# Global age-sex-specific mortality, life expectancy, and population estimates in 204 countries and territories and 811 subnational locations, 1950–2021, and the impact of the COVID-19 pandemic: a comprehensive demographic analysis for the Global Burden of Disease Study 2021

*GBD 2021 Demographics Collaborators**

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*Collaborators listed at the end of the paper

Correspondence to: Prof Simon I Hay, Institute for Health Metrics and Evaluation, University of Washington, Seattle, WA 98195, USA **sihay@uw.edu**

## Summary

**Background** Estimates of demographic metrics are crucial to assess levels and trends of population health outcomes. The profound impact of the COVID-19 pandemic on populations worldwide has underscored the need for timely estimates to understand this unprecedented event within the context of long-term population health trends. The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2021 provides new demographic estimates for 204 countries and territories and 811 additional subnational locations from 1950 to 2021, with a particular emphasis on changes in mortality and life expectancy that occurred during the 2020–21 COVID-19 pandemic period.

**Methods** 22 223 data sources from vital registration, sample registration, surveys, censuses, and other sources were used to estimate mortality, with a subset of these sources used exclusively to estimate excess mortality due to the COVID-19 pandemic. 2026 data sources were used for population estimation. Additional sources were used to estimate migration; the effects of the HIV epidemic; and demographic discontinuities due to conflicts, famines, natural disasters, and pandemics, which are used as inputs for estimating mortality and population. Spatiotemporal Gaussian process regression (ST-GPR) was used to generate under-5 mortality rates, which synthesised 30 763 location-years of vital registration and sample registration data, 1365 surveys and censuses, and 80 other sources. ST-GPR was also used to estimate adult mortality (between ages 15 and 59 years) based on information from 31 642 location-years of vital registration and sample registration data, 355 surveys and censuses, and 24 other sources. Estimates of child and adult mortality rates were then used to generate life tables with a relational model life table system. For countries with large HIV epidemics, life tables were adjusted using independent estimates of HIV-specific mortality generated via an epidemiological analysis of HIV prevalence surveys, antenatal clinic serosurveillance, and other data sources. Excess mortality due to the COVID-19 pandemic in 2020 and 2021 was determined by subtracting observed all-cause mortality (adjusted for late registration and mortality anomalies) from the mortality expected in the absence of the pandemic. Expected mortality was calculated based on historical trends using an ensemble of models. In location-years where all-cause mortality data were unavailable, we estimated excess mortality rates using a regression model with covariates pertaining to the pandemic. Population size was computed using a Bayesian hierarchical cohort component model. Life expectancy was calculated using age-specific mortality rates and standard demographic methods. Uncertainty intervals (UIs) were calculated for every metric using the 25th and 975th ordered values from a 1000-draw posterior distribution.

**Findings** Global all-cause mortality followed two distinct patterns over the study period: age-standardised mortality rates declined between 1950 and 2019 (a 62·8% [95% UI 60·5–65·1] decline), and increased during the COVID-19 pandemic period (2020–21; 5·1% [0·9–9·6] increase). In contrast with the overall reverse in mortality trends during the pandemic period, child mortality continued to decline, with 4·66 million (3·98–5·50) global deaths in children younger than 5 years in 2021 compared with 5·21 million (4·50–6·01) in 2019. An estimated 131 million (126–137) people died globally from all causes in 2020 and 2021 combined, of which 15·9 million (14·7–17·2) were due to the COVID-19 pandemic (measured by excess mortality, which includes deaths directly due to SARS-CoV-2 infection and those indirectly due to other social, economic, or behavioural changes associated with the pandemic). Excess mortality rates exceeded 150 deaths per 100 000 population during at least one year of the pandemic in 80 countries and territories, whereas 20 nations had a negative excess mortality rate in 2020 or 2021, indicating that all-cause mortality in these countries was lower during the pandemic than expected based on historical trends. Between 1950 and 2021, global life expectancy at birth increased by 22·7 years (20·8–24·8), from 49·0 years (46·7–51·3) to 71·7 years (70·9–72·5). Global life expectancy at birth declined by 1·6 years (1·0–2·2) between 2019 and 2021, reversing historical trends. An increase in life expectancy was only observed in 32 (15·7%) of 204 countries and territories between 2019 and 2021. The global population reached 7·89 billion (7·67–8·13) people in 2021, by which time 56 of 204 countries and territories had peaked and subsequently populations have declined. The largest proportion of

population growth between 2020 and 2021 was in sub-Saharan Africa (39·5% [28·4–52·7]) and south Asia (26·3% [9·0–44·7]). From 2000 to 2021, the ratio of the population aged 65 years and older to the population aged younger than 15 years increased in 188 (92·2%) of 204 nations.

**Interpretation** Global adult mortality rates markedly increased during the COVID-19 pandemic in 2020 and 2021, reversing past decreasing trends, while child mortality rates continued to decline, albeit more slowly than in earlier years. Although COVID-19 had a substantial impact on many demographic indicators during the first 2 years of the pandemic, overall global health progress over the 72 years evaluated has been profound, with considerable improvements in mortality and life expectancy. Additionally, we observed a deceleration of global population growth since 2017, despite steady or increasing growth in lower-income countries, combined with a continued global shift of population age structures towards older ages. These demographic changes will likely present future challenges to health systems, economies, and societies. The comprehensive demographic estimates reported here will enable researchers, policy makers, health practitioners, and other key stakeholders to better understand and address the profound changes that have occurred in the global health landscape following the first 2 years of the COVID-19 pandemic, and longer-term trends beyond the pandemic.

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## Introduction

Understanding mortality and population trends over time and across locations, age groups, and sexes is crucial for planning population-specific public health policies. Age-specific mortality rates can indicate the emergence of new adverse health risks in specific locations, while population counts can inform resource allocation and aid in planning future development. The COVID-19 pandemic has highlighted the importance of demography in understanding disease and injury burden[1] and the roles health policy and infrastructure have in health and demographic outcomes.[1,2] As the COVID-19 pandemic enters an endemic phase in some locations, demographic indicators can provide important context for understanding and addressing COVID-19, long COVID-19,[3] and the interaction between COVID-19 and other diseases and injuries. Furthermore, demographic trends in the decades before the COVID-19 pandemic and reversals in those trends during the first 2 years of the COVID-19 pandemic (2020–21) can provide insights into potential long-term effects of the pandemic. These shifts in demographic patterns, including in population growth and age distribution, can help policy makers and public health experts better understand how the pandemic has impacted different groups within society and inform strategies for future pandemic preparedness and health-care planning.

The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) is an evolving research effort that quantifies the state of global health.[4] The scope of the study has historically included estimating key demographic metrics and comprehensive health metrics for a set of national and subnational locations that has expanded over time. Mortality has been estimated as part of GBD since the first GBD estimates were published in the 1993 World Bank World Development Report, and mortality estimates have been included in each update since GBD 2010.[5–10] A comprehensive, internally consistent modelling strategy for estimating population and fertility was introduced in GBD 2017, greatly improving the consistency of results.[11] Previously, GBD drew on population estimates from the UN Population Division of the Department of Economic and Social Affairs (UNPD).[12,13] In GBD 2019, the demographic analysis used population, fertility, and mortality estimates to produce a typology that better helped to specify phases of demographic transition.[10] The GBD demography framework is part of the greater GBD enterprise; thus, it differs from other demographic research initiatives by using estimates of disease and injury burden to inform population and mortality estimates, and vice versa. Attempting to estimate the effects of the pandemic is now a major focus of GBD and other demographic research efforts.[12,14–16]

The GBD 2021 demographic analysis improved on GBD 2019 by using additional data sources and refined methods to generate updated estimates of mortality, life expectancy, and population size at the global, regional, national, and subnational levels for each year from 1950 to 2021. GBD 2021 is the first round to incorporate the COVID-19 pandemic into the modelling process through the estimation of excess mortality due to the pandemic, defined as the net difference between the number of deaths that occurred between 2020 and 2021 and the number of deaths that would be expected over the same period based on previous trends in all-cause mortality.[16] The unified approach to estimate all-cause mortality and excess mortality in GBD 2021 is an innovation in current demographic research methods. This facilitates analysis of the interplay between wider demographic processes and the COVID-19 pandemic. In this iteration of the GBD demographic analysis, we aim to

## Research in context

### Evidence before this study

The UN Population Division of the Department of Economic and Social Affairs (UNPD) produces estimates and projections of global, regional, and national demographic metrics that are updated biannually. Their latest findings, published in the World Population Prospects 2022 revision, incorporated WHO estimates of excess mortality due to the COVID-19 pandemic in 2020 and 2021. Estimates of excess mortality during the pandemic have also been generated by the Institute for Health Metrics and Evaluation and the World Mortality Dataset. The International Database of the US Census Bureau reports population estimates and projections for more than 200 countries and areas, of which a subset are updated every year. Organisations including WHO, the Organisation for Economic Co-operation and Development, and the European Union release demographic estimates less regularly and typically only for select metrics or locations. Some national statistics offices also produce their own demographic indicators. The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) generates regularly updated and globally comparable health metrics, including mortality, life expectancy, and population estimates for past years, and forecasts up to the year 2100. The current GBD 2021 cycle is directly preceded by GBD 2019, which reported demographic estimates for 204 countries and territories for each year from 1950 through 2019. While each of these studies represent important efforts to provide insights into demographic estimates and the COVID-19 pandemic, only GBD estimates comply with the Guidelines for Accurate and Transparent Health Estimates Reporting, which identifies best practices for reporting global health estimates.

### Added value of this study

GBD 2021 is one of the first studies to fully evaluate demographic trends in the context of the first 2 years of the COVID-19 pandemic. The study employed a unified framework to calculate excess mortality rates due to the COVID-19 pandemic along with a comprehensive set of demographic metrics including all-cause mortality, life expectancy, and population counts for 204 countries and territories and 811 subnational locations. This allowed estimates of all-cause mortality to inform estimates of excess mortality due to the pandemic, and vice versa. In contrast, the demographic estimates published by UNPD for 2020 and 2021, although based on data available during the pandemic, did not use a unified framework for all-cause and excess mortality. Additionally, while the US Census Bureau published population estimates for 2020 and 2021, the estimates were adjusted to reflect the effects of the pandemic for only a subset of locations. GBD 2021 utilised a suite of customised and validated data processing and modelling tools, systematically analysing thousands of data sources to produce global, regional, national, and subnational demographic estimates by age, sex, and Socio-demographic Index (SDI) level for each year from 1950 to 2021. Compared with GBD 2019, GBD 2021 utilised 5296 additional data sources. Additionally, the model life table system used in GBD 2021 was improved to provide more accurate mortality estimates for older age groups. All estimates are packaged within freely accessible data-sharing and visualisation tools.

### Implications of all the available evidence

Our study highlights the impact of the first 2 years of the COVID-19 pandemic at a novel level of granularity, demonstrating unprecedented reversals in adult mortality and life expectancy trends at the global, regional, and national levels. Furthermore, globally comparable measures of excess mortality due to the pandemic show substantial variation in the burden experienced by different countries and territories. Our comprehensive set of demographic estimates provides a rich description of evolving long-term trends in mortality and life expectancy across age groups, sexes, and SDI levels, and our population analyses reveal changing dynamics and age structures with implications for the future of health-care systems, economies, and societies. Collectively, the estimates reported here provide an integrated demographic framework for GBD and a valuable foundation for policy evaluation, development, and implementation around the world.

provide policy makers and the public with the information needed to gain a better understanding of the demographic context of disease and injury burden since 1950 and during the COVID-19 pandemic in 2020–21 specifically.

## Methods

### Overview

For each new GBD iteration, recently available data and improved methods are used to update the full time series of demographic estimates from 1950 to the latest year of analysis; GBD 2021 demographic estimates therefore supersede all previous estimates.

The GBD 2021 demographic methods closely followed those used in GBD 2019.[10] Improvements for GBD 2021 centred on a single framework to estimate both all-cause mortality and excess mortality due to the COVID-19 pandemic. The analytical process for computing internally consistent demographic estimates included six main components: (1) estimating age-specific fertility rates; (2) estimating under-5 and adult (age 15–59 years) mortality rates; (3) estimating age-specific mortality rates using a relational model life table system with HIV adjustments; (4) estimating excess mortality due to the COVID-19 pandemic and adjusting all-cause mortality estimates accordingly; (5) accounting for fatal discontinuities such as wars, famines, and natural disasters; and (6) estimating population sizes. To resolve discrepancies due to the inherent interdependent nature of population, mortality,

and fertility estimates, the estimation process was run twice: first to generate preliminary numbers, and second to refine all estimates and ensure internal consistency. A detailed description of all methods and analytical flowcharts for all-cause mortality, fertility, and population estimation are available in appendix 1 (sections 2–6, 8).

See Online for appendix 1

This study complies with the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER);[17] a completed GATHER checklist is provided in appendix 1 (section 8). Python (version 3.8.17 and 3.10.4), Stata (version 15.1), and R (version 3.5 and 4.2) were used for statistical analysis This manuscript was produced with the GBD Collaborator Network and in accordance with the GBD Protocol.[18] An international network of collaborators provides, reviews, and analyses the available data to generate health metrics; the 2021 GBD round drew on the expertise of more than 11 000 collaborators across more than 160 countries and territories.

### Data sources and processing

The GBD 2021 analysis used a range of data types for mortality and population estimation that were identified from a systematic search of available data from government websites, statistical annuals, demographic compendia, large-scale surveys, and collaborator input; comprehensive details on the sources of input data are available online via the GBD 2021 Sources Tool. Under-5 mortality rates (U5MRs), defined as the probability of death from birth to age 5 years, were estimated using 30 526 location-years of vital registration data (3179 new location-years for GBD 2021 compared with GBD 2019),[10] 237 location-years of sample vital registration data, and 1445 other sources (including 57 new surveys, one new census, and ten other new sources; appendix 1 section 8). Adult mortality, defined as the probability of death before age 60 years assuming survival to age 15 years, was estimated using 30 207 location-years of vital registration data (3150 new location-years for GBD 2021 compared with GBD 2019), 1435 location-years of sample vital registration data, 75 censuses, 280 surveys (including 65 sources of household death data and 167 sources of sibling history data), and 24 other sources (appendix 1 section 8). Age-specific mortality was estimated using 43 758 empirical life tables for 1950–2021 (compared with 35 406 in GBD 2019; appendix 1 section 8). Prevalence surveys, antenatal clinic serosurveillance, and vital registration were used to adjust for the impact of the HIV epidemic due to its exceptional impact on age-specific mortality. Fatal discontinuities were accounted for using 2235 location-years from vital registration and 237 other sources (compared with 1812 from vital registration and 174 other sources in GBD 2019). Estimation of excess mortality due to the COVID-19 pandemic utilised an additional 146 139 datapoints of all-cause mortality data at either weekly or monthly intervals from vital registration and surveillance reports that were assessed for completeness of registration (compared with our previous excess mortality estimation,[16] GBD 2021 used 1389 additional weeks or months of data).

For the GBD 2021 Sources Tool see https://ghdx.healthdata.org/gbd-2021/sources

Population estimates utilised national and subnational censuses (1277 overall; 25 new), population registries (749 location-years of data), and post-enumeration surveys (161 in total). Additionally, migration data on refugee movements from the UN High Commissioner for Refugees and datasets for select countries (primarily Gulf States and nations in the EU) were used to inform migration estimates.

### All-cause mortality estimation

GBD 2021 all-cause mortality estimation followed the analytical framework for mortality analysis used in GBD 2019.[10] Point estimates from surveys were generated using both direct and indirect estimation methods for U5MR, while for adult mortality, they were generated from sibling history data with methods that correct for inherent biases such as zero-survivor and recall bias. Time series estimates of the completeness of adult vital registration data were generated using the same modelling process as GBD 2019, which used a combination of five death distribution methods, and point estimates were adjusted accordingly.

Time series of under-5 and adult mortality without fatal discontinuities were estimated using spatiotemporal Gaussian process regression (ST-GPR), including a bias-adjustment process for U5MR, to correct for systematic differences in the data sources and smooth results across time and location. Education, HIV, and lag-distributed income were included as covariates, along with U5MR for adult mortality. These estimates were used as inputs for the GBD relational model life table system with adjustments for older-age mortality to estimate HIV-free age-specific mortality rates. HIV mortality was modelled with a combination of ST-GPR, the Estimation and Projection Package Age-Sex Model,[19] and Spectrum,[20] and subsequently used to produce life tables that included HIV mortality. These abridged life tables were used to generate full life tables by single year age groups with further detailed age groups under the age of 1 year. Sex-redistributed and age-redistributed fatal discontinuities by cause were aggregated by age and sex and added to the estimated mortality from the previous step to generate the final all-cause mortality life tables by location, year, sex, and age. We recalculated abridged life tables, including fatal discontinuities for each location, year, and sex combination, and then calculated the final envelope from these abridged life tables. Detailed methods for estimating each mortality component are available in appendix 1 (section 2).

### Excess mortality due to the COVID-19 pandemic estimation

Excess mortality due to the COVID-19 pandemic in 2020 and 2021 is defined as the observed all-cause mortality minus the mortality that would be expected had

the pandemic not occurred, based on historical trends. Excess deaths are those attributed to the COVID-19 pandemic as a whole, both from SARS-CoV-2 infection and from other pandemic-related factors such as deferred care seeking.[21,22] Excess mortality was calculated using similar methods as in Wang et al (2022),[16] with several key improvements. We included yearly observed deaths from vital registration to supplement daily, weekly, and monthly observed death data. We then used five variants of the spline for weekly seasonal patterns that set the second-to-last knot at 18, 24, 36, 48, or 60 months to allow for more stable trends. To select covariates, we used Rover, a method developed at the Institute for Health Metrics and Evaluation based on Bayesian model averaging. Rover is conceptually similar to the Bayesian model averaging method, which is widely used to explore the parameter space and aggregate estimates across candidate models based on performance metrics.[23] The main difference is that while Bayesian model averaging uses marginal likelihood, Rover focuses on out-of-sample performance. We included covariates pertaining to the COVID-19 pandemic, such as seroprevalence, and background population health metrics, such as the Healthcare Access and Quality Index.[24] With the best model selected, we ran a prediction process using 100 draws for each covariate and 100 draws of estimated coefficients and residuals, estimated from the regressions run at the draw level using draw-level input data on both excess mortality and covariates. Mean values and 95% uncertainty intervals (UIs) were then generated at national, regional, and global levels. Out-of-sample predictive validity testing was conducted based on our final model specification. Complete excess mortality methodology is detailed in appendix 1 (section 2.8).

To determine age-specific and sex-specific excess mortality, we estimated all-cause mortality twice: once with data from during the pandemic in 2020 and 2021 included and once without. For location-years with vital registration data from during the pandemic, we computed the difference in estimated age-sex-specific mortality between the two sets of estimates. We then applied this distribution to our excess mortality estimates to calculate age-specific and sex-specific excess mortality. Due to instability in age-sex distributions and implausible patterns, we used the global age-sex distribution for locations with fewer than 75 000 excess deaths, unless otherwise noted (appendix 1 section 2.8). Other pandemic-related mortality (OPRM) was estimated by calculating the difference between excess mortality and the sum of deaths due directly to COVID-19 infection and indirect deaths due to lower respiratory infections, measles, and pertussis. For locations with a negative OPRM, we adjusted the non-pandemic mortality estimates downward accordingly. We redistributed small discrepancies that remained between the mortality estimates that used vital registration age-sex-specific data from during the pandemic and the non-pandemic mortality estimates plus age-sex-specific excess mortality to ensure that the final mortality estimates including mortality shocks were consistent with observed high-quality vital registration data.

### Population estimation

We used the Bayesian hierarchical cohort component model for population projection (BCCMP) from GBD 2019 to produce age-specific population estimates.[10] This method used age-specific fertility estimates from GBD 2021 (appendix 1 section 3), the previously described age-specific mortality estimates, and available census and registry data as inputs. Auxiliary refugee and migration data were used to inform the prior distribution on net migration in countries with substantial migration or reliable data. The model estimates an age-specific 1950 baseline population, age-specific net migration, and age-specific population estimates that are fully consistent with the input fertility and mortality estimates. Complete population estimation methodology is in appendix 1 (section 4).

### Expected mortality based on Socio-demographic Index (SDI) estimation

We analysed the relationship between age-specific log mortality rates and SDI using MR-BRT (meta-regression-Bayesian regularised trimmed),[25] a meta-regression programme (appendix 1 section 6.1). SDI is a composite indicator of a country's lag-distributed income per capita,

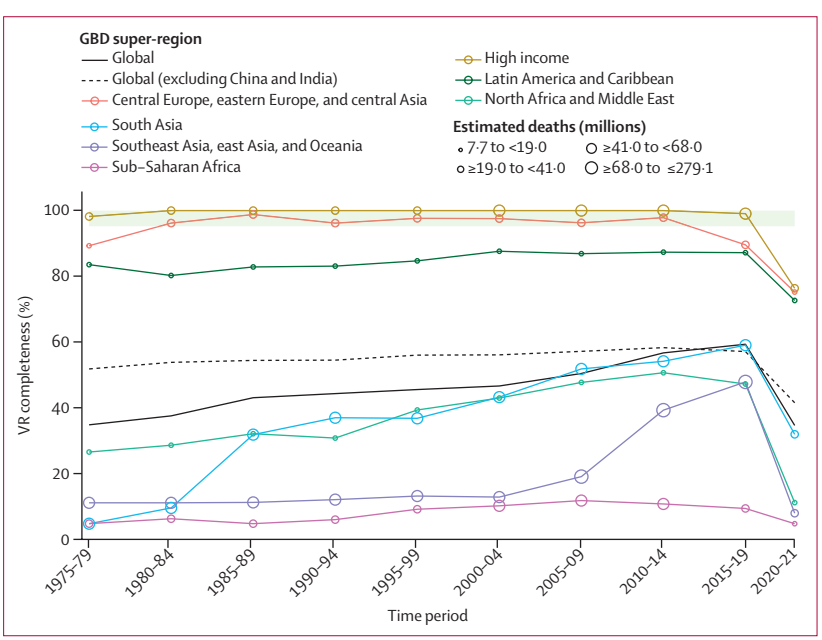



*Figure 1:* **Completeness of VR systems in GBD super-regions, 1975–2021**
Completeness is defined as the total number of deaths registered in all VR systems within a super-region during a 5-year period divided by the total number of estimated deaths within that super-region and period, with 100% completeness indicating that all deaths were registered. The size of the datapoints represents the number of estimated deaths. The solid black line shows the global completeness, the dashed black line indicates global completeness, excluding China and India, and other coloured lines indicate GBD super-regions. The green box indicates complete registration (defined as >95%). GBD=Global Burden of Diseases, Injuries, and Risk Factors Study. VR=vital registration.

average years of schooling, and the total fertility rate in females younger than age 25 years (appendix 1 section 5). MR-BRT defines a linear mixed-effects model with a B-spline specification for the relationship between outcomes of interest and SDI. We used a cubic spline with five knots between 0 and 1, with left-most and right-most spline segments enforced to be linear, and with slopes matching adjacent interior segments. To ensure that the results were not sensitive to the choice of spline knots, we used a model ensemble of over 50 cubic spline models, as described above. For each model, interior knot placement was randomly generated to be between 0·1 and 0·9, with minimum inter-knot distance of 0·1 and maximum inter-knot distance of 1·0. The final predictions were obtained using the ensemble aggregate over these 50 models. This model was performed separately for each GBD age-sex group. Expected mortality rates for each age-sex group based on SDI were used to estimate expected life expectancy. A similar analysis was done for excess mortality rates due to the COVID-19 pandemic, with the exception that two-degree splines were used.

See Online for appendix 2

### Geographical units, age groups, and time periods

We produced estimates for each demographic metric by age-sex-location-year for 25 age groups: early neonatal (0–6 days), late neonatal (7–27 days), 1–5 months, 6–11 months, 12–23 months, 2–4 years, 5–9 years, every 5-year age group up to 95 years, and 95 years and older (fertility estimated for 5-year age groups between ages 10 years and 54 years); for males, females, and all sexes combined; for 204 countries and territories grouped into 21 regions and seven super-regions; and for every year from 1950 to 2021. We also included subnational analyses for 21 countries and territories (Brazil, China, Ethiopia, India, Indonesia, Iran, Italy, Japan, Kenya, Mexico, New Zealand, Nigeria, Norway, Pakistan, the Philippines, Poland, Russia, South Africa, Sweden, the UK, and the USA) and estimates by SDI quintile. All countries and territories were assigned an SDI value ranging from 0 (lowest income and educational attainment and highest fertility) to 100 and then grouped into quintiles from low SDI to high SDI.

### Uncertainty analysis

Uncertainty was propagated throughout the estimation process. For under-5 and adult mortality, ST-GPR generated 1000 draws for every location, year, and sex combination; 1000 draws were also produced for the crude death rate associated with HIV estimates. The 100 draws of excess mortality due to the COVID-19 pandemic were repeated ten times to generate 1000 draws. These draw-level inputs were then used to create 1000 draws of all-cause mortality estimates and draw-level estimates of fatal discontinuities. Mean estimates and 95% UIs (the 25th and 975th ranked values from the 1000 draws) were generated for all demographic metrics using the draw-level estimates. The uncertainty associated with fertility and mortality estimates was included as inputs in the BCCMP model to produce 1000 draws of population estimates.

### Role of the funding source

The funders of this study had no role in study design, data collection, data analysis, data interpretation, or the writing of the report

## Results

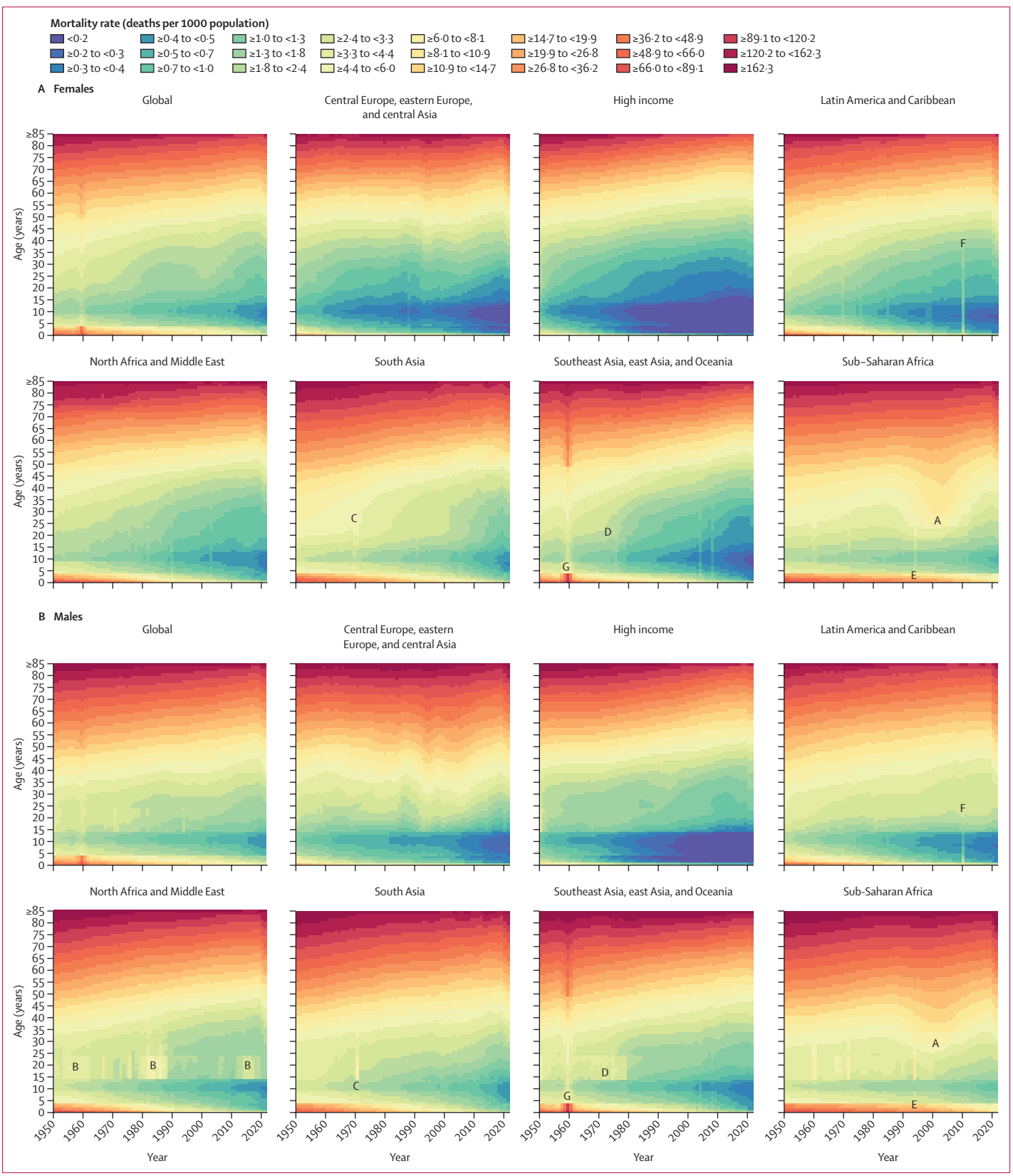
### Civil registration and vital statistics completeness

This section presents global, regional, and national-level results for key demographic metrics; given space constraints, estimates at the subnational level are presented in appendix 2. All subnational locations are listed in appendix 1 (section 8).

The proportion of deaths registered in vital registration systems increased substantially at the global level during the study period, from 30·3% in 1975 to a peak of 61·1% in 2016, before declining in subsequent years due to lags in reporting (figure 1). Completeness of death registration in vital registration systems varied markedly between regions, however, most progress in completeness was observed in China (where completeness peaked at 71·2% in 2018) and India (where completeness peaked at 80·1% in 2019; appendix 2 table S1). The Indian Sample Registration System is considered complete for the sample population it covers. Outside of China and India, progress in death registration has been slow, with only a 10·3 percentage point increase observed in the rest of the world between 1975 and the peak in 2016. This increase was concentrated in north Africa and the Middle East, which improved from 20·6% completeness in 1975 to a peak of 56·0% in 2016. While registration has been complete (defined as >95%) since 1975 for nearly all countries in the high-income super-region and central Europe, eastern Europe, and central Asia, in sub-Saharan Africa peak completeness of only 8·7% was reached in 2008 and completeness has declined since then. Death registration in Latin America and the Caribbean was more variable: countries such as Costa Rica, Cuba, and Argentina have been complete for many years; registration in countries such as Peru and Ecuador has remained around 60–90% complete, and others, such as Bolivia, continue to lack registration data. At the national level, 96 countries and territories had at

*Figure 2:* **Global and GBD super-region all-cause mortality rates across the lifespan in females (A) and males (B), 1950–2021**

Mortality rates are expressed as the number of deaths per 1000 population. Fatal discontinuities are indicated by the following letters: A=HIV epidemic; B=conflicts in the Middle East; C=war and genocide in India, Pakistan, and Bangladesh in 1971; D=war and genocide in Cambodia in the 1970s; E=Rwandan genocide in 1994; F=earthquake in Haiti in 2010; G=famine between 1959 and 1961. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.


Mortality rate (deaths per 1000 population)
<0·2
≥0·2 to <0·3
≥0·3 to <0·4
≥0·4 to <0·5
≥0·5 to <0·7
≥0·7 to <1·0
≥1·0 to <1·3
≥1·3 to <1·8
≥1·8 to <2·4
≥2·4 to <3·3
≥3·3 to <4·4
≥4·4 to <6·0
≥6·0 to <8·1
≥8·1 to <10·9
≥10·9 to <14·7
≥14·7 to <19·9
≥19·9 to <26·8
≥26·8 to <36·2
≥36·2 to <48·9
≥48·9 to <66·0
≥66·0 to <89·1
≥89·1 to <120·2
≥120·2 to <162·3
≥162·3
A Females
Global
Central Europe, eastern Europe, and central Asia
High income
Latin America and Caribbean
North Africa and Middle East
South Asia
Southeast Asia, east Asia, and Oceania
Sub–Saharan Africa
B Males
Global
Central Europe, eastern Europe, and central Asia
High income
Latin America and Caribbean
North Africa and Middle East
South Asia
Southeast Asia, east Asia, and Oceania
Sub-Saharan Africa
Age (years)
Year
A
B
C
D
E
F
G

least 1 year of complete death registration between 2010 and 2021; 29 countries and territories without complete death registration had at least 1 year of registering more than 75% of deaths; and 47 countries and territories had no vital registration data in the GBD 2021 mortality database. Registration was incomplete or non-existent in many countries with large numbers of deaths in 2021, especially in sub-Saharan Africa, including Nigeria and Democratic Republic of Congo. In the 2020–21 period, super-regions had varying degrees of lowered completeness indicative of lags in reporting (figure 1).

## Mortality and life expectancy

Between 1950 and 2019, global age-standardised all-cause mortality rates per 100 000 population broadly declined, from 1980·5 age-standardised deaths (95% UI 1855·5–2115·0) in 1950 to 736·1 (700·1–772·8) in 2019 (appendix 2 table S3A), which equates to a 62·8% (60·5–65·1) decline in mortality during the entire period. Global all-cause mortality rates across the human lifespan for the younger than 15 years and older than 40 years age groups broadly improved for both females and males between 1950 and 2019 (figure 2). This pattern was relatively consistent across super-regions, with the exception of increased mortality in sub-Saharan Africa during the HIV epidemic and a fluctuating pattern in the central Europe, eastern Europe, and central Asia super-region. However, substantial variation in mortality levels and trends across super-regions and over time were observed in the 15–39-years age group. This age group was particularly susceptible to mortality shocks such as famine in China between 1959 and 1961; conflicts in the Middle East during multiple time periods; war in India, Pakistan, and Bangladesh and genocide in Bangladesh in 1971; war and genocide in Cambodia in the 1970s; the Rwandan genocide in 1994; and the earthquake in Haiti in 2010 (figure 2). Conflict and war had a larger impact on mortality rates in males than females. Furthermore, the HIV epidemic had an especially large impact on this age group in sub-Saharan Africa and a lesser impact in southeast Asia, east Asia, and Oceania, with a larger impact on females than males. Additionally, male mortality rates increased in Latin America and the Caribbean during the 2000s, to varying extents in countries such as El Salvador, Peru, Guatemala, Honduras, Mexico, Venezuela, and Brazil (appendix 2 figure S5). An increase in male and female mortality was observed in the high-income super-region during the late 2010s, which was most notable in the USA, Canada, and Spain (appendix 2 figure S5).

During the COVID-19 pandemic in 2020 and 2021, global age-standardised all-cause mortality rates increased by 21·9% (95% UI 13·6–31·1) for males aged 15 years and older compared with 2019 and 16·6% (10·0–23·4) for females in the same age group and time period, reversing trends in mortality observed before the pandemic (appendix 2 table S3). In contrast, during 2020 and 2021, global mortality rates for both males and females generally remained constant or further decreased for age groups younger than 15 years (figure 2). In particular, between 2019 and 2021, global U5MR decreased by 7·0% (2·3–11·1). This continued reduction in child mortality was consistent across all super-regions (figure 2).

All-cause mortality rates differed between sexes, and the extent of this difference varied across age groups and

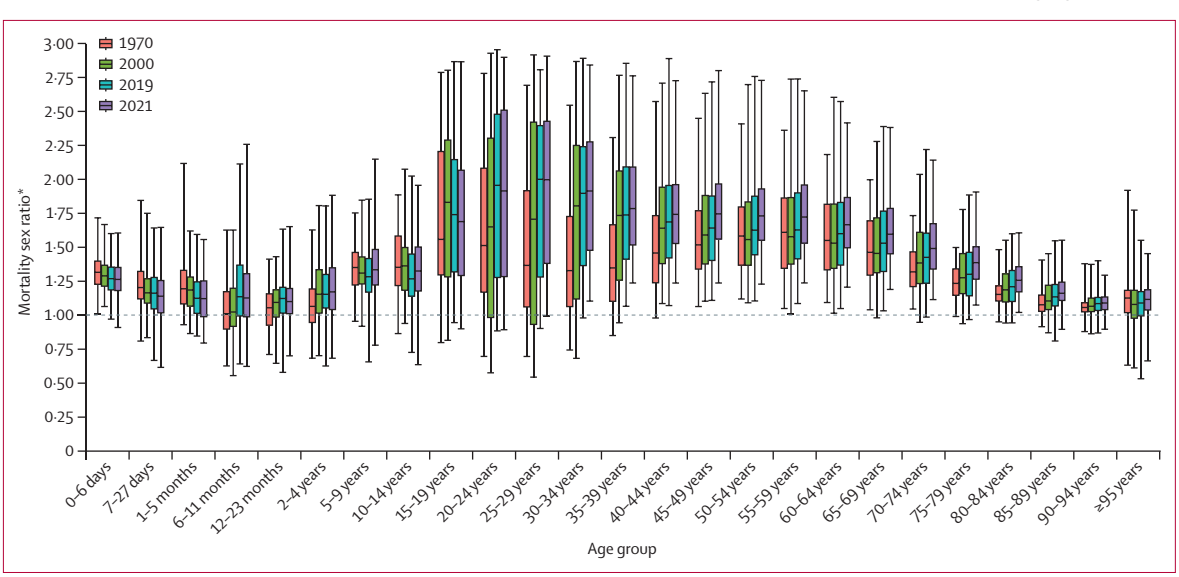



***Figure 3:*** **Distribution of the mortality sex ratio by age in 1970, 2000, 2019, and 2021**

The distributions are for the mortality sex ratio calculated across all 204 countries and territories included in this study. The boxes represent the middle 50% of the distribution (25th and 75th percentiles), the horizontal line in boxes indicates the mean, and the whiskers show the middle 95% of the distribution (2·5th and 97·5th percentiles). *The ratio of male to female mortality rates, computed by dividing the male mortality rate by the female mortality rate for each age group and year.

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| **Global** | **35·7 (30·5 to 42·0)** | **−3·3% (−4·0 to −2·5)** | **0·12 (0·11 to 0·12)** | **0·19 (0·18 to 0·20)** | **74·8 (74·0 to 75·5)** | **69·0 (68·0 to 69·9)** | **71·7 (70·9 to 72·5)** | **67 900·0 (65 000·0 to 70 800·0)** | **4660·0 (3980·0 to 5500·0)** | **5890 (5480 to 6440)** | **9970 (9260 to 10 900)** | **1·04 (0·96 to 1·13)** |
| **Central Europe, eastern Europe, and Central Asia** | **12·0 (10·5 to 13·7)** | **−3·8% (−4·4 to −3·2)** | **0·11 (0·11 to 0·12)** | **0·25 (0·24 to 0·26)** | **75·5 (75·0 to 75·9)** | **67·4 (66·9 to 67·9)** | **71·5 (71·0 to 71·8)** | **5950·0 (5790·0 to 6130·0)** | **59·0 (51·7 to 67·6)** | **740 (681 to 801)** | **1400 (1300 to 1520)** | **2·70 (2·50 to 2·90)** |
| Central Asia | 20·9 (17·6 to 24·6) | −4·1% (−4·8 to −3·2) | 0·11 (0·10 to 0·12) | 0·22 (0·21 to 0·24) | 74·3 (73·3 to 75·2) | 67·4 (66·4 to 68·5) | 70·8 (69·8 to 71·8) | 724·0 (671·0 to 779·0) | 42·6 (36·0 to 50·4) | 108 (80 to 133) | 150 (102 to 186) | 1·46 (1·06 to 1·80) |
| Armenia | 11·1 (9·0 to 13·8) | −4·8% (−6·0 to −3·6) | 0·07 (0·06 to 0·07) | 0·18 (0·16 to 0·19) | 78·6 (77·8 to 79·4) | 71·3 (70·3 to 72·4) | 75·0 (74·1 to 76·0) | 31·3 (28·9 to 33·8) | 0·4 (0·3 to 0·5) | 7 (5 to 9) | 5 (3 to 6) | 2·08 (1·43 to 2·61) |
| Azerbaijan | 28·6 (23·4 to 34·7) | −4·0% (−5·0 to −3·0) | 0·10 (0·09 to 0·11) | 0·21 (0·19 to 0·23) | 73·4 (72·5 to 74·3) | 67·0 (66·0 to 68·2) | 70·1 (69·2 to 71·2) | 89·3 (81·9 to 96·4) | 3·9 (3·2 to 4·7) | 21 (17 to 24) | 25 (20 to 30) | 2·31 (1·83 to 2·67) |
| Georgia | 9·7 (7·7 to 12·2) | −6·1% (−7·2 to −5·0) | 0·10 (0·10 to 0·10) | 0·25 (0·25 to 0·26) | 75·8 (75·5 to 76·2) | 67·3 (67·0 to 67·5) | 71·5 (71·2 to 71·7) | 59·6 (58·6 to 60·5) | 0·4 (0·3 to 0·6) | 6 (4 to 7) | 17 (11 to 21) | 3·29 (2·22 to 4·19) |
| Kazakhstan | 10·2 (8·4 to 12·3) | −6·1% (−7·0 to −5·1) | 0·13 (0·12 to 0·14) | 0·28 (0·26 to 0·30) | 73·9 (73·1 to 74·7) | 65·3 (64·4 to 66·2) | 69·6 (68·7 to 70·4) | 181·0 (169·0 to 194·0) | 4·1 (3·4 to 5·0) | 30 (23 to 36) | 51 (41 to 60) | 2·36 (1·87 to 2·76) |
| Kyrgyzstan | 17·0 (14·9 to 19·0) | −4·4% (−5·2 to −3·7) | 0·10 (0·09 to 0·12) | 0·23 (0·20 to 0·26) | 76·1 (74·7 to 77·6) | 68·4 (66·6 to 70·2) | 72·3 (70·7 to 73·9) | 38·9 (34·2 to 43·6) | 2·7 (2·3 to 3·0) | 7 (5 to 9) | 6 (4 to 9) | 1·06 (0·74 to 1·38) |
| Mongolia | 16·9 (14·0 to 20·5) | −5·6% (−6·6 to −4·6) | 0·12 (0·10 to 0·13) | 0·29 (0·26 to 0·32) | 74·6 (73·5 to 75·7) | 65·7 (64·3 to 67·1) | 70·0 (69·1 to 71·0) | 21·5 (19·9 to 23·0) | 1·3 (1·1 to 1·6) | −2 (−5 to 1) | 1 (−3 to 4) | −0·17 (−1·15 to 0·74) |
| Tajikistan | 34·5 (28·5 to 42·2) | −3·1% (−4·1 to −2·1) | 0·13 (0·11 to 0·15) | 0·21 (0·18 to 0·24) | 72·1 (70·4 to 73·7) | 66·9 (65·1 to 69·1) | 69·3 (67·8 to 71·0) | 59·1 (52·2 to 65·6) | 9·7 (8·0 to 11·9) | 12 (9 to 15) | 16 (11 to 20) | 1·46 (1·06 to 1·79) |
| Turkmenistan | 27·5 (22·2 to 33·5) | −3·7% (−4·6 to −2·6) | 0·15 (0·12 to 0·19) | 0·28 (0·24 to 0·34) | 71·5 (69·4 to 73·7) | 64·3 (62·0 to 66·8) | 67·8 (65·5 to 70·1) | 43·6 (36·5 to 51·2) | 3·0 (2·4 to 3·7) | 6 (5 to 8) | 8 (6 to 10) | 1·46 (1·06 to 1·79) |
| Uzbekistan | 21·5 (17·7 to 26·0) | −3·5% (−4·4 to −2·5) | 0·10 (0·09 to 0·12) | 0·18 (0·15 to 0·20) | 75·1 (73·6 to 76·6) | 69·9 (68·1 to 71·7) | 72·5 (70·8 to 74·2) | 200·0 (175·0 to 227·0) | 17·0 (14·0 to 20·7) | 22 (12 to 30) | 21 (7 to 31) | 0·69 (0·30 to 0·98) |
| Central Europe | 5·0 (4·5 to 5·6) | −4·7% (−5·1 to −4·2) | 0·08 (0·08 to 0·08) | 0·18 (0·18 to 0·18) | 78·3 (78·2 to 78·5) | 71·3 (71·1 to 71·4) | 74·7 (74·5 to 74·8) | 1760·0 (1740·0 to 1780·0) | 5·3 (4·8 to 5·9) | 195 (140 to 243) | 353 (268 to 422) | 2·54 (1·89 to 3·05) |
| Albania | 13·1 (10·7 to 16·0) | −3·7% (−4·8 to −2·6) | 0·06 (0·05 to 0·07) | 0·13 (0·11 to 0·15) | 78·7 (77·6 to 79·9) | 73·6 (72·1 to 75·3) | 76·0 (74·7 to 77·5) | 30·1 (26·5 to 33·6) | 0·4 (0·3 to 0·4) | 5 (2 to 8) | 7 (3 to 10) | 2·36 (1·05 to 3·63) |
| Bosnia and Herzegovina | 5·2 (4·4 to 6·3) | −3·6% (−4·4 to −2·7) | 0·07 (0·06 to 0·09) | 0·15 (0·12 to 0·17) | 78·3 (76·9 to 79·8) | 72·6 (70·8 to 74·6) | 75·4 (73·8 to 77·1) | 46·4 (39·7 to 53·0) | 0·1 (0·1 to 0·2) | 5 (1 to 9) | 8 (3 to 14) | 2·05 (0·80 to 3·47) |
| Bulgaria | 6·6 (5·9 to 7·4) | −4·6% (−5·2 to −4·1) | 0·13 (0·13 to 0·14) | 0·26 (0·25 to 0·27) | 73·7 (73·3 to 74·1) | 66·4 (65·9 to 67·0) | 69·9 (69·4 to 70·3) | 169·0 (164·0 to 173·0) | 0·4 (0·3 to 0·4) | 20 (11 to 26) | 47 (36 to 56) | 5·21 (3·82 to 6·30) |
| Croatia | 4·6 (3·8 to 5·4) | −2·7% (−3·5 to −1·8) | 0·06 (0·05 to 0·06) | 0·13 (0·12 to 0·13) | 80·3 (80·0 to 80·6) | 74·1 (73·8 to 74·4) | 77·2 (76·9 to 77·5) | 62·4 (60·6 to 64·0) | 0·2 (0·1 to 0·2) | 5 (2 to 7) | 10 (6 to 14) | 1·84 (1·03 to 2·61) |
| Czechia | 2·7 (2·3 to 3·1) | −3·2% (−4·0 to −2·4) | 0·06 (0·06 to 0·06) | 0·12 (0·12 to 0·13) | 80·9 (80·6 to 81·1) | 74·4 (74·2 to 74·6) | 77·6 (77·3 to 77·8) | 138·0 (136·0 to 141·0) | 0·3 (0·2 to 0·3) | 15 (8 to 22) | 23 (12 to 32) | 1·88 (1·00 to 2·57) |
| Hungary | 4·0 (3·4 to 4·7) | −4·6% (−5·3 to −3·8) | 0·09 (0·09 to 0·10) | 0·19 (0·19 to 0·19) | 78·0 (77·8 to 78·2) | 70·9 (70·7 to 71·1) | 74·5 (74·3 to 74·6) | 154·0 (152·0 to 156·0) | 0·4 (0·3 to 0·4) | 12 (3 to 18) | 26 (14 to 35) | 2·02 (0·96 to 2·84) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Montenegro | 3·9 (3·2 to 4·7) | −5·5% (−6·5 to −4·5) | 0·08 (0·08 to 0·09) | 0·18 (0·17 to 0·19) | 76·0 (75·4 to 76·6) | 69·8 (69·0 to 70·5) | 72·7 (72·1 to 73·3) | 9·9 (9·4 to 10·4) | 0·0 (0·0 to 0·0) | 1 (1 to 1) | 3 (3 to 3) | 3·35 (2·78 to 3·90) |
| North Macedonia | 5·6 (4·9 to 6·3) | −4·9% (−5·5 to −4·2) | 0·11 (0·09 to 0·12) | 0·19 (0·17 to 0·22) | 74·2 (73·2 to 75·3) | 69·2 (68·0 to 70·4) | 71·5 (70·4 to 72·7) | 32·7 (29·3 to 36·3) | 0·1 (0·1 to 0·1) | 7 (5 to 8) | 10 (8 to 12) | 4·86 (3·79 to 5·66) |
| Poland | 4·4 (3·9 to 5·0) | −3·7% (−4·3 to −3·1) | 0·07 (0·07 to 0·07) | 0·18 (0·18 to 0·18) | 79·7 (79·6 to 79·8) | 71·8 (71·7 to 71·9) | 75·7 (75·6 to 75·8) | 517·0 (514·0 to 520·0) | 1·5 (1·3 to 1·7) | 65 (48 to 78) | 101 (72 to 122) | 2·28 (1·81 to 2·72) |
| Romania | 6·7 (6·1 to 7·4) | −5·7% (−6·2 to −5·3) | 0·10 (0·10 to 0·10) | 0·22 (0·22 to 0·22) | 76·8 (76·7 to 77·0) | 69·2 (69·1 to 69·4) | 72·9 (72·8 to 73·0) | 334·0 (332·0 to 337·0) | 1·2 (1·1 to 1·3) | 38 (25 to 51) | 72 (49 to 90) | 3·00 (2·06 to 3·85) |
| Serbia | 4·7 (4·2 to 5·2) | −5·4% (−6·3 to −4·6) | 0·08 (0·08 to 0·09) | 0·16 (0·16 to 0·16) | 76·7 (76·5 to 76·9) | 71·7 (71·5 to 71·8) | 74·1 (74·0 to 74·3) | 149·0 (147·0 to 151·0) | 0·3 (0·3 to 0·4) | 15 (5 to 27) | 26 (6 to 44) | 2·52 (0·61 to 4·24) |
| Slovakia | 5·8 (5·1 to 6·4) | −2·6% (−3·2 to −2·0) | 0·08 (0·08 to 0·08) | 0·17 (0·17 to 0·18) | 78·3 (78·1 to 78·6) | 71·3 (71·0 to 71·5) | 74·7 (74·6 to 74·9) | 72·6 (71·5 to 73·6) | 0·3 (0·3 to 0·4) | 5 (2 to 8) | 18 (13 to 22) | 2·23 (1·38 to 2·88) |
| Slovenia | 2·2 (2·0 to 2·5) | −4·2% (−4·8 to −3·6) | 0·04 (0·04 to 0·04) | 0·10 (0·09 to 0·10) | 84·0 (83·4 to 84·6) | 77·6 (77·2 to 78·1) | 80·8 (80·4 to 81·3) | 23·0 (22·0 to 23·9) | 0·0 (0·0 to 0·0) | 3 (1 to 4) | 2 (0 to 4) | 1·20 (0·31 to 1·88) |
| Eastern Europe | 6·1 (5·6 to 6·5) | −5·2% (−5·6 to −4·8) | 0·13 (0·12 to 0·14) | 0·30 (0·28 to 0·32) | 74·9 (74·2 to 75·5) | 65·8 (65·0 to 66·6) | 70·4 (69·8 to 70·9) | 3470·0 (3340·0 to 3610·0) | 11·1 (10·3 to 11·9) | 436 (398 to 467) | 899 (854 to 940) | 3·33 (3·15 to 3·46) |
| Belarus | 4·0 (3·1 to 5·3) | −6·9% (−8·2 to −5·5) | 0·11 (0·10 to 0·13) | 0·29 (0·25 to 0·33) | 76·0 (74·4 to 77·5) | 66·0 (64·2 to 67·8) | 71·0 (69·2 to 72·7) | 162·0 (141·0 to 186·0) | 0·3 (0·3 to 0·4) | 23 (17 to 29) | 42 (32 to 54) | 3·67 (2·78 to 4·77) |
| Estonia | 2·5 (2·2 to 2·9) | −7·1% (−7·8 to −6·4) | 0·07 (0·06 to 0·07) | 0·17 (0·17 to 0·18) | 81·2 (80·6 to 81·8) | 72·4 (71·9 to 72·9) | 76·9 (76·5 to 77·3) | 18·6 (18·0 to 19·2) | 0·0 (0·0 to 0·0) | 0 (−1 to 1) | 3 (2 to 5) | 1·44 (0·59 to 2·33) |
| Latvia | 3·7 (3·2 to 4·3) | −6·1% (−6·9 to −5·4) | 0·10 (0·09 to 0·10) | 0·26 (0·25 to 0·27) | 78·1 (77·7 to 78·5) | 68·3 (67·9 to 68·7) | 73·2 (73·0 to 73·5) | 34·2 (33·4 to 35·0) | 0·1 (0·1 to 0·1) | 1 (0 to 3) | 7 (5 to 9) | 2·35 (1·36 to 3·41) |
| Lithuania | 3·5 (3·1 to 3·9) | −5·3% (−5·9 to −4·7) | 0·09 (0·09 to 0·10) | 0·24 (0·23 to 0·24) | 78·9 (78·5 to 79·3) | 69·2 (68·8 to 69·5) | 74·1 (73·8 to 74·4) | 47·2 (46·2 to 48·2) | 0·1 (0·1 to 0·1) | 5 (3 to 8) | 10 (6 to 13) | 2·84 (1·91 to 3·89) |
| Moldova | 10·9 (8·2 to 14·4) | −4·4% (−5·7 to −3·0) | 0·11 (0·10 to 0·12) | 0·25 (0·23 to 0·27) | 76·4 (75·4 to 77·3) | 67·9 (66·7 to 69·0) | 72·1 (71·0 to 73·2) | 50·1 (47·0 to 53·6) | 0·3 (0·2 to 0·4) | 5 (5 to 6) | 10 (10 to 11) | 2·29 (2·21 to 2·38) |
| Russia | 5·8 (5·5 to 6·2) | −5·6% (−5·9 to −5·2) | 0·14 (0·14 to 0·14) | 0·31 (0·31 to 0·31) | 74·3 (74·3 to 74·4) | 65·5 (65·5 to 65·6) | 70·0 (69·9 to 70·0) | 2410·0 (2410·0 to 2420·0) | 8·1 (7·6 to 8·6) | 357 (355 to 360) | 690 (687 to 693) | 3·70 (3·68 to 3·72) |
| Ukraine | 7·8 (6·2 to 9·2) | −3·3% (−4·3 to −2·4) | 0·11 (0·08 to 0·15) | 0·29 (0·22 to 0·37) | 75·7 (72·7 to 78·6) | 66·3 (62·7 to 70·1) | 71·0 (68·5 to 73·6) | 745·0 (614·0 to 880·0) | 2·2 (1·7 to 2·6) | 44 (9 to 77) | 137 (96 to 179) | 2·18 (1·45 to 2·93) |
| **High income** | **4·6 (4·2 to 5·0)** | **−2·4% (−2·8 to −2·0)** | **0·06 (0·06 to 0·06)** | **0·11 (0·11 to 0·11)** | **83·3 (83·3 to 83·4)** | **77·9 (77·8 to 78·0)** | **80·6 (80·5 to 80·7)** | **10 900·0 (10 800·0 to 10 900·0)** | **47·9 (44·0 to 52·2)** | **971 (939 to 1000)** | **947 (907 to 985)** | **0·90 (0·87 to 0·93)** |
| Australasia | 3·3 (2·8 to 3·8) | −3·3% (−4·0 to −2·5) | 0·04 (0·04 to 0·04) | 0·08 (0·08 to 0·08) | 85·3 (85·3 to 85·4) | 81·2 (81·1 to 81·2) | 83·2 (83·2 to 83·3) | 210·0 (209·0 to 210·0) | 1·2 (1·0 to 1·4) | −5 (−6 to −5) | 4 (3 to 5) | −0·03 (−0·06 to −0·00) |
| Australia | 3·0 (2·5 to 3·6) | −3·6% (−4·4 to −2·7) | 0·04 (0·04 to 0·04) | 0·08 (0·08 to 0·08) | 85·6 (85·5 to 85·7) | 81·2 (81·1 to 81·3) | 83·4 (83·3 to 83·5) | 175·0 (174·0 to 176·0) | 0·9 (0·7 to 1·0) | −3 (−4 to −3) | 4 (3 to 4) | 0·01 (−0·02 to 0·03) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| New Zealand | 4·8 (4·3 to 5·4) | −2·3% (−2·9 to −1·6) | 0·05 (0·05 to 0·05) | 0·08 (0·08 to 0·08) | 84·1 (83·9 to 84·3) | 80·7 (80·5 to 80·9) | 82·4 (82·3 to 82·6) | 34·5 (34·1 to 35·0) | 0·3 (0·3 to 0·3) | −2 (−2 to −2) | 0 (0 to 0) | −0·21 (−0·27 to −0·15) |
| High-income Asia Pacific | 2·2 (2·0 to 2·4) | −4·1% (−4·5 to −3·7) | 0·03 (0·03 to 0·03) | 0·07 (0·07 to 0·07) | 87·8 (87·7 to 87·8) | 81·8 (81·7 to 81·9) | 84·8 (84·8 to 84·9) | 1800·0 (1790·0 to 1800·0) | 2·7 (2·5 to 2·9) | −27 (−32 to −22) | 22 (15 to 29) | −0·01 (−0·04 to 0·01) |
| Brunei | 9·7 (7·7 to 12·1) | −0·3% (−1·5 to 1·0) | 0·08 (0·07 to 0·10) | 0·13 (0·12 to 0·15) | 78·3 (77·1 to 79·3) | 74·9 (73·6 to 76·0) | 76·6 (75·4 to 77·7) | 1·8 (1·7 to 2·0) | 0·1 (0·0 to 0·1) | 0 (0 to 0) | 0 (0 to 0) | 0·13 (−0·08 to 0·30) |
| Japan | 2·1 (1·9 to 2·4) | −3·5% (−4·1 to −2·9) | 0·03 (0·03 to 0·03) | 0·06 (0·06 to 0·06) | 88·1 (88·0 to 88·2) | 82·2 (82·1 to 82·2) | 85·2 (85·1 to 85·2) | 1440·0 (1430·0 to 1450·0) | 1·8 (1·6 to 2·1) | −28 (−33 to −24) | 8 (2 to 14) | −0·08 (−0·12 to −0·05) |
| Singapore | 1·7 (1·4 to 2·0) | −4·2% (−5·2 to −3·2) | 0·03 (0·03 to 0·03) | 0·05 (0·05 to 0·05) | 87·7 (87·5 to 87·9) | 83·6 (83·4 to 83·8) | 85·7 (85·5 to 85·9) | 23·7 (23·3 to 24·2) | 0·1 (0·1 to 0·1) | 0 (−1 to 0) | 2 (1 to 2) | 0·10 (0·06 to 0·15) |
| South Korea | 2·5 (2·0 to 2·9) | −4·9% (−5·9 to −4·0) | 0·04 (0·03 to 0·04) | 0·08 (0·07 to 0·08) | 86·0 (85·9 to 86·2) | 80·3 (80·1 to 80·5) | 83·2 (83·1 to 83·4) | 331·0 (326·0 to 336·0) | 0·7 (0·5 to 0·8) | 2 (1 to 3) | 12 (12 to 14) | 0·13 (0·12 to 0·15) |
| High-income North America | 5·7 (5·2 to 6·2) | −1·7% (−2·1 to −1·3) | 0·09 (0·09 to 0·09) | 0·16 (0·16 to 0·16) | 80·4 (80·3 to 80·6) | 74·8 (74·6 to 74·9) | 77·6 (77·4 to 77·7) | 3780·0 (3750·0 to 3810·0) | 23·1 (21·1 to 25·2) | 530 (519 to 542) | 560 (543 to 579) | 1·53 (1·49 to 1·56) |
| Canada | 4·0 (3·4 to 4·8) | −1·8% (−2·6 to −0·9) | 0·05 (0·05 to 0·05) | 0·09 (0·09 to 0·09) | 84·1 (83·9 to 84·2) | 79·5 (79·4 to 79·7) | 81·8 (81·7 to 82·0) | 310·0 (307·0 to 314·0) | 1·5 (1·2 to 1·8) | 37 (35 to 39) | 32 (30 to 34) | 0·95 (0·90 to 0·99) |
| Greenland | 10·6 (9·0 to 12·3) | −3·1% (−4·1 to −2·3) | 0·12 (0·11 to 0·14) | 0·20 (0·17 to 0·23) | 76·9 (75·7 to 77·9) | 71·4 (69·7 to 72·7) | 73·8 (72·4 to 75·0) | 0·4 (0·4 to 0·5) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·38 (0·08 to 0·62) |
| USA | 5·9 (5·4 to 6·4) | −1·7% (−2·1 to −1·2) | 0·09 (0·09 to 0·09) | 0·17 (0·16 to 0·17) | 80·0 (79·9 to 80·2) | 74·3 (74·1 to 74·4) | 77·1 (77·0 to 77·2) | 3470·0 (3440·0 to 3500·0) | 21·6 (19·7 to 23·6) | 493 (482 to 504) | 528 (512 to 546) | 1·59 (1·56 to 1·63) |
| Southern Latin America | 8·5 (6·9 to 10·4) | −3·4% (−4·4 to −2·4) | 0·08 (0·08 to 0·08) | 0·14 (0·14 to 0·14) | 79·9 (79·6 to 80·1) | 73·8 (73·5 to 74·1) | 76·8 (76·6 to 77·1) | 553·0 (545·0 to 562·0) | 6·6 (5·4 to 8·1) | 41 (38 to 45) | 71 (66 to 77) | 0·88 (0·82 to 0·95) |
| Argentina | 9·7 (7·7 to 12·1) | −3·3% (−4·4 to −2·3) | 0·08 (0·08 to 0·09) | 0·15 (0·14 to 0·15) | 79·1 (78·8 to 79·3) | 73·0 (72·7 to 73·3) | 76·1 (75·7 to 76·3) | 378·0 (372·0 to 386·0) | 5·2 (4·1 to 6·5) | 30 (27 to 32) | 44 (40 to 48) | 0·85 (0·79 to 0·94) |
| Chile | 5·7 (4·9 to 6·4) | −3·5% (−4·1 to −2·8) | 0·06 (0·06 to 0·06) | 0·13 (0·13 to 0·13) | 81·9 (81·7 to 82·1) | 76·1 (76·0 to 76·3) | 79·0 (78·9 to 79·2) | 134·0 (133·0 to 135·0) | 1·2 (1·0 to 1·3) | 14 (12 to 15) | 22 (21 to 23) | 1·03 (0·96 to 1·10) |
| Uruguay | 6·8 (5·5 to 8·5) | −4·2% (−5·3 to −3·1) | 0·09 (0·08 to 0·09) | 0·17 (0·17 to 0·17) | 79·4 (79·0 to 79·7) | 72·0 (71·6 to 72·4) | 75·7 (75·3 to 76·0) | 40·5 (39·7 to 41·4) | 0·2 (0·2 to 0·3) | −2 (−3 to −2) | 5 (5 to 6) | 0·49 (0·38 to 0·59) |
| Western Europe | 3·5 (3·2 to 3·8) | −2·4% (−2·7 to −2·0) | 0·04 (0·04 to 0·04) | 0·08 (0·08 to 0·08) | 84·2 (84·1 to 84·3) | 79·4 (79·3 to 79·4) | 81·8 (81·7 to 81·9) | 4540·0 (4520·0 to 4560·0) | 14·3 (13·3 to 15·5) | 432 (411 to 448) | 291 (271 to 311) | 0·85 (0·80 to 0·89) |
| Andorra | 1·2 (0·8 to 1·5) | −5·7% (−7·4 to −4·4) | 0·04 (0·03 to 0·05) | 0·08 (0·06 to 0·10) | 85·7 (83·5 to 87·9) | 80·7 (77·9 to 83·6) | 83·0 (80·5 to 85·6) | 0·6 (0·5 to 0·8) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·60 (−0·31 to 1·77) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Austria | 3·1 (2·7 to 3·5) | −2·9% (−3·5 to −2·2) | 0·04 (0·04 to 0·04) | 0·08 (0·08 to 0·08) | 84·1 (83·9 to 84·2) | 79·2 (79·1 to 79·4) | 81·7 (81·5 to 81·8) | 88·8 (87·7 to 89·9) | 0·3 (0·2 to 0·3) | 6 (5 to 7) | 4 (3 to 5) | 0·58 (0·44 to 0·72) |
| Belgium | 3·7 (3·0 to 4·4) | −2·3% (−3·3 to −1·4) | 0·05 (0·05 to 0·05) | 0·08 (0·08 to 0·08) | 84·2 (84·0 to 84·4) | 79·3 (79·1 to 79·5) | 81·8 (81·6 to 81·9) | 111·0 (110·0 to 112·0) | 0·4 (0·3 to 0·5) | 17 (16 to 18) | 2 (1 to 3) | 0·85 (0·76 to 0·93) |
| Cyprus | 2·4 (2·0 to 2·9) | −5·0% (−5·9 to −4·1) | 0·04 (0·03 to 0·04) | 0·07 (0·06 to 0·08) | 83·2 (82·5 to 83·9) | 79·2 (78·2 to 80·1) | 81·2 (80·4 to 82·0) | 9·2 (8·4 to 10·1) | 0·0 (0·0 to 0·0) | 0 (0 to 1) | 1 (0 to 1) | 0·30 (−0·24 to 0·76) |
| Denmark | 3·6 (3·2 to 4·1) | −2·1% (−2·7 to −1·4) | 0·04 (0·04 to 0·05) | 0·07 (0·07 to 0·07) | 83·5 (83·3 to 83·7) | 79·5 (79·3 to 79·7) | 81·5 (81·3 to 81·7) | 56·7 (55·8 to 57·7) | 0·2 (0·2 to 0·3) | 0 (0 to 1) | 2 (2 to 3) | 0·23 (0·14 to 0·34) |
| Finland | 2·2 (1·9 to 2·6) | −3·1% (−3·9 to −2·4) | 0·04 (0·04 to 0·04) | 0·09 (0·09 to 0·09) | 84·9 (84·7 to 85·2) | 79·5 (79·2 to 79·7) | 82·2 (82·0 to 82·4) | 57·1 (56·1 to 58·1) | 0·1 (0·1 to 0·1) | 1 (0 to 2) | 2 (2 to 3) | 0·30 (0·16 to 0·43) |
| France | 4·0 (3·6 to 4·5) | −1·4% (−1·9 to −0·9) | 0·04 (0·04 to 0·04) | 0·09 (0·09 to 0·09) | 85·5 (85·4 to 85·6) | 79·6 (79·5 to 79·7) | 82·6 (82·5 to 82·7) | 642·0 (639·0 to 646·0) | 2·8 (2·5 to 3·1) | 65 (61 to 68) | 28 (24 to 32) | 0·74 (0·68 to 0·79) |
| Germany | 3·5 (3·3 to 3·8) | −2·0% (−2·3 to −1·6) | 0·05 (0·05 to 0·05) | 0·09 (0·09 to 0·09) | 83·4 (83·3 to 83·5) | 78·5 (78·5 to 78·6) | 81·0 (80·9 to 81·0) | 1010·0 (1000·0 to 1010·0) | 2·8 (2·6 to 3·0) | 38 (34 to 44) | 63 (57 to 69) | 0·60 (0·54 to 0·66) |
| Greece | 3·9 (3·4 to 4·5) | −2·2% (−2·9 to −1·5) | 0·05 (0·05 to 0·05) | 0·11 (0·11 to 0·11) | 82·8 (82·6 to 83·0) | 77·2 (77·0 to 77·5) | 80·0 (79·8 to 80·2) | 144·0 (142·0 to 146·0) | 0·3 (0·3 to 0·4) | 5 (3 to 6) | 15 (14 to 16) | 0·95 (0·82 to 1·06) |
| Iceland | 2·4 (2·0 to 2·9) | −2·3% (−3·3 to −1·2) | 0·04 (0·04 to 0·04) | 0·07 (0·07 to 0·07) | 84·9 (84·2 to 85·5) | 82·3 (81·6 to 83·0) | 83·6 (82·9 to 84·3) | 2·3 (2·2 to 2·4) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | −0·02 (−0·25 to 0·22) |
| Ireland | 3·4 (2·9 to 3·8) | −3·5% (−4·2 to −2·8) | 0·04 (0·04 to 0·04) | 0·07 (0·07 to 0·07) | 84·5 (84·2 to 84·7) | 80·8 (80·5 to 81·0) | 82·6 (82·4 to 82·8) | 32·2 (31·6 to 32·9) | 0·2 (0·2 to 0·2) | 0 (0 to 1) | 1 (0 to 1) | 0·12 (0·02 to 0·21) |
| Israel | 2·3 (2·0 to 2·7) | −5·1% (−5·8 to −4·3) | 0·04 (0·03 to 0·04) | 0·07 (0·07 to 0·07) | 85·1 (84·9 to 85·3) | 81·2 (80·9 to 81·5) | 83·2 (82·9 to 83·4) | 50·1 (49·0 to 51·1) | 0·4 (0·4 to 0·5) | 2 (2 to 3) | 3 (3 to 4) | 0·29 (0·24 to 0·34) |
| Italy | 2·9 (2·6 to 3·3) | −3·0% (−3·6 to −2·4) | 0·04 (0·04 to 0·04) | 0·07 (0·07 to 0·07) | 84·9 (84·8 to 85·0) | 80·3 (80·2 to 80·4) | 82·7 (82·6 to 82·7) | 699·0 (695·0 to 702·0) | 1·2 (1·0 to 1·3) | 98 (95 to 101) | 62 (59 to 66) | 1·38 (1·34 to 1·44) |
| Luxembourg | 3·5 (2·9 to 4·2) | −1·0% (−1·9 to −0·1) | 0·04 (0·04 to 0·04) | 0·07 (0·06 to 0·07) | 84·9 (84·4 to 85·4) | 80·4 (79·8 to 81·0) | 82·6 (82·0 to 83·2) | 4·5 (4·3 to 4·8) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·31 (0·09 to 0·54) |
| Malta | 5·3 (4·2 to 6·6) | −1·7% (−2·9 to −0·5) | 0·04 (0·04 to 0·04) | 0·07 (0·07 to 0·08) | 84·1 (83·4 to 84·7) | 81·3 (80·6 to 82·0) | 82·7 (81·9 to 83·3) | 4·0 (3·8 to 4·3) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·62 (0·32 to 0·95) |
| Monaco | 3·8 (3·7 to 3·9) | −1·0% (−2·2 to 0·2) | 0·07 (0·05 to 0·08) | 0·12 (0·10 to 0·14) | 81·4 (79·8 to 83·2) | 76·3 (74·7 to 77·8) | 78·8 (77·2 to 80·4) | 0·6 (0·5 to 0·7) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 1·33 (0·51 to 2·17) |
| Netherlands | 3·8 (3·5 to 4·2) | −2·4% (−2·9 to −1·8) | 0·05 (0·04 to 0·05) | 0·06 (0·06 to 0·07) | 83·2 (83·1 to 83·4) | 79·8 (79·6 to 79·9) | 81·5 (81·4 to 81·7) | 170·0 (168·0 to 172·0) | 0·7 (0·6 to 0·7) | 15 (13 to 16) | 15 (14 to 17) | 0·92 (0·83 to 0·99) |
| Norway | 2·1 (1·8 to 2·4) | −3·9% (−4·6 to −3·2) | 0·04 (0·04 to 0·04) | 0·06 (0·06 to 0·06) | 84·9 (84·7 to 85·1) | 81·7 (81·5 to 81·8) | 83·3 (83·1 to 83·4) | 41·9 (41·3 to 42·6) | 0·1 (0·1 to 0·1) | 0 (−1 to 0) | 1 (0 to 1) | 0·06 (0·00 to 0·10) |
| Portugal | 2·9 (2·6 to 3·3) | −4·4% (−5·0 to −3·8) | 0·04 (0·04 to 0·04) | 0·10 (0·10 to 0·10) | 84·4 (84·3 to 84·6) | 78·5 (78·3 to 78·7) | 81·5 (81·4 to 81·7) | 123·0 (122·0 to 124·0) | 0·2 (0·2 to 0·3) | 11 (10 to 12) | 10 (9 to 11) | 1·05 (0·95 to 1·14) |
| San Marino | 1·7 (1·1 to 2·3) | −5·3% (−7·3 to −3·4) | 0·03 (0·02 to 0·04) | 0·06 (0·04 to 0·08) | 88·1 (85·3 to 91·0) | 84·4 (81·4 to 87·1) | 86·2 (83·3 to 89·0) | 0·3 (0·2 to 0·3) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·78 (0·01 to 1·98) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Spain | 3·0 (2·7 to 3·3) | −2·9% (−3·3 to −2·4) | 0·04 (0·04 to 0·04) | 0·08 (0·07 to 0·08) | 85·7 (85·6 to 85·8) | 79·9 (79·8 to 80·0) | 82·9 (82·8 to 82·9) | 445·0 (442·0 to 448·0) | 1·0 (0·9 to 1·1) | 72 (69 to 74) | 22 (18 to 25) | 1·03 (0·97 to 1·09) |
| Sweden | 2·3 (2·0 to 2·5) | −2·6% (−3·2 to −2·0) | 0·04 (0·03 to 0·04) | 0·06 (0·05 to 0·06) | 85·0 (84·1 to 85·9) | 82·0 (80·9 to 83·0) | 83·5 (82·8 to 84·2) | 92·0 (86·0 to 98·7) | 0·3 (0·2 to 0·3) | 9 (8 to 9) | 1 (−1 to 4) | 0·50 (0·38 to 0·61) |
| Switzerland | 3·7 (3·3 to 4·2) | −2·4% (−3·0 to −1·7) | 0·03 (0·03 to 0·03) | 0·05 (0·05 to 0·05) | 86·4 (86·2 to 86·6) | 82·5 (82·3 to 82·7) | 84·5 (84·3 to 84·7) | 69·7 (68·7 to 70·7) | 0·3 (0·3 to 0·4) | 9 (8 to 9) | 3 (2 to 4) | 0·69 (0·61 to 0·76) |
| UK | 4·2 (3·8 to 4·6) | −2·3% (−2·9 to −1·7) | 0·06 (0·06 to 0·06) | 0·10 (0·10 to 0·10) | 82·4 (82·3 to 82·5) | 78·2 (78·1 to 78·3) | 80·3 (80·2 to 80·3) | 686·0 (683·0 to 690·0) | 2·9 (2·6 to 3·2) | 82 (80 to 85) | 55 (51 to 58) | 1·02 (0·99 to 1·06) |
| **Latin America and Caribbean** | **16·5 (13·4 to 20·2)** | **−3·5% (−4·5 to −2·5)** | **0·13 (0·12 to 0·13)** | **0·23 (0·22 to 0·24)** | **75·9 (75·2 to 76·6)** | **68·9 (68·1 to 69·7)** | **72·3 (71·5 to 73·0)** | **4980·0 (4770·0 to 5200·0)** | **155·0 (125·0 to 190·0)** | **922 (847 to 1010)** | **1390 (1280 to 1520)** | **1·99 (1·85 to 2·15)** |
| Andean Latin America | 16·7 (13·1 to 20·8) | −4·8% (−6·0 to −3·6) | 0·13 (0·11 to 0·14) | 0·22 (0·20 to 0·24) | 74·3 (72·9 to 75·5) | 68·3 (66·9 to 69·6) | 71·1 (69·8 to 72·4) | 565·0 (514·0 to 621·0) | 20·6 (16·2 to 25·7) | 220 (209 to 231) | 246 (233 to 258) | 3·79 (3·59 to 3·97) |
| Bolivia | 27·9 (23·5 to 32·7) | −4·5% (−5·4 to −3·6) | 0·19 (0·16 to 0·22) | 0·28 (0·25 to 0·32) | 68·8 (66·7 to 70·5) | 63·8 (61·9 to 65·6) | 66·2 (64·1 to 67·9) | 121·0 (106·0 to 140·0) | 6·8 (5·7 to 8·0) | 40 (33 to 46) | 53 (46 to 59) | 4·19 (3·58 to 4·72) |
| Ecuador | 13·7 (10·5 to 17·9) | −4·3% (−5·7 to −2·9) | 0·10 (0·09 to 0·12) | 0·19 (0·16 to 0·22) | 77·1 (75·5 to 78·7) | 71·0 (69·0 to 73·1) | 74·0 (72·1 to 75·7) | 124·0 (107·0 to 143·0) | 4·4 (3·4 to 5·8) | 50 (43 to 58) | 38 (28 to 46) | 2·58 (2·10 to 3·02) |
| Peru | 14·0 (9·5 to 19·1) | −5·2% (−7·0 to −3·6) | 0·12 (0·11 to 0·14) | 0·21 (0·19 to 0·24) | 74·9 (73·4 to 76·3) | 68·8 (67·3 to 70·1) | 71·6 (70·2 to 73·0) | 320·0 (289·0 to 357·0) | 9·4 (6·4 to 12·8) | 130 (129 to 131) | 155 (154 to 156) | 4·27 (4·24 to 4·30) |
| Caribbean | 40·8 (33·9 to 48·8) | −1·1% (−2·0 to −0·3) | 0·15 (0·13 to 0·17) | 0·23 (0·20 to 0·25) | 72·5 (70·7 to 74·1) | 66·9 (64·9 to 68·7) | 69·6 (67·7 to 71·3) | 488·0 (440·0 to 541·0) | 32·5 (26·9 to 39·0) | 21 (−7 to 48) | 107 (60 to 155) | 1·48 (0·60 to 2·32) |
| Antigua and Barbuda | 9·3 (8·0 to 10·7) | −1·9% (−2·8 to −0·8) | 0·09 (0·09 to 0·10) | 0·14 (0·13 to 0·14) | 77·1 (76·7 to 77·3) | 73·0 (72·7 to 73·3) | 75·0 (74·8 to 75·1) | 0·7 (0·7 to 0·7) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | −0·12 (−0·55 to 0·28) |
| The Bahamas | 10·2 (7·8 to 13·5) | −2·2% (−3·5 to −0·6) | 0·16 (0·14 to 0·19) | 0·29 (0·25 to 0·33) | 73·6 (71·7 to 75·4) | 66·1 (63·7 to 68·2) | 69·8 (67·5 to 71·8) | 3·8 (3·3 to 4·4) | 0·0 (0·0 to 0·0) | 1 (0 to 1) | 1 (1 to 1) | 2·33 (1·56 to 2·88) |
| Barbados | 11·7 (8·2 to 16·3) | −1·1% (−2·6 to 0·5) | 0·10 (0·08 to 0·12) | 0·14 (0·11 to 0·17) | 77·6 (75·5 to 79·7) | 74·4 (71·8 to 76·8) | 76·0 (73·7 to 78·3) | 3·3 (2·8 to 3·9) | 0·1 (0·1 to 0·1) | 0 (−1 to 0) | 0 (0 to 0) | −1·03 (−1·86 to −0·23) |
| Belize | 14·4 (11·9 to 17·5) | −3·5% (−4·5 to −2·4) | 0·13 (0·12 to 0·14) | 0·21 (0·19 to 0·23) | 76·1 (74·9 to 77·3) | 70·5 (69·0 to 72·3) | 73·2 (71·8 to 74·7) | 2·3 (2·1 to 2·6) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 1) | 0·72 (0·46 to 0·96) |
| Bermuda | 3·8 (3·2 to 4·5) | −1·9% (−3·0 to −0·7) | 0·06 (0·05 to 0·07) | 0·13 (0·11 to 0·14) | 83·3 (81·5 to 84·7) | 75·6 (73·9 to 77·1) | 79·3 (77·5 to 80·8) | 0·7 (0·7 to 0·9) | 0·5 (0·4 to 0·5) | 0 (0 to 0) | 0 (0 to 0) | 1·23 (0·53 to 1·90) |
| Cuba | 4·6 (3·9 to 5·3) | −3·0% (−3·7 to −2·2) | 0·10 (0·09 to 0·11) | 0·19 (0·17 to 0·20) | 77·3 (76·3 to 78·3) | 70·9 (69·9 to 72·1) | 73·9 (73·0 to 74·9) | 165·0 (151·0 to 178·0) | 0·0 (0·0 to 0·0) | 1 (−4 to 7) | 55 (45 to 65) | 2·65 (1·96 to 3·40) |
| Dominica | 27·6 (20·2 to 37·1) | 1·8% (0·1 to 3·3) | 0·12 (0·10 to 0·15) | 0·21 (0·17 to 0·26) | 73·3 (70·8 to 75·5) | 67·4 (64·4 to 70·3) | 70·2 (67·4 to 72·7) | 0·8 (0·6 to 1·0) | 5·3 (4·3 to 6·4) | 0 (0 to 0) | 0 (0 to 0) | 1·24 (0·44 to 2·38) |
| Dominican Republic | 24·9 (20·2 to 30·1) | −2·4% (−3·4 to −1·4) | 0·10 (0·09 to 0·12) | 0·20 (0·17 to 0·23) | 77·3 (75·5 to 78·9) | 70·5 (68·3 to 72·5) | 73·7 (71·8 to 75·5) | 73·0 (64·1 to 82·9) | 0·0 (0·0 to 0·0) | 1 (−10 to 13) | 9 (−5 to 20) | 0·48 (−0·62 to 1·53) |

(Table 1 continues on next page)

