Supplementary Materials

Association between inequalities in human resources for health and all cause and cause specific mortality in 172 countries and territories, 1990-2019: observational study

Supplementary information: Additional methods, results, discussion, figures, and tables

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<div align="center">**Supplementary Materials**</div>

1. Supplementary Methods

1.1 Study design and data sources

We collected yearly data on total HRH, specific types of HRH, all cause mortality, and cause specific mortality from 1990 to 2019 at both country and global levels from the GBD Results (https://vizhub.healthdata.org/gbd-results/), a widely used database coordinated by the Institute for Health Metrics and Evaluation (IHME).[1] The GBD 2019 assigned standard star ratings (0–5 star(s)) to rate the data quality for any given location year for each 5-year time interval as well as the full time series from 1980 to 2019. After re-evaluating the data quality from 1990 to 2019 with full reference to the assessment criteria, we finally included 172 of the 204 countries/territories to ensure the rigor of our study (details in table S1). The United Nations Statistics (http://data.un.org/)[2] and Our World in Data (https://ourworldindata.org/)[3 4] provided data on demographic characteristics, socioeconomic status, and health services as the covariates for our models. Given that this study used secondary data aggregated at both country and global levels, it was exempt from Institutional Review Board (IRB)/ethical approval.

1.2 Estimation of human resources for health (HRH) in GBD 2019

1.2.1 Data sources

(1) Surveys sampling general population aged 15-69: census; labor force surveys; household surveys.

(2) Country reports to National Health Workforce Accounts (NHWA): WHO administrative data.

   These sources provided data for 196 of the 204 countries and territories for which we produced estimates and covered locations that made up 99.9% of the world's population in 2019. We updated a table to specify the source and date of data to estimate HRH in Supplementary Table S3 at https://github.com/cheng01zi/codes-for-inequalities-in-HRH.git.

1.2.2 Defining health worker cadres

The GBD 2019 referred to the WHO Handbook on Monitoring and Evaluation of Human Resources for Health to create a list of relevant health worker cadres identified by four-digit ISCO-88 codes. The included cadres and their corresponding occupation codes are listed in appendix 1 of reference 1.

In our study, we extracted annual data for health workforce densities per 10 000 employed individuals for health worker from 1990 to 2019 by country and territory from the GBD Study 2019. After consolidating similar occupations, 16 health worker cadres were left (Supplementary Table S4): doctors; nursing and midwifery staff; dentistry staff (dentists and dental assistants); pharmaceutical staff (pharmaceutical technicians and pharmacists); medical assistants and community health workers; aides and emergency medical workers; medical laboratory technicians; dieticians and nutritionists; optometrists; audiologists and counsellors; psychologists; environmental health officers; personal care workers; traditional and complementary medicine practitioners; physiotherapists; radiographers. The first four core cadres were highlighted in SDG indicator 3.c.1.

1.2.3 Data adjustment and modelling strategy

The GBD 2019 adjusted the WHO data to address inconsistencies in definitions, standards, and methods affecting lack of comparability in this data source using lasso regressions or crosswalk models (details on page 14-27, appendix 1 of reference 1).

Spatiotemporal Gaussian process regression (ST-GPR) is a flexible modelling strategy that synthesizes noisy data by incorporating covariates and borrowing strength across both geography and time to produce comprehensive time series estimates of an indicator with corresponding uncertainty. ST-GPR has three stages. The first stage of the model fits a linear regression to the data with random effects on specified covariates. The second stage smooths the residuals between the regression fit and the data across time and geography to generate a nonlinear trend that better follows available data in each national location, as well as in the surrounding region and super-region. The third stage uses that trend as a mean function in a Gaussian process regression to account for input data variance and to generate uncertainty in the final estimates. The model leveraged available survey and census data along with related covariates, including Socio-demographic Index (SDI), total per capita health expenditure, and estimates of the professional workforce, to generate HRH densities by cadre and for all cadres together, for all 204 countries and territories from 1990 to 2019. Details can be seen on the page 27-29, Appendix 1 of the reference 1.

1.2.4 Uncertainty interval (UI)

In GBD 2019, uncertainty is propagated throughout all the modelling processes. Each estimation was used to model 1000 draws of densities for each type of health worker cadre and the total human health resource separately from 1990 to 2019. The lower and upper bounds of the 95% UI are the 25th and 975th values of the ordered 1000 values.

1.2.5 References

1.   GBD 2019 Human Resources for Health Collaborators. Measuring the availability of human resources for health and its relationship to universal health coverage for 204 countries and territories from 1990 to 2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet 2022; 399(10341): 2129-54.

2.   GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet 2020; 396(10258): 1204-22.

1.3 Estimation of all cause and cause specific mortality in GBD 2019

1.3.1 Data sources

The cause of death (CoD) database used in GBD 2019 contains eight types of data sources: (1) Vital registration (VR); (2) verbal autopsy (VA); (3) cancer registry; (4) police records; (5) sibling history; (6) surveillance; (7) survey/census; (8) minimally invasive tissue sample (MITS) diagnoses. We updated a table to specify the source and date of data to estimate all cause and cause specific mortality in Supplementary Table S6 at https://github.com/cheng01zi/codes-for-inequalities-in-HRH.git.

1.3.2 Defining all cause and cause specific mortality

In this study, we considered age-standardized all cause mortality (per 100 000 population) as the primary outcome of this study. The secondary outcome was 21 age-standardized cause specific mortalities (all the level 2 causes of death in the GBD study):[5] HIV/AIDS and sexually transmitted infections (STIs), respiratory infections and tuberculosis, enteric infections, neglected tropical diseases (NTDs) and malaria, other infectious diseases, maternal and neonatal disorders, nutritional deficiencies, neoplasms, cardiovascular diseases, chronic respiratory diseases, digestive diseases, neurological disorders, mental disorders, substance use disorders, diabetes and kidney diseases, skin

and subcutaneous diseases, musculoskeletal disorders, other non-communicable diseases, transport injuries, unintentional injuries, and self-harm and interpersonal violence.

1.3.3 Data adjustment and modelling strategy

DisMod-MR 2.1 and a custom CoD model are performed to correct the miscoding of Alzheimer's and other dementias, Parkinson's disease, and atrial fibrillation and flutter in the GBD 2019 (details on section 2.6, appendix 1 of reference 1). Detailed causes coded to the International Classification of Diseases (ICD) coding systems and redistributed garbage codes were mapped to the GBD cause list (Levels 1- 4) to enhance the comparability (details on section 2.3-2.4, appendix 1 of reference 1). Garbage codes are codes to which deaths were assigned that cannot or should not be considered as the underlying cause of death (e.g., injury from undetermined intent). A Bayesian noise-reduction algorithm was used to deal with problems of zero counts in VR, VA, cancer registries, or sibling histories for a given age group in a given year. The GBD 2019 assigned star ratings to rate the quality of data (details on Table S4, appendix 1 of reference 1).

After several steps of data correction, processed data are modelled using standardized tools to generate estimates of mortalities. Cause of death ensemble modelling (CODEm), a highly systematized tool with four families of statistical models, is the framework used to model most cause specific death rates in the GBD. DisMod-MR 2.1, negative binomial models, natural history models, sub-cause proportion models, and prevalence-based models were used to model a subset of causes of death with unique epidemiology, large changes in reporting over time, or particularly limited data availability. Modelling strategy for individual cause of death models in GBD 2019 is shown in Table S11, Appendix 1 of reference 1. For all cause mortality, ST-GPR was mainly used to synthesize data sources after correction for known biases and estimate the mortality rate. Detailed methods of GBD study for the mortalities were described in appendix 1 of reference 1.

1.3.4 Uncertainty interval (UI)

In GBD 2019, uncertainty is propagated throughout all the modelling processes. Each estimation was used to model 1000 draws of densities for all cause mortality, and each cause specific mortality separately from 1990 to 2019. The lower and upper bounds of the 95% UI are the 25th and 975th values of the ordered 1000 values.

1.3.5 References

1.   GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet 2020; 396(10258): 1204-22.

2.   GBD 2019 Demographics Collaborators. 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(10258): 1160-203.

3.   GBD 2017 Causes of Death Collaborators. 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(10159): 1736-88.

4.   Naghavi M, Makela S, Foreman K, O'Brien J, Pourmalek F, Lozano R. Algorithms for enhancing public health utility of national causes-of-death data. Popul Health Metr 2010; 8: 9.

1.4 Covariates

Through United Nations Statistics and Our World in Data,[2] [3] we collected demographic characteristics, namely, population density (the number of people per km² of land area), percentage of the population living in urban areas (%), and average years of schooling (average number of years people aged 25+ participated in formal education). Moreover, we collected the socio-demographic index (SDI), a composite indicator of the fertility rate, educational status and lag distributed income, from the GBD 2019.[5] [6] SDI is strongly correlated with health outcomes and ranges from 0 to 1 with the increasing level of development relevant to health outcomes.[7] Socioeconomic status included GDP per capita (measured in constant 2017 international-$)[4] and Human Development Index (HDI).[8] HDI is a summary measure of average achievement in key dimensions of human development and is measured by the geometric mean of normalized indices for each of the three dimensions, namely, life expectancy at birth, mean years of schooling and expected years of schooling, and income. We filled in the missing data by linear interpolation.[9]

1.5 Statistical analysis

We compared demographics, socioeconomics, and health resources among 172 countries and territories within different levels (lowest, low, middle, high, and highest) of HRH with median and

interquartile range. We used the ASMR to describe the disease burden of mortalities (all cause mortality and 21 cause specific mortalities). Estimated annual percentage change (EAPC) is a widely used indicator to indicate the trend and annual change over a specified time interval.[10] We fitted a regression line to the natural logarithm of HRH density, all cause and cause specific mortality using the formula $y = \alpha + \beta x + \varepsilon$, where y refers to ln(HRH density or mortality rate), x refers to the calendar year, α refers to the intercept, β represents the annual change in ln (HRH density or mortality rate), and ε represents the error term.[11] We calculated EAPC as $100 \times (e^{\beta} - 1)$ to assess the temporal trend of the HRH density or mortality rate with corresponding 95% confidence intervals between 1990 and 2019.[12-14] We considered the HRH densities, all cause mortality rate, and cause specific mortality rates to be in an upward trend (or downward trend) if both EAPC estimates and 95% confidence intervals were > 0 (or both < 0).

We applied the Lorenz curve and concentration index (CCI) as measures of health inequalities, indicating the unequal distribution among countries with different development levels of the HDI. A diagonal line is indicative of equal distribution, and the greater the deviation of the Lorenz curve from this line, the more significant the inequality. When applying this index to health variables, the cumulative proportion of the population ranked by the HDI is displayed on the x-axis, and the cumulative proportion of the HRH density is shown on the y-axis.[15] The CCI is defined as twice the area between the curve and the diagonal, using the formula $CCI = \frac{2}{\mu} cov(h, r)$, where h refers to the HRH density, μ refers to the mean (h), r refers to the respective HDI ranking in the aggregate (in descending order), and the CCI ranges from –1 to 1. A positive CCI value indicates that HRH is distributed in the higher HDI group, whereas a negative value indicates opposite significance. The closer to 0 the CCI is, the more equitable the allocation of resources.[16]

To assess the relationship between HRH and both all cause and cause specific mortalities, we applied the generalized estimating equation (GEE) model, a widely used linear model for longitudinal data analysis with repeated measures over time.[17] We utilized the GEE model with a gamma distribution and log link function to control for the skewed nature of mortalities. The dependent variable refers to ln(ASMR). In the univariable model, after controlling for the effect of time, we analyzed the association between HRH and mortality was analyzed with year, HRH, and mortality in the model. We calculated crude incidence risk ratios (cIRRs) with 95% confidence

intervals. In the multivariable models, we calculated the association (adjusted incidence risk ratio, aIRRs) between HRH and both all cause and cause specific mortalities after controlling for year, population density, percentage of the population living in urban areas, average years of schooling, GDP per capita, and HDI. In the subgroup analysis, we disaggregated the total HRH into 16 health worker cadres for further analysis. We also analyzed the way in which different types of combined HRH affected the impact on mortalities. To examine the robustness of our findings, we included SDI in the multivariable model in the sensitivity analysis instead of the HDI. We applied Lorenz curve and CCI using STATA version 13.0, and we analyzed other results using SPSS version 23.0. Statistical significance was attributed to two-sided P values <0.05.

2. Supplementary Results

2.1 Association between HRH and mortality rate in univariable GEE models

In the univariable GEE model, the total HRH density exhibited a negative association with all cause mortality rate with the highest levels of HRH as a reference (lowest: cIRR=2.53, 95% confidence interval 2.28 to 2.81; low: cIRR=1.83, 1.62 to 2.06; middle: cIRR=1.45, 1.31 to 1.61; high: aIRR=1.35, 1.26 to 1.45) (table S13).

In the univariable GEE models of 21 specific HRH densities, the negative associations were significant between all cause mortality and specific HRH densities, except for the traditional and complementary medicine practitioners (table S14).

2.2 Association between different types of HRH and cause specific mortality

Meaningful associations were found as below:

The positive association of doctors, nursing and midwifery staff with mental disorders and substance use disorders (fig S3-4).

The positive association of dieticians and nutritionists, and physiotherapists with musculoskeletal disorders (fig S10, S17).

The negative association of doctors, dentistry staff, and pharmaceutical staff with HIV/AIDS and sexually transmitted infections (fig S3, S5-6).

The negative association of aides and emergency medical workers, dentistry staff, psychologists, medical laboratory technicians, and personal care workers with maternal and neonatal disorders mortality (fig S5, S8-9, S13, S15).

