-14	-14%	+7.0	+5.4%	+4.1	+3.9%	+17	+13%	+16	+15%	-36	-33%	-34	-38%
Infection-associated NCDs	120	110	-12	-9.7%	-2.6	-2.6%	+6.9	+5.4%	+4.2	+4.1%	+15	+11%	+13	+13%	-33	-31%	-20	-22%
Road injury	48	21	-22	-59%	-5.7	-27%	+2.2	+4.4%	+0.87	+3.6%	+0.31	+0.63%	+0.30	+1.2%	-24	-68%	-6.9	-33%
Strongly tobacco-associated NCDs	440	490	+22	+5.0%	+31	+7.2%	+26	+5.8%	+18	+4.2%	+60	+13%	+64	+15%	-64	-16%	-51	-13%
Suicide	53	49	-1.7	-3.3%	-1.9	-4.2%	+3.0	+5.6%	+1.9	+4.0%	+2.3	+4.3%	+1.6	+3.5%	-7.0	-14%	-5.4	-12%
NCDI-7	2100	1700	-270	-14%	-120	-7.3%	+110	+5.3%	+66	+4.0%	+300	+14%	+280	+16%	-680	-39%	-460	-32%
Sub-Saharan Africa																		
Atherosclerotic CVD	390	570	+81	+19%	+94	+20%	+120	+26%	+130	+27%	-5.5	-1.4%	+28	+6.4%	-30	-7.8%	-60	-15%
Diabetes	150	220	+39	+24%	+31	+18%	+44	+27%	+49	+26%	-2.4	-1.6%	+9.1	+5.3%	-3.2	-2.2%	-26	-17%
Hemorrhagic stroke	250	290	+16	+6.4%	+22	+8.7%	+70	+25%	+68	+25%	-3.6	-1.5%	+12	+4.8%	-50	-22%	-58	-27%
Infection-associated NCDs	200	240	+22	+11%	+20	+9.7%	+56	+25%	+56	+26%	-1.3	-0.64%	+10	+4.9%	-32	-18%	-46	-26%
Road injury	200	300	+40	+18%	+64	+27%	+59	+26%	+65	+27%	-0.40	-0.20%	+3.1	+1.4%	-18	-9.5%	-4.1	-1.9%
Strongly tobacco-associated NCDs	120	150	+17	+14%	+21	+16%	+33	+26%	+35	+26%	-1.9	-1.6%	+6.8	+5.6%	-14	-13%	-21	-19%
Suicide	61	77	+10	+15%	+5.7	+8.5%	+18	+26%	+18	+25%	+0.30	+0.49%	+2.7	+4.1%	-7.9	-14%	-15	-26%
NCDI-7	1400	1800	+230	+15%	+260	+17%	+400	+26%	+420	+26%	-15	-1.1%	+71	+4.9%	-150	-12%	-230	-17%
United States																		
Atherosclerotic CVD	710	590	-160	-26%	+45	+8.9%	+59	+8.0%	+36	+7.1%	+68	+9.2%	+78	+15%	-290	-51%	-68	-15%
Diabetes	70	88	-0.04	-0.06%	+18	+25%	+6.5	+8.9%	+4.9	+7.6%	+6.5	+8.9%	+10	+16%	-13	-20%	+2.3	+3.6%
Hemorrhagic stroke	62	69	-3.8	-6.2%	+9.9	+18%	+5.6	+8.7%	+4.0	+7.3%	+5.4	+8.4%	+8.3	+15%	-15	-27%	-2.3	-4.5%