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Grenada | 12·6 (10·1 to 15·6) | −1·4% (−2·3 to −0·4) | 0·14 (0·12 to 0·18) | 0·23 (0·19 to 0·30) | 72·9 (70·5 to 74·9) | 67·3 (64·1 to 69·7) | 69·9 (66·9 to 72·2) | 1·1 (0·9 to 1·4) | 0·3 (0·3 to 0·4) | 0 (0 to 0) | 0 (0 to 1) | 1·54 (0·58 to 3·10) |
| Guyana | 22·7 (17·0 to 29·7) | −2·7% (−4·2 to −1·2) | 0·22 (0·17 to 0·28) | 0·37 (0·29 to 0·46) | 68·6 (65·0 to 72·1) | 61·1 (57·0 to 65·4) | 64·6 (60·6 to 68·6) | 8·6 (6·4 to 11·6) | 24·0 (19·9 to 28·8) | 1 (0 to 2) | 2 (1 to 5) | 2·37 (0·77 to 4·53) |
| Haiti | 70·6 (59·2 to 84·1) | −1·9% (−2·9 to −1·0) | 0·28 (0·23 to 0·35) | 0·34 (0·26 to 0·43) | 61·5 (58·2 to 64·6) | 58·8 (54·9 to 62·5) | 60·1 (56·5 to 63·6) | 131·0 (104·0 to 166·0) | 0·5 (0·4 to 0·7) | 14 (5 to 27) | 26 (10 to 53) | 1·67 (0·65 to 3·23) |
| Jamaica | 15·0 (11·0 to 20·1) | −1·8% (−3·5 to 0·0) | 0·12 (0·10 to 0·15) | 0·16 (0·13 to 0·20) | 76·4 (73·7 to 78·9) | 72·0 (69·1 to 75·1) | 74·1 (71·3 to 76·9) | 24·2 (19·5 to 29·2) | 0·1 (0·1 to 0·1) | 0 (−2 to 1) | 5 (3 to 7) | 0·90 (0·25 to 1·61) |
| Puerto Rico | 6·4 (5·4 to 7·7) | −2·7% (−3·6 to −1·7) | 0·06 (0·05 to 0·07) | 0·16 (0·13 to 0·18) | 84·5 (82·8 to 86·4) | 76·6 (74·4 to 79·1) | 80·6 (78·5 to 82·8) | 34·1 (29·1 to 39·3) | 0·0 (0·0 to 0·0) | 2 (−1 to 4) | 2 (−1 to 5) | 0·64 (−0·21 to 1·28) |
| Saint Kitts and Nevis | 15·9 (12·5 to 20·4) | −1·6% (−2·9 to −0·4) | 0·10 (0·09 to 0·12) | 0·21 (0·18 to 0·24) | 75·5 (73·9 to 77·1) | 68·5 (66·7 to 70·2) | 71·8 (70·1 to 73·5) | 0·5 (0·5 to 0·6) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·76 (0·30 to 1·13) |
| Saint Lucia | 15·6 (11·2 to 21·2) | −1·0% (−2·7 to 0·6) | 0·11 (0·09 to 0·14) | 0·20 (0·16 to 0·25) | 76·5 (73·8 to 78·9) | 69·7 (66·4 to 72·7) | 72·9 (69·7 to 75·6) | 1·9 (1·6 to 2·5) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 1) | 1·45 (0·48 to 2·74) |
| Saint Vincent and the Grenadines | 13·0 (9·6 to 17·2) | −3·1% (−4·7 to −1·6) | 0·14 (0·12 to 0·16) | 0·22 (0·20 to 0·24) | 75·2 (73·7 to 76·6) | 69·7 (68·0 to 71·3) | 72·2 (70·5 to 73·7) | 1·2 (1·0 to 1·3) | 0·2 (0·2 to 0·3) | 0 (0 to 0) | 0 (0 to 0) | 0·62 (0·20 to 1·11) |
| Suriname | 24·8 (18·9 to 32·0) | −2·3% (−3·7 to −0·8) | 0·14 (0·12 to 0·18) | 0·25 (0·21 to 0·31) | 74·2 (70·9 to 76·7) | 67·5 (63·4 to 70·7) | 70·8 (66·9 to 73·6) | 5·4 (4·3 to 7·2) | 0·0 (0·0 to 0·1) | 0 (0 to 0) | 1 (0 to 3) | 0·79 (0·03 to 2·25) |
| Trinidad and Tobago | 13·6 (10·2 to 18·0) | −3·2% (−4·7 to −1·7) | 0·14 (0·11 to 0·17) | 0·25 (0·20 to 0·31) | 75·0 (72·0 to 78·0) | 67·6 (64·1 to 71·2) | 71·0 (67·7 to 74·4) | 16·7 (12·8 to 21·4) | 0·2 (0·2 to 0·3) | 1 (0 to 2) | 4 (2 to 8) | 2·00 (0·74 to 3·74) |
| Virgin Islands | 5·9 (4·8 to 7·3) | −3·1% (−3·9 to −2·2) | 0·08 (0·06 to 0·10) | 0·21 (0·17 to 0·26) | 82·3 (79·4 to 84·6) | 71·3 (67·7 to 74·5) | 76·6 (73·1 to 79·5) | 0·9 (0·7 to 1·2) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 1·49 (0·45 to 3·33) |
| Central Latin America | 15·4 (11·9 to 19·7) | −3·1% (−4·5 to −1·9) | 0·13 (0·12 to 0·13) | 0·24 (0·23 to 0·25) | 75·7 (74·9 to 76·5) | 68·3 (67·3 to 69·3) | 71·9 (70·9 to 72·8) | 2080·0 (1970·0 to 2200·0) | 60·4 (46·7 to 77·3) | 497 (446 to 545) | 610 (538 to 688) | 2·21 (2·00 to 2·43) |
| Colombia | 11·9 (8·6 to 16·3) | −3·8% (−5·4 to −2·1) | 0·08 (0·08 to 0·10) | 0·16 (0·15 to 0·18) | 79·7 (78·2 to 81·2) | 72·6 (70·8 to 74·5) | 76·1 (74·5 to 77·8) | 354·0 (314·0 to 398·0) | 8·1 (5·8 to 11·0) | 49 (37 to 62) | 105 (78 to 127) | 1·70 (1·28 to 2·08) |
| Costa Rica | 9·4 (8·2 to 10·7) | −1·4% (−2·0 to −0·7) | 0·08 (0·08 to 0·08) | 0·17 (0·17 to 0·18) | 81·2 (80·8 to 81·5) | 74·3 (73·9 to 74·6) | 77·7 (77·3 to 78·1) | 30·7 (29·9 to 31·5) | 0·5 (0·5 to 0·6) | 1 (0 to 3) | 6 (3 to 8) | 0·74 (0·30 to 1·10) |
| El Salvador | 9·5 (7·1 to 12·5) | −5·3% (−6·8 to −3·9) | 0·12 (0·10 to 0·14) | 0·28 (0·24 to 0·32) | 77·2 (75·4 to 79·1) | 67·9 (65·4 to 70·4) | 72·7 (70·6 to 74·9) | 52·0 (44·8 to 59·9) | 1·1 (0·8 to 1·5) | 6 (5 to 7) | 11 (9 to 13) | 1·40 (1·19 to 1·63) |
| Guatemala | 25·5 (20·0 to 32·6) | −3·2% (−4·4 to −1·9) | 0·15 (0·14 to 0·17) | 0·27 (0·24 to 0·29) | 72·7 (71·3 to 74·1) | 66·2 (64·4 to 67·9) | 69·4 (67·8 to 71·0) | 113·0 (102·0 to 125·0) | 7·6 (6·0 to 9·8) | 20 (16 to 23) | 32 (27 to 37) | 1·78 (1·46 to 2·06) |
| Honduras | 15·0 (12·2 to 18·2) | −4·1% (−5·3 to −3·1) | 0·18 (0·15 to 0·22) | 0·25 (0·21 to 0·30) | 70·7 (68·4 to 72·6) | 66·4 (64·3 to 68·2) | 68·5 (66·3 to 70·3) | 72·9 (64·5 to 84·7) | 3·3 (2·7 to 4·0) | 12 (10 to 14) | 20 (16 to 26) | 1·65 (1·35 to 2·06) |
| Mexico | 14·8 (11·6 to 18·9) | −3·2% (−4·5 to −2·0) | 0·14 (0·14 to 0·14) | 0·27 (0·27 to 0·27) | 74·7 (74·4 to 74·9) | 67·4 (67·0 to 67·7) | 70·9 (70·6 to 71·2) | 1120·0 (1110·0 to 1120·0) | 28·1 (22·0 to 36·0) | 335 (302 to 362) | 341 (291 to 390) | 2·61 (2·36 to 2·84) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Nicaragua | 13·8 (10·3 to 18·0) | −4·6% (−6·0 to −3·1) | 0·11 (0·10 to 0·12) | 0·21 (0·19 to 0·23) | 76·8 (75·6 to 77·9) | 69·9 (68·5 to 71·2) | 73·3 (72·0 to 74·4) | 38·3 (35·0 to 42·2) | 1·8 (1·3 to 2·3) | 14 (12 to 15) | 16 (14 to 18) | 2·21 (1·99 to 2·42) |
| Panama | 14·1 (11·0 to 17·8) | −2·3% (−3·5 to −1·0) | 0·08 (0·06 to 0·09) | 0·14 (0·11 to 0·16) | 81·4 (79·5 to 83·5) | 75·5 (73·1 to 78·2) | 78·3 (76·2 to 80·8) | 23·9 (19·7 to 27·9) | 1·0 (0·8 to 1·3) | 3 (1 to 4) | 3 (1 to 5) | 0·81 (0·33 to 1·20) |
| Venezuela | 19·7 (14·8 to 25·8) | −0·8% (−2·2 to 0·5) | 0·13 (0·11 to 0·16) | 0·28 (0·23 to 0·32) | 74·6 (72·3 to 76·9) | 65·1 (62·2 to 68·1) | 69·7 (67·0 to 72·3) | 276·0 (231·0 to 326·0) | 8·9 (6·6 to 11·6) | 58 (52 to 64) | 77 (68 to 87) | 2·22 (2·00 to 2·43) |
| Tropical Latin America | 12·0 (9·9 to 14·6) | −4·8% (−5·9 to −3·7) | 0·12 (0·12 to 0·12) | 0·22 (0·22 to 0·23) | 77·3 (77·1 to 77·6) | 70·2 (69·9 to 70·4) | 73·7 (73·4 to 73·9) | 1850·0 (1830·0 to 1870·0) | 41·4 (33·8 to 50·3) | 184 (170 to 197) | 426 (408 to 444) | 1·35 (1·29 to 1·41) |
| Brazil | 11·9 (9·8 to 14·4) | −4·9% (−6·0 to −3·8) | 0·12 (0·12 to 0·12) | 0·22 (0·22 to 0·23) | 77·4 (77·2 to 77·6) | 70·2 (69·9 to 70·4) | 73·7 (73·5 to 73·9) | 1800·0 (1780·0 to 1810·0) | 39·5 (32·4 to 47·8) | 183 (169 to 197) | 411 (393 to 429) | 1·36 (1·29 to 1·42) |
| Paraguay | 14·7 (10·5 to 19·6) | −3·0% (−4·5 to −1·5) | 0·11 (0·10 to 0·14) | 0·21 (0·18 to 0·25) | 75·9 (73·8 to 77·6) | 69·0 (66·5 to 71·1) | 72·2 (69·9 to 74·2) | 50·7 (43·7 to 59·3) | 1·9 (1·4 to 2·5) | 1 (0 to 1) | 15 (14 to 16) | 1·11 (1·04 to 1·18) |
| **North Africa and Middle East** | **20·2 (17·4 to 23·3)** | **−4·8% (−5·5 to −4·1)** | **0·12 (0·11 to 0·13)** | **0·19 (0·18 to 0·21)** | **73·7 (72·6 to 74·7)** | **68·9 (67·8 to 70·1)** | **71·1 (70·0 to 72·2)** | **4050·0 (3730·0 to 4390·0)** | **243·0 (208·0 to 280·0)** | **679 (583 to 753)** | **934 (797 to 1060)** | **1·33 (1·14 to 1·49)** |
| Afghanistan | 48·7 (40·5 to 58·4) | −4·7% (−5·7 to −3·8) | 0·33 (0·27 to 0·39) | 0·42 (0·37 to 0·47) | 60·7 (58·5 to 62·8) | 55·9 (54·0 to 57·9) | 58·2 (56·3 to 60·3) | 272·0 (241·0 to 305·0) | 58·0 (48·1 to 69·8) | 43 (32 to 57) | 50 (40 to 59) | 1·01 (0·78 to 1·24) |
| Algeria | 16·9 (13·4 to 21·0) | −4·1% (−5·4 to −2·9) | 0·10 (0·09 to 0·11) | 0·15 (0·13 to 0·17) | 75·4 (74·3 to 76·4) | 72·1 (70·6 to 73·6) | 73·6 (72·3 to 74·9) | 273·0 (243·0 to 306·0) | 15·5 (12·2 to 19·3) | 53 (51 to 54) | 79 (62 to 95) | 1·56 (1·35 to 1·75) |
| Bahrain | 5·7 (4·8 to 6·7) | −3·5% (−4·4 to −2·7) | 0·09 (0·08 to 0·10) | 0·13 (0·11 to 0·14) | 75·1 (74·1 to 76·0) | 72·2 (71·1 to 73·3) | 73·3 (72·3 to 74·4) | 6·3 (5·6 to 7·0) | 0·1 (0·1 to 0·1) | 1 (1 to 1) | 2 (1 to 2) | 0·91 (0·75 to 1·03) |
| Egypt | 12·8 (10·5 to 15·7) | −6·0% (−7·1 to −4·8) | 0·14 (0·12 to 0·17) | 0·24 (0·20 to 0·27) | 70·2 (68·7 to 71·6) | 66·9 (65·0 to 68·7) | 68·4 (66·7 to 70·0) | 712·0 (612·0 to 823·0) | 33·1 (27·1 to 40·7) | 89 (58 to 121) | 152 (98 to 196) | 1·20 (0·81 to 1·55) |
| Iran | 5·3 (4·4 to 6·2) | −9·7% (−10·7 to −8·6) | 0·09 (0·08 to 0·09) | 0·17 (0·16 to 0·18) | 77·2 (76·8 to 77·6) | 71·9 (71·5 to 72·3) | 74·4 (74·1 to 74·6) | 569·0 (556·0 to 582·0) | 5·6 (4·7 to 6·7) | 158 (153 to 162) | 205 (198 to 210) | 2·12 (2·07 to 2·16) |
| Iraq | 18·8 (14·8 to 23·7) | −4·3% (−5·4 to −3·0) | 0·13 (0·10 to 0·16) | 0·21 (0·17 to 0·26) | 73·5 (71·6 to 75·4) | 67·5 (65·6 to 70·0) | 70·2 (68·3 to 72·5) | 233·0 (193·0 to 269·0) | 15·7 (12·4 to 19·9) | 60 (50 to 70) | 50 (35 to 62) | 1·65 (1·33 to 1·94) |
| Jordan | 11·5 (9·4 to 14·1) | −3·9% (−4·9 to −2·8) | 0·08 (0·07 to 0·09) | 0·13 (0·11 to 0·15) | 77·6 (76·1 to 78·9) | 74·1 (72·4 to 75·9) | 75·7 (74·1 to 77·3) | 45·5 (39·2 to 52·3) | 2·5 (2·0 to 3·0) | 9 (6 to 11) | 15 (11 to 18) | 1·01 (0·70 to 1·22) |
| Kuwait | 8·1 (6·6 to 9·7) | −1·7% (−2·6 to −0·7) | 0·04 (0·03 to 0·04) | 0·09 (0·07 to 0·10) | 85·1 (84·0 to 86·2) | 78·1 (76·3 to 80·0) | 80·7 (79·2 to 82·3) | 12·1 (10·4 to 13·9) | 0·4 (0·3 to 0·5) | 2 (2 to 3) | 2 (1 to 3) | 0·48 (0·32 to 0·62) |
| Lebanon | 7·7 (5·4 to 10·9) | −4·9% (−6·5 to −3·2) | 0·08 (0·07 to 0·09) | 0·16 (0·14 to 0·17) | 78·4 (77·4 to 79·3) | 72·2 (70·9 to 73·3) | 75·2 (74·0 to 76·2) | 49·6 (45·6 to 54·6) | 0·6 (0·4 to 0·9) | 8 (7 to 9) | 18 (16 to 19) | 2·86 (2·59 to 3·17) |
| Libya | 21·6 (16·9 to 27·0) | −0·7% (−1·9 to 0·5) | 0·13 (0·11 to 0·16) | 0·20 (0·17 to 0·24) | 73·4 (70·9 to 75·4) | 68·7 (66·0 to 71·1) | 70·8 (68·2 to 73·1) | 46·3 (38·9 to 55·7) | 1·8 (1·4 to 2·2) | 6 (5 to 7) | 10 (8 to 12) | 1·24 (0·99 to 1·48) |
| Morocco | 14·8 (12·1 to 17·8) | −5·9% (−6·9 to −4·8) | 0·13 (0·10 to 0·16) | 0·16 (0·13 to 0·19) | 73·9 (72·2 to 75·8) | 70·9 (69·4 to 72·9) | 72·3 (70·7 to 74·3) | 286·0 (241·0 to 318·0) | 9·5 (7·7 to 11·4) | 52 (41 to 62) | 46 (36 to 57) | 1·41 (1·15 to 1·68) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Oman | 9·1 (8·0 to 10·2) | −2·5% (−3·1 to −1·8) | 0·09 (0·08 to 0·10) | 0·16 (0·15 to 0·18) | 76·3 (75·1 to 77·4) | 70·5 (69·1 to 71·7) | 72·7 (71·4 to 73·9) | 17·0 (15·3 to 19·0) | 0·7 (0·6 to 0·8) | 3 (3 to 4) | 6 (5 to 6) | 1·05 (0·98 to 1·11) |
| Palestine | 10·8 (8·6 to 13·9) | −4·6% (−5·8 to −3·4) | 0·08 (0·07 to 0·09) | 0·15 (0·13 to 0·17) | 76·2 (75·2 to 77·2) | 71·5 (70·3 to 72·8) | 73·8 (72·6 to 74·9) | 19·5 (17·5 to 21·6) | 1·3 (1·0 to 1·7) | 1 (0 to 2) | 4 (3 to 5) | 0·50 (0·34 to 0·66) |
| Qatar | 3·6 (2·9 to 4·6) | −5·2% (−6·3 to −4·2) | 0·05 (0·04 to 0·06) | 0·09 (0·07 to 0·11) | 79·2 (77·6 to 80·7) | 76·1 (74·2 to 77·9) | 77·2 (75·4 to 78·9) | 5·1 (4·2 to 6·0) | 0·1 (0·1 to 0·2) | 1 (1 to 1) | 1 (1 to 1) | 0·31 (0·23 to 0·37) |
| Saudi Arabia | 4·2 (3·2 to 5·3) | −8·2% (−9·7 to −6·8) | 0·14 (0·11 to 0·17) | 0·19 (0·16 to 0·23) | 75·1 (72·9 to 77·2) | 71·8 (69·9 to 73·6) | 73·1 (71·1 to 75·0) | 156·0 (129·0 to 187·0) | 2·0 (1·5 to 2·5) | 15 (12 to 18) | 12 (8 to 17) | 0·38 (0·29 to 0·46) |
| Sudan | 36·8 (29·5 to 45·0) | −5·0% (−6·1 to −4·0) | 0·16 (0·13 to 0·20) | 0·22 (0·17 to 0·27) | 70·1 (67·2 to 72·7) | 66·3 (63·1 to 69·3) | 68·0 (64·9 to 70·8) | 246·0 (200·0 to 300·0) | 42·5 (33·9 to 52·1) | 37 (27 to 46) | 48 (26 to 72) | 1·08 (0·69 to 1·50) |
| Syria | 10·0 (8·0 to 12·4) | −2·9% (−3·9 to −1·8) | 0·10 (0·08 to 0·13) | 0·19 (0·15 to 0·23) | 74·7 (72·5 to 76·6) | 70·1 (67·5 to 72·4) | 72·4 (69·9 to 74·6) | 104·0 (85·4 to 128·0) | 2·0 (1·6 to 2·5) | 7 (5 to 8) | 16 (11 to 22) | 0·53 (0·38 to 0·69) |
| Tunisia | 10·3 (8·4 to 12·5) | −5·2% (−6·2 to −4·1) | 0·09 (0·07 to 0·11) | 0·17 (0·14 to 0·21) | 77·1 (75·1 to 79·0) | 70·8 (68·5 to 73·1) | 73·7 (71·5 to 75·9) | 103·0 (84·9 to 124·0) | 1·7 (1·4 to 2·1) | 8 (−1 to 15) | 34 (26 to 42) | 1·87 (1·14 to 2·54) |
| Türkiye | 11·1 (9·1 to 13·4) | −6·3% (−7·3 to −5·3) | 0·07 (0·06 to 0·08) | 0·14 (0·12 to 0·17) | 78·3 (77·0 to 79·5) | 72·3 (70·7 to 74·0) | 75·2 (73·7 to 76·7) | 654·0 (566·0 to 744·0) | 11·4 (9·3 to 13·7) | 111 (83 to 135) | 144 (107 to 172) | 1·62 (1·21 to 1·87) |
| United Arab Emirates | 4·8 (4·1 to 5·7) | −4·2% (−5·1 to −3·5) | 0·06 (0·05 to 0·07) | 0·09 (0·07 to 0·10) | 71·5 (70·8 to 72·3) | 77·5 (75·7 to 79·6) | 75·0 (73·6 to 76·6) | 20·1 (15·9 to 23·7) | 0·4 (0·3 to 0·4) | −2 (−7 to 2) | 4 (0 to 5) | 0·21 (−0·24 to 0·61) |
| Yemen | 38·9 (32·0 to 46·5) | −4·1% (−5·1 to −3·2) | 0·18 (0·14 to 0·23) | 0·29 (0·24 to 0·35) | 68·5 (65·5 to 70·9) | 62·4 (59·4 to 65·2) | 65·3 (62·2 to 67·9) | 216·0 (181·0 to 263·0) | 37·8 (30·9 to 45·3) | 19 (15 to 22) | 37 (15 to 65) | 0·85 (0·50 to 1·29) |
| **South Asia** | **37·1 (31·4 to 44·2)** | **−3·6% (−4·5 to −2·7)** | **0·15 (0·14 to 0·17)** | **0·23 (0·21 to 0·25)** | **70·8 (69·8 to 71·8)** | **66·4 (65·4 to 67·4)** | **68·5 (67·6 to 69·3)** | **14 800·0 (14 000·0 to 15 600·0)** | **1180·0 (995·0 to 1410·0)** | **1610 (1500 to 1710)** | **2830 (2710 to 2960)** | **1·28 (1·24 to 1·32)** |
| Bangladesh | 28·0 (22·5 to 34·6) | −5·3% (−6·4 to −4·2) | 0·11 (0·09 to 0·13) | 0·16 (0·14 to 0·19) | 74·1 (72·0 to 76·1) | 70·6 (68·3 to 72·8) | 72·3 (70·0 to 74·3) | 1100·0 (929·0 to 1280·0) | 79·2 (63·4 to 98·0) | 152 (127 to 208) | 180 (154 to 219) | 1·07 (0·92 to 1·37) |
| Bhutan | 29·3 (22·8 to 36·6) | −5·2% (−6·4 to −3·9) | 0·10 (0·08 to 0·13) | 0·13 (0·10 to 0·16) | 74·9 (72·6 to 77·3) | 72·7 (70·2 to 75·2) | 73·7 (71·3 to 76·2) | 4·4 (3·7 to 5·2) | 0·4 (0·3 to 0·5) | 0 (0 to 0) | 0 (0 to 0) | 0·09 (0·07 to 0·11) |
| India | 33·1 (26·9 to 40·8) | −4·0% (−5·2 to −2·8) | 0·15 (0·14 to 0·17) | 0·23 (0·21 to 0·25) | 71·2 (70·2 to 72·4) | 66·6 (65·4 to 67·7) | 68·7 (67·8 to 69·6) | 11 700·0 (11 100·0 to 12 500·0) | 730·0 (590·0 to 902·0) | 1170 (1100 to 1240) | 2270 (2160 to 2370) | 1·29 (1·26 to 1·33) |
| Nepal | 28·4 (22·0 to 36·4) | −5·1% (−6·3 to −3·8) | 0·15 (0·13 to 0·18) | 0·24 (0·21 to 0·27) | 70·8 (68·8 to 72·4) | 66·1 (64·1 to 67·8) | 68·4 (66·4 to 70·1) | 252·0 (224·0 to 290·0) | 18·2 (14·0 to 23·4) | 29 (22 to 32) | 62 (58 to 70) | 1·47 (1·39 to 1·59) |
| Pakistan | 56·3 (46·2 to 68·0) | −2·2% (−3·2 to −1·2) | 0·19 (0·15 to 0·24) | 0·25 (0·20 to 0·30) | 66·4 (63·8 to 68·8) | 63·8 (61·3 to 66·1) | 65·0 (63·1 to 66·9) | 1720·0 (1520·0 to 1940·0) | 353·0 (288·0 to 428·0) | 254 (236 to 271) | 311 (258 to 385) | 1·28 (1·15 to 1·48) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| **Southeast Asia, east Asia, and Oceania** | **14·6 (12·6 to 17·0)** | **–5·1% (–5·8 to –4·4)** | **0·08 (0·07 to 0·09)** | **0·15 (0·13 to 0·17)** | **78·6 (77·2 to 80·0)** | **72·5 (70·9 to 74·1)** | **75·4 (74·1 to 76·6)** | **17 800·0 (15 900·0 to 19 900·0)** | **352·0 (302·0 to 411·0)** | **165 (–39 to 534)** | **869 (424 to 1490)** | **0·24 (0·09 to 0·44)** |
| East Asia | 7·3 (6·2 to 8·6) | –7·9% (–8·9 to –6·9) | 0·06 (0·04 to 0·07) | 0·12 (0·09 to 0·15) | 80·7 (78·9 to 82·5) | 74·8 (72·7 to 77·0) | 77·6 (76·0 to 79·1) | 12 100·0 (10 400·0 to 14 000·0) | 90·0 (76·2 to 107·0) | 55 (–6 to 292) | 12 (–14 to 72) | 0·02 (–0·01 to 0·12) |
| China | 7·2 (6·1 to 8·6) | –7·7% (–8·5 to –6·8) | 0·05 (0·04 to 0·07) | 0·12 (0·09 to 0·14) | 80·7 (78·9 to 82·6) | 74·9 (72·7 to 77·1) | 77·6 (76·0 to 79·2) | 11 700·0 (9980·0 to 13 600·0) | 86·1 (72·3 to 102·0) | 59 (3 to 283) | 11 (–2 to 55) | 0·02 (0·00 to 0·12) |
| North Korea | 10·5 (7·8 to 13·9) | –10·9% (–15·4 to –7·3) | 0·12 (0·09 to 0·15) | 0·20 (0·16 to 0·25) | 76·2 (73·6 to 78·5) | 70·1 (67·8 to 72·5) | 73·3 (70·7 to 75·7) | 242·0 (202·0 to 288·0) | 3·1 (2·3 to 4·1) | 1 (0 to 5) | 0 (0 to 1) | 0·02 (0·00 to 0·12) |
| Taiwan (province of China) | 4·6 (4·1 to 5·2) | –2·7% (–3·4 to –2·1) | 0·05 (0·05 to 0·05) | 0·12 (0·12 to 0·12) | 84·6 (84·4 to 84·8) | 78·1 (77·9 to 78·2) | 81·3 (81·1 to 81·4) | 184·0 (182·0 to 186·0) | 0·7 (0·7 to 0·8) | –6 (–15 to 4) | 1 (–18 to 16) | –0·11 (–0·69 to 0·43) |
| Oceania | 47·1 (38·9 to 56·1) | –1·2% (–2·2 to –0·2) | 0·21 (0·18 to 0·26) | 0·29 (0·24 to 0·35) | 66·6 (64·2 to 69·0) | 62·5 (59·4 to 65·6) | 64·4 (61·6 to 67·1) | 108·0 (89·4 to 131·0) | 19·8 (16·3 to 23·7) | 1 (0 to 3) | 16 (4 to 34) | 0·69 (0·17 to 1·47) |
| American Samoa | 12·1 (9·4 to 15·5) | –0·9% (–2·3 to 0·4) | 0·16 (0·13 to 0·19) | 0·23 (0·19 to 0·27) | 72·8 (70·6 to 74·9) | 69·3 (67·0 to 71·2) | 71·0 (68·7 to 72·9) | 0·4 (0·4 to 0·5) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Cook Islands | 5·4 (5·4 to 5·5) | –4·4% (–5·4 to –3·4) | 0·08 (0·07 to 0·10) | 0·18 (0·15 to 0·22) | 79·6 (77·6 to 81·6) | 72·9 (70·9 to 74·7) | 76·1 (74·2 to 78·0) | 0·2 (0·1 to 0·2) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Federated States of Micronesia | 15·4 (12·2 to 19·1) | –4·1% (–5·2 to –2·9) | 0·21 (0·16 to 0·27) | 0·32 (0·26 to 0·40) | 69·7 (66·6 to 72·4) | 64·5 (61·1 to 67·5) | 67·0 (63·6 to 69·9) | 0·8 (0·7 to 1·0) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Fiji | 19·3 (14·6 to 25·2) | –1·4% (–2·9 to 0·3) | 0·21 (0·16 to 0·26) | 0·31 (0·23 to 0·38) | 68·8 (65·8 to 71·9) | 63·8 (60·4 to 67·4) | 66·1 (62·9 to 69·6) | 9·4 (7·2 to 12·0) | 0·3 (0·3 to 0·5) | 0 (0 to 0) | 2 (0 to 4) | 1·08 (0·27 to 2·36) |
| Guam | 12·0 (9·6 to 14·9) | 0·1% (–1·0 to 1·3) | 0·11 (0·10 to 0·12) | 0·21 (0·19 to 0·23) | 82·9 (81·2 to 84·7) | 73·5 (71·7 to 75·5) | 77·9 (76·2 to 79·8) | 1·2 (1·0 to 1·3) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 1·08 (0·65 to 1·48) |
| Kiribati | 36·4 (29·6 to 44·7) | –2·6% (–3·6 to –1·5) | 0·22 (0·17 to 0·28) | 0·36 (0·30 to 0·44) | 67·0 (64·1 to 69·5) | 61·1 (57·8 to 64·0) | 64·1 (60·9 to 66·8) | 1·0 (0·8 to 1·2) | 0·1 (0·1 to 0·1) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Marshall Islands | 19·9 (15·3 to 26·2) | –3·1% (–4·4 to –1·7) | 0·26 (0·21 to 0·33) | 0·34 (0·28 to 0·41) | 66·8 (63·5 to 69·6) | 63·4 (59·8 to 66·5) | 65·0 (61·5 to 68·1) | 0·4 (0·4 to 0·6) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Nauru | 24·5 (18·2 to 33·0) | –3·1% (–4·5 to –1·6) | 0·28 (0·22 to 0·34) | 0·43 (0·37 to 0·51) | 65·7 (62·3 to 68·7) | 59·2 (55·8 to 62·4) | 62·3 (58·8 to 65·4) | 0·1 (0·1 to 0·1) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Niue | 51·1 (51·0 to 52·5) | 2·8% (1·8 to 3·7) | 0·15 (0·12 to 0·18) | 0·23 (0·19 to 0·29) | 69·2 (67·6 to 71·1) | 65·1 (62·9 to 66·8) | 67·1 (65·1 to 69·0) | 0·0 (0·0 to 0·0) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Northern Mariana Islands | 6·2 (5·0 to 7·4) | –0·7% (–1·6 to 0·1) | 0·13 (0·11 to 0·15) | 0·22 (0·18 to 0·25) | 75·0 (73·8 to 77·1) | 69·5 (68·1 to 71·9) | 72·0 (70·7 to 74·2) | 0·4 (0·3 to 0·4) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·38 (–0·75 to 1·39) |
| Palau | 16·9 (13·9 to 20·8) | –1·5% (–2·7 to –0·4) | 0·15 (0·12 to 0·19) | 0·28 (0·23 to 0·33) | 70·5 (68·2 to 72·6) | 67·7 (64·9 to 70·5) | 68·7 (66·1 to 71·1) | 0·2 (0·2 to 0·2) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Papua New Guinea | 52·7 (43·5 to 62·8) | −1·4% (−2·5 to −0·4) | 0·22 (0·18 to 0·27) | 0·29 (0·23 to 0·37) | 65·5 (62·8 to 68·3) | 61·9 (58·4 to 65·4) | 63·5 (60·3 to 66·7) | 80·7 (65·2 to 99·6) | 17·6 (14·5 to 21·1) | 1 (0 to 2) | 13 (3 to 29) | 0·75 (0·18 to 1·62) |
| Samoa | 13·0 (10·1 to 16·6) | −2·4% (−3·8 to −0·9) | 0·17 (0·14 to 0·21) | 0·22 (0·18 to 0·27) | 71·9 (69·5 to 74·2) | 69·6 (67·2 to 71·5) | 70·7 (68·3 to 72·8) | 1·4 (1·2 to 1·6) | 0·1 (0·1 to 0·1) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Solomon Islands | 19·5 (15·6 to 24·2) | −2·7% (−3·9 to −1·5) | 0·23 (0·18 to 0·29) | 0·33 (0·27 to 0·41) | 68·4 (65·2 to 71·1) | 63·7 (60·3 to 66·5) | 65·9 (62·6 to 68·7) | 4·6 (3·7 to 5·7) | 0·4 (0·3 to 0·5) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Tokelau | 64·0 (64·0 to 64·0) | 5·3% (4·1 to 6·3) | 0·17 (0·14 to 0·20) | 0·19 (0·15 to 0·24) | 67·8 (65·6 to 70·0) | 67·1 (65·1 to 69·0) | 67·5 (65·3 to 69·5) | 0·0 (0·0 to 0·0) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Tonga | 11·7 (9·0 to 14·9) | −2·8% (−4·2 to −1·4) | 0·13 (0·10 to 0·16) | 0·20 (0·16 to 0·25) | 75·7 (72·9 to 78·2) | 70·6 (67·9 to 73·1) | 73·1 (70·4 to 75·6) | 0·7 (0·6 to 0·8) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Tuvalu | 17·3 (13·2 to 22·5) | −5·4% (−6·8 to −4·0) | 0·19 (0·15 to 0·24) | 0·29 (0·23 to 0·35) | 70·6 (67·8 to 73·2) | 65·8 (62·7 to 68·7) | 68·0 (65·7 to 70·1) | 0·1 (0·1 to 0·1) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·00 (0·00 to 0·00) |
| Vanuatu | 20·7 (16·3 to 26·6) | −2·5% (−3·8 to −1·2) | 0·20 (0·17 to 0·24) | 0·35 (0·30 to 0·41) | 69·4 (67·3 to 71·3) | 62·5 (59·9 to 64·8) | 65·7 (63·3 to 67·8) | 2·3 (1·9 to 2·7) | 0·2 (0·1 to 0·2) | 0 (0 to 0) | 0 (0 to 1) | 0·41 (0·10 to 0·87) |
| Southeast Asia | 21·5 (18·2 to 25·4) | −3·9% (−4·7 to −3·1) | 0·12 (0·11 to 0·14) | 0·22 (0·19 to 0·25) | 74·3 (72·7 to 75·8) | 67·9 (66·1 to 69·7) | 71·0 (69·4 to 72·5) | 5510·0 (4870·0 to 6180·0) | 243·0 (205·0 to 287·0) | 109 (−33 to 304) | 841 (428 to 1410) | 0·70 (0·29 to 1·26) |
| Cambodia | 30·7 (25·5 to 37·4) | −5·3% (−6·2 to −4·3) | 0·15 (0·12 to 0·19) | 0·25 (0·20 to 0·31) | 71·0 (68·2 to 73·6) | 65·2 (62·3 to 68·2) | 68·2 (65·3 to 71·0) | 129·0 (104·0 to 156·0) | 11·0 (9·1 to 13·4) | 0 (0 to 0) | 14 (4 to 27) | 0·40 (0·12 to 0·79) |
| Indonesia | 24·1 (19·5 to 29·5) | −3·8% (−4·9 to −2·8) | 0·14 (0·11 to 0·18) | 0·21 (0·16 to 0·27) | 72·0 (69·6 to 74·3) | 67·3 (64·4 to 70·3) | 69·5 (67·3 to 71·9) | 2200·0 (1790·0 to 2630·0) | 107·0 (86·1 to 130·0) | 133 (47 to 271) | 364 (124 to 717) | 0·94 (0·32 to 1·87) |
| Laos | 40·2 (31·3 to 50·3) | −5·2% (−6·4 to −3·9) | 0·15 (0·12 to 0·19) | 0·23 (0·19 to 0·29) | 70·4 (67·4 to 73·2) | 65·4 (62·2 to 68·7) | 67·8 (64·6 to 70·9) | 51·0 (40·9 to 62·3) | 7·0 (5·4 to 8·8) | 0 (0 to 0) | 5 (2 to 11) | 0·36 (0·12 to 0·78) |
| Malaysia | 6·2 (5·6 to 7·0) | −1·8% (−2·4 to −1·2) | 0·11 (0·11 to 0·12) | 0·20 (0·19 to 0·22) | 75·7 (75·2 to 76·2) | 70·4 (69·5 to 71·1) | 72·9 (72·1 to 73·4) | 224·0 (214·0 to 240·0) | 3·0 (2·7 to 3·4) | −15 (−27 to −6) | 37 (19 to 52) | 0·34 (−0·05 to 0·70) |
| Maldives | 12·5 (10·1 to 15·6) | −4·4% (−5·6 to −3·2) | 0·05 (0·04 to 0·06) | 0·08 (0·06 to 0·10) | 81·2 (79·7 to 82·6) | 78·1 (76·1 to 80·0) | 79·4 (77·6 to 81·1) | 1·6 (1·4 to 1·9) | 0·1 (0·1 to 0·1) | 0 (0 to 0) | 0 (0 to 0) | 0·28 (0·05 to 0·56) |
| Mauritius | 12·6 (10·5 to 14·3) | −1·5% (−2·4 to −0·7) | 0·11 (0·10 to 0·12) | 0·21 (0·19 to 0·22) | 76·9 (76·1 to 78·1) | 70·1 (69·1 to 71·6) | 73·4 (72·5 to 74·8) | 13·2 (11·9 to 14·3) | 0·2 (0·1 to 0·2) | 0 (−1 to 0) | 2 (0 to 3) | 0·44 (−0·38 to 1·04) |
| Myanmar | 39·2 (31·7 to 49·3) | −4·8% (−5·9 to −3·7) | 0·14 (0·12 to 0·18) | 0·26 (0·21 to 0·32) | 71·2 (68·7 to 73·5) | 64·1 (61·3 to 66·9) | 67·6 (64·9 to 70·2) | 511·0 (423·0 to 620·0) | 42·1 (33·9 to 53·2) | 17 (6 to 34) | 66 (21 to 134) | 0·82 (0·27 to 1·65) |
| Philippines | 21·0 (17·3 to 25·3) | −2·6% (−3·7 to −1·5) | 0·15 (0·13 to 0·18) | 0·28 (0·24 to 0·32) | 72·2 (70·6 to 73·8) | 64·8 (63·0 to 66·7) | 68·3 (66·9 to 69·5) | 880·0 (799·0 to 968·0) | 47·6 (39·3 to 57·6) | −17 (−19 to −16) | 229 (227 to 230) | 0·94 (0·93 to 0·95) |
| Seychelles | 13·3 (10·8 to 16·4) | −0·0% (−1·1 to 1·1) | 0·11 (0·09 to 0·12) | 0·20 (0·18 to 0·21) | 76·5 (75·5 to 77·4) | 70·8 (69·9 to 71·7) | 73·4 (72·5 to 74·3) | 0·9 (0·8 to 0·9) | 0·0 (0·0 to 0·0) | 0 (0 to 0) | 0 (0 to 0) | 0·06 (−0·31 to 0·36) |
| Sri Lanka | 6·0 (4·6 to 7·7) | −4·9% (−6·1 to −3·6) | 0·07 (0·04 to 0·09) | 0·16 (0·11 to 0·21) | 79·7 (76·8 to 83·1) | 73·4 (69·6 to 78·1) | 76·6 (73·2 to 80·5) | 158·0 (110·0 to 209·0) | 1·8 (1·4 to 2·3) | −10 (−54 to 23) | 18 (−19 to 48) | 0·17 (−1·60 to 1·58) |

(Table 1 continues on next page)

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Thailand | 7·4 (6·5 to 8·3) | −4·2% (−5·1 to −3·2) | 0·09 (0·07 to 0·11) | 0·21 (0·17 to 0·25) | 80·3 (77·8 to 82·6) | 72·4 (69·1 to 75·8) | 76·3 (73·5 to 79·1) | 626·0 (499·0 to 766·0) | 4·0 (3·5 to 4·5) | 1 (0 to 2) | 62 (20 to 117) | 0·44 (0·14 to 0·83) |
| Timor-Leste | 35·2 (29·0 to 42·7) | −4·1% (−5·1 to −3·1) | 0·16 (0·12 to 0·19) | 0·21 (0·17 to 0·26) | 70·5 (68·2 to 72·8) | 66·9 (64·2 to 69·6) | 68·6 (66·1 to 71·0) | 9·5 (7·9 to 11·4) | 1·4 (1·2 to 1·7) | 0 (0 to 0) | 1 (0 to 2) | 0·45 (0·14 to 0·88) |
| Viet Nam | 11·1 (8·7 to 14·3) | −4·4% (−5·6 to −3·2) | 0·08 (0·06 to 0·10) | 0·19 (0·16 to 0·24) | 78·3 (76·5 to 80·3) | 69·9 (68·0 to 72·0) | 74·0 (72·1 to 76·1) | 701·0 (587·0 to 813·0) | 17·5 (13·7 to 22·5) | 1 (0 to 1) | 44 (14 to 90) | 0·23 (0·07 to 0·47) |
| **Sub-Saharan Africa** | **70·7 (59·7 to 84·0)** | **−3·5% (−4·3 to −2·7)** | **0·24 (0·22 to 0·26)** | **0·34 (0·32 to 0·37)** | **64·1 (62·4 to 65·5)** | **58·7 (56·8 to 60·3)** | **61·3 (59·5 to 62·7)** | **9430·0 (8620·0 to 10 500·0)** | **2630·0 (2210·0 to 3140·0)** | **805 (747 to 864)** | **1600 (1480 to 1720)** | **1·13 (1·05 to 1·19)** |
| Central sub-Saharan Africa | 58·3 (49·7 to 68·9) | −4·6% (−5·4 to −3·8) | 0·25 (0·22 to 0·29) | 0·37 (0·33 to 0·41) | 63·8 (61·5 to 66·0) | 58·4 (56·1 to 60·5) | 61·0 (58·7 to 63·1) | 1090·0 (953·0 to 1250·0) | 259·0 (220·0 to 307·0) | 94 (84 to 104) | 174 (150 to 202) | 1·04 (0·91 to 1·17) |
| Angola | 54·7 (45·7 to 65·1) | −5·3% (−6·3 to −4·5) | 0·27 (0·22 to 0·32) | 0·37 (0·32 to 0·43) | 63·7 (60·8 to 66·6) | 58·4 (55·6 to 61·1) | 61·0 (58·2 to 63·7) | 250·0 (208·0 to 296·0) | 65·3 (54·3 to 78·0) | 15 (13 to 18) | 40 (29 to 51) | 0·92 (0·71 to 1·10) |
| Central African Republic | 110·0 (89·2 to 136·0) | −2·4% (−3·4 to −1·3) | 0·39 (0·33 to 0·47) | 0·57 (0·50 to 0·65) | 55·2 (51·2 to 58·6) | 48·2 (44·5 to 51·7) | 51·4 (47·6 to 54·9) | 73·7 (60·8 to 89·4) | 20·6 (16·6 to 25·8) | 9 (6 to 12) | 9 (6 to 14) | 1·47 (0·98 to 2·15) |
| Congo (Brazzaville) | 39·2 (32·4 to 47·3) | −4·6% (−5·7 to −3·6) | 0·31 (0·25 to 0·37) | 0·35 (0·29 to 0·42) | 63·1 (60·4 to 65·6) | 60·6 (58·1 to 62·9) | 61·8 (59·2 to 64·2) | 46·3 (39·6 to 54·4) | 5·0 (4·2 to 6·1) | 5 (4 to 6) | 8 (5 to 10) | 1·25 (0·93 to 1·49) |
| Democratic Republic of the Congo | 57·8 (48·3 to 71·4) | −4·6% (−5·5 to −3·6) | 0·23 (0·19 to 0·28) | 0·35 (0·30 to 0·40) | 64·5 (62·3 to 67·0) | 59·0 (56·6 to 61·4) | 61·6 (59·3 to 64·1) | 698·0 (595·0 to 802·0) | 165·0 (137·0 to 204·0) | 61 (55 to 67) | 112 (96 to 135) | 1·02 (0·91 to 1·16) |
| Equatorial Guinea | 46·3 (34·6 to 62·3) | −4·6% (−6·0 to −3·1) | 0·29 (0·22 to 0·38) | 0·37 (0·30 to 0·45) | 63·7 (58·9 to 67·7) | 59·3 (55·3 to 62·9) | 61·5 (57·2 to 65·3) | 10·5 (8·2 to 13·6) | 1·8 (1·3 to 2·4) | 1 (1 to 2) | 2 (1 to 3) | 1·12 (0·73 to 1·55) |
| Gabon | 32·5 (23·6 to 44·5) | −3·7% (−5·1 to −2·1) | 0·23 (0·19 to 0·29) | 0·35 (0·29 to 0·41) | 67·3 (64·0 to 70·2) | 60·9 (57·8 to 63·6) | 63·9 (60·6 to 66·7) | 15·5 (12·9 to 18·7) | 1·4 (1·0 to 1·9) | 2 (2 to 2) | 3 (2 to 4) | 1·49 (1·22 to 1·69) |
| Eastern sub-Saharan Africa | 57·9 (47·4 to 71·6) | −4·0% (−5·0 to −3·0) | 0·24 (0·22 to 0·26) | 0·36 (0·33 to 0·38) | 64·5 (62·9 to 66·0) | 58·9 (57·2 to 60·4) | 61·5 (59·8 to 63·0) | 3330·0 (3040·0 to 3700·0) | 787·0 (640·0 to 978·0) | 282 (259 to 305) | 662 (594 to 712) | 1·17 (1·07 to 1·25) |
| Burundi | 63·9 (50·0 to 82·0) | −4·3% (−5·4 to −3·1) | 0·22 (0·19 to 0·26) | 0·32 (0·27 to 0·36) | 64·9 (62·6 to 67·2) | 60·0 (57·7 to 62·3) | 62·2 (59·9 to 64·4) | 97·4 (84·8 to 112·0) | 29·6 (23·0 to 38·3) | 4 (4 to 5) | 11 (10 to 12) | 0·66 (0·60 to 0·70) |
| Comoros | 48·0 (39·0 to 58·9) | −3·7% (−4·7 to −2·6) | 0·18 (0·14 to 0·22) | 0·24 (0·20 to 0·28) | 68·2 (65·8 to 70·2) | 64·8 (62·5 to 66·9) | 66·5 (64·2 to 68·5) | 5·9 (5·1 to 6·8) | 0·8 (0·7 to 1·0) | 0 (0 to 0) | 1 (1 to 1) | 0·94 (0·86 to 1·01) |
| Djibouti | 37·2 (30·1 to 45·6) | −4·1% (−5·1 to −3·0) | 0·23 (0·18 to 0·29) | 0·31 (0·26 to 0·38) | 67·0 (63·4 to 70·0) | 62·3 (59·0 to 65·1) | 64·3 (60·9 to 67·2) | 9·3 (7·5 to 11·6) | 1·1 (0·9 to 1·4) | 1 (1 to 2) | 2 (1 to 3) | 1·38 (0·98 to 1·72) |
| Eritrea | 45·5 (34·4 to 60·3) | −3·5% (−4·9 to −2·2) | 0·25 (0·20 to 0·31) | 0·38 (0·32 to 0·46) | 64·8 (61·5 to 67·8) | 58·7 (55·2 to 61·7) | 61·7 (58·3 to 64·7) | 50·8 (41·6 to 62·3) | 8·8 (6·6 to 11·7) | 1 (1 to 2) | 7 (5 to 7) | 0·52 (0·44 to 0·60) |
| Ethiopia | 52·2 (41·8 to 65·1) | −4·8% (−5·8 to −3·7) | 0·19 (0·17 to 0·22) | 0·28 (0·25 to 0·32) | 67·5 (65·7 to 69·2) | 62·0 (60·3 to 63·7) | 64·5 (63·1 to 65·8) | 737·0 (678·0 to 805·0) | 180·0 (143·0 to 225·0) | 72 (67 to 78) | 157 (143 to 170) | 1·14 (1·04 to 1·23) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Kenya | 36·6 (29·7 to 44·7) | −4·0% (−5·1 to −3·0) | 0·22 (0·20 to 0·26) | 0·35 (0·31 to 0·39) | 67·2 (65·2 to 68·9) | 61·0 (59·4 to 62·6) | 63·9 (62·5 to 65·2) | 357·0 (326·0 to 390·0) | 43·7 (35·3 to 53·5) | 56 (51 to 61) | 86 (77 to 94) | 1·49 (1·34 to 1·60) |
| Madagascar | 57·6 (46·2 to 72·4) | −3·1% (−4·2 to −2·0) | 0·25 (0·20 to 0·30) | 0·31 (0·27 to 0·37) | 63·9 (61·7 to 66·2) | 60·5 (58·2 to 63·0) | 62·1 (59·9 to 64·5) | 206·0 (177·0 to 237·0) | 48·9 (39·0 to 62·0) | 24 (22 to 26) | 33 (28 to 37) | 1·11 (0·97 to 1·21) |
| Malawi | 52·1 (43·0 to 62·7) | −5·4% (−6·4 to −4·5) | 0·31 (0·27 to 0·36) | 0·46 (0·41 to 0·50) | 62·1 (59·5 to 64·5) | 55·8 (53·7 to 57·7) | 58·7 (56·7 to 60·6) | 173·0 (154·0 to 196·0) | 29·6 (24·3 to 35·8) | 8 (7 to 9) | 43 (38 to 48) | 1·49 (1·31 to 1·64) |
| Mozambique | 62·2 (49·4 to 79·3) | −4·5% (−5·7 to −3·3) | 0·33 (0·28 to 0·38) | 0·50 (0·45 to 0·56) | 59·9 (57·4 to 62·4) | 53·4 (51·0 to 55·5) | 56·4 (54·0 to 58·6) | 307·0 (268·0 to 350·0) | 68·5 (54·0 to 88·1) | 9 (5 to 13) | 54 (42 to 64) | 1·11 (0·94 to 1·25) |
| Rwanda | 41·4 (33·7 to 49·8) | −5·9% (−6·9 to −4·9) | 0·21 (0·17 to 0·24) | 0·30 (0·26 to 0·34) | 67·5 (65·2 to 69·7) | 62·3 (60·0 to 64·3) | 65·0 (62·7 to 67·1) | 92·1 (79·4 to 107·0) | 15·1 (12·3 to 18·3) | 2 (2 to 3) | 20 (16 to 22) | 0·88 (0·72 to 0·97) |
| Somalia | 92·3 (75·9 to 112·0) | −2·6% (−3·5 to −1·6) | 0·36 (0·30 to 0·43) | 0·53 (0·45 to 0·61) | 56·9 (53·6 to 59·9) | 50·7 (47·1 to 54·0) | 53·6 (50·1 to 56·9) | 238·0 (197·0 to 288·0) | 86·0 (70·2 to 106·0) | 25 (20 to 29) | 41 (30 to 54) | 1·26 (0·96 to 1·57) |
| South Sudan | 129·0 (103·0 to 159·0) | −0·8% (−1·8 to 0·3) | 0·28 (0·22 to 0·35) | 0·40 (0·33 to 0·48) | 58·1 (53·6 to 62·0) | 52·6 (47·9 to 56·7) | 55·0 (50·5 to 59·1) | 115·0 (92·3 to 144·0) | 47·5 (37·6 to 59·9) | 10 (8 to 11) | 12 (9 to 16) | 0·96 (0·75 to 1·14) |
| Tanzania | 52·4 (42·4 to 65·6) | −4·2% (−5·2 to −3·1) | 0·23 (0·19 to 0·26) | 0·31 (0·28 to 0·35) | 65·9 (63·8 to 67·8) | 61·3 (59·2 to 63·1) | 63·5 (61·4 to 65·3) | 440·0 (390·0 to 498·0) | 101·0 (78·6 to 131·0) | 38 (35 to 42) | 89 (80 to 95) | 1·17 (1·07 to 1·24) |
| Uganda | 64·6 (50·6 to 83·0) | −3·6% (−4·8 to −2·4) | 0·23 (0·19 to 0·27) | 0·38 (0·32 to 0·43) | 64·9 (62·2 to 67·3) | 57·8 (55·3 to 60·3) | 61·2 (58·7 to 63·7) | 329·0 (283·0 to 382·0) | 98·2 (79·1 to 123·0) | 16 (11 to 18) | 58 (36 to 70) | 0·92 (0·67 to 1·08) |
| Zambia | 46·1 (36·5 to 58·1) | −5·4% (−6·5 to −4·2) | 0·33 (0·28 to 0·38) | 0·47 (0·40 to 0·53) | 61·4 (58·4 to 64·2) | 55·8 (53·0 to 58·6) | 58·3 (55·4 to 61·0) | 175·0 (145·0 to 207·0) | 27·9 (21·9 to 35·4) | 14 (13 to 16) | 49 (36 to 63) | 1·75 (1·35 to 2·13) |
| Southern sub-Saharan Africa | 43·6 (36·2 to 53·2) | −2·8% (−3·7 to −1·8) | 0·31 (0·30 to 0·33) | 0·47 (0·45 to 0·49) | 63·0 (61·8 to 63·9) | 55·9 (54·7 to 57·0) | 59·3 (58·2 to 60·3) | 1040·0 (989·0 to 1090·0) | 71·4 (59·0 to 87·7) | 155 (152 to 158) | 297 (281 to 311) | 3·01 (2·90 to 3·10) |
| Botswana | 40·6 (30·3 to 53·9) | −2·8% (−4·1 to −1·4) | 0·32 (0·27 to 0·36) | 0·45 (0·40 to 0·51) | 62·9 (60·9 to 65·0) | 57·0 (55·0 to 58·9) | 59·7 (58·0 to 61·6) | 28·1 (24·7 to 31·3) | 2·0 (1·5 to 2·6) | 1 (1 to 1) | 10 (7 to 12) | 2·54 (1·90 to 3·06) |
| Eswatini | 42·1 (33·4 to 53·8) | −3·9% (−5·0 to −2·7) | 0·46 (0·39 to 0·54) | 0·66 (0·59 to 0·73) | 56·1 (53·0 to 59·2) | 49·5 (46·9 to 52·2) | 52·5 (49·6 to 55·5) | 17·6 (14·6 to 20·9) | 1·2 (1·0 to 1·6) | 2 (2 to 3) | 6 (4 to 7) | 3·91 (2·97 to 4·57) |
| Lesotho | 78·8 (64·6 to 94·5) | −1·0% (−2·0 to −0·1) | 0·53 (0·46 to 0·60) | 0·73 (0·67 to 0·78) | 52·1 (49·7 to 54·6) | 45·3 (43·5 to 47·2) | 48·5 (46·5 to 50·5) | 37·9 (33·0 to 42·9) | 3·4 (2·7 to 4·1) | 3 (3 to 3) | 11 (9 to 13) | 4·47 (3·79 to 5·14) |
| Namibia | 33·4 (26·1 to 43·0) | −3·3% (−4·4 to −2·0) | 0·29 (0·25 to 0·35) | 0·47 (0·41 to 0·53) | 64·0 (61·3 to 66·5) | 56·5 (53·8 to 58·9) | 60·1 (57·4 to 62·5) | 26·8 (22·9 to 31·4) | 1·9 (1·5 to 2·5) | 2 (2 to 2) | 9 (7 to 10) | 2·33 (2·00 to 2·65) |
| South Africa | 38·6 (31·9 to 47·1) | −3·3% (−4·2 to −2·3) | 0·28 (0·27 to 0·30) | 0·44 (0·42 to 0·46) | 64·8 (64·0 to 65·5) | 57·4 (56·6 to 58·3) | 61·0 (60·3 to 61·6) | 733·0 (712·0 to 754·0) | 38·4 (31·6 to 47·1) | 130 (130 to 130) | 204 (204 to 204) | 3·12 (3·12 to 3·12) |
| Zimbabwe | 52·7 (43·6 to 64·5) | −1·9% (−2·9 to −0·9) | 0·41 (0·36 to 0·47) | 0·56 (0·51 to 0·62) | 58·0 (55·5 to 60·4) | 52·2 (49·7 to 54·5) | 55·0 (52·5 to 57·3) | 193·0 (167·0 to 222·0) | 24·6 (20·2 to 30·2) | 16 (14 to 18) | 57 (45 to 67) | 2·56 (2·14 to 2·93) |
| Western sub-Saharan Africa | 86·3 (73·5 to 101·0) | −3·2% (−3·9 to −2·5) | 0·21 (0·18 to 0·23) | 0·29 (0·26 to 0·32) | 64·5 (62·5 to 66·3) | 59·9 (57·6 to 61·9) | 62·1 (59·9 to 63·8) | 3970·0 (3580·0 to 4510·0) | 1510·0 (1280·0 to 1780·0) | 274 (248 to 299) | 468 (422 to 511) | 0·81 (0·75 to 0·86) |
| Benin | 77·3 (62·8 to 95·2) | −2·9% (−3·9 to −1·9) | 0·19 (0·16 to 0·22) | 0·29 (0·26 to 0·34) | 65·9 (63·5 to 68·0) | 60·1 (57·8 to 62·1) | 62·9 (60·5 to 65·0) | 105·0 (92·8 to 120·0) | 39·6 (32·0 to 49·1) | 4 (3 to 5) | 13 (11 to 14) | 0·67 (0·60 to 0·75) |

(Table 1 continues on next page)

| | Under-5 mortality | | Probability of death between ages 15 and 59 years, 2021 | | Life expectancy at birth in 2021 (years) | | | Total deaths in 2021 (thousands) | Total deaths among children younger than 5 years in 2021 (thousands) | Excess deaths due to COVID-19 in 2020 (thousands) | Excess deaths due to COVID-19 in 2021 (thousands) | Excess mortality rate due to COVID-19, 2020–21 (deaths per 1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality rate in 2021 (deaths per 1000) | Annualised rate of change, 2000–21 | Females | Males | Females | Males | Both sexes | | | | | |
| (Continued from previous page) | | | | | | | | | | | | |
| Burkina Faso | 95·5 (77·9 to 117·0) | −3·0% (−4·0 to −2·0) | 0·21 (0·18 to 0·25) | 0·33 (0·29 to 0·37) | 63·0 (60·7 to 65·1) | 57·4 (54·9 to 59·6) | 60·1 (57·6 to 62·3) | 218·0 (192·0 to 249·0) | 87·8 (71·1 to 109·0) | 15 (14 to 16) | 25 (19 to 28) | 0·95 (0·82 to 1·04) |
| Cabo Verde | 15·0 (11·3 to 19·7) | −5·8% (−7·3 to −4·2) | 0·08 (0·07 to 0·10) | 0·20 (0·17 to 0·25) | 77·8 (75·8 to 79·8) | 69·0 (66·8 to 71·2) | 73·2 (71·1 to 75·4) | 3·7 (3·1 to 4·2) | 0·1 (0·1 to 0·2) | 0 (0 to 0) | 0 (0 to 0) | 0·41 (0·23 to 0·64) |
| Cameroon | 65·5 (54·3 to 77·6) | −3·2% (−4·1 to −2·3) | 0·26 (0·21 to 0·31) | 0·36 (0·31 to 0·42) | 63·6 (60·6 to 66·1) | 58·5 (55·7 to 60·8) | 60·8 (58·0 to 63·2) | 261·0 (225·0 to 308·0) | 67·6 (55·6 to 80·4) | 16 (14 to 17) | 46 (39 to 51) | 1·03 (0·91 to 1·14) |
| Chad | 112·0 (94·6 to 134·0) | −2·3% (−3·2 to −1·4) | 0·25 (0·20 to 0·30) | 0·33 (0·28 to 0·39) | 60·5 (56·9 to 63·5) | 56·5 (52·5 to 59·8) | 58·3 (54·5 to 61·5) | 182·0 (153·0 to 220·0) | 92·9 (77·9 to 112·0) | 14 (11 to 16) | 12 (9 to 14) | 0·80 (0·63 to 0·90) |
| Côte d'Ivoire | 68·5 (58·2 to 80·6) | −3·4% (−4·2 to −2·5) | 0·21 (0·17 to 0·26) | 0·31 (0·26 to 0·36) | 65·8 (63·1 to 68·4) | 60·3 (57·6 to 62·7) | 62·7 (59·9 to 65·1) | 209·0 (181·0 to 244·0) | 64·4 (54·3 to 76·1) | 19 (17 to 20) | 24 (21 to 28) | 0·80 (0·71 to 0·88) |
| The Gambia | 44·2 (35·3 to 55·4) | −4·0% (−5·1 to −2·9) | 0·24 (0·19 to 0·28) | 0·34 (0·29 to 0·39) | 65·9 (63·4 to 68·2) | 60·9 (58·5 to 63·2) | 63·2 (60·9 to 65·5) | 17·6 (15·2 to 20·3) | 42·0 (32·3 to 53·9) | 2 (2 to 3) | 3 (2 to 3) | 1·16 (1·01 to 1·33) |
| Ghana | 43·4 (33·6 to 55·5) | −4·0% (−5·2 to −2·7) | 0·21 (0·18 to 0·25) | 0·31 (0·27 to 0·36) | 67·4 (65·0 to 69·6) | 61·7 (59·5 to 63·9) | 64·6 (62·3 to 66·7) | 250·0 (215·0 to 289·0) | 42·6 (35·3 to 51·5) | 18 (16 to 20) | 40 (32 to 48) | 0·93 (0·80 to 1·05) |
| Guinea | 86·8 (72·7 to 104·0) | −3·4% (−4·3 to −2·5) | 0·25 (0·20 to 0·30) | 0·32 (0·27 to 0·38) | 62·2 (58·9 to 65·1) | 58·2 (54·6 to 61·2) | 60·1 (56·6 to 63·0) | 127·0 (107·0 to 152·0) | 4·4 (3·6 to 5·4) | 14 (12 to 17) | 19 (13 to 23) | 1·37 (1·07 to 1·64) |
| Guinea-Bissau | 61·8 (50·9 to 75·1) | −4·6% (−5·6 to −3·6) | 0·31 (0·25 to 0·37) | 0·45 (0·38 to 0·53) | 61·3 (58·8 to 63·8) | 55·1 (52·4 to 57·7) | 58·1 (55·6 to 60·7) | 18·4 (15·8 to 21·2) | 10·9 (8·4 to 14·4) | 3 (3 to 3) | 3 (1 to 4) | 1·45 (1·07 to 1·77) |
| Liberia | 66·9 (51·7 to 87·8) | −4·5% (−5·7 to −3·1) | 0·23 (0·19 to 0·29) | 0·28 (0·24 to 0·34) | 64·1 (60·1 to 67·4) | 61·6 (57·7 to 64·8) | 62·7 (58·9 to 66·0) | 39·5 (32·2 to 49·3) | 101·0 (83·9 to 124·0) | 3 (3 to 4) | 4 (4 to 5) | 0·88 (0·77 to 1·00) |
| Mali | 97·7 (81·4 to 118·0) | −3·3% (−4·1 to −2·3) | 0·25 (0·22 to 0·30) | 0·32 (0·28 to 0·36) | 61·1 (58·8 to 63·2) | 57·3 (55·1 to 59·2) | 59·1 (56·8 to 61·0) | 234·0 (208·0 to 265·0) | 4·6 (3·8 to 5·5) | 21 (18 to 23) | 36 (33 to 40) | 1·28 (1·17 to 1·36) |
| Mauritania | 33·7 (28·3 to 40·2) | −4·3% (−5·2 to −3·4) | 0·17 (0·13 to 0·21) | 0·19 (0·15 to 0·23) | 70·1 (67·4 to 72·5) | 68·4 (65·6 to 71·0) | 69·2 (66·5 to 71·7) | 25·0 (21·0 to 30·1) | 100·0 (80·9 to 124·0) | 3 (3 to 4) | 3 (2 to 4) | 0·82 (0·66 to 0·93) |
| Niger | 88·7 (72·1 to 110·0) | −4·4% (−5·3 to −3·4) | 0·21 (0·17 to 0·26) | 0·28 (0·23 to 0·33) | 63·5 (60·0 to 66·6) | 60·1 (56·3 to 63·4) | 61·8 (58·1 to 65·0) | 206·0 (170·0 to 253·0) | 787·0 (662·0 to 938·0) | 13 (12 to 15) | 17 (13 to 20) | 0·66 (0·56 to 0·74) |
| Nigeria | 96·3 (81·8 to 114·0) | −3·1% (−3·9 to −2·2) | 0·19 (0·15 to 0·24) | 0·25 (0·21 to 0·31) | 65·0 (62·2 to 67·4) | 60·7 (58·0 to 63·1) | 62·8 (60·8 to 64·6) | 1820·0 (1650·0 to 2030·0) | 0·1 (0·1 to 0·1) | 106 (96 to 116) | 186 (167 to 210) | 0·67 (0·62 to 0·73) |
| São Tomé and Príncipe | 17·8 (13·5 to 23·2) | −7·1% (−8·4 to −5·7) | 0·15 (0·12 to 0·19) | 0·20 (0·17 to 0·24) | 72·2 (70·1 to 74·1) | 68·6 (66·5 to 70·3) | 70·4 (68·3 to 72·1) | 1·1 (1·0 to 1·3) | 19·3 (16·1 to 23·0) | 0 (0 to 0) | 0 (0 to 0) | 0·51 (0·47 to 0·55) |
| Senegal | 40·5 (33·9 to 47·9) | −5·2% (−6·0 to −4·3) | 0·19 (0·16 to 0·23) | 0·27 (0·23 to 0·31) | 68·2 (65·8 to 70·2) | 63·7 (61·4 to 65·8) | 65·9 (63·5 to 67·9) | 111·0 (96·4 to 130·0) | 28·9 (22·8 to 36·4) | 12 (10 to 14) | 22 (19 to 25) | 1·15 (0·97 to 1·26) |
| Sierra Leone | 97·2 (77·3 to 121·0) | −3·9% (−5·0 to −2·8) | 0·24 (0·19 to 0·29) | 0·29 (0·24 to 0·34) | 62·1 (58·2 to 65·5) | 59·2 (54·9 to 62·8) | 60·6 (56·5 to 64·1) | 79·5 (65·3 to 97·7) | 3·4 (2·7 to 4·2) | 6 (5 to 7) | 6 (5 to 7) | 0·75 (0·67 to 0·83) |
| Togo | 56·7 (45·7 to 70·8) | −3·7% (−4·8 to −2·6) | 0·21 (0·18 to 0·26) | 0·33 (0·28 to 0·39) | 66·0 (62·7 to 69·0) | 60·2 (56·6 to 63·2) | 63·1 (59·6 to 66·2) | 62·8 (51·4 to 77·5) | 13·8 (11·1 to 17·4) | 3 (3 to 4) | 8 (6 to 9) | 0·72 (0·57 to 0·82) |

Excess deaths due to COVID-19 include all deaths due to the pandemic. Data in parentheses are 95% uncertainty intervals.

*Table 1:* **Under-5 mortality rate (2021), rate of change in under-5 mortality (2000–21), probability of death between ages 15 and 59 years (2021), life expectancy at birth (2021), total number of deaths among children under-5 years, total number of deaths among all ages (2021), and excess deaths due to the COVID-19 pandemic (2020, 2021) globally and for GBD regions, super-regions, countries, and territories**

by location. Female mortality was generally lower than male mortality in all age groups, with substantial heterogeneity across countries and territories (figure 3). The highest variability in the ratio of male to female mortality rates across countries and territories was found in the 15–39 age groups; although little change in the mortality sex ratio has been observed between locations over time, the ratio generally increased between 1970 and 2021, indicating that the gap between male and female mortality has been increasing, generally driven by mortality rates among females decreasing at a faster rate than among males. Globally in 2021, the mortality rate for males aged 15–39 years was 65·9% (95% UI 56·8–74·7) higher than for females. The widening gap between males and females was also observed for nearly all age groups aged 40 years and older. In the neonatal age groups, the ratio of male to female mortality rates declined slightly over time towards 1, while the variability among countries and territories remained similar. Individuals aged 40 years and older had a consistent pattern of an increasing ratio of male to female mortality rates over time, with increased variability observed among those aged 65 years and older across countries and territories from 1970 to 2000, followed by little change in variability from 2000 to 2021.

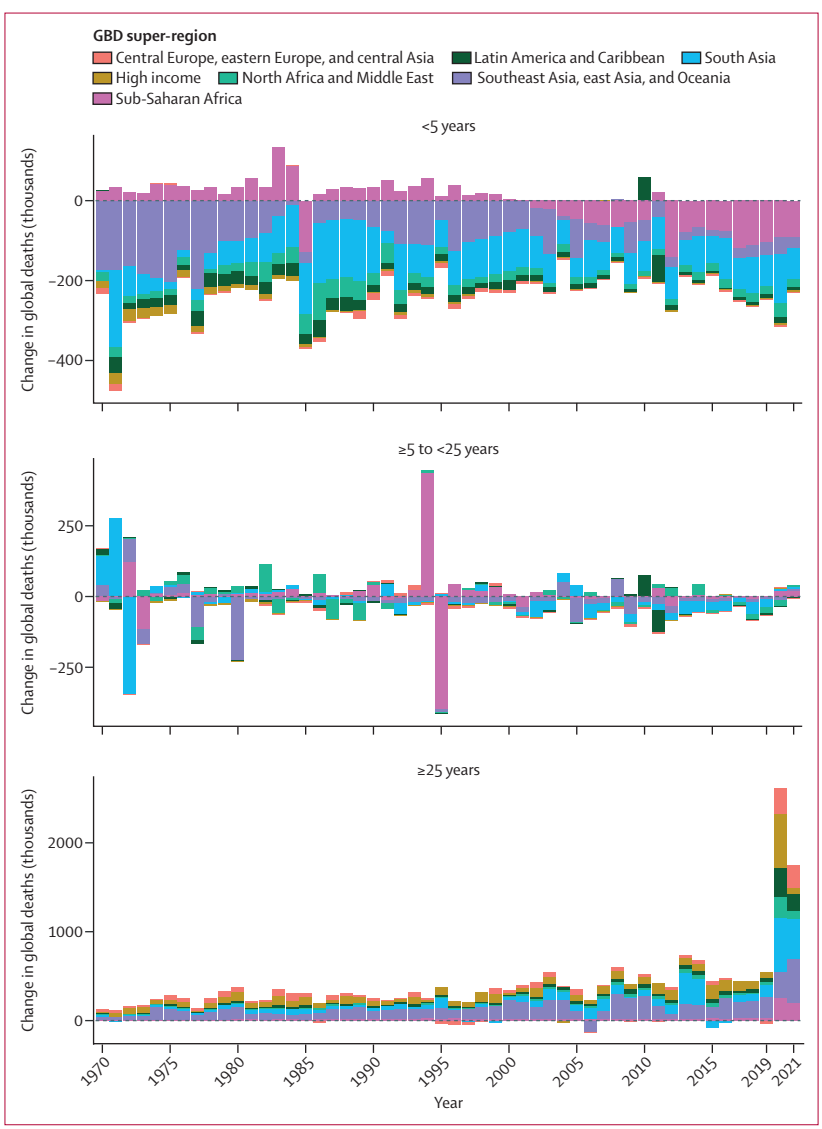


***Figure 4:*** **Annual change in all-cause deaths by GBD super-region across three age groups, 1970–2021**
Annual change is defined as the difference between the number of deaths in the current year and the preceding year. The y-axes scales differ by age groups. The large change in the 5–24 years group between 1994 and 1995 was due to deaths during the Rwandan genocide. Different colours show GBD super-regions. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

Despite declines in age-standardised all-cause mortality rates during the study period, the global number of deaths due to all causes combined increased from 44·0 million (95% UI 40·3–47·7) in 1950 to 50·3 million (49·3–51·4) in 2000 and 57·0 million (54·9–59·6) in 2019, largely reflecting a growing population and changing age structures. Global deaths further increased to 63·1 million (60·6–65·9) in 2020 and 67·9 million (65·0–70·8) in 2021, a notable spike attributable to the COVID-19 pandemic (table 1). Since 1970, the number of global deaths in the 25 years and older age group had increased steadily, until an unprecedented increase in 2020–21 (figure 4). This increase was observed across all GBD super-regions, with the exception of central Europe, eastern Europe, and central Asia, from 2000 to 2019. In contrast, deaths in children under 5 years declined over the entire study period, including during the COVID-19 pandemic period, with death counts of 20·0 million (17·2–23·0) in 1950, 9·21 million (8·73–9·73) in 2000, 5·21 million (4·50–6·01) in 2019, 4·89 million (4·19–5·71) in 2020, and 4·66 million (3·98–5·50) in 2021 (appendix 2 table S1). Initially, most of this decline could be attributed to declines in both U5MR and the under-5 population in southeast Asia, east Asia, and Oceania (especially China) until a tapering off around the year 2000. After this, the share of the decline attributed to sub-Saharan Africa began to increase, and this pattern continued during 2021 (figure 4). The largest number of under-5 deaths was observed in south Asia and sub-Saharan Africa during the pandemic, with south Asia accounting for 25·7% (24·1–27·2) of all deaths in children under 5 years in 2020 and 25·3% (24·0–26·6) in 2021, and sub-Saharan Africa accounting for 55·5% (53·2–57·7) in 2020 and 56·3% (54·1–58·4) in 2021. The number of global deaths in the intermediate age group (ages 5–24 years) demonstrates large yearly variability with no clear patterns, since deaths in this age group were heavily impacted by mortality shocks such as the Rwandan genocide in 1994 and natural disasters such as the earthquake in Haiti in 2010. Deaths in this age group increased slightly during 2020 and 2021 in most super-regions, but these increases were minimal compared with previous years, and in comparison to the increase observed in ages 25 years and older.

Historically, global life expectancy at birth has increased steadily; between 1950 and 2021, global life expectancy at

birth increased by 22·7 years (95% UI 20·8 to 24·8), from 49·0 years (46·7 to 51·3) to 71·7 years (70·9 to 72·5; table 1; appendix 2 table S4). Life expectancy improved for females from 51·6 years (49·4 to 53·8) in 1950 to 76·0 years (75·2 to 76·7) in 2019 and for males from 46·7 years (44·3 to 49·2) in 1950 to 70·8 years (69·9 to 71·7) in 2019 (figure 5). At the super-region level, the largest increases in life expectancy occurred in south Asia and north Africa and the Middle East, while at the national level, some of the largest increases were in South Korea and Iran (appendix 2 table S4). During this time period, the smallest gains in life expectancy occurred in the central Europe, eastern Europe, and central Asia and high-income super-regions and, at the national level, in Ukraine and Lesotho. Increasing life expectancy was generally consistent across all super-regions over the entire period, with the exception of mortality shocks in several locations, stagnation in sub-Saharan Africa during the HIV/AIDS epidemic, and slow progress in central Europe, eastern Europe, and central Asia before the mid-2000s. In 2020 and 2021, however, these trends reversed. Between 2019 and 2021, global life expectancy declined by 1·6 years (1·0 to 2·2); all super-regions had decreases in life expectancy during this period, ranging from a 3·7 year (3·4 to 4·1) decline in Latin America and the Caribbean to a 0·3 year (–1·9 to 1·3) decline in southeast Asia, east Asia, and Oceania (appendix 2 table S4). An increase in life expectancy during this period was only observed in 32 (15·7%) of 204 countries and territories.

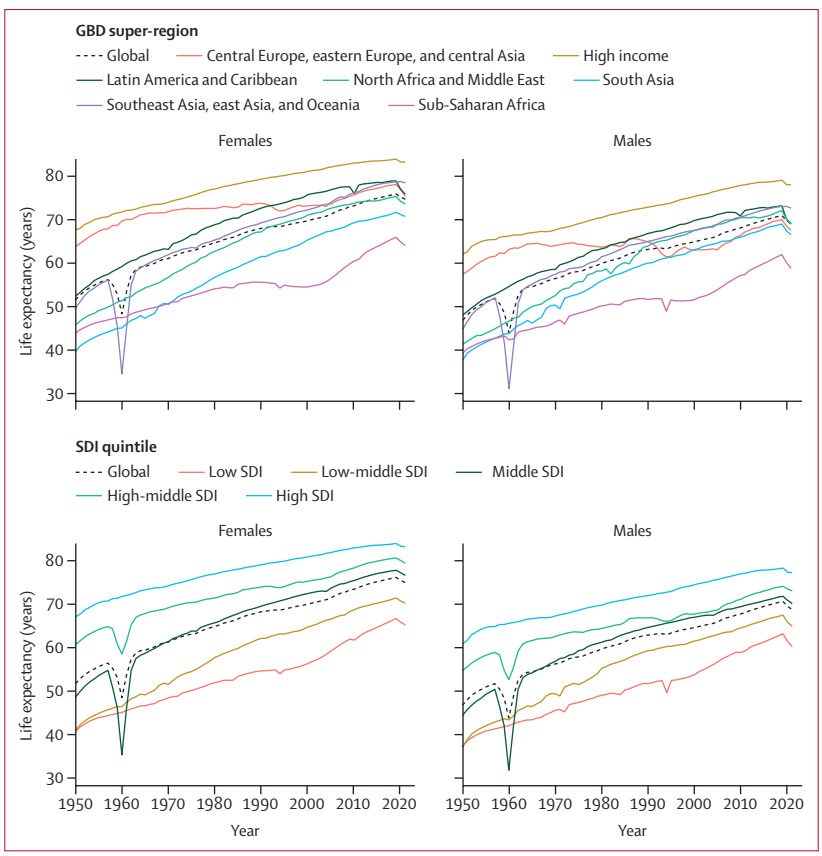


***Figure 5:*** **Life expectancy at birth across GBD super-regions and SDI quintiles in females and males, 1950–2021**
The different colours represent GBD super-regions in the top row and SDI quintiles in the bottom row. The decline in life expectancy in 1960 for the southeast Asia, east Asia, and Oceania super-region was due to famine. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study. SDI=Socio-demographic Index.

## Excess mortality due to the COVID-19 pandemic

We estimated 5·89 million (95% UI 5·48–6·44) excess deaths globally attributable to the COVID-19 pandemic in 2020 and 9·97 million (9·26–10·9) excess deaths in 2021 (table 1). The GBD super-regions with the highest all-age excess mortality rates in 2020 and 2021 combined were central Europe, eastern Europe, and central Asia (269·7 excess deaths per 100 000 population [250·0–289·6]) and Latin America and the Caribbean (199·0 [184·7–215·4]). The super-regions with the lowest all-age excess mortality rates during this time period were southeast Asia, east Asia, and Oceania (23·8 [8·9–44·1]) and high-income (90·2 [87·2–93·2]; appendix 2 figure S2). At the national level, in 2020 and 2021 combined, all-age excess mortality rates were highest in Bulgaria (520·8 [382·0–630·0]) and Lesotho (447·0 [379·3–514·0]), the highest rate in 2020 was in Peru (413·4 [410·3–416·1]), and the highest rate in 2021 was in Bulgaria (697·5 [532·4–830·5]; appendix 2 figure S2). For seven countries and territories (Taiwan [province of China], Mongolia, Japan, New Zealand, Iceland, Antigua and Barbuda, and Barbados), the all-age excess mortality rate for 2020 and 2021 combined was negative, indicating that fewer deaths occurred in these locations during the first 2 years of the pandemic than what would be expected based on past trends. In 2020, 20 countries and territories had negative excess mortality, while in 2021, only New Zealand and Barbados had negative excess mortality (table 1).

Additionally, we computed age-standardised excess mortality rates to compare the impact of the pandemic across countries and territories while controlling for different population age structures. Age-standardised rates and all-age rates differed substantially, with the highest age-standardised excess mortality rates observed in nations in sub-Saharan Africa, Latin America, and the Middle East (figure 6). The lowest age-standardised rates were found in some countries and territories in the Caribbean, east Asia, and Oceania, and some high-income nations. There was substantial variability within all super-regions. The countries or territories with the highest age-standardised rates during 2020 and 2021 combined were Eswatini (992·5 age-standardised excess deaths per 100 000 population [95% UI 745·5 to 1173·2]), Lesotho (874·3 [734·7 to 1009·4]), and Somalia (715·6 [549·3 to 912·7]); the nations with the lowest rates were Barbados (–61·5 [–111·6 to –13·1]), Mongolia (–32·9 [–209·6 to 131·0]), and Antigua and Barbuda (–13·7 [–55·5 to 27·9]).

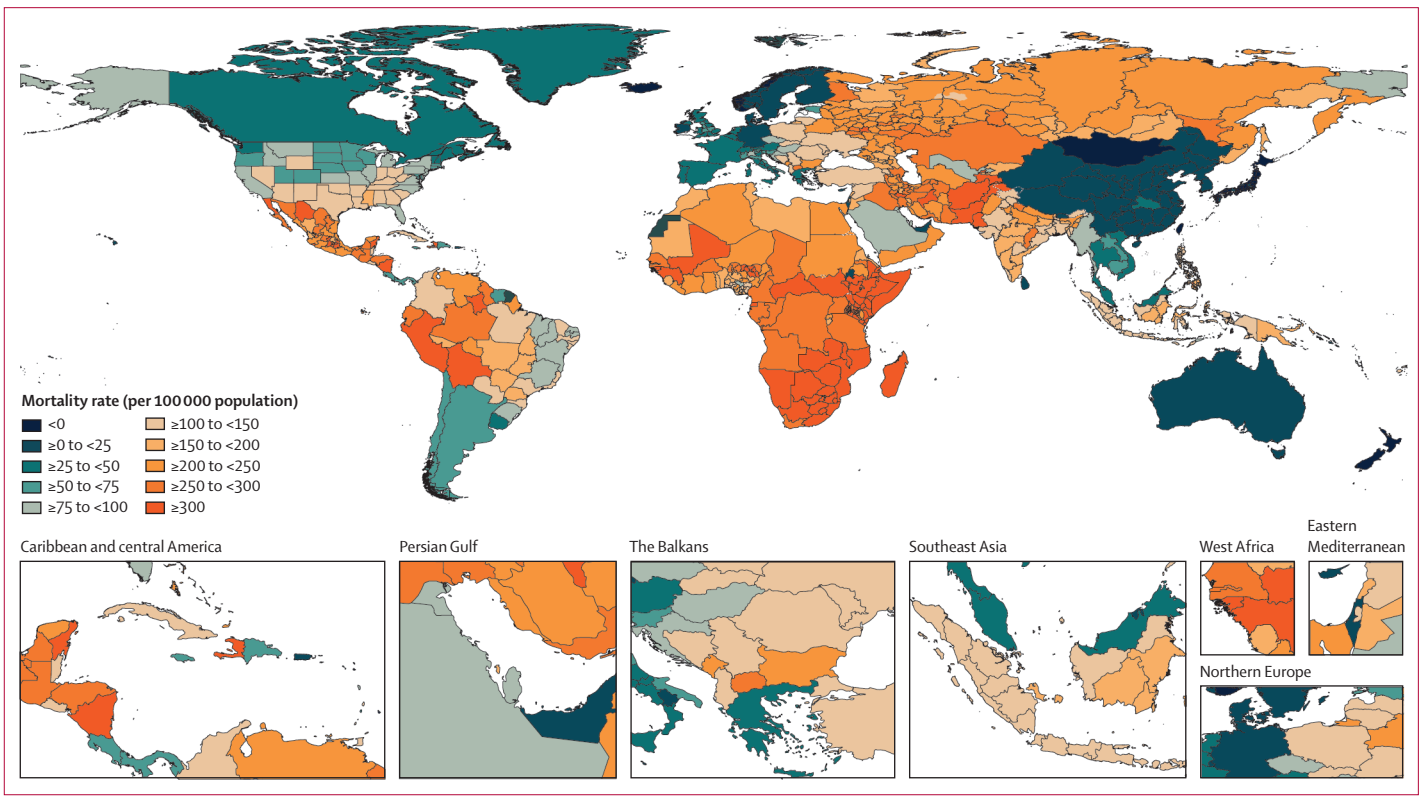


***Figure 6:*** **Global distribution of age-standardised excess mortality rates due to the COVID-19 pandemic, 2020 and 2021 combined**
Mortality rates are expressed as the number of deaths per 100 000 population. Excess mortality rates are negative in countries and territories where fewer deaths occurred than predicted.

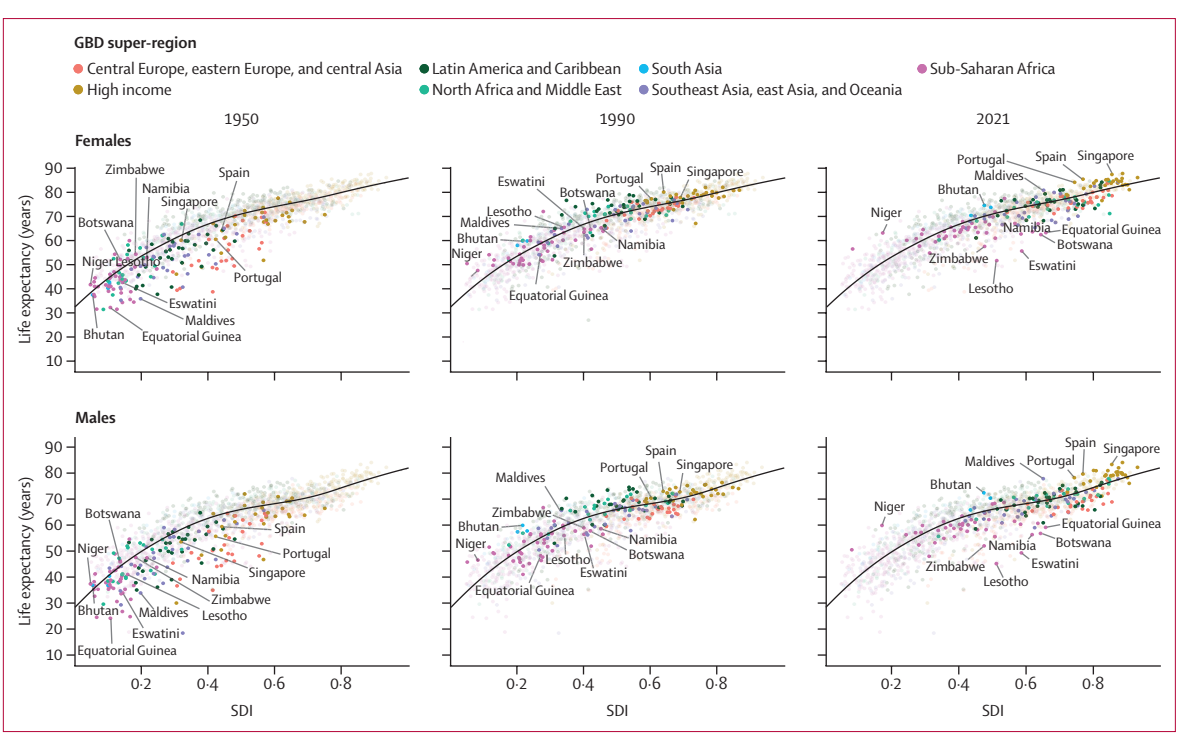


***Figure 7:*** **National life expectancy at birth versus SDI, and expected life expectancy based on SDI, in females and males in 1950, 1990, and 2021**
Life expectancy at birth is shown for 204 countries and territories coloured by GBD super-region. Transparent points in all plots show every fifth year between 1950 and 2015, and 2021 in the first two columns. The black line represents the expected life expectancy at birth based on SDI, and the shaded area corresponds to 95% uncertainty intervals. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study. SDI=Socio-demographic Index.

### Estimated mortality versus expected mortality based on SDI

Between 1950 and 2021, longer life expectancies at birth were generally associated with higher SDI levels (figure 7; table 2). For females in 2021, the super-regions with the largest proportion of nations with a life expectancy higher than expected based on SDI were high-income (31 of 36 nations), south Asia (three of five nations), and Latin America and the Caribbean (16 of 33 nations), while central Europe, eastern Europe, and central Asia (23 of 29 nations), sub-Saharan Africa (35 of 46 nations), and north Africa and the Middle East (14 of 21 nations) had the highest proportion of nations with a lower life expectancy than expected based on SDI. For males in 2021, the GBD super-regions with the largest proportion of nations with a life expectancy greater than expected based on SDI were high-income (31 of 36 nations), south Asia (three of five nations), and north Africa and the Middle East (11 of 21 nations); the super-regions with the highest proportion of nations displaying a life expectancy lower than expected based on SDI were central Europe, eastern Europe, and central Asia (24 of 29 nations), sub-Saharan Africa (34 of 46 nations), and southeast Asia, east Asia, and Oceania (24 of 34 nations). Between 1950 and 2021, an increase in both life expectancy at birth and SDI was observed in all countries and territories. For females in 2021, the five countries or territories with the largest positive difference between estimated life expectancy and expected life expectancy based on SDI were Somalia (13·9 years), Niger (10·0 years), Spain (6·5 years), Portugal (6·0 years), and Singapore (5·6 years); the five countries or territories with the largest negative difference were Lesotho (–19·6 years), Eswatini (–17·9 years), Botswana (–12·8 years), Equatorial Guinea (–12·5 years), and Zimbabwe (–12·5 years; table 3). For males in 2021, the five countries or territories with the largest positive difference between estimated life expectancy and expected life expectancy based on SDI were Somalia (12·2 years), Niger (10·6 years), the Maldives (8·4 years), Bhutan (7·1 years), and Singapore (6·7 years); the five countries or territories with the largest negative difference were Lesotho (–21·2 years), Eswatini (–18·7 years), Zimbabwe (–13·4 years), South Africa (–12·8 years), and Botswana (–12·4 years; table 4).