The negative association of dieticians and nutritionists, optometrists, psychologists, personal care workers, and radiographers with cardiovascular disease (fig S10-11, S13, S15, S18).

The negative association of doctors, nursing and midwifery staff, pharmaceutical staff, dentistry staff, optometrists, psychologists, personal care workers, and radiographers with diabetes and kidney diseases (fig S3-6, S11, S13, S15, S18).

The negative association of environmental health officers with skin and subcutaneous diseases (fig S14).

The negative association of optometrists, audiologists and counsellors, psychologists, personal care workers, physiotherapists, and radiographers with the transport injuries (fig S11-13, S15, S17, S18).

2.3 Association between different types of combined HRH and mortality

With the highest group as a reference, a relatively lower proportion of doctors in nursing and midwifery staff were negatively associated with all cause mortality (lowest: aIRR=1.12, 1.02 to 1.23) as well as the mortalities caused by HIV/AIDS and sexually transmitted infections (lowest: aIRR=3.10, 1.85 to 5.20; low: aIRR=2.66, 1.29 to 5.50), respiratory infections and tuberculosis (lowest: aIRR=1.29, 1.06 to 1.56), neurological disorders (lowest: aIRR=1.09, 1.04 to 1.15; low: aIRR=1.06, 1.02 to 1.09; middle: aIRR=1.06, 1.02 to 1.10), diabetes and kidney diseases (lowest: aIRR=1.36, 1.01 to 1.85), and skin and subcutaneous diseases (lowest: aIRR=2.23, 1.53 to 3.25; low: aIRR=1.61, 1.09 to 2.39) (table S18). Associations between the proportion of doctors, nursing and midwifery staff, dentistry staff, or pharmaceutical staff in total HRH and mortalities were presented in table S19-22.

3. Supplementary Discussion

3.1 Inequalities and current status of human resources for health

As one of the critical international issues, inequity in HRH is not a newly surfaced that has just emerged.[18-20] Our findings revealed that the health workforce tended to be concentrated in countries

and territories with higher levels of the HDI. Concerning a UHC effective coverage of 80%, there was a daunting health workforce shortage globally in 2019, including at least approximately 6.4 million doctors, 30.6 million nurses and midwives, 3.3 million dental personnel and 2.9 million pharmaceutical staff.[21] The GBD super regions of sub-Saharan Africa, South Asia, North Africa, and the Middle East were the most prominent low-density regions for HRH, which confirmed our results.[21] Abundant human resources are vital for the sustainable and healthy economic development of a country.[22] Because the overall carrying capacity of each country varies, without clear and appropriate fertility planning and economic development schemes, countries with an excessive population may have collapsed economies, health care, education, and other sector.[22-25] Sub-Saharan Africa or densely populated Bangladesh are examples.[24 26] A reasonable population capacity is favorable to promoting sustainable social, economic, and environmental development. Countries and territories with low levels of the HDI (e.g., most African countries) tend to encounter greater challenges.[21] Inadequate health financing, low levels of education, lack of employment opportunities, war and violence against health workers are possible factors contributing to this disparity.[27-30] According to our results, Myanmar held the highest EAPC at 7.2%, as the governing party has accelerated the systemic strengthening of health care with economic and noneconomic incentives, including social recognition and career development.[31 32] Despite the high EAPC, the HRH level in Myanmar remained low at 58.40 per 10 000 population. Being the only country with negative HRH growth, multiple inflationary financial crises and regime instability, Zimbabwe's deployment decisions on healthcare were rendered elusive, even during the apparent health workforce losses. In many low- and middle-income countries (LMICs), challenges in national development priorities often divert scarce resources from the health sector. Many of these developing nations struggle with structural vulnerabilities such as persistent social and economic inequalities, conflict and forced displacement, declining trust in government, and the effects of climate change and environmental vulnerability.[33] Furthermore, the migration of HRH from sub-Saharan African to developed Western countries is an aspect of increasing global mobility.[34] Trends of global migration from South to North mirror the capital concentration in major cities of developed countries. Developing countries, especially in Africa, deserve attention to retain health professionals, and in addition to financial incentives, work environment, sociocultural and political contexts ought to be invested in improvement.[34]

A political economy study of African countries concluded that some institutional arrangements in Africa hinder investment in HRH, with issues such as tenure of officials, health planning models, global health structures, and weak capacity of health human resource management units, resulting in no breakthrough changes in HRH issues.[35] The High-Level Commission on Health Employment and Economic Growth (ComHEEG)[36] highlights that targeted investments in HRH contribute to economic growth through a range of pathways, such as increased productivity and output, social protection and cohesion, social justice, innovation, and health security. However, investment in the health workforce remains below expected levels in medical education and access to health services in LMICs.[21] In addition, HRH matters in reducing the burden of disease in low-income countries.[37] The review of Aditya K. et al. demonstrated that community health workers may be effective in helping tackle the burden of cardiovascular disease in LMICs.[37] The *Global Strategy on Human Resources for Health: Workforce 2030* suggests that investments in HRH need to consider the needs of health systems and populations, and the coordination of labor market and education-related policies.[38] Social welfare, status and employment are supposed to be improved as well.[38] [39] Moreover, establishing coordinating institutions at the national, territorial, and international levels is also vital for the improvement of HRH equity.[38]

Fortunately, although this disparity in health workforce exists, it has been narrowing since the turn of the century, which may be due in part to the effective implementation of both the MDGs and SDGs.[40-42] Our findings revealed that the number of health workers available per 10 000 population has increased globally from 56.0 in 1990 to 142.5 in 2019. In particular, the densities of the four types of HRH, namely, doctors, nursing and midwifery staff, dentistry staff, and pharmaceutical staff, of special interest in SDG 3c.1 in 2019 were almost two to three times higher than those in 1990.

3.2 Changes in all cause and cause specific mortality

Over the three decades, all cause mortality decreased in 172 countries, with an EAPC of −1.3% (95% confidence interval −1.4% to −1.2%), from 1990 to 2019. In 2019, the all cause ASMR was the highest in the Solomon Islands (1919.9 per 100 000 population) but the lowest in Japan (323.3). In addition to HRH disparities,[43-45] the large differences in mortality may be related to their economic development level, social security, medical insurance system, lifestyle, dietary habits, and other

factors.[46-50] Compared with the Solomon Islands, some countries, such as Ethiopia, Morocco, and Palestine, had a very low HRH density in 2019, but their all cause mortality rankings were not always ahead. Ethiopia is the second most populous country in Africa, and is the fastest growing African economy in recent decades.[51] The poverty rate in Ethiopia was reduced to 24% in 2019.[52] Its life expectancy increased from 52 years in 2000 to 66 years in 2019, and infant mortality reduced by more than 50% over the same period.[53] Ethiopia has facilitated universal health coverage through health financing initiatives (revenue generation, risk sharing, and purchase of health care services),[54] most of the health-related MDGs have been achieved and considered to attribute to a comprehensive approach to health development, including health and other socioeconomic systems.[55] Morocco has a life expectancy of 74 years in 2021, relatively high in a country in Africa. The Moroccan government has implemented economic revitalization, increased employment, and developed health care, justice, and other social services. Through reforms, they have gradually reduced social disparities, improved the living standards of low-income people, partially subsidized the necessities of life, and strengthened health and education coverage.[56] It also suggests that even the poorest countries can achieve extraordinary results by implementing these multi-tiered strategies.[55] In contrast, Palestine, as a refugee area, has received high levels of aid and a considerable amount of charitable resources per capita, and more developed further its education, culture, and health care.[57] All three countries have developed their economies through different pathways and improved the living, cultural, and medical standards of their populations, thus controlling the rate of all cause mortality to some extent.

In addition, mortality rates for several diseases in our study were increasing. The most noteworthy was mental disorders, which displayed the highest EAPC at 1.6%, although the mortality rate was still low at 0.001 per 100 000 population. Psychological problems are becoming more common as a result of heightened social pressures, and advances in neuroscience and psychiatric care have improved diagnostic capabilities.[58-60] However, current modalities of mental health care embodied primarily by the biomedical model do not adequately address the complex challenges of mental illness, which accounts for roughly one-third of adult disabilities globally.[61-63] Clinical guidelines for comprehensive mental health care in general should be developed, and comprehensive training for mental health-care practitioners should continue to be enhanced to raise the quality of HRH.

For HIV/AIDS and sexually transmitted infections, the mortality rate increased from 2.0 to 3.4 per 100 000 population over the 30 years between 1990 and 2019. Global achievements in interrupting HIV transmission over the last decade (2010–2019) have been noteworthy (EAPC=–2.7%). Since 2010, the number of new HIV-positive cases has decreased by 32% (mostly among children, –52%), and AIDS-related deaths have decreased by 68% after peaking at 2.0 million in 2004 as a result of global initiatives to combat the epidemic over the past decades.[64-68] The percentage of pregnant women receiving antiretroviral therapy (ART) for the prevention of mother-to-child transmission of HIV increased to 81% in 2021, up from 46% in 2010.[64] Nonetheless, there is a large challenge in controlling STIs in the future, as STIs vary in prevalence across countries among younger or aging populations. An enhanced understanding of the epidemiological patterns of STIs is urgently necessary to facilitate the programming and implementation of prevention and control strategies in priority areas and populations.[10]

Except for psychological disorders and sexually transmitted diseases, the burden of some chronic diseases deserves attention. The EAPC of diabetes and kidney disease mortality rate was 0.2%, in line with the findings of Deng et al.[69] A global study indicated that the global burden of diabetes has increased significantly since 1990 and continues to rise.[70] Both metabolic risk (high body mass index) and behavioral factors (unsuitable diet, smoking and poor physical activity) are the major causes of diabetes disability-adjusted life years (DALYs) and death.[70] Although we detected no trend of a continuous increase in the mortality rate from 2010 to 2019 based on EAPC, it remains worthy of attention as trained renal specialists and universal access to primary health care and renal replacement therapy are still lacking in many countries.[69] Screening for kidney function in people with diabetes and raising awareness contributed to reducing the burden of kidney disease. These measures should be reflected in the government's health priorities and resource allocation measures, with a focus on prevention, early control and delayed progress.[69] For skin and subcutaneous diseases (EAPC=0.6%), many factors can explain the prevalence of skin diseases, including local weather, climate change, and diet. Changes in dermatologist density, health insurance coverage and other factors may also affect differences in skin and subcutaneous disease mortality.[71] There were still implications that the currently reported burden of musculoskeletal disorders was underestimated, particularly because of population growth, aging and other risk factors for musculoskeletal disease burden (e.g., obesity, injuries and sedentary lifestyles).[72 73] Inconsistencies existed between the

burden of musculoskeletal pain conditions and appropriate international health policy responses and planning, which must be addressed through a comprehensive research and policy agenda.[73]

3.3 Human resources for health (HRH) associates with human mortality

3.3.1 Findings about the association between total HRH density and cause specific mortality

Among the results, neoplasms, mental disorders, substance use disorders, musculoskeletal disorders, self-harm and interpersonal violence were discovered to be positively related to total HRH density. Previous studies and statements of the World Cancer Research Fund International claimed that the ASMR of neoplasms appeared to be higher in more developed countries.[74][75] Accounting for nearly 10 million deaths in 2020 (nearly one in six deaths), neoplasm remains a significant cause of death globally.[76] Cases and deaths are projected to increase rapidly with population growth, aging and the adoption of lifestyle behaviors that increase neoplasms risk.[76] Furthermore, it is alarming that numerous risk factors for lifestyle are prevalent in high-income countries (HICs), such as smoking, physical inactivity, excess weight and reproductive patterns. These risk factors are also becoming prevalent in LMICs.[74] As discussed earlier, mental disorders and their detection are of greater concern in more developed, high-HRH countries. In addition, a study reviewed that the relative risk of all violent outcomes typically increased two to four times in most patients diagnosed with mental disorders compared with those without mental disorders, explaining the association between self-harm and interpersonal violence mortality and HRH level.[77] The higher mortality of substance use disorders in high HRH countries was attributed to high rates of illicit drug use in high-income countries.[78] Substance use disorders are also associated with an increased risk of death by suicide.[79] The results of musculoskeletal disorders were in accordance with GBD 2016 estimates, which have demonstrated that low back pain was the leading cause of disability for many years in most countries and territories.[73] Musculoskeletal disorders as a whole were the primary driver of noncommunicable disease (NCD)-related disability burden,[73] as most painful musculoskeletal disorders worsen with age, and owing to the multiple diseases associated with musculoskeletal pain, the increasing incidence of non-communicable diseases and reduced physical activity, the age-related risk of the disease could explain its severity in high HRH and more developed countries.[73]

The negative association between total HRH density and mortality rates was significant and more pronounced for some secondary causes, including neglected tropical diseases and malaria, enteric

infections, maternal and neonatal disorders, diabetes and kidney diseases, and transport injuries. We once constructed a global study and suggested that malaria is still a public health threat for locals and travelers in sub-Saharan Africa and other malaria-endemic areas, especially for children under 5 years old.[12] One of our studies on Brazil, Russia, India, China and South Africa (BRICS) indicated that mortality rates for NTDs and malaria were relatively higher in both younger and older age groups, and poor sanitation led to the spread of enteric infections.[80] Our latest study also revealed that COVID-19 pandemic disrupts malaria-related health care services and leads to a staggering malaria burden.[81] Because NTDs and enteric infections can reduce worker productivity and child intellectual growth and ultimately impair the economy, the study recommends large-scale coordinated action to control mortality and reduce losses in developing countries.[82]

3.3.2 Key insights on the global burden of HIV/AIDS and sexually transmitted infections

The anomalous association between total HRH density and mortality of HIV/AIDS and sexually transmitted infections appears challenging to elucidate, which highlights the specificity in resisting HIV/AIDS burden among countries. Since the total HRH density represent the overall level, failing to reveal the level of main HRH cadres and the coordination of different HRH proportions in HIV/AIDS health outcomes, so it is not stable in the face of complex HIV epidemic problems. Therefore, we disaggregated the HRH into 16 cadres to obtain more convincing results.