	Total deaths						Deaths due to changes in population size				Deaths due to changes in population structure				Deaths due to changes in age-specific mortality rates			
	2000	2019	Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019		Δ 2000-2010		Δ 2010-2019	
	N	N	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC	N	AARC
Infection-associated NCDs	44	58	+4.5	+9.7%	+9.4	+20%	+4.3	+9.3%	+3.3	+7.4%	+4.3	+9.4%	+5.4	+12%	-4.2	-9.9%	+0.65	+1.5%
Road injury	44	42	-8.0	-20%	+5.5	+16%	+3.7	+8.2%	+2.4	+7.3%	+0.56	+1.3%	+0.84	+2.6%	-12	-32%	+2.3	+6.8%
Strongly tobacco-associated NCDs	310	370	+21	+6.6%	+38	+12%	+30	+9.2%	+22	+7.2%	+29	+9.0%	+54	+17%	-37	-13%	-38	-13%
Suicide	31	53	+9.4	+27%	+13	+31%	+3.3	+10%	+2.9	+7.8%	+0.76	+2.4%	+0.98	+2.6%	+5.4	+16%	+8.7	+22%
NCDI-7	1300	1300	-140	-12%	+140	+13%	+110	+8.5%	+76	+7.2%	+120	+8.7%	+160	+15%	-370	-34%	-94	-9.6%
Western Pacific and Southeast Asia																		
Atherosclerotic CVD	950	1500	+290	+27%	+300	+24%	+120	+12%	+120	+10%	+270	+25%	+310	+25%	-93	-10%	-120	-11%
Diabetes	200	390	+76	+33%	+110	+39%	+26	+12%	+28	+11%	+43	+20%	+59	+22%	+6.5	+3.2%	+27	+10%
Hemorrhagic stroke	470	620	+110	+21%	+53	+9.9%	+57	+12%	+50	+9.4%	+96	+19%	+110	+19%	-48	-11%	-100	-22%
Infection-associated NCDs	360	400	+14	+3.8%	+19	+5.4%	+41	+11%	+32	+9.2%	+63	+16%	+63	+17%	-90	-28%	-77	-25%
Road injury	160	170	+8.9	+5.5%	+3.3	+2.1%	+18	+11%	+14	+9.0%	+7.3	+4.5%	+7.7	+5.0%	-16	-11%	-19	-13%
Strongly tobacco-associated NCDs	480	740	+120	+23%	+140	+23%	+59	+12%	+56	+9.9%	+110	+22%	+140	+23%	-48	-11%	-55	-11%
Suicide	83	80	+8.4	+9.7%	-12	-16%	+9.6	+11%	+7.2	+8.4%	+7.5	+8.6%	+6.5	+7.6%	-8.6	-11%	-26	-36%
NCDI-7	2700	3900	+630	+21%	+610	+19%	+330	+12%	+300	+9.7%	+600	+20%	+690	+21%	-300	-12%	-370	-13%

Notes:

Δ 2000-2010 = Change over the period 2000-2010

Δ 2010-2019 = Change over the period 2010-2019

AARC = Average annual rate of change, percent per year

N = Number of deaths, thousands

Table A7. Median age of death and proportion of deaths occurring at ages 70 and above by region, 1970-2050.

	Median age of death	Proportion of deaths aged 70+
World		
1970	69	21%
1980	71	27%
1990	72	32%
2000	73	37%
2010	75	44%
2019	76	48%
2030	77	55%
2040	79	62%
2050	82	68%
Central and Eastern Europe		
1970	73	44%
1980	74	49%
1990	75	50%
2000	74	53%
2010	76	60%
2019	78	62%
2030	79	68%
2040	82	74%
2050	84	78%
Central Asia		
1970	68	15%
1980	69	17%
1990	69	19%
2000	69	23%
2010	71	28%
2019	71	32%
2030	71	37%
2040	73	44%
2050	74	48%

	Median age of death	Proportion of deaths aged 70+
China		
1970	66	18%
1980	69	29%
1990	72	36%
2000	74	47%
2010	76	57%
2019	78	61%
2030	79	71%
2040	83	81%
2050	85	87%
India		
1970	64	12%
1980	66	16%
1990	68	21%
2000	69	25%
2010	71	34%
2019	71	39%
2030	73	49%
2040	76	57%
2050	79	65%
Latin America and Caribbean		
1970	67	17%
1980	70	24%
1990	72	31%
2000	73	40%
2010	75	47%
2019	76	53%
2030	78	59%
2040	80	68%
2050	82	75%

	Median age of death	Proportion of deaths aged 70+
Middle East and North Africa		
1970	67	14%
1980	69	19%
1990	70	26%
2000	72	36%
2010	73	42%
2019	74	46%
2030	75	52%
2040	77	61%
2050	80	69%
North Atlantic		
1970	75	58%
1980	77	65%
1990	79	68%
2000	80	73%
2010	83	76%
2019	84	79%
2030	86	83%
2040	87	88%
2050	89	90%
Sub-Saharan Africa		
1970	61	9%
1980	62	10%
1990	62	11%
2000	61	12%
2010	63	14%
2019	65	18%
2030	66	21%
2040	67	25%
2050	69	30%

	Median age of death	Proportion of deaths aged 70+
United States		
1970	74	51%
1980	76	56%
1990	78	61%
2000	80	67%
2010	81	65%
2019	80	64%
2030	82	73%
2040	85	79%
2050	88	83%
Western Pacific and Southeast Asia		
1970	67	18%
1980	70	24%
1990	72	32%
2000	73	40%
2010	75	49%
2019	77	54%
2030	78	60%
2040	80	67%
2050	82	73%