In 2020 and 2021 combined, lower age-standardised excess mortality rates due to the COVID-19 pandemic were broadly associated with higher SDI levels, but the association was not consistently strong (figure 8). The GBD super-regions with the largest proportion of countries and territories with an excess mortality rate higher than expected based on SDI were central Europe, eastern Europe, and central Asia (26 of 29 nations), Latin America and the Caribbean (21 of 33 nations), and south Asia (three of five nations); the super-regions with the largest proportion of nations with an excess mortality rate lower than expected based on SDI were southeast

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference |
| Global | 49·0 | 63·4 | –14·3 | 65·5 | 69·5 | –4·0 | 67·2 | 70·7 | –3·4 | 70·5 | 71·7 | –1·2 | 71·7 | 72·9 | –1·2 |
| Low SDI | 38·6 | 45·7 | –7·0 | 53·1 | 54·0 | –1·0 | 54·9 | 56·2 | –1·2 | 60·2 | 60·2 | 0·1 | 62·6 | 64·9 | –2·3 |
| Low-middle SDI | 38·8 | 50·1 | –11·3 | 60·6 | 61·1 | –0·5 | 63·0 | 64·1 | –1·1 | 66·5 | 67·0 | –0·5 | 67·4 | 69·9 | –2·5 |
| Middle SDI | 46·2 | 55·5 | –9·2 | 67·0 | 68·3 | –1·3 | 69·6 | 69·9 | –0·3 | 72·3 | 71·4 | 1·0 | 73·2 | 73·1 | 0·2 |
| High-middle SDI | 57·6 | 65·1 | –7·5 | 70·4 | 71·0 | –0·6 | 71·4 | 72·3 | –0·9 | 74·7 | 73·9 | 0·8 | 76·2 | 75·7 | 0·5 |
| High SDI | 63·9 | 71·0 | –7·1 | 75·6 | 75·7 | –0·1 | 77·8 | 77·2 | 0·5 | 80·0 | 78·6 | 1·5 | 80·2 | 79·9 | 0·4 |

SDI=Socio-demographic Index.

*Table 2:* **Life expectancy (estimated, expected based on SDI, and their difference), globally and by SDI quintile, for 1950, 1990, 2000, 2010, and 2021**

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| **Global** | **51·6** | **65·6** | **–14·0** | **68·1** | **72·2** | **–4·1** | **69·8** | **73·6** | **–3·7** | **73·3** | **74·8** | **–1·6** | **74·8** | **76·2** | **–1·4** | **0·67** |
| **Central Europe, eastern Europe, and central Asia** | **63·8** | **72·2** | **–8·4** | **73·8** | **75·5** | **–1·7** | **73·2** | **76·6** | **–3·3** | **75·7** | **78·0** | **–2·2** | **75·5** | **79·3** | **–3·8** | **0·77** |
| Central Asia | 51·9 | 68·6 | –16·7 | 71·6 | 73·1 | –1·5 | 71·0 | 73·9 | –2·9 | 73·6 | 75·4 | –1·7 | 74·3 | 76·2 | –1·9 | 0·68 |
| Armenia | 52·2 | 69·4 | –17·3 | 73·9 | 72·8 | 1·1 | 74·9 | 73·9 | 1·1 | 77·1 | 75·9 | 1·2 | 78·6 | 77·3 | 1·3 | 0·70 |
| Azerbaijan | 39·2 | 67·6 | –28·4 | 70·6 | 74·3 | –3·7 | 70·6 | 73·9 | –3·3 | 73·0 | 75·8 | –2·7 | 73·4 | 77·0 | –3·6 | 0·69 |
| Georgia | 57·0 | 73·0 | –16·0 | 73·7 | 75·9 | –2·2 | 74·0 | 75·2 | –1·3 | 77·9 | 76·4 | 1·4 | 75·8 | 78·1 | –2·3 | 0·73 |
| Kazakhstan | 61·3 | 69·2 | –7·9 | 72·6 | 74·1 | –1·5 | 70·5 | 75·6 | –5·2 | 73·0 | 76·7 | –3·7 | 73·9 | 77·7 | –3·8 | 0·73 |
| Kyrgyzstan | 51·9 | 69·0 | –17·1 | 70·9 | 72·0 | –1·1 | 71·4 | 72·8 | –1·5 | 73·8 | 73·1 | 0·7 | 76·1 | 74·7 | 1·4 | 0·60 |
| Mongolia | 39·9 | 61·6 | –21·7 | 65·5 | 70·1 | –4·5 | 67·0 | 72·2 | –5·2 | 71·1 | 73·7 | –2·6 | 74·6 | 75·0 | –0·4 | 0·62 |
| Tajikistan | 40·6 | 62·0 | –21·3 | 68·6 | 70·1 | –1·4 | 69·0 | 69·6 | –0·7 | 71·7 | 71·0 | 0·7 | 72·1 | 72·4 | –0·3 | 0·54 |
| Turkmenistan | 48·8 | 68·3 | –19·6 | 69·3 | 73·4 | –4·2 | 70·0 | 73·4 | –3·4 | 73·1 | 75·1 | –2·0 | 71·5 | 76·7 | –5·2 | 0·68 |
| Uzbekistan | 52·1 | 65·3 | –13·2 | 72·7 | 71·5 | 1·2 | 71·5 | 73·1 | –1·7 | 73·4 | 74·8 | –1·4 | 75·1 | 75·6 | –0·5 | 0·66 |
| Central Europe | 58·9 | 70·6 | –11·8 | 74·6 | 75·4 | –0·8 | 76·4 | 77·1 | –0·7 | 79·0 | 78·8 | 0·2 | 78·3 | 80·1 | –1·8 | 0·80 |
| Albania | 50·2 | 64·4 | –14·3 | 75·7 | 73·3 | 2·4 | 78·4 | 74·0 | 4·4 | 80·4 | 75·9 | 4·5 | 78·7 | 77·3 | 1·4 | 0·71 |
| Bosnia and Herzegovina | 47·5 | 60·6 | –13·2 | 76·2 | 72·7 | 3·5 | 78·0 | 74·5 | 3·5 | 79·8 | 76·6 | 3·3 | 78·3 | 77·8 | 0·4 | 0·72 |
| Bulgaria | 58·9 | 69·9 | –11·0 | 73·5 | 75·4 | –1·9 | 73·7 | 76·6 | –2·9 | 75·9 | 78·0 | –2·1 | 73·7 | 79·3 | –5·5 | 0·77 |
| Croatia | 52·9 | 70·2 | –17·4 | 75·7 | 76·3 | –0·6 | 78·1 | 77·3 | 0·8 | 80·0 | 78·9 | 1·1 | 80·3 | 80·3 | 0·0 | 0·80 |
| Czechia | 68·1 | 73·7 | –5·6 | 75·6 | 76·6 | –0·9 | 78·4 | 79·3 | –0·8 | 80·9 | 80·6 | 0·3 | 80·9 | 81·2 | –0·4 | 0·83 |
| Hungary | 62·4 | 71·5 | –9·2 | 73·8 | 75·8 | –1·9 | 76·1 | 77·5 | –1·5 | 78·5 | 79·1 | –0·6 | 78·0 | 79·9 | –2·0 | 0·79 |
| Montenegro | 66·4 | 69·6 | –3·2 | 78·3 | 76·4 | 1·8 | 76·7 | 76·4 | 0·3 | 77·7 | 78·5 | –0·7 | 76·0 | 80·1 | –4·1 | 0·80 |
| North Macedonia | 49·3 | 67·6 | –18·4 | 72·6 | 74·5 | –2·0 | 73·7 | 75·5 | –1·8 | 75·4 | 77·3 | –1·9 | 74·2 | 78·6 | –4·4 | 0·75 |
| Poland | 59·6 | 71·2 | –11·5 | 75·6 | 75·1 | 0·5 | 78·0 | 77·3 | 0·8 | 80·5 | 79·1 | 1·5 | 79·7 | 80·6 | –0·9 | 0·81 |
| Romania | 60·9 | 67·1 | –6·3 | 73·0 | 75·0 | –1·9 | 74·7 | 76·2 | –1·5 | 77·5 | 77·8 | –0·3 | 76·8 | 79·3 | –2·5 | 0·77 |
| Serbia | 49·9 | 70·4 | –20·5 | 73·0 | 75·2 | –2·3 | 73·8 | 76·0 | –2·2 | 76·7 | 78·3 | –1·6 | 76·7 | 80·1 | –3·4 | 0·79 |
| Slovakia | 64·4 | 72·2 | –7·8 | 75·6 | 75·9 | –0·3 | 77·9 | 78·1 | –0·2 | 79·6 | 79·8 | –0·1 | 78·3 | 80·6 | –2·3 | 0·81 |
| Slovenia | 59·5 | 73·3 | –13·8 | 78·0 | 78·0 | 0·1 | 80·0 | 79·6 | 0·4 | 83·0 | 80·9 | 2·0 | 84·0 | 81·7 | 2·3 | 0·84 |
| Eastern Europe | 69·5 | 73·1 | –3·6 | 74·6 | 76·2 | –1·5 | 72·9 | 77·1 | –4·2 | 75·1 | 78·8 | –3·7 | 74·9 | 80·4 | –5·6 | 0·80 |
| Belarus | 70·6 | 70·6 | –0·1 | 75·8 | 75·0 | 0·8 | 74·7 | 76·2 | –1·5 | 76·6 | 78·1 | –1·5 | 76·0 | 79·8 | –3·8 | 0·78 |
| Estonia | 70·0 | 73·3 | –3·3 | 75·0 | 76·4 | –1·4 | 76·2 | 78·3 | –2·1 | 80·8 | 80·3 | 0·5 | 81·2 | 81·7 | –0·5 | 0·84 |
| Latvia | 72·0 | 73·6 | –1·6 | 74·7 | 76·6 | –1·9 | 76·0 | 78·0 | –2·0 | 78·1 | 80·3 | –2·1 | 78·1 | 81·2 | –3·1 | 0·83 |
| Lithuania | 68·7 | 71·5 | –2·8 | 76·1 | 76·3 | –0·2 | 77·5 | 77·7 | –0·2 | 78·7 | 80·1 | –1·4 | 78·9 | 82·2 | –3·3 | 0·86 |
| Moldova | 56·5 | 69·9 | –13·4 | 71·5 | 74·5 | –3·0 | 72·5 | 75·0 | –2·5 | 74·7 | 76·3 | –1·6 | 76·4 | 78·0 | –1·6 | 0·73 |
| Russia | 69·5 | 73·3 | –3·8 | 74·5 | 76·3 | –1·8 | 72·5 | 77·4 | –4·9 | 74·8 | 79·1 | –4·3 | 74·3 | 80·6 | –6·3 | 0·81 |
| Ukraine | 70·8 | 73·0 | –2·2 | 74·8 | 75·6 | –0·8 | 73·5 | 76·3 | –2·8 | 75·4 | 77·7 | –2·3 | 75·7 | 78·9 | –3·3 | 0·76 |
| **High income** | **67·7** | **74·0** | **–6·3** | **79·4** | **78·6** | **0·8** | **81·2** | **79·9** | **1·3** | **83·1** | **80·8** | **2·4** | **83·3** | **82·0** | **1·3** | **0·85** |
| Australasia | 71·9 | 73·6 | –1·7 | 79·7 | 78·0 | 1·7 | 82·1 | 79·4 | 2·6 | 84·0 | 80·4 | 3·5 | 85·3 | 81·7 | 3·6 | 0·85 |
| Australia | 72·0 | 73·3 | –1·3 | 80·0 | 77·8 | 2·1 | 82·3 | 79·3 | 3·1 | 84·2 | 80·4 | 3·8 | 85·6 | 81·7 | 3·9 | 0·84 |

(Table 3 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| New Zealand | 71·5 | 74·5 | –3·0 | 78·4 | 78·6 | –0·2 | 80·8 | 79·8 | 1·1 | 82·8 | 80·6 | 2·2 | 84·1 | 81·9 | 2·2 | 0·85 |
| High-income Asia Pacific | 59·6 | 71·5 | –11·9 | 80·9 | 79·3 | 1·7 | 84·1 | 80·8 | 3·3 | 86·2 | 81·7 | 4·5 | 87·8 | 82·7 | 5·1 | 0·88 |
| Brunei | 49·5 | 65·6 | –16·1 | 73·1 | 76·2 | –3·0 | 75·2 | 77·7 | –2·5 | 77·1 | 79·4 | –2·3 | 78·3 | 80·6 | –2·3 | 0·81 |
| Japan | 63·5 | 72·8 | –9·3 | 82·3 | 79·9 | 2·4 | 85·1 | 81·1 | 4·0 | 86·7 | 81·7 | 5·0 | 88·1 | 82·5 | 5·6 | 0·87 |
| Singapore | 60·5 | 62·6 | –2·1 | 78·2 | 76·7 | 1·5 | 81·7 | 79·3 | 2·4 | 85·0 | 81·2 | 3·7 | 87·7 | 82·0 | 5·6 | 0·86 |
| South Korea | 46·5 | 61·6 | –15·1 | 75·9 | 76·8 | –0·9 | 79·7 | 79·8 | –0·0 | 84·0 | 81·7 | 2·2 | 86·0 | 83·0 | 3·1 | 0·89 |
| High-income North America | 71·1 | 74·8 | –3·7 | 79·1 | 79·1 | 0·0 | 79·7 | 80·1 | –0·4 | 81·4 | 81·2 | 0·1 | 80·4 | 82·4 | –1·9 | 0·86 |
| Canada | 70·9 | 75·0 | –4·1 | 80·6 | 79·6 | 1·0 | 81·8 | 80·8 | 1·1 | 83·6 | 81·7 | 1·8 | 84·1 | 82·7 | 1·4 | 0·87 |
| Greenland | 52·2 | 73·6 | –21·3 | 67·5 | 78·0 | –10·5 | 71·1 | 78·3 | –7·2 | 74·9 | 80·4 | –5·6 | 76·9 | 81·4 | –4·5 | 0·83 |
| USA | 71·2 | 74·8 | –3·7 | 79·0 | 79·1 | –0·1 | 79·5 | 80·1 | –0·6 | 81·1 | 81·1 | 0·0 | 80·0 | 82·4 | –2·3 | 0·86 |
| Southern Latin America | 64·0 | 70·2 | –6·3 | 76·3 | 74·0 | 2·3 | 78·4 | 75·5 | 3·0 | 79·6 | 76·6 | 3·1 | 79·9 | 78·5 | 1·4 | 0·74 |
| Argentina | 66·9 | 70·6 | –3·7 | 76·0 | 74·0 | 2·0 | 77·9 | 75·5 | 2·4 | 79·0 | 76·3 | 2·7 | 79·1 | 78·1 | 0·9 | 0·72 |
| Chile | 55·2 | 69·0 | –13·8 | 76·7 | 74·0 | 2·7 | 79·8 | 75·9 | 3·9 | 81·3 | 77·3 | 4·1 | 81·9 | 79·3 | 2·6 | 0·77 |
| Uruguay | 70·2 | 70·4 | –0·2 | 76·9 | 73·9 | 3·0 | 78·6 | 75·1 | 3·5 | 80·0 | 76·2 | 3·9 | 79·4 | 77·7 | 1·7 | 0·72 |
| Western Europe | 69·2 | 74·0 | –4·8 | 79·5 | 78·5 | 1·1 | 81·5 | 79·8 | 1·8 | 83·6 | 80·8 | 2·8 | 84·2 | 81·9 | 2·3 | 0·85 |
| Andorra | 77·9 | 74·5 | 3·3 | 82·3 | 78·9 | 3·4 | 83·5 | 79·6 | 4·0 | 84·8 | 81·6 | 3·2 | 85·7 | 82·5 | 3·2 | 0·87 |
| Austria | 68·6 | 74·4 | –5·8 | 79·0 | 78·6 | 0·3 | 81·3 | 79·9 | 1·4 | 83·2 | 81·1 | 2·2 | 84·1 | 82·0 | 2·0 | 0·85 |
| Belgium | 68·9 | 73·7 | –4·9 | 79·3 | 78·3 | 1·0 | 81·0 | 79·6 | 1·4 | 82·8 | 80·8 | 2·0 | 84·2 | 82·0 | 2·2 | 0·85 |
| Cyprus | 61·7 | 69·4 | –7·7 | 76·3 | 75·8 | 0·5 | 78·1 | 78·5 | –0·4 | 81·3 | 80·6 | 0·7 | 83·2 | 81·4 | 1·8 | 0·84 |
| Denmark | 71·9 | 75·4 | –3·4 | 77·9 | 80·3 | –2·3 | 79·3 | 81·6 | –2·2 | 81·6 | 82·4 | –0·8 | 83·5 | 83·3 | 0·2 | 0·90 |
| Finland | 68·1 | 73·4 | –5·4 | 79·4 | 78·8 | 0·6 | 81·5 | 79·9 | 1·6 | 83·7 | 81·1 | 2·6 | 84·9 | 82·2 | 2·7 | 0·86 |
| France | 69·8 | 72·7 | –2·9 | 81·1 | 78·0 | 3·1 | 82·7 | 79·4 | 3·3 | 84·6 | 80·4 | 4·1 | 85·5 | 81·6 | 3·9 | 0·84 |
| Germany | 70·2 | 75·5 | –5·3 | 78·6 | 80·8 | –2·2 | 81·2 | 81·9 | –0·7 | 82·8 | 82·8 | 0·0 | 83·4 | 83·6 | –0·2 | 0·90 |
| Greece | 70·9 | 71·7 | –0·9 | 79·4 | 76·4 | 3·0 | 80·8 | 78·1 | 2·7 | 82·7 | 79·4 | 3·3 | 82·8 | 79·9 | 2·9 | 0·79 |
| Iceland | 74·0 | 73·4 | 0·6 | 80·2 | 79·1 | 1·1 | 82·1 | 80·4 | 1·7 | 83·4 | 81·6 | 1·9 | 84·9 | 82·7 | 2·2 | 0·88 |
| Ireland | 67·2 | 73·9 | –6·6 | 77·6 | 77·7 | –0·1 | 79·3 | 79·6 | –0·2 | 82·9 | 81·2 | 1·6 | 84·5 | 82·7 | 1·8 | 0·87 |
| Israel | 72·7 | 71·7 | 1·0 | 78·8 | 77·4 | 1·4 | 80·6 | 78·6 | 2·0 | 83·4 | 79·4 | 4·0 | 85·1 | 80·6 | 4·5 | 0·81 |
| Italy | 68·9 | 72·2 | –3·3 | 80·3 | 77·3 | 3·0 | 82·4 | 78·6 | 3·8 | 84·4 | 79·6 | 4·8 | 84·9 | 80·4 | 4·5 | 0·81 |
| Luxembourg | 68·2 | 75·6 | –7·4 | 78·7 | 79·6 | –0·8 | 81·4 | 80·9 | 0·4 | 83·4 | 82·0 | 1·4 | 84·9 | 83·0 | 1·9 | 0·88 |
| Malta | 67·4 | 67·9 | –0·5 | 78·7 | 75·9 | 2·9 | 81·1 | 77·4 | 3·7 | 83·3 | 78·8 | 4·5 | 84·1 | 80·3 | 3·8 | 0·80 |
| Monaco | 68·1 | 76·8 | –8·7 | 81·0 | 81·7 | –0·7 | 81·4 | 82·5 | –1·1 | 81·7 | 83·1 | –1·4 | 81·4 | 83·7 | –2·3 | 0·91 |
| Netherlands | 72·9 | 75·8 | –2·9 | 80·1 | 80·1 | 0·0 | 80·7 | 81·2 | –0·6 | 82·8 | 82·2 | 0·6 | 83·2 | 83·1 | 0·1 | 0·89 |
| Norway | 73·7 | 75·9 | –2·2 | 80·1 | 80·1 | 0·0 | 81·6 | 81·7 | –0·2 | 83·4 | 82·8 | 0·6 | 84·9 | 83·9 | 1·0 | 0·92 |
| Portugal | 60·9 | 68·1 | –7·2 | 77·6 | 74·4 | 3·2 | 80·1 | 76·0 | 4·1 | 83·1 | 77·3 | 5·9 | 84·4 | 78·5 | 6·0 | 0·74 |
| San Marino | 76·2 | 75·5 | 0·7 | 82·4 | 80·8 | 1·6 | 84·5 | 82·2 | 2·3 | 87·6 | 82·8 | 4·8 | 88·1 | 83·0 | 5·1 | 0·89 |
| Spain | 64·5 | 69·0 | –4·5 | 80·4 | 75·4 | 5·1 | 82·9 | 77·0 | 5·9 | 85·0 | 78·3 | 6·7 | 85·7 | 79·3 | 6·5 | 0·77 |
| Sweden | 72·7 | 75·5 | –2·8 | 80·8 | 79·8 | 1·0 | 82·2 | 81·4 | 0·8 | 83·8 | 82·2 | 1·6 | 85·0 | 83·1 | 1·9 | 0·89 |

(Table 3 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| Switzerland | 71·1 | 78·6 | –7·5 | 81·2 | 82·4 | –1·2 | 83·1 | 83·0 | 0·2 | 85·0 | 83·7 | 1·3 | 86·4 | 84·4 | 1·9 | 0·93 |
| UK | 71·3 | 74·7 | –3·4 | 78·4 | 78·5 | –0·0 | 80·1 | 79·9 | 0·1 | 82·5 | 80·9 | 1·6 | 82·4 | 82·2 | 0·2 | 0·86 |
| England | 71·8 | 74·7 | –2·9 | 78·6 | 78·5 | 0·2 | 80·3 | 79·9 | 0·3 | 82·8 | 80·9 | 1·8 | 82·6 | 82·2 | 0·4 | 0·86 |
| Northern Ireland | 68·7 | 73·7 | –5·1 | 77·2 | 77·8 | –0·6 | 79·6 | 79·4 | 0·2 | 81·8 | 80·4 | 1·4 | 82·3 | 81·6 | 0·7 | 0·84 |
| Scotland | 68·0 | 74·4 | –6·4 | 76·7 | 78·5 | –1·7 | 78·6 | 79·9 | –1·4 | 80·8 | 80·9 | –0·1 | 80·8 | 82·0 | –1·2 | 0·85 |
| Wales | 71·1 | 73·9 | –2·8 | 78·5 | 77·4 | 1·1 | 79·7 | 78·9 | 0·8 | 81·9 | 79·9 | 2·0 | 81·1 | 81·4 | –0·3 | 0·83 |
| **Latin America and Caribbean** | **52·4** | **59·6** | **–7·3** | **72·7** | **71·4** | **1·4** | **75·8** | **72·8** | **3·0** | **76·1** | **74·3** | **1·8** | **75·9** | **75·6** | **0·3** | **0·65** |
| Andean Latin America | 42·5 | 60·6 | –18·1 | 70·6 | 71·4 | –0·8 | 74·8 | 72·7 | 2·1 | 77·3 | 74·1 | 3·2 | 74·3 | 75·9 | –1·6 | 0·65 |
| Bolivia | 38·2 | 57·5 | –19·3 | 62·4 | 68·3 | –5·9 | 67·4 | 70·8 | –3·4 | 71·0 | 72·7 | –1·6 | 68·8 | 74·5 | –5·8 | 0·60 |
| Ecuador | 51·2 | 62·9 | –11·7 | 74·2 | 72·0 | 2·1 | 76·6 | 72·8 | 3·7 | 77·5 | 74·1 | 3·4 | 77·1 | 76·2 | 1·0 | 0·66 |
| Peru | 41·2 | 60·6 | –19·4 | 72·0 | 71·7 | 0·3 | 76·8 | 73·0 | 3·8 | 79·7 | 74·5 | 5·1 | 74·9 | 76·0 | –1·1 | 0·66 |
| Caribbean | 57·0 | 62·9 | –5·9 | 69·8 | 72·0 | –2·2 | 72·1 | 73·1 | –1·0 | 56·4 | 74·5 | –18·1 | 72·5 | 75·5 | –3·0 | 0·64 |
| Antigua and Barbuda | 60·3 | 62·9 | –2·6 | 77·4 | 74·8 | 2·5 | 76·8 | 76·0 | 0·7 | 78·0 | 77·4 | 0·6 | 77·1 | 78·6 | –1·6 | 0·75 |
| The Bahamas | 60·1 | 70·4 | –10·3 | 74·5 | 77·0 | –2·5 | 74·4 | 78·3 | –3·9 | 76·3 | 79·4 | –3·1 | 73·6 | 80·4 | –6·8 | 0·81 |
| Barbados | 56·5 | 67·9 | –11·4 | 76·1 | 75·9 | 0·2 | 76·7 | 76·6 | 0·2 | 77·2 | 77·5 | –0·3 | 77·6 | 78·5 | –0·8 | 0·75 |
| Belize | 56·6 | 60·0 | –3·4 | 75·6 | 68·3 | 7·3 | 73·3 | 71·4 | 1·9 | 76·2 | 73·3 | 2·9 | 76·1 | 74·7 | 1·4 | 0·61 |
| Bermuda | 66·5 | 68·1 | –1·6 | 77·4 | 77·0 | 0·4 | 80·8 | 78·1 | 2·6 | 84·9 | 79·9 | 5·0 | 83·3 | 80·9 | 2·4 | 0·82 |
| Cuba | 68·9 | 65·8 | 3·0 | 76·7 | 73·3 | 3·4 | 79·2 | 73·4 | 5·7 | 80·4 | 74·8 | 5·6 | 77·3 | 76·3 | 1·0 | 0·67 |
| Dominica | 49·7 | 65·8 | –16·1 | 74·7 | 73·3 | 1·4 | 75·4 | 75·6 | –0·2 | 75·7 | 77·1 | –1·4 | 73·3 | 78·5 | –5·1 | 0·75 |
| Dominican Republic | 56·3 | 50·2 | 6·1 | 73·4 | 69·0 | 4·4 | 76·9 | 71·2 | 5·7 | 76·9 | 73·6 | 3·4 | 77·3 | 75·0 | 2·3 | 0·62 |
| Grenada | 58·9 | 56·1 | 2·8 | 72·6 | 69·0 | 3·6 | 76·5 | 72·7 | 3·8 | 75·9 | 74·8 | 1·1 | 72·9 | 76·3 | –3·3 | 0·67 |
| Guyana | 52·9 | 60·3 | –7·4 | 66·5 | 69·9 | –3·3 | 67·8 | 72·4 | –4·5 | 69·6 | 73·9 | –4·2 | 68·6 | 75·8 | –7·2 | 0·65 |
| Haiti | 41·4 | 53·1 | –11·7 | 54·1 | 62·0 | –7·9 | 56·6 | 65·3 | –8·6 | 27·6 | 67·6 | –40·1 | 61·5 | 69·4 | –7·9 | 0·45 |
| Jamaica | 58·6 | 65·0 | –6·4 | 76·5 | 72·5 | 4·0 | 76·8 | 74·3 | 2·5 | 79·4 | 75·5 | 3·9 | 76·4 | 76·7 | –0·3 | 0·68 |
| Puerto Rico | 62·9 | 67·1 | –4·2 | 78·2 | 76·0 | 2·1 | 80·2 | 77·4 | 2·8 | 83·2 | 78·9 | 4·3 | 84·5 | 81·1 | 3·4 | 0·83 |
| Saint Kitts and Nevis | 60·2 | 63·5 | –3·3 | 69·2 | 73·9 | –4·6 | 73·5 | 75·6 | –2·2 | 75·7 | 77·7 | –2·0 | 75·5 | 78·9 | –3·4 | 0·75 |
| Saint Lucia | 53·6 | 59·6 | –6·1 | 72·5 | 71·2 | 1·3 | 76·2 | 73·9 | 2·4 | 79·4 | 75·4 | 4·0 | 76·5 | 76·3 | 0·2 | 0·67 |
| Saint Vincent and the Grenadines | 53·3 | 58·6 | –5·3 | 71·8 | 70·4 | 1·4 | 73·5 | 72·5 | 1·0 | 75·1 | 74·0 | 1·1 | 75·2 | 75·5 | –0·2 | 0·64 |
| Suriname | 61·2 | 59·6 | 1·5 | 71·1 | 71·5 | –0·5 | 73·0 | 72·8 | 0·1 | 75·6 | 74·4 | 1·2 | 74·2 | 75·5 | –1·2 | 0·63 |
| Trinidad and Tobago | 59·2 | 66·6 | –7·4 | 71·9 | 75·1 | –3·2 | 73·0 | 76·4 | –3·4 | 76·8 | 78·1 | –1·3 | 75·0 | 79·3 | –4·2 | 0·77 |

(Table 3 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| Virgin Islands | 64·8 | 69·2 | –4·4 | 75·4 | 75·9 | –0·5 | 77·0 | 77·4 | –0·5 | 80·6 | 79·9 | 0·7 | 82·3 | 80·9 | 1·3 | 0·82 |
| Central Latin America | 51·0 | 60·0 | –8·9 | 73·5 | 70·8 | 2·7 | 76·7 | 72·5 | 4·2 | 78·5 | 74·0 | 4·5 | 75·7 | 75·6 | 0·1 | 0·64 |
| Colombia | 56·0 | 59·6 | –3·7 | 75·0 | 70·8 | 4·1 | 78·4 | 72·4 | 6·0 | 81·2 | 74·0 | 7·2 | 79·7 | 75·9 | 3·8 | 0·66 |
| Costa Rica | 57·4 | 62·0 | –4·6 | 79·3 | 72·5 | 6·7 | 80·5 | 74·0 | 6·5 | 82·3 | 75·4 | 7·0 | 81·2 | 77·3 | 3·9 | 0·70 |
| El Salvador | 46·2 | 53·5 | –7·3 | 74·4 | 65·8 | 8·5 | 78·5 | 69·2 | 9·2 | 79·7 | 71·5 | 8·1 | 77·2 | 73·4 | 3·8 | 0·56 |
| Guatemala | 41·8 | 54·3 | –12·4 | 65·4 | 62·3 | 3·1 | 70·3 | 66·1 | 4·2 | 73·6 | 70·1 | 3·5 | 72·7 | 72·4 | 0·4 | 0·54 |
| Honduras | 40·5 | 53·1 | –12·6 | 71·0 | 63·2 | 7·8 | 70·7 | 66·6 | 4·1 | 71·8 | 69·6 | 2·1 | 70·7 | 71·9 | –1·2 | 0·51 |
| Mexico | 49·7 | 60·6 | –10·9 | 73·2 | 71·5 | 1·7 | 76·4 | 73·3 | 3·1 | 77·7 | 74·4 | 3·3 | 74·7 | 76·2 | –1·5 | 0·66 |
| Nicaragua | 49·5 | 55·0 | –5·5 | 77·0 | 64·1 | 12·9 | 80·1 | 67·9 | 12·2 | 79·6 | 70·2 | 9·4 | 76·8 | 72·2 | 4·6 | 0·52 |
| Panama | 63·2 | 63·8 | –0·6 | 78·9 | 72·8 | 6·1 | 80·9 | 74·1 | 6·8 | 82·0 | 75·1 | 6·9 | 81·4 | 77·3 | 4·1 | 0·71 |
| Venezuela | 57·1 | 62·9 | –5·8 | 75·2 | 71·9 | 3·3 | 78·7 | 73·4 | 5·2 | 80·1 | 74·4 | 5·7 | 74·6 | 74·8 | –0·2 | 0·60 |
| Tropical Latin America | 55·4 | 57·9 | –2·5 | 73·2 | 71·4 | 1·9 | 76·0 | 72·7 | 3·3 | 78·2 | 74·4 | 3·7 | 77·3 | 75·8 | 1·6 | 0·65 |
| Brazil | 55·4 | 57·9 | –2·5 | 73·1 | 71·4 | 1·7 | 76·0 | 72·7 | 3·3 | 78·2 | 74·4 | 3·7 | 77·4 | 75·8 | 1·6 | 0·65 |
| Paraguay | 59·8 | 59·6 | 0·2 | 77·2 | 70·4 | 6·7 | 77·9 | 72·4 | 5·5 | 78·2 | 74·0 | 4·2 | 75·9 | 75·8 | 0·1 | 0·64 |
| **North Africa and Middle East** | **45·8** | **53·5** | **–7·7** | **67·2** | **69·0** | **–1·8** | **71·1** | **72·0** | **–0·9** | **73·9** | **73·9** | **–0·0** | **73·7** | **76·0** | **–2·3** | **0·66** |
| Afghanistan | 38·0 | 45·6 | –7·6 | 52·5 | 51·9 | 0·6 | 54·1 | 52·3 | 1·8 | 59·8 | 57·5 | 2·3 | 60·7 | 63·5 | –2·8 | 0·34 |
| Algeria | 44·5 | 49·3 | –4·8 | 71·2 | 69·9 | 1·3 | 74·0 | 72·7 | 1·3 | 76·0 | 74·5 | 1·5 | 75·4 | 76·0 | –0·6 | 0·66 |
| Bahrain | 52·7 | 56·5 | –3·8 | 70·5 | 74·0 | –3·5 | 71·3 | 75·6 | –4·3 | 75·0 | 77·3 | –2·2 | 75·1 | 78·9 | –3·9 | 0·75 |
| Egypt | 45·5 | 56·5 | –11·0 | 63·7 | 68·1 | –4·4 | 68·7 | 71·5 | –2·9 | 69·3 | 71·2 | –1·9 | 70·2 | 74·5 | –4·4 | 0·61 |
| Iran | 43·7 | 51·9 | –8·2 | 69·5 | 69·6 | –0·1 | 75·0 | 73·4 | 1·5 | 78·1 | 75·5 | 2·6 | 77·2 | 77·1 | 0·1 | 0·70 |
| Iraq | 58·6 | 50·2 | 8·4 | 70·3 | 67·4 | 3·0 | 71·8 | 69·9 | 2·0 | 73·8 | 72·2 | 1·6 | 73·5 | 75·9 | –2·4 | 0·66 |
| Jordan | 52·9 | 48·4 | 4·5 | 71·9 | 72·7 | –0·8 | 72·2 | 74·1 | –1·9 | 77·2 | 76·0 | 1·2 | 77·6 | 77·8 | –0·3 | 0·73 |
| Kuwait | 67·2 | 62·6 | 4·6 | 77·3 | 76·4 | 0·9 | 80·2 | 77·7 | 2·5 | 82·8 | 79·8 | 3·1 | 85·1 | 81·7 | 3·3 | 0·85 |
| Lebanon | 55·8 | 59·3 | –3·5 | 73·1 | 72·4 | 0·7 | 76·9 | 73·9 | 3·0 | 80·0 | 76·2 | 3·9 | 78·4 | 78·3 | 0·1 | 0·74 |
| Libya | 43·7 | 50·2 | –6·5 | 74·5 | 72·5 | 2·0 | 76·2 | 75·5 | 0·7 | 74·9 | 77·7 | –2·8 | 73·4 | 78·1 | –4·8 | 0·73 |
| Morocco | 43·7 | 45·1 | –1·4 | 68·3 | 65·0 | 3·3 | 71·3 | 67·9 | 3·4 | 73·1 | 70·4 | 2·7 | 73·9 | 73·3 | 0·6 | 0·56 |
| Oman | 42·9 | 48·4 | –5·6 | 72·3 | 68·6 | 3·8 | 75·7 | 74·7 | 1·0 | 77·3 | 77·4 | –0·1 | 76·3 | 79·3 | –3·0 | 0·77 |
| Palestine | 46·2 | 49·3 | –3·1 | 71·7 | 67·1 | 4·5 | 73·2 | 69·9 | 3·3 | 74·9 | 72·2 | 2·7 | 76·2 | 75·2 | 1·0 | 0·63 |
| Qatar | 62·5 | 58·6 | 3·9 | 72·7 | 75·8 | –3·1 | 73·7 | 77·5 | –3·9 | 75·6 | 79·6 | –4·0 | 79·2 | 81·7 | –2·5 | 0·85 |
| Saudi Arabia | 53·3 | 54·6 | –1·3 | 69·4 | 72·7 | –3·3 | 71·6 | 75·6 | –4·1 | 73·5 | 78·3 | –4·8 | 75·1 | 80·8 | –5·7 | 0·82 |
| Sudan | 47·1 | 48·4 | –1·3 | 59·2 | 60·6 | –1·4 | 64·1 | 64·1 | –0·0 | 68·8 | 68·8 | –0·0 | 70·1 | 72·7 | –2·6 | 0·54 |
| Syria | 54·6 | 51·1 | 3·5 | 70·7 | 68·6 | 2·1 | 72·8 | 71·5 | 1·2 | 75·6 | 74·3 | 1·3 | 74·7 | 75·1 | –0·4 | 0·62 |
| Tunisia | 44·0 | 50·2 | –6·2 | 74·4 | 70·2 | 4·1 | 76·9 | 73·3 | 3·6 | 78·9 | 75·1 | 3·8 | 77·1 | 76·6 | 0·5 | 0·68 |
| Türkiye | 50·0 | 57·2 | –7·2 | 71·3 | 69·9 | 1·5 | 77·6 | 72·5 | 5·1 | 79·6 | 74·8 | 4·7 | 78·3 | 77·4 | 0·9 | 0·71 |
| United Arab Emirates | 57·4 | 53·9 | 3·5 | 70·9 | 75·6 | –4·7 | 72·5 | 78·9 | –6·4 | 71·3 | 81·2 | –10·0 | 71·5 | 81·9 | –10·3 | 0·85 |
| Yemen | 32·0 | 44·1 | –12·1 | 60·5 | 55·4 | 5·1 | 64·7 | 61·3 | 3·4 | 69·4 | 66·9 | 2·5 | 68·5 | 69·4 | –1·0 | 0·45 |

(Table 3 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| **South Asia** | **39·6** | **52·7** | **–13·1** | **61·5** | **62·6** | **–1·0** | **65·4** | **66·4** | **–1·0** | **69·4** | **69·6** | **–0·3** | **70·8** | **73·3** | **–2·5** | **0·56** |
| Bangladesh | 43·3 | 46·5 | –3·3 | 60·2 | 56·5 | 3·7 | 67·1 | 61·3 | 5·8 | 71·1 | 65·6 | 5·6 | 74·1 | 71·2 | 2·9 | 0·49 |
| Bhutan | 38·0 | 40·9 | –2·9 | 60·2 | 55·4 | 4·8 | 65·6 | 61·3 | 4·3 | 72·5 | 67·1 | 5·4 | 74·9 | 70·4 | 4·5 | 0·47 |
| India | 38·6 | 53·5 | –14·9 | 61·7 | 63·2 | –1·5 | 65·6 | 66·9 | –1·3 | 69·6 | 70·1 | –0·4 | 71·2 | 73·9 | –2·6 | 0·58 |
| Nepal | 40·8 | 45·6 | –4·8 | 58·4 | 54·3 | 4·1 | 66·3 | 59·6 | 6·6 | 70·6 | 64·7 | 5·9 | 70·8 | 68·8 | 2·0 | 0·43 |
| Pakistan | 46·1 | 50·6 | –4·5 | 62·9 | 62·0 | 0·9 | 62·9 | 65·8 | –2·9 | 65·7 | 68·8 | –3·0 | 66·4 | 71·5 | –5·1 | 0·50 |
| Southeast Asia, east Asia, and Oceania | 49·6 | 54·6 | –5·1 | 69·4 | 70·2 | –0·9 | 72·3 | 73·0 | –0·7 | 76·2 | 75·2 | 1·0 | 78·6 | 77·0 | 1·6 | 0·70 |
| East Asia | 50·6 | 53·9 | –3·3 | 70·1 | 70·2 | –0·2 | 73·3 | 73·3 | –0·0 | 77·8 | 75·8 | 2·0 | 80·7 | 77·8 | 2·9 | 0·73 |
| China | 50·7 | 53·1 | –2·4 | 69·9 | 69·9 | 0·1 | 73·4 | 72·8 | 0·6 | 77·8 | 75·5 | 2·3 | 80·7 | 77·7 | 3·0 | 0·72 |
| North Korea | 41·2 | 62·9 | –21·7 | 72·4 | 71·2 | 1·2 | 64·8 | 71·2 | –6·3 | 73·4 | 72·5 | 0·9 | 76·2 | 73·6 | 2·6 | 0·57 |
| Taiwan (province of China) | 58·4 | 61·0 | –2·6 | 77·3 | 76·3 | 1·0 | 79·8 | 78·8 | 1·0 | 83·0 | 81·1 | 1·9 | 84·6 | 82·7 | 1·9 | 0·87 |
| Oceania | 49·2 | 55·8 | –6·6 | 64·5 | 66·6 | –2·1 | 65·7 | 68·3 | –2·7 | 66·6 | 69·0 | –2·4 | 66·6 | 70·1 | –3·4 | 0·47 |
| American Samoa | 63·2 | 70·8 | –7·6 | 73·8 | 74·8 | –1·1 | 73·0 | 75·5 | –2·4 | 72·6 | 76·2 | –3·5 | 72·8 | 77·3 | –4·4 | 0·72 |
| Cook Islands | 46·7 | 63·5 | –16·9 | 71·4 | 73·4 | –2·0 | 75·6 | 75·4 | 0·3 | 78·8 | 77·4 | 1·4 | 79·6 | 79·6 | 0·0 | 0·78 |
| Federated States of Micronesia | 45·1 | 56·8 | –11·7 | 65·6 | 69·9 | –4·3 | 66·8 | 71·7 | –4·9 | 68·6 | 73·0 | –4·4 | 69·7 | 74·1 | –4·5 | 0·59 |
| Fiji | 59·2 | 61·3 | –2·1 | 69·1 | 72·5 | –3·4 | 68·2 | 74·1 | –6·0 | 69·2 | 75·0 | –5·8 | 68·8 | 76·3 | –7·5 | 0·68 |
| Guam | 70·1 | 73·4 | –3·3 | 75·8 | 76·6 | –0·8 | 78·6 | 77·8 | 0·7 | 82·9 | 78·9 | 4·0 | 82·9 | 80·3 | 2·6 | 0·80 |
| Kiribati | 48·0 | 59·3 | –11·2 | 61·5 | 67·6 | –6·1 | 63·5 | 69·2 | –5·7 | 65·1 | 70·6 | –5·5 | 67·0 | 72·2 | –5·2 | 0·53 |
| Marshall Islands | 53·6 | 56·5 | –2·9 | 66·3 | 68·6 | –2·3 | 63·9 | 70·2 | –6·4 | 64·6 | 71·9 | –7·3 | 66·8 | 73·6 | –6·8 | 0·57 |
| Nauru | 54·5 | 66·9 | –12·4 | 64·3 | 72·7 | –8·4 | 61·5 | 72·0 | –10·6 | 62·0 | 72·7 | –10·6 | 65·7 | 75·1 | –9·4 | 0·63 |
| Niue | 54·5 | 63·5 | –9·0 | 71·9 | 74·0 | –2·1 | 71·6 | 75·2 | –3·6 | 72·7 | 76·7 | –4·0 | 69·2 | 77·8 | –8·6 | 0·73 |
| Northern Mariana Islands | 65·4 | 69·2 | –3·8 | 73·2 | 77·5 | –4·4 | 75·3 | 78·8 | –3·5 | 76·2 | 78·8 | –2·5 | 75·0 | 79·6 | –4·6 | 0·77 |
| Palau | 50·8 | 68·1 | –17·3 | 68·6 | 76·2 | –7·5 | 69·7 | 77·3 | –7·5 | 69·5 | 77·8 | –8·4 | 70·5 | 78·8 | –8·3 | 0·75 |
| Papua New Guinea | 45·9 | 49·3 | –3·5 | 62·8 | 62·0 | 0·8 | 64·4 | 64·7 | –0·3 | 65·5 | 66·1 | –0·6 | 65·5 | 68·1 | –2·6 | 0·42 |
| Samoa | 58·0 | 60·3 | –2·3 | 71·1 | 70·8 | 0·3 | 71·7 | 71·9 | –0·2 | 72·0 | 73·1 | –1·1 | 71·9 | 74·1 | –2·2 | 0·59 |
| Solomon Islands | 48·6 | 51·9 | –3·3 | 64·1 | 61·3 | 2·8 | 65·8 | 64·7 | 1·1 | 66·9 | 66·1 | 0·8 | 68·4 | 68·6 | –0·2 | 0·43 |
| Tokelau | 58·2 | 61·0 | –2·8 | 68·6 | 72·0 | –3·4 | 70·3 | 73·6 | –3·3 | 72·2 | 75·2 | –3·0 | 67·8 | 76·7 | –8·9 | 0·69 |
| Tonga | 62·9 | 58·9 | 3·9 | 73·1 | 71·0 | 2·1 | 73·9 | 72·8 | 1·1 | 74·6 | 73·9 | 0·8 | 75·7 | 75·2 | 0·5 | 0·63 |
| Tuvalu | 49·2 | 58·6 | –9·4 | 62·5 | 66·9 | –4·4 | 63·5 | 70·2 | –6·7 | 69·0 | 72·0 | –3·1 | 70·6 | 73·7 | –3·1 | 0·58 |
| Vanuatu | 49·9 | 53·9 | –4·0 | 67·2 | 64·4 | 2·8 | 68·1 | 66·6 | 1·5 | 69·3 | 68·6 | 0·7 | 69·4 | 70·2 | –0·8 | 0·47 |
| Southeast Asia | 47·2 | 56·1 | –8·9 | 67·9 | 70·1 | –2·1 | 70·5 | 72·5 | –2·0 | 73·3 | 74·0 | –0·7 | 74·3 | 75·8 | –1·5 | 0·65 |

(Table 3 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| Cambodia | 45·4 | 53·5 | –8·1 | 59·6 | 60·6 | –1·0 | 62·4 | 63·5 | –1·1 | 69·2 | 67·6 | 1·5 | 71·0 | 70·4 | 0·5 | 0·47 |
| Indonesia | 44·4 | 53·9 | –9·4 | 65·4 | 69·6 | –4·3 | 68·3 | 72·5 | –4·2 | 70·8 | 74·0 | –3·2 | 72·0 | 76·0 | –4·0 | 0·66 |
| Laos | 41·0 | 48·9 | –7·9 | 54·6 | 58·9 | –4·4 | 60·0 | 62·9 | –2·9 | 67·0 | 67·9 | –0·8 | 70·4 | 71·0 | –0·6 | 0·49 |
| Malaysia | 57·5 | 55·4 | 2·1 | 74·5 | 72·8 | 1·7 | 75·6 | 75·2 | 0·4 | 76·4 | 76·8 | –0·5 | 75·7 | 78·3 | –2·6 | 0·74 |
| Maldives | 36·4 | 53·9 | –17·5 | 65·4 | 63·2 | 2·2 | 72·8 | 70·6 | 2·2 | 79·3 | 73·9 | 5·4 | 81·2 | 76·0 | 5·2 | 0·65 |
| Mauritius | 52·6 | 61·0 | –8·4 | 74·1 | 72·8 | 1·2 | 75·5 | 74·5 | 0·9 | 77·8 | 76·0 | 1·8 | 76·9 | 77·7 | –0·8 | 0·72 |
| Myanmar | 35·8 | 49·3 | –13·6 | 58·1 | 62·6 | –4·5 | 61·4 | 65·6 | –4·2 | 67·6 | 69·9 | –2·2 | 71·2 | 72·4 | –1·2 | 0·53 |
| Philippines | 58·8 | 63·5 | –4·7 | 71·8 | 71·7 | 0·1 | 73·8 | 72·8 | 1·0 | 74·0 | 73·6 | 0·4 | 72·2 | 75·9 | –3·7 | 0·65 |
| Seychelles | 62·9 | 65·6 | –2·6 | 75·5 | 73·7 | 1·8 | 76·6 | 75·8 | 0·9 | 77·0 | 76·6 | 0·5 | 76·5 | 78·0 | –1·5 | 0·73 |
| Sri Lanka | 54·1 | 63·2 | –9·1 | 74·1 | 72·0 | 2·1 | 76·5 | 73·9 | 2·6 | 78·2 | 75·4 | 2·9 | 79·7 | 77·1 | 2·6 | 0·70 |
| Thailand | 53·9 | 56·8 | –3·0 | 74·6 | 71·5 | 3·1 | 75·1 | 73·9 | 1·3 | 79·1 | 75·1 | 4·0 | 80·3 | 76·6 | 3·7 | 0·68 |
| Timor-Leste | 42·7 | 46·1 | –3·4 | 59·7 | 58·6 | 1·1 | 65·8 | 63·8 | 2·0 | 70·3 | 66·9 | 3·4 | 70·5 | 69·4 | 1·1 | 0·44 |
| Viet Nam | 50·3 | 55·0 | –4·7 | 73·2 | 67·4 | 5·8 | 76·4 | 71·0 | 5·4 | 77·4 | 73·3 | 4·1 | 78·3 | 75·0 | 3·4 | 0·63 |
| **Sub-Saharan Africa** | **43·9** | **50·6** | **–6·7** | **55·6** | **61·0** | **–5·4** | **54·5** | **63·2** | **–8·7** | **60·5** | **66·4** | **–5·8** | **64·1** | **69·9** | **–5·8** | **0·46** |
| Central sub-Saharan Africa | 44·0 | 50·2 | –6·2 | 55·0 | 61·3 | –6·3 | 54·6 | 62·6 | –8·0 | 59·8 | 66·6 | –6·8 | 63·8 | 70·8 | –7·0 | 0·47 |
| Angola | 45·3 | 48·4 | –3·1 | 52·2 | 59·3 | –7·1 | 55·0 | 62·0 | –6·9 | 62·3 | 66·4 | –4·1 | 63·7 | 70·6 | –6·9 | 0·45 |
| Central African Republic | 45·3 | 46·1 | –0·7 | 50·3 | 55·4 | –5·0 | 45·0 | 57·5 | –12·5 | 50·4 | 60·0 | –9·6 | 55·2 | 62·0 | –6·7 | 0·31 |
| Congo (Brazzaville) | 39·3 | 51·5 | –12·2 | 56·9 | 68·1 | –11·2 | 53·4 | 69·9 | –16·5 | 60·3 | 71·5 | –11·3 | 63·1 | 74·0 | –10·9 | 0·58 |
| Democratic Republic of the Congo | 44·2 | 49·8 | –5·6 | 56·0 | 60·6 | –4·6 | 55·3 | 58·9 | –3·6 | 59·7 | 60·3 | –0·6 | 64·5 | 66·6 | –2·1 | 0·38 |
| Equatorial Guinea | 32·8 | 46·1 | –13·3 | 54·5 | 59·3 | –4·8 | 58·6 | 67·6 | –9·1 | 62·1 | 73·3 | –11·2 | 63·7 | 76·2 | –12·5 | 0·66 |
| Gabon | 36·1 | 51·1 | –15·0 | 64·3 | 69·6 | –5·3 | 61·0 | 71·7 | –10·7 | 64·7 | 73·1 | –8·5 | 67·3 | 75·5 | –8·2 | 0·63 |
| Eastern sub-Saharan Africa | 40·8 | 47·0 | –6·2 | 53·1 | 56·8 | –3·7 | 53·3 | 58·9 | –5·7 | 61·7 | 63·2 | –1·6 | 64·5 | 67·6 | –3·1 | 0·41 |
| Burundi | 39·5 | 45·6 | –6·1 | 51·2 | 54·6 | –3·5 | 48·1 | 55·4 | –7·3 | 61·1 | 57·2 | 3·9 | 64·9 | 60·6 | 4·3 | 0·29 |
| Comoros | 45·7 | 47·5 | –1·8 | 59·6 | 60·0 | –0·3 | 62·2 | 64·7 | –2·5 | 66·7 | 67·9 | –1·2 | 68·2 | 70·4 | –2·3 | 0·48 |
| Djibouti | 60·4 | 51·5 | 8·9 | 63·7 | 63·8 | –0·2 | 62·6 | 65·8 | –3·3 | 64·7 | 68·3 | –3·6 | 67·0 | 71·2 | –4·2 | 0·49 |
| Eritrea | 41·4 | 42·5 | –1·1 | 52·3 | 55·4 | –3·1 | 58·8 | 62·0 | –3·2 | 62·8 | 64·4 | –1·6 | 64·8 | 67·4 | –2·6 | 0·40 |
| Ethiopia | 36·2 | 40·9 | –4·7 | 49·0 | 50·2 | –1·2 | 52·9 | 52·3 | 0·6 | 64·9 | 58·6 | 6·3 | 67·5 | 65·0 | 2·5 | 0·36 |
| Kenya | 48·4 | 47·5 | 0·9 | 63·5 | 63·5 | –0·1 | 56·0 | 66·4 | –10·3 | 62·7 | 68·8 | –6·0 | 67·2 | 72·2 | –5·0 | 0·52 |
| Madagascar | 40·4 | 48·4 | –8·0 | 57·4 | 60·0 | –2·6 | 60·0 | 60·3 | –0·3 | 62·8 | 62·3 | 0·5 | 63·9 | 67·1 | –3·2 | 0·40 |
| Malawi | 38·8 | 48·9 | –10·1 | 50·4 | 54·6 | –4·2 | 46·3 | 56·5 | –10·2 | 58·5 | 60·6 | –2·1 | 62·1 | 66·1 | –4·0 | 0·38 |
| Mozambique | 42·1 | 44·6 | –2·5 | 53·2 | 51·9 | 1·3 | 54·7 | 54·3 | 0·5 | 56·0 | 57·5 | –1·6 | 59·9 | 62·9 | –3·0 | 0·33 |
| Rwanda | 32·1 | 48·0 | –15·9 | 51·8 | 59·6 | –7·8 | 52·0 | 60·0 | –7·9 | 65·9 | 64·4 | 1·5 | 67·5 | 68·8 | –1·3 | 0·44 |

(Table 3 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| Somalia | 45·0 | 41·4 | 3·6 | 50·9 | 40·3 | 10·6 | 53·2 | 40·9 | 12·3 | 53·6 | 42·0 | 11·6 | 56·9 | 43·0 | 13·9 | 0·08 |
| South Sudan | 50·3 | 48·4 | 1·9 | 54·8 | 54·6 | 0·1 | 57·3 | 56·5 | 0·9 | 60·1 | 59·3 | 0·8 | 58·1 | 60·0 | –1·9 | 0·28 |
| Tanzania | 41·4 | 45·6 | –4·2 | 56·7 | 58·6 | –1·9 | 54·3 | 60·6 | –6·4 | 62·2 | 64·7 | –2·5 | 65·9 | 69·4 | –3·6 | 0·45 |
| Uganda | 41·5 | 45·1 | –3·6 | 50·8 | 53·1 | –2·3 | 51·5 | 56·8 | –5·3 | 62·0 | 63·2 | –1·2 | 64·9 | 68·3 | –3·5 | 0·42 |
| Zambia | 46·1 | 48·9 | –2·7 | 52·5 | 61·6 | –9·2 | 46·0 | 62·6 | –16·6 | 59·1 | 66·9 | –7·7 | 61·4 | 71·7 | –10·3 | 0·51 |
| Southern sub-Saharan Africa | 52·5 | 61·0 | –8·4 | 67·4 | 71·5 | –4·1 | 56·3 | 73·3 | –16·9 | 57·8 | 74·4 | –16·6 | 63·0 | 75·6 | –12·7 | 0·64 |
| Botswana | 52·6 | 48·9 | 3·8 | 65·0 | 67·9 | –2·9 | 50·1 | 71·9 | –21·7 | 59·7 | 74·0 | –14·3 | 62·9 | 75·6 | –12·8 | 0·64 |
| Eswatini | 43·2 | 49·3 | –6·2 | 65·1 | 67·1 | –2·0 | 50·4 | 70·2 | –19·9 | 49·7 | 72·2 | –22·5 | 56·1 | 74·0 | –17·9 | 0·59 |
| Lesotho | 52·9 | 50·6 | 2·2 | 65·9 | 63·8 | 2·1 | 51·2 | 67·1 | –16·0 | 51·9 | 69·4 | –17·5 | 52·1 | 71·7 | –19·6 | 0·51 |
| Namibia | 53·4 | 55·4 | –2·0 | 65·6 | 69·4 | –3·8 | 56·1 | 71·5 | –15·5 | 63·6 | 73·1 | –9·5 | 64·0 | 75·0 | –10·9 | 0·62 |
| South Africa | 52·4 | 62·9 | –10·5 | 68·4 | 72·7 | –4·2 | 59·2 | 74·3 | –15·0 | 59·0 | 75·4 | –16·3 | 64·8 | 76·6 | –11·8 | 0·68 |
| Zimbabwe | 54·8 | 52·7 | 2·1 | 63·8 | 67·1 | –3·3 | 47·8 | 69·2 | –21·4 | 53·5 | 67·9 | –14·4 | 58·0 | 70·4 | –12·5 | 0·47 |
| Western sub-Saharan Africa | 44·4 | 49·3 | –4·9 | 55·7 | 59·6 | –3·9 | 55·8 | 62·0 | –6·2 | 60·9 | 65·6 | –4·6 | 64·5 | 69·2 | –4·7 | 0·45 |
| Benin | 41·5 | 46·1 | –4·6 | 57·8 | 55·8 | 2·1 | 59·9 | 58·2 | 1·6 | 63·9 | 61·6 | 2·3 | 65·9 | 65·8 | 0·1 | 0·37 |
| Burkina Faso | 38·1 | 40·9 | –2·8 | 52·4 | 48·4 | 4·0 | 53·8 | 51·9 | 1·9 | 59·8 | 55·8 | 4·1 | 63·0 | 60·3 | 2·7 | 0·29 |
| Cabo Verde | 50·3 | 48·9 | 1·4 | 72·4 | 59·6 | 12·8 | 73·9 | 65·0 | 9·0 | 77·6 | 69·6 | 7·9 | 77·8 | 72·5 | 5·2 | 0·53 |
| Cameroon | 44·2 | 48·9 | –4·7 | 59·8 | 61·3 | –1·5 | 55·8 | 64·4 | –8·6 | 59·3 | 66·9 | –7·6 | 63·6 | 70·6 | –7·1 | 0·48 |
| Chad | 43·4 | 40·9 | 2·5 | 54·5 | 47·0 | 7·5 | 53·8 | 49·3 | 4·4 | 58·0 | 53·1 | 4·9 | 60·5 | 56·8 | 3·7 | 0·24 |
| Côte d'Ivoire | 47·5 | 47·0 | 0·4 | 58·4 | 60·0 | –1·5 | 53·7 | 63·5 | –9·8 | 59·4 | 65·0 | –5·6 | 65·8 | 68·3 | –2·5 | 0·43 |
| The Gambia | 54·8 | 47·5 | 7·3 | 61·9 | 57·2 | 4·7 | 62·7 | 61·0 | 1·8 | 64·8 | 64·4 | 0·4 | 65·9 | 67·6 | –1·8 | 0·41 |
| Ghana | 48·7 | 57·2 | –8·5 | 60·5 | 65·6 | –5·0 | 60·7 | 68·3 | –7·6 | 63·9 | 70·4 | –6·5 | 67·4 | 73·3 | –5·8 | 0·56 |
| Guinea | 41·5 | 41·4 | 0·0 | 51·9 | 52·7 | –0·9 | 54·8 | 55·4 | –0·6 | 59·1 | 58·6 | 0·5 | 62·2 | 63·8 | –1·6 | 0·34 |
| Guinea-Bissau | 32·1 | 42·0 | –9·9 | 52·2 | 54·6 | –2·5 | 54·2 | 57·9 | –3·7 | 58·8 | 60·6 | –1·8 | 61·3 | 64·7 | –3·4 | 0·35 |
| Liberia | 34·8 | 48·9 | –14·0 | 50·7 | 56·8 | –6·2 | 55·0 | 56·5 | –1·4 | 61·2 | 60·0 | 1·2 | 64·1 | 64·7 | –0·6 | 0·35 |
| Mali | 37·3 | 41·4 | –4·1 | 50·1 | 48·0 | 2·2 | 53·1 | 51·1 | 2·1 | 59·0 | 54·6 | 4·3 | 61·1 | 59·6 | 1·5 | 0·27 |
| Mauritania | 49·5 | 52·3 | –2·8 | 60·5 | 63·5 | –3·0 | 64·2 | 66·4 | –2·2 | 68·3 | 68·1 | 0·2 | 70·1 | 71·2 | –1·1 | 0·50 |
| Niger | 42·2 | 40·3 | 1·8 | 48·1 | 44·1 | 4·0 | 52·3 | 46·1 | 6·2 | 61·3 | 49·3 | 12·0 | 63·5 | 53·5 | 10·0 | 0·17 |
| Nigeria | 45·7 | 50·2 | –4·5 | 55·9 | 61·6 | –5·7 | 55·9 | 63·5 | –7·7 | 61·2 | 67·6 | –6·4 | 65·0 | 71·4 | –6·4 | 0·50 |
| São Tomé and Príncipe | 35·0 | 52·3 | –17·3 | 64·7 | 62·0 | 2·7 | 65·0 | 63·2 | 1·8 | 70·0 | 67·1 | 2·8 | 72·2 | 71·5 | 0·7 | 0·51 |
| Senegal | 46·5 | 46·1 | 0·4 | 60·4 | 56·8 | 3·5 | 61·9 | 60·3 | 1·6 | 67·1 | 63·2 | 3·9 | 68·2 | 67·6 | 0·6 | 0·41 |
| Sierra Leone | 40·3 | 47·0 | –6·7 | 53·1 | 55·0 | –1·9 | 52·7 | 55·8 | –3·0 | 56·6 | 59·6 | –3·0 | 62·1 | 65·0 | –2·8 | 0·36 |
| Togo | 44·8 | 45·6 | –0·8 | 59·4 | 59·3 | 0·1 | 58·4 | 61·6 | –3·2 | 61·4 | 63·5 | –2·1 | 66·0 | 67·6 | –1·6 | 0·41 |

SDI=Socio-demographic Index. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

*Table 3:* **Female life expectancy (estimated, expected based on SDI, and their difference) for 1950, 1990, 2000, 2010, and 2021, and SDI in 2021, globally and for GBD super-regions, regions, countries, and territories**

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| **Global** | **46·7** | **61·4** | **–14·6** | **63·0** | **66·9** | **–3·9** | **64·8** | **67·9** | **–3·1** | **68·0** | **68·8** | **–0·8** | **69·0** | **69·9** | **–0·9** | **0·67** |
| **Central Europe, eastern Europe, and central Asia** | **57·3** | **66·9** | **–9·6** | **64·8** | **69·3** | **–4·5** | **62·9** | **70·3** | **–7·4** | **66·2** | **71·8** | **–5·6** | **67·4** | **73·4** | **–5·9** | **0·77** |
| Central Asia | 45·9 | 64·0 | –18·1 | 64·0 | 67·6 | –3·6 | 63·2 | 68·1 | –4·9 | 66·3 | 69·2 | –2·9 | 67·4 | 69·9 | –2·4 | 0·68 |
| Armenia | 46·5 | 64·7 | –18·3 | 67·3 | 67·4 | –0·1 | 69·3 | 68·1 | 1·2 | 70·5 | 69·7 | 0·8 | 71·3 | 71·0 | 0·4 | 0·70 |
| Azerbaijan | 35·1 | 63·2 | –28·1 | 62·7 | 68·4 | –5·7 | 64·1 | 68·1 | –4·0 | 67·2 | 69·5 | –2·3 | 67·0 | 70·7 | –3·6 | 0·69 |
| Georgia | 48·3 | 67·5 | –19·2 | 65·2 | 69·7 | –4·4 | 65·5 | 69·1 | –3·6 | 67·7 | 70·1 | –2·5 | 67·3 | 72·0 | –4·7 | 0·73 |
| Kazakhstan | 52·5 | 64·6 | –12·0 | 63·2 | 68·3 | –5·1 | 59·4 | 69·4 | –10·0 | 63·1 | 70·4 | –7·3 | 65·3 | 71·5 | –6·1 | 0·73 |
| Kyrgyzstan | 44·6 | 64·4 | –19·8 | 62·5 | 66·8 | –4·3 | 62·6 | 67·4 | –4·8 | 65·2 | 67·6 | –2·4 | 68·4 | 68·7 | –0·3 | 0·60 |
| Mongolia | 36·8 | 57·7 | –20·9 | 59·8 | 65·2 | –5·5 | 60·6 | 66·9 | –6·3 | 62·6 | 68·0 | –5·4 | 65·7 | 68·9 | –3·2 | 0·62 |
| Tajikistan | 39·3 | 58·0 | –18·7 | 63·7 | 65·2 | –1·6 | 64·7 | 64·9 | –0·2 | 67·9 | 66·0 | 1·9 | 66·9 | 67·0 | –0·1 | 0·54 |
| Turkmenistan | 44·3 | 63·8 | –19·6 | 62·6 | 67·8 | –5·2 | 62·3 | 67·8 | –5·5 | 65·6 | 69·0 | –3·4 | 64·3 | 70·4 | –6·1 | 0·68 |
| Uzbekistan | 47·3 | 61·1 | –13·8 | 66·1 | 66·4 | –0·3 | 65·7 | 67·6 | –1·9 | 68·1 | 68·8 | –0·7 | 69·9 | 69·4 | 0·5 | 0·66 |
| Central Europe | 54·6 | 65·7 | –11·1 | 66·9 | 69·2 | –2·3 | 69·1 | 70·8 | –1·7 | 71·7 | 72·7 | –1·0 | 71·3 | 74·4 | –3·2 | 0·80 |
| Albania | 49·5 | 60·3 | –10·8 | 69·8 | 67·7 | 2·1 | 71·9 | 68·2 | 3·7 | 75·7 | 69·7 | 6·1 | 73·6 | 71·0 | 2·6 | 0·71 |
| Bosnia and Herzegovina | 45·6 | 56·7 | –11·2 | 70·6 | 67·3 | 3·3 | 72·7 | 68·6 | 4·1 | 74·3 | 70·3 | 4·0 | 72·6 | 71·6 | 0·9 | 0·72 |
| Bulgaria | 55·3 | 65·1 | –9·8 | 66·6 | 69·2 | –2·6 | 66·6 | 70·3 | –3·7 | 68·7 | 71·8 | –3·1 | 66·4 | 73·4 | –6·9 | 0·77 |
| Croatia | 48·9 | 65·4 | –16·5 | 68·1 | 70·0 | –1·9 | 70·9 | 71·0 | –0·1 | 73·7 | 73·0 | 0·7 | 74·1 | 74·7 | –0·5 | 0·80 |
| Czechia | 63·9 | 68·0 | –4·1 | 67·6 | 70·3 | –2·7 | 71·7 | 73·4 | –1·7 | 74·6 | 75·1 | –0·5 | 74·4 | 75·9 | –1·5 | 0·83 |
| Hungary | 57·7 | 66·4 | –8·7 | 65·2 | 69·5 | –4·4 | 67·5 | 71·3 | –3·8 | 70·8 | 73·2 | –2·4 | 70·9 | 74·2 | –3·3 | 0·79 |
| Montenegro | 64·7 | 64·9 | –0·2 | 71·5 | 70·1 | 1·4 | 71·0 | 70·1 | 0·8 | 72·6 | 72·4 | 0·2 | 69·8 | 74·4 | –4·7 | 0·80 |
| North Macedonia | 50·4 | 63·2 | –12·8 | 68·3 | 68·6 | –0·3 | 69·3 | 69·3 | –0·1 | 71·3 | 71·0 | 0·3 | 69·2 | 72·6 | –3·4 | 0·75 |
| Poland | 53·1 | 66·1 | –13·0 | 66·6 | 69·0 | –2·4 | 69·7 | 71·0 | –1·3 | 72·1 | 73·2 | –1·0 | 71·8 | 75·1 | –3·2 | 0·81 |
| Romania | 57·8 | 62·8 | –5·0 | 66·6 | 68·9 | –2·3 | 67·7 | 69·9 | –2·2 | 70·0 | 71·6 | –1·6 | 69·2 | 73·4 | –4·1 | 0·77 |
| Serbia | 46·3 | 65·6 | –19·3 | 67·3 | 69·1 | –1·8 | 68·6 | 69·8 | –1·2 | 71·7 | 72·2 | –0·4 | 71·7 | 74·4 | –2·8 | 0·79 |
| Slovakia | 60·7 | 66·9 | –6·2 | 66·7 | 69·7 | –3·0 | 69·4 | 72·0 | –2·6 | 71·9 | 74·0 | –2·1 | 71·3 | 75·1 | –3·8 | 0·81 |
| Slovenia | 53·0 | 67·7 | –14·7 | 70·1 | 71·8 | –1·7 | 72·4 | 73·8 | –1·4 | 76·3 | 75·5 | 0·7 | 77·6 | 76·5 | 1·1 | 0·84 |
| Eastern Europe | 61·7 | 67·6 | –5·9 | 64·5 | 69·9 | –5·4 | 60·4 | 70·8 | –10·4 | 63·7 | 72·7 | –9·0 | 65·8 | 74·9 | –9·0 | 0·80 |
| Belarus | 63·8 | 65·7 | –1·9 | 66·3 | 68·9 | –2·6 | 63·3 | 69·9 | –6·6 | 64·6 | 72·0 | –7·3 | 66·0 | 74·0 | –8·0 | 0·78 |
| Estonia | 62·1 | 67·7 | –5·6 | 64·7 | 70·1 | –5·4 | 65·6 | 72·2 | –6·6 | 71·0 | 74·7 | –3·7 | 72·4 | 76·5 | –4·2 | 0·84 |
| Latvia | 64·6 | 67·9 | –3·3 | 64·4 | 70·3 | –5·9 | 65·0 | 71·8 | –6·8 | 68·0 | 74·7 | –6·6 | 68·3 | 75·9 | –7·6 | 0·83 |
| Lithuania | 62·2 | 66·4 | –4·2 | 66·2 | 70·0 | –3·8 | 66·7 | 71·5 | –4·8 | 67·5 | 74·4 | –7·0 | 69·2 | 77·2 | –8·0 | 0·86 |
| Moldova | 49·2 | 65·1 | –15·9 | 64·6 | 68·6 | –4·0 | 65·0 | 68·9 | –3·9 | 65·6 | 70·0 | –4·4 | 67·9 | 71·8 | –3·9 | 0·73 |
| Russia | 60·9 | 67·7 | –6·8 | 64·0 | 70·0 | –6·0 | 59·3 | 71·1 | –11·8 | 62·9 | 73·2 | –10·3 | 65·5 | 75·1 | –9·6 | 0·81 |
| Ukraine | 64·7 | 67·5 | –2·8 | 65·7 | 69·4 | –3·8 | 62·3 | 70·0 | –7·7 | 65·7 | 71·5 | –5·7 | 66·3 | 73·0 | –6·7 | 0·76 |
| **High income** | **61·9** | **68·2** | **–6·3** | **72·7** | **72·6** | **0·2** | **75·2** | **74·2** | **1·0** | **77·7** | **75·3** | **2·4** | **77·9** | **77·0** | **0·9** | **0·85** |
| Australasia | 67·0 | 67·9 | –0·9 | 73·6 | 71·8 | 1·8 | 76·8 | 73·6 | 3·2 | 79·6 | 74·9 | 4·7 | 81·2 | 76·5 | 4·6 | 0·85 |
| Australia | 66·9 | 67·7 | –0·8 | 73·8 | 71·6 | 2·1 | 77·0 | 73·4 | 3·6 | 79·7 | 74·9 | 4·8 | 81·2 | 76·5 | 4·7 | 0·84 |

(Table 4 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| New Zealand | 68·6 | 67·6 | 1·0 | 72·6 | 72·6 | –0·1 | 74·0 | 76·0 | –2·0 | 75·1 | 79·0 | –3·9 | 76·8 | 80·7 | –4·0 | 0·85 |
| High–income Asia Pacific | 66·4 | 51·8 | 14·7 | 73·4 | 74·4 | –1·0 | 75·3 | 76·9 | –1·6 | 76·5 | 79·4 | –2·8 | 77·8 | 81·8 | –4·1 | 0·88 |
| Brunei | 61·4 | 48·6 | 12·7 | 69·9 | 69·6 | 0·3 | 71·5 | 72·8 | –1·3 | 73·6 | 74·6 | –1·0 | 75·1 | 74·9 | 0·2 | 0·81 |
| Japan | 67·4 | 59·9 | 7·5 | 74·2 | 76·2 | –2·0 | 75·7 | 78·0 | –2·3 | 76·5 | 79·9 | –3·4 | 77·6 | 82·2 | –4·6 | 0·87 |
| Singapore | 58·6 | 53·8 | 4·8 | 70·4 | 73·0 | –2·6 | 73·4 | 76·8 | –3·4 | 75·9 | 80·3 | –4·4 | 77·0 | 83·6 | –6·7 | 0·86 |
| South Korea | 57·7 | 30·1 | 27·5 | 70·5 | 68·0 | 2·5 | 74·0 | 72·6 | 1·4 | 76·5 | 77·2 | –0·7 | 78·1 | 80·3 | –2·1 | 0·89 |
| High–income North America | 68·8 | 65·5 | 3·3 | 73·2 | 72·3 | 0·9 | 74·4 | 74·4 | 0·0 | 75·9 | 76·6 | –0·7 | 77·4 | 74·8 | 2·6 | 0·86 |
| Canada | 68·9 | 66·6 | 2·3 | 73·8 | 74·1 | –0·3 | 75·3 | 76·6 | –1·3 | 76·5 | 79·2 | –2·6 | 77·8 | 79·5 | –1·8 | 0·87 |
| Greenland | 67·9 | 46·9 | 21·0 | 71·8 | 62·4 | 9·4 | 72·2 | 66·5 | 5·7 | 74·9 | 69·5 | 5·3 | 76·1 | 71·4 | 4·7 | 0·83 |
| USA | 68·8 | 65·5 | 3·3 | 73·2 | 72·1 | 1·1 | 74·4 | 74·2 | 0·3 | 75·7 | 76·3 | –0·6 | 77·4 | 74·3 | 3·1 | 0·86 |
| Southern Latin America | 65·4 | 58·8 | 6·6 | 68·2 | 69·3 | –1·1 | 69·3 | 71·4 | –2·1 | 70·3 | 73·5 | –3·2 | 72·4 | 73·8 | –1·4 | 0·74 |
| Argentina | 65·7 | 61·5 | 4·2 | 68·2 | 68·9 | –0·7 | 69·3 | 70·5 | –1·2 | 70·0 | 72·6 | –2·6 | 72·0 | 73·0 | –1·0 | 0·72 |
| Chile | 64·4 | 50·6 | 13·8 | 68·2 | 70·3 | –2·1 | 69·7 | 74·1 | –4·4 | 71·0 | 75·9 | –5·0 | 73·4 | 76·1 | –2·8 | 0·77 |
| Uruguay | 65·6 | 63·8 | 1·8 | 68·1 | 69·4 | –1·3 | 69·0 | 70·9 | –1·9 | 69·9 | 72·8 | –2·9 | 71·5 | 72·0 | –0·6 | 0·72 |
| Western Europe | 68·2 | 64·5 | 3·7 | 72·4 | 73·0 | –0·6 | 74·0 | 75·6 | –1·6 | 75·3 | 78·5 | –3·2 | 76·8 | 79·4 | –2·6 | 0·85 |
| Andorra | 68·6 | 71·2 | –2·6 | 73·0 | 75·8 | –2·8 | 73·8 | 77·2 | –3·4 | 76·3 | 79·2 | –2·8 | 77·6 | 80·7 | –3·1 | 0·87 |
| Austria | 68·5 | 63·6 | 4·9 | 72·6 | 72·4 | 0·2 | 74·2 | 75·3 | –1·1 | 75·7 | 77·9 | –2·2 | 77·0 | 79·2 | –2·3 | 0·85 |
| Belgium | 68·0 | 63·3 | 4·7 | 72·2 | 72·7 | –0·5 | 73·8 | 74·7 | –1·0 | 75·3 | 77·5 | –2·2 | 77·0 | 79·3 | –2·3 | 0·85 |
| Cyprus | 64·7 | 56·1 | 8·7 | 69·5 | 72·6 | –3·1 | 72·4 | 74·1 | –1·8 | 75·1 | 77·2 | –2·1 | 76·1 | 79·2 | –3·1 | 0·84 |
| Denmark | 69·2 | 69·5 | –0·2 | 74·7 | 72·3 | 2·3 | 76·3 | 74·7 | 1·7 | 77·4 | 77·4 | 0·0 | 78·5 | 79·5 | –1·0 | 0·90 |
| Finland | 67·8 | 60·7 | 7·1 | 72·7 | 71·2 | 1·6 | 74·2 | 74·4 | –0·2 | 75·7 | 77·1 | –1·4 | 77·2 | 79·5 | –2·3 | 0·86 |
| France | 67·3 | 64·5 | 2·8 | 71·8 | 73·0 | –1·2 | 73·6 | 75·3 | –1·7 | 74·9 | 78·1 | –3·2 | 76·3 | 79·6 | –3·2 | 0·84 |
| Germany | 69·3 | 64·4 | 5·0 | 75·3 | 72·1 | 3·2 | 76·8 | 75·3 | 1·5 | 77·9 | 77·9 | 0·0 | 78·9 | 78·5 | 0·4 | 0·90 |
| Greece | 66·5 | 67·8 | –1·2 | 70·1 | 74·7 | –4·6 | 72·0 | 75·9 | –3·9 | 73·6 | 77·8 | –4·2 | 74·2 | 77·2 | –3·0 | 0·79 |
| Iceland | 67·8 | 69·0 | –1·2 | 73·2 | 75·9 | –2·7 | 74·9 | 78·3 | –3·4 | 76·3 | 80·0 | –3·7 | 77·8 | 82·3 | –4·6 | 0·88 |
| Ireland | 68·1 | 65·0 | 3·1 | 71·5 | 72·2 | –0·8 | 73·8 | 74·0 | –0·2 | 75·9 | 78·6 | –2·6 | 77·8 | 80·8 | –3·0 | 0·87 |
| Israel | 66·5 | 72·2 | –5·7 | 71·1 | 75·5 | –4·3 | 72·6 | 76·8 | –4·2 | 73·6 | 80·1 | –6·5 | 75·1 | 81·2 | –6·1 | 0·81 |
| Italy | 66·9 | 65·2 | 1·7 | 71·0 | 73·7 | –2·7 | 72·6 | 76·5 | –3·9 | 73·8 | 79·3 | –5·5 | 74·9 | 80·3 | –5·4 | 0·81 |
| Luxembourg | 69·4 | 63·5 | 6·0 | 73·8 | 71·6 | 2·2 | 75·5 | 75·0 | 0·5 | 77·0 | 78·5 | –1·5 | 78·1 | 80·4 | –2·2 | 0·88 |
| Malta | 63·4 | 64·6 | –1·2 | 69·7 | 74·1 | –4·4 | 71·1 | 76·3 | –5·1 | 72·7 | 79·0 | –6·2 | 74·7 | 81·3 | –6·6 | 0·80 |
| Monaco | 70·5 | 64·0 | 6·5 | 76·5 | 74·7 | 1·8 | 77·6 | 75·9 | 1·7 | 78·3 | 77·1 | 1·2 | 79·1 | 76·3 | 2·8 | 0·91 |
| Netherlands | 69·5 | 70·6 | –1·1 | 74·4 | 73·8 | 0·6 | 75·9 | 75·5 | 0·4 | 77·2 | 78·8 | –1·6 | 78·3 | 79·8 | –1·5 | 0·89 |
| Norway | 69·7 | 70·6 | –1·0 | 74·4 | 73·7 | 0·8 | 76·5 | 76·0 | 0·5 | 77·9 | 79·0 | –1·0 | 79·3 | 81·7 | –2·4 | 0·92 |
| Portugal | 63·6 | 55·9 | 7·7 | 68·5 | 70·6 | –2·1 | 69·8 | 73·3 | –3·5 | 71·0 | 77·0 | –6·0 | 72·4 | 78·5 | –6·1 | 0·74 |
| San Marino | 69·3 | 69·4 | –0·1 | 75·3 | 76·6 | –1·3 | 77·2 | 78·4 | –1·3 | 77·9 | 80·5 | –2·6 | 78·1 | 84·4 | –6·2 | 0·89 |
| Spain | 64·4 | 59·6 | 4·8 | 69·2 | 73·3 | –4·1 | 70·7 | 75·9 | –5·2 | 72·2 | 78·9 | –6·8 | 73·4 | 79·9 | –6·6 | 0·77 |

(Table 4 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| Sweden | 69·3 | 70·3 | –1·0 | 74·0 | 75·0 | –1·0 | 76·1 | 77·5 | –1·4 | 77·2 | 79·8 | –2·7 | 78·3 | 82·0 | –3·6 | 0·89 |
| Switzerland | 72·6 | 66·7 | 5·9 | 77·4 | 74·3 | 3·0 | 78·1 | 77·3 | 0·8 | 79·1 | 80·5 | –1·4 | 80·0 | 82·5 | –2·5 | 0·93 |
| UK | 68·7 | 66·9 | 1·8 | 72·4 | 72·9 | –0·5 | 74·2 | 75·4 | –1·2 | 75·5 | 78·5 | –3·0 | 77·2 | 78·2 | –1·0 | 0·86 |
| England | 68·7 | 67·1 | 1·6 | 72·4 | 73·1 | –0·8 | 74·2 | 75·7 | –1·5 | 75·5 | 78·9 | –3·4 | 77·2 | 78·4 | –1·2 | 0·86 |
| Northern Ireland | 68·0 | 66·3 | 1·7 | 71·6 | 71·4 | 0·2 | 73·6 | 74·8 | –1·3 | 74·9 | 77·5 | –2·6 | 76·3 | 78·3 | –1·9 | 0·84 |
| Scotland | 68·5 | 65·7 | 2·8 | 72·4 | 71·1 | 1·3 | 74·2 | 73·3 | 0·9 | 75·5 | 76·3 | –0·8 | 77·0 | 76·3 | 0·7 | 0·85 |
| Wales | 68·1 | 66·3 | 1·8 | 71·1 | 72·9 | –1·8 | 73·0 | 75·0 | –2·0 | 74·2 | 77·9 | –3·6 | 76·1 | 78·7 | –2·6 | 0·83 |
| **Latin America and Caribbean** | **55·7** | **47·9** | **7·8** | **66·3** | **66·7** | **–0·4** | **67·4** | **69·7** | **–2·3** | **68·4** | **70·7** | **–2·3** | **69·4** | **68·9** | **0·5** | **0·65** |
| Andean Latin America | 56·7 | 40·4 | 16·3 | 66·3 | 66·6 | –0·3 | 67·3 | 71·1 | –3·9 | 68·3 | 73·9 | –5·6 | 69·7 | 68·3 | 1·3 | 0·65 |
| Bolivia | 53·7 | 36·3 | 17·4 | 63·8 | 60·4 | 3·5 | 65·9 | 65·4 | 0·5 | 67·3 | 69·4 | –2·2 | 68·6 | 63·8 | 4·8 | 0·60 |
| Ecuador | 58·9 | 49·9 | 9·0 | 66·8 | 69·8 | –3·0 | 67·4 | 71·4 | –4·0 | 68·3 | 71·9 | –3·6 | 69·9 | 71·0 | –1·1 | 0·66 |
| Peru | 56·7 | 39·1 | 17·6 | 66·5 | 67·3 | –0·7 | 67·5 | 73·1 | –5·6 | 68·6 | 76·7 | –8·1 | 69·8 | 68·8 | 1·0 | 0·66 |
| Caribbean | 58·9 | 52·8 | 6·1 | 66·8 | 66·0 | 0·8 | 67·6 | 68·2 | –0·7 | 68·6 | 59·1 | 9·5 | 69·3 | 66·9 | 2·5 | 0·64 |
| Antigua and Barbuda | 58·9 | 54·8 | 4·1 | 68·8 | 70·5 | –1·7 | 69·8 | 72·1 | –2·3 | 71·1 | 73·3 | –2·2 | 72·6 | 73·0 | –0·4 | 0·75 |
| The Bahamas | 65·6 | 54·8 | 10·8 | 70·7 | 67·7 | 3·0 | 72·2 | 67·7 | 4·4 | 73·6 | 69·5 | 4·0 | 74·9 | 66·1 | 8·8 | 0·81 |
| Barbados | 63·4 | 51·0 | 12·4 | 69·7 | 71·3 | –1·7 | 70·3 | 72·4 | –2·1 | 71·3 | 74·7 | –3·4 | 72·4 | 74·4 | –2·0 | 0·75 |
| Belize | 56·1 | 53·3 | 2·8 | 63·8 | 71·7 | –7·8 | 66·3 | 66·7 | –0·5 | 67·7 | 71·0 | –3·3 | 68·7 | 70·5 | –1·8 | 0·61 |
| Bermuda | 63·6 | 61·4 | 2·2 | 70·7 | 69·3 | 1·4 | 72·0 | 74·1 | –2·1 | 74·2 | 76·6 | –2·4 | 75·5 | 75·6 | –0·1 | 0·82 |
| Cuba | 61·6 | 65·0 | –3·4 | 67·7 | 73·0 | –5·3 | 67·8 | 74·9 | –7·1 | 68·8 | 76·2 | –7·4 | 70·0 | 70·9 | –0·9 | 0·67 |
| Dominica | 61·6 | 45·6 | 16·0 | 67·7 | 69·1 | –1·4 | 69·4 | 70·1 | –0·7 | 70·8 | 70·4 | 0·4 | 72·4 | 67·4 | 4·9 | 0·75 |
| Dominican Republic | 46·0 | 53·5 | –7·5 | 64·4 | 69·3 | –4·9 | 66·1 | 70·6 | –4·4 | 67·9 | 71·5 | –3·6 | 68·9 | 70·5 | –1·6 | 0·62 |
| Grenada | 52·2 | 54·6 | –2·4 | 64·4 | 67·6 | –3·2 | 67·3 | 67·7 | –0·4 | 68·8 | 68·2 | 0·6 | 70·0 | 67·3 | 2·7 | 0·67 |
| Guyana | 56·4 | 49·5 | 6·9 | 65·1 | 60·3 | 4·8 | 67·0 | 62·2 | 4·9 | 68·1 | 63·3 | 4·8 | 69·5 | 61·1 | 8·4 | 0·65 |
| Haiti | 49·1 | 35·2 | 13·9 | 58·0 | 53·2 | 4·8 | 61·1 | 57·2 | 3·9 | 63·2 | 35·4 | 27·8 | 64·7 | 58·8 | 6·0 | 0·45 |
| Jamaica | 60·8 | 54·5 | 6·3 | 67·1 | 73·9 | –6·7 | 68·4 | 72·7 | –4·3 | 69·3 | 74·6 | –5·2 | 70·4 | 72·0 | –1·6 | 0·68 |
| Puerto Rico | 62·8 | 59·7 | 3·1 | 69·8 | 69·8 | 0·0 | 71·1 | 72·6 | –1·5 | 73·0 | 75·8 | –2·8 | 75·7 | 76·6 | –0·9 | 0·83 |
| Saint Kitts and Nevis | 59·5 | 56·5 | 3·0 | 68·1 | 65·8 | 2·3 | 69·4 | 69·1 | 0·3 | 71·5 | 70·0 | 1·5 | 73·0 | 68·5 | 4·4 | 0·75 |
| Saint Lucia | 55·7 | 50·1 | 5·7 | 66·1 | 67·6 | –1·5 | 68·1 | 70·2 | –2·1 | 69·2 | 72·3 | –3·1 | 70·0 | 69·7 | 0·3 | 0·67 |
| Saint Vincent and the Grenadines | 54·7 | 50·4 | 4·3 | 65·6 | 68·2 | –2·6 | 67·1 | 68·8 | –1·6 | 68·2 | 71·1 | –2·9 | 69·3 | 69·7 | –0·4 | 0·64 |
| Suriname | 55·7 | 56·8 | –1·1 | 66·4 | 66·3 | 0·1 | 67·4 | 67·0 | 0·3 | 68·5 | 69·2 | –0·7 | 69·3 | 67·5 | 1·8 | 0·63 |
| Trinidad and Tobago | 62·3 | 56·6 | 5·7 | 69·0 | 67·0 | 2·0 | 70·1 | 68·0 | 2·2 | 72·0 | 70·6 | 1·4 | 73·4 | 67·6 | 5·8 | 0·77 |
| Virgin Islands | 64·6 | 58·8 | 5·8 | 69·7 | 69·2 | 0·5 | 71·1 | 70·1 | 1·1 | 74·2 | 71·5 | 2·7 | 75·5 | 71·3 | 4·2 | 0·82 |