According to our results, shortages of doctors, dentistry staff, and pharmaceutical staff were more likely to be associated with higher mortality (fig S3, S5-6). HIV continues to be a major global public health issue, having claimed 40.1 million lives to date.[83] In 2021, 650 000 people died from HIV-related causes globally.[83] Oral lesions have been regarded as one of the critical indications for the diagnosis of AIDS, including oral candidiasis, hairy leukoplakia, Kaposi's sarcoma, non-Hodgkin's lymphoma, oral herpes, and HIV-associated periodontal lesions.[84][85] More than one-third of patients have oral lesions, and the average prevalence is higher in developing countries.[85] Therefore, well-trained dentistry staff can serve as sentinel sites to detect and assist in the early diagnosis of patients and take the necessary treatment measures to prevent the spread of HIV/AIDS.[84][85] Pharmacists, as key members of the therapeutic team, often jointly develop treatment plans with doctors and counsel infected patients on medications to improve their adherence.[86] The role of the appropriate use of medications for HIV preexposure prophylaxis and

postexposure prophylaxes is also key to reducing infection and mortality rates.[87][88] Renewed focus on the human resource pool of priority types of health workers is necessary to achieve or close to global targets for eliminating HIV as a public health threat by 2030.[89]

Apart from these, there are many social problems, policies, laws, ethics and other factors regarding the HIV/AIDS epidemic affect health outcomes, these factors are not yet available for measurement and full inclusion at the global level, so the research of HIV/AIDS burden factors for global applicability will require more exploration in the future. In addition, this reminds that the HIV/AIDS burden cannot be addressed by the health care system in isolation, but rather requires the continued strength of the entire community.

The burden of HIV/AIDS has the following characteristics, it is higher in high-risk populations,[90] but we know little about it, largely because these populations are underrepresented in national HIV/AIDS surveillance systems, and hidden or stigmatized in many settings. The United Nations Programme on HIV and AIDS (UNAIDS) reported that in 2021, key populations (sex workers and their clients, gay men and other men who have sex with men, people who inject drugs, transgender people) and their sexual partners accounted for 70% of HIV infections globally. The risk of acquiring HIV is 35 times higher among people who inject drugs than adults who do not inject drugs, 30 times higher for female sex workers than adult women, 28 times higher among gay men and other men who have sex with men than adult men, and 14 times higher for transgender women than adult women.[91] In addition to HRH density, much inequality deserves attention, as one study found that the burden of HIV among female sex workers in low- and middle-income countries is disproportionately high.[92] As HIV/AIDS prevalence declines in the general population, it continues to rise among female sex workers (FSWs). In North American, European, and Asian countries, the burden of HIV infection among FSWs remains influenced by the co-occurring risks associated with drug injection. People living with HIV have limited access to HRH, often experience physical and sexual violence, and generally have limited access to and utilization of health care services,[93][94] in addition to facing exclusion/social stigma.[95] This is a serious social problem. The data suggests an urgent need to scale up access to high-quality HIV prevention programmes. Considerations of the legal and political context in which sex workers operate and actions to address the important role of stigma, discrimination, and violence targeting female sex workers is needed.[92]

Countries are expected to adopt specific policies in focusing on the burden of HIV/AIDS. There are many more points of interest, the actual prevalence levels are related to national and international concerns and initiatives for HIV in a region, such as in South Africa, where condom promotion and distribution programs have reduced HIV incidence among FSWs and their clients by more than 70%.[96] In addition, community empowerment (CE) and community mobilization (CM) interventions can reduce new infections by 17-40%[97] and are cost-effective.[98] Meanwhile a research has identified decriminalization of sex work made sense in the human rights protection and control of HIV epidemic, a serious jurisprudential issue that also poses notable problem for HIV control internationally.[99]

Through the literature review, we stressed that infections among key populations and their sexual partners, adolescent girls and young women, and populations in sub-Saharan Africa. Combining our model results, we suggest that, under the premise of ensuring the strong development of HRH, countries should widely promote social mobilization, especially in high prevalence and high mortality areas, and broadly roll out effective measures, including condom campaigns, health counseling for HIV/AIDS, gender-based violence interventions, community empowerment, etc., raising awareness of early treatment and heading towards the 95-95-95 targets, which would ensure that 95% of people living with HIV know their status, 95% of people who know their status are receiving treatment, and 95% of people on HIV treatment have a suppressed viral load by 2030.

3.3.3 Findings about the association between specific types of HRH density and infectious disease mortality

Remarkably, our findings also note the significance of the densities for doctors, nursing and midwifery staff, dentistry staff, pharmaceutical staff, medical assistants and CHWs, and medical laboratory technicians in reducing NTDs and malaria, respiratory infections and tuberculosis, and enteric infections (fig S3-7, S9). Most of the detailed discussion can be found at **Section 3.3.1**. What's more, we cannot disregard the role of the oral-gut microbiome axis in gastrointestinal disease and cancer, and evidence supports that the oral microbiota can change the entire gut microbial ecosystem through direct translocation and/or indirectly through the secretome of oral bacteria, especially in the context of poor hygiene and immune dysfunction.[100] This explains the significance of dentistry for the prevention of enteric infections caused by microorganisms such as

viruses, bacteria and parasites. In addition, the inadequate expertise of dentists can lead to the over-prescription of antibiotics, causing side effects, such as gastrointestinal disorders.[101]

3.3.4 Findings about the association between specific types of HRH density and maternal and neonatal disorders mortality

Maternal and neonatal disorders are the focus of national health development plans. For death caused by maternal and neonatal disorders, the densities of aides and emergency medical workers, dentistry staff, psychologists, and personal care workers warrant more attention (fig S5, S8-9, S13, S15). The gestation period is a time of dramatic physical and emotional changes and an increased risk of mental disorders (including depression, anxiety, and self-harm).[102] Studies[103-105] have indicated that serious emotional problems, psychological disorders and the use of medicine may affect not only maternal health but also the fetal health, with irreversible consequences. Therefore, the professional help and psychotherapy provided by psychologists to women before pregnancy, during pregnancy and even after delivery cannot be underestimated. Oral health is an important component of systemic health, especially because approximately 40% of pregnant women suffer from periodontal disease.[106] An association between periodontal infection in pregnant women and adverse pregnancy outcomes such as neonatal death has been confirmed.[107] [108] Although more research is needed to conclusively establish a causal relationship between periodontal disease and adverse pregnancy outcomes, the results to date suggest that preventive and treatment measures for periodontal disease by dentists in pregnant women are necessary.[107] [108] Maternal oral hygiene may strongly affect infant health, especially through common parenting behaviors such as spoon sharing.[109]

3.3.5 Findings about the association between specific types of HRH density and mortality of cardiovascular diseases, diabetes and kidney diseases

Cardiovascular disease (CVD) is an expensive global problem with high annual morbidity and mortality rates. Primary and secondary prevention of CVD requires an integrated team of health professionals under the direction of a physician during inpatient and outpatient care. Appropriate team members may include, but not limited to, nurses, advanced practice nurses, physician assistants,

dieticians, physiotherapists, psychologists, pharmacists, cardiac researchers, exercise physiologists, etc,[110] which corroborates the results of our model (fig S10, S13, S15).

In addition to health personnel such as doctors, nursing and midwifery staff, and pharmaceutical staff, the densities of dentistry staff, optometrists, psychologists, personal care workers, and radiographers were also negatively associated with deaths caused by diabetes and kidney diseases (fig S3-6, S11, S13, S15, S18). Periodontitis appears to increase the risk of diabetes caused by infection and/or inflammatory responses.[111] Interestingly, the results from a meta-analysis study suggested that periodontal treatment leads to an improvement in glycemic control in type 2 diabetes patients.[112] People with diabetes are at increased risk for mental disorders such as depression and anxiety.[113] Mental health comorbidities of diabetes can affect treatment adherence, thereby increasing the risk of serious short- and long-term complications, which may lead to premature death.[113] Identifying and treating mental health comorbidities in people with diabetes should be a priority. Optometrists have recognized technical training and expertise in detecting diabetic eye disease, and they are often the first to notice signs of diabetes by looking for changes in blood vessels in the eye.[114] In addition, they can also be effective in helping to improve overall diabetes outcomes by adopting strategies which can assist in earlier referral to appropriate services for people with established diabetes and who may be experiencing problems, and greater patient awareness of recommendations for optimal diabetes care.[114 115] Except for diabetic nephropathy, other causes of kidney disease may also lead to the development of eye symptoms or signs.[116]

Radiologists are extremely involved in basic screening and therapy. Magnetic resonance (MR) imaging is the preferred noninvasive test for various patients with CVD,[117 118] it continues to evolve and progress in the diagnosis and treatment of CVD, as well as in the diagnosis of chronic kidney disease.[119] Therefore, it is important to develop the human resources of radiographers, innovate technology, and promote the globalization of HRH and technology to improve important mortality outcomes such as CVD, diabetes and kidney diseases, and so on.

3.3.6 Findings about the association between specific types of HRH density and mental disorders and substance use disorders

In the multivariable model, we found the densities of doctors, nursing and midwifery staff were positively associated with mortality of mental disorders and substance use disorders (fig S3-4). Mental and addictive disorders affect a significant portion of the global population with high burden,

in particular in high- and upper-middle-income countries.[120] The relative share of these disorders has increased in the past decades, in part due to stigma and lack of treatment. A Japanese study[121] found the number of doctors was positively and significantly related with suicide rates. The possible reason is that with more non-psychiatrists, more opportunities for suboptimal prescribing of psychotropic medications occur, hence facing the burden of mental disorders, attention needs to be paid to the per capita occupancy of psychologists. The higher mortality of substance use disorders in high HRH countries was attributed to high rates of illicit drug use in high-income countries.[78] And substance use disorders are also associated with an increased risk of death by suicide.[79] On the path to improved mental health, we must work to end the stigma and discrimination against the community of people with mental disorders and increase clinical services for them, also to protect the mental health of medical professionals and to provide equitable, affordable mental health services in a contextualized manner.[122]

3.3.7 Findings about the association between environmental health officers (EHOs) and skin and subcutaneous diseases mortality

EHOs matter for improving worksite health,[123] while skin and subcutaneous diseases are considered a major health risk of environmental hazards in workers' occupational sites.[124] Thus, the potential contribution of EHOs to the workplace health improvement agenda should be explored further.

3.3.8 Findings about the other HRH cadres with significant effect

For the density of some professional and technical personnel, their medical functions might not directly lead to the health outcome of a specific disease, but these HRH cadres reflect the level of medical care, the comprehensive degree and balance of human health resources in quantity and type in a country, and the high density of these represents the high level of national development and medical care, so unsurprisingly their effects are similar to the total HRH. Therefore, we could explain the negative association between specific HRH and secondary-cause mortality, namely medical laboratory technicians (NTDs and malaria, maternal and neonatal disorders) (fig S9), optometrists (cardiovascular diseases, chronic respiratory diseases, transport injuries) (fig S11), psychologists (cardiovascular diseases, transport injuries) (fig S13). A major barrier to addressing traffic injuries in low- and middle-income countries is information lacking on the extent and nature of non-fatal trauma, along with the prevalence of behavioral safety indicators and

regulatory compliance, such as helmet and seat belt use and drunk driving.[125] So we detected the negative association of optometrists, audiologists and counsellors, psychologists, personal care workers, physiotherapists, and radiographers with the transport injuries (fig S11-13, S15, S17, S18). The interpretation of positive association between densities of dieticians and nutritionists, physiotherapists and musculoskeletal disorders (fig S10, S17) is that musculoskeletal disorders were the primary driver of noncommunicable disease-related disability burden,[73] as most painful musculoskeletal disorders worsen with age, and owing to the multiple diseases associated with musculoskeletal pain, the increasing incidence of non-communicable diseases and reduced physical activity, the age-related risk of the disease could explain its severity in high HRH and more developed countries.

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Supplementary Tables and Figures

Supplementary Table S1. Data quality rating from 0 to 5 stars, maximum percent well certified per 5-year interval and percent well certified across time series for 204 countries, 1990-2019.