(Table 4 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| Central Latin America | 56·1 | 48·5 | 7·6 | 65·9 | 67·9 | –2·1 | 67·1 | 70·8 | –3·6 | 68·2 | 72·6 | –4·4 | 69·4 | 68·3 | 1·1 | 0·64 |
| Colombia | 55·7 | 53·3 | 2·5 | 65·9 | 68·2 | –2·4 | 67·0 | 70·5 | –3·4 | 68·2 | 75·0 | –6·8 | 69·7 | 72·6 | –3·0 | 0·66 |
| Costa Rica | 58·0 | 55·4 | 2·6 | 67·1 | 74·8 | –7·7 | 68·2 | 75·5 | –7·3 | 69·2 | 76·7 | –7·5 | 71·0 | 74·3 | –3·3 | 0·70 |
| El Salvador | 49·5 | 43·7 | 5·8 | 61·6 | 65·4 | –3·8 | 64·6 | 68·3 | –3·7 | 66·4 | 71·0 | –4·5 | 67·8 | 67·9 | –0·1 | 0·56 |
| Guatemala | 50·3 | 42·4 | 7·9 | 58·3 | 60·1 | –1·8 | 61·8 | 64·3 | –2·4 | 65·2 | 67·5 | –2·2 | 67·0 | 66·2 | 0·9 | 0·54 |
| Honduras | 49·1 | 38·0 | 11·1 | 59·2 | 66·5 | –7·3 | 62·3 | 69·0 | –6·7 | 64·9 | 70·0 | –5·1 | 66·7 | 66·4 | 0·2 | 0·51 |
| Mexico | 56·7 | 46·8 | 9·9 | 66·4 | 68·2 | –1·7 | 67·7 | 71·7 | –4·0 | 68·5 | 72·4 | –3·9 | 69·9 | 67·4 | 2·5 | 0·66 |
| Nicaragua | 51·1 | 46·6 | 4·5 | 60·0 | 70·5 | –10·5 | 63·4 | 73·2 | –9·8 | 65·4 | 74·3 | –8·9 | 66·9 | 69·9 | –3·0 | 0·52 |
| Panama | 59·8 | 59·4 | 0·3 | 67·4 | 74·2 | –6·8 | 68·3 | 75·5 | –7·2 | 69·0 | 75·5 | –6·5 | 71·0 | 75·5 | –4·5 | 0·71 |
| Venezuela | 58·9 | 54·8 | 4·1 | 66·7 | 69·5 | –2·8 | 67·8 | 69·7 | –1·9 | 68·5 | 71·4 | –2·9 | 68·8 | 65·1 | 3·7 | 0·60 |
| Tropical Latin America | 54·0 | 48·3 | 5·7 | 66·3 | 65·8 | 0·5 | 67·3 | 68·7 | –1·5 | 68·5 | 70·9 | –2·4 | 69·5 | 70·2 | –0·6 | 0·65 |
| Brazil | 54·0 | 48·1 | 5·9 | 66·3 | 65·6 | 0·7 | 67·3 | 68·6 | –1·4 | 68·5 | 70·8 | –2·3 | 69·5 | 70·2 | –0·7 | 0·65 |
| Paraguay | 55·7 | 57·7 | –1·9 | 65·6 | 73·7 | –8·1 | 67·0 | 73·1 | –6·1 | 68·2 | 72·7 | –4·5 | 69·5 | 69·0 | 0·6 | 0·64 |
| **North Africa and Middle East** | **49·5** | **41·3** | **8·2** | **64·4** | **63·8** | **0·6** | **66·8** | **67·4** | **–0·6** | **68·1** | **70·3** | **–2·2** | **69·8** | **68·9** | **0·8** | **0·66** |
| Afghanistan | 41·2 | 38·5 | 2·7 | 47·8 | 52·5 | –4·7 | 48·2 | 53·3 | –5·0 | 53·7 | 59·1 | –5·4 | 59·5 | 55·9 | 3·6 | 0·34 |
| Algeria | 45·1 | 41·1 | 4·0 | 65·1 | 68·6 | –3·5 | 67·3 | 71·2 | –3·9 | 68·6 | 74·9 | –6·3 | 69·8 | 72·1 | –2·3 | 0·66 |
| Bahrain | 52·6 | 50·9 | 1·7 | 68·2 | 67·9 | 0·4 | 69·4 | 68·6 | 0·9 | 71·0 | 73·0 | –2·0 | 73·0 | 72·2 | 0·8 | 0·75 |
| Egypt | 52·6 | 42·7 | 9·9 | 63·6 | 62·3 | 1·3 | 66·4 | 66·4 | 0·0 | 66·1 | 67·5 | –1·3 | 68·6 | 66·9 | 1·7 | 0·61 |
| Iran | 47·8 | 35·7 | 12·1 | 64·9 | 65·8 | –0·9 | 67·8 | 71·2 | –3·4 | 69·3 | 74·0 | –4·7 | 70·8 | 71·9 | –1·0 | 0·70 |
| Iraq | 46·0 | 51·5 | –5·5 | 63·0 | 64·5 | –1·5 | 65·1 | 66·6 | –1·6 | 66·9 | 68·5 | –1·5 | 69·7 | 67·5 | 2·1 | 0·66 |
| Jordan | 44·2 | 49·4 | –5·2 | 67·3 | 72·1 | –4·9 | 68·3 | 74·2 | –5·9 | 69·8 | 77·5 | –7·7 | 71·6 | 74·1 | –2·5 | 0·73 |
| Kuwait | 58·6 | 50·9 | 7·7 | 70·1 | 72·4 | –2·3 | 71·5 | 76·0 | –4·5 | 74·0 | 79·1 | –5·1 | 76·5 | 78·1 | –1·6 | 0·85 |
| Lebanon | 55·4 | 51·4 | 4·0 | 67·0 | 65·9 | 1·1 | 68·1 | 74·3 | –6·2 | 69·9 | 75·6 | –5·8 | 72·2 | 72·2 | 0·0 | 0·74 |
| Libya | 46·0 | 40·2 | 5·8 | 67·1 | 71·3 | –4·1 | 69·3 | 72·8 | –3·5 | 71·5 | 72·4 | –0·9 | 72·0 | 68·7 | 3·3 | 0·73 |
| Morocco | 40·6 | 38·6 | 2·0 | 60·8 | 65·8 | –5·0 | 63·4 | 69·2 | –5·8 | 65·6 | 71·5 | –6·0 | 67·7 | 70·9 | –3·2 | 0·56 |
| Oman | 44·2 | 38·0 | 6·1 | 64·0 | 66·6 | –2·6 | 68·7 | 69·4 | –0·7 | 71·1 | 70·6 | 0·5 | 73·4 | 70·5 | 2·9 | 0·77 |
| Palestine | 45·1 | 41·3 | 3·8 | 62·8 | 67·2 | –4·5 | 65·1 | 66·8 | –1·7 | 66·9 | 70·7 | –3·8 | 69·1 | 71·5 | –2·4 | 0·63 |
| Qatar | 54·7 | 54·7 | 0·1 | 69·5 | 68·7 | 0·9 | 71·3 | 69·0 | 2·3 | 73·8 | 72·6 | 1·2 | 76·5 | 76·1 | 0·4 | 0·85 |
| Saudi Arabia | 50·7 | 52·6 | –1·9 | 67·3 | 66·6 | 0·7 | 69·4 | 69·1 | 0·3 | 72·2 | 70·3 | 1·9 | 75·3 | 71·8 | 3·5 | 0·82 |
| Sudan | 44·2 | 47·4 | –3·2 | 56·7 | 56·7 | 0·0 | 60·0 | 61·5 | –1·5 | 64·2 | 66·4 | –2·2 | 67·3 | 66·3 | 1·0 | 0·54 |
| Syria | 46·9 | 52·1 | –5·2 | 64·0 | 67·8 | –3·8 | 66·4 | 70·4 | –4·0 | 68·4 | 72·9 | –4·5 | 69·0 | 70·1 | –1·1 | 0·62 |
| Tunisia | 46·0 | 39·7 | 6·3 | 65·4 | 70·1 | –4·7 | 67·7 | 71·8 | –4·1 | 69·0 | 73·9 | –4·9 | 70·3 | 70·8 | –0·6 | 0·68 |
| Türkiye | 53·3 | 41·3 | 12·0 | 65·1 | 64·4 | 0·7 | 67·1 | 69·3 | –2·2 | 68·8 | 73·0 | –4·2 | 71·1 | 72·3 | –1·1 | 0·71 |
| United Arab Emirates | 49·9 | 53·3 | –3·4 | 69·4 | 69·4 | 0·0 | 73·0 | 70·1 | 2·8 | 75·9 | 72·3 | 3·6 | 76·8 | 77·5 | –0·8 | 0·85 |
| Yemen | 39·6 | 29·7 | 9·9 | 51·4 | 57·1 | –5·7 | 57·4 | 61·7 | –4·4 | 62·5 | 66·3 | –3·7 | 64·7 | 62·4 | 2·3 | 0·45 |

(Table 4 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| **South Asia** | **48·6** | **37·6** | **11·0** | **58·6** | **59·9** | **–1·3** | **62·1** | **63·0** | **–0·9** | **64·9** | **65·9** | **–0·9** | **67·7** | **66·4** | **1·3** | **0·56** |
| Bangladesh | 42·2 | 40·5 | 1·7 | 52·6 | 58·0 | –5·4 | 57·4 | 63·6 | –6·2 | 61·4 | 68·1 | –6·7 | 66·1 | 70·6 | –4·5 | 0·49 |
| Bhutan | 36·3 | 37·0 | –0·8 | 51·4 | 60·1 | –8·7 | 57·4 | 65·5 | –8·1 | 62·8 | 70·6 | –7·9 | 65·6 | 72·7 | –7·1 | 0·47 |
| India | 49·5 | 36·4 | 13·1 | 59·2 | 60·0 | –0·8 | 62·5 | 63·1 | –0·5 | 65·2 | 65·9 | –0·6 | 68·1 | 66·6 | 1·5 | 0·58 |
| Nepal | 41·2 | 37·0 | 4·1 | 50·3 | 57·6 | –7·3 | 55·7 | 64·2 | –8·5 | 60·6 | 67·9 | –7·3 | 64·2 | 66·1 | –1·9 | 0·43 |
| Pakistan | 46·5 | 47·6 | –1·1 | 58·0 | 62·2 | –4·2 | 61·6 | 62·3 | –0·7 | 64·2 | 64·4 | –0·2 | 66·4 | 63·8 | 2·6 | 0·50 |
| **Southeast Asia, east Asia, and Oceania** | **50·7** | **44·8** | **5·9** | **65·4** | **64·9** | **0·5** | **67·5** | **67·4** | **0·1** | **69·1** | **70·4** | **–1·3** | **70·7** | **72·5** | **–1·8** | **0·70** |
| East Asia | 49·9 | 46·3 | 3·6 | 65·4 | 65·8 | –0·4 | 67·7 | 68·4 | –0·7 | 69·5 | 71·9 | –2·3 | 71·6 | 74·8 | –3·2 | 0·73 |
| China | 49·1 | 47·4 | 1·7 | 65·1 | 65·7 | –0·6 | 67·4 | 68·5 | –1·1 | 69·3 | 71·9 | –2·6 | 71·5 | 74·9 | –3·4 | 0·72 |
| North Korea | 58·9 | 18·5 | 40·4 | 66·1 | 66·8 | –0·7 | 66·1 | 59·3 | 6·9 | 67·1 | 67·6 | –0·4 | 67·9 | 70·1 | –2·2 | 0·57 |
| Taiwan (province of China) | 57·0 | 55·7 | 1·3 | 70·0 | 72·2 | –2·1 | 72·7 | 74·1 | –1·4 | 75·7 | 76·9 | –1·1 | 77·8 | 78·1 | –0·3 | 0·87 |
| Oceania | 51·8 | 46·8 | 5·0 | 62·3 | 61·1 | 1·2 | 63·8 | 62·8 | 1·0 | 64·4 | 63·9 | 0·4 | 65·2 | 62·5 | 2·7 | 0·47 |
| American Samoa | 65·9 | 60·8 | 5·0 | 68·8 | 67·4 | 1·4 | 69·3 | 68·1 | 1·2 | 69·9 | 68·6 | 1·2 | 71·0 | 69·3 | 1·7 | 0·72 |
| Cook Islands | 59·5 | 46·4 | 13·0 | 67·8 | 66·4 | 1·4 | 69·2 | 69·8 | –0·6 | 71·1 | 72·1 | –1·0 | 73·8 | 72·9 | 0·9 | 0·78 |
| Federated States of Micronesia | 52·9 | 41·5 | 11·4 | 65·1 | 60·5 | 4·6 | 66·5 | 61·6 | 5·0 | 67·5 | 63·4 | 4·1 | 68·3 | 64·5 | 3·8 | 0·59 |
| Fiji | 57·4 | 58·5 | –1·1 | 67·1 | 63·9 | 3·3 | 68·3 | 63·4 | 4·9 | 68·9 | 65·4 | 3·5 | 70·0 | 63·8 | 6·2 | 0·68 |
| Guam | 67·8 | 65·9 | 1·9 | 70·3 | 72·1 | –1·8 | 71·6 | 75·8 | –4·1 | 73·0 | 76·3 | –3·4 | 74·7 | 73·5 | 1·1 | 0·80 |
| Kiribati | 55·4 | 44·0 | 11·4 | 63·2 | 56·4 | 6·8 | 64·6 | 57·3 | 7·2 | 65·7 | 59·2 | 6·5 | 66·9 | 61·1 | 5·8 | 0·53 |
| Marshall Islands | 52·6 | 47·4 | 5·1 | 64·0 | 59·6 | 4·4 | 65·4 | 60·5 | 4·9 | 66·7 | 61·4 | 5·3 | 67·9 | 63·4 | 4·5 | 0·57 |
| Nauru | 62·5 | 57·5 | 5·0 | 67·3 | 58·1 | 9·2 | 66·8 | 55·0 | 11·8 | 67·3 | 55·6 | 11·6 | 69·0 | 59·2 | 9·8 | 0·63 |
| Niue | 59·5 | 51·3 | 8·2 | 68·2 | 65·8 | 2·4 | 69·1 | 65·4 | 3·7 | 70·4 | 66·9 | 3·5 | 71·6 | 65·1 | 6·5 | 0·73 |
| Northern Mariana Islands | 64·6 | 62·2 | 2·4 | 71·3 | 70·1 | 1·2 | 72·7 | 71·1 | 1·6 | 72·7 | 71·0 | 1·8 | 73·8 | 69·5 | 4·3 | 0·77 |
| Palau | 63·6 | 46·9 | 16·7 | 69·9 | 63·6 | 6·3 | 71·0 | 65·4 | 5·5 | 71·6 | 65·9 | 5·7 | 72·7 | 67·7 | 5·0 | 0·75 |
| Papua New Guinea | 45·1 | 44·4 | 0·8 | 58·0 | 60·3 | –2·3 | 60·6 | 62·7 | –2·1 | 61·8 | 63·7 | –1·9 | 63·6 | 61·9 | 1·7 | 0·42 |
| Samoa | 56·4 | 55·5 | 0·9 | 65·9 | 65·9 | –0·1 | 66·7 | 67·8 | –1·1 | 67·6 | 69·3 | –1·7 | 68·3 | 69·6 | –1·3 | 0·59 |
| Solomon Islands | 47·8 | 45·1 | 2·7 | 57·4 | 59·1 | –1·7 | 60·6 | 61·1 | –0·5 | 61·8 | 62·2 | –0·3 | 64·0 | 63·7 | 0·4 | 0·43 |
| Tokelau | 57·0 | 55·7 | 1·3 | 66·8 | 66·9 | –0·2 | 67·9 | 68·4 | –0·5 | 69·1 | 70·2 | –1·1 | 70·4 | 67·1 | 3·3 | 0·69 |
| Tonga | 55·1 | 59·2 | –4·2 | 66·0 | 68·5 | –2·5 | 67·4 | 68·1 | –0·7 | 68·1 | 69·4 | –1·3 | 69·1 | 70·6 | –1·5 | 0·63 |
| Tuvalu | 54·7 | 37·8 | 16·9 | 62·5 | 57·2 | 5·3 | 65·4 | 57·5 | 7·9 | 66·8 | 63·8 | 3·0 | 68·0 | 65·8 | 2·2 | 0·58 |
| Vanuatu | 49·9 | 44·7 | 5·2 | 60·3 | 60·9 | –0·6 | 62·3 | 61·7 | 0·6 | 64·0 | 62·8 | 1·2 | 65·4 | 62·5 | 2·9 | 0·47 |

(Table 4 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| Southeast Asia | 52·2 | 40·8 | 11·4 | 65·2 | 62·8 | 2·4 | 67·1 | 65·4 | 1·7 | 68·2 | 67·8 | 0·4 | 69·5 | 67·9 | 1·6 | 0·65 |
| Cambodia | 49·5 | 41·4 | 8·1 | 56·7 | 55·2 | 1·6 | 59·5 | 57·8 | 1·6 | 63·2 | 63·5 | –0·3 | 65·6 | 65·2 | 0·3 | 0·47 |
| Indonesia | 49·9 | 38·2 | 11·7 | 64·9 | 62·7 | 2·2 | 67·1 | 66·0 | 1·2 | 68·2 | 67·4 | 0·8 | 69·8 | 67·3 | 2·5 | 0·66 |
| Laos | 44·6 | 34·8 | 9·8 | 55·1 | 50·6 | 4·4 | 58·9 | 56·1 | 2·8 | 63·4 | 62·4 | 1·0 | 66·0 | 65·4 | 0·6 | 0·49 |
| Malaysia | 51·4 | 51·8 | –0·3 | 67·4 | 69·9 | –2·5 | 69·1 | 70·8 | –1·7 | 70·5 | 72·2 | –1·7 | 72·2 | 70·4 | 1·8 | 0·74 |
| Maldives | 49·9 | 34·0 | 15·8 | 59·2 | 65·8 | –6·7 | 65·7 | 72·1 | –6·4 | 68·1 | 77·0 | –8·9 | 69·8 | 78·1 | –8·4 | 0·65 |
| Mauritius | 57·0 | 50·8 | 6·3 | 67·4 | 66·3 | 1·1 | 68·6 | 69·0 | –0·4 | 69·8 | 70·8 | –1·0 | 71·5 | 70·1 | 1·3 | 0·72 |
| Myanmar | 45·1 | 29·4 | 15·7 | 58·6 | 52·3 | 6·3 | 61·4 | 56·0 | 5·4 | 65·1 | 61·4 | 3·7 | 67·0 | 64·1 | 2·9 | 0·53 |
| Philippines | 59·5 | 55·8 | 3·7 | 66·5 | 65·4 | 1·2 | 67·4 | 67·3 | 0·1 | 67·9 | 67·6 | 0·3 | 69·7 | 64·8 | 4·8 | 0·65 |
| Seychelles | 61·4 | 57·8 | 3·6 | 68·0 | 66·1 | 1·9 | 69·5 | 68·0 | 1·5 | 70·3 | 69·6 | 0·6 | 71·8 | 70·8 | 1·0 | 0·73 |
| Sri Lanka | 59·2 | 54·8 | 4·4 | 66·8 | 65·8 | 1·0 | 68·1 | 67·1 | 1·0 | 69·2 | 70·1 | –0·8 | 70·8 | 73·4 | –2·6 | 0·70 |
| Thailand | 52·9 | 49·6 | 3·3 | 66·4 | 67·6 | –1·2 | 68·1 | 67·7 | 0·4 | 69·0 | 72·6 | –3·6 | 70·3 | 72·4 | –2·1 | 0·68 |
| Timor-Leste | 41·7 | 43·6 | –1·9 | 54·7 | 59·0 | –4·3 | 59·8 | 65·1 | –5·3 | 62·5 | 68·3 | –5·7 | 64·7 | 66·9 | –2·1 | 0·44 |
| Viet Nam | 51·1 | 39·6 | 11·5 | 63·0 | 65·4 | –2·4 | 66·0 | 67·9 | –1·9 | 67·7 | 68·6 | –0·9 | 68·9 | 69·9 | –1·0 | 0·63 |
| **Sub-Saharan Africa** | **46·5** | **39·3** | **7·2** | **57·0** | **51·5** | **5·5** | **59·2** | **51·5** | **7·7** | **62·1** | **57·1** | **5·0** | **65·1** | **58·7** | **6·4** | **0·46** |
| Central sub-Saharan Africa | 46·0 | 36·3 | 9·7 | 57·4 | 50·4 | 7·0 | 58·6 | 50·9 | 7·7 | 62·3 | 56·5 | 5·8 | 65·9 | 58·4 | 7·5 | 0·47 |
| Angola | 44·2 | 38·7 | 5·5 | 55·4 | 46·5 | 8·9 | 58·0 | 50·1 | 7·9 | 62·1 | 57·9 | 4·2 | 65·7 | 58·4 | 7·3 | 0·45 |
| Central African Republic | 41·7 | 39·0 | 2·7 | 51·4 | 44·4 | 7·0 | 53·7 | 42·4 | 11·3 | 56·1 | 46·2 | 9·9 | 58·0 | 48·2 | 9·8 | 0·31 |
| Congo (Brazzaville) | 47·4 | 31·6 | 15·8 | 63·6 | 52·1 | 11·5 | 65·1 | 52·2 | 12·8 | 66·4 | 60·6 | 5·8 | 68·2 | 60·6 | 7·6 | 0·58 |
| Democratic Republic of the Congo | 45·6 | 35·4 | 10·2 | 56·7 | 51·9 | 4·8 | 55·1 | 51·7 | 3·3 | 56·4 | 56·5 | –0·1 | 62·3 | 59·0 | 3·3 | 0·38 |
| Equatorial Guinea | 41·7 | 24·3 | 17·4 | 55·4 | 48·4 | 7·0 | 63·2 | 55·2 | 8·0 | 67·7 | 63·4 | 4·3 | 69·9 | 59·3 | 10·6 | 0·66 |
| Gabon | 46·9 | 24·9 | 22·0 | 64·9 | 56·7 | 8·3 | 66·5 | 57·0 | 9·5 | 67·6 | 60·4 | 7·2 | 69·3 | 60·9 | 8·4 | 0·63 |
| Eastern sub-Saharan Africa | 42·7 | 37·3 | 5·4 | 52·9 | 48·9 | 4·0 | 55·1 | 50·3 | 4·8 | 59·2 | 58·0 | 1·2 | 63·2 | 58·9 | 4·3 | 0·41 |
| Burundi | 41·2 | 35·5 | 5·7 | 50·7 | 47·1 | 3·6 | 51·4 | 42·6 | 8·8 | 53·3 | 58·4 | –5·1 | 56·7 | 60·0 | –3·3 | 0·29 |
| Comoros | 43·2 | 42·7 | 0·4 | 56·1 | 56·8 | –0·7 | 60·6 | 60·3 | 0·3 | 63·4 | 64·9 | –1·5 | 65·6 | 64·8 | 0·8 | 0·48 |
| Djibouti | 47·4 | 54·8 | –7·4 | 59·8 | 59·1 | 0·7 | 61·6 | 58·9 | 2·7 | 63·8 | 61·7 | 2·2 | 66·1 | 62·3 | 3·8 | 0·49 |
| Eritrea | 37·9 | 35·5 | 2·5 | 51·4 | 41·2 | 10·2 | 58·0 | 50·9 | 7·1 | 60·3 | 56·5 | 3·8 | 63·0 | 58·7 | 4·3 | 0·40 |
| Ethiopia | 36·3 | 34·5 | 1·7 | 46·0 | 44·1 | 2·0 | 48·2 | 50·3 | –2·1 | 54·7 | 62·0 | –7·3 | 60·8 | 62·0 | –1·2 | 0·36 |
| Kenya | 43·2 | 44·6 | –1·4 | 59·5 | 60·8 | –1·3 | 62·1 | 53·9 | 8·2 | 64·2 | 59·2 | 5·0 | 66·9 | 61·0 | 5·9 | 0·52 |
| Madagascar | 44·2 | 39·4 | 4·8 | 56·1 | 54·6 | 1·5 | 56·4 | 57·9 | –1·5 | 58·3 | 60·7 | –2·4 | 62·8 | 60·5 | 2·3 | 0·40 |
| Malawi | 44·6 | 33·7 | 10·9 | 50·7 | 47·7 | 3·0 | 52·6 | 44·9 | 7·7 | 56·7 | 54·0 | 2·7 | 61·8 | 55·8 | 6·1 | 0·38 |
| Mozambique | 40·1 | 38·0 | 2·1 | 47·8 | 48·5 | –0·7 | 50·3 | 50·1 | 0·2 | 53·7 | 51·0 | 2·7 | 58·9 | 53·4 | 5·5 | 0·33 |
| Rwanda | 43·7 | 30·7 | 12·9 | 55·7 | 47·8 | 7·9 | 56·1 | 48·8 | 7·3 | 60·3 | 62·0 | –1·7 | 64·2 | 62·3 | 1·9 | 0·44 |

(Table 4 continues on next page)

| | 1950 | | | 1990 | | | 2000 | | | 2010 | | | 2021 | | | SDI, 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | Estimated life expectancy | Expected life expectancy | Difference | |
| (Continued from previous page) | | | | | | | | | | | | | | | | |
| Somalia | 36·8 | 41·4 | –4·6 | 35·7 | 45·9 | –10·3 | 36·3 | 48·3 | –12·1 | 37·4 | 48·1 | –10·7 | 38·5 | 50·7 | –12·2 | 0·08 |
| South Sudan | 44·2 | 44·0 | 0·1 | 50·7 | 49·9 | 0·8 | 52·6 | 52·8 | –0·2 | 55·4 | 56·2 | –0·8 | 56·1 | 52·6 | 3·5 | 0·28 |
| Tanzania | 41·2 | 37·2 | 3·9 | 54·7 | 53·4 | 1·3 | 56·7 | 52·2 | 4·5 | 60·6 | 59·8 | 0·8 | 64·7 | 61·3 | 3·5 | 0·45 |
| Uganda | 40·6 | 36·6 | 4·1 | 49·1 | 46·4 | 2·7 | 52·9 | 47·4 | 5·5 | 59·2 | 56·7 | 2·5 | 63·8 | 57·8 | 6·0 | 0·42 |
| Zambia | 44·6 | 40·5 | 4·1 | 57·7 | 50·3 | 7·4 | 58·6 | 44·6 | 14·0 | 62·5 | 54·6 | 7·9 | 66·5 | 55·8 | 10·8 | 0·51 |
| Southern sub–Saharan Africa | 57·0 | 46·2 | 10·8 | 66·4 | 60·0 | 6·4 | 67·7 | 51·6 | 16·1 | 68·5 | 53·4 | 15·1 | 69·4 | 55·9 | 13·5 | 0·64 |
| Botswana | 44·6 | 46·0 | –1·4 | 63·4 | 58·0 | 5·4 | 66·7 | 45·9 | 20·8 | 68·2 | 56·1 | 12·1 | 69·4 | 57·0 | 12·4 | 0·64 |
| Eswatini | 45·1 | 34·0 | 11·1 | 62·8 | 56·6 | 6·1 | 65·4 | 45·6 | 19·8 | 66·9 | 44·3 | 22·6 | 68·2 | 49·5 | 18·7 | 0·59 |
| Lesotho | 46·5 | 41·2 | 5·3 | 59·8 | 56·2 | 3·6 | 62·8 | 45·7 | 17·1 | 64·7 | 45·5 | 19·3 | 66·5 | 45·3 | 21·2 | 0·51 |
| Namibia | 51·4 | 47·6 | 3·9 | 64·7 | 58·9 | 5·9 | 66·4 | 51·6 | 14·8 | 67·6 | 56·8 | 10·8 | 68·9 | 56·5 | 12·4 | 0·62 |
| South Africa | 58·9 | 46·7 | 12·2 | 67·3 | 60·6 | 6·6 | 68·4 | 53·8 | 14·6 | 69·2 | 54·6 | 14·7 | 70·3 | 57·4 | 12·8 | 0·68 |
| Zimbabwe | 48·6 | 47·7 | 0·9 | 62·8 | 59·1 | 3·6 | 64·6 | 45·9 | 18·7 | 63·4 | 50·4 | 13·0 | 65·6 | 52·2 | 13·4 | 0·47 |
| Western sub–Saharan Africa | 45·1 | 40·4 | 4·8 | 55·7 | 52·9 | 2·8 | 58·0 | 53·3 | 4·7 | 61·4 | 58·0 | 3·4 | 64·6 | 59·9 | 4·7 | 0·45 |
| Benin | 41·7 | 36·3 | 5·4 | 51·8 | 53·9 | –2·1 | 54·4 | 55·8 | –1·4 | 57·7 | 59·3 | –1·7 | 61·6 | 60·1 | 1·5 | 0·37 |
| Burkina Faso | 36·3 | 35·3 | 0·9 | 44·2 | 49·2 | –5·1 | 47·8 | 50·8 | –3·0 | 51·8 | 55·5 | –3·7 | 56·4 | 57·4 | –1·0 | 0·29 |
| Cabo Verde | 44·6 | 46·5 | –1·9 | 55·7 | 67·0 | –11·2 | 60·8 | 66·5 | –5·7 | 64·9 | 70·9 | –6·0 | 67·1 | 69·0 | –1·8 | 0·53 |
| Cameroon | 44·6 | 38·4 | 6·2 | 57·4 | 57·0 | 0·4 | 60·3 | 53·3 | 7·0 | 62·5 | 56·7 | 5·8 | 65·7 | 58·5 | 7·3 | 0·48 |
| Chad | 36·3 | 38·4 | –2·1 | 42·7 | 51·7 | –9·0 | 45·1 | 50·5 | –5·4 | 49·1 | 55·0 | –5·9 | 52·9 | 56·5 | –3·6 | 0·24 |
| Côte d'Ivoire | 42·7 | 42·7 | 0·0 | 56·1 | 53·3 | 2·8 | 59·5 | 50·3 | 9·2 | 60·8 | 55·8 | 5·0 | 63·8 | 60·3 | 3·5 | 0·43 |
| The Gambia | 43·2 | 49·1 | –5·9 | 53·3 | 56·8 | –3·5 | 57·0 | 58·6 | –1·5 | 60·3 | 61·3 | –1·0 | 63·2 | 60·9 | 2·3 | 0·41 |
| Ghana | 53·3 | 43·9 | 9·4 | 61·4 | 57·9 | 3·4 | 63·8 | 58·2 | 5·6 | 65·6 | 59·6 | 6·0 | 67·7 | 61·7 | 6·0 | 0·56 |
| Guinea | 36·8 | 36·8 | 0·1 | 48·6 | 51·9 | –3·2 | 51·4 | 53·0 | –1·5 | 54·7 | 56·6 | –1·9 | 59·8 | 58·2 | 1·6 | 0·34 |
| Guinea–Bissau | 37·4 | 24·6 | 12·7 | 50·7 | 45·9 | 4·8 | 54·0 | 48·9 | 5·1 | 56·7 | 54·1 | 2·7 | 60·6 | 55·1 | 5·5 | 0·35 |
| Liberia | 44·6 | 26·9 | 17·8 | 52·9 | 45·4 | 7·6 | 52·6 | 53·8 | –1·2 | 56·1 | 60·7 | –4·6 | 60·6 | 61·6 | –1·0 | 0·35 |
| Mali | 36·8 | 32·8 | 4·1 | 43·7 | 49·5 | –5·8 | 46·9 | 53·2 | –6·3 | 50·7 | 57·6 | –7·0 | 55·7 | 57·3 | –1·5 | 0·27 |
| Mauritania | 48·2 | 44·5 | 3·8 | 59·5 | 60·1 | –0·6 | 62·1 | 64·4 | –2·4 | 63·6 | 68·6 | –5·0 | 66·1 | 68·4 | –2·2 | 0·50 |
| Niger | 35·7 | 37·5 | –1·9 | 39·6 | 46·7 | –7·1 | 41·7 | 51·4 | –9·8 | 45·1 | 59·2 | –14·1 | 49·5 | 60·1 | –10·6 | 0·17 |
| Nigeria | 46·0 | 42·6 | 3·4 | 57·7 | 52·9 | 4·8 | 59·5 | 53·3 | 6·2 | 63·2 | 58·4 | 4·8 | 66·3 | 60·7 | 5·5 | 0·50 |
| São Tomé and Príncipe | 48·2 | 36·9 | 11·3 | 58·0 | 61·8 | –3·8 | 59·2 | 64·1 | –4·9 | 62·8 | 67·8 | –5·1 | 66·4 | 68·6 | –2·2 | 0·51 |
| Senegal | 41·7 | 42·3 | –0·6 | 52·9 | 56·6 | –3·7 | 56·4 | 58·6 | –2·2 | 59·2 | 64·0 | –4·8 | 63·2 | 63·7 | –0·5 | 0·41 |
| Sierra Leone | 42·7 | 35·8 | 6·9 | 51·1 | 49·2 | 1·9 | 51·8 | 48·9 | 2·9 | 55·7 | 54·6 | 1·1 | 60·8 | 59·2 | 1·7 | 0·36 |
| Togo | 41·2 | 38·6 | 2·6 | 55·4 | 56·2 | –0·8 | 57·7 | 54·4 | 3·2 | 59·5 | 56·8 | 2·6 | 63·2 | 60·2 | 3·0 | 0·41 |

SDI=Socio-demographic Index. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

*Table 4:* **Male life expectancy (estimated, expected based on SDI, and their difference) for 1950, 1990, 2000, 2010, and 2021, and SDI in 2021, globally and for GBD super-regions, regions, countries, and territories**

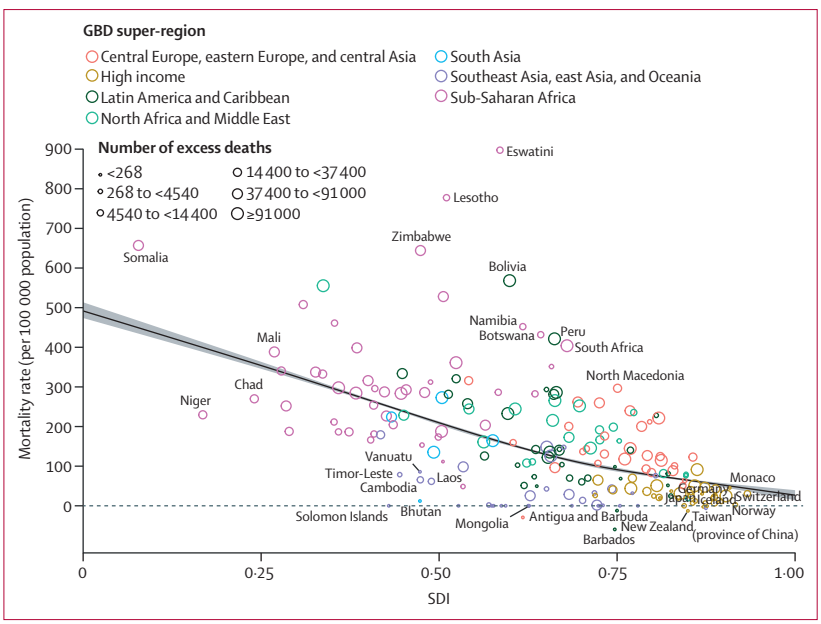


***Figure 8:*** **National age-standardised rates of excess mortality due to the COVID-19 pandemic versus SDI, and expected rates of excess mortality based on SDI, 2020 and 2021 combined**

Mortality rates are expressed as the number of deaths per 100 000 and are shown for 204 countries and territories coloured by GBD super-region. The size of the datapoints indicates the number of excess deaths. The black line represents expected age-standardised excess mortality rates based on SDI, and the shaded area indicates the 95% uncertainty intervals. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study. SDI=Socio-demographic Index.

Asia, east Asia, and Oceania (33 of 34 nations), high-income (33 of 36 nations), and sub-Saharan Africa (27 of 46 nations). At the national level, the five countries or territories with the largest positive difference between estimated excess mortality and expected excess mortality based on SDI (ie, higher mortality than expected) were Bulgaria, North Macedonia, Lesotho, Peru, and Bolivia; the five nations with the highest negative difference between estimated excess mortality and expected excess mortality based on SDI (ie, lower mortality than expected) were Barbados, Mongolia, New Zealand, Antigua and Barbuda, and the Marshall Islands.

## Population

The global total population increased annually over the study period, from 2·52 billion (95% UI 2·48–2·58) in 1950 to 6·10 billion (5·98–6·22) in 2000 and 7·89 billion (7·67–8·13) in 2021 (table 5). Annual growth in total population fluctuated over the study period, from an annual increase of 46·9 million (41·0–52·7) from 1950 to 1951 with the highest annual increase of 92·5 million (75·7–106·6) observed between 2008 and 2009 (figure 9). After 2009, population growth plateaued, and in 2017, the annual increase in population began to decline. Between 2019 and 2021, this decline accelerated, with annual gains of just 77·0 million (49·4–95·6) from 2019 to 2020 and 69·0 million (50·8–93·2) from 2020 to 2021. These reduced gains include the impact of excess deaths due to the COVID-19 pandemic, therefore the magnitude might not persist as excess mortality declines. The majority of global population growth during the study period is attributed to three GBD super-regions: sub-Saharan Africa; south Asia; and southeast Asia, east Asia, and Oceania. The population of sub-Saharan Africa grew at a steadily increasing rate throughout the study period, contributing 9·1% (7·3–11·0) of the total global population growth from 1950 to 1951, 23·3% (19·4–27·6) from 2000 to 2001, and 39·5% (28·4–52·7) from 2020 to 2021. South Asia contributed 17·1% (13·8–20·6) of the total global population growth from 1950 to 1951, rose to a peak contribution of 32·9% (28·4–37·8) from 1999 to 2000, and remained relatively constant in more recent years, with a contribution of 26·3% (9·0–44·7) from 2020 to 2021. In contrast, the annual growth of the population fluctuated in southeast Asia, east Asia, and Oceania. The contribution of this super-region to annual global population growth was relatively stable up to a peak of 37·3% (30·4–41·8) from 1956 to 1957 and then subsequently decreased, contributing 14·1% (0·0 to 30·2) from 2020 to 2021. Central Europe, eastern Europe, and central Asia contributed little to global population growth, and in fact experienced a decline in population over some periods, with growth from 1950 to 1992, a decline from 1993 to 2006, growth from 2007 to 2018, and a return to population decline in 2019. Population growth was relatively stable in Latin America and the Caribbean and north Africa and the Middle East at the super-regional level during the previous three decades, whereas population growth in the high-income super-region began to decline starting around 2015.

The majority of countries and territories (154 [75·5%] of 204 countries and territories representing all seven super-regions) had a positive rate of natural increase (calculated as the number of births minus the number of deaths divided by person-years) between 2000 and 2009 followed by a smaller positive rate between 2010 and 2019 (figure 10). 26 countries and territories had a rate of natural increase that was positive during both decades and that was larger between 2010 and 2019 than between 2000 and 2009 (figure 10). Of these countries and territories, nine were in sub-Saharan Africa, eight were in central Europe, eastern Europe, and central Asia, and five were in the high-income super-region. Seven countries and territories had a positive rate of natural increase between 2000 and 2009 followed by a negative rate of natural increase between 2010 and 2019: Bosnia and Herzegovina, Greece, Japan, North Macedonia, Poland, Portugal, and San Marino (figure 10). The countries and territories of Belarus, Estonia, Latvia, Russia, and Ukraine experienced a negative rate of natural increase between 2000 and 2009 and continued to have a negative rate of natural increase between 2010 and 2019, but to a smaller extent (figure 10). The rate of natural increase was negative between 2000 and 2009 in Bulgaria, Croatia, Germany, Hungary,

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| **Global** | **6 100 000 (5 980 000 to 6 220 000)** | **1 830 000 (1 800 000 to 1 870 000)** | **3 840 000 (3 760 000 to 3 920 000)** | **423 000 (416 000 to 432 000)** | **7 890 000 (7 670 000 to 8 130 000)** | **2 010 000 (1 950 000 to 2 070 000)** | **5 110 000 (4 960 000 to 5 270 000)** | **770 000 (750 000 to 792 000)** | **1·2% (1·2 to 1·3)** |
| **Central Europe, eastern Europe, and central Asia** | **417 000 (404 000 to 431 000)** | **87 300 (84 500 to 90 000)** | **282 000 (272 000 to 291 000)** | **48 400 (46 600 to 50 000)** | **418 000 (393 000 to 441 000)** | **80 800 (75 900 to 85 500)** | **275 000 (259 000 to 291 000)** | **61 800 (58 100 to 65 200)** | **0·0% (–0·1 to 0·1)** |
| Central Asia | 74 400 (70 600 to 78 100) | 24 800 (23 500 to 26 100) | 45 300 (43 100 to 47 600) | 4310 (4120 to 4500) | 95 800 (85 900 to 106 000) | 27 700 (24 700 to 30 600) | 62 100 (55 700 to 68 600) | 6020 (5490 to 6550) | 1·2% (0·9 to 1·4) |
| Armenia | 3320 (3070 to 3550) | 849 (785 to 909) | 2170 (2010 to 2320) | 297 (275 to 318) | 3000 (2600 to 3380) | 592 (515 to 668) | 2000 (1740 to 2260) | 398 (346 to 449) | –0·5% (–0·8 to –0·2) |
| Azerbaijan | 8280 (7700 to 8890) | 2580 (2400 to 2770) | 5220 (4860 to 5600) | 480 (447 to 515) | 10 500 (9080 to 12 000) | 2360 (2040 to 2700) | 7440 (6440 to 8500) | 699 (605 to 798) | 1·1% (0·8 to 1·4) |
| Georgia | 4730 (4340 to 5120) | 1030 (948 to 1120) | 3090 (2830 to 3340) | 612 (562 to 662) | 3610 (3200 to 4010) | 736 (653 to 817) | 2300 (2040 to 2550) | 572 (507 to 635) | –1·3% (–1·4 to –1·2) |
| Kazakhstan | 15 000 (13 900 to 16 100) | 4180 (3860 to 4500) | 9790 (9060 to 10 500) | 1010 (934 to 1090) | 19 000 (17 000 to 20 800) | 5430 (4880 to 5960) | 12 100 (10 900 to 13 300) | 1400 (1260 to 1540) | 1·1% (1·0 to 1·2) |
| Kyrgyzstan | 5010 (4650 to 5380) | 1770 (1640 to 1900) | 2970 (2750 to 3180) | 279 (259 to 299) | 6860 (5860 to 7900) | 2270 (1940 to 2620) | 4250 (3630 to 4890) | 340 (290 to 391) | 1·5% (1·1 to 1·8) |
| Mongolia | 2440 (2270 to 2610) | 879 (817 to 939) | 1480 (1380 to 1580) | 83·6 (77·8 to 89·3) | 3340 (3080 to 3580) | 1090 (1000 to 1170) | 2110 (1950 to 2260) | 144 (134 to 155) | 1·5% (1·4 to 1·5) |
| Tajikistan | 6360 (5950 to 6800) | 2710 (2540 to 2900) | 3410 (3180 to 3640) | 244 (228 to 261) | 10 200 (8800 to 11 600) | 3580 (3110 to 4090) | 6210 (5380 to 7080) | 368 (319 to 420) | 2·2% (1·9 to 2·5) |
| Turkmenistan | 4260 (3710 to 4830) | 1600 (1400 to 1820) | 2480 (2160 to 2810) | 179 (156 to 203) | 5160 (4620 to 5700) | 1520 (1370 to 1680) | 3350 (3000 to 3700) | 284 (254 to 314) | 0·9% (0·8 to 1·0) |
| Uzbekistan | 25 000 (21 500 to 28 700) | 9150 (7880 to 10 500) | 14 700 (12 700 to 16 900) | 1120 (967 to 1290) | 34 200 (24 500 to 43 600) | 10 100 (7220 to 12 900) | 22 300 (16 000 to 28 500) | 1810 (1300 to 2310) | 1·5% (0·6 to 2·0) |
| Central Europe | 122 000 (118 000 to 126 000) | 23 000 (22 200 to 23 700) | 83 500 (80 700 to 86 200) | 16 000 (15 500 to 16 500) | 115 000 (110 000 to 120 000) | 17 700 (16 900 to 18 500) | 75 200 (71 800 to 78 500) | 22 300 (21 300 to 23 300) | –0·3% (–0·4 to –0·2) |
| Albania | 3190 (2970 to 3430) | 962 (895 to 1030) | 2010 (1870 to 2160) | 225 (209 to 242) | 2670 (2320 to 3020) | 444 (385 to 502) | 1810 (1570 to 2050) | 416 (361 to 471) | –0·9% (–1·2 to –0·6) |
| Bosnia and Herzegovina | 3980 (3490 to 4490) | 806 (707 to 911) | 2700 (2370 to 3060) | 466 (409 to 527) | 3300 (2900 to 3690) | 490 (431 to 548) | 2210 (1940 to 2470) | 606 (532 to 677) | –0·9% (–0·9 to –0·8) |
| Bulgaria | 7940 (7400 to 8580) | 1230 (1150 to 1330) | 5390 (5030 to 5820) | 1320 (1230 to 1420) | 6790 (6070 to 7430) | 976 (874 to 1070) | 4340 (3880 to 4750) | 1470 (1320 to 1610) | –0·8% (–0·9 to –0·7) |
| Croatia | 4570 (4250 to 4900) | 794 (738 to 851) | 3080 (2860 to 3310) | 696 (646 to 746) | 4210 (3680 to 4750) | 597 (522 to 674) | 2720 (2370 to 3060) | 896 (783 to 1010) | –0·4% (–0·7 to –0·2) |
| Czechia | 10 200 (10 200 to 10 300) | 1670 (1660 to 1680) | 7140 (7090 to 7200) | 1420 (1410 to 1430) | 10 600 (9670 to 11 600) | 1720 (1560 to 1870) | 6710 (6100 to 7330) | 2210 (2010 to 2410) | 0·2% (–0·2 to 0·6) |
| Hungary | 10 200 (9440 to 11 000) | 1720 (1590 to 1850) | 6950 (6430 to 7470) | 1530 (1410 to 1640) | 9600 (8430 to 10 900) | 1390 (1220 to 1570) | 6200 (5440 to 7020) | 2010 (1760 to 2280) | –0·3% (–0·5 to 0·0) |
| Montenegro | 637 (580 to 695) | 142 (129 to 155) | 425 (387 to 464) | 70·1 (63·9 to 76·6) | 618 (540 to 701) | 111 (97·4 to 126) | 413 (361 to 468) | 93·7 (81·9 to 106) | –0·1% (–0·3 to 0·0) |
| North Macedonia | 2060 (1900 to 2230) | 460 (424 to 497) | 1390 (1290 to 1510) | 204 (188 to 220) | 2180 (1800 to 2590) | 328 (270 to 390) | 1540 (1270 to 1830) | 308 (254 to 366) | 0·2% (–0·3 to 0·7) |
| Poland | 38 300 (35 200 to 41 300) | 7370 (6760 to 7950) | 26 200 (24 100 to 28 300) | 4720 (4330 to 5090) | 38 200 (34 600 to 41 900) | 5890 (5320 to 6450) | 25 200 (22 800 to 27 600) | 7170 (6480 to 7860) | 0·0% (–0·1 to 0·1) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Romania | 22 400 (20 600 to 24 300) | 4220 (3870 to 4570) | 15 200 (14 000 to 16 500) | 2960 (2720 to 3210) | 18 900 (16 500 to 21 500) | 3010 (2630 to 3420) | 12 100 (10 600 to 13 800) | 3790 (3300 to 4300) | −0·8% (−1·1 to −0·6) |
| Serbia | 9670 (8880 to 10 500) | 1870 (1720 to 2030) | 6550 (6020 to 7090) | 1250 (1140 to 1350) | 8920 (7750 to 10 000) | 1330 (1150 to 1490) | 5930 (5160 to 6670) | 1660 (1440 to 1860) | −0·4% (−0·6 to −0·2) |
| Slovakia | 5390 (5360 to 5420) | 1050 (1040 to 1050) | 3720 (3700 to 3740) | 624 (620 to 628) | 5430 (4900 to 5960) | 857 (772 to 940) | 3640 (3280 to 3990) | 937 (845 to 1030) | 0·0% (−0·4 to 0·4) |
| Slovenia | 1990 (1980 to 2010) | 321 (318 to 323) | 1390 (1380 to 1400) | 280 (278 to 282) | 2070 (1890 to 2250) | 312 (285 to 340) | 1320 (1200 to 1440) | 437 (398 to 475) | 0·2% (−0·2 to 0·5) |
| Eastern Europe | 221 000 (208 000 to 234 000) | 39 600 (37 300 to 41 900) | 153 000 (144 000 to 162 000) | 28 100 (26 400 to 29 700) | 207 000 (185 000 to 228 000) | 35 400 (31 600 to 39 200) | 138 000 (123 000 to 152 000) | 33 500 (29 900 to 36 800) | −0·3% (−0·6 to −0·1) |
| Belarus | 10 200 (9460 to 11 000) | 1930 (1790 to 2070) | 6920 (6410 to 7440) | 1360 (1260 to 1460) | 9320 (8020 to 10 600) | 1580 (1360 to 1800) | 6250 (5380 to 7120) | 1490 (1280 to 1700) | −0·4% (−0·8 to −0·2) |
| Estonia | 1390 (1390 to 1400) | 251 (249 to 252) | 936 (930 to 942) | 208 (206 to 209) | 1310 (1190 to 1430) | 216 (196 to 236) | 825 (748 to 902) | 270 (244 to 295) | −0·3% (−0·7 to 0·1) |
| Latvia | 2380 (2210 to 2540) | 431 (399 to 459) | 1600 (1480 to 1700) | 355 (329 to 379) | 1870 (1700 to 2050) | 297 (270 to 326) | 1180 (1070 to 1290) | 392 (356 to 430) | −1·2% (−1·3 to −1·0) |
| Lithuania | 3520 (3260 to 3780) | 705 (653 to 756) | 2330 (2160 to 2500) | 483 (447 to 518) | 2730 (2480 to 3010) | 408 (370 to 449) | 1760 (1600 to 1940) | 557 (506 to 614) | −1·2% (−1·3 to −1·1) |
| Moldova | 4200 (3810 to 4600) | 922 (836 to 1010) | 2850 (2580 to 3120) | 428 (388 to 469) | 3590 (2970 to 4190) | 522 (432 to 609) | 2520 (2080 to 2940) | 555 (459 to 647) | −0·8% (−1·2 to −0·4) |
| Russia | 149 000 (137 000 to 161 000) | 26 700 (24 600 to 28 900) | 104 000 (95 800 to 113 000) | 18 400 (16 900 to 19 900) | 145 000 (125 000 to 164 000) | 26 100 (22 500 to 29 400) | 96 000 (82 900 to 108 000) | 22 700 (19 600 to 25 700) | −0·1% (−0·5 to 0·1) |
| Ukraine | 49 600 (46 000 to 53 200) | 8640 (8010 to 9270) | 34 100 (31 600 to 36 600) | 6850 (6350 to 7350) | 43 100 (34 600 to 51 400) | 6350 (5100 to 7570) | 29 300 (23 500 to 34 900) | 7440 (5990 to 8880) | −0·7% (−1·3 to −0·2) |
| **High income** | **968 000 (944 000 to 990 000)** | **185 000 (180 000 to 189 000)** | **647 000 (631 000 to 661 000)** | **137 000 (134 000 to 140 000)** | **1 090 000 (1 060 000 to 1 120 000)** | **176 000 (171 000 to 181 000)** | **702 000 (682 000 to 720 000)** | **214 000 (208 000 to 219 000)** | **0·6% (0·5 to 0·6)** |
| Australasia | 22 700 (21 300 to 24 100) | 4870 (4570 to 5170) | 15 100 (14 100 to 16 000) | 2780 (2600 to 2950) | 31 000 (29 200 to 32 700) | 5730 (5400 to 6060) | 20 000 (18,900 to 21,200) | 5200 (4890 to 5500) | 1·5% (1·4 to 1·5) |
| Australia | 18 900 (17 400 to 20 300) | 4000 (3690 to 4290) | 12 600 (11 600 to 13 500) | 2330 (2150 to 2500) | 25 800 (24 000 to 27 500) | 4750 (4420 to 5070) | 16 700 (15 500 to 17 800) | 4390 (4080 to 4690) | 1·5% (1·5 to 1·5) |
| New Zealand | 3860 (3580 to 4150) | 878 (813 to 944) | 2530 (2340 to 2720) | 454 (421 to 488) | 5170 (4720 to 5610) | 982 (896 to 1060) | 3380 (3080 to 3660) | 810 (739 to 878) | 1·4% (1·3 to 1·4) |
| High-income Asia Pacific | 180 000 (171 000 to 190 000) | 29 700 (28 200 to 31 100) | 125 000 (118 000 to 131 000) | 25 900 (24 300 to 27 400) | 185 000 (175 000 to 196 000) | 22 400 (21 200 to 23 700) | 117 000 (111 000 to 123 000) | 46 100 (43 300 to 49 000) | 0·1% (0·1 to 0·2) |
| Brunei | 333 (306 to 358) | 105 (96·7 to 113) | 218 (201 to 235) | 9·3 (8·6 to 10) | 451 (394 to 510) | 94·6 (82·6 to 107) | 332 (290 to 375) | 24·5 (21·4 to 27·7) | 1·4% (1·2 to 1·7) |
| Japan | 129 000 (120 000 to 138 000) | 18 900 (17 600 to 20 200) | 87 800 (81 800 to 93 800) | 22 200 (20 700 to 23 700) | 128 000 (118 000 to 137 000) | 15 400 (14 300 to 16 600) | 75 400 (69 700 to 80 900) | 36 800 (34 000 to 39 600) | 0·0% (−0·1 to 0·0) |
| Singapore | 4030 (3740 to 4300) | 754 (701 to 805) | 3020 (2810 to 3220) | 256 (238 to 274) | 5730 (5260 to 6200) | 812 (746 to 878) | 4150 (3810 to 4490) | 768 (706 to 831) | 1·7% (1·6 to 1·7) |
| South Korea | 46 800 (43 500 to 49 900) | 9860 (9160 to 10 500) | 33 500 (31 200 to 35 800) | 3390 (3150 to 3610) | 51 600 (47 800 to 55 100) | 6070 (5630 to 6490) | 37 000 (34 300 to 39 600) | 8500 (7870 to 9080) | 0·5% (0·4 to 0·5) |
| High-income North America | 311 000 (292 000 to 331 000) | 66 700 (62 400 to 70 800) | 206 000 (193 000 to 219 000) | 38 300 (35 900 to 40 600) | 370 000 (346 000 to 394 000) | 65 600 (61 300 to 69 800) | 240 000 (225 000 to 256 000) | 64 200 (60 000 to 68 200) | 0·8% (0·8 to 0·8) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Canada | 30 300 (28 100 to 32 400) | 5920 (5490 to 6330) | 20 600 (19 100 to 22 000) | 3830 (3560 to 4100) | 37 500 (35 100 to 40 200) | 6170 (5770 to 6620) | 24 300 (22 700 to 26 000) | 7040 (6580 to 7540) | 1·0% (1·0 to 1·0) |
| Greenland | 56·1 (55·8 to 56·5) | 15·2 (15·1 to 15·3) | 38·1 (37·8 to 38·3) | 2·8 (2·8 to 2·8) | 56·1 (50·7 to 61·1) | 11·8 (10·6 to 12·8) | 39·1 (35·3 to 42·6) | 5·3 (4·8 to 5·8) | 0·0% (−0·5 to 0·4) |
| USA | 281 000 (261 000 to 301 000) | 60 700 (56 500 to 65 000) | 186 000 (173 000 to 199 000) | 34 400 (32 000 to 36 800) | 333 000 (308 000 to 357 000) | 59 400 (55 100 to 63 700) | 216 000 (200 000 to 232 000) | 57 100 (52 900 to 61 300) | 0·8% (0·8 to 0·8) |
| Southern Latin America | 55 200 (52 400 to 58 200) | 15 400 (14 600 to 16 200) | 34 700 (32 900 to 36 500) | 5180 (4910 to 5460) | 67 700 (61 400 to 74 200) | 14 500 (13 100 to 15 900) | 45 100 (40 900 to 49 400) | 8110 (7370 to 8870) | 1·0% (0·7 to 1·2) |
| Argentina | 36 800 (34 200 to 39 600) | 10 500 (9730 to 11 300) | 22 700 (21 100 to 24 500) | 3590 (3340 to 3870) | 45 500 (39 200 to 51 800) | 10 200 (8780 to 11 600) | 30 100 (25 900 to 34 300) | 5250 (4530 to 5990) | 1·0% (0·7 to 1·3) |
| Chile | 15 100 (13 900 to 16 300) | 4090 (3750 to 4420) | 9890 (9060 to 10 700) | 1160 (1060 to 1250) | 18 800 (17 100 to 20 600) | 3650 (3320 to 4000) | 12 800 (11 700 to 14 000) | 2330 (2120 to 2550) | 1·0% (1·0 to 1·1) |
| Uruguay | 3300 (2990 to 3600) | 818 (742 to 895) | 2050 (1860 to 2240) | 427 (387 to 467) | 3410 (2990 to 3860) | 660 (578 to 748) | 2210 (1940 to 2510) | 531 (466 to 603) | 0·1% (0·0 to 0·3) |
| Western Europe | 398 000 (391 000 to 405 000) | 68 000 (66 700 to 69 300) | 266 000 (261 000 to 270 000) | 64 600 (63 300 to 65 700) | 437 000 (422 000 to 451 000) | 68 100 (65 900 to 70 200) | 279 000 (270 000 to 288 000) | 90 000 (86 700 to 92 900) | 0·4% (0·3 to 0·5) |
| Andorra | 65·6 (65·2 to 66·1) | 10·1 (10 to 10·2) | 47·5 (47·2 to 47·8) | 8·1 (8 to 8·1) | 85·6 (77·6 to 94·3) | 10·2 (9·2 to 11·2) | 61·7 (56 to 68) | 13·7 (12·4 to 15·1) | 1·3% (0·8 to 1·7) |
| Austria | 8020 (7450 to 8600) | 1360 (1260 to 1460) | 5410 (5030 to 5800) | 1240 (1150 to 1330) | 8980 (8090 to 9780) | 1300 (1170 to 1410) | 5970 (5380 to 6500) | 1710 (1540 to 1870) | 0·5% (0·4 to 0·6) |
| Belgium | 10 300 (9510 to 11 000) | 1810 (1670 to 1940) | 6730 (6230 to 7230) | 1730 (1600 to 1860) | 11 500 (10 300 to 12 600) | 1910 (1720 to 2090) | 7310 (6580 to 8010) | 2240 (2020 to 2460) | 0·5% (0·4 to 0·6) |
| Cyprus | 918 (851 to 983) | 204 (189 to 218) | 620 (575 to 664) | 94·2 (87·3 to 101) | 1360 (1170 to 1540) | 219 (189 to 248) | 941 (813 to 1070) | 198 (171 to 225) | 1·9% (1·5 to 2·1) |
| Denmark | 5330 (5290 to 5380) | 982 (974 to 990) | 3560 (3530 to 3590) | 796 (789 to 802) | 5850 (5300 to 6410) | 954 (865 to 1050) | 3720 (3370 to 4070) | 1180 (1070 to 1290) | 0·4% (0·0 to 0·8) |
| Finland | 5190 (5150 to 5230) | 936 (929 to 942) | 3470 (3440 to 3490) | 784 (779 to 790) | 5540 (4950 to 6060) | 847 (758 to 927) | 3400 (3040 to 3720) | 1290 (1150 to 1410) | 0·3% (−0·2 to 0·7) |
| France | 59 900 (55 500 to 64 400) | 11 400 (10 500 to 12 200) | 39 100 (36 200 to 42 000) | 9440 (8740 to 10 100) | 66 400 (59 500 to 73 500) | 11 600 (10 400 to 12 800) | 41 000 (36 800 to 45 400) | 13 800 (12 300 to 15 200) | 0·5% (0·3 to 0·6) |
| Germany | 82 300 (81 600 to 83 000) | 12 800 (12 700 to 12 900) | 55 800 (55 400 to 56 300) | 13 700 (13 600 to 13 800) | 85 400 (76 200 to 94 000) | 12 000 (10 700 to 13 200) | 54 900 (49 000 to 60 400) | 18 600 (16 600 to 20 400) | 0·2% (−0·3 to 0·6) |
| Greece | 11 100 (10 300 to 11 900) | 1720 (1600 to 1850) | 7560 (7000 to 8130) | 1800 (1670 to 1940) | 10 200 (8730 to 11 500) | 1390 (1200 to 1580) | 6470 (5550 to 7320) | 2310 (1980 to 2610) | −0·4% (−0·8 to −0·2) |
| Iceland | 279 (277 to 282) | 65 (64·5 to 65·6) | 182 (180 to 183) | 32·5 (32·3 to 32·8) | 350 (318 to 384) | 67·5 (61·3 to 74) | 228 (206 to 250) | 55·2 (50·1 to 60·5) | 1·1% (0·7 to 1·5) |
| Ireland | 3870 (3560 to 4170) | 849 (781 to 915) | 2590 (2380 to 2790) | 427 (393 to 461) | 4940 (4420 to 5450) | 997 (892 to 1100) | 3190 (2860 to 3520) | 751 (672 to 829) | 1·2% (1·1 to 1·3) |
| Israel | 6390 (5760 to 7070) | 1840 (1660 to 2040) | 3940 (3550 to 4360) | 614 (554 to 680) | 9590 (8200 to 11 000) | 2630 (2250 to 3030) | 5770 (4930 to 6640) | 1200 (1020 to 1380) | 1·9% (1·7 to 2·1) |
| Italy | 56 700 (52 400 to 60 700) | 8100 (7500 to 8680) | 38 200 (35 300 to 40 900) | 10 400 (9600 to 11 100) | 59 800 (54 400 to 65 100) | 7600 (6910 to 8270) | 38 200 (34 700 to 41 600) | 14 000 (12 700 to 15 300) | 0·3% (0·2 to 0·3) |
| Luxembourg | 434 (401 to 466) | 81·9 (75·8 to 88·1) | 291 (270 to 313) | 60·3 (55·8 to 64·8) | 644 (589 to 703) | 101 (92·5 to 110) | 447 (409 to 488) | 96 (87·8 to 105) | 1·9% (1·8 to 1·9) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Malta | 402 (363 to 442) | 80·1 (72·3 to 88·2) | 272 (246 to 299) | 50 (45·1 to 55) | 442 (384 to 500) | 64 (55·7 to 72·4) | 278 (242 to 315) | 100 (87 to 113) | 0·4% (0·3 to 0·6) |
| Monaco | 33 (30·8 to 35·4) | 4·3 (4 to 4·7) | 20·9 (19·5 to 22·4) | 7·8 (7·2 to 8·3) | 37·9 (34·3 to 41·4) | 5 (4·5 to 5·4) | 23·2 (21 to 25·4) | 9·7 (8·8 to 10·6) | 0·7% (0·5 to 0·8) |
| Netherlands | 15 900 (15 800 to 16 000) | 2950 (2930 to 2980) | 10 800 (10 700 to 10 900) | 2160 (2140 to 2180) | 17 200 (15 600 to 18 900) | 2680 (2430 to 2940) | 11 100 (10 000 to 12 200) | 3460 (3130 to 3800) | 0·4% (–0·1 to 0·8) |
| Norway | 4480 (4440 to 4520) | 893 (886 to 901) | 2900 (2870 to 2920) | 689 (684 to 695) | 5420 (4930 to 5960) | 924 (841 to 1020) | 3520 (3210 to 3880) | 972 (885 to 1070) | 0·9% (0·5 to 1·3) |
| Portugal | 10 500 (9780 to 11 300) | 1720 (1590 to 1840) | 7160 (6640 to 7670) | 1660 (1550 to 1780) | 10 600 (9230 to 12 000) | 1360 (1190 to 1550) | 6830 (5940 to 7750) | 2420 (2110 to 2750) | 0·0% (–0·3 to 0·3) |
| San Marino | 27·5 (23·9 to 31) | 4·3 (3·7 to 4·8) | 18·6 (16·2 to 21) | 4·6 (4 to 5·2) | 32·7 (28·4 to 37·4) | 4·4 (3·8 to 5) | 21·3 (18·4 to 24·3) | 7·1 (6·1 to 8·1) | 0·8% (0·8 to 0·9) |
| Spain | 40 800 (40 500 to 41 100) | 6070 (6030 to 6110) | 27 900 (27 700 to 28 000) | 6860 (6820 to 6900) | 45 500 (41 000 to 49 900) | 6480 (5830 to 7100) | 29 900 (26 900 to 32 700) | 9190 (8270 to 10 100) | 0·5% (0·0 to 0·9) |
| Sweden | 8900 (8830 to 8980) | 1630 (1620 to 1650) | 5730 (5680 to 5770) | 1540 (1530 to 1560) | 10 400 (9390 to 11 400) | 1820 (1650 to 2000) | 6420 (5810 to 7050) | 2140 (1930 to 2350) | 0·7% (0·3 to 1·1) |
| Switzerland | 7300 (6820 to 7760) | 1250 (1160 to 1330) | 4930 (4600 to 5240) | 1130 (1050 to 1200) | 8920 (8050 to 9860) | 1330 (1200 to 1470) | 5890 (5310 to 6510) | 1710 (1540 to 1880) | 1·0% (0·8 to 1·1) |
| UK | 59 000 (55 400 to 62 600) | 11 200 (10 500 to 11 900) | 38 500 (36 100 to 40 800) | 9310 (8730 to 9880) | 67 800 (63 900 to 71 600) | 11 800 (11 100 to 12 400) | 43 600 (41 000 to 46 000) | 12 500 (11 800 to 13 200) | 0·7% (0·6 to 0·7) |
| England | 49 200 (45 600 to 52 900) | 9330 (8640 to 10 000) | 32 100 (29 800 to 34 500) | 7780 (7210 to 8360) | 57 300 (53 400 to 60 900) | 10 000 (9370 to 10 700) | 36 800 (34 300 to 39 100) | 10 400 (9730 to 11 100) | 0·7% (0·7 to 0·7) |
| Northern Ireland | 1700 (1570 to 1840) | 384 (355 to 416) | 1100 (1020 to 1190) | 219 (202 to 237) | 1930 (1800 to 2060) | 372 (346 to 397) | 1230 (1150 to 1310) | 328 (305 to 350) | 0·6% (0·6 to 0·6) |
| Scotland | 5140 (4760 to 5510) | 939 (870 to 1010) | 3400 (3150 to 3650) | 802 (743 to 861) | 5520 (4790 to 6280) | 843 (732 to 960) | 3590 (3120 to 4080) | 1090 (943 to 1240) | 0·3% (0·0 to 0·6) |
| Wales | 2950 (2730 to 3180) | 567 (526 to 612) | 1870 (1740 to 2020) | 506 (468 to 546) | 3150 (2940 to 3370) | 524 (489 to 560) | 1960 (1830 to 2100) | 664 (620 to 709) | 0·3% (0·3 to 0·4) |
| **Latin America and Caribbean** | **465 000 (450 000 to 480 000)** | **152 000 (148 000 to 157 000)** | **288 000 (278 000 to 297 000)** | **25 100 (24 200 to 25 900)** | **594 000 (560 000 to 626 000)** | **143 000 (136 000 to 150 000)** | **398 000 (374 000 to 420 000)** | **53 200 (49 800 to 56 400)** | **1·2% (1·0 to 1·3)** |
| Andean Latin America | 46 300 (43 400 to 49 200) | 16 500 (15 500 to 17 500) | 27 400 (25 700 to 29 200) | 2390 (2240 to 2540) | 66 100 (61 400 to 70 300) | 18 100 (16 800 to 19 200) | 43 000 (40 000 to 45 700) | 5020 (4660 to 5340) | 1·7% (1·6 to 1·8) |
| Bolivia | 8290 (7670 to 8910) | 3230 (2990 to 3470) | 4690 (4340 to 5030) | 373 (345 to 401) | 11 800 (10 300 to 13 300) | 3490 (3050 to 3930) | 7560 (6620 to 8520) | 750 (656 to 845) | 1·7% (1·4 to 1·9) |
| Ecuador | 12 500 (11 600 to 13 500) | 4550 (4210 to 4900) | 7360 (6810 to 7930) | 628 (581 to 677) | 18 100 (15 500 to 20 500) | 5070 (4350 to 5750) | 11 600 (9930 to 13 100) | 1420 (1220 to 1610) | 1·7% (1·4 to 2·0) |
| Peru | 25 500 (22 900 to 28 200) | 8690 (7820 to 9620) | 15 400 (13 800 to 17 000) | 1390 (1250 to 1530) | 36 300 (32 900 to 39 700) | 9540 (8650 to 10 400) | 23 900 (21 700 to 26 100) | 2850 (2580 to 3120) | 1·7% (1·6 to 1·7) |
| Caribbean | 40 100 (38 700 to 41 600) | 12 100 (11 600 to 12 500) | 25 200 (24 300 to 26 100) | 2870 (2760 to 2970) | 47 500 (44 300 to 50 900) | 11 500 (10 600 to 12 500) | 31 200 (29 200 to 33 500) | 4750 (4470 to 5050) | 0·8% (0·6 to 1·0) |
| Antigua and Barbuda | 76·4 (70·3 to 82·2) | 21·6 (19·9 to 23·2) | 49·7 (45·7 to 53·4) | 5·1 (4·7 to 5·5) | 89·4 (78·4 to 100) | 16·9 (14·8 to 19) | 63·6 (55·7 to 71·4) | 8·9 (7·8 to 10) | 0·7% (0·5 to 1·0) |
| The Bahamas | 303 (283 to 325) | 85·4 (79·7 to 91·4) | 202 (188 to 216) | 16 (14·9 to 17·1) | 388 (334 to 444) | 81·2 (69·9 to 92·9) | 275 (237 to 314) | 31·8 (27·4 to 36·4) | 1·2% (0·8 to 1·5) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Barbados | 257 (240 to 273) | 56·7 (53 to 60·3) | 170 (158 to 180) | 30·6 (28·6 to 32·5) | 299 (260 to 342) | 47·1 (40·9 to 53·9) | 203 (176 to 232) | 49·2 (42·7 to 56·3) | 0·7% (0·4 to 1·1) |
| Belize | 240 (223 to 256) | 93·7 (87·1 to 100) | 136 (126 to 145) | 10·2 (9·5 to 10·9) | 429 (369 to 489) | 123 (106 to 140) | 284 (244 to 323) | 22·5 (19·3 to 25·6) | 2·8% (2·4 to 3·1) |
| Bermuda | 63·3 (59·3 to 67·3) | 12·1 (11·3 to 12·8) | 44·5 (41·6 to 47·3) | 6·8 (6·4 to 7·2) | 63·5 (57·4 to 69·9) | 8·4 (7·6 to 9·3) | 42 (37·9 to 46·2) | 13·1 (11·9 to 14·5) | 0·0% (–0·2 to 0·2) |
| Cuba | 11 400 (10 500 to 12 300) | 2440 (2250 to 2630) | 7840 (7220 to 8450) | 1120 (1030 to 1200) | 11 300 (9910 to 12 700) | 1780 (1560 to 2000) | 7720 (6790 to 8690) | 1770 (1560 to 1990) | –0·1% (–0·3 to 0·2) |
| Dominica | 68·6 (63·5 to 73·6) | 21 (19·5 to 22·6) | 41·9 (38·8 to 44·9) | 5·7 (5·3 to 6·1) | 67·1 (58·4 to 76·2) | 13·7 (11·9 to 15·6) | 46·1 (40·2 to 52·4) | 7·3 (6·3 to 8·3) | –0·1% (–0·4 to 0·2) |
| Dominican Republic | 8600 (7900 to 9250) | 2990 (2750 to 3220) | 5150 (4730 to 5550) | 451 (415 to 486) | 11 000 (9390 to 12 600) | 2940 (2510 to 3350) | 7230 (6170 to 8260) | 843 (719 to 963) | 1·2% (0·8 to 1·5) |
| Grenada | 104 (95·9 to 112) | 31·9 (29·4 to 34·4) | 66·1 (61 to 71·2) | 5·9 (5·5 to 6·4) | 103 (88·9 to 116) | 21·8 (18·9 to 24·6) | 71·5 (61·9 to 80·5) | 9·3 (8·1 to 10·5) | –0·1% (–0·4 to 0·2) |
| Guyana | 779 (719 to 842) | 284 (262 to 307) | 463 (428 to 501) | 31·8 (29·3 to 34·3) | 765 (670 to 859) | 213 (187 to 240) | 501 (439 to 563) | 50 (43·7 to 56·1) | –0·1% (–0·3 to 0·1) |
| Haiti | 8190 (7470 to 8870) | 3260 (2980 to 3540) | 4610 (4210 to 5000) | 314 (286 to 340) | 12 900 (10 700 to 15 200) | 4350 (3620 to 5140) | 8010 (6660 to 9450) | 506 (421 to 597) | 2·1% (1·7 to 2·6) |
| Jamaica | 2630 (2450 to 2840) | 840 (781 to 905) | 1590 (1480 to 1720) | 200 (186 to 215) | 2800 (2450 to 3160) | 584 (511 to 660) | 1950 (1700 to 2200) | 269 (236 to 304) | 0·3% (0·0 to 0·5) |
| Puerto Rico | 3880 (3620 to 4130) | 925 (862 to 985) | 2530 (2360 to 2690) | 428 (398 to 455) | 3290 (3050 to 3530) | 444 (411 to 477) | 2120 (1970 to 2280) | 725 (671 to 778) | –0·8% (–0·8 to –0·7) |
| Saint Kitts and Nevis | 46·4 (42·9 to 50) | 13·7 (12·6 to 14·7) | 29·2 (27 to 31·4) | 3·6 (3·3 to 3·8) | 58·6 (48·5 to 69·6) | 9·8 (8·1 to 11·7) | 43·4 (35·9 to 51·5) | 5·4 (4·4 to 6·4) | 1·1% (0·6 to 1·6) |
| Saint Lucia | 155 (144 to 166) | 49·1 (45·4 to 52·7) | 95·7 (88·6 to 103) | 10·3 (9·6 to 11·1) | 178 (152 to 202) | 29·7 (25·4 to 33·7) | 127 (109 to 144) | 20·6 (17·6 to 23·4) | 0·6% (0·3 to 0·9) |
| Saint Vincent and the Grenadines | 110 (102 to 118) | 34·8 (32·3 to 37·3) | 67·5 (62·7 to 72·5) | 7·5 (7 to 8·1) | 114 (100 to 129) | 25 (21·9 to 28·2) | 76·6 (67·1 to 86·6) | 12·6 (11 to 14·2) | 0·2% (–0·1 to 0·4) |
| Suriname | 449 (418 to 479) | 135 (126 to 144) | 287 (267 to 306) | 26·9 (25 to 28·7) | 579 (510 to 654) | 143 (126 to 162) | 384 (338 to 434) | 51·8 (45·6 to 58·5) | 1·2% (0·9 to 1·5) |
| Trinidad and Tobago | 1290 (1200 to 1380) | 331 (309 to 354) | 871 (812 to 930) | 89·6 (83·5 to 95·6) | 1390 (1210 to 1570) | 272 (236 to 307) | 943 (816 to 1060) | 178 (154 to 200) | 0·4% (0·0 to 0·6) |
| Virgin Islands | 111 (104 to 119) | 29·7 (27·8 to 31·7) | 72·5 (67·9 to 77·5) | 9·1 (8·6 to 9·8) | 85·9 (79·8 to 91·9) | 13·4 (12·4 to 14·3) | 53·9 (50 to 57·6) | 18·6 (17·3 to 19·9) | –1·2% (–1·3 to –1·2) |
| Central Latin America | 199 000 (191 000 to 208 000) | 70 000 (67 400 to 73 000) | 119 000 (115 000 to 125 000) | 9530 (9150 to 9950) | 253 000 (242 000 to 265 000) | 63 500 (60 800 to 66 400) | 168 000 (161 000 to 176 000) | 21 200 (20 300 to 22 200) | 1·1% (1·1 to 1·2) |
| Colombia | 39 700 (35 700 to 43 700) | 13 100 (11 800 to 14 500) | 24 500 (22 000 to 26 900) | 2130 (1910 to 2350) | 49 100 (44 500 to 53 500) | 10 600 (9630 to 11 600) | 33 600 (30 500 to 36 600) | 4840 (4390 to 5280) | 1·0% (1·0 to 1·1) |
| Costa Rica | 3900 (3640 to 4160) | 1250 (1170 to 1340) | 2440 (2270 to 2590) | 214 (200 to 228) | 4750 (4180 to 5340) | 1020 (894 to 1140) | 3250 (2860 to 3660) | 481 (423 to 541) | 0·9% (0·7 to 1·2) |
| El Salvador | 5860 (5240 to 6550) | 2240 (2010 to 2510) | 3280 (2930 to 3670) | 336 (301 to 376) | 6450 (5430 to 7380) | 1820 (1530 to 2080) | 4070 (3430 to 4660) | 557 (469 to 637) | 0·4% (0·2 to 0·6) |
| Guatemala | 11 100 (10 200 to 12 000) | 5010 (4630 to 5420) | 5680 (5250 to 6140) | 388 (359 to 420) | 15 800 (14 400 to 17 100) | 4930 (4490 to 5360) | 9910 (9030 to 10 800) | 920 (838 to 1000) | 1·7% (1·6 to 1·7) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Honduras | 6170 (5720 to 6660) | 2630 (2440 to 2840) | 3310 (3070 to 3570) | 226 (210 to 244) | 10 100 (8910 to 11 300) | 3280 (2890 to 3660) | 6330 (5580 to 7060) | 508 (448 to 567) | 2·3% (2·1 to 2·5) |
| Mexico | 101 000 (94 400 to 108 000) | 34 900 (32 600 to 37 400) | 61 400 (57 300 to 65 800) | 4770 (4460 to 5110) | 129 000 (119 000 to 139 000) | 32 100 (29 600 to 34 500) | 86 600 (80 000 to 93 300) | 10 600 (9750 to 11 400) | 1·2% (1·1 to 1·2) |
| Nicaragua | 4930 (4460 to 5400) | 2010 (1820 to 2200) | 2740 (2480 to 3000) | 185 (167 to 203) | 6670 (5590 to 7770) | 1980 (1660 to 2310) | 4300 (3600 to 5010) | 391 (328 to 456) | 1·4% (1·1 to 1·7) |
| Panama | 2910 (2730 to 3120) | 927 (868 to 994) | 1810 (1700 to 1940) | 175 (164 to 187) | 4290 (3700 to 4870) | 1150 (993 to 1310) | 2750 (2370 to 3120) | 389 (335 to 441) | 1·8% (1·4 to 2·1) |
| Venezuela | 23 300 (21 600 to 25 100) | 7820 (7270 to 8420) | 14 300 (13 300 to 15 400) | 1100 (1020 to 1180) | 26 600 (23 000 to 30 100) | 6620 (5710 to 7480) | 17 400 (15 000 to 19 700) | 2580 (2220 to 2910) | 0·6% (0·3 to 0·9) |
| Tropical Latin America | 180 000 (168 000 to 192 000) | 53 900 (50 300 to 57 600) | 116 000 (108 000 to 124 000) | 10 300 (9600 to 11 000) | 228 000 (196 000 to 258 000) | 50 200 (43 300 to 56 900) | 155 000 (134 000 to 176 000) | 22 200 (19 100 to 25 300) | 1·1% (0·7 to 1·4) |
| Brazil | 175 000 (162 000 to 187 000) | 52 000 (48 300 to 55 600) | 113 000 (105 000 to 121 000) | 10 000 (9340 to 10 800) | 220 000 (188 000 to 251 000) | 48 200 (41 100 to 54 900) | 150 000 (128 000 to 171 000) | 21 800 (18 600 to 24 800) | 1·1% (0·7 to 1·4) |
| Paraguay | 5150 (4730 to 5580) | 1960 (1800 to 2130) | 2930 (2690 to 3180) | 251 (230 to 272) | 7170 (5860 to 8460) | 2010 (1640 to 2370) | 4680 (3830 to 5520) | 481 (393 to 568) | 1·6% (1·0 to 2·0) |
| **North Africa and Middle East** | **421 000 (407 000 to 434 000)** | **152 000 (147 000 to 157 000)** | **251 000 (243 000 to 260 000)** | **17 400 (16 800 to 18 100)** | **623 000 (600 000 to 646 000)** | **183 000 (175 000 to 191 000)** | **406 000 (390 000 to 420 000)** | **34 200 (32 900 to 35 400)** | **1·9% (1·8 to 2·0)** |
| Afghanistan | 15 900 (12 800 to 18 900) | 7830 (6270 to 9320) | 7500 (6000 to 8910) | 604 (484 to 718) | 31 200 (21 600 to 40 900) | 14 200 (9840 to 18 600) | 16 400 (11 400 to 21 500) | 623 (432 to 816) | 3·2% (2·5 to 3·6) |
| Algeria | 31 000 (28 600 to 33 500) | 10 700 (9890 to 11 600) | 18 900 (17 500 to 20 400) | 1360 (1260 to 1470) | 44 200 (37 400 to 51 000) | 13 300 (11 200 to 15 300) | 28 100 (23 700 to 32 300) | 2840 (2400 to 3280) | 1·7% (1·3 to 2·0) |
| Bahrain | 646 (602 to 695) | 186 (173 to 200) | 445 (415 to 479) | 15·1 (14·1 to 16·2) | 1530 (1420 to 1650) | 297 (276 to 320) | 1180 (1100 to 1270) | 54·5 (50·7 to 58·7) | 4·1% (4·1 to 4·1) |
| Egypt | 67 300 (61 500 to 73 000) | 23 800 (21 800 to 25 900) | 41 100 (37 600 to 44 600) | 2290 (2090 to 2490) | 106 000 (95 700 to 116 000) | 36 900 (33 400 to 40 400) | 64 400 (58 400 to 70 500) | 4380 (3970 to 4790) | 2·1% (2·1 to 2·2) |
| Iran | 66 200 (60 400 to 72 200) | 21 900 (19 900 to 23 800) | 41 300 (37 700 to 45 100) | 3040 (2770 to 3310) | 85 400 (76 900 to 93 900) | 20 200 (18 200 to 22 200) | 59 200 (53 300 to 65 100) | 6010 (5410 to 6610) | 1·2% (1·1 to 1·3) |
| Iraq | 25 100 (21 600 to 29 100) | 10 200 (8790 to 11 800) | 14 100 (12 100 to 16 400) | 762 (654 to 881) | 41 200 (29 200 to 52 100) | 13 500 (9520 to 17 000) | 26 100 (18 500 to 32 900) | 1680 (1190 to 2120) | 2·3% (1·4 to 2·8) |
| Jordan | 4820 (4380 to 5270) | 1900 (1730 to 2080) | 2780 (2530 to 3040) | 134 (122 to 147) | 12 300 (11 100 to 13 700) | 3630 (3260 to 4030) | 8180 (7340 to 9080) | 512 (459 to 568) | 4·5% (4·4 to 4·5) |
| Kuwait | 1920 (1720 to 2110) | 530 (476 to 583) | 1320 (1180 to 1450) | 67·1 (60·2 to 73·8) | 4650 (4030 to 5280) | 846 (733 to 959) | 3630 (3150 to 4120) | 171 (148 to 194) | 4·2% (4·1 to 4·4) |
| Lebanon | 3560 (3200 to 3970) | 1110 (1000 to 1240) | 2170 (1950 to 2420) | 273 (245 to 304) | 5540 (4670 to 6390) | 1280 (1080 to 1470) | 3720 (3130 to 4290) | 546 (461 to 630) | 2·1% (1·8 to 2·3) |
| Libya | 5090 (4590 to 5600) | 1790 (1620 to 1970) | 3100 (2800 to 3410) | 199 (180 to 219) | 6870 (5810 to 7980) | 1490 (1260 to 1730) | 5030 (4250 to 5840) | 350 (296 to 406) | 1·4% (1·1 to 1·7) |
| Morocco | 29 700 (26 800 to 32 600) | 10 200 (9240 to 11 200) | 18 000 (16 200 to 19 800) | 1480 (1330 to 1620) | 37 200 (33 100 to 41 300) | 9790 (8730 to 10 900) | 24 600 (22 000 to 27 400) | 2740 (2440 to 3040) | 1·1% (1·0 to 1·1) |
| Oman | 2330 (2120 to 2530) | 880 (801 to 956) | 1400 (1270 to 1520) | 53·2 (48·4 to 57·7) | 4700 (4350 to 5060) | 1220 (1130 to 1320) | 3370 (3120 to 3620) | 115 (107 to 124) | 3·3% (3·3 to 3·4) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Palestine | 3020 (2750 to 3290) | 1410 (1280 to 1540) | 1520 (1390 to 1660) | 92 (83·8 to 100) | 5140 (4660 to 5610) | 1870 (1700 to 2040) | 3090 (2810 to 3380) | 176 (160 to 192) | 2·5% (2·5 to 2·6) |
| Qatar | 592 (538 to 643) | 159 (145 to 173) | 425 (386 to 462) | 7·9 (7·2 to 8·6) | 2980 (2750 to 3200) | 494 (456 to 531) | 2450 (2260 to 2630) | 37·1 (34·2 to 39·9) | 7·7% (7·6 to 7·8) |
| Saudi Arabia | 20 800 (18 800 to 22 800) | 7480 (6760 to 8210) | 12 700 (11 500 to 14 000) | 547 (494 to 600) | 37 700 (32 600 to 43 000) | 7570 (6550 to 8630) | 29 100 (25 200 to 33 200) | 1020 (884 to 1170) | 2·8% (2·6 to 3·0) |
| Sudan | 26 700 (23 700 to 29 800) | 11 900 (10 500 to 13 300) | 13 900 (12 300 to 15 500) | 922 (817 to 1030) | 43 400 (37 000 to 49 700) | 16 600 (14 100 to 19 000) | 25 400 (21 700 to 29 100) | 1390 (1180 to 1590) | 2·3% (2·1 to 2·4) |
| Syria | 16 700 (15 100 to 18 200) | 6940 (6260 to 7550) | 9270 (8360 to 10 100) | 519 (468 to 565) | 14 000 (11 500 to 16 200) | 3660 (2990 to 4240) | 9350 (7640 to 10 800) | 1010 (829 to 1170) | −0·9% (−1·3 to −0·5) |
| Tunisia | 9840 (8930 to 10 800) | 2980 (2710 to 3260) | 6250 (5670 to 6830) | 607 (551 to 663) | 11 800 (10 600 to 13 200) | 2770 (2470 to 3070) | 7950 (7110 to 8830) | 1130 (1010 to 1260) | 0·9% (0·8 to 1·0) |
| Türkiye | 67 100 (58 200 to 75 600) | 20 100 (17 400 to 22 600) | 43 100 (37 400 to 48 600) | 3940 (3420 to 4450) | 83 600 (77 100 to 90 000) | 18 500 (17 100 to 19 900) | 56 900 (52 500 to 61 200) | 8170 (7530 to 8790) | 1·1% (0·8 to 1·3) |
| United Arab Emirates | 3230 (2900 to 3550) | 720 (647 to 792) | 2480 (2230 to 2730) | 28·5 (25·6 to 31·4) | 9630 (7900 to 11 200) | 1340 (1100 to 1560) | 8130 (6670 to 9470) | 163 (134 to 190) | 5·2% (4·8 to 5·5) |
| Yemen | 18 600 (17 000 to 20 200) | 8970 (8190 to 9730) | 9160 (8370 to 9950) | 490 (448 to 532) | 33 600 (28 200 to 39 500) | 13 800 (11 500 to 16 200) | 18 800 (15 800 to 22 100) | 1020 (850 to 1190) | 2·8% (2·4 to 3·2) |
| **South Asia** | **1 330 000 (1 250 000 to 1 400 000)** | **487 000 (458 000 to 514 000)** | **781 000 (734 000 to 828 000)** | **57 400 (53 800 to 60 900)** | **1 850 000 (1 670 000 to 2 040 000)** | **507 000 (460 000 to 557 000)** | **1 220 000 (1 100 000 to 1 350 000)** | **120 000 (108 000 to 133 000)** | **1·6% (1·4 to 1·8)** |
| Bangladesh | 129 000 (120 000 to 139 000) | 52 300 (48 400 to 56 100) | 72 800 (67 400 to 78 100) | 4310 (3990 to 4620) | 165 000 (143 000 to 186 000) | 45 800 (39 700 to 51 600) | 107 000 (93 100 to 121 000) | 11 600 (10 100 to 13 100) | 1·1% (0·8 to 1·4) |
| Bhutan | 645 (582 to 712) | 238 (215 to 263) | 382 (344 to 421) | 25·2 (22·7 to 27·8) | 757 (685 to 823) | 187 (169 to 204) | 520 (470 to 565) | 50·1 (45·3 to 54·5) | 0·8% (0·7 to 0·8) |
| India | 1 030 000 (953 000 to 1 110 000) | 366 000 (338 000 to 393 000) | 620 000 (572 000 to 666 000) | 47 000 (43 400 to 50 600) | 1 410 000 (1 240 000 to 1 600 000) | 366 000 (321 000 to 415 000) | 951 000 (833 000 to 1 080 000) | 97 500 (85 500 to 110 000) | 1·5% (1·3 to 1·7) |
| Nepal | 23 900 (22 200 to 25 500) | 9770 (9080 to 10 400) | 13 200 (12 300 to 14 100) | 904 (840 to 966) | 31 100 (27 300 to 35 300) | 9230 (8100 to 10 500) | 20 000 (17 600 to 22 700) | 1910 (1680 to 2170) | 1·2% (1·0 to 1·5) |
| Pakistan | 139 000 (127 000 to 150 000) | 58 400 (53 700 to 63 100) | 75 100 (69 100 to 81 200) | 5140 (4730 to 5560) | 236 000 (215 000 to 257 000) | 85 400 (78 100 to 93 100) | 142 000 (129 000 to 154 000) | 8550 (7820 to 9320) | 2·5% (2·5 to 2·6) |
| **Southeast Asia, east Asia, and Oceania** | **1 860 000 (1 760 000 to 1 950 000)** | **483 000 (460 000 to 505 000)** | **1 250 000 (1 190 000 to 1 320 000)** | **119 000 (112 000 to 125 000)** | **2 190 000 (2 070 000 to 2 290 000)** | **445 000 (424 000 to 465 000)** | **1 490 000 (1 410 000 to 1 560 000)** | **254 000 (240 000 to 269 000)** | **0·8% (0·7 to 0·8)** |
| East Asia | 1 300 000 (1 220 000 to 1 390 000) | 305 000 (285 000 to 326 000) | 907 000 (847 000 to 968 000) | 92 500 (86 300 to 98 700) | 1 470 000 (1 370 000 to 1 580 000) | 267 000 (248 000 to 287 000) | 1 000 000 (933 000 to 1 080 000) | 203 000 (188 000 to 217 000) | 0·6% (0·6 to 0·6) |
| China | 1 260 000 (1 170 000 to 1 350 000) | 294 000 (274 000 to 314 000) | 876 000 (816 000 to 937 000) | 89 000 (82 900 to 95 200) | 1 420 000 (1 320 000 to 1 530 000) | 260 000 (241 000 to 279 000) | 967 000 (896 000 to 1 040 000) | 196 000 (182 000 to 211 000) | 0·6% (0·6 to 0·6) |
| North Korea | 23 400 (20 900 to 26 000) | 6550 (5830 to 7260) | 15 300 (13 600 to 17 000) | 1540 (1380 to 1710) | 26 400 (22 400 to 30 300) | 4770 (4040 to 5480) | 18 900 (16 000 to 21 700) | 2670 (2260 to 3060) | 0·6% (0·3 to 0·7) |
| Taiwan (province of China) | 22 300 (22 100 to 22 400) | 4700 (4670 to 4730) | 15 600 (15 500 to 15 700) | 1930 (1920 to 1940) | 23 600 (21 400 to 25 900) | 2950 (2670 to 3230) | 16 700 (15 100 to 18 300) | 4010 (3640 to 4390) | 0·3% (−0·1 to 0·7) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Oceania | 8350 (7950 to 8720) | 3300 (3140 to 3450) | 4780 (4560 to 5000) | 256 (244 to 266) | 13 900 (12 500 to 15 300) | 5080 (4540 to 5590) | 8360 (7520 to 9170) | 489 (446 to 530) | 2·4% (2·2 to 2·7) |
| American Samoa | 58·5 (54·6 to 62·6) | 22·1 (20·6 to 23·6) | 34·2 (31·9 to 36·6) | 2·2 (2·1 to 2·4) | 49·8 (45·8 to 53·2) | 14·2 (13·1 to 15·2) | 31·9 (29·4 to 34·1) | 3·7 (3·4 to 3·9) | −0·8% (−0·8 to −0·7) |
| Cook Islands | 18·6 (17·1 to 20) | 5·5 (5·1 to 5·9) | 11·8 (10·9 to 12·7) | 1·3 (1·2 to 1·4) | 17·7 (16 to 19·4) | 3·8 (3·4 to 4·1) | 11·6 (10·5 to 12·7) | 2·3 (2·1 to 2·5) | −0·2% (−0·3 to −0·1) |
| Federated States of Micronesia | 110 (102 to 117) | 44·4 (41·3 to 47·3) | 61·3 (57·1 to 65·4) | 3·8 (3·5 to 4) | 103 (89·5 to 116) | 30·6 (26·7 to 34·7) | 67·2 (58·6 to 76·2) | 4·8 (4·2 to 5·5) | −0·3% (−0·6 to 0·0) |
| Fiji | 816 (739 to 892) | 266 (241 to 290) | 522 (473 to 571) | 28·2 (25·5 to 30·8) | 924 (839 to 1020) | 272 (247 to 300) | 596 (540 to 654) | 56·4 (51·2 to 62) | 0·6% (0·6 to 0·6) |
| Guam | 159 (149 to 170) | 49·5 (46·2 to 52·7) | 101 (94·7 to 108) | 8·5 (8 to 9·1) | 159 (146 to 171) | 36·6 (33·7 to 39·3) | 104 (95·3 to 111) | 19·1 (17·6 to 20·6) | 0·0% (−0·1 to 0·0) |
| Kiribati | 87·3 (81 to 93·8) | 34·9 (32·4 to 37·5) | 49·5 (45·9 to 53·1) | 2·9 (2·7 to 3·1) | 121 (108 to 134) | 42 (37·6 to 46·6) | 74·5 (66·6 to 82·7) | 4·6 (4·1 to 5·1) | 1·6% (1·4 to 1·7) |
| Marshall Islands | 52·5 (48·5 to 56·6) | 21·9 (20·2 to 23·5) | 29·5 (27·3 to 31·8) | 1·1 (1 to 1·2) | 56·3 (49·2 to 63·6) | 17·5 (15·3 to 19·7) | 36·5 (31·9 to 41·3) | 2·3 (2 to 2·6) | 0·3% (0·1 to 0·6) |
| Nauru | 10·8 (9·9 to 11·6) | 4·2 (3·8 to 4·5) | 6·3 (5·8 to 6·8) | 0·3 (0·3 to 0·4) | 11 (9·6 to 12·4) | 4 (3·5 to 4·5) | 6·6 (5·8 to 7·5) | 0·4 (0·3 to 0·5) | 0·1% (−0·1 to 0·3) |
| Niue | 1·9 (1·8 to 2·1) | 0·6 (0·5 to 0·6) | 1·2 (1·1 to 1·3) | 0·2 (0·2 to 0·2) | 1·7 (1·5 to 1·9) | 0·4 (0·3 to 0·4) | 1·1 (1 to 1·2) | 0·2 (0·2 to 0·2) | −0·7% (−0·9 to −0·4) |
| Northern Mariana Islands | 72·7 (67·7 to 77·5) | 17·9 (16·7 to 19·1) | 53·5 (49·9 to 57·1) | 1·3 (1·2 to 1·3) | 48·5 (45·1 to 52·1) | 11·3 (10·5 to 12·1) | 33·6 (31·3 to 36·2) | 3·6 (3·3 to 3·9) | −1·9% (−2·0 to −1·9) |
| Palau | 19·7 (18·4 to 21·1) | 4·9 (4·6 to 5·2) | 13·9 (13 to 14·9) | 1 (0·9 to 1) | 18·1 (16·2 to 20·1) | 3·3 (2·9 to 3·6) | 13·2 (11·8 to 14·6) | 1·7 (1·5 to 1·8) | −0·4% (−0·6 to −0·2) |
| Papua New Guinea | 5520 (5140 to 5880) | 2250 (2100 to 2400) | 3110 (2900 to 3310) | 156 (145 to 166) | 10 500 (9100 to 11 800) | 3920 (3410 to 4410) | 6230 (5420 to 7020) | 314 (273 to 354) | 3·0% (2·7 to 3·3) |
| Samoa | 180 (166 to 193) | 72·6 (67 to 77·6) | 99·3 (91·6 to 106) | 8·3 (7·6 to 8·8) | 214 (193 to 236) | 79·9 (72·2 to 88·1) | 123 (111 to 135) | 11 (10 to 12·2) | 0·8% (0·7 to 1·0) |
| Solomon Islands | 445 (412 to 480) | 190 (176 to 205) | 242 (224 to 261) | 13·6 (12·6 to 14·7) | 684 (579 to 780) | 260 (220 to 297) | 401 (339 to 457) | 22·6 (19·1 to 25·7) | 2·0% (1·6 to 2·3) |
| Tokelau | 1·5 (1·4 to 1·7) | 0·5 (0·5 to 0·6) | 0·9 (0·8 to 0·9) | 0·1 (0·1 to 0·1) | 1·4 (1·2 to 1·5) | 0·4 (0·4 to 0·4) | 0·8 (0·8 to 0·9) | 0·1 (0·1 to 0·2) | −0·6% (−0·7 to −0·5) |
| Tonga | 103 (93 to 113) | 40·5 (36·6 to 44·3) | 56·8 (51·4 to 62·2) | 5·5 (5 to 6·1) | 106 (96 to 117) | 39 (35·2 to 42·8) | 60·6 (54·7 to 66·5) | 6·7 (6 to 7·3) | 0·2% (0·1 to 0·2) |
| Tuvalu | 9·7 (8·9 to 10·5) | 3·4 (3·1 to 3·7) | 5·7 (5·2 to 6·2) | 0·6 (0·6 to 0·7) | 12·4 (10·8 to 14) | 3·7 (3·3 to 4·2) | 7·8 (6·8 to 8·8) | 0·9 (0·8 to 1) | 1·1% (0·9 to 1·3) |
| Vanuatu | 194 (180 to 208) | 82·3 (76·3 to 88·1) | 106 (98·6 to 114) | 5·8 (5·4 to 6·2) | 313 (291 to 336) | 116 (108 to 125) | 184 (171 to 198) | 12·2 (11·4 to 13·1) | 2·3% (2·3 to 2·3) |
| Southeast Asia | 543 000 (513 000 to 573 000) | 174 000 (165 000 to 184 000) | 343 000 (323 000 to 362 000) | 26 100 (24 700 to 27 500) | 698 000 (670 000 to 728 000) | 173 000 (166 000 to 180 000) | 474 000 (456 000 to 495 000) | 51 200 (49 000 to 53 300) | 1·2% (1·1 to 1·3) |
| Cambodia | 12 500 (11 500 to 13 600) | 5200 (4780 to 5640) | 6910 (6350 to 7500) | 430 (396 to 467) | 17 000 (14 500 to 19 600) | 5120 (4360 to 5890) | 11 000 (9380 to 12 700) | 931 (794 to 1070) | 1·5% (1·1 to 1·8) |
| Indonesia | 212 000 (183 000 to 240 000) | 66 600 (57 600 to 75 700) | 135 000 (117 000 to 154 000) | 9580 (8280 to 10 900) | 279 000 (257 000 to 300 000) | 67 300 (62 000 to 72 400) | 194 000 (179 000 to 209 000) | 17 500 (16 100 to 18 800) | 1·3% (1·1 to 1·6) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Laos | 5390 (4850 to 5930) | 2310 (2080 to 2540) | 2890 (2600 to 3180) | 193 (174 to 212) | 7380 (6610 to 8100) | 2300 (2060 to 2520) | 4750 (4260 to 5220) | 327 (293 to 359) | 1·5% (1·5 to 1·5) |
| Malaysia | 23 800 (22 200 to 25 500) | 7990 (7460 to 8540) | 14 900 (13 900 to 15 900) | 911 (851 to 974) | 31 800 (27 200 to 36 000) | 7610 (6510 to 8610) | 21 900 (18 700 to 24 700) | 2340 (2000 to 2650) | 1·4% (1·0 to 1·6) |
| Maldives | 280 (260 to 299) | 113 (105 to 121) | 156 (146 to 167) | 10·3 (9·6 to 11) | 517 (456 to 571) | 100 (88·3 to 110) | 395 (348 to 436) | 22·1 (19·5 to 24·4) | 2·9% (2·7 to 3·1) |
| Mauritius | 1210 (1130 to 1300) | 312 (290 to 334) | 827 (769 to 887) | 75·7 (70·4 to 81·1) | 1270 (1100 to 1440) | 207 (180 to 235) | 900 (779 to 1020) | 164 (142 to 186) | 0·2% (−0·1 to 0·5) |
| Myanmar | 45 300 (38 300 to 52 300) | 14 300 (12 100 to 16 500) | 28 700 (24 300 to 33 100) | 2300 (1950 to 2650) | 56 400 (50 200 to 62 800) | 15 600 (13 900 to 17 400) | 37 000 (32 900 to 41 200) | 3810 (3390 to 4240) | 1·1% (0·9 to 1·3) |
| Philippines | 79 500 (73 900 to 85 100) | 30 000 (27 900 to 32 100) | 46 500 (43 300 to 49 800) | 2940 (2740 to 3150) | 113 000 (100 000 to 125 000) | 34 000 (30 100 to 37 600) | 73 100 (64 700 to 80 800) | 6170 (5470 to 6830) | 1·7% (1·5 to 1·8) |
| Seychelles | 81·6 (74·6 to 88) | 22·3 (20·4 to 24·1) | 53·2 (48·6 to 57·4) | 6 (5·5 to 6·5) | 105 (91·4 to 121) | 23·4 (20·3 to 26·8) | 73 (63·2 to 83·5) | 9·1 (7·9 to 10·4) | 1·2% (0·9 to 1·5) |
| Sri Lanka | 18 700 (16 200 to 21 200) | 5090 (4390 to 5770) | 12 500 (10 800 to 14 200) | 1100 (954 to 1250) | 22 300 (19 400 to 25 000) | 5100 (4460 to 5740) | 14 700 (12 800 to 16 500) | 2450 (2140 to 2760) | 0·8% (0·8 to 0·9) |
| Thailand | 62 500 (58 500 to 66 800) | 15 200 (14 200 to 16 200) | 43 400 (40 600 to 46 400) | 3920 (3670 to 4190) | 66 700 (57 500 to 75 900) | 9770 (8430 to 11 100) | 47 300 (40 800 to 53 800) | 9640 (8320 to 11 000) | 0·3% (−0·1 to 0·6) |
| Timor-Leste | 904 (821 to 984) | 389 (353 to 423) | 487 (442 to 530) | 28·2 (25·6 to 30·6) | 1400 (1250 to 1540) | 521 (465 to 575) | 803 (717 to 887) | 74·4 (66·4 to 82·1) | 2·1% (2·0 to 2·2) |
| Viet Nam | 80 200 (74 500 to 86 400) | 26 300 (24 400 to 28 300) | 49 400 (45 900 to 53 200) | 4570 (4240 to 4920) | 100 000 (92 300 to 108 000) | 24 800 (22 800 to 26 600) | 67 800 (62 400 to 73 000) | 7670 (7060 to 8250) | 1·1% (1·0 to 1·1) |
| **Sub-Saharan Africa** | **647 000 (629 000 to 666 000)** | **289 000 (281 000 to 297 000)** | **338 000 (329 000 to 348 000)** | **19 600 (19 000 to 20 100)** | **1 130 000 (1 090 000 to 1 180 000)** | **476 000 (457 000 to 496 000)** | **624 000 (599 000 to 650 000)** | **33 500 (32 200 to 34 800)** | **2·7% (2·6 to 2·7)** |
| Central sub-Saharan Africa | 73 600 (65 300 to 81 300) | 33 600 (29 800 to 37 200) | 37 900 (33 700 to 41 800) | 2020 (1780 to 2250) | 137 000 (110 000 to 166 000) | 58 700 (47 400 to 70 600) | 74 800 (60 100 to 90 500) | 3490 (2800 to 4230) | 2·9% (2·5 to 3·4) |
| Angola | 14 700 (12 600 to 16 900) | 6840 (5860 to 7850) | 7560 (6480 to 8680) | 323 (277 to 371) | 32 700 (29 100 to 36 400) | 15 200 (13 500 to 17 000) | 16 700 (14 900 to 18 600) | 741 (658 to 826) | 3·8% (3·7 to 4·0) |
| Central African Republic | 3620 (3320 to 3940) | 1620 (1490 to 1760) | 1920 (1760 to 2080) | 85·4 (78·5 to 93) | 5480 (4510 to 6410) | 2280 (1880 to 2670) | 3080 (2530 to 3590) | 125 (103 to 146) | 2·0% (1·5 to 2·3) |
| Congo (Brazzaville) | 3150 (2790 to 3450) | 1280 (1130 to 1400) | 1780 (1570 to 1940) | 98·1 (86·9 to 107) | 5390 (4590 to 6240) | 1930 (1640 to 2230) | 3290 (2800 to 3810) | 172 (147 to 200) | 2·5% (2·3 to 2·8) |
| Democratic Republic of the Congo | 50 200 (41 900 to 58 100) | 23 100 (19 300 to 26 700) | 25 600 (21 400 to 29 700) | 1450 (1210 to 1670) | 90 000 (63 000 to 118 000) | 38 000 (26 600 to 49 700) | 49 700 (34 700 to 65 000) | 2340 (1640 to 3070) | 2·7% (1·9 to 3·4) |
| Equatorial Guinea | 654 (544 to 758) | 309 (258 to 359) | 328 (273 to 381) | 16·3 (13·6 to 18·9) | 1510 (1360 to 1680) | 585 (527 to 648) | 894 (805 to 990) | 33·6 (30·3 to 37·3) | 4·0% (3·8 to 4·3) |
| Gabon | 1230 (1090 to 1370) | 499 (442 to 556) | 675 (598 to 753) | 53·2 (47·1 to 59·4) | 1820 (1610 to 2020) | 639 (566 to 709) | 1100 (975 to 1220) | 74·7 (66·1 to 82·9) | 1·9% (1·8 to 1·9) |
| Eastern sub-Saharan Africa | 250 000 (242 000 to 259 000) | 117 000 (113 000 to 121 000) | 127 000 (122 000 to 131 000) | 6540 (6320 to 6760) | 426 000 (406 000 to 447 000) | 178 000 (170 000 to 187 000) | 236 000 (225 000 to 247 000) | 11 800 (11 300 to 12 400) | 2·5% (2·5 to 2·6) |
| Burundi | 6390 (5610 to 7130) | 3040 (2670 to 3400) | 3160 (2780 to 3530) | 182 (159 to 202) | 13 200 (11 300 to 15 000) | 5850 (5020 to 6640) | 7040 (6040 to 7990) | 326 (279 to 369) | 3·5% (3·4 to 3·5) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Comoros | 553 (505 to 602) | 233 (213 to 253) | 300 (275 to 327) | 19·5 (17·8 to 21·2) | 744 (612 to 882) | 240 (197 to 284) | 467 (384 to 554) | 37 (30·4 to 43·8) | 1·4% (0·9% to 1·8) |
| Djibouti | 619 (546 to 696) | 238 (210 to 268) | 368 (324 to 414) | 13 (11·5 to 14·7) | 1260 (1080 to 1450) | 413 (355 to 476) | 806 (693 to 927) | 39·8 (34·2 to 45·8) | 3·4% (3·3 to 3·5) |
| Eritrea | 3980 (3370 to 4650) | 1780 (1500 to 2070) | 2130 (1800 to 2480) | 79·7 (67·4 to 93) | 6600 (4580 to 8750) | 2520 (1750 to 3350) | 3900 (2710 to 5180) | 169 (118 to 225) | 2·4% (1·5 to 3·0) |
| Ethiopia | 68 400 (61 800 to 75 400) | 32 500 (29 400 to 35 800) | 34 200 (30 900 to 37 700) | 1710 (1550 to 1890) | 109 000 (91 800 to 125 000) | 44 400 (37 400 to 51 100) | 61 400 (51 700 to 70 700) | 3220 (2720 to 3710) | 2·2% (1·9 to 2·4) |
| Kenya | 31 100 (28 800 to 33 400) | 14 000 (12 900 to 15 000) | 16 300 (15 100 to 17 500) | 831 (768 to 892) | 50 100 (46 200 to 54 000) | 18 700 (17 200 to 20 100) | 29 700 (27 500 to 32 100) | 1650 (1530 to 1790) | 2·3% (2·2 to 2·3) |
| Madagascar | 15 900 (14 300 to 17 500) | 7270 (6530 to 8030) | 8180 (7360 to 9040) | 406 (365 to 448) | 28 600 (26 100 to 31 000) | 11 700 (10 700 to 12 700) | 16 100 (14 700 to 17 500) | 687 (627 to 745) | 2·8% (2·7 to 2·9) |
| Malawi | 11 100 (10 200 to 11 900) | 5080 (4660 to 5470) | 5690 (5220 to 6120) | 329 (302 to 354) | 19 400 (17 900 to 21 000) | 8120 (7460 to 8790) | 10 800 (9900 to 11 700) | 539 (494 to 582) | 2·7% (2·7 to 2·7) |
| Mozambique | 17 600 (16 000 to 19 100) | 8080 (7360 to 8800) | 8970 (8180 to 9770) | 506 (461 to 551) | 31 100 (28 200 to 33 900) | 14 300 (13 000 to 15 600) | 16 000 (14 600 to 17 500) | 767 (697 to 838) | 2·7% (2·7 to 2·7) |
| Rwanda | 8110 (7420 to 8780) | 3740 (3420 to 4050) | 4180 (3820 to 4520) | 197 (180 to 213) | 13 300 (11 500 to 14 900) | 4970 (4310 to 5600) | 7850 (6810 to 8840) | 451 (392 to 508) | 2·3% (2·1 to 2·5) |
| Somalia | 10 200 (8650 to 11 700) | 4780 (4070 to 5510) | 5210 (4430 to 6000) | 170 (144 to 195) | 21 600 (15 600 to 27 000) | 10 300 (7450 to 12 900) | 10 900 (7850 to 13 600) | 386 (279 to 484) | 3·6% (2·8 to 4·0) |
| South Sudan | 7270 (6420 to 8090) | 3300 (2920 to 3670) | 3770 (3330 to 4190) | 202 (178 to 225) | 9670 (8120 to 11 000) | 4300 (3610 to 4900) | 5140 (4310 to 5860) | 242 (203 to 276) | 1·4% (1·1 to 1·5) |
| Tanzania | 34 300 (31 500 to 37 100) | 15 600 (14 300 to 16 900) | 17 700 (16 200 to 19 100) | 1070 (985 to 1160) | 58 400 (51 500 to 65 500) | 24 400 (21 500 to 27 300) | 32 200 (28 400 to 36 100) | 1840 (1620 to 2060) | 2·5% (2·3 to 2·7) |
| Uganda | 24 300 (22 200 to 26 300) | 12 200 (11 200 to 13 300) | 11 500 (10 500 to 12 400) | 565 (516 to 612) | 43 300 (38 700 to 48 300) | 19 800 (17 700 to 22 100) | 22 500 (20 000 to 25 100) | 1010 (905 to 1130) | 2·8% (2·6 to 2·9) |
| Zambia | 9930 (9220 to 10 600) | 4730 (4390 to 5060) | 4950 (4590 to 5290) | 246 (229 to 264) | 19 500 (16 800 to 22 300) | 8270 (7110 to 9440) | 10 800 (9270 to 12 300) | 455 (391 to 519) | 3·2% (2·9 to 3·5) |
| Southern sub-Saharan Africa | 63 700 (60 000 to 67 300) | 22 600 (21 300 to 23 800) | 38 300 (36 100 to 40 600) | 2790 (2620 to 2960) | 80 300 (72 900 to 88 200) | 24 100 (22 000 to 26 200) | 51 700 (46 900 to 56 900) | 4490 (4030 to 4970) | 1·1% (0·9 to 1·3) |
| Botswana | 1700 (1580 to 1820) | 658 (613 to 706) | 978 (911 to 1050) | 58·7 (54·6 to 62·9) | 2390 (2080 to 2710) | 698 (606 to 791) | 1590 (1380 to 1800) | 105 (90·8 to 118) | 1·6% (1·3 to 1·9) |
| Eswatini | 1020 (927 to 1110) | 445 (406 to 485) | 546 (498 to 595) | 25·8 (23·5 to 28·1) | 1160 (1030 to 1260) | 413 (368 to 451) | 703 (626 to 767) | 40 (35·7 to 43·7) | 0·6% (0·5 to 0·6) |
| Lesotho | 1740 (1570 to 1910) | 680 (617 to 748) | 976 (885 to 1070) | 79·7 (72·3 to 87·7) | 1870 (1680 to 2070) | 630 (566 to 695) | 1160 (1040 to 1280) | 83·9 (75·4 to 92·5) | 0·4% (0·3 to 0·4) |
| Namibia | 1830 (1700 to 1960) | 748 (695 to 800) | 1020 (948 to 1090) | 65·8 (61·1 to 70·4) | 2430 (2090 to 2730) | 825 (711 to 926) | 1500 (1300 to 1690) | 101 (87·2 to 114) | 1·3% (1·0 to 1·6) |
| South Africa | 45 400 (41 800 to 48 800) | 15 000 (13 800 to 16 100) | 28 300 (26 000 to 30 400) | 2170 (2000 to 2340) | 56 900 (49 700 to 64 300) | 15 200 (13 300 to 17 200) | 38 000 (33 200 to 42 900) | 3670 (3210 to 4140) | 1·1% (0·8 to 1·3) |
| Zimbabwe | 12 000 (11 100 to 12 900) | 5060 (4670 to 5440) | 6530 (6030 to 7020) | 389 (359 to 418) | 15 600 (13 800 to 17 500) | 6290 (5570 to 7050) | 8810 (7790 to 9860) | 494 (437 to 553) | 1·2% (1·1 to 1·4) |
| Western sub-Saharan Africa | 259 000 (246 000 to 273 000) | 116 000 (110 000 to 122 000) | 135 000 (128 000 to 142 000) | 8220 (7790 to 8640) | 490 000 (462 000 to 518 000) | 215 000 (203 000 to 227 000) | 261 000 (247 000 to 276 000) | 13 700 (12 900 to 14 400) | 3·0% (3·0 to 3·1) |

(Table 5 continues on next page)

| | Population in 2000 (thousands) | | | | Population in 2021 (thousands) | | | | Annualised rate of change in population, 2000–21 |
|---|---|---|---|---|---|---|---|---|---|
| | All ages | <15 years | 15–64 years | ≥65 years | All ages | <15 years | 15–64 years | ≥65 years | |
| (Continued from previous page) | | | | | | | | | |
| Benin | 6720 (6170 to 7260) | 3250 (2990 to 3520) | 3260 (3000 to 3530) | 201 (184 to 217) | 13 500 (11 800 to 15 100) | 6080 (5330 to 6820) | 7050 (6180 to 7910) | 370 (325 to 415) | 3·3% (3·1 to 3·5) |
| Burkina Faso | 12 400 (11 300 to 13 700) | 6050 (5480 to 6660) | 5970 (5410 to 6560) | 409 (370 to 450) | 22 800 (20 900 to 24 600) | 10 400 (9550 to 11 200) | 11 700 (10 800 to 12 700) | 690 (635 to 747) | 2·9% (2·8 to 3·0) |
| Cabo Verde | 451 (420 to 482) | 188 (176 to 201) | 236 (220 to 252) | 26·9 (25·1 to 28·8) | 559 (487 to 634) | 143 (125 to 162) | 382 (333 to 434) | 33·7 (29·4 to 38·2) | 1·0% (0·7 to 1·3) |
| Cameroon | 15 100 (13 600 to 16 600) | 6820 (6160 to 7530) | 7780 (7020 to 8590) | 453 (409 to 500) | 31 800 (26 700 to 37 200) | 13 500 (11 300 to 15 700) | 17 500 (14 600 to 20 400) | 862 (723 to 1010) | 3·5% (3·2 to 3·8) |
| Chad | 8290 (7350 to 9220) | 4130 (3660 to 4590) | 3890 (3450 to 4330) | 269 (238 to 299) | 17 700 (15 200 to 20 300) | 9010 (7720 to 10 300) | 8330 (7130 to 9510) | 409 (350 to 467) | 3·6% (3·5 to 3·8) |
| Côte d'Ivoire | 16 900 (15 700 to 18 200) | 7290 (6740 to 7850) | 9270 (8570 to 9980) | 390 (360 to 420) | 27 900 (24 900 to 31 100) | 11 600 (10 300 to 12 900) | 15 600 (13 900 to 17 400) | 728 (649 to 814) | 2·4% (2·2 to 2·5) |
| The Gambia | 1350 (1240 to 1460) | 604 (555 to 653) | 706 (648 to 763) | 40·6 (37·3 to 43·9) | 2390 (2110 to 2680) | 993 (875 to 1110) | 1330 (1170 to 1490) | 72·1 (63·5 to 80·9) | 2·7% (2·5 to 2·9) |
| Ghana | 19 100 (17 800 to 20 400) | 8010 (7460 to 8530) | 10 500 (9770 to 11 200) | 642 (598 to 683) | 34 200 (29 700 to 38 900) | 12 900 (11 200 to 14 600) | 20 200 (17 500 to 22 900) | 1200 (1040 to 1360) | 2·8% (2·4 to 3·1) |
| Guinea | 8100 (7380 to 8800) | 3750 (3420 to 4070) | 3970 (3620 to 4310) | 382 (348 to 415) | 13 400 (12 000 to 15 000) | 6050 (5380 to 6730) | 6960 (6200 to 7750) | 425 (379 to 474) | 2·4% (2·3 to 2·5) |
| Guinea-Bissau | 1250 (1080 to 1410) | 580 (504 to 655) | 635 (552 to 717) | 31·2 (27·2 to 35·3) | 2060 (1780 to 2340) | 898 (775 to 1020) | 1120 (966 to 1270) | 46·4 (40 to 52·6) | 2·4% (2·4 to 2·5) |
| Liberia | 2850 (2520 to 3180) | 1260 (1120 to 1410) | 1480 (1310 to 1650) | 105 (93·3 to 118) | 5460 (4610 to 6310) | 2190 (1840 to 2530) | 3140 (2650 to 3630) | 138 (117 to 160) | 3·1% (2·9 to 3·3) |
| Mali | 11 100 (10 200 to 12 000) | 5280 (4850 to 5710) | 5450 (5010 to 5900) | 338 (311 to 366) | 24 100 (20 600 to 27 500) | 11 600 (9900 to 13 200) | 11 900 (10 200 to 13 600) | 633 (541 to 722) | 3·7% (3·4 to 4·0) |
| Mauritania | 2610 (2440 to 2790) | 1150 (1080 to 1230) | 1360 (1270 to 1450) | 99·4 (92·7 to 106) | 4400 (3880 to 4930) | 1850 (1640 to 2080) | 2370 (2100 to 2660) | 169 (149 to 189) | 2·5% (2·2 to 2·7) |
| Niger | 11 300 (10 400 to 12 100) | 5560 (5130 to 5980) | 5470 (5050 to 5880) | 248 (229 to 267) | 25 000 (21 900 to 28 000) | 12 800 (11 200 to 14 300) | 11 700 (10 200 to 13 100) | 572 (500 to 641) | 3·8% (3·5 to 4·0) |
| Nigeria | 123 000 (110 000 to 135 000) | 53 400 (48 000 to 58 900) | 65 300 (58 700 to 72 100) | 3950 (3550 to 4360) | 231 000 (206 000 to 258 000) | 102 000 (90 400 to 113 000) | 123 000 (110 000 to 138 000) | 6200 (5510 to 6920) | 3·0% (3·0 to 3·1) |
| São Tomé and Príncipe | 144 (133 to 154) | 64·5 (59·7 to 69·4) | 73·1 (67·7 to 78·7) | 6 (5·6 to 6·5) | 217 (191 to 243) | 77·8 (68·6 to 87·3) | 131 (116 to 147) | 7·8 (6·8 to 8·7) | 2·0% (1·7 to 2·2) |
| Senegal | 9930 (9180 to 10 700) | 4390 (4060 to 4720) | 5210 (4810 to 5600) | 337 (312 to 362) | 15 900 (14 000 to 17 600) | 6360 (5620 to 7060) | 8920 (7880 to 9900) | 583 (515 to 647) | 2·2% (2·0 to 2·4) |
| Sierra Leone | 4420 (4010 to 4810) | 1980 (1800 to 2160) | 2260 (2050 to 2450) | 182 (164 to 197) | 8870 (7940 to 9810) | 3580 (3200 to 3960) | 5010 (4490 to 5550) | 276 (247 to 305) | 3·3% (3·3 to 3·4) |
| Togo | 4850 (4270 to 5470) | 2180 (1910 to 2450) | 2560 (2260 to 2890) | 114 (101 to 129) | 8370 (7160 to 9500) | 3310 (2830 to 3760) | 4810 (4120 to 5460) | 254 (217 to 288) | 2·6% (2·5 to 2·6) |

Data in parentheses are 95% uncertainty intervals. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

*Table 5:* **The 2000 population and 2021 population and annualised rate of change in population (2000–21), globally and for GBD super-regions, regions, countries, and territories**

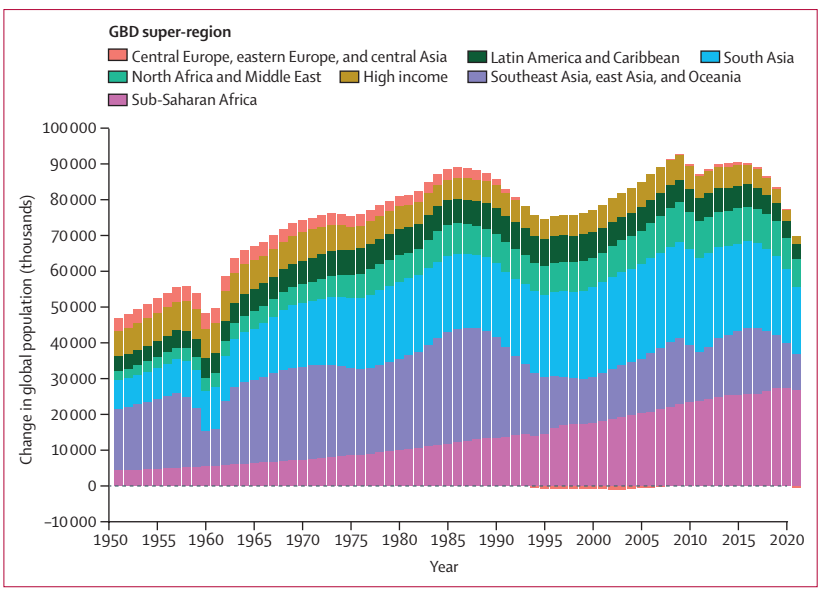


***Figure 9:*** **Annual change in global total population by GBD super-region, 1950–2021**
Annual change is defined as the difference between the population size in the current year and the preceding year. Different colours show GBD super-regions. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

Italy, Lithuania, Moldova, Monaco, Romania, and Serbia, and to an even larger extent between 2010 and 2019 (figure 10). Of the 204 countries and territories, peak population was reached between 1950 and 1969 in three countries and territories, between 1970 and 1989 in eight countries and territories, between 1990 and 2009 in 23 countries and territories, between 2010 and 2021 in 22 countries and territories, and the peak population had not yet been reached as of 2021 in 148 countries and territories.

The age structure of populations changed substantially across the globe between 1950 and 2021, with a general shift in the distribution away from younger ages and towards older ages (table 5). From 2000 to 2021, the proportion of the population aged younger than 15 years decreased in 196 of 204 countries and territories, with some of the largest declines observed in Saudi Arabia (from 36·0% to 20·1%) and Syria (41·5% to 26·1%). The eight countries in which the proportion of the population aged younger than 15 years did not decline were Angola, Chad, Kazakhstan, Mali, Niger, Nigeria, Russia, and Somalia. During this same period, the proportion of the population aged 65 years and older increased in 175 of 204 countries and territories; some of the largest increases were observed in Japan (from 17·2% to 28·9%) and Puerto Rico (from 11·0% to 22·0%). Three of 204 countries and territories had an increase in the proportion of the population aged younger than 15 years combined with a decline in the proportion of the population aged 65 years and older; these nations (Mali, Nigeria, and Chad) are all located in sub-Saharan Africa. The ratio of the population aged 65 years and older to the population aged less than 15 years increased between 2000 and 2021 in 188 of 204 countries and territories, including all nations within the high-income; Latin America and the Caribbean; south Asia; and southeast Asia, east Asia, and Oceania super-regions (figure 11). Some of the largest increases occurred in Japan, Puerto Rico, and South Korea. The countries and territories in which this ratio did not increase were Afghanistan, Benin, Burkina Faso, Burundi, Cameroon, Chad, Democratic Republic of Congo, Guinea, Guinea-Bissau, Kyrgyzstan, Liberia, Mali, Mozambique, Nigeria, Sierra Leone, and South Sudan.

## Discussion

### Main findings

Our comprehensive set of updated demographic metrics indicate profound changes in the global health landscape during the first 2 years of the COVID-19 pandemic relative to historical trends. Long-term trends of decreasing mortality were superseded by marked increases in mortality rates in age groups older than 15 years during 2020 and 2021; in contrast, mortality in children under 5 years remained largely unaffected by the pandemic and continued to decrease globally. Global life expectancy declined sharply during 2020 and 2021, reversing the longstanding trend of life expectancy improvement. Age-standardised rates demonstrated the pandemic was disproportionately severe in countries within sub-Saharan Africa, the Middle East, south Asia, and Latin America. The COVID-19 pandemic has also highlighted the need for timely and comprehensive data collection and reporting. The development of high-quality civil registration and vital statistics systems has stagnated in many parts of the world due to multifaceted societal, financial, logistical, legislative, and political reasons, with notable exceptions including China, India, and some countries in north Africa and the Middle East. Population growth has slowed globally since 2017, although future declines might not persist at rates similar to those in 2020 and 2021 as the pandemic eases. In contrast, population growth is steady in south Asia and accelerating in sub-Saharan Africa. Increasing populations in many low-income and middle-income locations, combined with a shift in the age distribution away from younger ages and towards older ages, is likely to lead to new social, economic, and political challenges.

### Data availability and gaps

Although the proportion of registered deaths has continuously increased at the global level since 1950, we observed marked variability across GBD super-regions and individual countries and territories. Civil registration and vital statistics are particularly scarce in sub-Saharan Africa; investment in vital registration system development in these nations is recommended to improve the availability of data necessary for accurate health measurements and policy evaluation. The COVID-19 pandemic highlighted the need for accessible and up-to-

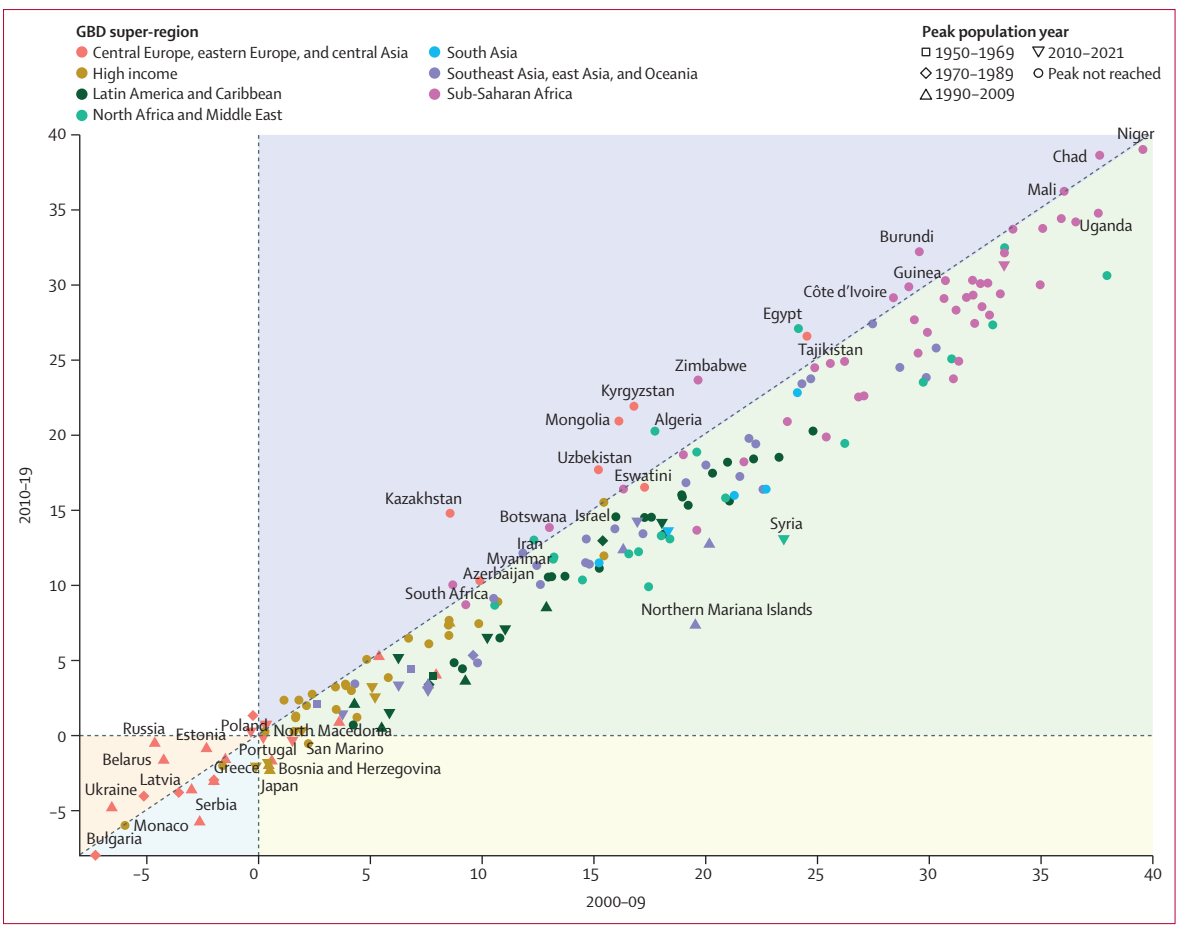


***Figure 10:*** **Rate of natural increase in population, 2010–19 versus 2000–09**

Rate of natural increase is shown for 204 countries and territories coloured by GBD super-region. The rate of natural increase is calculated as the number of births minus the number of deaths divided by the person-years during the time period. The shape of the datapoints represents the year that peak population was reached. Purple shading indicates a higher rate of natural increase between 2010 and 2019 than between 2000 and 2009; green shading denotes a higher rate between 2000 and 2009 than between 2010 and 2019; yellow shading indicates a negative rate between 2010 and 2019 and a positive rate between 2000 and 2009; blue shading denotes a negative rate across all years that was most pronounced between 2010 and 2019; orange shading indicates a negative rate across all years that was most pronounced between 2000 and 2009; white shading denotes a negative rate between 2000 and 2009 and a positive rate between 2010 and 2019. The years 2020 and 2021 were omitted due to the impact of the COVID-19 pandemic on deaths. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

date health data when trying to understand and track emerging global health events. Much uncertainty remains about the true extent of the effect of the pandemic on mortality in countries and territories with minimal to no vital registration data available, which is particularly concerning considering that these countries are potentially the most negatively impacted by the pandemic. With the exception of China, India, and some countries in north Africa and the Middle East, progress in improving the extent of global death registration has slowed—perhaps due to a focus on cheaper but less permanent and systematic data collection efforts, such as small-scale and large-scale surveys. Although surveys are an invaluable source of demographic information, investing in more expensive yet comprehensive civil registration and vital statistics systems is crucial to monitor and improve population health.[26]

Beyond creating and improving civil registration and vital statistics systems, countries and territories without data during the past decade would also benefit from collecting additional data from other sources, such as censuses and nationally representative surveys. 30 countries and territories had no available data on child mortality for the period 2015–21, and 62 countries and territories had no available data on adult mortality. 41 countries and territories had no usable census data between 2010 and 2021, but census data were available before 2000 for these countries. Furthermore, the COVID-19 pandemic interrupted many data collection efforts, such as the USAID Demographic and Health Surveys Program,[27] and national censuses, which are now resuming.[28] Impacts such as these must be resolved to improve future data availability.

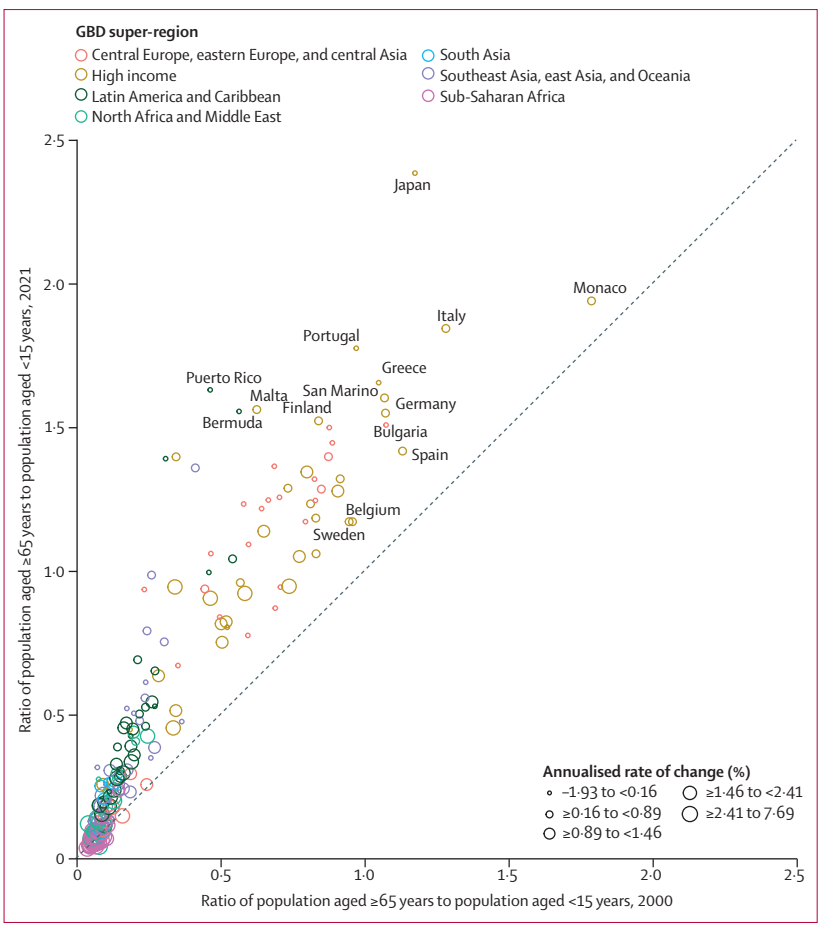


***Figure 11:*** **Ratio of the number of individuals older than 65 years to those younger than 15 years, 2000 versus 2021**

This ratio is shown for 204 countries and territories coloured by GBD super-region. The size of the datapoints indicates the annualised rate of change in total population from 2000 to 2021, and the black dotted line represents the line of equality. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

## Impact of the COVID-19 pandemic

The COVID-19 pandemic had differential effects on mortality across the lifespan. Life expectancy decreased in every GBD super-region and 84% of countries and territories from 2019 to 2021, but younger age groups were minimally affected. This finding is a welcome contrast to early warnings about potentially devastating impacts of the pandemic on child mortality.[29] Conversely, increases in mortality rates in populations aged 25 years and older were observed on a scale not seen in the previous 70 years.[30] Although the burden of excess deaths and all-age excess mortality rates due to the pandemic was largest in countries in central and eastern Europe, and Latin America, our analysis of age-standardised mortality rates highlights the relative severity of the pandemic's effects on mortality in certain countries within sub-Saharan Africa, the Middle East, south Asia, and Latin America. There was a general association between higher SDI and lower excess mortality, but this association was not particularly strong, and many countries were exceptions to this association, suggesting that at the population level, SDI was not always a strong predictor of excess mortality due to the COVID-19 pandemic in 2020 and 2021. Excess mortality was particularly high in nations such as Bolivia and South Africa when compared with other countries and territories with a similar SDI, which some have argued was in part due to relaxed containment strategies and vaccine hesitancy.[31] Conversely, excess mortality was particularly low in countries such as the Solomon Islands and Bhutan, which might be a reflection of delayed transmission in more isolated nations and of high vaccination rates.[32] These findings emphasise that mortality outcomes during the COVID-19 pandemic were not solely determined by SDI and that vaccination efforts, public policies, and individual behaviour changes likely influenced the severity of the pandemic across countries and territories at all levels of SDI.[33–37] Reports published as recently as 2023 have shown that since 2021, mortality due to the pandemic has declined,[38,39] presumably driven by vaccination efforts, public policies, individual behaviour changes, and the emergence of new SARS-CoV-2 variants with lower case-fatality ratios.[40,41] However, mortality has increased in some locations, which might be due to lifting of protective restrictions.[42]

## Long-term mortality trends

In the era of the UN Sustainable Development Goals (SDGs), there has been a decline in the global U5MR, which continued during the COVID-19 pandemic. However, progress has varied substantially between countries, and many continue to lag behind SDG targets. Based on the trajectory of U5MR between 2010 and 2021, 38 countries will not reach SDG target 3.2 of a U5MR at least as low as 25 deaths per 1000 livebirths by 2030 (appendix 2 table S2A). To eradicate preventable under-5 deaths, more equitable global strategies—intensified in regions with the highest rates—are imperative. Compared with child mortality, reductions in adult mortality have not been as consistent globally. Historically, increased adult mortality was observed in the 1990s in countries spanning eastern and southern Africa, eastern Europe, and central Asia. During the late 2010s, some high-income nations, including the USA, have had mortality spikes, particularly among the 15–39-years age group, which reflect mortality patterns associated with increased drug and alcohol misuse and mental health disorders.[43,44] The 15–39-years age group is particularly volatile globally, and is the age group most affected by fatal discontinuities such as conflict.[45] Sex differences in mortality vary widely across the globe. The global ratio of male to female mortality has generally increased, although it has differed as a function of age. The largest variability in the ratio of male to female mortality was in the 15–39-years age group with much less variability observed in younger and older age groups. These differences go beyond biological explanations and

highlight the importance of future efforts to address mortality risks to which males are particularly susceptible due to behavioural factors, war and conflict, occupational hazards, homicide, and suicide.[46,47] The substantial differences among countries show, however, that it is also important to address mortality risks that predominantly affect women, such as maternal mortality, gender-based violence, and economic disparities.[48,49] We also found that life expectancy was consistently higher in countries in the Americas, east Asia, and western Europe than countries in sub-Saharan Africa, and this effect was strongly associated with SDI. Although we did not establish causal effects, this finding is supported by many studies showing that social determinants of health are key drivers of mortality,[50–54] and improving education, economic prosperity, and gender inequalities is vital for continual progress in health outcomes globally. However, notable exceptions regarding the relationship between mortality and SDI indicate that other factors are also involved.

### Population dynamics and age structures

Although the rate of global population growth has plateaued and started to decline since 2017, in lower income countries—primarily in sub-Saharan Africa—rapid population growth has continued. Thus, much of future population growth will likely occur in the poorest regions. Resource scarcity and rapid infrastructure expansion will be crucial issues to address.[55,56] These factors, and a history of colonialism, can contribute to political instability.[57,58] These challenges will require responses from governments and the global community. Furthermore, the concentration of population growth has shifted to locations with the poorest health—ie, locations with the highest child mortality rates. This might lead to challenges in continuing improvement of health outcomes.

Outside of these locations, slowing of population growth is widespread. Although most countries and territories had not reached a peak population as of 2021, in 171 of 204 countries and territories a lower rate of natural increase was observed between 2010 and 2019 than between 2000 and 2009. Furthermore, our analysis of population age structures over time indicated a prominent shift towards older ages in most regions and nations. As older populations expand and reduced younger populations reach working-age, nations could encounter economic and social challenges requiring updated policies related to health care, retirement, reproduction, childcare, and migration.[59–62] The shift towards a higher ratio of older people to younger people will require greater attention to be paid to labour shortages, health systems strengthening, and evaluation of government policies on retirement and health care.[61,63,64] However, beneficial consequences such as the so-called second demographic dividend of greater personal wealth and investment in human capital might offset some of these challenges.[65] Future research on these topics must seek to understand how changing population dynamics impact health outcomes and systems, and how health interventions can be tailored to address the unique challenges posed by these demographic shifts. Migration is particularly relevant to these challenges. Voluntary emigration from locations with younger adult population bulges to locations in need of more labour to support ageing populations is an open public policy discussion.[66,67] The level of migration needed to support older age populations is dynamic and is likely to change over time with technological innovations and new public policies.[68] Furthermore, environmental constraints in some high-income countries might limit immigration possibilities. Migration of skilled workers out of lower-income countries might consequently worsen these economies.[69,70] Global cooperation is necessary, and guidelines such as the UN Global Compact for Safe, Orderly and Regular Migration[71] can help lead this work.

### Comparisons between GBD 2021 estimates and other estimates

There are numerous differences in data processing and statistical modelling assumptions between the GBD 2021 estimates reported here and those from other demographic studies that provide important advantages. Excess mortality estimates for 2020 and 2021 have been previously reported in the GBD study and by other institutes. Our previous excess mortality estimates reported 18·2 million (95% UI 17·1–19·6) excess deaths in this study. Estimating mortality during the COVID-19 pandemic was particularly difficult due to many factors including delays in reporting, differing granularity of available data, and political will to provide accurate data. Although our earlier estimates were based on the best available data and methodology at the time, we have made data and modelling improvements that resulted in this lower estimate. We updated to more reliable data sources in some countries that corrected errors in reporting, and included more data up to the end of 2021. Methodologically, we modelled data at the yearly level, and additionally included age-specific detailed projections from our GBD mortality modelling process to inform our non-pandemic counterfactual, which generally led to higher estimates of expected non-pandemic mortality and thus lower excess mortality.

Our current estimate of global excess mortality during 2020 and 2021 is comparable to the WHO estimate of 14·9 million (95% UI 13·3–16·6) excess deaths,[15] with our mean estimate falling within the uncertainty interval of the WHO estimate and vice versa. Our estimates tend to be higher than those of WHO for sub-Saharan Africa, with the largest differences being 233 000 more deaths in Nigeria and 177 000 more deaths in Ethiopia; and south Asia, with the largest differences being 262 000 more deaths in Pakistan and 171 000 more deaths in Bangladesh. However, our estimate for India was 1·3 million deaths lower than that of WHO, which is the

largest discrepancy in this direction. We also estimated 123 000 more excess deaths in China—our results indicated positive excess, whereas WHO estimated negative excess. The largest differences occur in locations for which little or no all-cause mortality data were available for the pandemic period, and thus estimates relied on predictive models. These differences reflect different covariates used for predictions models. Additionally, WHO models and predicts all-cause mortality rates in locations without data, whereas we predict excess mortality rates directly, which leads to different assumptions and functional forms for statistical models. Differences in locations with all-cause mortality data are driven by different data processing steps and different models for expected non-pandemic mortality.

The latest estimates from UNICEF, published in 2023, reported a global U5MR of 38·1 deaths (95% UI 36·1–42·2) per 1000 livebirths in 2021,[72] which is consistent with our estimate of 35·7 deaths (30·5–42·0) per 1000 livebirths. The mean relative difference at the national level between our 2021 U5MR estimates and those provided by UNICEF is –2·6%, ranging from –58·4% to 111·9%. Similar to our estimates, the UNICEF estimates show a continued decreasing trend in child mortality during the COVID-19 pandemic. Between 1950 and 2019, the mean relative difference between our estimates and UNICEF estimates across countries and territories was –2·0%, ranging from –64·3% to 154·6%. These differences primarily reflect differences in data inclusion, processing, and synthesis. For example, our estimate of mortality in Iran in 2021 is 58·4% lower than that of UNICEF. We included vital registration data from 2021 and our estimates closely match this observed mortality, whereas UNICEF does not include these data, leading to higher estimates. Using the most recent available data suggests our estimates are more reliable.

Adult mortality estimates at the country level from the 2022 UN World Population Prospects (WPP) report are on average 11·1% lower than our 2021 estimates,[13] which range from 41·8% lower to 289·5% higher. Between 1950 and 2019, the mean relative difference between our adult mortality estimates and those from WPP 2022 was –4·3%, ranging from –64·0% to 229·6%. Differences between WPP 2022 estimates of national life expectancy at birth and those from GBD 2021 are primarily driven by these differences in adult mortality estimates, and variability in child mortality estimates. While location-years with complete death registration show substantial agreement between estimates, with a mean relative difference of 1·3%, our estimates for 2021 range from 7·8 years lower to 10·1 years higher, and our estimates for years before the COVID-19 pandemic range from 20·4 years lower to 38·4 years higher. The largest discrepancies were due to location-years with large fatal discontinuities or scarcity of high-quality vital registration data. Furthermore, discrepancies between 2021 estimates are highly influenced by the differences in estimation of excess mortality due to the COVID-19 pandemic. As one of the largest differences, our life expectancy estimate for Nigeria in 2021 is 10·1 years higher than the WPP estimate, driven by our estimated 41·8% lower adult mortality. Our adult mortality estimates more closely follow the bulk of the data from sibling-survival histories, and our age-specific mortality estimates rely on a database of 43 758 empirical life tables as opposed to the Coale-Demeny north model life table used by WPP 2022, which has been shown to underperform compared with other modern model life table methods.[73,74]

For further comparison with WPP and as a model validation exercise, we compared estimated age-specific mortality rates and death counts from our analysis and from WPP with those calculated directly from all location-years of vital registration data deemed to have complete death registration. When comparing our results, we used our population estimates as the denominator to calculate mortality rates from vital registration; similarly, we used WPP population estimates as the denominator for that comparison. Across all location-year-age-sex mortality rates, our estimates had mean absolute error of 0·024, indicating a good fit to the data, along with root mean squared error (RMSE) of 0·52. These were lower than the respective 0·033 and 0·53 calculated for WPP. Similarly, our death count estimates had a mean absolute error of 84·8 and RMSE of 365 compared with a mean absolute error of 222 and RMSE of 1032 for WPP estimates.

Estimates of the global population from WPP 2022 are similar to that of this study, with an estimated global population of 7·91 billion in 2021, compared with our estimate of 7·89 billion (95 % UI 7·67–8·13). On average in 2021, country-level population estimates were 0·2% lower in GBD 2021 than WPP 2022 and ranged from 34·2% lower to 82·2% higher. For specific ages, differences in the younger than 15 years age group ranged from 48·0% lower to 75·3% higher, while differences in the 65 years and older age group ranged from 36·0% lower to 39·5% higher. The largest relative differences were for locations in which no recent census data were available, and those with substantial net in-migration from other countries.

## Limitations

This research has several limitations. First, estimates continue to be limited by data source availability and scope. COVID-19 showed the crucial need to create more robust vital registration systems that can highlight the differential effects of disease and injury across population subgroups in a timely manner. 93 of 204 countries and territories had no available all-cause mortality data to estimate excess mortality due to the COVID-19 pandemic, which means our estimates in these areas are solely driven by associations with covariates. These locations were

largely in regions where the effects of the pandemic were most severe. Furthermore, the scarcity of high-quality civil registration and vital statistics systems to produce reliable data in many low-income and middle-income countries introduces large-scale uncertainty in all demographic estimates. Additionally, population estimates in certain countries rely on modelled projections due to no available recent censuses. Future development of reliable data sources is crucial because estimates improve as the quality of underlying data improves. Subsequent GBD cycles will provide revised estimates after additional data for recent years become available.

Second, analysis of more granular subpopulations such as subnational areas or by other population characteristics was restricted by data availability. Although our effort represents the most comprehensive global analysis of mortality and population, the estimates presented in this research mask substantial heterogeneity in smaller geographies. This limits the utility of our estimates to provide insights for more targeted interventions, for example, understanding occupational hazards in industrial regions. Improving this aspect of the research requires more comprehensive and detailed data, such as by race, ethnicity, socioeconomic status, and smaller administrative levels,[75–77] and future work will aim to produce more comprehensive health metrics.

Third, the GBD demographics approach has not developed an encompassing model to estimate migration together with population, mortality, and fertility. Estimating migration in a model that jointly informs population, mortality, and fertility will not only improve accuracy of population estimates, but also allow assessing and improving corrections for death registration completeness and census coverage. This is crucial in locations with large migration flows, such as the United Arab Emirates and Qatar, where current methods for these corrections might not perform well.[78,79] The increased importance of migration at present and in the future, especially considering the shifting age structure in many populations, places renewed importance on producing reliable migration estimates.

Fourth, we assumed a binomial distribution when calculating data variance and did not evaluate other models of distribution. Some of our input data might be overdispersed, resulting in inaccurate estimates of data variance. However, we do not expect that changing our assumptions on the distribution would have a sizeable impact on estimates since the sampling errors on vital registration and civil registration mortality and fertility data are likely to be much smaller than non-sampling errors. In the future, we will consider testing such assumptions.

Fifth, computational resources did not permit propagation of uncertainty for all covariates throughout the analytical process. While uncertainty from model estimation was accounted for at each stage, such as U5MR, adult mortality, and age-specific mortality rates, uncertainties for some covariates such as lag-distributed income and education were not. Similarly, estimates of coefficients in the COVID-19 excess mortality prediction model did not include uncertainty. Future iterations of GBD will investigate computationally more efficient implementation of current methods and development of new methods to allow for all sources of uncertainty to be included in modelling.

## Future directions

The COVID-19 pandemic will likely continue to impact estimates of demographic trends in future years due to reporting lags and the persistent effects of the pandemic. Future research should focus on understanding the full demographic impact of the pandemic in 2022 and beyond. Methodologically, we aim to improve our incorporation of excess mortality and COVID-19 direct mortality estimates into the GBD mortality estimation process, rather than post-hoc unification of two separate modelling endeavours. We also plan to develop a standalone migration model and integrate this model into the GBD demographic estimation process. Along with this, we aim to simultaneously estimate mortality and population rather than the current sequentially iterative approach. This would allow the uncertainty in mortality estimates to inform population estimates and vice versa, helping address issues in age, period, and cohort trends that might otherwise arise.

## Conclusion

Tracking long-term health trends and evaluating the impact of the COVID-19 pandemic require accurate global, regional, and national estimates of mortality, life expectancy, and population, because these crucial demographic indicators foundationally underpin our understanding of population health. The comprehensive demographic metrics reported in this study show that marked reversals in adult mortality and life expectancy trends occurred during 2020 and 2021, leading to increased mortality and reduced life expectancy worldwide. This increased mortality did not occur in younger populations: mortality rates in children under 5 years continued to decline globally during the first 2 years of the pandemic, although more equitable and intensified investment is needed to achieve SDG targets in many locations. While global population growth is slowing, geographical distributions and age structures are undergoing fundamental shifts—low-income countries and territories continue to grow, and population structures across the globe are ageing. Nations in the post-pandemic world will need to address emerging health-care, economic, and social challenges with new policies and practices. The development, implementation, and evaluation of these health policies and practices in diverse locations around the world can be informed and guided by the GBD 2021 demographic estimates. Accurate mortality, life expectancy, and population estimates might be even more important to informing policy and practice in a post-pandemic world

than in the past. Collectively, the extensive set of demographic estimates reported here represent a valuable global tool for policy evaluation, development, and implementation in diverse locations around the world.

**GBD 2021 Demographics Collaborators**
Austin E Schumacher*, Hmwe Hmwe Kyu*, Amirali Aali, Cristiana Abbafati, Jaffar Abbas, Rouzbeh Abbasgholizadeh, Madineh Akram Abbasi, Mohammadreza Abbasian, Samar Abd ElHafeez, Michael Abdelmasseh, Sherief Abd-Elsalam, Ahmed Abdelwahab, Mohammad Abdollahi, Meriem Abdoun, Auwal Abdullahi, Ame Mehadi Abdurehman, Mesfin Abebe, Aidin Abedi, Armita Abedi, Tadesse M Abegaz, Roberto Ariel Abeldaño Zuñiga, E S Abhilash, Olugbenga Olusola Abiodun, Richard Gyan Aboagye, Hassan Abolhassani, Mohamed Abouzid, Lucas Guimarães Abreu, Woldu Aberhe Abrha, Michael R M Abrigo, Dariush Abtahi, Samir Abu Rumeileh, Niveen ME Abu-Rmeileh, Salahdein Aburuz, Ahmed Abu-Zaid, Juan Manuel Acuna, Tim Adair, Isaac Yeboah Addo, Oladimeji M Adebayo, Oyelola A Adegboye, Victor Adekanmbi, Bashir Aden, Abiola Victor Adepoju, Charles Oluwaseun Adetunji, Temitayo Esther Adeyeoluwa, Olorunsola Israel Adeyomoye, Rishan Adha, Amin Adibi, Wirawan Adikusuma, Qorinah Estiningtyas Sakilah Adnani, Saryia Adra, Abel Afework, Aanuoluwapo Adeyimika Afolabi, Ali Afraz, Shadi Afyouni, Saira Afzal, Pradyumna Agasthi, Shahin Aghamiri, Antonella Agodi, Williams Agyemang-Duah, Bright Opoku Ahinkorah, Aqeel Ahmad, Danish Ahmad, Firdos Ahmad, Muayyad M Ahmad, Tauseef Ahmad, Keivan Ahmadi, Amir Mahmoud Ahmadzade, Mohadese Ahmadzade, Ayman Ahmed, Haroon Ahmed, Luai A Ahmed, Muktar Beshir Ahmed, Syed Anees Ahmed, Marjan Ajami, Budi Aji, Olufemi Ajumobi, Gizachew Taddesse Akalu, Essona Matatom Akara, Karolina Akinosoglou, Sreelatha Akkala, Samuel Akyirem, Hanadi Al Hamad, Syed Mahfuz Al Hasan, Ammar Al Homsi, Mohammad Al Qadire, Moein Ala, Timothy Olukunle Aladelusi, Tareq Mohammed Ali AL-Ahdal, Samer O Alalalmeh, Ziyad Al-Aly, Khurshid Alam, Manjurul Alam, Zufishan Alam, Rasmieh Mustafa Al-amer, Fahad Mashhour Alanezi, Turki M Alanzi, Mohammed Albashtawy, Mohammad T AlBataineh, Robert W Aldridge, Sharifullah Alemi, Ayman Al-Eyadhy, Adel Ali Saeed Al-Gheethi, Khalid F Alhabib, Fadwa Alhalaiqa Naji Alhalaiqa, Mohammed Khaled Al-Hanawi, Abid Ali, Akhtar Ali, Beriwan Abdulqadir Ali, Hassam Ali, Mohammed Usman Ali, Rafat Ali, Syed Shujait Shujait Ali, Zahid Ali, Shohreh Alian Samakkhah, Gianfranco Alicandro, Sheikh Mohammad Alif, Mohammad Aligol, Rasoul Alimi, Ahmednur Adem Aliyi, Adel Al-Jumaily, Syed Mohamed Aljunid, Wael Almahmeed, Sabah Al-Marwani, Sadeq Ali Ali Al-Maweri, Joseph Uy Almazan, Hesham M Al-Mekhlafi, Omar Almidani, Mahmoud A Alomari, Nivaldo Alonso, Jaber S Alqahtani, Ahmed Yaseen Alqutaibi, Salman Khalifah Al-Sabah, Awais Altaf, Jaffar A Al-Tawfiq, Khalid A Altirkawi, Farrukh Jawad Alvi, Hassan Alwafi, Yaser Mohammed Al-Worafi, Hany Aly, Karem H Alzoubi, Azmeraw T Amare, Edward Kwabena Ameyaw, Abebe Feyissa Amhare, Tarek Tawfik Amin, Alireza Amindarolzarbi, Javad Aminian Dehkordi, Sohrab Amiri, Hubert Amu, Dickson A Amugsi, Jimoh Amzat, Robert Ancuceanu, Deanna Anderlini, Pedro Prata Andrade, Catalina Liliana Andrei, Tudorel Andrei, Dhanalakshmi Angappan, Abhishek Anil, Afifa Anjum, Catherine M Antony, Ernoiz Antriyandarti, Iyadunni Adesola Anuoluwa, Sumadi Lukman Anwar, Anayochukwu Edward Anyasodor, Seth Christopher Yaw Appiah, Muhammad Aqeel, Jalal Arabloo, Razman Arabzadeh Bahri, Morteza Arab-Zozani, Mosab Arafat, Ana Margarida Araújo, Aleksandr Y Aravkin, Abdulfatai Aremu, Hany Ariffin, Timur Aripov, Benedetta Armocida, Mahwish Arooj, Anton A Artamonov, Kurnia Dwi Artanti, Judie Arulappan, Idowu Thomas Aruleba, Raphael Taiwo Aruleba, Ashokan Arumugam, Malke Asaad, Saeed Asgary, Mubarek Yesse Ashemo, Muhammad Ashraf, Marvellous O Asika, Seyyed Shamsadin Athari, Maha Moh'd Wahbi Atout, Alok Atreya, Sameh Attia, Avinash Aujayeb, Abolfazl Avan, Adedapo Wasiu Awotidebe, Beatriz Paulina Ayala Quintanilla, Martin Amogre Ayanore, Getnet Melaku Ayele, Jose L Ayuso-Mateos, Seyed Mohammad Ayyoubzadeh, Sina Azadnajafabad, Gulrez Shah Azhar, Shahkaar Aziz, Ahmed Y Azzam, Mina Babashahi, Abraham Samuel Babu, Muhammad Badar, Alaa Badawi, Ashish D Badiye, Soroush Baghdadi, Nasser Bagheri, Sara Bagherieh, Sulaiman Bah, Saeed Bahadorikhalili, Jianjun Bai, Ruhai Bai, Jennifer L Baker, Shankar M Bakkannavar, Abdulaziz T Bako, Senthilkumar Balakrishnan, Saliu A Balogun, Ovidiu Constantin Baltatu, Kiran Bam, Maciej Banach, Soham Bandyopadhyay, Biswajit Banik, Palash Chandra Banik, Hansi Bansal, Shirin Barati, Martina Barchitta, Mainak Bardhan, Suzanne Lyn Barker-Collo, Francesco Barone-Adesi, Hiba Jawdat Barqawi, Ronald D Barr, Lope H Barrero, Zarrin Basharat, Asma'u I J Bashir, Hameed Akande Bashiru, Pritish Baskaran, Buddha Basnyat, Quique Bassat, João Diogo Basso, Saurav Basu, Kavita Batra, Ravi Batra, Bernhard T Baune, Mohsen Bayati, Nebiyou Simegnew Bayileyegn, Thomas Beaney, Neeraj Bedi, Tahmina Begum, Emad Behboudi, Amir Hossein Behnoush, Maryam Beiranvand, Diana Fernanda Bejarano Ramirez, Uzma Iqbal Belgaumi, Michelle L Bell, Aminu K Bello, Muhammad Bashir Bello, Olorunjuwon Omolaja Bello, Luis Belo, Apostolos Beloukas, Salaheddine Bendak, Derrick A Bennett, Isabela M Bensenor, Habib Benzian, Zombor Berezvai, Adam E Berman, Amiel Nazer C Bermudez, Paulo J G Bettencourt, Habtamu B Beyene, Kebede A Beyene, Devidas S Bhagat, Akshaya Srikanth Bhagavathula, Neeraj Bhala, Ashish Bhalla, Dinesh Bhandari, Nikha Bhardwaj, Pankaj Bhardwaj, Prarthna V Bhardwaj, Ashish Bhargava, Sonu Bhaskar, Vivek Bhat, Gurjit Kaur Bhatti, Jasvinder Singh Bhatti, Manpreet S Bhatti, Rajbir Bhatti, Zulfiqar A Bhutta, Boris Bikbov, Nada Binmadi, Bagas Suryo Bintoro, Antonio Biondi, Catherine Bisignano, Francesca Bisulli, Atanu Biswas, Raaj Kishore Biswas, Saeid Bitaraf, Tone Bjørge, Archie Bleyer, Mary Sefa Boampong, Virginia Bodolica, Aadam Olalekan Bodunrin, Obasanjo Afolabi Bolarinwa, Milad Bonakdar Hashemi, Aime Bonny, Kaustubh Bora, Berrak Bora Basara, Safiya Bala Borodo, Rohan Borschmann, Alejandro Botero Carvajal, Souad Bouaoud, Sofiane Boudalia, Edward J Boyko, Nicola Luigi Bragazzi, Dejana Braithwaite, Hermann Brenner, Gabrielle Britton, Annie J Browne, Andre R Brunoni, Norma B Bulamu, Lemma N Bulto, Danilo Buonsenso, Katrin Burkart, Richard A Burns, Sharath Burugina Nagaraja, Reinhard Busse, Yasser Bustanji, Zahid A Butt, Florentino Luciano Caetano dos Santos, Tianji Cai, Daniela Calina, Luis Alberto Cámera, Luciana Aparecida Campos, Ismael R Campos-Nonato, Chao Cao, Carlos Alberto Cardenas, Rosario Cárdenas, Sinclair Carr, Giulia Carreras, Juan J Carrero, Andrea Carugno, Felix Carvalho, Márcia Carvalho, Joao Mauricio Castaldelli-Maia, Carlos A Castañeda-Orjuela, Giulio Castelpietra, Ferrán Catalá-López, Alberico L Catapano, Maria Sofia Cattaruzza, Arthur Caye, Christopher R Cederroth, Francieli Cembranel, Muthia Cenderadewi, Kelly M Cercy, Ester Cerin, Muge Cevik, Pamela R Uscamaita Chacón-Uscamaita, Yaacoub Chahine, Chiranjib Chakraborty, Jeffrey Shi Kai Chan, Chin-Kuo Chang, Periklis Charalampous, Jaykaran Charan, Vijay Kumar Chattu, Victoria Chatzimavridou-Grigoriadou, Malizgani Paul Chavula, Huzaifa Ahmad Cheema, An-Tian Chen, Haowei Chen, Lingxiao Chen, Meng Xuan Chen, Simiao Chen, Nicolas Cherbuin, Derek S Chew, Gerald Chi, Jesus Lorenzo Chirinos-Caceres, Abdulaal Chitheer, So Mi Jemma Cho, William C S Cho, Bryan Chong, Hitesh Chopra, Rahul Choudhary, Rajiv Chowdhury, Dinh-Toi Chu, Isaac Sunday Chukwu, Eric Chung, Eunice Chung, Sheng-Chia Chung, Karly I Cini, Cain C T Clark, Kaleb Coberly, Alyssa Columbus, Haley Comfort, Joao Conde, Sara Conti, Paolo Angelo Cortesi, Vera Marisa Costa, Ewerton Cousin, Richard G Cowden, Michael H Criqui, Natália Cruz-Martins, Garland T Culbreth, Patricia Cullen, Matthew Cunningham, Daniel da Silva e Silva, Sriharsha Dadana, Omid Dadras, Zhaoli Dai, Koustuv Dalal, Lachlan L Dalli, Giovanni Damiani, Emanuele D'Amico, Sara Daneshvar, Aso Mohammad Darwesh, Jai K Das, Saswati Das, Nihar Ranjan Dash, Mohsen Dashti, Claudio Alberto Dávila-Cervantes, Nicole Davis Weaver, Kairat Davletov, Diego De Leo, Aklilu Tamire Debele, Louisa Degenhardt, Reza Dehbandi, Lee Deitesfeld,