No.	Country/territory	Data Quality Rating	Maximum percent well certified					
			1990–2019	1990–1994	1995–1999	2000–2004	2005–2009	2010–2019
1	Benin	0	0	0	0	0	0	0
2	Bhutan	0	0	0	0	0	0	0
3	Botswana	0	0	0	0	0	0	0
4	Cameroon	0	0	0	0	0	0	0
5	Central African Republic	0	0	0	0	0	0	0
6	Chad	0	0	0	0	0	0	0
7	Comoros	0	0	0	0	0	0	0
8	Congo (Brazzaville)	0	0	0	0	0	0	0
9	North Korea	0	0	0	0	0	0	0
10	Djibouti	0	0	0	0	0	0	0
11	Equatorial Guinea	0	0	0	0	0	0	0
12	Eritrea	0	0	0	0	0	0	0
13	Federated States of Micronesia	0	0	0	0	0	0	0
14	Gabon	0	0	0	0	0	0	0
15	Laos	0	0	0	0	0	0	0
16	Lesotho	0	0	0	0	0	0	0
17	Marshall Islands	0	0	0	0	0	0	0
18	Mauritania	0	0	0	0	0	0	0
19	Namibia	0	0	0	0	0	0	0
20	Nauru	0	0	0	0	0	0	0
21	Niue	0	0	0	0	0	0	0
22	Samoa	0	0	0	0	0	0	0
23	São Tomé and PrÍncipe	0	0	0	0	0	0	0
24	Somalia	0	0	0	0	0	0	0
25	South Sudan	0	0	0	0	0	0	0
26	Sudan	0	0	0	0	0	0	0
27	Timor-Leste	0	0	0	0	0	0	0
28	Togo	0	0	0	0	0	0	0
29	Tokelau	0	0	0	0	0	0	0
30	Tuvalu	0	0	0	0	0	0	0
31	Vanuatu	0	0	0	0	0	0	0
32	Yemen	0	0	0	0	0	0	0
33	Afghanistan	1	6.4	0	0	3.4	28.7	0

34	Algeria	1	3.2	0	0	0	15.8	0
35	Angola	1	0.6	0	0	0	0	2.8
36	Burkina Faso	1	2.7	0	4.6	6.3	2.4	0.3
37	Burundi	1	0.6	2.9	0	0	0	0
38	Cambodia	1	1.0	0	0	0.9	4.2	0
39	DR Congo	1	0.7	3.6	0	0	0	0
40	Ethiopia	1	3.1	3.2	0.9	3.3	4.0	4.0
41	Ghana	1	6.8	2.1	0.9	9.1	21.4	0.4
42	Guinea	1	0.7	0	3.4	0	0	0
43	Guinea-Bissau	1	0.5	0.4	2.3	0	0	0
44	Haiti	1	3.8	1.7	11.9	5.4	0	0
45	Kenya	1	7	0	2.4	4.3	5.1	23.4
46	eSwatini	1	0.1	0	0	0.5	0	0
47	Lebanon	1	0.1	0	0	0.3	0	0
48	Liberia	1	0.9	4.3	0	0	0	0
49	Libya	1	2.3	0	0	0	11.5	0
50	Madagascar	1	0.9	2.1	2.2	0	0	0
51	Malawi	1	1.6	0	0.7	3.2	3.4	0.6
52	Mali	1	1.2	0.3	0	0	0	5.6
53	Nepal	1	3.7	0	1.2	1	16.4	0
54	Niger	1	8.5	0	0	0	42.6	0
55	Nigeria	1	8.9	4.3	0	0	0	40.4
56	Papua New Guinea	1	5.9	0	0	0	0	29.5
57	Bolivia	1	2.5	0	0	12.4	0	0
58	Côte d'Ivoire	1	0.8	3.6	0	0	0.2	0.1
59	The Gambia	1	2.2	3.4	2.8	2.5	2.2	0
60	Rwanda	1	5.7	0	0	0	28.3	0
61	Senegal	1	1.4	3.5	3.3	0	0	0
62	Sierra Leone	1	0.8	4	0	0	0	0
63	Solomon Islands	1	7.6	0	0	0	0	38
64	Uganda	1	0.7	0	0	0.4	3.3	0
65	United Arab Emirates	1	7.2	0	0	0	35.8	0
66	Tanzania	1	3.0	3.3	2.3	6.3	3.1	0
67	Zambia	1	4.4	0	0	0	6.4	15.7
68	Andorra	2	13.1	0	0	0	0	65.3
69	Bangladesh	2	22.6	30.2	3.9	19.1	6.3	53.3
70	Bosnia and Herzegovina	2	28.4	66.5	0	0	0	75.4
71	Egypt	2	31.9	35.4	0	39.1	38.4	46.6
72	Honduras	2	12.9	39.1	0	0	12.4	13.0
73	India	2	21.9	2.7	4.8	6.3	49.7	46
74	Indonesia	2	24.0	1.8	0.6	0.3	53.9	63.4
75	Iraq	2	17.1	0	0	0	39.2	46.2

76	Kiribati	2	24.7	35.6	55.6	32.2	0	0
77	Malaysia	2	29.7	0	31.4	36.0	40.5	40.4
78	Maldives	2	31.0	0	0	44.0	49.1	61.9
79	Montenegro	2	24.9	0	0	62.0	62.6	0
80	Morocco	2	10.5	0	0	10.7	29.6	12.1
81	Mozambique	2	16.4	0	0.3	14.9	63.3	3.5
82	Myanmar	2	10.4	0	0	0	2.9	48.9
83	Oman	2	19.1	0	0	0	63.3	32.4
84	Pakistan	2	12.2	2.1	0	13.8	23.4	21.6
85	Palestine	2	33.3	0	28.5	31.6	33.8	72.8
86	Monaco	2	16.1	0	0	0	0	80.3
87	Cape Verde	2	14.1	0.3	0	0	0	70.2
88	Palau	2	10.2	0	0	0	0	51.0
89	Saudi Arabia	2	16.5	0	19.2	20.7	21.8	20.6
90	Vietnam	2	14.1	0.9	1.2	1.5	62.0	4.8
91	Tonga	2	10.6	0	0	52.9	0	0
92	Tunisia	2	10.5	0	0	0	28.3	24.0
93	Zimbabwe	2	28.5	38.9	58.7	0.4	44.3	0
94	American Samoa	3	54.9	0	65.9	72.6	69.7	66.2
95	Azerbaijan	3	49.6	68.0	65.4	72.1	42.7	0
96	Bahrain	3	47.7	0	62.9	61.8	58.8	54.9
97	Brunei	3	60.6	0	78.9	76.4	73.9	73.8
98	Cook Islands	3	36.5	0	0	60.0	53.9	68.5
99	Cyprus	3	48.2	0	32.2	60.7	69.7	78.4
100	Dominica	3	64.9	55.9	63.3	58.9	72.3	74.2
101	Dominican Republic	3	43.7	39.3	42.9	45.9	44.6	45.6
102	Ecuador	3	61.9	66.5	63.4	60.8	55.2	63.4
103	El Salvador	3	63.3	55.8	62.7	66.8	65.7	65.4
104	Fiji	3	42.4	0	32.9	53.5	59.7	66.0
105	Georgia	3	63.0	71.1	67.3	69.6	48.3	58.9
106	Iran	3	40.7	0	0	57.5	66.1	80
107	Jordan	3	43.8	0	1.7	72.8	79.3	65.2
108	Mongolia	3	35.8	59.1	0	19.5	20.9	79.4
109	Northern Mariana Islands	3	47.9	0	59.2	54.2	61.2	64.9
110	Peru	3	48.8	34.5	45.8	55.4	56.2	52.1
111	Philippines	3	50.3	15.4	40.4	46.2	74.1	75.4
112	Qatar	3	36.3	0	49.0	43.6	50.2	38.9
113	San Marino	3	59.3	0	75.7	77.4	77.4	65.8
114	Serbia	3	63.7	0	77.9	77.7	81.3	81.4
115	Seychelles	3	47.3	0	0	77.8	79.1	79.4
116	South Africa	3	55.0	1.2	66.0	69.3	69.2	69.1
117	Sri Lanka	3	58.1	41.9	52.7	62.7	67.9	65.3

118	Suriname	3	64.1	57.7	60.1	68.4	67.0	67.1
119	Syria	3	44.5	0	51.0	54.8	64.3	52.5
120	Tajikistan	3	53.1	66.5	51.8	48.3	48.4	50.5
121	Thailand	3	53.7	31.3	62.6	48.3	61.6	64.6
122	Turkey	3	48.1	17.4	20.8	59.2	63.7	79.5
123	Albania	4	68.7	67.8	74.8	73.8	72.5	54.6
124	Antigua and Barbuda	4	79.0	76.0	79.3	81.3	79.6	78.6
125	Argentina	4	70.5	70.6	69.9	69.1	69.1	73.7
126	Barbados	4	78.4	80.1	80.1	77.2	78	76.8
127	Belarus	4	82.1	80.0	80.7	82.6	83.4	83.7
128	Belize	4	76.7	57.9	74.9	75.9	87.2	87.6
129	Brazil	4	71.8	62.0	66.2	70.9	77.8	82.3
130	Bulgaria	4	73.7	81.3	78.6	70.1	70.2	68.1
131	China	4	70.9	70	73.7	66.8	72.1	71.7
132	The Bahamas	4	82.5	80.1	84.1	83.4	82.3	82.5
133	France	4	81.9	82	81.9	82.3	82.4	80.7
134	Greece	4	80.7	78.8	79.6	80.2	82.3	82.7
135	Greenland	4	69.1	0	86.3	87.4	88	83.6
136	Grenada	4	76.1	65.3	65.3	80.2	82.3	87.5
137	Guam	4	73.4	85.8	80.5	71.6	65.6	63.3
138	Guatemala	4	71.7	66.1	69.7	69.9	75	77.7
139	Guyana	4	70.5	61.4	68.1	73.5	75.1	74.2
140	Israel	4	82.5	83.5	83.5	82.3	81	82.3
141	Jamaica	4	65.5	67.0	0	83.9	87.2	89.4
142	Kazakhstan	4	80.6	87.3	85.5	79.7	76.9	73.6
143	Kuwait	4	69.9	71.9	71.7	69.9	67.7	68.5
144	Luxembourg	4	83.6	85.1	85.0	82.8	82.2	83.1
145	Mauritius	4	81.6	76.8	77.4	82.4	84.4	87.0
146	Mexico	4	80.8	73.0	78.8	80.6	82.4	89.4
147	Nicaragua	4	66.0	50.4	64.6	66.8	68.6	79.5
148	Panama	4	68.2	0	83.3	86.7	86.5	84.6
149	Paraguay	4	67.3	61.5	62.3	63.1	67.2	82.2
150	Poland	4	73.1	64.2	73.5	75.8	75.9	75.9
151	Portugal	4	80.6	77.6	77.6	82.4	79.5	86.0
152	Puerto Rico	4	84.0	84.1	83.8	84.0	83.4	84.5
153	South Korea	4	79.4	72.1	74.2	83.9	82.8	84
154	Saint Kitts and Nevis	4	75.4	68.0	78.4	67.3	78.5	84.8
155	Saint Lucia	4	77.6	73.9	73.3	80.4	74.0	86.5
156	Saint Vincent and the Grenadines	4	80.0	59.1	85.7	83.4	84.8	87.2
157	Switzerland	4	84.8	75.3	87.3	86.4	87.4	87.5

158	Taiwan (province of China)	4	83.5	78.5	83.5	84.9	85.2	85.6
159	North Macedonia	4	73.8	75.9	75.5	77.1	71.9	68.8
160	Turkmenistan	4	82.7	86.2	79.7	85.9	79.9	82.0
161	Virgin Islands	4	72.4	79.3	82.3	71.3	67.9	61.2
162	Uruguay	4	80.5	79.5	81.2	80.8	80.6	80.4
163	Uzbekistan	4	70.8	77.7	69.9	63.5	69.7	73.0
164	Armenia	5	87.8	86.2	86.1	86.4	90.9	89.6
165	Australia	5	92.5	93.6	93.5	92.5	91.8	91.1
166	Austria	5	92.9	92.7	92.3	94.8	93.6	91.1
167	Belgium	5	85.2	84.3	86.3	86.2	86.4	82.9
168	Bermuda	5	91.5	90.4	95.0	93.0	88.8	90.4
169	Venezuela	5	89.0	83.2	88.5	90.7	91.1	91.3
170	Canada	5	90.0	89.9	89.6	90.0	90.5	90.2
171	Chile	5	88.0	82.0	85.1	91.2	91.5	90.4
172	Colombia	5	86.7	76.3	88.3	89.7	88.5	90.8
173	Costa Rica	5	90.1	83.3	91.4	92.7	91.6	91.6
174	Croatia	5	88.5	85.9	84.9	88.2	89.9	93.7
175	Cuba	5	90.5	86.8	89.9	91.3	92.2	92.3
176	Czech Republic	5	87.5	90.5	85.9	86.5	86.6	87.9
177	Denmark	5	86.6	85.7	87.3	87.8	87.0	85.1
178	Estonia	5	92.7	93.1	93.2	92.3	92.8	91.9
179	Finland	5	94.3	91.3	96.1	95.3	94.3	94.4
180	Germany	5	85.8	86.1	86.1	85.4	85.7	85.6
181	Hungary	5	92.7	90.5	91.6	93.3	93.9	94.2
182	Iceland	5	93.8	96.0	95.0	94.3	92.6	91.3
183	Ireland	5	92.4	92.6	92.0	91.6	92.7	92.9
184	Italy	5	89.8	90.1	89.2	89.7	90.1	89.8
185	Japan	5	86.5	83.5	89.1	87.6	87	85.5
186	Kyrgyzstan	5	86.0	74.5	78.7	88.3	94.4	94.1
187	Latvia	5	91.0	88.8	92.0	91.3	89.2	93.8
188	Lithuania	5	93.4	92.7	94.8	93.2	92.8	93.5
189	Malta	5	92.2	89.9	90.8	92.3	94.5	93.5
190	Netherlands	5	85.1	86.5	86	84.2	84.5	84.2
191	New Zealand	5	96.3	95.5	96.7	96.9	96.4	96.0
192	Norway	5	88.4	91.0	90.8	88.4	86.1	85.7
193	Moldova	5	86.8	79.5	86.9	89.9	87.8	90.1
194	Romania	5	86.3	83.8	86.1	87.2	87.5	86.8
195	Russia	5	88.4	90.2	87.0	87.4	88.9	88.5
196	Singapore	5	92.5	90.6	92.5	93.4	92.2	93.8
197	Slovakia	5	86.7	83.8	83.7	85.3	88.5	92.0
198	Slovenia	5	85.0	85.4	81.5	85	86.1	87.0
199	Spain	5	86.5	85.3	86.7	86.2	86.2	88.0
200	Sweden	5	88.6	90.1	89.7	88.9	88.1	86.0

201	Trinidad and Tobago	5	88.9	85.9	89.4	90.4	88.8	89.8
202	Ukraine	5	86.1	81.7	83.5	84.1	89.8	91.2
203	UK	5	92.1	93.6	92.1	91.6	91.5	91.6
204	USA	5	88.6	90.1	89.5	88.6	87.8	87.2

Notes: GBD 2019 assigned star ratings to rate the quality of data for any given location year. Two dimensions determine this star rating: (I) the percentage of total deaths determined to be major garbage (such as ill-defined). Causes such as "injuries" or "cancer" will also be included in major garbage percentage because this percentage includes use of highly aggregated causes; and (II) the level of completeness of death registration. A "percent well-certified" value between 0 and 1 is a standard measure to assess the data quality calculated by the GBD 2019 per 5-year interval for 204 countries, except for 2010-2019. The percent well certified (*pct*) across time series for 204 countries from1990 to 2019 is the average of the *pct* in the five intervals. The mapping of *pct* to star rating is as followed: 0 star: $0\% = pct$; 1 star: $0\% < pct < 10\%$; 2 star: $10\% <= pct < 35\%$; 3 star: $35\% <= pct < 65\%$; 4 star: $65\% <= pct < 85\%$; 5 star: $pct \geq 85\%$. **32 countries/territories with 0 star were excludes from our study.** More details can be found in supplementary file (Section 2.16) of "*Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019*".