Ivan Delgado-Enciso, Laura Delgado-Ortiz, Daniel Demant, Berecha Hundessa Demessa, Andreas K Demetriades, Xinlei Deng, Edgar Denova-Gutiérrez, Kebede Deribe, Nikolaos Dervenis, Don C Des Jarlais, Hardik Dineshbhai Desai, Rupak Desai, Keshab Deuba, Vinoth Gnana Chellaiyan Devanbu, Sourav Dey, Arkadeep Dhali, Kuldeep Dhama, Mandira Lamichhane Dhimal, Meghnath Dhimal, Sameer Dhingra, Diana Dias da Silva, Daniel Diaz, Adriana Dima, Delaney D Ding, M Ashworth Dirac, Abhinav Dixit, Shilpi Gupta Dixit, Thanh Chi Do, Thao Huynh Phuong Do, Camila Bruneli do Prado, Masoud Dodangeh, Klara Georgieva Dokova, Christiane Dolecek, E Ray Dorsey, Wendel Mombaque dos Santos, Rajkumar Doshi, Leila Doshmangir, Abdel Douiri, Robert Kokou Dowou, Tim Robert Driscoll, Haneil Larson Dsouza, John Dube, Samuel C Dumith, Susanna J Dunachie, Bruce B Duncan, Andre Rodrigues Duraes, Senbagam Duraisamy, Oyewole Christopher Durojaiye, Sulagna Dutta, Paulina Agnieszka Dzianach, Arkadiusz Marian Dziedzic, Oluwakemi Ebenezer, Ejemai Eboreime, Alireza Ebrahimi, Chidiebere Peter Echieh, Abdelaziz Ed-Dra, Hisham Atan Edinur, David Edvardsson, Kristina Edvardsson, Defi Efendi, Ferry Efendi, Shayan Eghdami, Terje Andreas Eikemo, Ebrahim Eini, Michael Ekholuenetale, Emmanuel Ekpor, Temitope Cyrus Ekundayo, Rabie Adel El Arab, Doaa Abdel Wahab El Morsi, Maysaa El Sayed Zaki, Maha El Tantawi, Iffat Elbarazi, Noha Mousaad Elemam, Frank J Elgar, Islam Y Elgendy, Ghada Metwally Tawfik ElGohary, Hala Rashad Elhabashy, Muhammed Elhadi, Omar Abdelsadek Abdou Elmeligy, Mohammed Elshaer, Ibrahim Elsohaby, Amir Emami Zeydi, Mehdi Emamverdi, Theophilus I Emeto, Luchuo Engelbert Bain, Ryenchindorj Erkhembayar, Tesfahun C Eshetie, Sharareh Eskandarieh, Juan Espinosa-Montero, Kara Estep, Farshid Etaee, Ugochukwu Anthony Eze, Natalia Fabin, Adewale Oluwaseun Fadaka, Adeniyi Francis Fagbamigbe, Saman Fahimi, Luca Falzone, Carla Sofia e Sá Farinha, MoezAlIslam Ezzat Mahmoud Faris, Mohsen Farjoud Kouhanjani, Andre Faro, Hossein Farrokhpour, Ali Fatehizadeh, Hamed Fattahi, Nelsensius Klau Fauk, Pooria Fazeli, Valery L Feigin, Ginenus Fekadu, Seyed-Mohammad Fereshtehnejad, Abdullah Hamid Feroze, Daniela Ferrante, Pietro Ferrara, Nuno Ferreira, Getahun Fetensa, Irina Filip, Florian Fischer, Joanne Flavel, Abraham D Flaxman, Luisa S Flor, Bobirca Teodor Florin, Morenike Oluwatoyin Folayan, Kristen Marie Foley, Artem Alekseevich Fomenkov, Lisa M Force, Carla Fornari, Behzad Foroutan, Matteo Foschi, Kate Louise Francis, Richard Charles Franklin, Alberto Freitas, Joseph Friedman, Sara D Friedman, Takeshi Fukumoto, John E Fuller, Peter Andras Gaal, Muktar A Gadanya, Santosh Gaihre, Abduzhappar Gaipov, Emmanuela Gakidou, Yaseen Galali, Nasrin Galehdar, Silvano Gallus, Quan Gan, Aravind P Gandhi, Balasankar Ganesan, Jalaj Garg, Shuo-Yan Gau, Prem Gautam, Rupesh K Gautam, Federica Gazzelloni, Miglas W Gebregergis, Mesfin Gebrehiwot, Tesfay Brhane Gebremariam, Urge Gerema, Motuma Erena Getachew, Tamirat Getachew, Peter W Gething, Mansour Ghafourifard, Sulmaz Ghahramani, Khalid Yaser Ghailan, Alireza Ghajar, Mohammad Javad Ghanbarnia, MohammadReza Ghasemi, Afsaneh Ghasemzadeh, Fariba Ghassemi, Ramy Mohamed Ghazy, Sailaja Ghimire, Asadollah Gholamian, Ali Gholamrezanezhad, Pooyan Ghorbani Vajargah, Ghozali Ghozali, Sherief Ghozy, Arun Digambarrao Ghuge, Alessandro Gialluisi, Ruth Margaret Gibson, Artyom Urievich Gil, Paramjit Singh Gill, Tiffany K Gill, Richard F Gillum, Themba G Ginindza, Alem Girmay, James C Glasbey, Elena V Gnedovskaya, Laszlo Göbölös, Amit Goel, Mohamad Goldust, Mahaveer Golechha, Pouya Goleij, Arefeh Golestanfar, Davide Golinelli, Philimon N Gona, Houman Goudarzi, Amir Hossein Goudarzian, Anmol Goyal, Scott Greenhalgh, Michal Grivna, Giovanni Guarducci, Mohammed Ibrahim Mohialdeen Gubari, Mesay Dechasa Gudeta, Avirup Guha, Stefano Guicciardi, Damitha Asanga Gunawardane, Sasidhar Gunturu, Cui Guo, Anish Kumar Gupta, Bhawna Gupta, Indarchand Ratanlal Gupta, Rajat Das Gupta, Sapna Gupta, Veer Bala Gupta, Vijai Kumar Gupta, Vivek Kumar Gupta, Reyna Alma Gutiérrez, Farrokh Habibzadeh, Parham Habibzadeh, Vladimir Hachinski, Mohammad Haddadi, Rasool Haddadi, Nils Haep, Adel Hajj Ali, Esam S Halboub, Sobia Ahsan Halim, Brian J Hall, Sebastian Haller, Rabih Halwani, Randah R Hamadeh, Kanaan Hamagharib Abdullah, Samer Hamidi, Mohammad Hamiduzzaman, Ahmad Hammoud, Nasrin Hanifi, Graeme J Hankey, Md Abdul Hannan, Md Nuruzzaman Haque, Harapan Harapan, Josep Maria Haro, Ahmed I Hasaballah, Faizul Hasan, Ikramul Hasan, M Tasdik Hasan, Hamidreza Hasani, Mohammad Hasanian, Ali Hasanpour- Dehkordi, Abbas M Hassan, Amr Hassan, Hossein Hassanian-Moghaddam, Soheil Hassanipour, Johannes Haubold, Rasmus J Havmoeller, Simon I Hay, Youssef Hbid, Jeffrey J Hebert, Omar E Hegazi, Golnaz Heidari, Mohammad Heidari, Mahsa Heidari-Foroozan, Reza Heidari-Soureshjani, Bartosz Helfer, Claudiu Herteliu, Hamed Hesami, Dineshani Hettiarachchi, Demisu Zenbaba Heyi, Kamal Hezam, Yuta Hiraike, Howard J Hoffman, Ramesh Holla, Nobuyuki Horita, Md Belal Hossain, Md Mahbub Hossain, Sahadat Hossain, Mohammad-Salar Hosseini, Hassan Hosseinzadeh, Mehdi Hosseinzadeh, Mihaela Hostiuc, Sorin Hostiuc, Mohamed Hsairi, Vivian Chia-rong Hsieh, Chengxi Hu, Junjie Huang, Md Nazmul Huda, Fernando N Hugo, Michael Hultström, Javid Hussain, Salman Hussain, Nawfal R Hussein, Le Duc Huy, Hong-Han Huynh, Bing-Fang Hwang, Segun Emmanuel Ibitoye, Oluwatope Olaniyi Idowu, Desta Ijo, Kevin S Ikuta, Mehran Ilaghi, Olayinka Stephen Ilesanmi, Irena M Ilic, Milena D Ilic, Mustapha Immurana, Leeberk Raja Inbaraj, Arnaud Iradukunda, Farideh Iravanpour, Kenneth Chukwuemeka Iregbu, Md Rabiul Islam, Mohammad Mainul Islam, Sheikh Mohammed Shariful Islam, Farhad Islami, Nahlah Elkudssiah Ismail, Gaetano Isola, Masao Iwagami, Chidozie C D Iwu, Chinwe Juliana Iwu-Jaja, Mahalaxmi Iyer, Linda Merin J, Jalil Jaafari, Louis Jacob, Kathryn H Jacobsen, Farhad Jadidi-Niaragh, Morteza Jafarinia, Khushleen Jaggi, Kasra Jahankhani, Nader Jahanmehr, Haitham Jahrami, Akhil Jain, Nityanand Jain, Ammar Abdulrahman Jairoun, Mihajlo Jakovljevic, Reza Jalilzadeh Yengejeh, Elham Jamshidi, Chinmay T Jani, Mark M Janko, Abubakar Ibrahim Jatau, Sathish Kumar Jayapal, Shubha Jayaram, Jayakumar Jeganathan, Alelign Tasew Jema, Digisie Mequanint Jemere, Wonjeong Jeong, Anil K Jha, Ravi Prakash Jha, John S Ji, Heng Jiang, Yingzhao Jin, Yinzi Jin, Olatunji Johnson, Nabi Jomehzadeh, Darwin Phan Jones, Tamas Joo, Abel Joseph, Nitin Joseph, Charity Ehimwenma Joshua, Jacek Jerzy Jozwiak, Mikk Jürisson, Billingsley Kaambwa, Ali Kabir, Hannaneh Kabir, Zubair Kabir, Vidya Kadashetti, Farima Kahe, Pradnya Vishal Kakodkar, Rizwan Kalani, Leila R Kalankesh, Feroze Kaliyadan, Sanjay Kalra, Ashwin Kamath, Arun Kamireddy, Thanigaivelan Kanagasabai, Himal Kandel, Edmund Wedam Kanmiki, Kehinde Kazeem Kanmodi, Rami S Kantar, Neeti Kapoor, Mehrdad Karajizadeh, Behzad Karami Matin, Shama D Karanth, Ibraheem M Karaye, Asima Karim, Hanie Karimi, Salah Eddin Karimi, Arman Karimi Behnagh, Samad Karkhah, Ajit K Karna, Faizan Zaffar Kashoo, Hengameh Kasraei, Nigussie Assefa Kassaw, Nicholas J Kassebaum, Molly B Kassel, Adarsh Katamreddy, Srinivasa Vittal Katikireddi, Patrick DMC Katoto, Joonas H Kauppila, Navjot Kaur, Neda Kaydi, Jeanne Françoise Kayibanda, Gbenga A Kayode, Foad Kazemi, Sina Kazemian, Sara Kazeminia, Leila Keikavoosi-Arani, Cathleen Keller, John H Kempen, Jessica A Kerr, Emmanuelle Kesse-Guyot, Mohammad Keykhaei, Mohamad Mehdi Khadembashiri, Mohammad Amin Khadembashiri, Morteza Abdullatif Khafaie, Himanshu Khajuria, Mohammad Khalafi, Amirmohammad Khalaji, Nauman Khalid, Ibrahim A Khalil, Faham Khamesipour, Asaduzzaman Khan, Gulfaraz Khan, Ikramullah Khan, Imteyaz A Khan, Maseer Khan, Moien AB Khan, Taimoor Khan, Mahammed Ziauddin Khan suheb, Shaghayegh Khanmohammadi, Khaled Khatab, Fatemeh Khatami, Armin Khavandegar, Hamid Reza Khayat Kashani, Khalid A Kheirallah, Feriha Fatima Khidri, Elaheh Khodadoust, Moein Khormali, Mahmood Khosrowjerdi, Jagdish Khubchandani, Helda Khusun, Zemene Demelash Kifle, Grace Kim, Jihee Kim, Ruth W Kimokoti, Kasey E Kinzel, Girmay Tsegay Kiross, Adnan Kisa, Sezer Kisa, Juniper Boroka Kiss, Mika Kivimäki, Desmond Klu, Ann Kristin Skrindo Knudsen, Ali-Asghar Kolahi, Farzad Kompani,

Gerbrand Koren, Soewarta Kosen, Karel Kostev, Ashwin Laxmikant Kotnis, Parvaiz A Koul, Sindhura Lakshmi Koulmane Laxminarayana, Ai Koyanagi, Michael A Kravchenko, Kewal Krishan, Hare Krishna, Vijay Krishnamoorthy, Yuvaraj Krishnamoorthy, Kris J Krohn, Barthelemy Kuate Defo, Connor M Kubeisy, Burcu Kucuk Bicer, Md Abdul Kuddus, Mohammed Kuddus, Ilari Kuitunen, Omar Kujan, Mukhtar Kulimbet, Vishnutheertha Kulkarni, Ashish Kumar, Harish Kumar, Nithin Kumar, Rahul Kumar, Shiv Kumar, Madhulata Kumari, Almagul Kurmanova, Om P Kurmi, Asep Kusnali, Dian Kusuma, Tezer Kutluk, Ambily Kuttikkattu, Evans F Kyei, Ilias Kyriopoulos, Carlo La Vecchia, Muhammad Awwal Ladan, Lucie Laflamme, Chandrakant Lahariya, Abdelilah Lahmar, Daphne Teck Ching Lai, Tri Laksono, Dharmesh Kumar Lal, Ratilal Lalloo, Tea Lallukka, Judit Lám, Demetris Lamnisos, Tuo Lan, Francesco Lanfranchi, Berthold Langguth, Van Charles Lansingh, Ariane Laplante-Lévesque, Bagher Larijani, Anders O Larsson, Savita Lasrado, Kamaluddin Latief, Mahrukh Latif, Kaveh Latifinaibin, Paolo Lauriola, Long Khanh Dao Le, Nhi Huu Hanh Le, Thao Thi Thu Le, Trang Diep Thanh Le, Munjae Lee, Paul H Lee, Sang-woong Lee, Seung Won Lee, Wei-Chen Lee, Yo Han Lee, Samson Mideksa Legesse, James Leigh, Jacopo Lenzi, Elvynna Leong, Temesgen L Lerango, Ming-Chieh Li, Wei Li, Xiaopan Li, Yichong Li, Zhihui Li, Massimo Libra, Virendra S Ligade, Andrew Tiyamike Makhiringa Likaka, Lee-Ling Lim, Ro-Ting Lin, Shuzhi Lin, Vasileios-Arsenios Lioutas, Stefan Listl, Jue Liu, Simin Liu, Xiaofeng Liu, Katherine M Livingstone, Erand Llanaj, Chun-Han Lo, Arianna Maever Loreche, László Lorenzovici, Mojgan Lotfi, Masoud Lotfizadeh, Rafael Lozano, Jailos Lubinda, Giancarlo Lucchetti, Alessandra Lugo, Raimundas Lunevicius, Jianing Ma, Stefan Ma, Zheng Feei Ma, Mahmoud Mabrok, Nikolaos Machairas, Monika Machoy, Christian Madsen, Javier A Magaña Gómez, Azzam A Maghazachi, Sandeep B Maharaj, Preeti Maharjan, Soleiman Mahjoub, Mansour Adam Mahmoud, Elham Mahmoudi, Morteza Mahmoudi, Omar Mohamed Makram, Jeadran N Malagón-Rojas, Elaheh Malakan Rad, Reza Malekzadeh, Armaan K Malhotra, Kashish Malhotra, Ahmad Azam Malik, Iram Malik, Lesibana Anthony Malinga, Deborah Carvalho Malta, Abdullah A Mamun, Yosef Manla, Fahmida Mannan, Yasaman Mansoori, Ali Mansour, Vahid Mansouri, Mohammad Ali Mansournia, Lorenzo Giovanni Mantovani, Bishnu P Marasini, Hamid Reza Marateb, Joemer C Maravilla, Agustina M Marconi, Parham Mardi, Mirko Marino, Abdoljalal Marjani, Carlos Alberto Marrugo Arnedo, Bernardo Alfonso Martinez-Guerra, Ramon Martinez-Piedra, Cleodice A Martins, Francisco Rogerlândio Martins-Melo, Miquel Martorell, Wolfgang Marx, Sharmeen Maryam, Roy Rillera Marzo, Kedar K V Mate, Clara N Matei, Alexander G Mathioudakis, Richard James Maude, Andrea Maugeri, Erin A May, Mahsa Mayeli, Maryam Mazaheri, Mohsen Mazidi, Antonio Mazzotti, Colm McAlinden, John J McGrath, Martin McKee, Anna Laura W McKowen, Susan A McLaughlin, Michael A McPhail, Steven M McPhail, Enkeleint A Mechili, Rishi P Mediratta, Jitendra Kumar Meena, Medhin Mehari, Max L Mehlman, Rahul Mehra, Kamran Mehrabani-Zeinabad, Entezar Mehrabi Nasab, Ravi Mehrotra, Mathewos M Mekonnen, Walter Mendoza, Ritesh G Menezes, Endalkachew Worku Mengesha, George A Mensah, Laverne G Mensah, Alexios-Fotios A Mentis, Sultan Ayoub Meo, Atte Meretoja, Tuomo J Meretoja, Abera M Mersha, Bezawit Afework Mesfin, Tomislav Mestrovic, Adquate Mhlanga, Laurette Mhlanga, Tianyue Mi, Georgia Micha, Irmina Maria Michalek, Ted R Miller, Sergey Nikolaevich Mindlin, Giada Minelli, Le Huu Nhat Minh, GK Mini, Neema W Minja, Niloofar Mirdamadi, Mojgan Mirghafourvand, Andreea Mirica, Seyed Kazem Mirinezhad, Omid Mirmosayyeb, Mizan Kiros Mirutse, Mohammad Mirza-Aghazadeh-Attari, Maryam Mirzaei, Tadesse Misgana, Sanjeev Misra, Philip B Mitchell, Prasanna Mithra, Chaitanya Mittal, Madhukar Mittal, Babak Moazen, Ahmed Ismail Mohamed, Jama Mohamed, Mouhand F H Mohamed, Nouh Saad Mohamed, Sakineh Mohammad-Alizadeh-Charandabi, Soheil Mohammadi, Abdollah Mohammadian-Hafshejani, Saeed Mohammadpour, Marita Mohammadshahi, Mustapha Mohammed, Salahuddin Mohammed, Shafiu Mohammed, Hoda Mojiri-forushani, Ali H Mokdad, Peyman Mokhtarzadehazar, Kaveh Momenzadeh, Sara Momtazmanesh, Lorenzo Monasta, Mohammad Ali Moni, Fateme Montazeri, AmirAli Moodi Ghalibaf, Maryam Moradi, Yousef Moradi, Maziar Moradi-Lakeh, Mehdi Moradinazar, Farhad Moradpour, Paula Moraga, Lidia Morawska, Rafael Silveira Moreira, Negar Morovatdar, Shane Douglas Morrison, Jakub Morze, Reza Mosaddeghi Heris, Jonathan F Mosser, Elias Mossialos, Hakimeh Mostafavi, Amirmahdi Mostofinejad, Vincent Mougin, Simin Mouodi, Parsa Mousavi, Seyed Ehsan Mousavi, Amin Mousavi Khaneghah, Christine Mpundu-Kaambwa, Matías Mrejen, Sumaira Mubarik, Lorenzo Muccioli, Ulrich Otto Mueller, Faraz Mughal, Sumoni Mukherjee, George Duke Mukoro, Admir Mulita, Francesk Mulita, Malaisamy Muniyandi, Kavita Munjal, Fungai Musaigwa, Khaled M Musallam, Ghulam Mustafa, Sathish Muthu, Saravanan Muthupandian, Woojae Myung, Ashraf F Nabhan, Fredrick Muyia Nafukho, Ahamarshan Jayaraman Nagarajan, Mohsen Naghavi, Pirouz Naghavi, Ganesh R Naik, Gurudatta Naik, Mukhammad David Naimzada, Sanjeev Nair, Tapas Sadasivan Nair, Hastyar Hama Rashid Najmuldeen, Luigi Naldi, Vinay Nangia, Shumaila Nargus, Bruno Ramos Nascimento, Gustavo G Nascimento, Abdallah Y Naser, Mohammad Javad Nasiri, Zuhair S Natto, Javaid Nauman, Muhammad Naveed, Biswa Prakash Nayak, Vinod C Nayak, Ashish Kumar Nayyar, Athare Nazri-Panjaki, Hadush Negash, Amayu Kumesa Negero, Ionut Negoi, Ruxandra Irina Negoi, Serban Mircea Negru, Seyed Aria Nejadghaderi, Chakib Nejjari, Mohammad Hadi Nematollahi, Evangelia Nena, Samata Nepal, Olivia D Nesbit, Charles Richard James Newton, Josephine W Ngunjiri, Dang H Nguyen, Phat Tuan Nguyen, Phuong The Nguyen, Tuan Thanh Nguyen, Van Thanh Nguyen, Yeshambel T Nigatu, Taxiarchis Konstantinos Nikolouzakis, Ali Nikoobar, Amin Reza Nikpoor, Muhammad A Nizam, Shuhei Nomura, Mamoona Noreen, Nafise Noroozi, Abbas Norouzian Baghani, Bo Norrving, Jean Jacques Noubiap, Amanda Novotney, Chisom Adaobi Nri-Ezedi, George Ntaios, Mpiko Ntsekhe, Virginia Nuñez-Samudio, Dieta Nurrika, Bogdan Oancea, Kehinde O Obamiro, Ismail A Odetokun, Akinyemi O D Ofakunrin, Ropo Ebenezer Ogunsakin, James Odhiambo Oguta, In-Hwan Oh, Hassan Okati-Aliabad, Sylvester Reuben Okeke, Akinkunmi Paul Okekunle, Lawrence Okidi, Osaretin Christabel Okonji, Patrick Godwin Okwute, Andrew T Olagunju, Muideen Tunbosun Olaiya, Titilope O Olanipekun, Matthew Idowu Olatubi, Antonio Olivas-Martinez, Gláucia Maria Moraes Oliveira, Susan Oliver, Abdulhakeem Abayomi Olorukooba, Isaac Iyinoluwa Olufadewa, Bolajoko Olubukunola Olusanya, Jacob Olusegun Olusanya, Yinka Doris Oluwafemi, Gideon Olamilekan Oluwatunase, Hany A Omar, Goran Latif Omer, Sokking Ong, Obinna E Onwujekwe, Kenneth Ikenna Onyedibe, John Nelson Opio, Michal Ordak, E Roberto Orellana, Orish Ebere Orisakwe, Verner N Orish, Hans Orru, Doris V Ortega-Altamirano, Alberto Ortiz, Edgar Ortiz-Brizuela, Esteban Ortiz-Prado, Uchechukwu Levi Osuagwu, Adrian Otoiu, Nikita Otstavnov, Amel Ouyahia, Guoqing Ouyang, Mayowa O Owolabi, Ifeoluwa Temitayo Oyeyemi, Oyetunde T Oyeyemi, Yaz Ozten, Mahesh Padukudru P A, Jagadish Rao Padubidri, Mahsa Pahlavikhah Varnosfaderani, Pramod Kumar Pal, Tamás Palicz, Claudia Palladino, Raffaele Palladino, Raul Felipe Palma-Alvarez, Adrian Pana, Parsa Panahi, Ashok Pandey, Seithikurippu R Pandi-Perumal, Victoria Pando-Robles, Helena Ullyartha Pangaribuan, Georgios D Panos, Ioannis Pantazopoulos, Paraskevi Papadopoulou, Shahina Pardhan, Romil R Parikh, Seoyeon Park, Ashwaghosha Parthasarathi, Ava Pashaei, Deepak Kumar Pasupula, Jenil R Patel, Sangram Kishor Patel, Aslam Ramjan Pathan, Ashlesh Patil, Shankargouda Patil, Dimitrios Patoulias, Venkata Suresh Patthipati, Uttam Paudel, Shrikant Pawar, Hamidreza Pazoki Toroudi, Spencer A Pease, Amy E Peden, Paolo Pedersini, Minjin Peng, Umberto Pensato, Veincent Christian Filipino Pepito, Emmanuel K Peprah, Gavin Pereira, Jeevan Pereira, Marcos Pereira, Mario F P Peres, Arokiasamy Perianayagam, Norberto Perico, Ionela-Roxana Petcu, Fanny Emily Petermann-Rocha, Raffaele Pezzani, Hoang Tran Pham, Michael R Phillips, Daniela Pierannunzio, Manon Pigeolet,

David M Pigott, Thomas Pilgrim, Marina Pinheiro, Michael A Piradov, Nishad Plakkal, Evgenii Plotnikov, Dimitri Poddighe, Peter Pollner, Ramesh Poluru, Constance Dimity Pond, Maarten J Postma, Govinda Raj Poudel, Lisasha Poudel, Ghazaleh Pourali, Naeimeh Pourtaheri, Sergio I Prada, Pranil Man Singh Pradhan, Vijay Kumar Prajapati, V Prakash, Chandra P Prasad, Manya Prasad, Akila Prashant, Elton Junio Sady Prates, Hery Purnobasuki, Bharathi M Purohit, Jagadeesh Puvvula, Rizwan Qaisar, Nameer Hashim Qasim, Ibrahim Qattea, Gangzhen Qian, Nguyen Khoi Quan, Amir Radfar, Venkatraman Radhakrishnan, Pourya Raee, Hadi Raeisi Shahraki, Seyedeh Niloufar Rafiei Alavi, Ibrar Rafique, Alberto Raggi, Fakher Rahim, Md Mosfequr Rahman, Mosiur Rahman, Muhammad Aziz Rahman, Tafhimur Rahman, Amir Masoud Rahmani, Shayan Rahmani, Niloufar Rahnavard, Pramila Rai, Sathish Rajaa, Ali Rajabpour-Sanati, Prashant Rajput, Prasanna Ram, Hazem Ramadan, Shakthi Kumaran Ramasamy, Sheena Ramazanu, Juwel Rana, Kritika Rana, Chhabi Lal Ranabhat, Nemanja Rancic, Smitha Rani, Shubham Ranjan, Chythra R Rao, Indu Ramachandra Rao, Mithun Rao, Sowmya J Rao, Drona Prakash Rasali, Davide Rasella, Sina Rashedi, Vahid Rashedi, Ahmed Mustafa Rashid, Ashkan Rasouli-Saravani, Prateek Rastogi, Azad Rasul, Ramin Ravangard, Nakul Ravikumar, David Laith Rawaf, Salman Rawaf, Reza Rawassizadeh, Iman Razeghian-Jahromi, Murali Mohan Rama Krishna Reddy, Elrashdy Moustafa Mohamed Redwan, Faizan Ur Rehman, Robert C Reiner Jr, Giuseppe Remuzzi, Bhageerathy Reshmi, Serge Resnikoff, Luis Felipe Reyes, Malihe Rezaee, Negar Rezaei, Nima Rezaei, Mohsen Rezaeian, Mavra A Riaz, Ana Isabel Ribeiro, Daniel Cury Ribeiro, Jennifer Rickard, Maria Jesus Rios-Blancas, Hannah Elizabeth Robinson-Oden, Mónica Rodrigues, Jefferson Antonio Buendia Rodriguez, Leonardo Roever, Ravi Rohilla, Peter Rohloff, Debby Syahru Romadlon, Luca Ronfani, Gholamreza Roshandel, Sharareh Roshanzamir, Morteza Rostamian, Bedanta Roy, Priyanka Roy, Enrico Rubagotti, Susan Fred Rumisha, Godfrey M Rwegerera, Andrzej Rynkiewicz, Manjula S, Chandan S N, Katharina S Sunnerhagen, Aly M A Saad, Michela Sabbatucci, Korosh Saber, Maha Mohamed Saber-Ayad, Simona Sacco, Basema Saddik, Adam Saddler, Bashdar Abuzed Sadee, Ehsan Sadeghi, Masoumeh Sadeghi, Saeid Sadeghian, Umar Saeed, Maryam Saeedi, Sare Safi, Rajesh Sagar, Amene Saghazadeh, Narjes Saheb Sharif-Askari, Soumya Swaroop Sahoo, Mohammad Ali Sahraian, Seyed Aidin Sajedi, Mirza Rizwan Sajid, Joseph W Sakshaug, Saina Salahi, Sarvenaz Salahi, Payman Salamati, Afeez Abolarinwa Salami, Luciane B Salaroli, Mohamed A Saleh, Sana Salehi, Marwa Rashad Salem, Mohammed Z Y Salem, Sohrab Salimi, Hossein Samadi Kafil, Sara Samadzadeh, Kamel A Samara, Saad Samargandy, Yoseph Leonardo Samodra, Vijaya Paul Samuel, Abdallah M Samy, Juan Sanabria, Nima Sanadgol, Edmond Sanganyado, Rama Krishna Sanjeev, Francesco Sanmarchi, Francesca Sanna, Ichtiarini Nurullita Santri, Milena M Santric-Milicevic, Made Ary Sarasmita, Aswini Saravanan, Babak Saravi, Yaser Sarikhani, Chinmoy Sarkar, Rodrigo Sarmiento-Suárez, Gargi Sachin Sarode, Sachin C Sarode, Arash Sarveazad, Brijesh Sathian, Thirunavukkarasu Sathish, Davide Sattin, Jennifer Saulam, Susan M Sawyer, Sonia Saxena, Ganesh Kumar Saya, Yaser Sayadi, Abu Sayeed, Md Abu Sayeed, Mete Saylan, Nikolaos Scarmeas, Benedikt Michael Schaarschmidt, Winfried Schlee, Maria Inês Schmidt, Art Schuermans, David C Schwebel, Falk Schwendicke, Mario Šekerija, Siddharthan Selvaraj, Mohammad H Semreen, Sabyasachi Senapati, Pallav Sengupta, Subramanian Senthilkumaran, Sadaf G Sepanlou, Dragos Serban, Addisu Sertsu, Yashendra Sethi, SeyedAhmad SeyedAlinaghi, Seyed Arsalan Seyedi, Amir Shafaat, Omid Shafaat, Mahan Shafie, Arman Shafiee, Nilay S Shah, Pritik A Shah, Saeed Shahabi, Ataollah Shahbandi, Izza Shahid, Samiah Shahid, Wajeehah Shahid, Moyad Jamal Shahwan, Masood Ali Shaikh, Alireza Shakeri, Husain Shakil, Sunder Sham, Muhammad Aaqib Shamim, Mehran Shams-Beyranvand, Hina Shamshad, Mohammad Ali Shamshirgaran, Mohammad Anas Shamsi, Mohd Shanawaz, Abhishek Shankar, Sadaf Sharfaei, Amin Sharifan, Mariam Shariff, Javad Sharifi-Rad, Manoj Sharma, Rajesh Sharma, Saurab Sharma, Vishal Sharma, Rajesh P Shastry, Amin Shavandi, David H Shaw, Amir Mehdi Shayan, Amr Mohamed Elsayed Shehabeldine, Aziz Sheikh, Rahim Ali Sheikhi, Jiabin Shen, Manjunath Mala Shenoy, B Suresh Kumar Shetty, Ranjitha S Shetty, Robert Adamu Shey, Amir Shiani, Kenji Shibuya, Desalegn Shiferaw, Mika Shigematsu, Jae Il Shin, Min-Jeong Shin, Rahman Shiri, Reza Shirkoohi, Aminu Shittu, Ivy Shiue, K M Shivakumar, Velizar Shivarov, Sina Shool, Sunil Shrestha, Kanwar Hamza Shuja, Kerem Shuval, Yafei Si, Migbar Mekonnen Sibhat, Emmanuel Edwar Siddig, Inga Dora Sigfusdottir, João Pedro Silva, Luís Manuel Lopes Rodrigues Silva, Soraia Silva, Jorge Piano Simões, Colin R Simpson, Anjali Singal, Abhinav Singh, Aditya Singh, Ambrish Singh, Balbir Bagicha Singh, Baljinder Singh, Mahendra Singh, Mayank Singh, Narinder Pal Singh, Paramdeep Singh, Surjit Singh, Md Shahjahan Siraj, Freddy Sitas, Shravan Sivakumar, Valentin Yurievich Skryabin, Anna Aleksandrovna Skryabina, David A Sleet, Erica Leigh N Slepak, Hanye Sohrabi, Hamidreza Soleimani, Sameh S M Soliman, Marco Solmi, Yonatan Solomon, Yimeng Song, Reed J D Sorensen, Joan B Soriano, Ireneous N Soyiri, Michael Spartalis, Chandrashekhar T Sreeramareddy, Joseph R Starnes, Vladimir I Starodubov, Antonina V Starodubova, Simona Cătălina Stefan, Dan J Stein, Fridolin Steinbeis, Paschalis Steiropoulos, Leo Stockfelt, Mark A Stokes, Stefan Stortecky, Saverio Stranges, Konstantinos Stroumpoulis, Muhammad Suleman, Rizwan Suliankatchi Abdulkader, Abida Sultana, Jing Sun, David Sunkersing, Sri Susanty, Chandan Kumar Swain, Bryan L Sykes, Lukasz Szarpak, Mindy D Szeto, Miklós Szócska, Payam Tabaee Damavandi, Ozra Tabatabaei Malazy, Seyed-Amir Tabatabaeizadeh, Shima Tabatabai, Karen M Tabb, Mohammad Tabish, Luis M Taborda-Barata, Takahiro Tabuchi, Birkneh Tilahun Tadesse, Amirmasoud Taheri, Yasaman Taheri Abkenar, Moslem Taheri Soodejani, Amir Taherkhani, Jabeen Taiba, Ardeshir Tajbakhsh, Iman M Talaat, Ashis Talukder, Jacques Lukenze Tamuzi, Ker-Kan Tan, Haosu Tang, Hong K Tang, Nathan Y Tat, Vivian Y Tat, Razieh Tavakoli Oliaee, Seyed Mohammad Tavangar, Nuno Taveira, Tsion Mulat Tebeje, Yibekal Manaye Tefera, Mojtaba Teimoori, Mohamad-Hani Temsah, Reem Mohamad Hani Temsah, Masayuki Teramoto, Solomon Hailemariam Tesfaye, Pugazhenthan Thangaraju, Kavumpurathu Raman Thankappan, Rajshree Thapa, Rekha Thapar, Nihal Thomas, Amanda G Thrift, Chern Choong Chern Thum, Jing Tian, Ales Tichopad, Jansje Henny Vera Ticoalu, Tenaw Yimer Tiruye, Seyed Abolfazl Tohidast, Marcello Tonelli, Mathilde Touvier, Marcos Roberto Tovani-Palone, Khai Hoan Tram, Nghia Minh Tran, Domenico Trico, Indang Trihandini, Samuel Joseph Tromans, Vien T Truong, Thien Tan Tri Tai Truyen, Evangelia Eirini Tsermpini, Munkhtuya Tumurkhuu, Kang Tung, Stefanos Tyrovolas, Chukwudi S Ubah, Aniefiok John Udoakang, Arit Udoh, Inam Ulhaq, Saeed Ullah, Sana Ullah, Muhammad Umair, Tungki Pratama Umar, Chukwuma David Umeokonkwo, Anushri Umesh, Brigid Unim, Bhaskaran Unnikrishnan, Era Upadhyay, Daniele Urso, Marco Vacante, Amir Mohammad Vahdani, Asokan Govindaraj Vaithinathan, Sahel Valadan Tahbaz, Rohollah Valizadeh, Jef Van den Eynde, Elena Varavikova, Orsolya Varga, Siddhartha Alluri Varma, Priya Vart, Shoban Babu Varthya, Tommi Juhani Vasankari, Lennert J Veerman, Narayanaswamy Venketasubramanian, Deneshkumar Venugopal, Nicholas Alexander Verghese, Madhur Verma, Pratibha Verma, Massimiliano Veroux, Georgios-Ioannis Verras, Dominique Vervoort, Rafael José Vieira, Jorge Hugo Villafañe, Leonardo Villani, Gabriela Ines Villanueva, Paul J Villeneuve, Francesco S Violante, Rachel Visontay, Vasily Vlassov, Bay Vo, Stein Emil Vollset, Simona Ruxandra Volovat, Victor Volovici, Avina Vongpradith, Theo Vos, Isidora S Vujcic, Rade Vukovic, Yohannes Dibaba Wado, Hatem A Wafa, Yasir Waheed, Richard G Wamai, Cong Wang, Denny Wang, Fang Wang, Shu Wang, Song Wang, Yanzhong Wang, Yuan-Pang Wang, Paul Ward, Stefanie Watson, Marcia R Weaver, Kosala Gayan Weerakoon, Daniel J Weiss, Abrha Hailay Weldemariam, Katherine M Wells, Yi Feng Wen, Andrea Werdecker, Ronny Westerman, Dakshitha Praneeth Wickramasinghe, Nuwan Darshana Wickramasinghe, Tissa Wijeratne, Shadrach Wilson,

Marcin W Wojewodzic, Eve E Wool, Anthony D Woolf, Dongze Wu, Ratna Dwi Wulandari, Hong Xiao, Bin Xu, Xiaoyue Xu, Lalit Yadav, Sajad Yaghoubi, Lin Yang, Yuichiro Yano, Yao Yao, Pengpeng Ye, Gesila Endashaw Yesera, Renjulal Yesodharan, Subah Abderehim Yesuf, Arzu Yiğit, Vahit Yiğit, Paul Yip, Dong Keon Yon, Naohiro Yonemoto, Yuyi You, Mustafa Z Younis, Chuanhua Yu, Siddhesh Zadey, Vesna Zadnik, Nima Zafari, Mohammad Zahedi, Muhammad Nauman Zahid, Mazyar Zahir, Fathiah Zakham, Nazar Zaki, Josefina Zakzuk, Giulia Zamagni, Burhan Abdullah Zaman, Sojib Bin Zaman, Nelson Zamora, Ramin Zand, Milad Zandi, Ghazal G Z Zandieh, Aurora Zanghì, Iman Zare, Mikhail Sergeevich Zastrozhin, Mohammed G M Zeariya, Youjie Zeng, Chunxia Zhai, Chen Zhang, Haijun Zhang, Hongwei Zhang, Yunquan Zhang, Zhaofeng Zhang, Zhenyu Zhang, Hanqing Zhao, Yang Zhao, Yong Zhao, Peng Zheng, Chenwen Zhong, Juexiao Zhou, Bin Zhu, Zhaohua Zhu, Pardis Ziaeefar, Magdalena Zielińska, Zhiyong Zou, Alimuddin Zumla, Elric Zweck, Samer H Zyoud, Stephen S Lim†, and Christopher J L Murray†. *Joint first authors. †Joint senior authors.

**Affiliations**

Institute for Health Metrics and Evaluation (A E Schumacher PhD, H H Kyu PhD, C M Antony MA, A Y Aravkin PhD, G S Azhar PhD, C Bisignano MPH, K Burkart PhD, K M Cercy BS, E Chung MSc, K Coberly BS, H Comfort MPH, E Cousin PhD, G T Culbreth PhD, M Cunningham MSc, N Davis Weaver MPH, Prof L Degenhardt PhD, L Deitesfeld MA, M A Dirac MD, K Estep MPA, Prof V L Feigin PhD, A D Flaxman PhD, L S Flor MPH, L M Force MD, J E Fuller MLIS, Prof E Gakidou PhD, Prof S I Hay FMedSci, K S Ikuta MD, D P Jones BS, N J Kassebaum MD, M B Kassel BA, C Keller MPH, K E Kinzel MSPH, K J Krohn MPH, Prof R Lozano MD, E A May MS, A L W McKowen MA, S A McLaughlin PhD, M L Mehlman PhD, T Mestrovic PhD, A H Mokdad PhD, J F Mosser MD, V Mougin BA, Prof M Naghavi PhD, O D Nesbit MA, A Novotney MPH, Y Ozten MS, S A Pease BS, D M Pigott PhD, R C Reiner Jr PhD, H E Robinson-Oden MLIS, D H Shaw BA, E N Slepak MLIS, R J D Sorensen PhD, N A Verghese BA, Prof S Vollset DrPH, A Vongpradith BA, Prof T Vos PhD, D Wang BA, S Watson MS, Prof M R Weaver PhD, K M Wells BA, S Wilson BS, E E Wool MPH, P Zheng PhD, Prof S S Lim PhD, Prof C J L Murray DPhil), Department of Health Metrics Sciences, School of Medicine (H H Kyu PhD, A Y Aravkin PhD, K Burkart PhD, E Cousin PhD, M A Dirac MD, A D Flaxman PhD, L S Flor MPH, L M Force MD, Prof E Gakidou PhD, Prof S I Hay FMedSci, N J Kassebaum MD, Prof R Lozano MD, A H Mokdad PhD, Prof M Naghavi PhD, D M Pigott PhD, R C Reiner Jr PhD, Prof S Vollset DrPH, Prof T Vos PhD, Prof M R Weaver PhD, P Zheng PhD, Prof S S Lim PhD, Prof C J L Murray DPhil), Department of Applied Mathematics (A Y Aravkin PhD), School of Medicine (Prof E J Boyko MD), Department of Internal Medicine (Y Chahine MD), Department of Cardiology (Y Chahine MD), Department of Family Medicine (M A Dirac MD), Division of Pediatric Hematology-Oncology (L M Force MD), Department of Neurology (R Kalani MD), Department of Anesthesiology and Pain Medicine (N J Kassebaum MD, V Krishnamoorthy MD), Department of Global Health (I A Khalil MD, N W Minja MD, R J D Sorensen PhD), Division of Plastic and Reconstructive Surgery (S D Morrison MD), Foster School of Business (F M Nafukho PhD), Department of Biostatistics (A Olivas-Martinez MD), School of Social Work (E Orellana PhD), and Division of Allergy and Infectious Diseases (K Tram MD), University of Washington, Seattle, WA, USA; Faculty of Medicine (A Aali MD, N Rahnavard MD), Department of Neuroscience (A Ahmadzade MD), Emam-Reza Hospital (S Mohammadpour PhD), Clinical Research Development Unit (N Morovatdar MD), Metabolic Syndrome Research Center (G Pourali MD), International UNESCO Center for Health-related Basic Sciences and Human Nutrition (G Pourali MD), and Department of Medical Genetics (N Zafari MD), Mashhad University of Medical Sciences, Mashhad, Iran; Department of Juridical and Economic Studies (C Abbafati PhD) and Department of Public Health and Infectious Diseases (M S Cattaruzza PhD), La Sapienza University, Rome, Italy; Antai College of Economics (J Abbas PhD), Shanghai Mental Health Center (Prof M R Phillips MD), Shanghai Jiao Tong University, Shanghai, China; Doheny Eye Institute (R Abbasgholizadeh MD), Department of Ophthalmology (M Emamverdi MD), and Center for Social Medicine (J Friedman PhD), University of California Los Angeles, Los Angeles, CA, USA; Infectious and Tropical Research Center (M A Abbasi PhD), Tuberculosis and Lung Diseases Research Center (S Daneshvar MD), Department of Radiology (M Dashti MD, A Ghasemzadeh MD, M Mirza-Aghazadeh-Attari MD), Department of Health Policy and Management (L Doshmangir PhD), Department of Medical Surgical Nursing (M Ghafourifard PhD, M Lotfi PhD), Research Center for Evidence-Based Medicine (M Hosseini MD), Department of Immunology (F Jadidi-Niaragh PhD), School of Management and Medical Informatics (L R Kalankesh PhD), Social Determinants of Health Research Center (S Karimi PhD, Prof S Mohammad-Alizadeh-Charandabi PhD), Radiology Research Committee (M Khalafi MD), Medical Education Research Center (M Lotfi PhD), Faculty of Nursing and Midwifery (Prof M Mirghafourvand PhD, Prof S Mohammad-Alizadeh-Charandabi PhD), Liver and Gastrointestinal Disease Research Center (S Mirinezhad PhD), Neurosciences Research Center (R Mosaddeghi Heris MD), Student Research Committee (R Mosaddeghi Heris MD), Department of Community Medicine (S Mousavi MD), and Drug Applied Research Center (H Samadi Kafil PhD), Tabriz University of Medical Sciences, Tabriz, Iran; Department of Orthopedic Surgery (M Abbasian MD, K Momenzadeh MD), Harvard Business School (F Caetano dos Santos PhD), Department of Epidemiology (S Carr MS), Division of Cardiovascular Medicine (G Chi MD), Division of Cardiology (I Y Elgendy MD), Department of Neurological Surgery at Brigham and Women's Hospital (A H Feroze MD), Department of Ophthalmology (Prof J H Kempen MD), Department of Health Policy and Management (C M Kubeisy BA), Department of Global Health and Population (Z Li PhD, P Rohloff MD), Department of Health Policy and Oral Epidemiology (Z S Natto DrPH), Department of Pulmonary and Critical Care (T O Olanipekun MD), Department of Global Health and Social Medicine (M Pigeolet MD), Harvard TH Chan School of Public Health (P M S Pradhan MD, E Zweck MD), Beth Israel Deaconess Medical Center (S Sharfaei MD), and Division of General Internal Medicine (Prof A Sheikh MD), Harvard University, Boston, MA, USA; Department of Orthopaedic Surgery (M Abbasian MD), Department of Anesthesiology (D Abtahi MD, S Salimi MD, A Shakeri MD, A Tajbakhsh MD, A Tajbakhsh MD), Department of Biotechnology (S Aghamiri PhD), Urology Department (M Ahmadzade MD, M Bonakdar Hashemi MD), National Nutrition and Food Technology Research Institute (M Ajami PhD), Research Institute of Dental Sciences (Prof S Asgary MSc), Department of Medical Genetics (M Ghasemi PhD), Center for Comprehensive Genetic Services (M Ghasemi PhD), Social Determinants of Health Research Center (Prof H Hassanian-Moghaddam MD, A Kolahi MD, A Nikoobar DipSc), School of Medicine (M Heidari-Foroozan BSc, F Montazeri MD, S Nejadghaderi MD, S Rahmani MD, P Ziaeefar MD), Urology and Nephrology Research Center (H Hesami MD, M Zahir MD, P Ziaeefar MD), Ophtalmic Research Centre (H Hesami MD), Department of Immunology (K Jahankhani MSc, A Rasouli-Saravani PhD), Department of Health Policy and Management (N Jahanmehr PhD), Safety Promotion and Injury Prevention Research Center (N Jahanmehr PhD), Department of Neurosurgery (H Khayat Kashani MD), Department of Microbiology and Infectious Diseases (M Nasiri PhD), Department of Biology and Anatomical Sciences (P Raee PhD), Department of Pharmacology (M Rezaee MD), Ophthalmic Research Center (S Safi PhD), Emergency Department (S Shool MD), and Department of Medical Education (S Tabatabai PhD), Shahid Beheshti University of Medical Sciences, Tehran, Iran; Department of Epidemiology (S Abd ElHafeez DrPH), Department of Pediatric Dentistry and Dental Public Health (Prof M El Tantawi PhD, Prof O A A Elmeligy PhD), Department of Tropical Health (R M Ghazy PhD), and Department of Pathology (Prof I M Talaat PhD), Alexandria University, Alexandria, Egypt; Department of Surgery (M Abdelmasseh MD, Prof J Sanabria MD), Marshall University, Huntington, WV, USA; Department of Tropical Medicine and Infectious Diseases (S Abd-Elsalam PhD), Tanta University, Tanta, Egypt; Department of Internal Medicine, Baylor College of Medicine, Houston,

TX, USA (A Abdelwahab MD); Institute of Pharmaceutical Sciences (Prof M Abdollahi PhD), School of Pharmacy (Prof M Abdollahi PhD), Research Center for Immunodeficiencies (H Abolhassani PhD, Prof N Rezaei PhD, A Saghazadeh MD), Department of Pharmacology (M Ala MD, N Noroozi DVM), Urology Research Center (R Arabzadeh Bahri MD, Prof F Khatami PhD), Department of Health Information Management (S Ayyoubzadeh PhD), Non-communicable Diseases Research Center (S Azadnajafabad MD, M Keykhaei MD, S Momtazmanesh MD, F Montazeri MD, P Mousavi MD, S Rahmani MD, N Rezaei PhD), School of Medicine (A Behnoush BS, H Farrokhpour MD, H Karimi MD, A Khalaji BS, S Khanmohammadi MD, M Mayeli MD, S Mohammadi MD, S Momtazmanesh MD), Multiple Sclerosis Research Center (S Eskandarieh PhD, Prof M Sahraian MD), Digestive Diseases Research Institute (S Fahimi MD, Prof R Malekzadeh MD, V Mansouri MD, S G Sepanlou MD), Department of Ophthalmology (Prof F Ghassemi MD), Vali-E-Asr Reproductive Health Research Center (M Haddadi MD), Cardiac Primary Prevention Research Center (S Kazemian MD), Department of Cardiac Electrophysiology (S Kazemian MD), Students' Scientific Research Center (M Keykhaei MD, M Khadembashiri MD), Center for Research and Training in Skin Diseases and Leprosy (F Khamesipour PhD), Sina Trauma and Surgery Research Center (A Khavandegar MD, M Khormali MD, Prof P Salamati MD, S Shool MD), Children's Medical Center (F Kompani MD), Endocrinology and Metabolism Research Institute (Prof B Larijani FACE, N Mirdamadi MD, N Rezaei PhD, S Seyedi MD, O Tabatabaei Malazy PhD), Department of Cardiology (E Mahmoudi MD, S Rashedi MD), Department of Pediatric Cardiology (Prof E Malakan Rad MD), Department of Epidemiology and Biostatistics (M Mansournia PhD), Tehran Heart Center (E Mehrabi Nasab MD, M Rezaee MD), Sports and Exercise Medicine Research Center (N Mirdamadi MD), National Institute for Health Research (M Mohammadshahi PhD), Health Equity Research Center (H Mostafavi PhD), Iranian Research Center for HIV/AIDS (S Seyed Alinaghi PhD), Department of Neurology (M Shafie MD), Department of Medicine (A Shahbandi MD, A M Vahdani MD), Department of Pharmaceutical Care (A Sharifan PharmD), Research Center for Rational Use of Drugs (A Sharifan PharmD), Cancer Research Center (R Shirkoohi PhD), Cancer Biology Research Center (R Shirkoohi PhD), Faculty of Medicine (H Sohrabi MD), and Department of Pathology (Prof S Tavangar MD), Tehran University of Medical Sciences, Tehran, Iran (R Heidari-Soureshjani MSc, M M Khadembashiri MD); Department of Medicine, University of Setif Algeria, Sétif, Algeria (Prof M Abdoun BMedSc); Department of Physiotherapy (A Abdullahi PhD, A W Awotidebe PhD), Department of Pharmacology and Therapeutics (S B Borodo MSc), Department of Community Medicine (Prof M A Gadanya FMCPH), and Department of Nursing Science (M Ladan PhD), Bayero University Kano, Kano, Nigeria; Department of Rehabilitation Sciences (A Abdullahi PhD, M U Ali MSc) and School of Nursing (S Tyrovolas PhD), Hong Kong Polytechnic University, Hong Kong, China; Department of Emergency and Critical Care Nursing (A M Abdurehman MSc), Department of Health Policy and Management (A T Debele MSc), School of Nursing and Midwifery (T Getachew MSc), Department of Clinical Pharmacy (M D Gudeta MSc), Department of Psychiatry (T Misgana MSc), and Department of Nursing (A Sertsu MSc), Haramaya University, Harar, Ethiopia; Department of Midwifery (M Abebe MSc, G M Ayele MSc), Department of Infection Prevention and Control (A Afework MPH), Department of Public Health (T L Lerango MPH, T M Tebeje MPH), Department of Pediatrics and Child Health Nursing (M M Sibhat MSc), and School of Public Health (S H Tesfaye PhD), Dilla University, Dilla, Ethiopia; Department of Neurosurgery (A Abedi MD), Keck School of Medicine (A Abedi MD), Department of Radiology (A Gholamrezanezhad MD), and Mark and Mary Stevens Neuroimaging and Informatics Institute (S Salehi MD), University of Southern California, Los Angeles, CA, USA; Department of Emergency Medicine (A Abedi MD), Department of Immunology (S Athari PhD), and Department of Critical Care and Emergency Nursing (N Hanifi PhD), Zanjan University of Medical Sciences, Zanjan, Iran; Department of Clinical Pharmacy (T M Abegaz MS) and Department of Pharmacology (Z D Kifle MSc), University of Gondar, Gondar, Ethiopia; College of Pharmacy and Pharmaceutical Sciences (T M Abegaz MS), Florida Agricultural and Mechanical University, Tallahassee, FL, USA; Postgraduate Department, University of Sierra Sur, Miahuatlan de Porfirio Diaz, Mexico (Prof R A Abeldaño Zuñiga PhD); National Research Council of Mexico, Mexico City, Mexico (Prof R A Abeldaño Zuñiga PhD); Department of Botany, Sree Narayana Guru College Chelannur, Kozhikode, India (E S Abhilash PhD); Department of Internal Medicine, Federal Medical Centre, Abuja, Nigeria (O O Abiodun FWACP); Department of Family and Community Health (R G Aboagye MPH), Department of Population and Behavioural Sciences (H Amu PhD), Department of Health Policy Planning and Management (M A Ayanore PhD), Department of Epidemiology and Biostatistics (R K Dowou MPhil), Institute of Health Research (M Immurana PhD, D Klu PhD), and Department of Microbiology and Immunology (V N Orish PhD), University of Health and Allied Sciences, Ho, Ghana; Department of Medical Biochemistry and Biophysics (H Abolhassani PhD), Department of Medical Epidemiology and Biostatistics (Prof J J Carrero PhD), Department of Physiology and Pharmacology (C R Cederroth PhD), Department of Global Public Health (K Deuba DrPH, Prof L Laflamme PhD), Department of Neurobiology, Care Sciences, and Society (S Fereshtehnejad PhD), and Department of Molecular Medicine and Surgery (Prof J H Kauppila MD), Karolinska Institute, Stockholm, Sweden; Department of Physical Pharmacy and Pharmacokinetics, Poznan University of Medical Sciences, Poznan, Poland (M Abouzid PharmD); Department of Pediatric Dentistry (Prof L G Abreu PhD), Department of Maternal and Child Nursing and Public Health (Prof D C Malta PhD, E J S Prates BS), Department of Clinical Medicine (Prof B R Nascimento PhD), and Clinical Hospital (Prof B R Nascimento PhD), Federal University of Minas Gerais, Belo Horizonte, Brazil; Department of Adult Health Nursing (W A Abrha MSc, A H Weldemariam MSc) and Department of Nursing (A Girmay MSc), Aksum University, Aksum, Ethiopia; Department of Research, Philippine Institute for Development Studies, Quezon City, Philippines (M R M Abrigo PhD); Department of Neurology, Martin Luther University Halle-Wittenberg, Halle, Germany (S Abu Rumeileh MD); Institute of Community and Public Health, Birzeit University, Ramallah, Palestine (Prof N M Abu-Rmeileh PhD); Department of Therapeutics (Prof S Aburuz PhD), Institute of Public Health (L A Ahmed PhD, Z Alam PhD, I Elbarazi DrPH), College of Medicine and Health Sciences (Prof M Grivna PhD, J Nauman PhD), Department of Medical Microbiology and Immunology (Prof G Khan PhD), Family Medicine Department (M A Khan MSc), and Department of Computer Science and Software Engineering (Prof N Zaki PhD), United Arab Emirates University, Al Ain, United Arab Emirates; College of Pharmacy (Prof S Aburuz PhD) and Department of Clinical Nursing (Prof M M Ahmad PhD), University of Jordan, Amman, Jordan; Department of Surgery (A Abu-Zaid MD) and College of Pharmacy (R M H Temsah PharmD), Alfaisal University, Riyadh, Saudi Arabia; College of Graduate Health Sciences (A Abu-Zaid MD) and Department of Neurology (R Zand MD), University of Tennessee, Memphis, TN, USA; Department of Clinical Medicine, American University of Antigua, Osbourn, Antigua and Barbuda (Prof J M Acuna MD); Robert Stempel College of Public Health and Social Work (Prof J M Acuna MD) and Department of Epidemiology (P Gautam MPH), Florida International University, Miami, FL, USA (Prof R Chowdhury PhD); Melbourne School of Population and Global Health (T Adair PhD, H Jiang PhD), Department of Medicine (A S Babu PhD), Justice Health Unit (R Borschmann PhD), School of Health Sciences (A Meretoja MD), and Department of Neurology (Prof T Wijeratne MD), University of Melbourne, Melbourne, VIC, Australia; Centre for Social Research in Health (I Y Addo PhD, S R Okeke PhD), School of Population Health (Z Dai PhD, X Xu PhD), National Drug and Alcohol Research Centre (Prof L Degenhardt PhD), School of Clinical Medicine (M Huda PhD), School of Psychiatry (Prof P B Mitchell MD), School of Public Health and Community Medicine (A E Peden PhD), School of Optometry and Vision Science (Prof S Resnikoff MD), Faculty of Medicine and Health (S Sharma PhD), School of Risk and Actuarial Studies (Y Si PhD), Centre for Primary Health Care and Equity (F Sitas PhD), and The George Institute for Global Health (P Ye MPH), University of New South Wales, Sydney, NSW, Australia; Quality and Systems Performance Unit, Cancer

Institute NSW, Sydney, NSW, Australia (I Y Addo PhD); College of Medicine (O M Adebayo MD), Department of Oral and Maxillofacial Surgery (T O Aladelusi FWACS, A A Salami BDS), Department of Community Medicine (O S Ilesanmi PhD), and Department of Medicine (Prof M O Owolabi DrM), University College Hospital, Ibadan, Ibadan, Nigeria; Menzies School of Health Research, Charles Darwin University, Darwin, NT, Australia (O A Adegboye PhD); Department of Obstetrics and Gynecology, University of Texas Medical Branch, Galveston, TX, USA (V Adekanmbi PhD); Department of Molecular Biology and Genetics (Prof M T AlBataineh PhD), and College of Medicine and Health Sciences Academic Programs (Prof W Almahmeed MD), Khalifa University, Abu Dhabi, United Arab Emirates (B Aden PhD); Institute of Public Health, Walden University, Al Ain, United Arab Emirates (B Aden PhD); Department of HIV and Infectious Diseases, Jhpiego, Abuja, Nigeria (A V Adepoju MD); Department of Adolescent Research and Care, Adolescent Friendly Research Initiative and Care, Ado Ekiti, Nigeria (A V Adepoju MD); Department of Microbiology, Edo State University Uzairue, Iyamho, Nigeria (Prof C O Adetunji PhD); Department of Biosciences and Biotechnology (T E Adeyeoluwa PhD, I T Oyeyemi PhD, O T Oyeyemi PhD, A J Udoakang PhD), Department of Physiology (O I Adeyomoye PhD), Department of Microbiology (I A Anuoluwa PhD, O O Bello PhD, Y D Oluwafemi PhD), Department of Biological Sciences (T C Ekundayo PhD), Department of Chemistry (O O Idowu MSc), and Department of Anatomy (G O Oluwatunase MSc), University of Medical Sciences, Ondo, Ondo, Nigeria; Department of Veterinary Medicine (T E Adeyeoluwa PhD), Department of Community Medicine (A A Afolabi MPH, O S Ilesanmi PhD), Department of Oral and Maxillofacial Surgery (T O Aladelusi FWACS), Department of Epidemiology and Medical Statistics (M Ekholuenetale MSc, A F Fagbamigbe PhD), Faculty of Public Health (M Ekholuenetale MSc, I I Olufadewa MHS), Department of Health Promotion and Education (S E Ibitoye MPH), College of Medicine (A P Okekunle PhD), and Department of Medicine (Prof M O Owolabi DrM), University of Ibadan, Ibadan, Nigeria; Department of Business Administration (R Adha PhD) and Department of Pharmacy (W Adikusuma PhD), Muhammadiyah University of Mataram, Mataram, Indonesia; Department of Pharmaceutical Sciences (A Adibi MSc), Department of Oral Biological and Medical Sciences (M Chen BDS), School of Population and Public Health (M Hossain MSc, D P Rasali PhD), and School of Nursing (A Pashaei MSc), University of British Columbia, Vancouver, BC, Canada; Faculty of Medicine (Q E S Adnani PhD) and Center of Excellence in Higher Education for Pharmaceutical Care Innovation (Prof M J Postma PhD), Padjadjaran University, Bandung, Indonesia; Clinical Sciences Department (S Adra MD, H J Barqawi MPhil, N R Dash MD, Prof R Halwani PhD, Prof A A Maghazachi PhD, M M Saber-Ayad MD, N Saheb Sharif-Askari PhD, Prof I M Talaat PhD), College of Medicine (F Ahmad PhD, Prof R Halwani PhD, Prof B Saddik PhD, M A Saleh PhD), Department of Pharmacy Practice and Pharmacotherapeutics (Prof K H Alzoubi PhD, Prof H A Omar PhD), Department of Physiotherapy (A Arumugam PhD), Department of Basic Biomedical Sciences (Y Bustanji PhD), Sharjah Institute for Medical Research (N M Elemam PhD), Department of Clinical Nutrition and Dietetics (M E M Faris PhD), Department of Basic Medical Sciences (A Karim PhD, R Qaisar PhD), College of Pharmacy (Prof M H Semreen PhD), Research Institute of Medical and Health Sciences (Prof M H Semreen PhD), and Department of Medicinal Chemistry (S S M Soliman PhD), University of Sharjah, Sharjah, United Arab Emirates (K A Altirkawi MD); Department of Medical Information Sciences (A Afraz MSc), Neurology Research Center (M Ilaghi MD), Kerman Neuroscience Research Center (M Ilaghi MD), Research Center for Hydatid Disease (F Khamesipour PhD), and Department of Clinical Biochemistry (M Nematollahi PhD), Kerman University of Medical Sciences, Kerman, Iran; Department of Radiology (S Afyouni PhD, A Amindarolzarbi MD, G G Z Zandieh MD), Department of Biostatistics (A Columbus MS), Russell H Morgan Department of Radiology and Radiological Science (A Kamireddy MD, O Shafaat MD), Department of Neurosurgery (F Kazemi MD), Department of Health Policy and Management (D Vervoort MD), and Department of International Health (H Zhang MS), Johns Hopkins University, Baltimore, MD, USA (E Jamshidi PharmD); Department of Community Medicine, King Edward Memorial Hospital, Lahore, Pakistan (Prof S Afzal PhD); Department of Public Health, Public Health Institute, Lahore, Pakistan (Prof S Afzal PhD); Department of Cardiovascular Medicine, Mayo Clinic, Scottsdale, AZ, USA (P Agasthi MD); Department of Medical and Surgical Sciences and Advanced Technologies "GF Ingrassia" (Prof A Agodi PhD, M Barchitta PhD, E D'Amico MD, A Maugeri PhD, Prof M Veroux PhD), Department of General Surgery and Medical-Surgical Specialties (Prof A Biondi PhD, Prof G Isola PhD, M Vacante PhD), and Department of Biomedical and Biotechnological Sciences (L Falzone PhD, Prof M Libra PhD), University of Catania, Catania, Italy; Department of Geography and Planning (W Agyemang-Duah MSc) and Department of Biomedical and Molecular Sciences (A Nikpoor PhD), Queen's University, Kingston, ON, Canada; School of Public Health, University of Technology Sydney, Sydney, NSW, Australia (B O Ahinkorah MPhil, D Demant PhD); Department of Medical Biochemistry (A Ahmad PhD), Department of Pediatrics (Prof G Mustafa MD), and Department of Pharmacology (A R Pathan PhD, M Tabish MPharm), Shaqra University, Shaqra, Saudi Arabia; School of Medicine and Psychology (D Ahmad PhD) and Research School of Population Health (N Bagheri PhD, R A Burns PhD, Prof N Cherbuin PhD), Australian National University, Canberra, ACT, Australia; Public Health Foundation of India, Gandhinagar, India (D Ahmad PhD); Department of Epidemiology and Health Statistics, Southeast University, Nanjing, China (T Ahmad MS); School of Public Health (K Ahmadi PhD, Prof S Saxena MD), Department of Primary Care and Public Health (T Beaney MSc, R Palladino MD, Prof S Rawaf MD), Department of Surgery and Cancer (Prof E Mossialos PhD), and WHO Collaborating Centre for Public Health Education and Training (D L Rawaf MRCS), Imperial College London, London, UK; Institute of Endemic Diseases (A Ahmed MSc) and Unit of Basic Medical Sciences (E E Siddig MD), University of Khartoum, Khartoum, Sudan; Swiss Tropical and Public Health Institute, University of Basel, Basel, Switzerland (A Ahmed MSc); Department of Biosciences, COMSATS Institute of Information Technology, Islamabad, Pakistan (H Ahmed PhD); Department of Epidemiology (M B Ahmed MPH, D Shiferaw MPH), Department of Public Health (M Y Ashemo PhD, U Gerema MSc, M E Getachew MPH), Department of Surgery (N S Bayileyegn MD), and Institute of Health Science (A I Mohamed MSc), Jimma University, Jimma, Ethiopia; Australian Center for Precision Health (M B Ahmed MPH), UniSA Clinical and Health Sciences (T C Eshetie PhD), and Department of Allied Health and Human Performance (T Y Tiruye PhD), University of South Australia, Adelaide, SA, Australia; Brody School of Medicine (S Ahmed PhD), Department of Internal Medicine (H Ali MD), Department of Computer Science (A O Bodunrin MSc), Department of Physiology (M Tumurkhuu PhD), Diabetes and Obesity Institute and Physiology (K Tung PhD), and Department of Public Health (C S Ubah MPH), East Carolina University, Greenville, NC, USA (R T Aruleba PhD); Department of Food and Nutrition Policy and Planning Research, National Institute of Nutrition, Tehran, Iran (M Ajami PhD); Faculty of Medicine and Public Health, Jenderal Soedirman University, Purwokerto, Indonesia (B Aji DrPH); School of Community Health Sciences, University of Nevada Reno, Reno, NV, USA (O Ajumobi MPH); National Malaria Elimination Program, Federal Ministry of Health, Abuja, Nigeria (O Ajumobi MPH); Department of Microbiology, Immunology and Parasitology, St Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia (G T Akalu MSc); Department of Microbial, Cellular and Molecular Biology (G T Akalu MSc), Department of Microbiology (H B Beyene PhD), School of Public Health (K Deribe PhD), Emergency Department (D Ijo MSc), Department of Health Management Information Systems (D Ijo MSc), and Department of Reproductive, Family, and Population Health (N A Kassaw MPH), Addis Ababa University, Addis Ababa, Ethiopia; Moyen Mono Health District, Ministry of Health, Tohoun, Togo (E Akara MD); Department of Internal Medicine, University of Patras, Greece, Patras, Greece (K Akinosoglou PhD); Department of Internal Medicine and Infectious Diseases, University General Hospital of Patras, Patras, Greece (K Akinosoglou PhD); Department of Management, Policy, and Community Health (S Akkala MPH), Department of Plastic Surgery

(M Asaad MD, A M Hassan MD), and McGovern Medical School (A Bleyer MD), University of Texas, Houston, TX, USA; Yale School of Nursing (S Akyirem Mres), School of the Environment (Prof M L Bell PhD, Y Song PhD), Department of Internal Medicine (F Etaee MD), Department of Dermatology (M Goldust MD), Department of Psychiatry (W Li PhD), Department of Radiology and Biomedical Imaging (X Liu PhD), and Department of Genetics (S Pawar PhD), Yale University, New Haven, CT, USA; Department of Geriatric and Long Term Care (H Al Hamad MD, B Sathian PhD), Rumailah Hospital (H Al Hamad MD), Hamad Medical Corporation, Doha, Qatar; Division of Public Health Sciences, Washington University School of Medicine, St Louis, MO, USA (S Al Hasan PhD); Department of Urology (A Al Homsi MD, O Almidani MSc), Department of Cardiology, Heart, Vascular, and Thoracic Institute (Prof W Almahmeed MD), and Department of Cardiac Surgery (L Göbölös PhD), Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates; Department of Nursing, Al Al-Bayt University, Mafraq, Jordan (Prof M Al Qadire PhD); Heidelberg Institute of Global Health, Heidelberg University, Heidelberg, Germany (T M A AL-Ahdal MPH, S Chen DSc, B Moazen MSc); Department of Clinical Sciences (S O Alalalmeh BPharm, O E Hegazi BPharm) and Center for Medical and Bio-Allied Health Sciences Research (Prof M J Shahwan PhD, M A Shamsi PhD, S H Zyoud PhD), Ajman University, Ajman, United Arab Emirates; John T Milliken Department of Internal Medicine (Z Al-Aly MD), Department of Surgery (T Lan PhD, C Wang MPH), Brown School (C Wang MPH), Washington University in St Louis, St Louis, MO, USA; Clinical Epidemiology Center, US Department of Veterans Affairs, St Louis, MO, USA (Z Al-Aly MD); Murdoch Business School, Murdoch University, Perth, WA, Australia (K Alam PhD); Department of Bioengineering (M Alam PhD) and Department of Nutrition and Food Studies (S Tyrovolas PhD), George Mason University, Fairfax, VA, USA; School of Nursing, Yarmouk University, Irbid, Jordan (R M Al-amer PhD); School of Nursing and Midwifery (R M Al-amer PhD) and Department of Engineering (G R Naik PhD), Western Sydney University, Sydney, NSW, Australia; Department of Health Information Management and Technology (T M Alanzi PhD), Department of Public Health (Prof S Bah PhD), and Division of Forensic Medicine (Prof R G Menezes MD), Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia (F M Alanezi PhD); Department of Community and Mental Health, Al al-Bayt University, Mafraq, Jordan (Prof M Albashtawy PhD); Institute of Health Informatics (R W Aldridge PhD), Department of Health Informatics (S Chung PhD), Department of Behavioural Science and Health (S Hossain MS), Institute of Epidemiology and Health Care (J Kim MSc), Department of Epidemiology and Public Health (Prof M Kivimäki PhD), Department of Population Health Sciences (D Sunkersing PhD), Division of Surgery and Interventional Science (T Umar MD), and Department of Infection (Prof A Zumla PhD), University College London, London, UK; Global Health Entrepreneurship, Tokyo Medical and Dental University, Tokyo, Japan (S Alemi PhD); Pediatric Intensive Care Unit (A Al-Eyadhy MD, M Temsah MD), Department of Cardiac Sciences (Prof K F Alhabib MD), Section of Adult Hematology (Prof G M T ElGohary MD), and Department of Physiology (Prof S A Meo PhD), King Saud University, Riyadh, Saudi Arabia; Global Centre for Environmental Remediation (A A S Al-Gheethi PhD) and Department of Women's Health (G T Kiross MPH), University of Newcastle, Newcastle, NSW, Australia; Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, Newcastle, NSW, Australia (A A S Al-Gheethi PhD); College of Nursing (Prof F A N Alhalaiqa PhD), College of Dental Medicine (S A A Al-Maweri PhD), Department of Physical Education (Prof M A Alomari PhD), and QU Health (M Mohammed PhD), Qatar University, Doha, Qatar; Psychological Sciences Association, Amman, Jordan (Prof F A N Alhalaiqa PhD); Department of Health Services and Hospital Administration (M K Al-Hanawi PhD), Health Economics Research Group (M K Al-Hanawi PhD), Department of Oral Diagnostic Sciences (N Binmadi PhD), Department of Pediatric Dentistry (Prof O A A Elmeligy PhD), Rabigh Faculty of Medicine (A A Malik PhD), Department of Dental Public Health (Z S Natto DrPH), and Department of Community Medicine (S Samargandy PhD), King Abdulaziz University, Jeddah, Saudi Arabia; Department of Zoology (A Ali PhD) and Department of Botany (Prof I Khan PhD), Abdul Wali Khan University Mardan, Mardan, Pakistan; School of Agriculture, Food, and Ecosystem Sciences (A Ali PhD) and Department of Paediatrics (Prof S M Sawyer MD), University of Melbourne, Parkville, VIC, Australia; Erbil Technical Health College, Erbil Polytechnic University, Erbil, Iraq (B A Ali PhD); School of Pharmacy, Tishk International University, Erbil, Iraq (B A Ali PhD); Department of Internal Medicine, Brody School of Medicine, Greenville, NC, USA (H Ali MD); Department of Medical Rehabilitation (Physiotherapy), University of Maiduguri, Maiduguri, Nigeria (M U Ali MSc); Department of Biosciences (R Ali MPhil) and Centre For Interdisciplinary Research In Basic Sciences (M A Shamsi PhD), Jamia Millia Islamia, New Delhi, India; Center for Biotechnology and Microbiology, University of Swat, Swat, Pakistan (S S Ali PhD); Department of Pharmacy, University of Peshawar, Peshawar, Pakistan (Z Ali PharmD); Department of Food Hygiene, Amol University of Special Modern Technologies, Amol, Iran (S Alian Samakkhah PhD); Department of Pathophysiology and Transplantation, University of Milan, Milan, Italy (G Alicandro PhD); Cystic Fibrosis Center, IRCCS "Ca' Granda Maggiore Policlinico" Hospital Foundation, Milan, Italy (G Alicandro PhD); School of Public Health and Preventive Medicine (S M Alif PhD, P Maharjan MPH, P Rai MPH), Department of Human Centered Computing (M Hasan MSc), Eastern Health Clinical School (R Thapa PhD), and Department of Medicine (Prof A G Thrift PhD), Monash University, Melbourne, VIC, Australia; Department of Public Health (M Aligol PhD), Qom University of Medical Sciences, Qom, Iran; Department of Epidemiology and Biostatistics, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran (R Alimi PhD); Department of Public Health, Madda Walabu University, Goba, Ethiopia (A A Aliyi MPH, A Jema MPH); School of Physics, Mathematics and Computing (Prof A Al-Jumaily PhD), Centre for Neuromuscular and Neurological Disorders (Prof G J Hankey MD), Dental School (O Kujan PhD), University of Western Australia, Perth, WA, Australia; Information and Communication Technology Research Pole (Prof A Al-Jumaily PhD, Prof A Mansour PhD), ENSTA Bretagne, Brest, France; Department of Health Policy and Management (Prof S M Aljunid PhD) and Department of Surgery (S K Al-Sabah MD), Kuwait University, Kuwait, Kuwait; International Centre for Casemix and Clinical Coding, National University of Malaysia, Bandar Tun Razak, Malaysia (Prof S M Aljunid PhD); Sana'a, Yemen (S Al-Marwani MSc); Irbid, Jordan (S Al-Marwani MSc); Department of Medicine, Nazarbayev University, Astana, Kazakhstan (J U Almazan PhD, Prof D Poddighe PhD); Department of Parasitology (Prof H M Al-Mekhlafi PhD), Department of Paediatrics (Prof H Ariffin MD), University of Malaya Medical Centre (Prof H Ariffin MD), and Department of Medicine (L Lim MRCP), University of Malaya, Kuala Lumpur, Malaysia; Department of Parasitology, Sana'a University, Sana'a, Yemen (Prof H M Al-Mekhlafi PhD); Nuffield Department of Surgical Sciences (O Almidani MSc, S Bandyopadhyay BA), Nuffield Department of Medicine (B Basnyat MD, Prof R J Maude PhD), Nuffield Department of Population Health (D A Bennett PhD), Big Data Institute (A J Browne MPH), Oxford Centre for Global Health Research (C Dolecek PhD), Centre for Tropical Medicine and Global Health (S J Dunachie PhD), Department of Psychiatry (Prof C R J Newton MD), and Health Economics Research Centre (Prof J A B Rodriguez PhD), University of Oxford, Oxford, UK; Department of Rehabilitation Sciences and Physical Therapy (Prof M A Alomari PhD), Department of Clinical Pharmacy (Prof K H Alzoubi PhD), and Department of Public Health (Prof K A Kheirallah PhD), Jordan University of Science and Technology, Irbid, Jordan; Department of Surgery (N Alonso MD), Department of Internal Medicine (I M Bensenor PhD, Prof A R Brunoni PhD), and Department of Psychiatry (Prof A R Brunoni PhD, Prof J Castaldelli-Maia PhD, Prof M F P Peres MD, Y Wang PhD), University of São Paulo, São Paulo, Brazil; Department of Respiratory Care, Prince Sultan Military College of Health Sciences, Dammam, Saudi Arabia (J S Alqahtani PhD); Department of Prosthodontics and Implant Dentistry, Taibah University, Medinah, Saudi Arabia (A Alqutaibi PhD); Department of Prosthodontics, Ibb University, Ibb, Yemen (A Alqutaibi PhD); Jaber Al Ahmad Al Sabah Hospital, Ministry of Health, Kuwait, Kuwait

(S K Al-Sabah MD); Institute of Molecular Biology and Biotechnology (A Altaf PhD), University Institute of Public Health (F J Alvi MPH, A A Malik PhD, S Nargus PhD), University College of Medicine and Dentistry (Prof M Arooj PhD), Radiological Sciences and Medical Imaging Technology (M Latif PhD), Institute of Molecular Biology and Biotechnology (Prof M Ashraf PhD, S Shahid PhD), Research Centre for Health Sciences (S Shahid PhD), and Department of Physics (W Shahid PhD), University of Lahore, Lahore, Pakistan (M A Riaz Mcom); Department of Specialty Internal Medicine, Johns Hopkins Aramco Healthcare, Dhahran, Saudi Arabia (Prof J A Al-Tawfiq MD); Department of Medicine, Indiana University School of Medicine, Indianapolis, IN, USA (Prof J A Al-Tawfiq MD); Department of Clinical Pharmacology and Toxicology (H Alwafi PhD) and Institute of Center and Research Studies (F Rehman PhD), Umm Al-Qura University, Makkah, Saudi Arabia; Department of Medical Sciences, Azal University for Human Development, Sana'a, Yemen (Prof Y M Al-Worafi PhD); Department of Clinical Sciences, University of Science and Technology of Fujairah, Fujairah, United Arab Emirates (Prof Y M Al-Worafi PhD); Department of Pediatrics (Prof H Aly MD), Heart, Vascular, and Thoracic Institute (A Hajj Ali MD), Cleveland Clinic, Cleveland, OH, USA; School of Medicine (A Amare PhD), Adelaide Medical School (T K Gill PhD, L Yadav PhD), Centre for Heart Rhythm Disorders (J Noubiap MD), and Joanna Briggs Institute (J Opio MPH), University of Adelaide, Adelaide, SA, Australia; College of Medicine and Health Science (A Amare PhD) and Department of Reproductive Health and Population Studies (E W Mengesha MPH), Bahir Dar University, Bahir Dar, Ethiopia; School of Graduate Studies, Lingnan University, Hong Kong, China (E K Ameyaw MPhil); Department of Public Health, Salale University, Fitche, Ethiopia (A Amhare MSc); School of Public Health (A Amhare MSc), Center for Drug Safety and Policy Research (S Lin MS), Xi'an Jiaotong University, Xi'an, China; Department of Public Health (Prof T T Amin MD), Department of Neurophysiology (Prof H R Elhabashy MD), and Department of Neurology (A Hassan MD), Cairo University, Cairo, Egypt; Applied Sciences and Technology Graduate Group (J Aminian Dehkordi PhD) and Department of Bioengineering (H Kabir MSc), University of California Berkeley, Berkeley, CA, USA; Faculty of Chemical Engineering, Tarbiat Modares University, Tehran, Iran (J Aminian Dehkordi PhD); Medicine, Quran and Hadith Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran (S Amiri PhD); Department of Maternal and Child Wellbeing (D A Amugsi PhD) and Department of Population Dynamics and Sexual and Reproductive Health (Y D Wado PhD), African Population and Health Research Center, Nairobi, Kenya; Department of Sociology (Prof J Amzat PhD), Department of Veterinary Microbiology (M B Bello PhD), and Department of Veterinary Public Health and Preventive Medicine (A Shittu MSc), Usmanu Danfodiyo University, Sokoto, Sokoto, Nigeria; Department of Sociology (Prof J Amzat PhD) and Department of Electrical and Electronics Engineering (I T Aruleba MSc), University of Johannesburg, Johannesburg, South Africa; Faculty of Pharmacy (Prof R Ancuceanu PhD), Department of Cardiology (C Andrei PhD), Department of General Surgery (B T Florin PhD, I Negoi PhD, D Serban PhD), Department of Internal Medicine (M Hostiuc PhD), Department of Legal Medicine and Bioethics (S Hostiuc PhD), Department of Dermatology (C N Matei PhD), and Department of Anatomy and Embryology (R I Negoi PhD), Carol Davila University of Medicine and Pharmacy, Bucharest, Romania; Centre for Sensorimotor Performance (D Anderlini MD), Center of Research Excellence in Stillbirth (T Begum MPH), Department of Urology (Prof E Chung MD), Institute for Social Science Research (E Kanmiki MPH, J C Maravilla PhD), School of Health and Rehabilitation Sciences (A Khan PhD, M Moni PhD), School of Dentistry (R Lalloo PhD), Queensland Brain Institute (Prof J J McGrath MD), and School of Public Health (Prof L J Veerman PhD), University of Queensland, Brisbane, QLD, Australia; Neurology Department, Royal Brisbane and Women's Hospital, Brisbane, QLD, Australia (D Anderlini MD); Department of Health Care Management, Technical University of Berlin, Berlin, Germany (P P Andrade MD, Prof R Busse PhD, S Mohammed PhD); European University, Lisbon, Portugal (P P Andrade MD); Department of Statistics and Econometrics (Prof T Andrei PhD, Prof C Herteliu PhD, A Mirica PhD, A Otoiu PhD, I Petcu PhD) and Faculty of Management (A Dima PhD, S Stefan PhD), Bucharest University of Economic Studies, Bucharest, Romania; Department of Child Neurology (D Angappan MD) and Department of Radiation Medicine (A Bleyer MD), Oregon Health and Science University, Portland, OR, USA; Department of Pharmacology (A Anil MD, J Charan MD, M Shamim MBBS, S Singh MD, S B Varthya MD), Department of Community Medicine and Family Medicine (P Baskaran MD, P Bhardwaj MD), Department of Anatomy (Prof N Bhardwaj MD, Prof S G Dixit MD, H Krishna MD, A K Nayyar MD), School of Public Health (P Bhardwaj MD), Department of Cardiology (R Choudhary MD), Department of Physiology (Prof A Dixit MD), Department of Surgical Oncology (Prof S Misra MCh), Department of Endocrinology and Metabolism (Prof M Mittal MD), Department of Pharmacology and Research (A Saravanan MD), and Department of Urology and Kidney Transplant (M Singh MCh Urology), All India Institute of Medical Sciences, Jodhpur, India; Department of Urology (P Ram MS), All India Institute of Medical Sciences, Bhubaneswar, India (A Anil MD); Department of Psychiatry, University of Cambridge, Cambridge, UK (A Anjum BHlthSci); Agribusiness Study Program, Sebelas Maret University, Surakarta, Indonesia (E Antriyandarti DrAgrSc); Department of Surgery, Gadjah Mada University, Yogyakarta, Indonesia (S Anwar PhD); School of Dentistry and Medical Sciences, Charles Sturt University, Orange, NSW, Australia (A E Anyasodor PhD); Department of Sociology and Social Work, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana (S Appiah PhD, M S Boampong PhD); Center for International Health, Ludwig Maximilians University, Munich, Germany (S Appiah PhD); Department of Psychology, Foundation University Islamabad, Rawalpandi, Pakistan (M Aqeel PhD, M Aqeel PhD); Health Management and Economics Research Center (J Arabloo PhD), School of Medicine (S Eghdami MD, P Panahi MD), Minimally Invasive Surgery Research Center (A Kabir MD, S Salahi MD), Endocrine Research Center (A Karimi Behnagh MD), Department of Echocardiography (A Karimi Behnagh MD), Eye Research Center (H Kasraei MD), Neuro Musculoskeletal Research Center (M Khadembashiri MD), Educational Development Center (E Khodadoust MD), Department of Anesthesiology (K Latifinaibin MD), Gastrointestinal and Liver Diseases Research Center (M Moradi-Lakeh MD), Preventive Medicine and Public Health Research Center (M Moradi-Lakeh MD), Department of Physiology (H Pazoki Toroudi PhD), Physiology Research Center (H Pazoki Toroudi PhD), Colorectal Research Center (A Sarveazad PhD), Department of Medical Biotechnology (M Zahedi MSc), and Student Research Committee (M Zahedi MSc), Iran University of Medical Sciences, Tehran, Iran (M M Khadembashiri MD, M Moradi MD); Social Determinants of Health Research Center (M Arab-Zozani PhD) and Faculty of Medicine (A Moodi Ghalibaf MD, A Rajabpour-Sanati MD), Birjand University of Medical Sciences, Birjand, Iran; College of Pharmacy, Al Ain University, Abu Dhabi, United Arab Emirates (M Arafat PhD); Associated Laboratory for Green Chemistry (A M Araújo PhD), Department of Biological Sciences (L Belo PhD), Research Unit on Applied Molecular Biosciences (L Belo PhD, Prof F Carvalho PhD, V M Costa PhD, Prof D Dias da Silva PhD, J P Silva PhD), Associated Laboratory for Green Chemistry (M Carvalho PhD), Institute for Research and Innovation in Health (Prof N Cruz-Martins PhD), Department of Community Medicine, Information, and Health Decision Sciences (A Freitas PhD, R J Vieira MD), Department of Chemistry (M Pinheiro PhD), and Epidemiology Research Unit (A Ribeiro PhD), University of Porto, Porto, Portugal; Department of Veterinary Pharmacology and Toxicology (A Aremu PhD) and Department of Veterinary Public Health and Preventive Medicine (I A Odetokun PhD), University of Ilorin, Ilorin, Nigeria; Public Health and Healthcare Management, Tashkent Institute of Postgraduate Medical Education, Tashkent, Uzbekistan (T Aripov PhD); Boston Children's Hospital, Boston, MA, USA (T Aripov PhD); Department of Cardiovascular, Endocrine-metabolic Diseases and Aging (B Armocida MSc, B Unim PhD) and Department of Infectious Diseases (M Sabbatucci PhD), National Institute of Health, Rome, Italy; Division of Tropical and Humanitarian Medicine, University of Geneva, Geneva, Switzerland (B Armocida MSc); Department of Biophysics, Russian Academy of Sciences, Moscow, Russia (A A Artamonov PhD);