Supplementary Table S2. Data on human resources for health (HRH) that extracted from GBD 2019

In table S2, we provided data on HRH that we used in this study. Since this supplementary table has over 5000 records, we have uploaded it to GitHub at https://github.com/cheng01zi/codes-for-inequalities-in-HRH.git.

Supplementary Table S3. Data input sources for GBD group to estimate human resources for health (HRH) from 1990 to 2019

In table S3, we provided data input sources for human resources for health (HRH) estimation in GBD 2019. The GBD group obtained raw data from the sources given in the table and used a series of models and parameters to complete the imputation of missing values, then adjust and standardize the data (more details can be found in Supplementary Methods). Since this supplementary table has over 5000 records, we have uploaded it to GitHub at https://github.com/cheng01zi/codes-for-inequalities-in-HRH.git.

Supplementary Table S4. Cadres and corresponding occupation codes for human resources for health (HRH).

Health worker cadre	No.	4-digit ISCO 88 code	ISCO 88-defined health worker cadre	Type of mapping [a]
All health workers				
Doctors*	1	2221	Medical doctors	Approximate match
Nursing and midwifery staff*	2	2230, 3231, 3232	Nursing and midwifery personnel, nursing assistant professionals, midwifery assistant professionals	Exact aggregation
Dentistry staff*	3	2222, 3225	Dentists, dental assistants	Exact aggregation
Pharmaceutical staff*	4	2224, 3228	Pharmacists, pharmaceutical assistant	Exact aggregation
Medical assistants and CHWs	5	3221	Medical assistant	Approximate match
Aides and emergency medical workers	6	5132, 5139	Institution-based personal care workers, personal care and related workers not elsewhere classified	Approximate match
Medical laboratory technicians	7	3211	Life science technicians	Approximate match
Dieticians and nutritionists	8	3223	Dietitians and nutritionists	Exact match
Optometrists	9	3224	Optometrists and opticians	Approximate match
Audiologists and counsellors	10	3229	Modern health associate professionals (except nursing) not classified elsewhere	Approximate match
Psychologists	11	2445	Psychologists	Exact match
Environmental health officers	12	3222	Sanitarians	Approximate match
Personal care workers	13	5133	Home-based personal care worker	Approximate match
Traditional and complementary medicine practitioners	14	3241	Traditional medical practitioners	Approximate match
Physiotherapists	15	3226	Physiotherapists and associate professionals	Approximate match
Radiographers	16	3133	Medical equipment operators	Approximate match
Dental assistants	Partial of No.3	3225	Dental assistants	Exact match

Dentists	Partial of No.3	2222	Dentists	Exact match
Nursing and midwifery professionals	Duplicate with No.2	2230, 3231, 3232	Nursing and midwifery personnel, nursing assistant professionals, midwifery assistant professionals	Exact aggregation
Pharmaceutical technicians	Partial of No.4	3228	Pharmaceutical assistant	Approximate match
Pharmacists	Partial of No.4	2224	Pharmacists	Exact match
Doctors, clinical officers, and CHWs	Aggregate of No.1 and No.5	2221, 3221	Medical doctors, medical assistant	Exact aggregation

Notes: *Included in the definition of SDG indicator 3.c.1 a.

CHWs=community health workers.

[a] The table draws the concordance between GBD 2019 HRH and ISCO-88 HRH codes:

Exact match: map the cadre across versions with no information loss

Approximate match: This resulted in some inconsistency but was preferable to dropping the cadre entirely or diluting it with many unrelated occupations.

Exact aggregation: map the GBD 2019 HRH with multiple ISCO-88 HRH codes

Supplementary Table S5. Data on all cause and cause specific mortality in 172 countries and territories that extracted from GBD 2019

In table S5, we provided data on all cause and cause specific mortality that we used in this study for each country in each year. Since this supplementary table has over 5000 records, we have uploaded it to GitHub at https://github.com/cheng01zi/codes-for-inequalities-in-HRH.git.

Supplementary Table S6. Data input sources for GBD group to estimate all cause and cause specific mortality in 172 countries and territories from 1990 to 2019

In table S6, we provided data input sources for all cause and cause specific mortality estimation in GBD 2019. The GBD group obtained raw data from the sources given in the table and used a series of models and parameters to complete the imputation of missing values, then adjust and standardize the data (more details can be found in Supplementary Methods). Since this supplementary table is too large, we have uploaded it to GitHub at https://github.com/cheng01zi/codes-for-inequalities-in-HRH.git.

Supplementary Table S7. EAPC of total HRH per 10 000 population by country and territory, from 1990 to 2019

Countries and territories	Human resources for health (Workers per 10 000 population)		EAPC (%, 95% CI)	P value
	1990	**2019**		
Sweden	638.9	696.1	0.6 (0.5 to 0.7)	<0.001*
Denmark	548.6	680.3	0.8 (0.7 to 0.9)	<0.001*
Norway	490.7	671.6	1.3 (1.2 to 1.4)	<0.001*
Andorra	435.4	610.5	1.2 (1.1 to 1.3)	<0.001*
Netherlands	355.0	574.9	1.5 (1.4 to 1.7)	<0.001*
Finland	439.3	571.7	0.6 (0.5 to 0.6)	<0.001*
Switzerland	327.4	553.1	1.9 (1.8 to 2.0)	<0.001*
Australia	346.9	531.5	0.9 (0.8 to 1.1)	<0.001*
San Marino	322.8	522.6	1.4 (1.3 to 1.6)	<0.001*
Bermuda	253.9	515.1	3.3 (3.0 to 3.6)	<0.001*
Iceland	341.8	487.6	1.4 (1.3 to 1.5)	<0.001*
Canada	305.8	487.1	2.2 (2.1 to 2.4)	<0.001*
Monaco	331.5	483.1	1.0 (0.9 to 1.1)	<0.001*
New Zealand	312.7	471.6	1.6 (1.5 to 1.7)	<0.001*
United States of America	294.3	467.4	1.3 (1.3 to 1.4)	<0.001*
France	283.0	440.9	0.9 (0.7 to 1.2)	<0.001*
United Kingdom	242.7	430.0	2.4 (2.3 to 2.4)	<0.001*
Germany	260.9	419.9	2.4 (2.3 to 2.6)	<0.001*
Belgium	213.6	398.6	1.9 (1.8 to 2.1)	<0.001*
Ireland	127.8	386.8	4.1 (3.7 to 4.6)	<0.001*
Bahamas	126.2	385.5	3.7 (3.2 to 4.2)	<0.001*
Japan	198.5	373.5	2.5 (2.4 to 2.6)	<0.001*
Austria	190.1	366.2	2.7 (2.6 to 2.9)	<0.001*
United States Virgin Islands	161.6	361.2	2.9 (2.6 to 3.3)	<0.001*
Slovenia	131.5	350.8	3.2 (2.7 to 3.7)	<0.001*
Greenland	198.0	346.0	1.8 (1.7 to 1.9)	<0.001*
Czechia	177.6	336.9	2.0 (2.0 to 2.1)	<0.001*
Luxembourg	145.2	336.2	3.4 (3.2 to 3.6)	<0.001*
Israel	174.9	331.3	3.0 (2.8 to 3.3)	<0.001*
Russian Federation	185.3	328.6	2.2 (1.9 to 2.5)	<0.001*
Cuba	146.8	318.6	4.3 (4.0 to 4.6)	<0.001*
Slovakia	159.4	317.3	2.6 (2.5 to 2.7)	<0.001*
Spain	106.0	316.4	4.4 (4.0 to 4.7)	<0.001*
Bulgaria	145.9	308.7	2.8 (2.6 to 3.0)	<0.001*
Qatar	123.2	304.5	3.5 (3.3 to 3.7)	<0.001*
United Arab Emirates	121.4	304.0	3.7 (3.6 to 3.9)	<0.001*
Singapore	106.5	303.9	5.0 (4.8 to 5.2)	<0.001*
Ukraine	154.9	297.6	2.4 (2.1 to 2.7)	<0.001*

Guam	189.4	297.0	0.6 (0.5 to 0.7)	<0.001*
Lithuania	113.9	291.2	3.1 (2.9 to 3.2)	<0.001*
Italy	140.2	288.0	2.9 (2.7 to 3.0)	<0.001*
Estonia	165.3	285.6	1.4 (1.3 to 1.6)	<0.001*
Barbados	114.8	278.1	2.6 (2.4 to 2.8)	<0.001*
Puerto Rico	126.5	277.0	1.9 (1.7 to 2.0)	<0.001*
Latvia	148.5	261.4	1.5 (1.4 to 1.6)	<0.001*
Northern Mariana Islands	155.4	240.5	0.3 (0.0 to 0.6)	0.027*
Malta	126.3	237.6	3.3 (3.2 to 3.4)	<0.001*
Hungary	163.3	236.7	0.7 (0.6 to 0.8)	<0.001*
Belarus	115.7	233.7	4.2 (3.8 to 4.5)	<0.001*
Brunei Darussalam	129.0	233.4	2.1 (2.0 to 2.2)	<0.001*
Saint Kitts and Nevis	105.3	231.1	2.9 (2.8 to 3.0)	<0.001*
Kuwait	129.4	228.6	2.7 (2.6 to 2.9)	<0.001*
Argentina	142.1	226.0	1.8 (1.6 to 2.0)	<0.001*
Portugal	100.6	225.7	4.1 (3.9 to 4.2)	<0.001*
Poland	121.8	221.9	1.9 (1.8 to 2.0)	<0.001*
Kazakhstan	113.3	215.4	3.0 (2.7 to 3.2)	<0.001*
Uruguay	129.3	214.6	3.3 (2.8 to 3.7)	<0.001*
Cyprus	99.9	212.7	2.4 (2.3 to 2.6)	<0.001*
Greece	101.9	210.9	1.8 (1.5 to 2.1)	<0.001*
Antigua and Barbuda	101.0	210.6	2.7 (2.6 to 2.8)	<0.001*
Croatia	89.0	206.3	3.8 (3.6 to 4.1)	<0.001*
Romania	113.3	204.8	1.9 (1.8 to 2.0)	<0.001*
Palau	100.8	204.7	1.7 (1.5 to 1.9)	<0.001*
Suriname	96.2	200.5	2.9 (2.6 to 3.1)	<0.001*
Montenegro	106.1	198.3	1.8 (1.7 to 1.9)	<0.001*
Mexico	84.6	198.3	3.0 (2.9 to 3.2)	<0.001*
Azerbaijan	79.5	192.3	4.8 (4.2 to 5.3)	<0.001*
Cook Islands	94.0	191.1	2.2 (2.1 to 2.3)	<0.001*
Georgia	78.5	181.4	2.6 (2.5 to 2.7)	<0.001*
Bahrain	81.0	172.5	3.5 (3.2 to 3.7)	<0.001*
Seychelles	81.3	168.8	2.3 (2.1 to 2.4)	<0.001*
Chile	66.8	168.4	3.7 (3.5 to 4.0)	<0.001*
Trinidad and Tobago	52.5	167.4	4.5 (4.2 to 4.9)	<0.001*
Republic of Korea	50.2	165.7	5.3 (5.2 to 5.5)	<0.001*
Costa Rica	63.8	165.2	2.6 (2.4 to 2.8)	<0.001*
Armenia	55.8	165.2	5.2 (4.9 to 5.6)	<0.001*
Taiwan (Province of China)	49.1	161.8	4.5 (4.3 to 4.7)	<0.001*
Brazil	64.3	161.5	3.5 (3.3 to 3.7)	<0.001*
Thailand	70.8	160.1	2.6 (2.4 to 2.7)	<0.001*
Saint Lucia	58.2	158.3	3.4 (3.2 to 3.6)	<0.001*
Mongolia	53.6	155.8	3.1 (2.8 to 3.4)	<0.001*
Panama	66.1	154.2	3.3 (3.1 to 3.5)	<0.001*