Department of Epidemiology (K D Artanti MSc), Department of Community Health Nursing (F Efendi PhD), Department of Biology (Prof H Purnobasuki PhD), and Department of Health Policy and Administration (R D Wulandari DrPH), Airlangga University, Surabaya, Indonesia; Department of Maternal and Child Health, Sultan Qaboos University, Muscat, Oman (J Arulappan DSc); Department of Community Medicine and Rehabilitation (A Arumugam PhD), Department of Epidemiology and Global Health (M P Chavula MPH), Department of Nursing (Prof D Edvardsson PhD), and Section of Sustainable Health (H Orru PhD), Umeå University, Umea, Sweden; National Agency for Strategic Research in Medical Education (Prof S Asgary MSc) and Centre for Primary Health Care Network Management (H Fattahi PhD), Ministry of Health and Medical Education, Tehran, Iran; Department of Public Health, Wachemo University, Hossana, Ethiopia (M Y Ashemo PhD); Department of Medical Laboratory Sciences (M O Asika BMLS) and Department of Pharmacology and Therapeutics (Prof O E Onwujekwe PhD), University of Nigeria Nsukka, Enugu, Nigeria; Department of Telemedicine, Society For Disease Prevention, Hummelstown, PA, USA (M O Asika BMLS); Faculty of Nursing, Philadelphia University, Amman, Jordan (M M W Atout PhD); Department of Forensic Medicine, Lumbini Medical College, Palpa, Nepal (A Atreya MD); Department of Oral and Maxillofacial Surgery, Justus Liebig University of Giessen, Giessen, Germany (S Attia MSc); Northumbria HealthCare National Health Service (NHS) Foundation Trust, Newcastle upon Tyne, UK (A Aujayeb MBBS); Robarts Research Institute (A Avan MD), Clinical Neurological Sciences (Prof V Hachinski MD), and Department of Epidemiology and Biostatistics (Prof S Stranges MD), University of Western Ontario, London, ON, Canada; School of Nursing and Public Health (A W Awotidebe PhD) and Discipline of Public Health Medicine (O A Bolarinwa MSc, T G Ginindza PhD, R E Ogunsakin PhD), University of KwaZulu-Natal, Durban, South Africa; The Judith Lumley Centre (B Ayala Quintanilla PhD), School of Nursing and Midwifery (Prof D Edvardsson PhD, F Efendi PhD, M Rahman PhD), and Department of Public Health (H Jiang PhD), La Trobe University, Melbourne, VIC, Australia; San Martin de Porres University, Lima, Peru (B Ayala Quintanilla PhD); Department of Health Economics, Centre for Health Policy Advocacy Innovation and Research in Africa, Accra, Ghana (M A Ayanore PhD); Department of Psychiatry (Prof J L Ayuso-Mateos PhD), Department of Medicine (Prof A Ortiz MD), and Princess University Hospital (Prof J B Soriano MD), Autonomous University of Madrid, Madrid, Spain; Biomedical Research Networking Center for Mental Health Network (Prof J L Ayuso-Mateos PhD) and National School of Public Health (F Catalá-López PhD), Institute of Health Carlos III, Madrid, Spain; Central Bureau of Statistics, RAND Corporation, Santa Monica, CA, USA (G S Azhar PhD); Institute of Biotechnology and Genetic Engineering, The University of Agriculture, Peshawar, Pakistan (S Aziz MS); Department of Neurovascular Research, Nested Knowledge, Saint Paul, MN, USA (A Y Azzam MBBCh); Faculty of Medicine (A Y Azzam MBBCh), Department of Cardiology (O M Makram MD), October 6 University, 6th of October City, Egypt; Nutrition Research Center (M Babashahi PhD), Health Human Resources Research Center (M Bayati PhD), Medical School (M Farjoud Kouhanjani MD), Epilepsy Research Center (M Farjoud Kouhanjani MD), Trauma Research Center (P Fazeli MSc, M Karajizadeh PhD), Department of Medical Immunology (P Fazeli MSc), Health Policy Research Center (S Ghahramani MD, H Kasraei MD, Y Sarikhani PhD, S Shahabi PhD), Basic Science Laboratory (F Iravanpour PhD), Shiraz Neuroscience Research Center (M Jafarinia PhD, R Tavakoli Oliaee PhD), Non-communicable Disease Research Center (Prof R Malekzadeh MD, S G Sepanlou MD), Department of Health Services Management (R Ravangard PhD), Cardiovascular Research Center (I Razeghian-Jahromi PhD), Department of Physical Medicine and Rehabilitation (S Roshanzamir MD), and Burn and Wound Healing Research Center (S Roshanzamir MD), Shiraz University of Medical Sciences, Shiraz, Iran (Y Mansoori MD); Department of Physiotherapy (A S Babu PhD), Department of Forensic Medicine and Toxicology (S M Bakkannavar MD, Prof V C Nayak MD), Kasturba Medical College, Mangalore (R Holla MD, A Kamath MD, M Rao MD), Department of Pharmacy Management (V S Ligade PhD), Department of Community Medicine (C R Rao MD, R S Shetty MD), Department of Nephrology (I Rao DM), and Department of Health Information Management (B Reshmi PhD), Manipal Academy of Higher Education, Manipal, India; Gomal Center of Biochemistry and Biotechnology, Gomal University, Dera Ismail Khan, Pakistan (M Badar PhD); Public Health Risk Sciences Division, Public Health Agency of Canada, Toronto, ON, Canada (A Badawi PhD); Department of Nutritional Sciences (A Badawi PhD), Centre for Global Child Health (Prof Z A Bhutta PhD), Temerty Faculty of Medicine (V Chattu MD), Division of Neurology (S Fereshtehnejad PhD), Department of Neurosurgery (A K Malhotra MD), Mechanical and Industrial Engineering (A Mostofinejad MSc), Institute of Health Policy, Management, and Evaluation (H Shakil MD), and Division of Neurosurgery (H Shakil MD), University of Toronto, Toronto, ON, Canada; Department of Forensic Science, Government Institute of Forensic Science, Nagpur, India (A D Badiye PhD, H Bansal MSc, N Kapoor PhD); Division of Orthopaedics, Children's Hospital of Philadelphia, Philadelphia, PA, USA (S Baghdadi MD); Health Research Institute, University of Canberra, Canberra, ACT, Australia (N Bagheri PhD); School of Medicine (S Bagherieh BSc), Department of Environmental Health Engineering (A Fatehizadeh PhD), Cardiac Rehabilitation Research Center (K Mehrabani-Zeinabad PhD, Prof M Sadeghi MD), Department of Neurology (O Mirmosayyeb MD), Department of Medical Physics (K Saber PhD), Musculoskeletal Research Center (A Shafaat MS), and Department of Radiology and Interventional Neuroradiology (O Shafaat MD), Isfahan University of Medical Sciences, Isfahan, Iran; NanoElectronics and Photonics Systems, Universitat Rovira i Virgili, Tarragona, Spain (S Bahadorikhalili PhD); Department of Epidemiology and Biostatistics, Wuhan University, Wuhan, China (J Bai BA, Prof C Yu PhD); School of Public Affairs, Nanjing University of Science and Technology, Nanjing, China (R Bai MD); Center for Clinical Research and Prevention, Bispebjerg University Hospital, Frederiksberg, Denmark (J L Baker PhD); Department of Neurosurgery (A T Bako PhD) and Center for Health and Nature (O M Makram MD), Houston Methodist Hospital, Houston, TX, USA; Division of Biological Sciences, Tamil Nadu State Council for Science and Technology, Tamil Nadu, India (S Balakrishnan PhD); Menzies Institute for Medical Research (S A Balogun PhD, A Singh MTech, J Tian PhD) and School of Pharmacy and Pharmacology (A Jatau PhD), University of Tasmania, Hobart, TAS, Australia; Center of Innovation, Technology, and Education (Prof O C Baltatu PhD), and Institute of Biomedical Engineering (Prof L A Campos PhD), Anhembi Morumbi University, Sao Jose dos Campos, Brazil; Department of Medicine (K Bam MPH, M T Olaiya PhD), School of Nursing and Midwifery (D Bhandari PhD) and Stroke and Ageing Research, Victorian Heart Institute (L L Dalli PhD), Monash University, Clayton, VIC, Australia; Department of Hypertension, Medical University of Lodz, Lodz, Poland (Prof M Banach PhD); Polish Mothers' Memorial Hospital Research Institute, Lodz, Poland (Prof M Banach PhD); Department of Neurosurgery, University of Southampton, Southampton, UK (S Bandyopadhyay BA); Institute of Health and Wellbeing, Federation University Australia, Melbourne, VIC, Australia (B Banik PhD); Manna Institute, University of New England, Armidale, NSW, Australia (B Banik PhD); Department of Non-communicable Diseases, Bangladesh University of Health Sciences, Dhaka, Bangladesh (P C Banik MPhil); Department of Anatomy (S Barati PhD) and Department of Nursing and Midwifery (M Saeedi PhD), Saveh University of Medical Sciences, Saveh, Iran; Miami Cancer Institute, Baptist Health South Florida, Miami, FL, USA (M Bardhan MD); School of Psychology (Prof S L Barker-Collo PhD) and School of Pharmacy (K A Beyene PhD), University of Auckland, Auckland, New Zealand; Department of Translational Medicine, University of Eastern Piedmont, Novara, Italy (F Barone-Adesi PhD); Department of Pediatrics (Prof R D Barr MD), Department of Medicine (O P Kurmi PhD), Population Health Research Institute (PHRI) (F Mannan MD), and Department of Psychiatry and Behavioural Neurosciences (A T Olagunju MD), McMaster University, Hamilton, ON, Canada; Department of Industrial Engineering, Pontifical Javeriana University, Bogota, Colombia (Prof L H Barrero DSc); Alpha Genomics, Islamabad, Pakistan (Z Basharat PhD); Department of Pharmacology and Toxicology, Kaduna State University, Kaduna, Nigeria (A I J Bashir PhD);

Department of Animal Sciences (H A Bashiru MSc) and Department of Child Dental Health (Prof M O Folayan FWACS), Obafemi Awolowo University, Ile-Ife, Nigeria; Department of Tuberculosis, Birat Nepal Medical Trust, Kathmandu, Nepal (B Basnyat MD); Barcelona Institute for Global Health, University of Barcelona, Barcelona, Spain (Prof Q Bassat MD); Catalan Institution for Research and Advanced Studies, Barcelona, Spain (Prof Q Bassat MD); Faculty of Pharmacy (J D Basso PharmD, S Silva MSc), Coimbra Chemistry Centre (J D Basso PharmD), Department of Geography and Demography (M Rodrigues PhD), and Coimbra Institute for Biomedical Imaging and Translational Research (S Silva MSc), University of Coimbra, Coimbra, Portugal; Department of Academics, Indian Institute of Public Health, Gurgaon, India (S Basu MD); Department of Medical Education (K Batra PhD), School of Public Health (R Batra MS), and Department of Social and Behavioral Health (Prof M Sharma PhD), University of Nevada Las Vegas, Las Vegas, NV, USA; IT Department, Coforge, Georgia, GA, USA (R Batra MS); Department of Psychiatry, University of Münster, Münster, Germany (Prof B T Baune PhD); Department of Psychiatry, Melbourne Medical School, Melbourne, VIC, Australia (Prof B T Baune PhD); School of Public Health, D Y Patil University, Mumbai, India (Prof N Bedi MD); Department of Epidemiology (K Y Ghailan PhD, M Khan MD), Department of Maxillofacial Surgery and Diagnostic Sciences (E S Halboub PhD), and Department of Health Education and Promotion (M Shanawaz MD), Jazan University, Jazan, Saudi Arabia (Prof N Bedi MD); Health System and Population Studies Division (T Begum MPH) and Maternal and Child Health Division (A Sayeed MSc, M Siraj MSc), International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh; Department of Basic Sciences, Khoy University of Medical Sciences, Khoy, Iran (E Behboudi PhD); Endocrinology and Metabolism Research Institute (H Farrokhpour MD, A Khalaji BS), Department of Epidemiology (M Heidari-Foroozan BSc, S Khanmohammadi MD, S Nejadghaderi MD, S Rashedi MD, H Sohrabi MD, H Soleimani MD), and Non-Communicable Diseases Research Center (NCDRC), Tehran, Iran (A Behnoush BS); Division of Pulmonary, Critical Care, and Sleep, University of Florida, Jacksonville, FL, USA (M Beiranvand PhD); Department of Medicine (D F Bejarano Ramirez BN) and Faculty of Medicine (J N Malagón-Rojas MSc), El Bosque University, Bogota, Colombia; Transplant Service, University Hospital Foundation Santa Fe de Bogotá, Bogota, Colombia (D F Bejarano Ramirez BN); Department of Oral Pathology and Microbiology, Krishna Vishwa Vidyapeeth Deemed to be University, Karad, India (U I Belgaumi MD); Department of Medicine (A K Bello PhD), Department of Physics (O Ebenezer PhD), and Department of Psychiatry (E Eboreime PhD), University of Alberta, Edmonton, AB, Canada; Infectious Disease Research Department (M B Bello PhD) and Medical Genomics Research Department (M Umair PhD), King Abdullah International Medical Research Center, Riyadh, Saudi Arabia; Department of Biomedical Sciences, University of West Attica, Athens, Greece (Prof A Beloukas PhD); Institute of Infection and Global Health (Prof A Beloukas PhD) and Department of Surgery (Prof R Lunevicius DSc), University of Liverpool, Liverpool, UK; Department of Industrial Engineering, Haliç University, Istanbul, Türkiye (S Bendak PhD); Department of Epidemiology and Health Promotion (Prof H Benzian PhD) and School of Global Public Health (S D Friedman BA, E K Peprah PhD), New York University, New York, NY, USA; Institute of Marketing, Corvinus University of Budapest, Budapest, Hungary (Z Berezvai PhD); Competition Economics and Market Research Section, Hungarian Competition Authority, Budapest, Hungary (Z Berezvai PhD); Department of Medicine, Medical College of Georgia at Augusta University, Augusta, GA, USA (A E Berman MD); Department of Epidemiology and Biostatistics (A C Bermudez MD) and National Institutes of Health (A Loreche BS), University of the Philippines Manila, Manila, Philippines; Department of Epidemiology (A C Bermudez MD, S Liu MD) and Department of Internal Medicine (M F H Mohamed MSc), Brown University, Providence, RI, USA; Faculty of Medicine, Catholic University of Portugal, Rio de Mouro, Portugal (P J G Bettencourt PhD); Metabolomics Laboratory, Baker Heart and Diabetes Institute, Melbourne, VIC, Australia (H B Beyene PhD); Department of Pharmaceutical and Administrative Sciences, University of Health Sciences and Pharmacy in St Louis, St Louis, MO, USA (K A Beyene PhD); Department of Forensic Chemistry, Government Institute of Forensic Science, Aurangabad, Aurangabad, India (D S Bhagat PhD); Department of Public Health, North Dakota State University, Fargo, ND, USA (A S Bhagavathula PhD); Institutes of Applied Health Research and Translational Medicine, Queen Elizabeth Hospital Birmingham, Birmingham, UK (N Bhala PhD); Institute of Applied Health Research (N Bhala PhD), School of Geography, Earth, and Environmental Sciences (R Dehbandi PhD), and National Institute for Health and Care Research (NIHR) Global Health Research Unit on Global Surgery (J C Glasbey MSc), University of Birmingham, Birmingham, UK; Department of Internal Medicine, Post Graduate Institute of Medical Education and Research, Chandigarh, India (Prof A Bhalla MD); Public Health Research Laboratory (D Bhandari PhD), Department of Biotechnology, National College (B P Marasini PhD), Faculty of Humanities and Social Sciences (U Paudel PhD), Central Department of Public Health (L Poudel MPH), and Department of Community Medicine (P M S Pradhan MD), Tribhuvan University, Kathmandu, Nepal; Department of Hematology Oncology, University of Massachusetts Medical School, Springfield, MA, USA (P V Bhardwaj MD); Department of Internal Medicine, Wayne State University, Detroit, MI, USA (A Bhargava MD, F Kahe MD); Global Health Neurology Laboratory, NSW Brain Clot Bank, Sydney, NSW, Australia (S Bhaskar PhD); Department of Neurology and Neurophysiology, South West Sydney Local Heath District and Liverpool Hospital, Sydney, NSW, Australia (S Bhaskar PhD); Department of Internal Medicine, St John's National Academy of Health Sciences, Bangalore, India (V Bhat MBBS); Medical Laboratory Technology (G K Bhatti PhD) and University Centre for Research and Development (S Kalra DM), Chandigarh University, Mohali, India; Department of Human Genetics and Molecular Medicine, Central University of Punjab, Bathinda, India (Prof J S Bhatti PhD, S Senapati PhD); Department of Botanical and Environmental Sciences (Prof M S Bhatti PhD) and Department of Pharmaceutical Sciences (R Bhatti PhD), Guru Nanak Dev University, Amritsar, India; Centre of Excellence in Women and Child Health (Prof Z A Bhutta PhD) and Division of Women and Child Health (J K Das MD), Aga Khan University, Karachi, Pakistan; Scientific-Tools.Org, Bergamo, Italy (B Bikbov MD); Department of Health Behaviour, Environment and Social Medicine (B Bintoro MD) and Center of Health and Behavior and Promotion (B Bintoro MD), Gadjah Mada University, Sleman, Indonesia; Department of Biomedical and NeuroMotor Sciences (Prof F Bisulli PhD), Department of Biomedical and Neuromotor Sciences (D Golinelli MD, S Guicciardi MD, J Lenzi PhD, A Mazzotti PhD, L Muccioli MD, F Sanmarchi MD), and Department of Medical and Surgical Sciences (Prof F S Violante MD), University of Bologna, Bologna, Italy; UOC Clinica Neurologica, Institute of Neurological Sciences of Bologna, Bologna, Italy (Prof F Bisulli PhD); Department of Neurology (Prof A Biswas DM) and Department of GI Surgery (A Dhali MBBS), Institute of Post-Graduate Medical Education and Research and Seth Sukhlal Karnani Memorial Hospital, Kolkata, India; Charles Perkins Centre (R Biswas PhD), Institute of Bone and Joint Research (L Chen MD), School of Pharmacy and Charles Perkins Centre (Z Dai PhD), School of Public Health (Prof T R Driscoll PhD, H K Tang PhD), Chapter of Addiction Medicine (Prof H Hassanian-Moghaddam MD), Sydney Medical School (S Islam PhD), Save Sight Institute (H Kandel PhD, Y You PhD), Asbestos Diseases Research Institute (J Leigh MD), School of Veterinary Science (B B Singh PhD), Menzies Centre for Health Policy (F Sitas PhD), and The Matilda Centre for Research in Mental Health and Substance Use (R Visontay BA), University of Sydney, Sydney, NSW, Australia; Clinical Research Centre, Sydney Local Health District, Sydney, NSW, Australia (R Biswas PhD); Department of Biostatistics and Epidemiology (Prof S Bitaraf PhD), Environmental Technologies Research Center (R Dehbandi PhD, N Kaydi PhD), Department of Orthodontics (E Eini DDS), Department of Public Health (M A Khafaie PhD), and Department of Pediatric Neurology (S Sadeghian MD), Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran; Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway (Prof T Bjørge PhD, O Dadras DrPH); Department of Research (M W Wojewodzic PhD), Cancer Registry of Norway, Oslo, Norway (Prof T Bjørge PhD); School of Business Administration, American University of Sharjah, Sharjah, United Arab Emirates (Prof V Bodolica PhD); Faculty of Medicine and

Pharmaceutical Sciences, University of Douala, Douala, Cameroon (A Bonny MD); Department of Cardiology, Montfermeil Hospital Center, Montfermeil, France (A Bonny MD); Regional Medical Research Centre, North East Region, Indian Council of Medical Research, Dibrugarh, India (K Bora MD); General Directorate of Health Information Systems, Ministry of Health, Ankara, Türkiye (B Bora Basara PhD); Centre for Adolescent Health, Murdoch Childrens Research Institute, Parkville, VIC, Australia (R Borschmann PhD, K I Cini MClinEpi, K L Francis MBiostat, J A Kerr PhD, Prof S M Sawyer MD); Faculty of Health, Santiago de Cali University, Cali, Colombia (Prof A Botero Carvajal MSc); Faculty of Health, San Martin University, Cali, Colombia (Prof A Botero Carvajal MSc); Department of Medicine (Prof S Bouaoud MD) and Faculty of Medicine (Prof A Ouyahia PhD), University Ferhat Abbas of Setif, Setif, Algeria; Department of Epidemiology and Preventive Medicine, University Hospital Saadna Abdenour, Setif, Algeria (Prof S Bouaoud MD); Faculty of Natural Sciences and Life Sciences, Guelma University, Guelma, Algeria (S Boudalia PhD); General Medicine Service, Department of Veterans Affairs, Seattle, WA, USA (Prof E J Boyko MD); Department of Health Sciences (F Lanfranchi MD), University of Genoa, Genoa, Italy (N L Bragazzi PhD); Department of Epidemiology (D Braithwaite PhD, D D Ding BS), UF Health Cancer Center (S D Karanth PhD), and Department of Computer and Information Science and Engineering (P Naghavi MSc), University of Florida, Gainesville, FL, USA; Cancer Population Sciences Program, University of Florida Health Cancer Center, Gainesville, FL, USA (D Braithwaite PhD); Division of Clinical Epidemiology and Aging Research, German Cancer Research Center, Heidelberg, Germany (Prof H Brenner MD); Department of Neuroscience, University of Panama, Ancon, Panama (G Britton PhD); Infectious Diseases Department, Gorgas Memorial Institute for Health Studies, Panama City, Panama (G Britton PhD); Flinders Health and Medical Research Institute (N B Bulamu PhD), College of Nursing and Health Sciences (L N Bulto PhD, K M Foley MPH), Caring Futures Institute (D Jemere MBA), Health Economics Unit (B Kaambwa PhD), College of Medicine and Public Health (B Kaambwa PhD, G R Naik PhD), and Health and Social Care Economics Group (C Mpundu-Kaambwa PhD), Flinders University, Adelaide, SA, Australia; Department of Woman and Child Health and Public Health, Agostino Gemelli University Polyclinic IRCCS, Rome, Italy (D Buonsenso MD); Global Health Research Institute (D Buonsenso MD) and Department of Health Science and Public Health (L Villani DrPH), Catholic University of Sacred Heart, Rome, Italy; Department of Community Medicine, Employee State Insurance Post Graduate Institute of Medical Sciences and Research, Bangalore, India (Prof S Burugina Nagaraja MD); Department of Biopharmaceutics and Clinical Pharmacy, University of Jordan, Amman, Jordan (Y Bustanji PhD); School of Public Health and Health Systems, University of Waterloo, Waterloo, ON, Canada (Z A Butt PhD); Al Shifa School of Public Health, Al Shifa Trust Eye Hospital, Rawalpindi, Pakistan (Z A Butt PhD); Department of Sociology, University of Macau, Macau, China (Prof T Cai PhD); Department of Clinical Pharmacy, University of Medicine and Pharmacy of Craiova, Craiova, Romania (Prof D Calina PhD); Department of Internal Medicine, Italian Hospital of Buenos Aires, Buenos Aires, Argentina (Prof L A Cámera MD); Argentine Society of Medicine, Buenos Aires, Argentina (Prof L A Cámera MD); College of Health Sciences, Abu Dhabi University, Abu Dhabi, United Arab Emirates (Prof L A Campos PhD); Center for Nutrition and Health Research (I R Campos-Nonato PhD, E Denova-Gutiérrez DSc), Center for Health Systems Research (D V Ortega-Altamirano DrPH, M Rios-Blancas DSc), and Infectious Disease Research Center (Prof V Pando-Robles PhD), National Institute of Public Health, Cuernavaca, Mexico; Dana-Farber Cancer Institute, Boston, MA, USA (C Cao MPH); Los Angeles, CA, USA (C A Cardenas MD); Department of Health Care, Metropolitan Autonomous University, Mexico City, Mexico (Prof R Cárdenas DSc); Institute for Cancer Research, Prevention and Clinical Network, Florence, Italy (G Carreras PhD); Dermatology Unit, Territorial Healthcare Company Pope John XXIII (Azienda Socio Sanitaria Territoriale Papa Giovanni XXIII), Bergamo, Italy (A Carugno MD); Institute of Research Innovation and Development, University Fernando Pessoa, Porto, Portugal (M Carvalho PhD); Colombian National Health Observatory (C A Castañeda-Orjuela MD) and Department of Public Health Research (J N Malagón-Rojas MSc), National Institute of Health, Bogota, Colombia; Epidemiology and Public Health Evaluation Group, National University of Colombia, Bogota, Colombia (C A Castañeda-Orjuela MD); Department of Medicine, University of Udine, Udine, Italy (G Castelpietra PhD); Department of Mental Health, Healthcare Agency "Friuli Occidentale", Pordenone, Italy (G Castelpietra PhD); Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, ON, Canada (F Catalá-López PhD); Department of Pharmacological and Biomolecular Sciences (Prof A L Catapano PhD), Galeazzi Orthopedic Institute IRCCS (G Damiani MD), and Department of Clinical Sciences and Community Health (Prof C La Vecchia MD), University of Milan, Milan, Italy; MultiMedica, IRCCS, Sesto San Giovanni, Italy (Prof A L Catapano PhD); Department of Psychiatry (A Caye PhD), Postgraduate Program in Epidemiology (Prof B B Duncan MD, Prof M I Schmidt MD), and Department of Preventive and Social Dentistry (F N Hugo PhD), Federal University of Rio Grande do Sul, Porto Alegre, Brazil; Department of Otolaryngology, Head and Neck Surgery, University of Tübingen, Tübingen, Germany (C R Cederroth PhD); Department of Nutrition, Federal University of Santa Catarina, Florianópolis, Brazil (Prof F Cembranel DSc); College of Public Health, Medical and Veterinary Sciences (M Cenderadewi MPHTM, A E Peden PhD) and Department of Public Health and Tropical Medicine (T I Emeto PhD), James Cook University, Townsville, QLD, Australia (K O Obamiro PhD); Department of Public Health, University of Mataram, Mataram, Indonesia (M Cenderadewi MPHTM); Mary MacKillop Institute for Health Research (Prof E Cerin PhD) and Faculty of Health Sciences (G R Poudel PhD), Australian Catholic University, Melbourne, VIC, Australia; School of Public Health (Prof E Cerin PhD), Department of Urban Planning and Design (C Guo PhD, C Sarkar PhD), Centre for Suicide Research and Prevention (Prof P Yip PhD), and Department of Social Work and Social Administration (Prof P Yip PhD), University of Hong Kong, Hong Kong, China; Infection and Global Health Research, University of St Andrews, St Andrews, UK (M Cevik MD); Regional Infectious Diseases Unit, NHS National Services Scotland, Edinburgh, UK (M Cevik MD); Emerging Diseases and Climate Change Research Unit (P R U Chacón-Uscamaita DDS) and Department of Public Health, Administration, and Social Sciences (J L Chirinos-Caceres DrPH), Cayetano Heredia University, Lima, Peru; Department of Biotechnology, Adamas University, Kolkata, India (Prof C Chakraborty PhD); Skeletal Aging and Orthopedic Surgery, Hallym University, Chuncheon, South Korea (Prof C Chakraborty PhD); Heart Failure and Structural Heart Disease Unit, Cardiovascular Analytics Group, Hong Kong, China (J Chan MBChB); Institute of Epidemiology and Preventive Medicine, National Taiwan University, Taipei City, Taiwan (C Chang PhD); Department of Psychological Medicine (C Chang PhD), School of Population Health and Environmental Sciences (A Douiri PhD, H A Wafa MPH, Y Wang PhD), School of Life Course and Population Sciences (Y Hbid PhD), Department of Twin Research and Genetic Epidemiology (M Mazidi PhD), and Institute of Psychiatry, Psychology, and Neuroscience (D Urso MD), King's College London, London, UK; Department of Public Health (P Charalampous PhD) and Department of Neurosurgery (V Volovici PhD), Erasmus University Medical Center, Rotterdam, Netherlands; Department of Community Medicine, Datta Meghe Institute of Medical Sciences, Sawangi, India (V Chattu MD); Department of Endocrinology (V Chatzimavridou-Grigoriadou MD), Department of Mathematics (O Johnson PhD), Department of Cardiovascular Science (F Mannan MD), Division of Immunology, Immunity to Infection and Respiratory Medicine (A G Mathioudakis PhD), and Division of Psychology and Mental Health (F Mughal FRCGP), University of Manchester, Manchester, UK; Department of Endocrinology, Christie Hospital NHS Foundation Trust, Manchester, UK (V Chatzimavridou-Grigoriadou MD); School of Public Health, University of Zambia, Lusaka, Zambia (M P Chavula MPH); Department of Medicine (H A Cheema MB) and Department of Community Medicine and Public Health (H A Cheema MB), King Edward Medical University, Lahore, Pakistan; Fuwai Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China (A Chen PhD); Department of Computer Science, University of Texas

Austin, Austin, TX, USA (A Chen PhD); Clinical Research Center (H Chen MB) and Zhujiang Hospital (Z Zhu PhD), Southern Medical University, Guangzhou, China; Department of Cardiac Sciences (D S Chew MD), Department of Medicine (Prof M Tonelli MD), and Department of Oncology (L Yang PhD), University of Calgary, Calgary, AB, Canada; Iraq Field Epidemiology Training Program, Ministry of Health, Baghdad, Iraq (A Chitheer MD); Program in Medical and Population Genetics, Broad Institute of MIT and Harvard, Cambridge, MA, USA (S J Cho PhD); Cardiovascular Research Center (S J Cho PhD), Department of Orthopaedic Surgery (A Ebrahimi MD), Division of Cardiology (I Y Elgendy MD, D H Nguyen BS), and Department of Radiology (X Liu PhD), Massachusetts General Hospital, Boston, MA, USA; Department of Clinical Oncology, Queen Elizabeth Hospital, Hong Kong, China (W C S Cho PhD); Department of Medicine (B Chong MBBS), Saw Swee Hock School of Public Health (S Ma PhD), Leadership Institute for Global Health Transformation (S Ramazanu PhD), Department of Surgery (K Tan PhD), and Yong Loo Lin School of Medicine (Prof N Venketasubramanian MBBS), National University of Singapore, Singapore; Department of Biosciences (H Chopra PhD), Department of Public Health Dentistry (Prof G Mini PhD), and Saveetha Dental College and Hospitals (M R Tovani-Palone PhD), Saveetha Institute of Medical and Technical Sciences, Chennai, India; Department of Epidemiology (Prof R Chowdhury PhD), Department of Emergency Medicine (I Pantazopoulos PhD), and Department of Cardiology (T Pilgrim MD, S Stortecky MD), University of Bern, Bern, Switzerland; Center for Biomedicine and Community Health, Viet Nam National University-International School, Hanoi, Viet Nam (D Chu PhD); Department of Paediatric Surgery, Federal Medical Centre, Umuahia, Nigeria (I S Chukwu BMedSc); Department of AndroUrology, AndroUrology Centre, Brisbane, QLD, Australia (Prof E Chung MD); Health Data Research UK, London, UK (S Chung PhD); Global Adolescent Health Group, Burnet Institute, Melbourne, VIC, Australia (K I Cini MClinEpi); College of Life Sciences, Birmingham City University, Birmingham, UK (C C T Clark PhD); Nova Medical School, Nova University of Lisbon, Lisbon, Portugal (J Conde PhD); School of Medicine and Surgery (S Conti PhD, P A Cortesi PhD, C Fornari PhD, Prof L G Mantovani DSc) and Research Center on Public Health (P Ferrara MD), University of Milan Bicocca, Monza, Italy; Department of Psychology, University of the Free State, Park West, South Africa (R G Cowden PhD); Department of Family Medicine and Public Health, University of California San Diego, La Jolla, CA, USA (Prof M H Criqui MD); Therapeutic and Diagnostic Technologies, Polytechnic and University Higher Education Cooperative, Gandra, Portugal (Prof N Cruz-Martins PhD); School of Population Health (P Cullen PhD) and Centre for Healthy Brain Ageing (R Visontay BA), University of New South Wales, Kensington, NSW, Australia; Global Women's Health Program, The George Institute for Global Health, Newtown, NSW, Australia (P Cullen PhD); Department of Neuroscience (D da Silva e Silva PhD) and Department of Psychiatry (Prof D C Des Jarlais PhD, S Gunturu MD), Icahn School of Medicine at Mount Sinai, New York, NY, USA; Department of Internal Medicine, Cheyenne Regional Medical Center, Cheyenne, WY, USA (S Dadana MD); Department of Addiction Medicine, Haukland University Hospital, Bergen, Norway (O Dadras DrPH); Division of Public Health Science, Mid Sweden University, Sundsvall, Sweden (Prof K Dalal PhD); Higher School of Public Health (Prof K Dalal PhD) and Department of Clinical Subjects (A Kurmanova MD), Al Farabi Kazakh National University, Almaty, Kazakhstan; Department of Dermatology (G Damiani MD), Lerner College of Medicine (L Göbölös PhD), Harrington Heart and Vascular Institute (A Guha MD), Department of Neonatology (I Qattea MD), and Department of Nutrition and Preventive Medicine (Prof J Sanabria MD), Case Western Reserve University, Cleveland, OH, USA; Department of Information Technology (A M Darwesh PhD) and Department of Computer Science (Prof M Hosseinzadeh PhD), University of Human Development, Sulaymaniyah, Iraq; Department of Biochemistry, Ministry of Health and Welfare, New Delhi, India (S Das MD); Department of Population and Development, Latin American Faculty of Social Sciences Mexico, Mexico City, Mexico (C A Dávila-Cervantes PhD); Health Research Institute, Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan (K Davletov PhD); Australian Institute for Suicide Research and Prevention, Griffith University, Mount Gravatt, QLD, Australia (Prof D De Leo DSc); School of Medicine, University of Colima, Colima, Mexico (I Delgado-Enciso DSc); Department of Research, Colima State Health Services, Colima, Mexico (I Delgado-Enciso DSc); NCDs and Environment Programme, Barcelona Institute for Global Health, Barcelona, Spain (L Delgado-Ortiz MSc); Department of Experimental and Health Sciences, Pompeu Fabra University, Barcelona, Spain (L Delgado-Ortiz MSc); School of Public Health and Social Work (D Demant PhD) and International Laboratory for Air Quality and Health (Prof L Morawska PhD), Queensland University of Technology, Brisbane, QLD, Australia; USAID-JSI Digital Health Activity, Jimma University, Addis Ababa, Ethiopia (B H Demessa MPH); Department of Neurosurgery (A K Demetriades MD), Postgraduate School (U A Eze MD), Centre for Medical Informatics (Prof A Sheikh MD), Usher Institute (Prof C R Simpson PhD), and College of Medicine and Veterinary Medicine (G Verras MD), University of Edinburgh, Edinburgh, UK; Department of Neurosurgery, NHS Scotland, Edinburgh, UK (A K Demetriades MD); Epidemiology Branch, National Institute of Health, Durham, NC, USA (X Deng PhD); Wellcome Trust Brighton and Sussex Centre for Global Health Research, Brighton and Sussex Medical School, Brighton, UK (K Deribe PhD); St Paul's Eye Unit, Royal Liverpool University Hospital, Liverpool, UK (N Dervenis MD); Department of Ophthalmology (N Dervenis MD) and Second Department of Cardiology (D Patoulias PhD), Aristotle University of Thessaloniki, Thessaloniki, Greece; Graduate Medical Education, Gujarat Adani Institute of Medical Sciences, Bhuj, India (H D Desai MD); Division of Cardiology, Atlanta Veterans Affairs Medical Center, Decatur, GA, USA (R Desai MBBS); National Centre for AIDS and STD Control, Save the Children, Kathmandu, Nepal (K Deuba DrPH); Department of Community Medicine, Chettinad Academy of Research and Education, Chennai, India (V G C Devanbu MD); Department of Biostatistics and Epidemiology (S Dey Mphil) and Department of Development Studies (Prof A Perianayagam PhD), International Institute for Population Sciences, Mumbai, India; Division of Pathology, ICAR-Indian Veterinary Research Institute, Bareilly, India (K Dhama PhD); Research Department (C L Ranabhat PhD), Policy Research Institute, Kathmandu, Nepal (M L Dhimal PhD); Global Institute for Interdisciplinary Studies, Kathmandu, Nepal (M L Dhimal PhD); Research Department, Nepal Health Research Council, Kathmandu, Nepal (M Dhimal PhD, S Ghimire MPH, B P Marasini PhD, A Pandey MPH, U Paudel PhD); Department of Pharmacy Practice, National Institute of Pharmaceutical Education and Research, Hajipur, India (S Dhingra PhD); Toxicology Research Unit, University Polytechnic Higher Education Cooperative, Gandra, Portugal (Prof D Dias da Silva PhD); Faculty of Science, National Autonomous University of Mexico, Mexico City, Mexico (Prof D Diaz PhD); Department of Medicine (T C Do MD), Medical School (H Pham MD), and Department of Epidemiology (H K Tang PhD), Pham Ngoc Thach University of Medicine, Ho Chi Minh City, Viet Nam; Department of Medicine, Can Tho University of Medicine and Pharmacy, Can Tho, Viet Nam (T H Do MD); Center for Health Sciences, Federal University of Espírito Santo, Vitória, Brazil (C B do Prado MSc); Tehran, Iran (M Dodangeh Mcom); Department of Social Medicine and Health Care Organisation, Medical University "Prof Dr Paraskev Stoyanov", Varna, Bulgaria (K G Dokova PhD); Mahidol Oxford Tropical Medicine Research Unit, Mahidol University, Bangkok, Thailand (C Dolecek PhD); University of Rochester, Rochester, NY, USA (E Dorsey MD); Department of Social Responsibility, Oswaldo Cruz German Hospital, São Paulo, Brazil (W M dos Santos PhD); Brazilian Centre for Evidence-based Healthcare, Joanna Briggs Institute, São Paulo, Brazil (W M dos Santos PhD); Department of Cardiology, St Joseph's University Medical Center, Paterson, NJ, USA (R Doshi MD); Department of Forensic Medicine and Toxicology (H L Dsouza MD, Prof P Rastogi MD, Prof B K Shetty MD), Department of General Medicine (J Jeganathan MD), Department of Community Medicine (N Joseph MD, N Kumar MD, P Mithra MD, R Thapar MD), Department of Internal Medicine (M M R Reddy MD), and Kasturba Medical College (Prof B Unnikrishnan MD), Manipal Academy of Higher Education, Mangalore, India; Department of Forensic Medicine and Toxicology, Kasturba Medical College Mangalore, Mangalore, India

(H L Dsouza MD); Office of Institutional Analysis, University of Windsor, Windsor, ON, Canada (J Dube MA); Post-graduate Program in Health Sciences, Federal University of Rio Grande, Rio Grande, Brazil (S C Dumith PhD); Department of Epidemiology (Prof R J Maude PhD), Mahidol Oxford Tropical Medicine Research Unit, Bangkok, Thailand (S J Dunachie PhD); School of Medicine (Prof A R Duraes PhD) and Institute of Collective Health (Prof M Pereira PhD, Prof D Rasella PhD), Federal University of Bahia, Salvador, Brazil; Department of Internal Medicine, Bahiana School of Medicine and Public Health, Salvador, Brazil (Prof A R Duraes PhD); Department of Biotechnology (S Duraisamy PhD) and SRM College of Pharmacy (M R Tovani-Palone PhD), SRM Institute of Science and Technology, Chennai, India; Department of Infection and Tropical Medicine (O C Durojaiye MPH) and School of Health and Related Research (J O Oguta MSc), University of Sheffield, Sheffield, UK; School of Life Sciences, Manipal Academy of Higher Education, Dubai, United Arab Emirates (S Dutta PhD); Child Health Analytics Research Program (P A Dzianach PhD, Prof P W Gething PhD, F Sanna PhD, D J Weiss PhD), The Malaria Atlas Project (J Kiss MRes, M A McPhail PhD, S F Rumisha PhD), and Geospatial Health and Development Team (J Lubinda PhD, A Saddler PhD), Telethon Kids Institute, Perth, WA, Australia; Department of Conservative Dentistry with Endodontics, Medical University of Silesia, Katowice, Poland (A M Dziedzic DSc); Department of Psychiatry, Dalhousie University, Halifax, NS, Canada (E Eboreime PhD, E Tsermpini PhD); Division of Cardiothoracic Vascular Surgery, University of Calabar, Calabar, Nigeria (C P Echieh FWACS); Division of Cardiothoracic Surgery, University of Arizona, Tucson, AZ, USA (C P Echieh FWACS); Higher School of Technology, Sultan Moulay Slimane University, Beni Mellal, Morocco (Prof A Ed-Dra PhD); School of Health Sciences, University of Science Malaysia, Kubang Kerian, Malaysia (H A Edinur PhD); College of Science, Health and Engineering, La Trobe University, Bundoora, VIC, Australia (K Edvardsson PhD); Department Pediatric Nursing (D Efendi MN), Faculty of Public Health (D Kusuma DSc, Prof I Trihandini PhD), and Centre for Family Welfare (K Latief Mepi), University of Indonesia, Depok, Indonesia; Neonatal Intensive Care Unit, University of Indonesia Hospital, Depok, Indonesia (D Efendi MN); Centre for Global Health Inequalities Research (Prof T Eikemo PhD) and Department of Circulation and Medical Imaging (J Nauman PhD), Norwegian University of Science and Technology, Trondheim, Norway; Department of Nursing, St Martin de Porres Hospital, Eikwe, Ghana (E Ekpor BSN); Department of Nursing, Christian Health Association of Ghana, Accra, Ghana (E Ekpor BSN); Al Ghad International Medical Sciences Colleges, Dammam, Saudi Arabia (R A El Arab MSc); Department of Forensic Medicine and Clinical Toxicology (Prof D A El Morsi MD), Department of Clinical Pathology (Prof M El Sayed Zaki PhD, M Elshaer MD), Department of Hygiene and Zoonoses (H Ramadan PhD), and Faculty of Pharmacy (M A Saleh PhD), Mansoura University, Mansoura, Egypt; Department of Medical Education, Delta University for Science and Technology, Mansoura, Egypt (Prof D A El Morsi MD); School of Population and Global Health (Prof F J Elgar PhD), Department of Family Medicine (K K V Mate PhD), and Department of Epidemiology, Biostatistics and Occupational Health (E Ortiz-Brizuela MSc, J Rana MPH), McGill University, Montreal, QC, Canada; Department of Internal Medicine and Hematology Unit (Prof G M T ElGohary MD), Department of Obstetrics and Gynecology (Prof A F Nabhan PhD), Department of Entomology (A M Samy PhD), and Medical Ain Shams Research Institute (A M Samy PhD), Ain Shams University, Cairo, Egypt; Faculty of Medicine, University of Tripoli, Tripoli, Libya (M Elhadi MD); Department of Infectious Diseases and Public Health, City University of Hong Kong, Hong Kong, China (I Elsohaby PhD); Department of Animal Medicine (I Elsohaby PhD), Department of Cardiology, Zagazig University, Zagazig, Egypt (Prof A M A Saad MD); Department of Medical-surgical Nursing (A Emami Zeydi PhD), Faculty of Nursing and Midwifery (A Goudarzian MSc), Department of Infectious Disease (A Taheri MD), and Department of Dermatology (A Taheri MD), Mazandaran University of Medical Sciences, Sari, Iran; Lincoln International Institute for Rural Health, University of Lincoln, Lincoln, UK (L Engelbert Bain PhD); Department of International Cyber Education, Mongolian National University of Medical Sciences, Ulaanbaatar, Mongolia (R Erkhembayar MD); Registry of Senior Australians, South Australian Health and Medical Research Institute, Adelaide, SA, Australia (T C Eshetie PhD); Department of Obesity, Diabetes and Cardiovascular Risk, National Institute of Public Health Mexico, Cuernavaca, Mexico (Prof J Espinosa-Montero PhD); Department of Ophthalmology, Federal Medical Centre, Asaba, Nigeria (U A Eze MD); Bologna, Italy (N Fabin MD); Department of Anesthesia, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA (A O Fadaka PhD); Department of Biotechnology (A O Fadaka PhD) and School of Pharmacy (O C Okonji MSc), University of the Western Cape, Cape Town, South Africa; Research Centre for Healthcare and Community (A F Fagbamigbe PhD) and Faculty of Health and Life Sciences (O P Kurmi PhD), Coventry University, Coventry, UK; Epidemiology and Biostatistics Unit IRCCS Pascale, Naples, Italy (L Falzone PhD); Dissemination Division, National Institute of Statistics, Lisbon, Portugal (C S e Farinha MSc); Activity Planning and Control Unit, Directorate-General of Health, Lisbon, Portugal (C S e Farinha MSc); Department of Psychology, Federal University of Sergipe, São Cristóvão, Brazil (Prof A Faro PhD); Department of Public Health, Equity, and Human Flourishing (K M Foley MPH) and Centre for Health Policy Research (Prof P Ward PhD), Torrens University Australia, Adelaide, SA, Australia (N K Fauk MSc); Institute of Resource Governance and Social Change, Kupang, Indonesia (N K Fauk MSc); National Institute for Stroke and Applied Neurosciences, Auckland University of Technology, Auckland, New Zealand (Prof V L Feigin PhD); Third Department of Neurology (E V Gnedovskaya PhD), Research Center of Neurology, Moscow, Russia (Prof V L Feigin PhD, M A Kravchenko PhD, Prof M A Piradov DSc); School of Pharmacy (G Fekadu MSc), Jockey Club School of Public Health and Primary Care (J Huang MD, C Zhong MD), and Department of Medicine and Therapeutics (Y Jin MD, L Lim MRCP), The Chinese University of Hong Kong, Hong Kong, China; Department of Pharmacy (G Fekadu MSc), Department of Nursing (G Fetensa MSc), and Department of Public Health (M E Getachew MPH), Wollega University, Nekemte, Ethiopia; Department of Translational Medicine, University of Piemonte Orientale, Italy, Novara, Italy (D Ferrante PhD); Department of Social Sciences, University of Nicosia, Nicosia, Cyprus (Prof N Ferreira PhD); Department of Psychiatry, Kaiser Permanente, Fontana, CA, USA (I Filip MD); School of Health Sciences, AT Still University, Mesa, AZ, USA (I Filip MD); Institute of Public Health (F Fischer PhD) and Department of Infectious Diseases and Respiratory Medicine (F Steinbeis MD), Charité Medical University Berlin, Berlin, Germany; School of Social Sciences, Stretton Health Equity, Adelaide, SA, Australia (J Flavel PhD); Clinical Science Department, Nigerian Institute of Medical Research, Yaba, Nigeria (Prof M O Folayan FWACS); Department of Cell Biology and Biotechnology, KA Timiryazev Institute of Plant Physiology, Moscow, Russia (A A Fomenkov PhD); Department of Pharmacology, Iranshahr University of Medical Sciences, Iranshahr, Iran (Prof B Foroutan PhD); Department of Biotechnological and Applied Clinical Sciences (M Foschi MD) and Department of Neurology (Prof S Sacco MD), University of L'Aquila, L'Aquila, Italy; Department of Neuroscience, Hospital Santa Maria delle Croci, Ravenna, Italy (M Foschi MD); School of Public Health, Medical, and Veterinary Sciences, James Cook University, Douglas, QLD, Australia (Prof R C Franklin PhD); Evidence-Based Decision Making, Research Synthesis and Health Technology Assessment (R J Vieira MD), Center for Health Technology and Services Research, Porto, Portugal (A Freitas PhD); Department of Dermatology, Kobe University, Kobe, Japan (T Fukumoto PhD); Health Services Management Training Centre (P A Gaal PhD, T Joo PhD, J Lám PhD, T Palicz MD), Institute of Digital Health Sciences (P Pollner PhD), and Faculty of Health and Public Administration (M Szócska PhD), Semmelweis University, Budapest, Hungary; Department of Applied Social Sciences, Sapientia Hungarian University of Transylvania, Târgu-Mureş, Romania (P A Gaal PhD); Department of Community Medicine, Aminu Kano Teaching Hospital, Kano, Nigeria (Prof M A Gadanya FMCPH); Institute of Applied Health Sciences, University of Aberdeen, Aberdeen, UK (S Gaihre PhD); Department of Medicine, Nazarbayev University School of Medicine, Astana, Kazakhstan (A Gaipov PhD); Department of Food Technology, Salahaddin University-Erbil, Erbil, Iraq (Y Galali ResM, B A Sadee PhD); Department of Nutrition and Dietetics, Cihan University-Erbil, Erbil,

Iraq (Y Galali ResM, B A Sadee PhD); Faculty of Paramedicine (N Galehdar PhD), Environmental Health Research Center (A Norouzian Baghani PhD), and Hepatitis Research Center (M Zandi PhD), Lorestan University of Medical Sciences, Khorramabad, Iran; Department of Environmental Health Sciences, Mario Negri Institute for Pharmacological Research, Milan, Italy (S Gallus DSc, A Lugo PhD); Nutrition and Metabolism Branch, International Agency for Research on Cancer, Lyon, France (Q Gan MPH); Department of Community Medicine and Family Medicine (A P Gandhi MD) and Department of Physiology (A Patil MD), All India Institute of Medical Sciences, Nagpur, India; Institute of Health and Wellbeing, Federation University, Churchill, VIC, Australia (B Ganesan PhD); Division of Cardiovascular Medicine, Medical College of Wisconsin, Milwaukee, WI, USA (J Garg MD); School of Medicine, Chung Shan Medical University, Taichung, Taiwan (S Gau MD); Department of Pharmacology, Indore Institute of Pharmacy, Indore, India (Prof R K Gautam PhD); Institute and Faculty of Actuaries, London, UK (F Gazzelloni BSc); Department of Midwifery (M W Gebregergis MSc), Department of Epidemiology (M Mehari MPH), and Department of Medical Laboratory Sciences (H Negash MSc), Adigrat University, Adigrat, Ethiopia; Department of Environmental Health, Wollo University, Dessie, Ethiopia (M Gebrehiwot DSc); Department of Public Health, Debre Berhan University, Debre Berhan, Ethiopia (T B Gebremariam MPH); Addis Ababa, Ethiopia (T B Gebremariam MPH, S A Yesuf MSc); School of Population Health (Prof P W Gething PhD), School of Public Health (T R Miller PhD), and Curtin School of Population Health (D J Weiss PhD), Curtin University, Perth, WA, Australia; Center of Health Management, Aden University, Aden, Yemen (K Y Ghailan PhD); Mount Auburn Hospital, Harvard Medical School, Cambridge, MA, USA (A Ghajar MD); Department of Ophthalmology (M Ghanbarnia MD), Cellular and Molecular Biology Research Center (Prof S Mahjoub PhD), Department of Clinical Biochemistry (Prof S Mahjoub PhD), and Social Determinants of Health Research Center (S Mouodi PhD), Babol University of Medical Sciences, Babol, Iran; Young Researchers and Elite Club, Islamic Azad University, Rasht, Iran (A Gholamian MSc); Department of Biology (A Gholamian MSc) and Department of Microbiology (S Valadan Tahbaz PhD), Islamic Azad University, Tehran, Iran; Department of Medical-Surgical Nursing (P Ghorbani Vajargah MSc, S Karkhah MSc), Gastrointestinal and Liver Diseases Research Center (S Hassanipour PhD), Caspian Digestive Disease Research Center (S Hassanipour PhD), and Department of Environmental Health Engineering (J Jaafari PhD), Guilan University of Medical Sciences, Rasht, Iran; Department of Public Health, University of Muhammadiyah Kalimantan Timur, Samarinda, Indonesia (G Ghozali PhD); Department of Radiology (S Ghozy MD) and Division of Nephrology and Hypertension (S Kazeminia MD), Mayo Clinic, Rochester, MN, USA; Department of Forensic Biology, Government Institute of Forensic Science, Aurangabad, India (A D Ghuge MPhil); Department of Clinical Research, National Institute For Research In Reproductive and Child Health, Mumbai, India (A D Ghuge MPhil); Department of Epidemiology and Prevention, IRCCS Neuromed, Pozzilli, Italy (A Gialluisi PhD); Department of Medicine (R M Gibson PhD), Blood and Marrow Transplantation and Cellular Therapy Program (A Goyal MD), and Division of Pediatric Hospital Medicine (R P Mediratta MD), Stanford University, Palo Alto, CA, USA; NCD Surveillance Unit, WHO, Moscow, Russia (A U Gil PhD); Institute for Leadership and Health Management, Moscow Medical Academy, Moscow, Russia (A U Gil PhD); Warwick Medical School (Prof P S Gill DM), University of Warwick, Coventry, UK (J W Sakshaug PhD); Division of General Internal Medicine (R F Gillum MD) and Department of Community and Family Medicine (R F Gillum MD), Howard University, Washington, DC, USA; Department of Hepatology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India (Prof A Goel DM); Department of Health Systems and Policy Research, Indian Institute of Public Health, Gandhinagar, India (M Golechha PhD); Department of Genetics, Sana Institute of Higher Education, Sari, Iran (P Goleij MSc); Universal Scientific Education and Research Network (P Goleij MSc), Research Center for Environmental Determinants of Health (Prof B Karami Matin PhD, Prof E Sadeghi PhD), Department of Rehabilitation and Sports Medicine (M Mirzaei MSc), Department of Epidemiology (M Moradinazar PhD), Substance Abuse Prevention Research Center (Y Sayadi PhD), and Department of Speech Therapy (A Shiani PhD), Kermanshah University of Medical Sciences, Kermanshah, Iran; Department of Theriogenology, University of Tehran, Tehran, Iran (A Golestanfar PhD); Department of Exercise and Health Sciences (P N Gona PhD) and Department of Nursing (E F Kyei MSc), University of Massachusetts Boston, Boston, MA, USA; Department of Respiratory Medicine (H Goudarzi PhD) and Center for Environmental and Health Sciences (H Goudarzi PhD), Hokkaido University, Sapporo, Japan; Department of Mathematics, Siena College, Loudonville, NY, USA (S Greenhalgh PhD); Department of Public Health and Preventive Medicine, Charles University, Prague, Czech Republic (Prof M Grivna PhD); Post Graduate School of Public Health, University of Siena, Siena, Italy (G Guarducci MD); Department of Family and Community Medicine, University Of Sulaimani, Sulaimani, Iraq (M I M Gubari PhD); Division of Cardiovascular Medicine (A Guha MD) and Center for Biostatistics (J Ma MS), Ohio State University, Columbus, OH, USA; Health Directorate, Local Health Authority of Bologna, Bologna, Italy (S Guicciardi MD); Department of Community Medicine, University of Peradeniya, Kandy, Sri Lanka (D A Gunawardane MD); Department of Psychiatry, Bronxcare Health System, Bronx, NY, USA (S Gunturu MD); Department of Internal Medicine (A K Gupta PharmD) and Faculty of Medicine and Health Sciences (Prof N P Singh MD), Shree Guru Gobind Singh Tricentenary University, Gurugram, India; Non-communicable Division, Indian Council of Medical Research, Delhi, India (A K Gupta PharmD); Department of Public Health, Torrens University Australia, Melbourne, VIC, Australia (B Gupta PhD); Department of Biotechnology, Government Institute of Science, Aurangabad, India (I R Gupta PhD); Department of Biotechnology, Sant Gadge Baba Amravati University, Amravati, India (I R Gupta PhD); Department of Epidemiology and Biostatistics (R Gupta MPH) and Department of Health Promotion, Education, and Behavior (T Mi PhD), University of South Carolina, Columbia, SC, USA; Centre for Noncommunicable Diseases and Nutrition (R Gupta MPH) and James P Grant School of Public Health (M Hossain MSc), BRAC University, Dhaka, Bangladesh; Department of Toxicology, Shriram Institute for Industrial Research, Delhi, India (S Gupta MSc); School of Medicine (V Gupta PhD) and Institute for Mental and Physical Health and Clinical Translation (W Marx PhD), Deakin University, Geelong, VIC, Australia; School of Biotechnology, Dublin City University, Glasnevin, Ireland (V Gupta PhD); Faculty of Medicine Health and Human Sciences (Prof V K Gupta PhD) and Macquarie Medical School (Y You PhD), Macquarie University, Sydney, NSW, Australia; Department of Epidemiology and Psychosocial Research, Ramón de la Fuente Muñiz National Institute of Psychiatry, Mexico City, Mexico (R A Gutiérrez PhD); Global Virus Network, Middle East Region, Shiraz, Iran (F Habibzadeh MD); School of Medicine, University of Maryland, Baltimore, MD, USA (P Habibzadeh MD); Lawson Health Research Institute, London, ON, Canada (Prof V Hachinski MD); Department of Pharmacology and Toxicology (R Haddadi PhD) and Research Center for Molecular Medicine (A Taherkhani PhD), Hamadan University of Medical Sciences, Hamadan, Iran; Department of Surgery (N Haep MD) and Department of Neurology (S Samadzadeh MD), Charité University Medical Center Berlin, Berlin, Germany; Clinician Scientist Program, Berlin Institute of Health, Berlin, Germany (N Haep MD); Natural and Medical Sciences Research Center, University of Nizwa, Nizwa, Oman (S A Halim PhD); NYU Shanghai, Shanghai, China (B J Hall PhD); Department of Infectious Disease Epidemiology, Robert Koch Institute, Berlin, Germany (S Haller MD); Department of Public Health, Charité Institute of Public Health, Berlin, Germany (S Haller MD); Department of Family and Community Medicine (Prof R R Hamadeh PhD) and College of Medicine and Medical Sciences (H Jahrami PhD), Arabian Gulf University, Manama, Bahrain; College of Law and Political Science, University of Human Development, Sulaimaniyah, Iraq (K Hamagharib Abdullah PhD); School of Health and Environmental Studies, Hamdan Bin Mohammed Smart University, Dubai, United Arab Emirates (Prof S Hamidi DrPH); Faculty of Health, Southern Cross University, Bilinga, QLD, Australia (M Hamiduzzaman PhD); Department of Medical and Technical Information Technology, Bauman Moscow State Technical University, Moscow, Russia (A Hammoud MSc); Perron Institute for Neurological and Translational Science, Perth, WA,

Australia (Prof G J Hankey MD); Department of Biochemistry and Molecular Biology, Bangladesh Agricultural University, Mymensingh, Bangladesh (Prof M Hannan PhD); Department of Anatomy, Dongguk University, Gyeongju, South Korea (Prof M Hannan PhD); Department of Population Science and Human Resource Development (Prof M Haque PhD, Prof M Rahman PhD, M Rahman DrPH) and Department of Mathematics (M Kuddus PhD), University of Rajshahi, Rajshahi, Bangladesh; Medical Research Unit, Syiah Kuala University, Banda Aceh, Indonesia (H Harapan PhD); Research Unit, University of Barcelona, Barcelona, Spain (J M Haro MD); Biomedical Research Networking Center for Mental Health Network, Barcelona, Spain (J M Haro MD); Department of Zoology and Entomology, Al Azhar University, Cairo, Egypt (A I Hasaballah PhD); Department of Nursing (F Hasan MSc), School of Health Care Administration (L D Huy MBA), International Master Program for Translational Science (H Huynh BS), Department of Global Health and Health Security (K Latief Mepi), International PhD Program in Medicine (L Minh MD), Research Center for Artificial Intelligence in Medicine (L Minh MD), School of Public Health (Y L Samodra MPH, Y L Samodra MPH), Department of Clinical Pharmacy (M A Sarasmita PharmD), and School of Nursing (S Susanty PhD), Taipei Medical University, Taipei, Taiwan; Department of Pharmaceutical Technology (I Hasan MPharm) and Department of Population Sciences (Prof M Islam PhD), University of Dhaka, Dhaka, Bangladesh; Department of Ophthalmology, Iran University of Medical Sciences, Karaj, Iran (H Hasani MD); Department of Radiology, Arak University of Medical Sciences, Arak, Iran (M Hasanian MD); Department of Medical Surgical, Shahroud University of Medical Sciences, Shahrekord, Iran (Prof A Hasanpour-Dehkordi PhD); Department of Diagnostic and Interventional Radiology and Neuroradiology (J Haubold MD, Prof B M Schaarschmidt MD) and Institute of Artificial Intelligence in Medicine (J Haubold MD), University Hospital Essen, Essen, Germany; Skaane University Hospital, Skaane County Council, Malmö, Sweden (R J Havmoeller PhD); Faculty of Kinesiology, University of New Brunswick, Fredericton, NB, Canada (Prof J J Hebert PhD); School of Allied Health, Murdoch University, Murdoch, WA, Australia (Prof J J Hebert PhD); Santa Clara, CA, USA (G Heidari MD); Community-Oriented Nursing Midwifery Research Center (M Heidari PhD), Department of Community Health (M Lotfizadeh PhD), Social Determinants of Health Research Center (M Lotfizadeh PhD), Department of Epidemiology and Biostatistics (A Mohammadian-Hafshejani PhD), and Department of Health in Disasters and Emergencies (R Sheikhi BHlthSci), Shahrekord University of Medical Sciences, Shahrekord, Iran; Institute of Psychology, University of Wroclaw, Wroclaw, Poland (B Helfer PhD); Meta Research Centre, University of Wrocław, Wroclaw, Poland (B Helfer PhD); School of Business, London South Bank University, London, UK (Prof C Herteliu PhD); Department of Anatomy Genetics and Biomedical Informatics (D Hettiarachchi PhD) and Department of Surgery (D P Wickramasinghe MD), University of Colombo, Colombo, Sri Lanka; Department of Public Health, Madda Walabu University, Robe, Ethiopia (D Z Heyi MPH); Department of Microbiology, Taiz University, Taiz, Yemen (K Hezam PhD); School of Medicine, Nankai University, Tianjin, China (K Hezam PhD); Division for Health Service Promotion (Y Hiraike PhD) and Department of Global Health Policy (S Nomura PhD), University of Tokyo, Tokyo, Japan; National Institute on Deafness and Other Communication Disorders (H J Hoffman MA) and Eunice Kennedy Shriver National Institute of Child Health and Human Development (L G Mensah MD), National Institute of Health, Bethesda, MD, USA; Division of Scientific Programs (H J Hoffman MA), National Human Genome Research Institute (N Horita PhD) and Center for Translation Research and Implementation Science (G A Mensah MD), National Institutes of Health, Bethesda, MD, USA; Department of Pulmonology, Yokohama City University, Yokohama, Japan (N Horita PhD); Social and Environmental Health Research, Nature Study Society of Bangladesh, Khulna, Bangladesh (M Hossain MPH); Department of Health Promotion and Community Health Sciences, Texas A&M University, College Station, TX, USA (M Hossain MPH); Department of Public Health and Informatics, Jahangirnagar University, Dhaka, Bangladesh (S Hossain MS); School of Health and Society, University of Wollongong, Wollongong, NSW, Australia (H Hosseinzadeh PhD); Institute of Research and Development, Duy Tan University, Da Nang, Viet Nam (Prof M Hosseinzadeh PhD); Department of Clinical Legal Medicine, National Institute of Legal Medicine Mina Minovici, Bucharest, Romania (S Hostiuc PhD); Faculty of Medicine of Tunis, University Tunis El Manar, Tunis, Tunisia (Prof M Hsairi MPH); Department of Health Services Administration (V Hsieh PhD), Department of Occupational Safety and Health (Prof B Hwang PhD), and College of Public Health (R Lin PhD), China Medical University, Taichung, Taiwan; Department of Psychology (C Hu PhD), Vanke School of Public Health (J S Ji DSc), and Tsinghua Vanke School of Public Health (Z Li PhD), Tsinghua University, Beijing, China; Research Division, ARCED Foundation, Dhaka, Bangladesh (M Huda PhD); Department of Surgical Sciences (M Hultström PhD), Department of Medical Cell Biology (M Hultström PhD), and Department of Medical Sciences (Prof A O Larsson PhD), Uppsala University, Uppsala, Sweden; Department of Biological Sciences and Chemistry (Prof J Hussain PhD) and Natural and Medical Sciences Research Center (S Ullah MSc), University of Nizwa Oman, Nizwa, Oman; Czech National Centre for Evidence-Based Healthcare and Knowledge Translation (S Hussain PhD) and Institute of Biostatistics and Analyses (S Hussain PhD), Masaryk University, Brno, Czech Republic; Department of Biomolecular Sciences, University of Zakho, Zakho, Iraq (N R Hussein PhD); College of Health Sciences, VinUniversity, Hanoi, Viet Nam (L D Huy MBA, N Quan MD); Department of Occupational Therapy, Asia University, Taiwan, Taichung, Taiwan (Prof B Hwang PhD); Division of Infectious Diseases, Veterans Affairs Greater Los Angeles, Los Angeles, CA, USA (K S Ikuta MD); Faculty of Medicine (I M Ilic PhD, Prof M M Santric-Milicevic PhD, I S Vujcic PhD), School of Public Health and Health Management (Prof M M Santric-Milicevic PhD), and School of Medicine (R Vukovic PhD), University of Belgrade, Belgrade, Serbia; Department of Epidemiology, University of Kragujevac, Kragujevac, Serbia (Prof M D Ilic PhD); Department of Health Research, ICMR National Institute for Research in Tuberculosis, Chennai, India (L R Inbaraj MD); Department of Medicine, University of Burundi, Bujumbura, Burundi (A Iradukunda MD); Research Department, ARNECH Research and Consulting Office, Bujumbura, Burundi (A Iradukunda MD); Department of Medical Microbiology, University of Abuja, Abuja, Nigeria (K C Iregbu MD); Department of Medical Microbiology, National Hospital, Abuja, Nigeria (K C Iregbu MD); Department of Pharmacy, University of Asia Pacific, Dhaka, Bangladesh (M R Islam PhD); Institute for Physical Activity and Nutrition (S Islam PhD, K M Livingstone PhD) and Department of Psychology (M A Stokes PhD), Deakin University, Burwood, VIC, Australia; Department of Surveillance and Health Services Research, American Cancer Society, Atlanta, GA, USA (F Islami PhD); Department of Clinical Pharmacy and Pharmacy Practice, Asian Institute of Medicine, Science and Technology, Kedah, Malaysia (Prof N Ismail PhD); Malaysian Academy of Pharmacy, Puchong, Malaysia (Prof N Ismail PhD); Department of Health Services Research, University of Tsukuba, Tsukuba, Japan (M Iwagami PhD); Department of Non-Communicable Disease Epidemiology (M Iwagami PhD), and Department of Health Services Research and Policy (Prof M McKee DSc), London School of Hygiene and Tropical Medicine, London, UK; School of Health Systems and Public Health (C C D Iwu MPH) and Department of Medical Microbiology (L A Malinga PhD), University of Pretoria, Pretoria, South Africa; Department of Global Health (C J Iwu-Jaja PhD) and Risk and Resilience in Mental Disorders Unit (Prof D J Stein MD), South African Medical Research Council, Cape Town, South Africa; Department of Global Health (C J Iwu-Jaja PhD, P D Katoto PhD), South African Centre for Epidemiological Modelling and Analysis (L Mhlanga PhD), and Department of Epidemiology (J L Tamuzi MSc), Stellenbosch University, Cape Town, South Africa; Department of Biotechnology, Karpagam Academy of Higher Education (Deemed to be University), Coimbatore, India (M Iyer PhD, S Muthu MS); Department of Orthodontics and Dentofacial Orthopedics (L J BDS) and Department of Oral Pathology and Microbiology (Prof G S Sarode PhD, Prof S C Sarode PhD), D Y Patil University, Pune, India; Research and Development Unit, Biomedical Research Networking Center for Mental Health Network, Sant Boi de Llobregat, Spain (L Jacob MD); Faculty of Medicine, University of Versailles Saint-Quentin-en-Yvelines,

Montigny-le-Bretonneux, France (L Jacob MD); Department of Health Studies, University of Richmond, Richmond, VA, USA (K H Jacobsen PhD); Department of Nephrology, San Mateo Medical Center, San Mateo, CA, USA (K Jaggi MD); Department of Nephrology, Mills Peninsula Medical Center, Burlingame, CA, USA (K Jaggi MD); Ministry of Health, Manama, Bahrain (H Jahrami PhD); Department of Leukemia, University of MD Anderson Cancer Center, Houston, TX, USA (A Jain MD); Statistics Unit, Riga Stradins University, Riga, Latvia (N Jain MD); Department of Health and Safety, Dubai Municipality, Dubai, United Arab Emirates (A A Jairoun PhD); The World Academy of Sciences UNESCO, Trieste, Italy (Prof M Jakovljevic PhD); Shaanxi University of Technology, Hanzhong, China (Prof M Jakovljevic PhD); Department of Environmental Health Engineering, Islamic Azad University, Ahvaz, Iran (R Jalilzadeh Yengejeh PhD); Department of Internal Medicine, Harvard University, Cambridge, MA, USA (C T Jani MD); Duke Global Health Institute (M M Janko PhD), Department of Anesthesiology (V Krishnamoorthy MD), and Center for the Study of Aging and Human Development (Y Yao MD), Duke University, Durham, NC, USA; Centre of Studies and Research, Ministry of Health, Muscat, Oman (S Jayapal PhD); Department of Biochemistry, Government Medical College, Mysuru, India (Prof S Jayaram MD); Department of Public Health, Yonsei University, Seoul, South Korea (W Jeong PhD); Department of Cardiovascular Medicine, Saint Vincent Hospital, Worcester, MA, USA (A K Jha MD); Department of Community Medicine, Dr Baba Saheb Ambedkar Medical College and Hospital, Delhi, India (R P Jha MSc); Department of Community Medicine (R P Jha MSc) and Department of Geography (A Singh PhD), Banaras Hindu University, Varanasi, India; Department of Global Health (Y Jin PhD, Prof Z Zhang PhD), Department of Epidemiology and Biostatistics (Prof J Liu PhD), China Center for Health Development Studies (Y Yao MD), School of Public Health (H Zhang MS), Department of Nutrition and Food Hygiene (Z Zhang PhD), and Institute of Child and Adolescent Health (Z Zou MD), Peking University, Beijing, China; Department of Microbiology (N Jomehzadeh PhD) and Department of Pharmacology (H Mojiri-forushani PhD), Abadan School of Medical Sciences, Abadan, Iran; Hungarian Health Management Association (T Palicz MD), Hungarian Health Management Association, Budapest, Hungary (T Joo PhD); Department of Gastroenterology and Hepatology (A Joseph MD), Department of Biomedical Data Science (S Park MD), and Department of Radiology (S Ramasamy MD), Stanford University, Stanford, CA, USA; Department of Economics, National Open University, Benin City, Nigeria (C E Joshua BSc); Department of Family Medicine and Public Health, University of Opole, Opole, Poland (J J Jozwiak PhD); Institute of Family Medicine and Public Health, University of Tartu, Tartu, Estonia (M Jürisson PhD, H Orru PhD); School of Public Health, University College Cork, Cork, Ireland (Z Kabir PhD); Department of Oral and Maxillofacial Pathology (V Kadashetti MDS), Department of Public Health Dentistry (Prof K M Shivakumar PhD), and Department of Periodontology (S A Varma MDS), Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, India; Pune, India (P V Kakodkar MDS); Department of Dermatology, King Faisal University, Hofuf, Saudi Arabia (F Kaliyadan MD); Department of Endocrinology, Bharti Hospital Karnal, Karnal, India (S Kalra DM); School of Graduate Studies, Meharry Medical College, Nashville, TN, USA (T Kanagasabai PhD); Sydney Eye Hospital, South Eastern Sydney Local Health District, Sydney, NSW, Australia (H Kandel PhD); Regional Institute for Population Studies, University of Ghana, Accra, Ghana (E Kanmiki MPH); Faculty of Dentistry, University of Puthisastra, Phnom Penh, Cambodia (K K Kanmodi MPH); Office of the Executive Director (K K Kanmodi MPH) and Campaign for Health and Neck Cancer Education Programme (A A Salami BDS), Cephas Health Research Initiative, Ibadan, Nigeria; Hansjörg Wyss Department of Plastic and Reconstructive Surgery, Nab'a Al-Hayat Foundation for Medical Sciences and Health Care, New York, NY, USA (R S Kantar MD); Cleft Lip and Palate Surgery Division, Global Smile Foundation, Norwood, MA, USA (R S Kantar MD); School of Health Professions and Human Services, Hofstra University, Hempstead, NY, USA (I M Karaye MD); Department of Anesthesiology, Montefiore Medical Center, Bronx, NY, USA (I M Karaye MD); Department of Biology (A K Karna PhD) and Department of Public Health (Prof J Khubchandani PhD), New Mexico State University, Las Cruces, NM, USA; Department of Physical Therapy and Health Rehabilitation, Majmaah University, Majmaah, Saudi Arabia (F Z Kashoo MSc); Department of Medicine, Jacobi Medical Center, New York, NY, USA (A Katamreddy MD); Medical Research Council/Chief Scientist Office Social and Public Health Sciences Unit (S V Katikireddi PhD) and School of Cardiovascular and Metabolic Health (F E Petermann-Rocha PhD), University of Glasgow, Glasgow, UK; Centre for Tropical Diseases and Global Health, Catholic University of Bukavu, Bukavu, Democratic Republic of the Congo (P D Katoto PhD); Surgery Research Unit (Prof J H Kauppila MD), Center for Environmental and Respiratory Health Research (I Shiue PhD), and Martti Ahtisaari Institute (I Shiue PhD), University of Oulu, Oulu, Finland; Department of ENT, Dr B R Ambedkar State Institute of Medical Sciences, Mohali, India (N Kaur MS); LUPUS Gatineau, Gatineau, QC, Canada (J Kayibanda PhD); International Research Center of Excellence, Institute of Human Virology Nigeria, Abuja, Nigeria (G A Kayode PhD); Julius Centre for Health Sciences and Primary Care (G A Kayode PhD) and Copernicus Institute of Sustainable Development (G Koren PhD), Utrecht University, Utrecht, Netherlands; Department of Healthcare Services Management (L Keikavoosi-Arani PhD), Non-communicable Diseases Research Center (P Mardi MD, A Shafiee MD), and School of Medicine (M Shams-Beyranvand MSc), Alborz University of Medical Sciences, Karaj, Iran; Eye Unit, MyungSung Medical College, Addis Ababa, Ethiopia (Prof J H Kempen MD); Department of Psychological Medicine, University of Otago, Christchurch, New Zealand (J A Kerr PhD); Department of Human Nutrition, National Research Institute for Agriculture, Food and Environment, Jouy-en-Josas, France (E Kesse-Guyot PhD); University Sorbonne Paris Nord (E Kesse-Guyot PhD) and Department of Health, Medicine and Human Biology (M Touvier PhD), Sorbonne Paris Nord University, Bobigny, France; Amity Institute of Forensic Sciences (H Khajuria PhD, B P Nayak PhD) and Amity Institute of Pharmacy (K Munjal PhD), Amity University, Noida, India; College of Health Sciences, Abu Dhabi University, Adu Dhabi, United Arab Emirates (N Khalid PhD); Department of Pediatrics (I A Khan MD) and Center for Pharmacoepidemiology and Treatment Science (A Parthasarathi MD), Rutgers University, New Brunswick, NJ, USA; Department of Primary Care, NHS North West London, London, UK (M A Khan MSc); Department of Radiation Oncology (T Khan PhD), Department of Epidemiology and Biostatistics (M Teramoto MD), and Department of Bioengineering and Therapeutic Sciences (Prof M S Zastrozhin PhD), University of California San Francisco, San Francisco, CA, USA; Department of Critical Care Medicine, St Luke's Aurora Medical Center, Milwaukee, WI, USA (M Z Khan suheb MD); College of Health, Wellbeing, and Life Sciences, Sheffield Hallam University, Sheffield, UK (Prof K Khatab PhD); College of Arts and Sciences, Ohio University, Zanesville, OH, USA (Prof K Khatab PhD); Department of Biochemistry, Liaquat University Of Medical and Health Sciences, Jamshoro, Pakistan (F Khidri PhD); Research Department, Inland Norway University of Applied Sciences, Elverum, Norway (M Khosrowjerdi PhD); Faculty of Health Sciences, University of Muhammadiyah Prof Dr Hamka, Jakarta, Indonesia (H Khusun PhD); Program Division, SEAMEO Regional Center for Food and Nutrition, Jakarta, Indonesia (H Khusun PhD); Department of Pediatrics, Case Western Reserve University School of Medicine, Cleveland, OH, USA (G Kim MD); Division of Pediatric Hospital Medicine, University Hospitals, Rainbow Babies and Children's Hospital, Cleveland, OH, USA (G Kim MD); Millennium Prevention, Westwood, MA, USA (R W Kimokoti MD); Department of Public Health, Debre Markos University, East Gojjam, Ethiopia (G T Kiross MPH); School of Health Sciences, Kristiania University College, Oslo, Norway (Prof A Kisa PhD); Department of International Health and Sustainable Development, Tulane University, New Orleans, LA, USA (Prof A Kisa PhD); Department of Nursing and Health Promotion, Oslo Metropolitan University, Oslo, Norway (S Kisa PhD); Department of Public Health (Prof M Kivimäki PhD, Prof T Lallukka PhD) and Department of Virology (F Zakham PhD), University of Helsinki, Helsinki, Finland (T J Meretoja MD); Department of Disease Burden, Norwegian Institute of Public Health, Bergen, Norway (A S Knudsen PhD, C Madsen PhD); Jakarta, Indonesia (S Kosen MD); Department of Epidemiology, IQVIA, Frankfurt, Germany (Prof K Kostev PhD); Department of Gynecology,

Philipps-Universität Marburg, Marburg, Germany (Prof K Kostev PhD); Department of Biochemistry (A L Kotnis PhD) and Department of Dentistry (A Singh MD), All India Institute of Medical Sciences, Bhopal, India; Department of Internal and Pulmonary Medicine, Sheri Kashmir Institute of Medical Sciences, Srinagar, India (Prof P A Koul MD); Kasturba Medical College (S Koulmane Laxminarayana MD) and Manipal College of Nursing (R Yesodharan MSc), Manipal Academy of Higher Education, Udupi, India; San Juan de Dios Sanitary Park, Barcelona, Spain (A Koyanagi MD); Department of Anthropology (Prof K Krishan PhD), Department of Community Medicine (R Rohilla MD), and Institute of Forensic Science and Criminology (V Sharma PhD), Panjab University, Chandigarh, India; Department of Community Medicine, Employees' State Insurance Model Hospital, Chennai, India (Y Krishnamoorthy MD, S Rajaa MD); Department of Demography (Prof B Kuate Defo PhD) and Department of Social and Preventive Medicine (Prof B Kuate Defo PhD), University of Montreal, Montreal, QC, Canada; Foundation for Drug Policy Solutions, Washington, DC, USA (C M Kubeisy BA); Faculty of Medicine, Gazi University, Ankara, Türkiye (B Kucuk Bicer PhD); Department of Biochemistry (Prof M Kuddus PhD) and Department of Public Health (M G M Zeariya PhD), University of Hail, Hail, Saudi Arabia; Department of Pediatrics, Kuopio University Hospital, Kuopio, Finland (I Kuitunen PhD); Institute of Clinical Medicine, University of Eastern Finland, Kuopio, Finland (I Kuitunen PhD); Department of Health Research (M Kulimbet MSc) and Atchabarov Scientific Research Institute of Fundamental and Applied Medicine (M Kulimbet MSc), Kazakh National Medical University, Almaty, Kazakhstan; Department of Medicine (V Kulkarni MS) and Digital Health and Informatics Directorate (Prof S M McPhail PhD), Queensland Health, Brisbane, QLD, Australia; Department of Internal Medicine, Cabrini Institute, Akron, OH, USA (A Kumar MD); Department of Food Technology, Shri Vishwakarma Skill University, Palwal, India (Prof H Kumar PhD); Department of Biotechnology (Prof H Kumar PhD) and Amity Institute of Biotechnology (M Kumari PhD, E Upadhyay PhD), Amity University Rajasthan, Jaipur, India; Department of Chemistry, Indian Institute of Technology Madras, Chennai, India (R Kumar PhD); Department of Food Science and Technology, Maharishi Markandeshwar (Deemed to be University), Ambala, India (S Kumar PhD, R Mehra PhD); National Research and Innovation Agency of the Republic of Indonesia, Jakarta, Indonesia (A Kusnali LLB); Department of Health Services Research and Management, City University of London, London, UK (D Kusuma DSc); Department of Pediatric Oncology, Hacettepe University, Ankara, Türkiye (Prof T Kutluk MD); Department of Nephrology, Pushpagiri Institute of Medical Sciences and Research Centre, Thiruvalla, India (A Kuttikkattu MD); Department of Health Policy, London School of Economics and Political Science, London, UK (I Kyriopoulos PhD, Prof E Mossialos PhD); Institute for Social and Health Sciences, University of South Africa, Pretoria, South Africa (Prof L Laflamme PhD); Department of Health Policy and Strategy, Foundation for People-centric Health Systems, New Delhi, India (Prof C Lahariya MD); SD Gupta School of Public Health, Indian Institute of Health Management Research University, Jaipur, India (Prof C Lahariya MD); Department of Family Medicine, University of Medicine, Oujda, Morocco (A Lahmar MD); School of Digital Science (D T C Lai PhD), Institute of Applied Data Analytics (D T C Lai PhD), and Faculty of Science (E Leong PhD), University of Brunei Darussalum, Bandar Seri Begawan, Brunei; Department of Physiotherapy, Universitas Aisyiyah Yogyakarta, Yogyakarta, Indonesia (T Laksono MS); Institute of Allied Health Sciences, National Cheng Kung University, Tainan, Taiwan (T Laksono MS); India Cancer Research Consortium (Prof R Mehrotra DPhil), Indian Council of Medical Research, New Delhi, India (D K Lal MD); NEVES Society for Patient Safety, Budapest, Hungary (J Lám PhD); Department of Health Sciences, European University Cyprus, Nicosia, Cyprus (D Lamnisos PhD); Department of Psychiatry and Psychotherapy, University of Regensburg, Regensburg, Germany (B Langguth PhD, W Schlee PhD); Chief Medical Office, HelpMeSee, New York, NY, USA (Prof V C Lansingh PhD); Mexican Institute of Ophthalmology, Queretaro, Mexico (Prof V C Lansingh PhD); Department of Behavioural Sciences and Learning, Linköping University, Linköping, Sweden (A Laplante-Lévesque PhD); Department of Clinical Chemistry and Pharmacology, Uppsala University Hospital, Uppsala, Sweden (Prof A O Larsson PhD); Department of Otorhinolaryngology, Father Muller Medical College, Mangalore, India (S Lasrado MS); International Society Doctors for the Environment, Arezzo, Italy (P Lauriola MD); Health Economics Division, Monash University, Burwood, VIC, Australia (L K D Le PhD); Faculty of Medicine (N Le MD), Department of Medicine (T Nguyen MD), and Department of General Medicine (V T Nguyen MD), University of Medicine and Pharmacy at Ho Chi Minh City, Ho Chi Minh City, Viet Nam (T T Le MD, T D T Le MD); Department of Cardiovascular Research, Methodist Hospital, Merrillville, IN, USA (N Le MD); Ho Chi Minh City, Viet Nam (T D T Le MD); Department of Medical Science, Ajou University School of Medicine, Suwon, South Korea (M Lee PhD); Department of Health Sciences, University of Leicester, Leicester, UK (P H Lee PhD, S J Tromans PhD); Pattern Recognition and Machine Learning Laboratory, Gachon University, Seongnam, South Korea (Prof S Lee PhD); Department of Precision Medicine, Sungkyunkwan University, Suwon-si, South Korea (Prof S W Lee MD); Department of Family Medicine (W Lee PhD) and Department of Pathology (V Y Tat BS), University of Texas, Galveston, TX, USA; Department of Preventive Medicine (Prof Y Lee PhD), Korea University, Seoul, South Korea (Prof M Shin PhD); Knowledge Translation Directorate, Ethiopian Public Health Institute, Addis Ababa, Ethiopia (S M Legesse PhD); Department of Health Promotion and Health Education, National Taiwan Normal University, Taipei, Taiwan (M Li PhD); Department of Health Management Center, Fudan University, Shanghai, China (X Li PhD); National Clinical Research Center for Cardiovascular Diseases, Chinese Academy of Medical Sciences, Shenzhen, China (Y Li PhD); Directorate of Quality Management and Digital Health, Ministry of Health, Lilongwe, Malawi (A T M Likaka MPH); Asbestos Diseases Research Institute, Concord, NSW, Australia (R Lin PhD); Department of Neurology, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA, USA (V Lioutas MD); Department of Neurology, Framingham Heart Study, Framingham, MA, USA (V Lioutas MD); Department of Dentistry-Quality and Safety of Oral Health Care, Radboud University, Nijmegen, Netherlands (Prof S Listl PhD); Department of Translational Health Economics, Heidelberg University Hospital, Heidelberg, Germany (Prof S Listl PhD); Department of Molecular Epidemiology, German Institute of Human Nutrition Potsdam-Rehbrücke, Potsdam, Germany (E Llanaj PhD); German Center for Diabetes Research, München-Neuherberg, Germany (E Llanaj PhD); Department of Internal Medicine, Kirk Kerkorian School of Medicine at UNLV, Las Vegas, NV, USA (C Lo MD); School of Medicine and Public Health (A Loreche BS) and Center for Research and Innovation (V F Pepito MSc), Ateneo De Manila University, Pasig City, Philippines; Department of Health Economics, Syreon Research Romania, Targu Mures, Romania (L Lorenzovici MSc); Department of Doctoral Studies, George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Targu Mures, Romania (L Lorenzovici MSc); School of Medicine, Federal University of Juiz de Fora, Juiz de Fora, Brazil (Prof G Lucchetti PhD); Department of General Surgery, Liverpool University Hospitals NHS Foundation Trust, Liverpool, UK (Prof R Lunevicius DSc); Department of Epidemiology and Disease Control, Ministry of Health, Singapore (S Ma PhD); Centre for Public Health and Wellbeing, University of the West of England, Bristol, UK (Z Ma PhD); Veterinary Microbiology, Suez Canal University, Ismailia, Egypt (M Mabrok PhD); 2nd Department of Propaedeutic Surgery (N Machairas PhD), Department of Biophysics (Prof P Papadopoulou PhD), and 3rd Department of Cardiology (M Spartalis PhD), University of Athens, Athens, Greece; Periodontal Department, Pomeranian Medical University, Szczecin, Poland (Prof M Machoy PhD); Department of Human Nutrition Research, Autonomous University of Sinaloa, Culiacán, Mexico (J A Magaña Gómez PhD); School of Pharmacy, University of the West Indies, St Augustine, Trinidad and Tobago (S B Maharaj DBA); Planetary Health Alliance, Boston, MA, USA (S B Maharaj DBA); Department of Clinical and Hospital Pharmacy, Taibah University, Al-Madinah Al-Munawarrah, Saudi Arabia (M A Mahmoud PhD); Radiology and Precision Health Program, Michigan State University, East Lansing, MI, USA (M Mahmoudi PhD); Department of Internal Medicine, Dayanand Medical College and Hospital, Ludhiana, India (K Malhotra MBBS); Department of Electrical Engineering, Prince Sattam bin Abdulaziz