American Samoa	83.1	153.1	1.1 (1.0 to 1.2)	<0.001*
Grenada	45.7	147.3	3.8 (3.5 to 4.1)	<0.001*
Turkmenistan	57.4	145.7	4.0 (3.7 to 4.3)	<0.001*
North Macedonia	56.2	144.8	3.5 (3.3 to 3.7)	<0.001*
Uzbekistan	57.3	140.2	4.3 (3.9 to 4.6)	<0.001*
Malaysia	54.9	137.3	3.5 (3.4 to 3.7)	<0.001*
Peru	59.5	133.9	2.9 (2.7 to 3.1)	<0.001*
Jamaica	61.1	130.6	2.4 (2.3 to 2.5)	<0.001*
Bolivia (Plurinational State of)	31.4	130.5	4.7 (4.2 to 5.2)	<0.001*
Albania	53.0	128.2	3.4 (3.3 to 3.6)	<0.001*
Dominica	51.4	127.9	3.1 (3.1 to 3.2)	<0.001*
Venezuela (Bolivarian Republic of)	67.4	127.1	1.3 (1.0 to 1.6)	<0.001*
Colombia	66.5	126.8	2.6 (2.1 to 3.0)	<0.001*
Jordan	45.8	123.5	2.0 (1.7 to 2.3)	<0.001*
Serbia	53.4	122.2	3.2 (3.0 to 3.4)	<0.001*
South Africa	56.9	122.0	1.9 (1.8 to 2.1)	<0.001*
Saudi Arabia	39.2	119.1	5.2 (5.0 to 5.5)	<0.001*
Saint Vincent and the Grenadines	45.1	114.7	3.0 (2.9 to 3.1)	<0.001*
Kyrgyzstan	54.4	112.5	2.0 (1.8 to 2.2)	<0.001*
China	29.4	110.8	5.6 (5.5 to 5.8)	<0.001*
Maldives	35.0	108.6	5.7 (5.5 to 5.8)	<0.001*
Bosnia and Herzegovina	27.7	104.7	5.0 (4.6 to 5.4)	<0.001*
Republic of Moldova	49.5	103.8	3.3 (2.9 to 3.7)	<0.001*
Mauritius	40.5	100.2	4.2 (4.0 to 4.4)	<0.001*
Oman	37.2	98.3	5.6 (5.3 to 5.9)	<0.001*
Ecuador	48.7	93.2	2.3 (2.1 to 2.5)	<0.001*
Dominican Republic	42.0	91.8	4.4 (4.0 to 4.8)	<0.001*
Libya	31.9	90.6	3.0 (2.5 to 3.5)	<0.001*
Paraguay	40.7	90.4	3.2 (3.0 to 3.4)	<0.001*
Lebanon	37.7	89.7	3.5 (3.3 to 3.7)	<0.001*
Guyana	36.3	87.3	2.8 (2.7 to 2.9)	<0.001*
Tajikistan	36.7	86.0	3.6 (3.3 to 3.9)	<0.001*
Philippines	44.1	80.6	1.0 (0.7 to 1.2)	<0.001*
Belize	30.6	79.7	4.2 (4.0 to 4.4)	<0.001*
Egypt	29.0	79.4	2.7 (2.4 to 3.0)	<0.001*
Fiji	44.4	76.1	2.3 (2.1 to 2.6)	<0.001*
El Salvador	30.5	75.5	3.4 (3.2 to 3.5)	<0.001*
Guatemala	30.0	75.0	3.4 (3.2 to 3.6)	<0.001*
Sri Lanka	27.8	73.8	3.5 (3.4 to 3.5)	<0.001*
Zimbabwe	43.5	71.6	–0.3 (–0.6 to 0.0)	0.02*
Indonesia	31.4	68.1	3.6 (3.3 to 3.9)	<0.001*
Turkey	26.6	67.1	3.5 (3.4 to 3.6)	<0.001*
Viet Nam	21.5	66.4	5.2 (5.0 to 5.4)	<0.001*
Iran (Islamic Republic of)	16.1	65.8	5.5 (5.1 to 5.9)	<0.001*

Ghana	27.9	65.5	2.0 (1.9 to 2.1)	<0.001*
Tunisia	23.8	64.2	3.1 (3.0 to 3.3)	<0.001*
Democratic Republic of the Congo	36.1	58.7	2.2 (1.6 to 2.7)	<0.001*
Tonga	29.1	58.4	1.3 (1.0 to 1.5)	<0.001*
Angola	29.3	56.0	1.9 (1.6 to 2.1)	<0.001*
United Republic of Tanzania	24.7	55.0	2.9 (2.6 to 3.2)	<0.001*
Nicaragua	22.4	54.8	4.2 (3.9 to 4.5)	<0.001*
Kenya	24.5	54.4	2.8 (2.7 to 2.9)	<0.001*
Cambodia	21.4	53.5	4.7 (4.3 to 5.1)	<0.001*
Nepal	24.1	52.8	3.2 (3.0 to 3.5)	<0.001*
Nigeria	20.8	52.7	2.3 (2.0 to 2.7)	<0.001*
Cabo Verde	19.1	52.5	4.0 (3.8 to 4.2)	<0.001*
Algeria	18.3	51.7	4.3 (4.1 to 4.5)	<0.001*
Honduras	18.8	48.4	3.5 (3.4 to 3.7)	<0.001*
Eswatini	22.0	48.3	3.3 (3.1 to 3.5)	<0.001*
Kiribati	19.5	48.1	3.9 (3.5 to 4.2)	<0.001*
Zambia	25.4	48.1	2.1 (1.8 to 2.4)	<0.001*
Iraq	15.8	47.1	4.3 (4.1 to 4.4)	<0.001*
Syrian Arab Republic	16.5	45.2	2.5 (2.2 to 2.7)	<0.001*
Cÿte d'Ivoire	24.3	43.9	1.1 (1.0 to 1.2)	<0.001*
Madagascar	22.7	43.2	1.3 (1.2 to 1.5)	<0.001*
India	17.3	42.0	3.3 (3.2 to 3.4)	<0.001*
Pakistan	18.3	41.0	3.3 (3.1 to 3.6)	<0.001*
Uganda	20.7	36.5	1.2 (1.0 to 1.4)	<0.001*
Solomon Islands	11.5	36.3	5.9 (5.3 to 6.4)	<0.001*
Bangladesh	15.0	34.9	4.0 (3.9 to 4.2)	<0.001*
Gambia	20.6	34.4	1.2 (1.0 to 1.3)	<0.001*
Myanmar	9.6	34.4	7.2 (6.9 to 7.5)	<0.001*
Morocco	12.6	33.9	3.5 (3.4 to 3.7)	<0.001*
Guinea-Bissau	17.1	32.3	1.7 (1.5 to 1.9)	<0.001*
Sierra Leone	21.0	31.3	1.6 (1.1 to 2.1)	<0.001*
Senegal	17.4	30.7	0.6 (0.4 to 0.8)	<0.001*
Palestine	11.0	30.5	4.2 (4.1 to 4.3)	<0.001*
Burundi	16.5	29.6	1.5 (1.3 to 1.7)	<0.001*
Liberia	12.3	28.9	5.3 (4.8 to 5.9)	<0.001*
Malawi	13.6	27.5	3.6 (3.3 to 3.9)	<0.001*
Papua New Guinea	15.9	24.2	1.5 (1.3 to 1.7)	<0.001*
Haiti	17.2	23.6	2.4 (2.0 to 2.8)	<0.001*
Mali	14.4	23.1	1.5 (1.4 to 1.6)	<0.001*
Burkina Faso	14.0	22.6	1.5 (1.3 to 1.7)	<0.001*
Mozambique	11.9	21.4	2.2 (2.0 to 2.4)	<0.001*
Rwanda	9.9	20.6	4.7 (4.2 to 5.2)	<0.001*
Niger	11.3	18.2	1.4 (1.3 to 1.6)	<0.001*
Afghanistan	10.0	15.9	1.5 (1.1 to 1.9)	<0.001*

Guinea	8.2	15.1	1.8 (1.6 to 1.9)	<0.001*
Ethiopia	6.1	13.9	4.2 (3.9 to 4.6)	<0.001*

Notes: * P value for trends <0.05.

CI=confidence interval; EAPC=estimated annual percentage change.

Supplementary Table S8. EAPC of 16 cadres of HRH (per 10 000 population) by country and territory, from 1990 to 2019

Countries and territories	Aides and emergency medical workers			Audiologists and counsellors			Dentistry staff			Dieticians and nutritionists			Environmental health officers			Medical assistants and CHWs		
	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)
Afghanistan	0.3	0.6	3.5 (2.5 to 4.5)	0.0	0.1	3.0 (2.3 to 3.8)	0.1	0.1	−0.1 (−0.4 to 0.2)	0.1	0.2	4.7 (3.7 to 5.7)	0.7	1.1	2.2 (1.5 to 2.9)	0.8	1.5	2.3 (1.6 to 3.0)
Albania	1.4	8.4	7.0 (6.7 to 7.3)	0.3	1.1	5.1 (5.0 to 5.3)	1.5	6.0	5.7 (5.4 to 6.0)	0.1	0.3	5.8 (5.6 to 6.0)	0.2	0.6	4.3 (4.2 to 4.4)	0.3	1.1	4.6 (4.4 to 4.7)
Algeria	0.5	2.9	7.4 (6.7 to 8.2)	0.0	0.1	4.9 (4.6 to 5.2)	0.9	3.1	4.5 (4.3 to 4.6)	0.2	0.9	6.5 (6.2 to 6.7)	0.6	1.8	4.4 (4.0 to 4.8)	0.7	2.1	4.3 (4.0 to 4.7)
American Samoa	6.0	7.6	0.9 (0.7 to 1.0)	3.6	5.0	1.2 (1.0 to 1.3)	4.1	5.5	0.8 (0.7 to 1.0)	1.2	2.2	2.1 (2.0 to 2.2)	3.3	3.8	0.5 (0.4 to 0.6)	2.5	3.1	0.8 (0.6 to 1.0)
Andorra	196.0	301.5	1.5 (1.4 to 1.7)	7.3	9.3	0.8 (0.7 to 0.9)	14.4	18.5	0.7 (0.7 to 0.8)	5.1	6.5	0.8 (0.7 to 0.9)	7.5	8.6	0.4 (0.3 to 0.5)	8.8	10.6	0.6 (0.5 to 0.7)
Angola	3.4	5.8	2.1 (1.3 to 3.0)	0.8	2.0	3.2 (2.8 to 3.7)	0.4	1.9	5.6 (5.1 to 6.2)	0.1	0.6	5.0 (4.5 to 5.6)	1.0	1.5	1.2 (0.7 to 1.6)	1.6	3.3	2.2 (1.8 to 2.5)
Antigua and Barbuda	19.0	38.1	2.8 (2.5 to 3.0)	2.4	4.3	2.0 (1.9 to 2.1)	2.4	2.0	−2.0 (−2.6 to −1.4)	3.3	7.3	2.7 (2.5 to 2.9)	7.4	10.2	1.2 (1.1 to 1.4)	5.5	8.5	1.5 (1.4 to 1.6)
Argentina	29.0	41.9	1.5 (1.0 to 2.1)	4.6	6.4	1.0 (0.9 to 1.1)	10.4	16.8	1.3 (1.2 to 1.5)	1.3	2.4	1.9 (1.8 to 2.1)	3.5	4.0	0.6 (0.4 to 0.8)	3.9	4.2	0.0 (−0.1 to 0.2)
Armenia	1.9	29.5	11.8 (10.9 to 12.8)	1.7	7.0	5.8 (5.4 to 6.2)	1.5	7.8	7.0 (6.5 to 7.6)	0.2	0.8	6.9 (6.5 to 7.4)	0.4	1.8	6.8 (6.2 to 7.4)	0.8	2.7	4.9 (4.6 to 5.3)
Australia	23.7	68.7	3.8 (3.4 to 4.3)	8.1	18.6	3.1 (2.7 to 3.4)	7.8	11.5	1.2 (1.0 to 1.5)	1.8	4.1	3.1 (2.8 to 3.4)	5.5	10.4	2.4 (2.1 to 2.7)	4.7	10.0	2.8 (2.5 to 3.1)
Austria	47.2	118.3	3.9 (3.7 to 4.1)	3.8	7.3	2.7 (2.5 to 2.9)	6.9	13.8	2.7 (2.6 to 2.9)	2.3	5.6	3.6 (3.4 to 3.7)	2.5	4.5	2.5 (2.3 to 2.7)	7.9	12.2	1.9 (1.6 to 2.3)
Azerbaijan	1.1	24.1	14.7 (13.0 to 16.4)	1.3	6.9	7.3 (6.7 to 7.9)	1.9	7.2	5.8 (5.2 to 6.4)	0.1	1.0	8.4 (7.7 to 9.2)	0.3	2.3	9.6 (8.6 to 10.5)	0.7	2.9	5.9 (5.3 to 6.5)
Bahamas	25.8	91.2	4.7 (3.9 to 5.4)	3.1	10.8	4.6 (4.1 to 5.2)	2.5	6.1	3.3 (3.1 to 3.6)	4.4	15.0	4.6 (4.1 to 5.1)	7.6	17.7	3.0 (2.5 to 3.5)	6.7	22.7	4.4 (3.8 to 5.0)
Bahrain	8.9	32.4	4.9 (4.0 to 5.7)	0.3	1.0	5.1 (4.8 to 5.3)	1.3	4.3	4.6 (4.4 to 4.8)	1.3	6.6	6.4 (6.1 to 6.7)	5.0	12.0	3.6 (3.1 to 4.1)	4.7	14.8	4.5 (4.2 to 4.9)
Bangladesh	0.7	2.0	4.4 (3.7 to 5.0)	0.8	2.4	4.0 (3.8 to 4.2)	0.1	0.8	6.5 (6.3 to 6.7)	0.0	0.1	5.7 (5.5 to 5.9)	0.2	0.4	2.6 (2.3 to 2.9)	1.7	4.0	3.5 (3.3 to 3.7)
Barbados	17.1	47.3	4.1 (3.8 to 4.3)	2.0	5.9	4.1 (4.0 to 4.3)	2.2	5.7	3.6 (3.4 to 3.8)	2.9	8.7	4.0 (3.9 to 4.2)	5.8	12.3	3.0 (2.8 to 3.1)	4.4	12.2	4.0 (3.8 to 4.1)
Belarus	10.5	57.4	7.8 (7.1 to 8.6)	2.7	8.4	4.8 (4.4 to 5.2)	4.3	12.3	4.4 (4.1 to 4.7)	0.7	2.5	5.6 (5.2 to 6.0)	2.0	5.3	4.6 (4.1 to 5.1)	5.5	15.3	4.4 (4.1 to 4.8)
Belgium	21.7	63.7	4.0 (3.8 to 4.2)	5.8	11.5	2.3 (2.1 to 2.4)	8.2	13.6	1.5 (1.3 to 1.7)	2.4	4.7	2.0 (1.9 to 2.2)	3.9	6.2	1.6 (1.5 to 1.7)	3.8	6.3	1.6 (1.4 to 1.8)
Belize	3.5	11.9	5.4 (4.8 to 5.9)	0.5	1.8	4.8 (4.6 to 5.0)	0.9	2.4	2.8 (2.1 to 3.5)	0.5	2.7	6.0 (5.8 to 6.2)	2.4	5.6	3.5 (3.2 to 3.8)	1.4	3.9	4.0 (3.8 to 4.2)

Bermuda	67.0	210.3	4.7 (4.2 to 5.1)	4.4	13.5	4.5 (4.2 to 4.9)	7.6	11.5	1.6 (1.3 to 1.8)	5.9	17.5	4.2 (4.0 to 4.5)	13.4	25.5	2.6 (2.4 to 2.8)	9.7	29.1	4.5 (4.1 to 4.8)
Bolivia (Plurinational State of)	0.4	2.0	6.0 (5.5 to 6.6)	0.0	0.1	4.1 (3.5 to 4.7)	3.8	15.9	5.4 (5.0 to 5.8)	0.3	1.1	5.2 (4.6 to 5.9)	0.2	0.6	4.1 (3.6 to 4.6)	1.1	3.1	4.0 (3.4 to 4.6)
Bosnia and Herzegovina	0.3	7.3	11.2 (9.4 to 13.1)	0.4	2.5	6.6 (5.9 to 7.2)	1.1	3.9	4.8 (4.5 to 5.0)	0.1	0.9	8.0 (7.1 to 8.9)	0.2	1.5	6.3 (5.3 to 7.4)	0.5	2.6	5.4 (4.9 to 6.0)
Brazil	14.3	29.5	2.9 (2.6 to 3.2)	0.8	1.7	3.0 (2.8 to 3.2)	5.8	10.3	2.3 (2.1 to 2.4)	1.0	3.2	4.4 (4.2 to 4.6)	9.2	15.8	2.3 (2.1 to 2.5)	1.6	3.0	2.6 (2.5 to 2.8)
Brunei Darussalam	27.4	38.1	0.6 (0.2 to 1.0)	4.5	10.4	3.1 (2.9 to 3.2)	3.6	7.9	2.8 (2.7 to 2.9)	2.7	7.7	3.8 (3.7 to 3.9)	1.4	1.7	0.4 (0.2 to 0.7)	4.0	8.1	2.6 (2.4 to 2.8)
Bulgaria	11.1	47.8	6.7 (6.1 to 7.4)	5.7	13.4	3.4 (3.1 to 3.6)	9.8	23.2	3.3 (3.1 to 3.5)	0.5	1.5	4.3 (4.0 to 4.5)	2.3	5.4	4.0 (3.6 to 4.4)	2.9	6.0	3.0 (2.7 to 3.2)
Burkina Faso	0.9	1.6	2.5 (1.9 to 3.1)	0.1	0.2	1.3 (1.1 to 1.5)	0.1	0.1	1.6 (1.4 to 1.8)	0.0	0.0	2.2 (2.0 to 2.4)	0.3	0.4	1.2 (0.9 to 1.6)	1.1	1.2	0.6 (0.3 to 0.8)
Burundi	1.5	2.1	2.2 (1.5 to 2.8)	0.4	0.6	1.2 (1.0 to 1.4)	0.0	0.1	0.9 (0.7 to 1.1)	0.1	0.1	1.7 (1.5 to 1.8)	0.3	0.3	1.2 (0.9 to 1.5)	1.0	1.2	0.8 (0.6 to 0.9)
CÃ´te d'Ivoire	3.1	3.4	0.2 (–0.3 to 0.6)	0.3	0.4	1.3 (1.1 to 1.4)	0.2	0.4	1.7 (1.6 to 1.7)	0.1	0.1	2.4 (2.2 to 2.5)	0.7	0.7	0.3 (0.1 to 0.5)	2.1	2.4	0.5 (0.3 to 0.6)
Cabo Verde	2.2	6.4	4.5 (4.1 to 4.9)	0.2	0.5	4.4 (4.2 to 4.7)	0.1	0.3	5.9 (5.7 to 6.1)	0.0	0.2	6.3 (6.1 to 6.5)	0.4	0.8	3.1 (2.9 to 3.4)	1.1	2.4	3.1 (2.9 to 3.4)
Cambodia	0.6	3.0	6.8 (6.0 to 7.6)	1.0	3.5	4.9 (4.5 to 5.3)	1.0	2.4	3.3 (3.0 to 3.5)	0.3	1.5	6.7 (6.2 to 7.1)	2.4	6.0	3.8 (3.3 to 4.3)	0.5	1.4	3.8 (3.4 to 4.1)
Canada	17.1	47.6	4.6 (4.1 to 5.0)	5.5	13.8	4.0 (3.6 to 4.3)	21.9	41.4	2.7 (2.4 to 3.0)	3.6	7.8	3.2 (2.9 to 3.5)	2.4	4.6	3.1 (2.8 to 3.4)	16.4	39.4	3.8 (3.5 to 4.1)
Chile	8.9	27.8	2.9 (2.4 to 3.5)	2.3	5.4	2.6 (2.3 to 2.9)	6.0	14.8	2.8 (2.6 to 2.9)	0.8	3.2	4.6 (4.5 to 4.8)	0.3	0.9	3.6 (3.4 to 3.8)	5.6	12.6	2.5 (2.1 to 2.9)
China	0.5	9.9	11.1 (10.7 to 11.5)	1.0	5.0	6.0 (5.7 to 6.3)	0.4	5.0	9.7 (9.2 to 10.2)	0.0	0.3	6.8 (6.5 to 7.2)	0.2	0.8	6.0 (5.7 to 6.3)	0.4	1.6	5.1 (4.8 to 5.4)
Colombia	9.1	16.7	2.1 (1.2 to 2.9)	1.0	1.5	1.5 (1.1 to 2.0)	9.7	20.2	2.6 (2.4 to 2.8)	0.8	2.0	3.4 (3.0 to 3.9)	2.9	3.9	1.1 (0.5 to 1.6)	4.1	5.6	0.9 (0.4 to 1.4)
Cook Islands	4.5	7.3	2.2 (1.8 to 2.6)	5.4	7.2	0.9 (0.8 to 1.1)	6.7	11.1	2.0 (1.7 to 2.3)	1.9	3.6	2.1 (2.1 to 2.2)	3.6	4.3	0.7 (0.5 to 0.9)	3.5	4.0	0.4 (0.2 to 0.6)
Costa Rica	4.4	13.5	4.9 (4.5 to 5.4)	0.7	1.1	1.6 (1.2 to 2.0)	5.0	4.4	–1.1 (–1.7 to –0.4)	0.3	0.8	2.8 (2.5 to 3.1)	3.8	5.6	1.6 (1.4 to 1.9)	1.7	2.5	1.3 (1.0 to 1.7)
Croatia	2.0	10.3	6.7 (6.3 to 7.2)	2.1	7.7	5.4 (5.1 to 5.7)	5.6	14.3	3.5 (3.2 to 3.8)	0.4	1.7	5.7 (5.4 to 5.9)	2.6	7.9	4.6 (4.3 to 4.9)	1.1	3.6	5.0 (4.8 to 5.3)
Cuba	3.2	30.7	10.2 (9.2 to 11.3)	4.0	13.4	5.1 (4.4 to 5.7)	11.1	34.4	4.3 (4.0 to 4.7)	3.7	12.7	4.9 (4.4 to 5.5)	4.8	18.1	5.9 (5.3 to 6.5)	12.7	41.0	5.0 (4.3 to 5.7)
Cyprus	8.8	26.3	4.1 (3.8 to 4.4)	1.0	2.7	3.5 (3.4 to 3.6)	7.2	11.7	1.0 (0.6 to 1.5)	0.8	2.9	4.5 (4.3 to 4.8)	1.0	1.8	2.3 (2.1 to 2.5)	2.1	4.1	2.2 (2.1 to 2.3)
Czechia	12.2	42.6	5.1 (4.8 to 5.4)	2.7	6.7	3.3 (3.3 to 3.4)	6.0	12.9	2.5 (2.1 to 2.8)	1.1	3.1	3.7 (3.4 to 4.0)	1.7	3.5	2.8 (2.5 to 3.0)	2.0	4.1	2.8 (2.7 to 2.9)