University, Al Kharj, Saudi Arabia (I Malik PhD); Department of Health Research, Ministry of Health, Pretoria, South Africa (L A Malinga PhD); Institute for Social Science Research, University of Queensland, Indooroopilly, QLD, Australia (A A Mamun PhD); Smidt Heart Institute, Cedars-Sinai Medical Center, Los Angeles, CA, USA (Y Manla MD); Laboratory of Public Health, Italian Auxological Institute, Milan, Italy (Prof L G Mantovani DSc); Biomedical Engineering Research Center, Universitat Politècnica de Catalunya, Barcelona, Spain (H Marateb PhD); Biomedical Engineering, University of Isfahan, Isfahan, Iran (H Marateb PhD); University Health Services, University of Wisconsin-Madison, Madison, WI, USA (A M Marconi MD); Center for the Study and Investigation of Addiction Prevention and Treatment, University of Buenos Aires, Buenos Aires, Argentina (A M Marconi MD); Department of Food, Environmental and Nutritional Sciences, University of Milan, Milano, Italy (M Marino PhD); Department of Biochemistry (A Marjani PhD), Golestan Research Center of Gastroenterology and Hepatology (G Roshandel PhD), and Department of Neurology (S Sajedi MD), Golestan University of Medical Sciences, Gorgan, Iran; Department of Health Economics, Mayor University, Cartagena, Colombia (Prof C A Marrugo Arnedo MSc); Research Group in Health Economics (Prof C A Marrugo Arnedo MSc) and Institute for Immunological Research (Prof J Zakzuk PhD), University of Cartagena, Cartagena, Colombia; Department of Infectious Diseases (B A Martinez-Guerra MSc, E Ortiz-Brizuela MSc) and Department of Medicine (A Olivas-Martinez MD), Salvador Zubiran National Institute of Medical Sciences and Nutrition, Mexico City, Mexico; Department of Noncommunicable Diseases and Mental Health, Pan American Health Organization, Washington, DC, USA (R Martinez-Piedra BSc); Centre for Health Sciences, Federal University of Espirito Santo, Vitoria, Brazil (C A Martins MSc); Federal Institute of Education, Science and Technology of Ceará, Fortaleza, Brazil (F R Martins-Melo PhD); Department of Nutrition and Dietetics (M Martorell PhD) and Centre for Healthy Living (M Martorell PhD), University of Concepción, Concepción, Chile; Department of Pharmacy, Bahauddin Zakariya University, Multan, Pakistan (S Maryam PharmD); Faculty of Humanities and Health Sciences, Curtin University, Malaysia, Sarawak, Malaysia (Prof R R Marzo MD); Jeffrey Cheah School of Medicine and Health Sciences, Monash University, Subang Jaya, Malaysia; Department of Orthopaedic Surgery, Mayo Clinic, Phoenix, AZ, USA (K K V Mate PhD); Association of Resident Physicians, Bucharest, Romania (C N Matei PhD); North West Lung Centre, Manchester University NHS Foundation Trust, Manchester, UK (A G Mathioudakis PhD); Department of Social Medicine and Family, Dezful University of Medical Sciences, Dezful, Iran (M Mazaheri PhD); Department of Orthopedic Trauma Pathology, IRCCS, Bologna, Italy (A Mazzotti PhD); Department of Ophthalmology, Princess of Wales Hospital, Wales, UK (C McAlinden PhD); School of Optometry and Vision Sciences, Cardiff University, Cardiff, UK (C McAlinden PhD); National Centre for Register-based Research, Aarhus University, Aarhus, Denmark (Prof J J McGrath MD); Australian Centre for Health Services Innovation, Queensland University of Technology, Kelvin Grove, QLD, Australia (Prof S M McPhail PhD); Department of Healthcare, University of Vlora, Vlora City, Albania (E A Mechili PhD); Clinic of Social and Family Medicine (E A Mechili PhD) and Laboratory of Toxicology (T K Nikolouzakis PhD), University of Crete, Heraklion, Greece; Department of Preventive Oncology (J K Meena MD), Medical Oncology Laboratory (C P Prasad PhD, M Singh PhD), Centre for Dental Education and Research (B M Purohit MDS), Department of Psychiatry (Prof R Sagar MD), and Department of Radiation Oncology (A Shankar MD), All India Institute of Medical Sciences, New Delhi, India; Department of Nursing, Salale University, Fiche, Ethiopia (M M Mekonnen MSc); Peru Country Office, United Nations Population Fund, Lima, Peru (W Mendoza MD); Department of Medicine (G A Mensah MD) and Division of Cardiology (Prof M Ntsekhe PhD), University of Cape Town, Cape Town, South Africa; International Dx Department, BGI Genomics, Copenhagen, Denmark (A A Mentis MD); Neurology Unit (A Meretoja MD) and Breast Surgery Unit (T J Meretoja MD), Helsinki University Hospital, Helsinki, Finland; Department of Nursing (A M Mersha MSc), Department of Clinical Midwifery (B A Mesfin BMedSc), and School of Nursing (G E Yesera MSc), Arba Minch University, Arba Minch, Ethiopia; University Centre Varazdin, University North, Varazdin, Croatia (T Mestrovic PhD); Stritch School of Medicine, Loyola University Chicago, Chicago, IL, USA (A Mhlanga PhD); Department of Preventive Medicine (L Mhlanga PhD), Department of Medicine (Cardiology), Northwestern University, Chicago, IL, USA (N S Shah MD); Department of Anaesthesiology, "Helena Venizelou" General and Maternity Hospital, Athens, Greece (G Micha PhD); Department of Epidemiology, National Cancer Registry, Maria Sklodowska-Curie National Research Institute of Oncology, Warsaw, Poland (I Michalek PhD); Pacific Institute for Research and Evaluation, Calverton, MD, USA (T R Miller PhD); Department of Otolaryngology (S N Mindlin MD), Department of Addiction Psychiatry (V Y Skryabin MD), and Department of Addictology (Prof M S Zastrozhin PhD), Russian Medical Academy of Continuous Professional Education, Moscow, Russia; Unit of Statistics, Istituto Superiore di Sanità, Rome, Italy (G Minelli PhD); Global Institute of Public Health, Ananthapuri Hospitals and Research Institute, Trivandrum, India (Prof G Mini PhD); Clinical Research Department, Kilimanjaro Clinical Research Centre, Moshi, Tanzania (N W Minja MD); Department of Neurology, State University of New York, Buffalo, NY, USA (O Mirmosayyeb MD); Federal Ministry of Health, Addis Ababa, Ethiopia (M K Mirutse MPH); Social Determinants of Health Center (M Mirza-Aghazadeh-Attari MD) and School of Medicine (P Mokhtarzadehazar MD), Urmia University of Medical Sciences, Urmia, Iran (R Valizadeh PhD); Department of Forensic Medicine and Toxicology, Dr B C Roy Multi-Specialty Medical Research Centre, Kharagpur, India (C Mittal MD); Institute of Addiction Research, Frankfurt University of Applied Sciences, Frankfurt, Germany (B Moazen MSc); College of Health Science (A I Mohamed MSc) and College of Applied and Natural Science (J Mohamed MSc), University of Hargeisa, Hargeisa, Somalia; Molecular Biology Unit (N S Mohamed MSc) and Department of Bio-Statistical and Molecular Biology (N S Mohamed MSc), Sirius Training and Research Centre, Khartoum, Sudan; Health Economics Division, Ministry of Health and Medical Education, Mashhad, Iran (S Mohammadpour PhD); Department of Pharmaceutical Sciences, Notre Dame of Maryland University, Baltimore, MD, USA (S Mohammed PhD); Department of Pharmacy, Mizan-Tepi University, Mizan, Ethiopia (S Mohammed PhD); Health Systems and Policy Research Unit (S Mohammed PhD) and Department of Community Medicine (A A Olorukooba MSc), Ahmadu Bello University, Zaria, Nigeria; Clinical Epidemiology and Public Health Research Unit, Burlo Garofolo Institute for Maternal and Child Health, Trieste, Italy (L Monasta DSc, L Ronfani PhD, G Zamagni MSc); Department of Epidemiology and Biostatistics (Y Moradi PhD) and Social Determinants of Health Research Center (F Moradpour PhD), Kurdistan University of Medical Sciences, Sanandaj, Iran; Computer, Electrical, and Mathematical Sciences and Engineering Division, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia (P Moraga PhD); Department of Public Health, Oswaldo Cruz Foundation, Recife, Brazil (Prof R S Moreira PhD); Department of Public Health, Federal University of Pernambuco, Recife, Brazil (Prof R S Moreira PhD); Department of Biology and Biological Engineering, Chalmers University of Technology, Gothenburg, Sweden (J Morze PhD); College of Medical Sciences, SGMK Copernicus University, Warsaw, Poland (J Morze PhD); Department of Epidemiology, Aging Research Institute, Tabriz, Iran (S Mousavi MD); Department of Fruit and Vegetable Product Technology, Prof Wacław Dąbrowski Institute of Agricultural and Food Biotechnology State Research Institute, Warsaw, Poland (Prof A Mousavi Khaneghah PhD); Research Department, Instituto de Estudos para Políticas de Saúde, São Paulo, Brazil (M Mrejen PhD); Unit of Pharmacotherapy, Epidemiology and Economy (S Mubarik MS), University Medical Center Groningen (Prof M J Postma PhD), and Department of Internal Medicine (P Vart PhD), University of Groningen, Groningen, Netherlands; Demographic Change and Aging Research Area (A Werdecker PhD), Competence Center of Mortality-Follow-Up of the German National Cohort (R Westerman DSc), Federal Institute for Population Research, Wiesbaden, Germany (Prof U O Mueller MD); Center for Population and Health, Wiesbaden, Germany (Prof U O Mueller MD); School of Medicine, Keele University, Keele, UK (F Mughal FRCGP); Department of Knowledge Management, Prahlad Omkarwati Foundation, Mumbai, India (S Mukherjee PhD); New Delhi, India (S Mukherjee PhD);

Department of Surgery, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria (G D Mukoro MD); Department of Medicine, Democritus University of Thrace, Alexandroupolis, Greece; Department of Surgery, General University Hospital of Patras, Patras, Greece (F Mulita PhD, G Verras MD); Faculty of Medicine (F Mulita PhD), Department of Internal Medicine (G Ntaios PhD), and Department of Emergency Medicine (I Pantazopoulos PhD), University of Thessaly, Larissa, Greece; Department of Health Economics, National Institute for Research in Tuberculosis, Chennai, India (M Muniyandi PhD); School of Veterinary Medicine (F Musaigwa PhD) and Department of Biostatistics Epidemiology and Informatics (J Puvvula PhD), University of Pennsylvania, Philadelphia, PA, USA; Department of Research and Innovation, Burjeel Medical City, Abu Dhabi, United Arab Emirates (Prof K M Musallam MD); Department of Pediatrics and Pediatric Pulmonology, Institute of Mother and Child Care, Multan, Pakistan (Prof G Mustafa MD); Department of Research Methodology, Orthopaedic Research Group, Coimbatore, India (S Muthu MS); Department of Medical Microbiology and Immunology, Mekelle University, Mekelle, Ethiopia (S Muthupandian PhD); Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Chennai, India (S Muthupandian PhD); Department of Neuropsychiatry, Seoul National University, Seongnam-si, South Korea (W Myung PhD); Knowledge Translation and Utilization, Egyptian Center for Evidence Based Medicine, Cairo, Egypt (Prof A F Nabhan PhD); Department of Research and Analytics, Initiative for Financing Health and Human Development, Chennai, India (A J Nagarajan MTech); Department of Research and Analytics, Bioinsilico Technologies, Chennai, India (A J Nagarajan MTech); Comprehensive Cancer Center (G Naik MPH) and Department of Psychology (D C Schwebel PhD), University of Alabama at Birmingham, Birmingham, AL, USA; Laboratory of Public Health Indicators Analysis and Health Digitalization, Moscow Institute of Physics and Technology, Dolgoprudny, Russia (M Naimzada MD, N Otstavnov BA); Experimental Surgery and Oncology Laboratory, Kursk State Medical University, Kursk, Russia (M Naimzada MD); Department of Pulmonary Medicine, Government Medical College Trivandrum, Trivandrum, India (S Nair MD); Health Action by People, Trivandrum, India (S Nair MD); Department of Community Medicine, MOSC Medical College, Kolenchery, India (T S Nair MD); Department of Medical Laboratory Analysis, Cihan University-Sulaimaniya, Sulaimaniya, Iraq (H H Najmuldeen PhD); Department of Dermatology, San Bortolo Hospital, Vicenza, Italy (Prof L Naldi MD); GISED Study Center, Bergamo, Italy (Prof L Naldi MD); Suraj Eye Institute, Nagpur, India (V Nangia MD); National Dental Research Institute Singapore, Duke-NUS Medical School, Singapore (G G Nascimento PhD); Department of Applied Pharmaceutical Sciences and Clinical Pharmacy, Isra University, Amman, Jordan (A Y Naser PhD); Department of Biotechnology, University of Central Punjab, Lahore, Pakistan (M Naveed PhD); Department of Health Promotion (A Nazri-Panjaki MSc) and Health Promotion Research Center (H Okati-Aliabad PhD), Zahedan University of Medical Sciences, Zahedan, Iran; Diseases Prevention and Control Team, Department of Public Health, Gedo, Ethiopia (A K Negero MPH); Department of General Surgery (I Negoi PhD) and Fourth Department of General Surgery (D Serban PhD), Emergency University Hospital Bucharest, Bucharest, Romania; Department of Cardiology, Cardio-Aid, Bucharest, Romania (R I Negoi PhD); Department of Oncology, Victor Babes University of Medicine and Pharmacy, Timisoara, Romania (S Negru MD); Faculty of Medicine, Euromed University of Fes, Fez, Morocco (Prof C Nejjari PhD); Faculty of Medicine, University Sidi Mohammed Ben Abdellah, Fez, Morocco (Prof C Nejjari PhD); Department of Community Medicine, Kathmandu University, Palpa, Nepal (S Nepal MD); Department of Neurosciences, Kenya Medical Research Institute/Wellcome Trust Research Programme, Kilifi, Kenya (Prof C R J Newton MD); Department of Biological Sciences, University of Embu, Embu, Kenya (J W Ngunjiri DrPH); Department of Medical Engineering, University of South Florida, Tampa, FL, USA (D H Nguyen BS); Department of Surgery, Danang Family Hospital, Danang, Viet Nam (P T Nguyen MD); Institute for Cancer Control, National Cancer Center, Tokyo, Japan (P T Nguyen MPH); Graduate School of Public Health, St Luke's International University, Chuo-ku, Japan (P T Nguyen MPH); Department of Urology (T Nguyen MD) and Department of Radiology (S Rafiei Alavi MD), University of California Irvine, Irvine, CA, USA; Institute for Mental Health and Policy, Centre for Addiction and Mental Health, Toronto, ON, Canada (Y T Nigatu PhD); Department of General Surgery, University Hospital of Heraklion, Heraklion, Crete, Greece (T K Nikolouzakis PhD); Department of Internal Medicine, Ziauddin University, Karachi, Pakistan (M A Nizam MD); Department of Health Policy and Management, Keio University, Tokyo, Japan (S Nomura PhD); Department of Microbiology and Molecular Genetics, The Women University Multan, Multan, Pakistan (M Noreen PhD); Department of Clinical Sciences, Lund University, Lund, Sweden (Prof B Norrving PhD); Department of Paediatrics, Nnamdi Azikiwe University, Awka, Nigeria (C A Nri-Ezedi MD); The Cardiac Clinic, Groote Schuur Hospital, Cape Town, South Africa (Prof M Ntsekhe PhD); Unit of Microbiology and Public Health, Institute of Medical Sciences, Las Tablas, Panama (V Nuñez-Samudio PhD); Department of Public Health, Ministry of Health, Herrera, Panama (V Nuñez-Samudio PhD); Department of Public Health, Banten School of Health Science, South Tangerang, Indonesia (D Nurrika PhD); Ministry of Research, Technology and Higher Education, Higher Education Service Institutions Region IV, Bandung, Indonesia (D Nurrika PhD); Department of Applied Economics and Quantitative Analysis, University of Bucharest, Bucharest, Romania (Prof B Oancea PhD); Department of Pediatrics, University of Jos, Jos, Nigeria (A O D Ofakunrin MSc); Department of Pediatrics, Jos University Teaching Hospital, Jos, Nigeria (A O D Ofakunrin MSc); Department of Preventive Medicine (I Oh PhD) and Department of Pediatrics (Prof D Yon MD), Kyung Hee University, Seoul, South Korea; Sydney, NSW, Australia (S R Okeke PhD); Department of Food and Nutrition (A P Okekunle PhD) and Department of Orthopedic Surgery (B Xu MD), Seoul National University, Seoul, South Korea; Department of Food Science and Postharvest Technology, Gulu University, Gulu, Uganda (L Okidi MSc); Department of Medical Physiology, Babcock University, Ilisan-Remo, Nigeria (P G Okwute MSc); Department of Medical Physiology (P G Okwute MSc) and Department of Psychiatry (A T Olagunju MD), University of Lagos, Lagos, Nigeria; Department of Nursing Science, Bowen University, Iwo, Nigeria (M I Olatubi PhD); Department of Cardiology, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil (G M M Oliveira PhD); Department of Literature, Film, and Theatre Studies, University of Essex, Colchester, UK (Prof S Oliver PhD); Slum and Rural Health Initiative Research Academy, Slum and Rural Health Initiative, Ibadan, Nigeria (I I Olufadewa MHS); Centre for Healthy Start Initiative, Lagos, Nigeria (B O Olusanya PhD, J O Olusanya MBA); Department of Anatomy, Olabisi Onabanjo University, Sagamu, Nigeria (G O Oluwatunase MSc); Department of Pharmacology and Toxicology, Beni-Suef University, Beni-Suef, Egypt (Prof H A Omar PhD); Department of Surgery, Sulaimani University, Sulaimani, Iraq (G L Omer MD); ENT Department, Tor Vergata University of Rome, Rome, Italy (G L Omer MD); Non-communicable Disease Prevention Unit, Ministry of Health, Bandar Seri Begawan, Brunei (S Ong FAMS); Early Detection and Cancer Prevention Services, Pantai Jerudong Specialist Centre, Bandar Seri Begawan, Brunei (S Ong FAMS); Department of Biomedical Sciences, Mercer University School of Medicine, Macon, GA, USA (K I Onyedibe PhD); Department of Health, Lira District Local Government, Lira, Uganda (J Opio MPH); Department of Pharmacotherapy and Pharmaceutical Care (M Ordak PhD) and Department of Biochemistry and Pharmacogenomics (M Zielińska MPharm), Medical University of Warsaw, Warsaw, Poland; Research Department, Asociacion IDEI Guatemala, Quetzaltenango, Guatemala (E Orellana PhD); University of Port Harcourt, Port Harcourt, Nigeria (Prof O E Orisakwe PhD); Sickle Cell Unit, Ho Teaching Hospital, Ho Municipality, Ghana (V N Orish PhD); Department of Nephrology and Hypertension, The Institute for Health Research Foundation Jiménez Díaz University Hospital, Madrid, Spain (Prof A Ortiz MD); One Health Global Research Group, University of the Americas, Quito, Ecuador (Prof E Ortiz-Prado PhD); School of Medicine (U L Osuagwu PhD) and Translation Health Research Institute (K Rana PhD), Western Sydney University, Campbelltown, NSW, Australia; Department of Optometry and Vision Science, University of KwaZulu-Natal, KwaZulu-Natal, South Africa (U L Osuagwu PhD); Division of Infectious Diseases, University Hospital of Setif, Setif, Algeria (Prof A Ouyahia PhD); Department of General Surgery, Central

South University, ChangSha, China (G Ouyang MD); Department of Respiratory Medicine (Prof M P P A DNB), Department of Forensic Medicine and Toxicology (S Rani MD), and Department of Oral and Maxillofacial Surgery (M S MDS, C S N PhD), Jagadguru Sri Shivarathreeswara University, Mysore, India; Department of Forensic Medicine and Toxicology, Kasturba Medical College, Mangalore, Mangalore, India (J Padubidri MD); Systems and Information Engineering, University of Virginia, Charlottesville, VA, USA (M Pahlavikhah Varnosfaderani MSc); Department of Neurology, National Institute of Mental Health and Neurosciences, Bengalore, India (Prof P K Pal DM); Research Institute for Medicines-FFUL (C Palladino PhD) and Research Institute for Medicines (Prof N Taveira PhD), University of Lisbon, Lisbon, Portugal; Department of Public Health, University of Naples Federico II, Naples, Italy (R Palladino MD); Department of Mental Health, Vall d'Hebron University Hospital, Barcelona, Spain (R F Palma-Alvarez PhD); Department of Psychiatry, Mental Health, and Addictions (R F Palma-Alvarez PhD), Vall d'Hebron Research Institute, Barcelona, Spain; Department of Public Health, Babes Bolyai University, Cluj Napoca, Romania (A Pana PhD); Department of Health Metrics, Center for Health Outcomes and Evaluation, Bucharest, Romania (A Pana PhD); Research Department, Public Health Research Society Nepal, Kathmandu, Nepal (A Pandey MPH); Saveetha Medical College and Hospitals (S R Pandi-Perumal MSc) and Centre of Molecular Medicine and Diagnostics (Prof S Patil PhD), Saveetha University, Chennai, India; Division of Research and Development, Lovely Professional University, Phagwara, India (S R Pandi-Perumal MSc); National Research and Innovation Agency, Jakarta, Indonesia (H U Pangaribuan MSc); Department of Ophthalmology, Nottingham University Hospitals Queen's Medical Centre Campus, Nottingham, UK (G D Panos PhD); Division of Ophthalmology and Visual Sciences, University of Nottingham, Nottingham, UK (G D Panos PhD); Department of Science and Mathematics, Deree–The American College of Greece, Athens, Greece (Prof P Papadopoulou PhD); Vision and Eye Research Institute, Anglia Ruskin University, Cambridge, UK (Prof S Pardhan PhD); Department of Epidemiology and Community Health, University of Minnesota School of Public Health, Minneapolis, MN, USA (R R Parikh MD); Research Center, Allergy Asthma and Chest Center, Mysore, India (A Parthasarathi MD); Department of Cardiology, MercyOne North Iowa Medical Center, Mason City, IA, USA (D Pasupula MD); Department of Epidemiology, Human Genetics and Environmental Sciences, The University of Texas Health Science Center at Houston, Dallas, TX, USA (J R Patel PhD); Department of Epidemiology, University of Arkansas for Medical Sciences, Little Rock, AR, USA (J R Patel PhD); Department of Poverty, Gender and Youth, Population Council, New Delhi, India (S K Patel PhD); Author Gate Publications, Malegaon, India (A R Pathan PhD); College of Dental Medicine, Roseman University of Health Sciences, South Jordan, UT, USA (Prof S Patil PhD); Second Department of Internal Medicine, European Interbalkan Medical Center, Thessaloniki, Greece (D Patoulias PhD); Department of Internal Medicine, Advent Health, Palm Coast, FL, USA (V Patthipati MD); Department of Hospital Medicine, Sound Physicians, Palm Coast, FL, USA (V Patthipati MD); Department of Clinical Research, IRCCS Fondazione Don Carlo Gnocchi, Milan, Italy (P Pedersini MSc, J H Villafañe PhD); Outpatient Department, Taihe Hospital, Shiyan, China (M Peng MPH); The First Clinical College, Hubei University of Medicine, Shiyan, China (M Peng MPH); Department of Neurology, IRCCS Humanitas Research Hospital, Milan, Italy (U Pensato MD); Curtin School of Population Health, Curtin University, Bentley, WA, Australia (Prof G Pereira PhD); Centre for Fertility and Health (Prof G Pereira PhD) and Department of Chemical Toxicology (M W Wojewodzic PhD), Norwegian Institute of Public Health, Oslo, Norway; Department of Orthopedics (J Pereira MS) and Department of Dermatology, Venereology and Leprosy (Prof M M Shenoy MD), Yenepoya Medical College, Mangalore, India; International Institute for Educational Planning, Albert Einstein Hospital, São Paulo, Brazil (Prof M F P Peres MD); Mario Negri Institute for Pharmacological Research, Bergamo, Italy (N Perico MD, Prof G Remuzzi MD); Faculty of Medicine, Diego Portales University, Santiago, Chile (F E Petermann-Rocha PhD); Department of Medicine, Endocrinology Unit, University of Padova, Padova, Italy (R Pezzani PhD); Associazione Italiana Ricerca Oncologica di Base, Padova, Italy (R Pezzani PhD); Department of Psychiatry (Prof M R Phillips MD), Department of Neurology (Prof N Scarmeas PhD), and Department of Health and Behavior Studies (Prof I D Sigfusdottir PhD), Columbia University, New York, NY, USA; National Centre for Disease Prevention and Health Promotion, National Institute of Health, Roma, Italy (D Pierannunzio PhD); Department of Pediatric Orthopedic Surgery, Hôpital Necker-Enfants Malades, Paris, France (M Pigeolet MD); Department of Neonatology (N Plakkal MD) and Department of Preventive and Social Medicine (G Saya MD), Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, India; Research School of Chemistry and Applied Biomedical Sciences, Tomsk Polytechnic University, Tomsk, Russia (E Plotnikov PhD); Mental Health Research Institute, Tomsk National Research Medical Center of the Russian Academy of Sciences, Tomsk, Russia (E Plotnikov PhD); Clinical Academic Department of Pediatrics (Prof D Poddighe PhD), University Medical Center, Astana, Kazakhstan; Data Driven Health Division, Hungarian Healthcare Management Association, Budapest, Hungary (P Pollner PhD); Department of Data Management and Analysis, The INCLEN Trust International, New Delhi, India (R Poluru PhD); Discipline of General Practice, University of Newcastle, Callaghan, NSW, Australia (Prof C D Pond PhD); Non-communicable Diseases Research Center, Bam University of Medical Sciences, Bam, Iran (N Pourtaheri PhD); Clinical Research Center, Valle del Lili Foundation, Cali, Colombia (S I Prada PhD); Research Center for Social and Health Economics, ICESI University, Cali, Colombia (S I Prada PhD); Department of Biochemistry, Central University of Rajasthan, Ajmer, India (V K Prajapati PhD); Askok and Rita Patel Institute of Physiotherapy, Charotar University of Science and Technology, Anand, India (V Prakash PhD); Department of Clinical Research and Epidemiology, Institute of Liver and Biliary Sciences, New Delhi, New Delhi, India (M Prasad MD); Department of Biochemistry, Jagadguru Sri Shivarathreeswara University, Mysuru, India (Prof A Prashant PhD); Department of Computer Science, Cihan University-Sulaymaniyah, Sulaymaniyah, Iraq (N H Qasim PhD); Department of Cardiology, Third Military Medical University, Chongqing, China (G Qian MS); College of Medicine, University of Central Florida, Orlando, FL, USA (A Radfar MD); Department of Medical Oncology, Cancer Institute, Chennai, India (Prof V Radhakrishnan MD); Department of Epidemiology and Biostatistics, Shiraz University of Medical Sciences, Shahrekord, Iran (H Raeisi Shahraki PhD); Research and Development Coordination, National Institutes of Health, Islamabad, Pakistan (I Rafique PhD); Neurology, Public Health and Disability Unit, Carlo Besta Neurological Institute, Milan, Italy (A Raggi PhD); Department of Health Sciences, Cihan University-Sulaimaniya, Sulaymaniyah, Iraq (Prof F Rahim PhD); Cihan University Sulaimaniya Research Center, Sulaymaniyah, Iraq (Prof F Rahim PhD); Institute of Health and Wellbeing, Federation University Australia, Berwick, VIC, Australia (M Rahman PhD); Dhaka, Bangladesh (T Rahman Mcom); Future Technology Research Center, National Yunlin University of Science and Technology, Yunlin, Taiwan (A Rahmani PhD); Centre for Chronic Disease Control, New Delhi, India (P Rajput PhD); Research and Innovation Division, South Asian Institute for Social Transformation, Dhaka, Bangladesh (J Rana MPH); Department of Health and Public Policy, Global Center for Research and Development, Kathmandu, Nepal (C L Ranabhat PhD); Centre for Clinical Pharmacology, University of Defence in Belgrade, Belgrade, Serbia (N Rancic PhD); Centre for Clinical Pharmacology, Medical College of Georgia at Augusta University, Belgrade, Serbia (N Rancic PhD); School of Humanities and Social Sciences, Indian Institute of Technology Mandi, Mandi, India (S Ranjan MA); Department of Oral Pathology, Sharavathi Dental College and Hospital, Shimogga, India (S Rao MDS); Data Analytic Services, British Columbia Centre for Disease Control, Vancouver, BC, Canada (D P Rasali PhD); University of Social Welfare and Rehabilitation Sciences, Tehran, Iran (V Rashedi PhD); Department of Medicine, Jinnah Sindh Medical University, Karachi, Pakistan (A M Rashid MD); Department of Geography, Soran University, Soran, Iraq (A Rasul PhD); Section of Pulmonary and Critical Care Medicine, University of Chicago, Chicago, IL, USA (N Ravikumar MD); Inovus Medical, St Helens, UK (D L Rawaf MRCS); Academic Public Health England, Public Health England, London, UK (Prof S Rawaf MD); Department of Computer

Science, Boston University, Boston, MA, USA (R Rawassizadeh PhD); Department of Biological Sciences, King Abdulaziz University, Jeddah, Egypt (Prof E M M Redwan PhD); Department of Protein Research, Research and Academic Institution, Alexandria, Egypt (Prof E M M Redwan PhD); Grenoble Computer Science Laboratory, University of Grenoble Alpes, Grenoble, France (F Rehman PhD); Brien Holden Vision Institute, Sydney, NSW, Australia (Prof S Resnikoff MD); Unisabana Center for Translational Science, Savannah University, Chia, Colombia (L F Reyes PhD); Department of Critical Care, Savannah University Clinic, Chia, Colombia (L F Reyes PhD); Network of Immunity in Infection, Malignancy and Autoimmunity, Universal Scientific Education and Research Network, Tehran, Iran (Prof N Rezaei PhD); Department of Epidemiology and Biostatistics, Rafsanjan University of Medical Sciences, Rafsanjan, Iran (Prof M Rezaeian PhD); School of Physiotherapy, University of Otago, Dunedin, New Zealand (D C Ribeiro PhD); Department of Surgery, University of Minnesota, Minneapolis, MN, USA (J Rickard MD); Department of Surgery, University Teaching Hospital of Kigali, Kigali, Rwanda (J Rickard MD); Carlos Slim Foundation, Mexico City, Mexico (M Rios-Blancas DSc); Department of Pharmacology and Toxicology, University of Antioquia, Medellin, Colombia (Prof J A B Rodriguez PhD); Department of Clinical Research, Federal University of Uberlândia, Uberlândia, Brazil (L Roever PhD); Gilbert and Rose-Marie Chagoury School of Medicine, Lebanese American University, Beirut, Lebanon (L Roever PhD); Center for Indigenous Health Research, Wuqu' Kawoq Maya Health Alliance, Tecpan, Guatemala (P Rohloff MD); Faculty of Nursing, Chulalongkorn University, Bangkok, Thailand (D S Romadlon PhD); School of Medicine, Gonabad University of Medical Sciences, Gonabad, Iran (M Rostamian PhD); Faculty of Medicine, Quest International University Perak, Ipoh, Malaysia (B Roy PhD); Department of Labour, Directorate of Factories, Government of West Bengal, Kolkata, India (P Roy PhD); Palmira Research Center, Colombian Agricultural Research Corporation, Bogota, Colombia (E Rubagotti PhD); Department of Health Statistics, National Institute for Medical Research, Dar es Salaam, Tanzania (S F Rumisha PhD); Department of Internal Medicine, University of Botswana, Gaborone, Botswana (G M Rwegerera MD); Department of Cardiology and Internal Medicine, University of Warmia and Mazury, Olsztyn, Poland (Prof A Rynkiewicz PhD); Institute of Neuroscience and Physiology (Prof K S Sunnerhagen PhD) and Department of Occupational and Environmental Medicine (L Stockfelt PhD), University of Gothenburg, Gothenburg, Sweden; Department of Neurocare, Sabzevar University of Medical Sciences, Gothenburg, Sweden (Prof K S Sunnerhagen PhD); Directorate General Health Prevention, Communicable Diseases and International Prophylaxis, Ministry of Health, Rome, Italy (M Sabbatucci PhD); Department of Medical Pharmacology (M M Saber-Ayad MD) and Department of Public Health and Community Medicine (M R Salem MD), Cairo University, Giza, Egypt; Multidisciplinary Laboratory Foundation University School of Health Sciences, Foundation University, Islamabad, Pakistan (Prof U Saeed PhD); International Center of Medical Sciences Research, Islamabad, Pakistan (Prof U Saeed PhD); Department of Community Medicine and Family Medicine (S S Sahoo MD, M Verma MD), Department of Anatomy (A Singal PhD), and Department of Radiodiagnosis (P Singh MD), All India Institute of Medical Sciences, Bathinda, India; Department of Statistics, University of Gujrat, Pakistan, Gujrat, Pakistan (M R Sajid PhD); Institute for Employment Research, Nuremberg, Germany (J W Sakshaug PhD); Medical Laboratory, Azad University of Medical Sciences, Tehran, Iran (S Salahi BMedSc); Department of Advanced Therapy Medicinal Products, Royan Institution, Tehran, Iran (S Salahi MD); Department of Integrated Health Education, Federal University of Espirito Santo, Vitória, Brazil (Prof L B Salaroli PhD); Department of Technology Management, University College of Applied Sciences, Gaza, Palestine (Prof M Z Y Salem PhD); School of Economics and Management, University of Kassel, Kassel, Germany (Prof M Z Y Salem PhD); Department of Neurology, University of Southern Denmark, Odense, Denmark (S Samadzadeh MD); Department of Urology, University of Texas Health Science Center at San Antonio, San Antonio, TX, USA (K A Samara MD); Department of Anatomy, Ras Al Khaimah Medical and Health Sciences University, Ras Al Khaimah, United Arab Emirates (Prof V P Samuel PhD); Institute of Neuroanatomy, Uniklinik Rhine-Westphalia Technical University of Aachen, Aachen, Germany (N Sanadgol PhD); Department of Applied Sciences, Northumbria University, Newcastle upon Tyne, UK (E Sanganyado PhD); Science Policy Division, Zimbabwe Young Academy of Sciences, Gwanda, Zimbabwe (E Sanganyado PhD); Department of Pediatrics, Pravara Institute of Medical Sciences, Loni, India (R K Sanjeev MD); College of Public Health, University of Ahmad Dahlan, Yogyakarta, Indonesia (I N Santri PhD); Pharmacy Study Program, Udayana University, Badung, Indonesia (M A Sarasmita PharmD); Indira Gandhi Medical College and Research Institute, Puducherry, India (A Saravanan MD); Department of Orthpaedics and Trauma Surgery, University of Freiburg, Freiburg, Germany (B Saravi PhD); Department of Orthopaedics, Loretto Hospital Freiburg, Freiburg, Germany (B Saravi PhD); Department of Public Health, Jahrom University of Medical Sciences, Jahrom, Iran (Y Sarikhani PhD); Department of Health and Society, University of Applied and Environmental Sciences, Bogota, Colombia (Prof R Sarmiento-Suárez MPH); National School of Public Health, Carlos III Health Institute, Madrid, Spain (Prof R Sarmiento-Suárez MPH); Faculty of Health and Social Sciences, Bournemouth University, Bournemouth, UK (B Sathian PhD); Department of Family and Preventive Medicine (T Sathish PhD) and Rollins School of Public Health (Prof D A Sleet PhD), Emory University, Atlanta, GA, USA; IRCCS Maugeri Scientific Clinical Institute, Milan, Italy (D Sattin PsyD); Department of Medical Informatics, Kagawa University, Miki-cho, Japan (J Saulam MSc); Food Processing and Nutrition, Karnataka State Akkamahadevi Women's University, Vijayapura, India (J Saulam MSc); Department of Educational Sciences, Farhangian University, Kermanshah, Iran (Y Sayadi PhD); Department of Post-Harvest Technology and Marketing, Patuakhali Science and Technology University, Patuakhali, Bangladesh (A Sayeed MSc); National Centre for Epidemiology and Population Health, Australian National University, Acton, ACT, Australia (M Sayeed MS, A Talukder MSc); Market Access Division, Bayer, Istanbul, Türkiye (M Saylan MD); Department of Neurology, National and Kapodistrian University of Athens, Athens, Greece (Prof N Scarmeas PhD); Cardiovascular Research Center, Massachusetts General Hospital, Cambridge, MA, USA (A Schuermans BSc); Department of Cardiovascular Sciences, Katholieke Universiteit Leuven, Leuven, Belgium (A Schuermans BSc, J Van den Eynde BSc); Clinic for Conservative Dentistry and Periodontology, University Hospital of the Ludwig-Maximilians-University Munich, Munich, Germany (Prof F Schwendicke PhD); Department of Medical Statistics, University of Zagreb, Zagreb, Croatia (M Šekerija PhD); Department of Epidemiology and Prevention of Chronic Noncommunicable Diseases, Croatian Institute of Public Health, Zagreb, Croatia (M Šekerija PhD); Faculty of Dentistry, AIMST University, Bedong, Malaysia (S Selvaraj PhD); Department of Biomedical Sciences, Gulf Medical University, Ajman, United Arab Emirates (P Sengupta PhD); Emergency Department, Manian Medical Centre, Erode, India (S Senthilkumaran MD); Department of Medicine and Surgery, Government Doon Medical College, Dehradun, India (Y Sethi MBBS); Department of Infectious Diseases and Microbiology, Rajiv Gandhi University of Health Sciences, Bangalore, India (P A Shah MBBS); Department of HepatoPancreatoBiliary Surgery and Liver Transplant, Healthcare Global Limited Cancer Care Hospital, Bangalore, India (P A Shah MBBS); Division of Preventive Cardiology, Houston Methodist Academic Institute, Houston, TX, USA (I Shahid MBBS); Karachi, Pakistan (M A Shaikh MD); Department of Pathology and Laboratory Medicine, Northwell Health, New York, NY, USA (S Sham MD); Research Institute of Pharmaceutical Sciences (H Shamshad PhD) and International Center for Chemical and Biological Sciences (S Ullah MSc), University of Karachi, Karachi, Pakistan; Department of Pathobiology, Shahid Bahonar University of Kerman, Kerman, Iran (M Shamshirgaran PhD); Department of Clinical Review and Safety, Baim Institute for Clinical Research, Boston, MA, USA (S Sharfaei MD); Department of General Surgery, Mayo Clinic Foundation for Medical Education and Research, Rochester, MN, USA (M Shariff MD); Faculty of Medicine, University of Azuay, Cuenca, Ecuador (J Sharifi-Rad PhD); University School of Management and Entrepreneurship, Delhi Technological University, Delhi, India (R Sharma PhD); Department of Physiotherapy, Kathmandu University,

Dhulikhel, Nepal (S Sharma PhD); Department of Microbiology, Yenepoya University, Mangalore, India (R P Shastry PhD); Department of Engineering (A Shavandi PhD) and Department of Molecular Biology (R Shey PhD), Free University of Brussels, Brussels, Belgium; Department of Bioengineering, Clemson University, Clemson, SC, USA (A Shayan BS); Department of Plant and Microbiology, ACS Medical College and Hospital, Cairo, Egypt (A M E Shehabeldine PhD); Department of Psychology, University of Massachusetts Lowell, Boston, MA, USA (J Shen PhD); Department of Biochemistry and Molecular Biology, University of Buea, Buea, Cameroon (R Shey PhD); Tokyo Foundation for Policy Research, Tokyo, Japan (Prof K Shibuya MD); Department of Public Health, Dambi Dollo University, Dembi Dollo, Ethiopia (D Shiferaw MPH); National Institute of Infectious Diseases, Tokyo, Japan (M Shigematsu PhD); Department of Pediatrics, Yonsei University College of Medicine, Seoul, South Korea (Prof J Shin MD); Finnish Institute of Occupational Health, Helsinki, Finland (R Shiri PhD); Department of Clinical Immunology and Hematology, Sofiamed University Hospital, Sofia, Bulgaria (V Shivarov PhD); Department of Genetics, Sofia University "St Kliment Ohridiski", Sofia, Bulgaria (V Shivarov PhD); School of Pharmacy, Monash University, Selangor Darul Ehsan, Malaysia (S Shrestha PharmD); National Institute of Psychology, Quaid-i-Azam University, Islamabad, Pakistan (K Shuja MS); The Cooper Institute, Dallas, TX, USA (K Shuval PhD); Global Health Research Center, Duke Kunshan University, Kunshan, China (Y Si PhD); Department of Medical Microbiology and Infectious Diseases, Erasmus University, Rotterdam, Netherlands (E E Siddig MD); Department of Psychology, Reykjavik University, Reykjavik, Iceland (Prof I D Sigfusdottir PhD); Center of Potential and Innovation of Natural Resources, Polytechnic Institute of Guarda, Guarda, Portugal (Prof L M R Silva PhD); Health Sciences Research Centre, University of Beira Interior, Covilhã, Portugal (Prof L M R Silva PhD); Faculty of Behavioural, Management and Social Sciences, University of Twente, Enschede, Netherlands (J P Simões PhD); School of Health, Victoria University of Wellington, Wellington, New Zealand (Prof C R Simpson PhD); School of Public Health and Zoonoses, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India (B B Singh PhD); Department of Biochemistry, Central University of Punbjab, Bathinda, India (B Singh PhD); Department of Neurology, University of Massachusetts Medical School, Worcester, MA, USA (S Sivakumar MD); Clinical Branch, Moscow Research and Practical Centre on Addictions, Moscow, Russia (V Y Skryabin MD); Department of Infectious Diseases and Epidemiology (A A Skryabina MD) and Department of Internal Disease (A V Starodubova DSc), Pirogov Russian National Research Medical University, Moscow, Russia; Division of Injury Prevention, The Bizzell Group, Atlanta, GA, USA (Prof D A Sleet PhD); Department of Neuroscience, University of Ottawa, Ottawa, ON, Canada (M Solmi MD); Department of Nursing (Y Solomon MSc) and Department of Public Health (Y M Tefera MPH), Dire Dawa University, Dire Dawa, Ethiopia; Center for Biomedical Research in Respiratory Diseases Network, Madrid, Spain (Prof J B Soriano MD); Hull York Medical School, University of Hull, Hull, UK (I N Soyiri PhD); Division of Community Medicine, International Medical University, Kuala Lumpur, Malaysia (C T Sreeramareddy MD); Department of Pediatric Cardiology, Vanderbilt University Medical Center, Nashville, TN, USA (J R Starnes MD); Department of Research and Learning, Lwala Community Alliance, Rongo, Kenya (J R Starnes MD); Central Research Institute of Cytology and Genetics (E Varavikova PhD), Federal Research Institute for Health Organization and Informatics of the Ministry of Health, Moscow, Russia (Prof V I Starodubov DSc); Department of Nutrition and Dietetics, Federal Research Institute of Nutrition, Biotechnology and Food Safety, Moscow, Russia (A V Starodubova DSc); Department of Population Health, Luxembourg Institute of Health, Strassen, Luxembourg (Prof S Stranges MD); Department of Pathophysiology, European University Cyprus Medical School, Engomi, Cyprus (K Stroumpoulis PhD); Center for Biotechnology and Microbiology, University of Swat, Mingora, Pakistan (M Suleman PhD); School of Life Sciences, Xiamen University, China, Xiamen, China (M Suleman PhD); National Institute of Epidemiology, Indian Council of Medical Research, Chennai, India (R Suliankatchi Abdulkader MD); Khulna, Bangladesh (A Sultana MD); Division of Global Mental Health, EviSyn Health, Khulna, Bangladesh (A Sultana MD); Rural Health Research Institute, Charles Sturt University, Bathurst, NSW, Australia (Prof J Sun PhD); Institute of Integrated Intelligence and Systems, Griffith University, QLD, Australia (Prof J Sun PhD); Nursing Professional Education Study Program, University Halu Oleo, Kendari, Indonesia (S Susanty PhD); Department of Analytical and Applied Economics, Utkal University, Bhubaneswar, India (C K Swain MPhil); Department of Sociology, Cornell University, Ithaca, NY, USA (Prof B L Sykes PhD); Department of Clinical Outcomes, Maria Sklodowska-Curie Medical Academy, Warsaw, Poland (Prof L Szarpak PhD); Department of Clinical Research and Development, LUXMED Group, Warsaw, Poland (Prof L Szarpak PhD); Department of Dermatology, University of Colorado, Aurora, CO, USA (M D Szeto BS); Department of Neurology, Neurocenter of Southern Switzerland, Lugano, Switzerland (P Tabaee Damavandi MD); Department of Basic Medical Sciences (S Tabatabaeizadeh PhD) and Department of Internal Medicine (S Tabatabaeizadeh PhD), Islamic Azad University, Mashhad, Iran; School of Social Work, University of Illinois, Urbana, IL, USA (Prof K M Tabb PhD); Health Sciences Research Centre, University of Beira Interior, Covilha, Portugal (Prof L M Taborda-Barata PhD); Department of Immunoallergology, Cova da Beira University Hospital Center, Covilha, Portugal (Prof L M Taborda-Barata PhD); Cancer Control Center, Osaka International Cancer Institute, Osaka, Japan (T Tabuchi MD); Department of Pediatrics, Hawassa University, Hawassa, Ethiopia (B T Tadesse MD); International Vaccine Institute, Seoul, South Korea (B T Tadesse MD); Living Systems Institute (Y Taheri Abkenar PharmD) and Department of Health and Community Sciences (A Udoh PhD), University of Exeter, Exeter, UK; Department of Biostatistics and Epidemiology, Shahid Sadoughi University of Medical Sciences, Yazd, Iran (M Taheri Soodejani PhD); Department of Environmental, Agricultural and Occupational Health, University of Nebraska Medical Center, Omaha, NE, USA (J Taiba MPH); Statistics Discipline, Khulna University, Khulna, Bangladesh (A Talukder MSc); Department of Medicine, Northlands Medical Group, Omuthiya, Namibia (J L Tamuzi MSc); State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics, Chinese Academy of Sciences, Beijing, China (H Tang PhD); Department of Economics, Rice University, Houston, TX, USA (N Y Tat MS); Department of Research and Innovation, Enventure Medical Innovation, Houston, TX, USA (N Y Tat MS); University Institute "Egas Moniz", Monte da Caparica, Portugal (Prof N Taveira PhD); Department of Urology, Sabzevar University of Medical Sciences, Sabzevar, Iran (M Teimoori MD); Department of Pharmacology, All India Institute of Medical Sciences, Raipur, India (P Thangaraju MD); Department of Public Health, Amrita Institute of Medical Sciences, Kochi, India (Prof K R Thankappan MD); Department of Endocrinology, Diabetes and Metabolism, Christian Medical College and Hospital, Vellore, India (Prof N Thomas PhD); Department of Psychiatry, Hospital Sultan Abdul Aziz Shah Universiti Putra Malaysia, Serdang, Malaysia (C C Thum MB); Faculty of Biomedical Engineering, Czech Technical University, Prague, Czech Republic (A Tichopad PhD); Faculty of Public Health, Universitas Sam Ratulangi, Manado, Indonesia (J H V Ticoalu MPH); Department of Public Health, Debre Markos University, Debre Markos, Ethiopia (T Y Tiruye PhD); Neuromuscular Rehabilitation Research Center, Semnan University of Medical Sciences, Semnan, Iran (S Tohidast PhD); Nutritional Epidemiology Research Team, National Institute for Health and Medical Research (INSERM), Paris, France (M Touvier PhD); Department of Health, Children's Hospital 1, Ho Chi Minh City, Viet Nam (N M Tran MD); Department of Surgical, Medical, Molecular Pathology and Critical Care Medicine, University of Pisa, Pisa, Italy (D Trico MD); Adult Learning Disability Service, Leicestershire Partnership National Health Service Trust, Leicester, UK (S J Tromans PhD); Internal Medicine Department, Nazareth Hospital, Philadelphia, PA, USA (V T Truong MD); School of Medicine, Nam Can Tho University, Can Tho, Viet Nam (T T Truyen MD); College of Public Health, Temple University, Philadelphia, PA, USA (C S Ubah MPH); Department of Health, Ministry of Health, Peshawar, Pakistan (I Ulhaq PhD); Department of Health, Directorate General of Health Services, Peshawar, Pakistan (I Ulhaq PhD); Department of Zoology, Division of Science and Technology, University of Education, Lahore, Lahore, Pakistan (S Ullah PhD); Department of Life Sciences, University

of Management and Technology, Lahore, Pakistan (M Umair PhD); Department of Community Medicine, Alex Ekwueme Federal University Teaching Hospital Abakaliki, Abakaliki, Nigeria (C D Umeokonkwo MPH); Department of Genomic Research on Complex Diseases, Centre for Cellular and Molecular Biology, Hyderabad, India (A Umesh MTech); Center for Neurodegenerative Diseases and the Aging Brain, University of Bari, Tricase, Italy (D Urso MD); College of Health and Sport Sciences, University of Bahrain, Salmanya, Bahrain (A G Vaithinathan MSc); Clinical Cancer Research Center, Milad General Hospital, Tehran, Iran (S Valadan Tahbaz PhD); Department of Public Health and Epidemiology, University of Debrecen, Debrecen, Hungary (O Varga PhD); UKK Institute, Tampere, Finland (Prof T J Vasankari MD); Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland (Prof T J Vasankari MD); School of Medicine, Griffith University, Gold Coast, QLD, Australia (Prof L J Veerman PhD); Raffles Neuroscience Centre, Raffles Hospital, Singapore (Prof N Venketasubramanian MBBS); Department of Statistics, Manonmaniam Sundaranar University, Tirunelveil, India (D Venugopal PhD); Department of Gamete Immunobiology, National Institute for Research in Reproductive Health, Mumbai, India (P Verma PhD); Department of Drug Combination, Innoplexus, Pune, India (P Verma PhD); Department of Pediatric Hematology and Oncology, Hospital de Clinicas Jose de San Martin, Buenos Aires, Argentina (G I Villanueva MD); School of Mathematics and Statistics, Carleton University, Ottawa, ON, Canada (Prof P J Villeneuve PhD); Occupational Health Unit, Sant'Orsola Malpighi Hospital, Bologna, Italy (Prof F S Violante MD); Department of Health Care Administration and Economics, National Research University Higher School of Economics, Moscow, Russia (Prof V Vlassov MD); Faculty of Information Technology, HUTECH University, Ho Chi Minh City, Viet Nam (B Vo PhD); Department of Medical Oncology, University of Medicine and Pharmacy "Grigore T Popa" Iasi, Iaşi, Romania (S R Volovat PhD); Department of Medical Oncology, Regional Institute of Oncology, Iaşi, Romania (S R Volovat PhD); Center for Experimental Microsurgery, Iuliu Haţieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania (V Volovici PhD); Department of Pediatric Endocrinology, Mother and Child Healthcare Institute of Serbia "Dr Vukan Cupic", Belgrade, Serbia (R Vukovic PhD); Office of Research, Innovation, and Commercialization, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, Pakistan (Prof Y Waheed PhD); Gilbert and Rose-Marie Chagoury School of Medicine, Lebanese American University, Byblos, Lebanon (Prof Y Waheed PhD); Department of Cultures, Societies and Global Studies, Northeastern University, Boston, MA, USA (R G Wamai PhD); School of Public Health, University of Nairobi, Nairobi, Kenya (R G Wamai PhD); School of Public Health, Xuzhou Medical University, Xuzhou, China (F Wang PhD); Department of Neurosurgery (S Wang MD), Department of Neurology (C Zhang MD), and National Center for Neurological Diseases (C Zhang MD), Capital Medical University, Beijing, China; Department of Gastroenterology, Shanghai Jiaotong University Affiliated Sixth People's Hospital, Shanghai, China (S Wang PhD); Department of Parasitology (Prof K G Weerakoon PhD) and Department of Community Medicine (N D Wickramasinghe MD), Rajarata University of Sri Lanka, Anuradhapura, Sri Lanka; Key Laboratory of Shaanxi Province for Craniofacial Precision Medicine Research, Stomatological Hospital (College) of Xi'an Jiaotong University, Xi'an, China (Y Wen PhD); Department of Medicine, University of Rajarata, Saliyapura Anuradhapuraya, Sri Lanka (Prof T Wijeratne MD); Bone and Joint Research Group, Royal Cornwall Hospital, Truro, UK (Prof A D Woolf MBBS); Global Alliance for Musculoskeletal Health, Truro, UK (Prof A D Woolf MBBS); Department of Rheumatology and Immunology, Sichuan Provincial People's Hospital, Chengdu, China (D Wu PhD); School of Public Health, Zhejiang University, Zhejiang, China (H Xiao PhD); Department of Public Health Science, Fred Hutchinson Cancer Research Center, Seattle, WA, USA (H Xiao PhD); Department of Orthopedic Surgery, Tianjin Hospital, Tianjin, China (B Xu MD); Cardiovascular Program, The George Institute for Global Health, Sydney, NSW, Australia (X Xu PhD); Australian Institute of Health Innovation, Macquarie University, Macquarie Park, NSW, Australia (L Yadav PhD); Department of Basic Medical Sciences, Neyshabur University of Medical Sciences, Neyshabur, Iran (S Yaghoubi PhD); Department of Cancer Epidemiology and Prevention Research, Alberta Health Services, Calgary, AB, Canada (L Yang PhD); Faculty of Medicine (Y Yano MD) and Department of Public Health (N Yonemoto PhD), Juntendo University, Tokyo, Japan; National Center for Chronic and Noncommunicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China (P Ye MPH); Department of Family Medicine, St Peter's Specialized Hospital, Addis Ababa, Ethiopia (S A Yesuf MSc); Department of Health Management, Süleyman Demirel University, Isparta, Türkiye (A Yiğit PhD, V Yiğit PhD); Department of Neuropsychopharmacology, National Center of Neurology and Psychiatry, Kodaira, Japan (N Yonemoto PhD); Department of Health Policy and Management, Jackson State University, Jackson, MS, USA (Prof M Z Younis PhD); School of Business and Economics, University of Putra Malaysia, Kuala Lumpur, Malaysia (Prof M Z Younis PhD); Association for Socially Applicable Research, Pune, India (S Zadey MS); Department of Emergency Medicine, Global Emergency Medicine Innovation and Implementation Research Center, Durham, NC, USA (S Zadey MS); Epidemiology and Cancer Registry Sector, Institute of Oncology Ljubljana, Ljubljana, Slovenia (Prof V Zadnik PhD); Department of Biology, University of Bahrain, Zallaq, Bahrain (M N Zahid PhD); Faculty of Medicine and Health Sciences, Hodeidah University, Hodeidah, Yemen (F Zakham PhD); Department of Pharmacology, University of Duhok, Duhok, Iraq (B A Zaman MSc); Department of Health Sciences, James Madison University, Harrisonburg, VA, USA (S Zaman MSc); Hospital San Juan de Dios, Tarija, Bolivia (N Zamora MD); Department of Neuroscience, Geisinger Health System, Danville, PA, USA (R Zand MD); Sant'Elia Hospital, University of Catania, Caltanissetta, Italy (A Zanghì MD); Department of Research and Development, Sina Medical Biochemistry Technologies, Shiraz, Iran (I Zare BSc); Department of Zoology and Entomology, Al-Azhar University, Cairo, Egypt (M G M Zeariya PhD); Department of Anesthesiology, Third Xiangya Hospital of Central South University, Changsha, China (Y Zeng MD); Department of Epidemiology and Biostatistics, Anhui Medical University, Hefei, China (C Zhai MD); Cardiovascular Diseases Centre, China Academy of Chinese Medical Sciences, Beijing, China (H Zhang MD); School of Public Health, Hubei Province Key Laboratory of Occupational Hazard Identification and Control, Wuhan University of Science and Technology, Wuhan, China (Y Zhang PhD); College of Traditional Chinese Medicine, Hebei University, Baoding, China (H Zhao MD); Department of Basic Medicine, Army Medical University, Chongqing, China (Y Zhao BS); School of Public Health and Management, Chongqing Medical University, Chongqing, China (Prof Y Zhao MSc); Computational Bioscience Research Center, King Abdullah University of Science and Technology, Jeddah, Saudi Arabia (J Zhou PhD); School of Public Health and Emergency Management, Southern University of Science and Technology, Shenzhen, China (B Zhu PhD); NIHR-Biomedical Research Centre, University College London Hospitals, London, UK (Prof A Zumla PhD); Department of Cardiology, Pulmonology, and Vascular Medicine, Heinrich-Heine-University, Duesseldorf, Germany (E Zweck MD); School of Physics, University of Science Malaysia, Penang, Malaysia (S H Zyoud PhD)

**Contributors**

Please see appendix 1 section 9 for more detailed information about individual author contributions to the research, divided into the following categories: managing the overall research enterprise; writing the first draft of the manuscript; primary responsibility for applying analytical methods to produce estimates; primary responsibility for seeking, cataloguing, extracting, or cleaning data; designing or coding figures and tables; providing data or critical feedback on data sources; developing methods or computational machinery; providing critical feedback on methods or results; drafting the manuscript or revising it critically for important intellectual content; and managing the estimation or publications process. Members of the core research team for this topic area had full access to the underlying data used to generate estimates presented in this article. All other authors had access to and reviewed estimates as part of the research evaluation process, which includes additional stages of formal review. The corresponding and senior authors had full access to the data in the study and final responsibility for the decision to submit for publication.

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Saira Afzal reports payment for educational events and webinars from King Edward Medical University and collaborative partners including University of Johns Hopkins, University of California, University of Massachusetts, University of Nebraska, Imperial College London, KEMCA-UK, KEMCAANA, and APPNA; participation on data safety monitoring boards or advisory boards for the National Bioethics Committee Pakistan, the King Edward Medical University institutional ethical review board, and the Fatima Jinnah Medical University and Sir Ganga Ram Hospital ethical review board; leadership or a fiduciary role in other board, society, committee, or advocacy groups, paid or unpaid, for the Pakistan Association of Medical Editors, fellow of Faculty of Public Health Royal Colleges UK, Society of Prevention, Advocacy And Research, King Edward Medical University, and Member Pakistan Society of Infectious Diseases; other financial or non-financial interest as a member Corona Experts Advisory Group, member of the Dengue Advisory Group, member of the Technical Working Group and Guidelines development for COVID-19, has provided expert opinion in National Command and Operation Committee Government of Pakistan, member of the Research and Journals Committee Pakistan Medical and Dental Council, member of the Higher Education Commission Research and Publications Committee on Quality Assurance Agency, dean of Public Health and Preventive Medicine King Edward Medical University, director of Quality Enhancement Cell King Edward Medical University, chief editor of Annals of King Edward Medical University, and Chief Editor History Book King Edward Medical University; all outside the submitted work. Robert Ancuceanu reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie, Sandoz, B Braun, Laropharm, and MagnaPharm, all outside the submitted work. Ruhai Bai reports support for the present manuscript from the Fundamental Research Funds for the Central Universities (grant number 30923011101) and the Social Science Fund of Jiangsu Province (grant number 21GLD008). Ovidiu Constantin Baltatu reports support for the present manuscript from the National Council for Scientific and Technological Development (grant number 304224/2022-7) and Anima Institute - AI research professor fellowship; leadership or a fiduciary role in other board, society, committee or advocacy group, paid or unpaid, as a board member of the Biotechnology Board at São José dos Campos Technology Park and an Academic Ambassador for Afya, outside the submitted work. Michelle L Bell reports grants or contracts from the US Environmental Protection Agency, National Institutes of Health, High Tide Foundation, Health Effects Institute Yale Women Faculty Forum Environmental Defense Fund, Wellcome Trust Foundation, Yale Climate Change and Health Center, Robert Wood Johnson Foundation, and the Hutchinson Postdoctoral Fellowship, all as payments to their institution; consulting fees from Clinique; honoraria for speakers bureaus from Colorado School of Public Health, Duke University, University of Texas, Data4Justice, Korea University, Organization of Teratology Information Specialists, UPenn, Boston University, honoraria for editing duties from IOP Publishing, honoraria for grant review from NIH, Health Canada, PAC- 10, UK Research and Innovation, AXA Research Fund Fellowship, and honoraria for external advisory committee from Harvard University and University of Montana; travel reimbursement from Colorado School of Public Health, University of Texas, Duke University, Boston University, UPenn, Harvard University, American Journal of Public Health; leadership or a fiduciary role in other board, society, committee or advocacy group, unpaid, with the Fifth National Climate Assessment, Lancet Countdown, Johns Hopkins EHE Advisory Board, Harvard external advisory committee for training grant, WHO Global Air Pollution and Health Technical Advisory group, and National Academies Panels and Committees, and paid roles with the US EPA Clean Air Scientific Advisory Committee; all outside the submitted work. Paulo J G Bettencourt reports other financial or non-financial interests with the Botnar Foundation as project reviewer, outside the submitted work. Pra Bhardwaj reports stock options in Doximity in 2020 and 2021 for being a Doximity fellow, outside the submitted work. Sonu Bhaskar reports grants or contracts from the Japan Society for the Promotion of Science (JSPS) through grants-in-aid for Scientific Research KAKENH and a JSPS International Fellowship (2023–25); leadership or a fiduciary role in other board, society, committee or advocacy group, paid or unpaid, as chair of the Global Health and Migration Hub Community for Global Health Hub Germany, Berlin, district chair; Diversity, Equity, and Inclusion for Rotary District 9675, Australia; and as editorial board member with *Frontiers in Stroke*, *Frontiers in Neurology*, *PLOS One*, *BMC Medical Research Methodology*, *BMC Neurology*, and *Frontiers in Public Health*; all outside the submitted work. Zulfiqar A Bhutta reports leadership or a fiduciary role in other board, society, committee or advocacy group, paid or unpaid, as member and chair of the Board of Governors of the National Institutes of Health, Pakistan, outside the submitted work. Boris Bikbov reports grants or contracts from the European Commission; support for attending meetings or travel expenses from the European Renal Association; an unpaid leadership role in the advocacy group International Society of Nephrology; and other non-financial interests in Scientific-Tools.org for a public health consultancy; all outside the submitted work. Atanu Biswas reports consulting fees from INTAS Pharmaceuticals, Lupin Pharmaceuticals, and Alkem Laboratories; and payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from Roche Diagnostic; all outside the submitted work. Edward J Boyko reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from the Korean Diabetes Association, Diabetes Association (Taiwan), and the American Diabetes Association, all outside the submitted work. Márcia Carvalho reports other financial or non-financial interests in LAQV-REQUIMTE and the Faculty of Science and Technology under the scope of the project UIDP/50006/2020, outside the submitted work. Joao Conde reports grants or contracts from the European Research Council (starting grant ERC-StG-2019-848325; €1·5 million funding), outside the submitted work. Saswati Das reports leadership or a fiduciary role in other board, society, committee or advocacy group, unpaid, with the Association for Diagnostics and Laboratory Medicine, and the Women in Global Health India Chapter, outside the submitted work. Louisa Degenhardt reports educational grants from Indivior to examine new opioid medications in Australia, outside the submitted work. Andreas K Demetriades reports leadership or a fiduciary role in other board, society, committee or advocacy group, unpaid, with the AO Knowledge Forum Degen Steering Committee, Global Neuro Foundation Board, and the European Association of Neurological Societies board, all outside the submitted work. 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Quan Gan reports other financial or non-financial interest in the International Agency for Research on Cancer, WHO; the authors alone are responsible for the views expressed in this article and they do not necessarily represent the decisions, policy or views of the International Agency for Research on Cancer or WHO. Paramjit Singh Gill reports support for the present manuscript from the NIHR as senior investigator with payments to their institution; the views expressed in this publication are those of the authors and not necessarily those of the NIHR or the UK Department of Health and Social Care. Avirup Guha reports grants or contracts from the American Heart Association and Department of Defense; consulting fees from Pfizer, Novartis, and Myovant; and a leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid, with ZERO Prostate Cancer Health Equity Task Force; all outside the submitted work. 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Milena D Illic reports support for the present manuscript from the Serbian Ministry of Education Science and Technological Development (project number 451-03-47/2023-01/200111). Sheikh Mohammed Shariful Islam reports grants or contracts from National Health and Medical Research Council through a fellowship, and from the Heart Foundation of Australia through a fellowship and Vanguard Grant, both outside the submitted work. Nahlah Elkudssiah Ismail reports A leadership or fiduciary role in other board, society, committee or advocacy group, unpaid, as a council member of the Malaysian Academy of Pharmacy, outside the submitted work. John S Ji reports a leadership or fiduciary role in other board, society, committee or advocacy group, unpaid, with the WHO Technical Advisory Group Climate Health Ethics, outside the submitted work. Tamas Joo reports support for the present manuscript from Data-Driven Health Division of the National Laboratory for Health Security, National Research, Development and Innovation Office in Hungary (grant number RRF-2.3.1-21-2022-00006). Jacek Jerzy Jozwiak reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Novartis, Adamed, and Amgen, all outside the submitted work. Sanjay Kalra reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AstraZeneca, Boehringer Ingleheim, Novo Nordisk, and Sanofi; and a leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid as president of the Endocrine Society of India and the South Asian Federation of Endocrine Societies; all outside the submitted work. 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Mika Kivimäki reports grants or contracts from Wellcome Trust (221854/Z/20/Z), Medical Research Council (R024227), National Institute on Aging (R01AG062553, R01AG056477), Academy of Finland (350426), and the Finnish Foundation for Cardiovascular Research (a86898); outside the submitted work. Kewal Krishan reports other non-financial interests from the UGC Centre of Advanced Study, awarded to the Department of Anthropology, Panjab University, outside the submitted work. Judit Lám reports support for the present manuscript from the National Research, Development and Innovation Fund (project number TKP2021-NVA-11). Munjae Lee reports support for the present manuscript from the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (grant number NRF-2021R1I1A4A01057428) and Bio-convergence Technology Education Program through the Korea Institute for Advancement Technology funded by the Ministry of Trade, Industry and Energy (grant number P0017805). Ming-Chieh Li reports grants or contracts from The National Science and Technology Council in Taiwan (NSTC 112-2410-H-003-031); and a leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid as the technical editor of the *Journal of the American Heart Association*; outside the submitted work. Katherine M Livingstone reports grants or contracts from the 2020 National Health and Medical Research Council Investigator Grant (APP1173803) and the 2022 Heart Foundation Vanguard Grant (ID106800); outside the submitted work. Mansour Adam Mahmoud reports grant or contract funding from the Deputyship for Research and Innovation, Ministry of Education in Saudi Arabia (project number 445-5-748). Morteza Mahmoudi reports other financial or non-financial interests as co-founder and director of the Academic Parity Movement, a non-profit organisation dedicated to addressing academic discrimination, violence and incivility; as a cofounder of and shareholder in Targets' Tip; and from royalties or honoraria for published books, plenary lectures, and licensed patents; outside the submitted work. Hamid Reza Marateb reports support for the present manuscript from The Beatriu de Pinós post-doctoral programme from the Office of the Secretary of Universities and Research from the Ministry of Business and Knowledge of the Government of Catalonia (programme number

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Sultan Ayoub Meo reports grant or contract support from the Research Supporting Project, King Saud University (grant number RSP-2024 R47), outside the submitted work. Lorenzo Monasta reports support for the present manuscript from the Ministry of Health (Ricerca Corrente 34/2017) through payments made to the Institute for Maternal and Child Health IRCCS Burlo Garofolo. Rafael Silveira Moreira reports grants or contracts from CNPq Research Productivity Scholarship (National Council for Scientific and Technological Development) scholarship registration number 316607/2021-5; outside the submitted work. Jakub Morze reports grants or contracts from the SciLifeLab & Wallenberg Data Driven Life Science Program (KAW 2020.0239); and consulting fees from ALAB Laboratoria; outside the submitted work. Jonathan F Mosser reports support for the present manuscript from the Gates Foundation; grants or contracts from Gavi; and support for attending meetings and travel from the Gates Foundation; outside the submitted work. Faraz Mughal reports support for the present manuscript funded by the NIHR (grant number 300957). Sathish Muthu reports a leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid from ICRS Next Gen Committee as a committee member, AO Spine KF Degenerative as an associate member, and SICOT grants committee as a member; all outside the submitted work. Shuhei Nomura reports support for the present manuscript from Ministry of Education, Culture, Sports, Science and Technology of Japan (grant number 21H03203) and Precursory Research for Embryonic Science and Technology from the Japan Science and Technology Agency (grant number JPMJPR22R8). Bo Norrving reports participation on a data safety monitoring board or advisory board with Simbec Orion, outside the submitted work. Mpiko Ntsekhe reports grants or contracts from SA Medical Research Council, National Heart, Lung, and Blood Institute, and National Institute of Allergy and Infectious Diseases; and consulting fees from Novartis Pharmaceuticals and Novo Nordisk; outside the submitted work. Akinkunmi Paul Okekunle reports support for the present manuscript and support for attending meetings or travel from the National Research Foundation of Korea funded by the Ministry of Science and Information and Communication Technology (grant number 2020H1D3A1A04081265). Pramod Kumar Pal reports grants or contracts paid to their institution from the Indian Council of Medical Research, the Department of Science & Technology-Science and Engineering Research Board, the Department of Biotechnology, Department of Science & Technology-Cognitive Science Research Initiative, Wellcome Trust UK-India Alliance DBT, PACE scheme of BIRAC, Michael J Fox Foundation, and Scientific Knowledge for Ageing and Neurological Ailments-Research Trust; Payment and honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events as faculty, speaker, and author from the International Parkinson and Movement Disorder Society, and Movement Disorder Societies of Korea, Taiwan and Bangladesh; support for attending meetings or travel from the National Institute of Mental Health and Neurosciences, International Parkinson and Movement Disorder Society, and Movement Disorder Societies of Korea, Taiwan and Bangladesh; a leadership or fiduciary role in other board, society, committee or advocacy group, unpaid as the Past President of Indian Academy of Neurology, Past Secretary of Asian and Oceanian subsection of International Parkinson and Movement Disorder Society, Editor-in-Chief of *Annals of Movement Disorders*, chair of the Education Committee of International Parkinson and Movement Disorder Society, president of the Parkinson Society of Karnataka, chair of Infection Related Movement Disorders Study Group of MDS, member of Rare Movement Disorders Study Group of International Parkinson and Movement Disorder Society, member of Education Committee of IAPRD, member of Rating Scales Education and Training Program Committee of IPMDS, member of Neurophysiology Task Force of International Parkinson and Movement Disorder Society (IPMDS), member of Movement Disorders in Asia Study Group, member of Post-Stroke Movement Disorders, member of Ataxia Study Group of IPMDS, and as a member of Ataxia Global Initiative; all outside the submitted work. Raul Felipe Palma-Alvarez reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Angelini, Lundbeck, Rubió, Servier, and Takeda; all outside the submitted work. Amy E Peden reports support for the present manuscript from the Australian National Health and Medical Research Council (grant number APP2009306). Manon Pigeolet reports a grant from the Belgian Kids' Fund for Pediatric Research, outside the submitted work. 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General Practitioners), vice president of Doctors Reform Society, chair of WONCA Special Interest Group, Ageing and Health, board member of Hunter Postgraduate Medical Institute, paid roles as adjunct professor in the School of Rural Medicine of University of New England, adjunct professor in the School of Nursing and Midwifery of Western Sydney University, clinical professor in the Wicking Dementia Research Education Centre of University of Tasmania, and professor of General Practice at University of Newcastle (until August 2021); all outside the submitted work. Luis Felipe Reyes reports consulting fees from GSK, MSD, and Pfizer; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from GSK, MSD, and Pfizer; payment for expert testimony from GSK, MSD, and Pfizer; support for attending meetings or travel from GSK, MSD, and Pfizer; outside the submitted work. 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### Data sharing

To download the data used in these analyses, please visit the GBD 2021 Sources Tool. The statistical code used in GBD 2021 is available online.

For the **GBD 2021 Sources Tool** see http://ghdx.healthdata.org/gbd-2021/sources

For the **statistical code used in GBD 2021** see http://ghdx.healthdata.org/gbd-2021/code

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**References**


1 Desai S. Demographic contributions to policymaking during the pandemic. In: MacKellar L, Friedman R, eds. Covid-19 and the global demographic research agenda. New York, NY: Population Council, 2021: 28–32.

2 Goldstein JR, Cassidy T, Wachter KW. Vaccinating the oldest against COVID-19 saves both the most lives and most years of life. *Proc Natl Acad Sci USA* 2021; **118:** e2026322118.

3 Wulf Hanson S, Abbafati C, Aerts JG, et al. Estimated global proportions of individuals with persistent fatigue, cognitive, and respiratory symptom clusters following symptomatic COVID-19 in 2020 and 2021. *JAMA* 2022; **328:** 1604–15.

4 Murray CJL. The Global Burden of Disease Study at 30 years. *Nat Med* 2022; **28:** 2019–26.

5 Wang H, Dwyer-Lindgren L, Lofgren KT, et al. Age-specific and sex-specific mortality in 187 countries, 1970–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; **380:** 2071–94.

6 GBD 2013 Mortality and Causes of Death Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2015; **385:** 117–71.

7 Wang H, Naghavi M, Allen C, et al. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet* 2016; **388:** 1459–544.

8 Wang H, Abajobir AA, Abate KH, et al. Global, regional, and national under-5 mortality, adult mortality, age-specific mortality, and life expectancy, 1970-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017; **390:** 1084–150.

9 Dicker D, Nguyen G, Abate D, et al. Global, regional, and national age-sex-specific mortality and life expectancy, 1950-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018; **392:** 1684–735.

10 Wang H, Abbas KM, Abbasifard M, et al. Global age-sex-specific fertility, mortality, healthy life expectancy (HALE), and population estimates in 204 countries and territories, 1950-2019: a comprehensive demographic analysis for the Global Burden of Disease Study 2019. *Lancet* 2020; **396:** 1160–203.

11 Murray CJL, Callender CSKH, Kulikoff XR, et al. Population and fertility by age and sex for 195 countries and territories, 1950-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018; **392:** 1995–2051.

12 UN Population Division. Family planning indicators. https://www.un.org/development/desa/pd/data/family-planning-indicators (accessed Sept 7, 2023).

13 UN Population Division. World Population Prospects 2022. https://population.un.org/wpp/ (accessed Sept 7, 2023).

14 Karlinsky A, Kobak D. Tracking excess mortality across countries during the COVID-19 pandemic with the World Mortality Dataset. *eLife* 2021; **10:** e69336.

15 Msemburi W, Karlinsky A, Knutson V, Aleshin-Guendel S, Chatterji S, Wakefield J. The WHO estimates of excess mortality associated with the COVID-19 pandemic. *Nature* 2023; **613:** 130–37.

16 Wang H, Paulson KR, Pease SA, et al. Estimating excess mortality due to the COVID-19 pandemic: a systematic analysis of COVID-19-related mortality, 2020-21. *Lancet* 2022; **399:** 1513–36.

17 Stevens GA, Alkema L, Black RE, et al. Guidelines for Accurate and Transparent Health Estimates Reporting: the GATHER statement. *Lancet* 2016; **388:** e19–23.

18 Institute for Health Metrics and Evaluation. Protocol for the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD). March, 2020. https://www.healthdata.org/sites/default/files/files/Projects/GBD/March2020_GBD%20Protocol_v4.pdf (accessed Dec 7, 2023).

19 Eaton JW, Brown T, Puckett R, et al. The Estimation and Projection Package Age-Sex Model and the r-hybrid model: new tools for estimating HIV incidence trends in sub-Saharan Africa. *AIDS* 2019; **33** (suppl 3)**:** S235–44.

20 Stover J, Glaubius R, Mofenson L, et al. Updates to the Spectrum/AIM model for estimating key HIV indicators at national and subnational levels. *AIDS* 2019; **33** (suppl 3)**:** S227–34.

21 Folino AF, Zorzi A, Cernetti C, et al. Impact of COVID-19 epidemic on coronary care unit accesses for acute coronary syndrome in Veneto region, Italy. *Am Heart J* 2020; **226:** 26–28.

22 Zubiri L, Rosovsky RP, Mooradian MJ, et al. Temporal trends in inpatient oncology census before and during the COVID-19 pandemic and rates of nosocomial COVID-19 among patients with cancer at a large academic center. *Oncologist* 2021; **26:** e1427–33.

23 Fragoso TM, Bertoli W, Louzada F. Bayesian model averaging: a systematic review and conceptual classification. *Int Stat Rev* 2018; **86:** 1–28.

24 Haakenstad A, Yearwood JA, Fullman N, et al. Assessing performance of the Healthcare Access and Quality Index, overall and by select age groups, for 204 countries and territories, 1990-2019: a systematic analysis from the Global Burden of Disease Study 2019. *Lancet Glob Health* 2022; **10:** e1715–43.

25 Zheng P, Barber R, Sorensen RJD, Murray CJL, Aravkin AY. Trimmed constrained mixed effects models: formulations and algorithms. *J Comput Graph Stat* 2021; **30:** 544–56.

26 Phillips DE, AbouZahr C, Lopez AD, et al. Are well functioning civil registration and vital statistics systems associated with better health outcomes? *Lancet* 2015; **386:** 1386–94.

27 The DHS Program. COVID-19 update: some DHS surveys return to the field; others postponed until 2021. https://dhsprogram.com/Who-We-Are/News-Room/COVID-19-Update-Some-DHS-surveys-return-to-the-field-others-postponed-until-2021.cfm (accessed Sept 11, 2023).

28 Agrawal A, Kumar V. Delays in the release of India's census data. *Stat J IAOS* 2020; **36:** 217–30.

29 Roberton T, Carter ED, Chou VB, et al. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. *Lancet Glob Health* 2020; **8:** e901–08.

30 COVID-19 Forecasting Team. Variation in the COVID-19 infection-fatality ratio by age, time, and geography during the pre-vaccine era: a systematic analysis. *Lancet* 2022; **399:** 1469–88.

31 Hummel C, Knaul FM, Touchton M, Guachalla VXV, Nelson-Nuñez J, Boulding C. Poverty, precarious work, and the COVID-19 pandemic: lessons from Bolivia. *Lancet Glob Health* 2021; **9:** e579–81.

32 Li Z, Jones C, Ejigu GS, et al. Countries with delayed COVID-19 introduction–characteristics, drivers, gaps, and opportunities. *Global Health* 2021; **17:** 28.

33 Ahmed SAKS, Ajisola M, Azeem K, et al. Impact of the societal response to COVID-19 on access to healthcare for non-COVID-19 health issues in slum communities of Bangladesh, Kenya, Nigeria and Pakistan: results of pre-COVID and COVID-19 lockdown stakeholder engagements. *BMJ Glob Health* 2020; **5:** e003042.

34 Asundi A, O'Leary C, Bhadelia N. Global COVID-19 vaccine inequity: The scope, the impact, and the challenges. *Cell Host Microbe* 2021; **29:** 1036–39.

35 Chernozhukov V, Kasahara H, Schrimpf P. Causal impact of masks, policies, behavior on early COVID-19 pandemic in the U.S. *J Econom* 2021; **220:** 23–62.

36 Bollyky TJ, Castro E, Aravkin AY, et al. Assessing COVID-19 pandemic policies and behaviours and their economic and educational trade-offs across US states from Jan 1, 2020, to July 31, 2022: an observational analysis. *Lancet* 2023; **401:** 1341–60.

37 Bollyky TJ, Hulland EN, Barber RM, et al. Pandemic preparedness and COVID-19: an exploratory analysis of infection and fatality rates, and contextual factors associated with preparedness in 177 countries, from Jan 1, 2020, to Sept 30, 2021. *Lancet* 2022; **399:** 1489–512.

38 Horita N, Fukumoto T. Global case fatality rate from COVID-19 has decreased by 96.8% during 2.5 years of the pandemic. *J Med Virol* 2023; **95:** e28231.

39 Nab L, Parker EPK, Andrews CD, et al. Changes in COVID-19-related mortality across key demographic and clinical subgroups in England from 2020 to 2022: a retrospective cohort study using the OpenSAFELY platform. *Lancet Public Health* 2023; **8:** e364–77.

40 Kim K, Cho K, Song J, et al. The case fatality rate of COVID-19 during the Delta and the Omicron epidemic phase: a meta-analysis. *J Med Virol* 2023; **95:** e28522.

41 Wang C, Liu B, Zhang S, et al. Differences in incidence and fatality of COVID-19 by SARS-CoV-2 Omicron variant versus Delta variant in relation to vaccine coverage: a world-wide review. *J Med Virol* 2023; **95:** e28118.

42 Walkowiak MP, Domaradzki J, Walkowiak D. Unmasking the COVID-19 pandemic prevention gains: excess mortality reversal in 2022. *Public Health* 2023; **223:** 193–201.

43 Scutchfield FD, Keck CW. Deaths of despair: why? What to do? *Am J Public Health* 2017; **107:** 1564–65.

44 Rahimi-Ardabili H, Feng X, Nguyen P-Y, Astell-Burt T. Have deaths of despair risen during the COVID-19 pandemic? A systematic review. *Int J Environ Res Public Health* 2022; **19:** 12835.

45 Roth GA, Abate D, Abate KH, et al. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018; **392:** 1736–88.

46 Williams DR. The health of men: structured inequalities and opportunities. *Am J Public Health* 2008; **98** (suppl)**:** S150–57.

47 Buvinic M, Das Gupta M, Casabonne U, Verwimp P. Violent conflict and gender inequality: an overview. *World Bank Res Obs* 2013; **28:** 110–38.

48 Connor J, Madhavan S, Mokashi M, et al. Health risks and outcomes that disproportionately affect women during the Covid-19 pandemic: A review. *Soc Sci Med* 2020; **266:** 113364.

49 Cutter SL. The forgotten casualties redux: Women, children, and disaster risk. *Glob Environ Change* 2017; **42:** 117–21.

50 Gakidou E, Cowling K, Lozano R, Murray CJL. Increased educational attainment and its effect on child mortality in 175 countries between 1970 and 2009: a systematic analysis. *Lancet* 2010; **376:** 959–74.

51 Cutler DM, Lleras-Muney A. Understanding differences in health behaviors by education. *J Health Econ* 2010; **29:** 1–28.

52 Baird S, Friedman J, Schady N. Aggregate income shocks and infant mortality in the developing world. *Rev Econ Stat* 2011; **93:** 847–56.

53 Adler NE, Glymour MM, Fielding J. Addressing social determinants of health and health inequalities. *JAMA* 2016; **316:** 1641–42.

54 Balaj M, York HW, Sripada K, et al. Parental education and inequalities in child mortality: a global systematic review and meta-analysis. *Lancet* 2021; **398:** 608–20.

55 Abdi AM, Seaquist J, Tenenbaum DE, Eklundh L, Ardö J. The supply and demand of net primary production in the Sahel. *Environ Res Lett* 2014; **9:** 094003.

56 Dos Santos S, Adams EA, Neville G, et al. Urban growth and water access in sub-Saharan Africa: progress, challenges, and emerging research directions. *Sci Total Environ* 2017; **607-608:** 497–508.

57 Evans A. Resource scarcity, climate change and the risk of violent conflict. Washington, DC: World Bank, 2011. http://hdl.handle.net/10986/9191 (accessed Dec 7, 2023).

58 Lagi M, Bertrand KZ, Bar-Yam Y. The food crises and political instability in north Africa and the Middle East. *SSRN* 2011; published online Aug 15. https://doi.org/10.2139/ssrn.1910031 (preprint).

59 Beard JR, Officer A, de Carvalho IA, et al. The World report on ageing and health: a policy framework for healthy ageing. *Lancet* 2016; **387:** 2145–54.

60 Bloom DE, Chatterji S, Kowal P, et al. Macroeconomic implications of population ageing and selected policy responses. *Lancet* 2015; **385:** 649–57.

61 Rowe JW, Fulmer T, Fried L. Preparing for better health and health care for an aging population. *JAMA* 2016; **316:** 1643–44.

62 Solanki G, Kelly G, Cornell J, Geffen L, Doherty T. The need to incorporate the impact of population ageing into the post-COVID-19 policy and planning reset in low and middle income countries. *Glob Health Action* 2021; **14:** 1921351.

63 Bloom DE, Canning D, Lubet A. Global population aging: facts, challenges, solutions & perspectives. *Daedalus* 2015; **144:** 80–92.

64 Liu JX, Goryakin Y, Maeda A, Bruckner T, Scheffler R. Global health workforce labor market projections for 2030. *Hum Resour Health* 2017; **15:** 11.

65 Mason A, Lee R. Reform and support systems for the elderly in developing countries: capturing the second demographic dividend. *Genus* 2006; **62:** 11–35.

66 Farris SR. Migrants' regular army of labour: gender dimensions of the impact of the global economic crisis on migrant labor in Western Europe. *Sociol Rev* 2015; **63:** 121–43.

67 Ince Yenilmez M. Economic and social consequences of population aging the dilemmas and opportunities in the twenty-first century. *Appl Res Qual Life* 2015; **10:** 735–52.

68 Suleyman M, Bhaskar M. The coming wave: technology, power, and the twenty-first century's greatest dilemma. New York, NY: Crown, 2023.

69 Dodani S, LaPorte RE. Brain drain from developing countries: how can brain drain be converted into wisdom gain? *J R Soc Med* 2005; **98:** 487–91.

70 Özden Ç, Schiff M. International migration, remittances, and the brain drain. Washington, DC: World Bank and Palgrave Macmillan, 2006.

71 UN. Refugees and Migrants. Global compact for migration. 2017. https://refugeesmigrants.un.org/migration-compact (accessed Sept 7, 2023).

72 UNICEF. Under-five mortality. https://data.unicef.org/topic/child-survival/under-five-mortality/ (accessed Sept 13, 2023).

73 Murray CJL, Ahmad OB, Lopez AD, Salomon JA, Ahmad O. Modified logit life table system: principles, empirical validation, and application. *Popul Stud* 2003; **57:** 165–82.

74 Wilmoth J, Zureick S, Canudas-Romo V, Inoue M, Sawyer C. A flexible two-dimensional mortality model for use in indirect estimation. *Popul Stud (Camb)* 2012; **66:** 1–28.

75 Burstein R, Henry NJ, Collison ML, et al. Mapping 123 million neonatal, infant and child deaths between 2000 and 2017. *Nature* 2019; **574:** 353–58.

76 Golding N, Burstein R, Longbottom J, et al. Mapping under-5 and neonatal mortality in Africa, 2000–15: a baseline analysis for the Sustainable Development Goals. *Lancet* 2017; **390:** 2171–82.

77 Ho JY. What demographers need—and what the world needs from demographers—in response to COVID-19. In: MacKellar L, Friedman R, eds. Covid-19 and the global demographic research agenda. New York, NY: Population Council, 2021: 33–36.

78 Hill K, Queiroz B. Adjusting the general growth balance method for migration. *Rev Bras Estud Popul* 2010; **27:** 7–20.

79 Monti A, Drefahl S, Mussino E, Härkönen J. Over-coverage in population registers leads to bias in demographic estimates. *Popul Stud (Camb)* 2020; **74:** 451–69.