Country																		
Democratic Republic of the Congo	0.9	2.7	4.4 (3.0 to 5.8)	0.6	1.4	3.2 (2.4 to 4.0)	0.4	0.9	2.2 (1.4 to 2.9)	0.1	0.3	3.8 (2.7 to 4.8)	0.2	0.5	3.0 (2.1 to 3.8)	1.3	2.8	2.8 (2.1 to 3.5)
Denmark	265.0	326.2	0.8 (0.6 to 1.0)	9.3	11.2	0.9 (0.8 to 1.0)	15.7	20.5	0.8 (0.7 to 0.9)	6.1	9.0	1.4 (1.4 to 1.5)	4.8	5.7	0.7 (0.7 to 0.8)	4.2	5.3	1.3 (1.0 to 1.6)
Dominica	4.5	9.9	3.0 (2.6 to 3.5)	0.8	2.0	3.7 (3.5 to 3.9)	0.8	1.9	3.4 (3.2 to 3.5)	1.1	3.6	4.6 (4.5 to 4.7)	2.4	4.2	2.1 (1.8 to 2.4)	1.7	3.8	3.1 (2.9 to 3.3)
Dominican Republic	4.1	25.7	7.4 (6.6 to 8.2)	0.5	1.9	5.2 (4.5 to 5.9)	4.9	10.8	2.6 (2.0 to 3.2)	0.5	2.4	6.6 (5.9 to 7.2)	2.0	6.5	4.8 (4.0 to 5.6)	1.6	4.4	4.2 (3.5 to 4.9)
Ecuador	7.0	17.0	3.7 (3.3 to 4.2)	0.3	0.6	1.8 (1.4 to 2.1)	3.4	8.1	2.8 (2.5 to 3.1)	0.2	0.5	2.9 (2.7 to 3.0)	0.4	0.6	1.7 (1.4 to 1.9)	0.7	1.3	2.1 (1.7 to 2.6)
Egypt	0.7	1.7	3.0 (2.7 to 3.3)	0.0	0.1	3.8 (3.5 to 4.0)	0.7	2.3	4.0 (3.8 to 4.3)	0.5	2.7	5.9 (5.7 to 6.1)	0.9	1.6	2.1 (2.0 to 2.3)	1.4	4.8	4.1 (3.8 to 4.4)
El Salvador	1.7	7.0	4.9 (4.6 to 5.2)	0.2	0.6	3.8 (3.6 to 4.0)	2.2	5.1	2.7 (2.0 to 3.5)	0.3	1.0	5.6 (5.3 to 5.9)	1.1	2.9	3.8 (3.5 to 4.1)	1.7	5.6	5.0 (4.7 to 5.4)
Estonia	34.4	78.7	3.6 (3.2 to 3.9)	2.9	4.9	2.1 (2.0 to 2.2)	6.6	12.1	2.0 (1.9 to 2.0)	0.6	1.4	2.7 (2.7 to 2.8)	1.9	2.5	1.2 (1.0 to 1.4)	3.1	4.4	1.6 (1.4 to 1.8)
Eswatini	1.1	4.7	6.7 (5.6 to 7.8)	0.1	0.3	4.9 (4.4 to 5.4)	0.0	0.2	8.0 (7.0 to 9.0)	0.0	0.1	6.2 (5.7 to 6.7)	0.1	0.3	4.4 (3.7 to 5.2)	0.1	0.3	3.8 (3.3 to 4.3)
Ethiopia	0.6	2.3	6.3 (5.6 to 7.1)	0.6	1.2	3.0 (2.5 to 3.4)	0.1	0.3	5.3 (3.9 to 6.8)	0.1	0.3	4.2 (3.6 to 4.8)	0.3	0.5	2.5 (2.1 to 2.9)	1.5	2.4	2.2 (1.8 to 2.6)
Fiji	1.5	2.8	2.4 (2.0 to 2.9)	2.4	3.9	2.1 (1.7 to 2.5)	0.9	2.3	3.8 (3.4 to 4.1)	0.7	1.7	3.3 (3.0 to 3.5)	1.8	2.5	1.4 (1.1 to 1.7)	1.8	2.4	1.6 (1.1 to 2.1)
Finland	101.3	177.3	2.1 (1.9 to 2.4)	4.3	4.5	0.0 (–0.3 to 0.2)	9.1	10.1	0.3 (0.3 to 0.4)	2.8	3.7	0.9 (0.7 to 1.0)	4.5	5.2	0.6 (0.5 to 0.7)	8.5	6.9	–1.1 (–1.3 to –0.8)
France	109.2	140.6	1.3 (1.1 to 1.5)	1.7	2.4	1.6 (1.3 to 1.9)	9.0	9.0	–0.1 (–0.3 to 0.1)	1.0	1.5	1.8 (1.5 to 2.1)	3.9	4.2	0.7 (0.4 to 1.0)	1.5	1.8	1.1 (0.9 to 1.4)
Gambia	1.2	1.8	1.7 (1.1 to 2.2)	0.2	0.2	–0.6 (–0.8 to –0.4)	0.1	0.2	2.3 (2.1 to 2.5)	0.0	0.1	1.9 (1.7 to 2.1)	0.4	0.4	0.3 (0.0 to 0.6)	2.0	1.3	–2.0 (–2.3 to –1.8)
Georgia	0.5	7.5	9.7 (8.7 to 10.6)	3.8	7.0	2.0 (1.8 to 2.1)	4.7	14.5	4.5 (4.2 to 4.8)	0.2	0.4	2.1 (1.9 to 2.3)	0.2	0.6	4.6 (4.1 to 5.1)	0.2	0.4	1.3 (1.2 to 1.5)
Germany	58.8	105.8	2.3 (2.2 to 2.3)	1.9	5.0	4.3 (4.0 to 4.5)	13.7	23.2	1.9 (1.8 to 2.0)	1.5	4.4	4.4 (4.1 to 4.6)	3.4	7.3	3.3 (3.1 to 3.5)	3.6	8.1	3.5 (3.3 to 3.7)
Ghana	2.2	4.0	2.5 (2.2 to 2.8)	0.1	0.2	1.2 (1.1 to 1.4)	0.2	0.4	2.5 (2.4 to 2.7)	0.1	0.2	2.6 (2.5 to 2.8)	0.5	0.6	0.6 (0.4 to 0.7)	1.9	2.5	0.8 (0.6 to 0.9)
Greece	13.5	22.7	2.1 (1.3 to 2.9)	0.7	1.4	2.4 (2.1 to 2.6)	7.3	9.6	0.7 (0.5 to 0.9)	0.6	1.1	2.2 (1.9 to 2.5)	1.1	1.4	0.8 (0.4 to 1.2)	1.3	2.2	1.8 (1.5 to 2.1)
Greenland	22.8	48.8	3.1 (2.9 to 3.3)	4.2	7.2	2.3 (2.1 to 2.4)	9.7	15.4	1.8 (1.7 to 2.0)	2.1	4.1	2.8 (2.7 to 3.0)	2.8	4.2	1.7 (1.5 to 1.8)	13.8	21.9	1.8 (1.7 to 2.0)
Grenada	7.3	15.8	3.0 (2.7 to 3.4)	0.7	2.1	4.1 (3.7 to 4.4)	0.8	3.0	5.1 (4.7 to 5.5)	0.7	3.2	5.3 (4.8 to 5.8)	3.4	6.0	2.2 (2.0 to 2.5)	1.9	4.6	3.3 (3.1 to 3.6)
Guam	20.1	25.2	1.1 (0.8 to 1.3)	7.9	8.2	0.3 (0.1 to 0.4)	9.5	11.2	0.7 (0.5 to 0.9)	2.9	4.2	1.6 (1.4 to 1.7)	6.9	6.7	0.0 (–0.2 to 0.2)	4.9	4.4	–0.3 (–0.5 to –0.1)
Guatemala	3.1	9.7	4.9 (4.4 to 5.5)	0.4	1.1	3.7 (3.6 to 3.9)	2.5	7.1	3.8 (3.7 to 3.9)	0.3	1.3	6.0 (5.9 to 6.2)	1.7	3.4	2.9 (2.7 to 3.2)	2.1	4.3	2.9 (2.7 to 3.1)
Guinea	0.7	1.4	2.7 (1.8 to 3.6)	0.1	0.2	2.8 (2.3 to 3.2)	0.1	0.2	2.3 (1.5 to 3.2)	0.0	0.1	3.9 (3.4 to 4.3)	0.2	0.3	1.8 (1.2 to 2.4)	0.6	1.2	2.1 (1.6 to 2.5)

Guinea–Bissau	1.7	2.3	1.3 (0.6 to 2.0)	0.1	0.3	2.7 (2.3 to 3.0)	0.0	0.1	3.8 (3.6 to 4.1)	0.0	0.1	3.9 (3.6 to 4.1)	0.4	0.6	1.6 (1.1 to 2.0)	1.1	1.8	1.9 (1.6 to 2.2)
Guyana	3.2	9.3	4.7 (4.1 to 5.3)	0.9	2.4	4.0 (3.7 to 4.3)	0.5	1.2	3.4 (3.2 to 3.6)	1.0	3.5	5.1 (4.9 to 5.2)	2.8	5.4	3.0 (2.6 to 3.4)	2.5	5.4	3.2 (2.9 to 3.5)
Haiti	2.4	2.8	0.9 (–0.1 to 2.0)	0.5	1.0	2.4 (2.1 to 2.8)	0.2	0.3	–0.6 (–1.5 to 0.3)	0.4	1.0	3.1 (2.8 to 3.5)	2.4	2.9	0.8 (0.2 to 1.4)	1.6	2.6	1.9 (1.5 to 2.3)
Honduras	1.1	5.6	6.8 (6.3 to 7.3)	0.2	0.6	4.8 (4.5 to 5.2)	0.9	2.4	3.8 (3.6 to 4.0)	0.2	0.9	6.7 (6.4 to 7.0)	0.2	0.5	4.7 (4.4 to 5.1)	0.2	0.7	3.8 (3.5 to 4.2)
Hungary	18.3	33.1	2.4 (2.1 to 2.8)	6.1	6.9	0.1 (–0.1 to 0.3)	7.9	13.8	1.7 (1.5 to 1.8)	1.6	2.2	0.6 (0.4 to 0.8)	3.4	3.0	–0.8 (–1.1 to –0.5)	23.2	23.0	–0.3 (–0.5 to –0.1)
Iceland	85.8	176.9	2.5 (2.1 to 2.8)	1.9	4.4	3.2 (3.0 to 3.3)	13.3	16.1	0.4 (0.3 to 0.5)	1.6	3.2	2.4 (2.3 to 2.5)	2.5	3.6	1.1 (1.0 to 1.3)	1.3	2.8	2.9 (2.8 to 3.0)
India	1.2	4.5	4.5 (4.3 to 4.7)	0.7	1.7	3.2 (3.1 to 3.3)	0.1	0.8	6.6 (6.4 to 6.7)	0.0	0.1	4.9 (4.8 to 4.9)	0.2	0.4	1.7 (1.7 to 1.8)	1.1	1.7	1.5 (1.5 to 1.6)
Indonesia	1.0	3.9	5.6 (4.7 to 6.6)	2.9	5.8	2.5 (2.1 to 3.0)	0.8	2.5	4.1 (3.5 to 4.7)	0.8	2.4	4.0 (3.5 to 4.4)	3.5	6.0	2.4 (1.8 to 2.9)	0.6	0.9	1.6 (1.2 to 2.1)
Iran (Islamic Republic of)	0.4	2.5	7.7 (6.9 to 8.5)	0.1	0.3	5.5 (5.0 to 6.0)	0.5	4.1	7.8 (7.6 to 8.1)	0.2	1.3	7.4 (6.7 to 8.0)	1.3	3.9	4.5 (3.9 to 5.1)	1.0	3.2	4.3 (3.9 to 4.8)
Iraq	0.9	6.6	8.0 (7.5 to 8.5)	0.1	0.5	4.8 (4.5 to 5.1)	0.3	2.3	7.4 (6.9 to 7.9)	0.1	0.3	7.0 (6.8 to 7.2)	0.6	1.6	3.8 (3.6 to 4.0)	2.1	6.3	3.7 (3.3 to 4.1)
Ireland	16.2	98.6	6.8 (5.9 to 7.7)	1.4	7.3	6.6 (5.9 to 7.3)	2.7	9.9	4.8 (4.2 to 5.4)	0.5	2.9	7.2 (6.5 to 7.9)	1.2	4.9	5.4 (4.7 to 6.2)	0.9	4.2	6.0 (5.5 to 6.5)
Israel	35.4	90.1	3.9 (3.6 to 4.2)	2.5	6.0	3.9 (3.5 to 4.4)	8.3	14.1	2.1 (2.0 to 2.3)	1.2	3.7	4.5 (4.2 to 4.8)	2.1	4.4	3.3 (3.0 to 3.7)	3.2	7.6	4.0 (3.4 to 4.6)
Italy	19.8	45.4	3.5 (3.2 to 3.7)	2.2	5.4	3.7 (3.4 to 4.0)	5.1	13.0	3.7 (3.5 to 4.0)	0.9	2.6	4.0 (3.7 to 4.3)	4.0	6.6	2.1 (1.9 to 2.2)	2.7	6.2	3.4 (3.1 to 3.7)
Jamaica	9.8	17.9	2.0 (1.8 to 2.3)	1.7	4.0	3.0 (2.9 to 3.1)	0.7	1.4	1.7 (1.4 to 2.0)	2.1	6.4	3.9 (3.8 to 3.9)	5.6	8.3	1.3 (1.2 to 1.5)	4.2	8.2	2.3 (2.2 to 2.5)
Japan	21.8	79.4	5.2 (4.9 to 5.4)	5.8	10.9	2.2 (2.1 to 2.2)	12.7	22.3	2.0 (1.9 to 2.0)	4.1	8.9	2.8 (2.7 to 2.9)	0.5	1.0	2.6 (2.5 to 2.8)	4.0	7.7	2.5 (2.4 to 2.6)
Jordan	1.7	3.7	2.9 (2.3 to 3.4)	0.1	0.1	2.7 (2.3 to 3.0)	2.6	5.3	2.3 (1.7 to 2.8)	0.3	1.1	4.0 (3.9 to 4.2)	4.1	6.4	1.4 (1.1 to 1.7)	1.3	2.7	2.1 (1.9 to 2.4)
Kazakhstan	3.5	18.4	7.3 (6.7 to 7.9)	1.8	6.8	5.3 (4.9 to 5.7)	3.6	8.0	3.3 (3.0 to 3.5)	0.2	1.0	5.6 (5.3 to 6.0)	0.6	1.9	4.9 (4.5 to 5.2)	0.9	2.7	4.3 (3.8 to 4.7)
Kenya	3.9	7.3	2.4 (2.1 to 2.6)	0.7	1.5	2.3 (2.2 to 2.4)	0.3	0.5	1.8 (1.7 to 2.0)	0.2	0.5	3.3 (3.1 to 3.5)	0.4	0.6	1.2 (1.2 to 1.3)	1.4	2.3	1.4 (1.3 to 1.5)
Kiribati	0.5	1.3	3.5 (2.8 to 4.2)	0.8	2.5	4.3 (3.9 to 4.6)	0.4	1.2	4.4 (3.9 to 4.8)	0.1	0.5	5.3 (4.9 to 5.8)	0.6	1.4	3.5 (3.0 to 3.9)	0.7	2.2	3.9 (3.6 to 4.2)
Kuwait	17.5	26.1	0.9 (0.5 to 1.4)	0.5	1.1	3.1 (3.0 to 3.2)	3.8	11.5	4.2 (4.0 to 4.4)	2.7	8.8	4.7 (4.5 to 4.9)	6.7	9.1	0.8 (0.6 to 1.0)	7.2	14.6	2.4 (2.2 to 2.5)
Kyrgyzstan	0.5	2.8	7.3 (6.5 to 8.0)	0.6	2.1	5.0 (4.6 to 5.4)	1.4	3.3	3.2 (3.0 to 3.5)	0.1	0.3	5.1 (4.8 to 5.3)	0.2	0.6	5.5 (5.0 to 6.0)	0.3	0.9	4.1 (3.5 to 4.6)
Latvia	9.3	36.5	5.8 (5.1 to 6.5)	1.4	3.6	3.8 (3.6 to 3.9)	8.0	17.7	3.0 (2.8 to 3.1)	0.4	1.1	4.0 (3.9 to 4.2)	1.5	3.0	3.0 (2.7 to 3.3)	4.4	10.0	3.2 (3.1 to 3.4)
Lebanon	2.6	5.1	2.4 (1.8 to 3.1)	0.1	0.3	5.6 (5.2 to 6.1)	4.4	11.9	3.4 (3.3 to 3.5)	0.2	1.8	7.6 (7.1 to 8.1)	1.5	2.8	2.3 (1.8 to 2.8)	1.3	4.7	4.7 (4.2 to 5.2)

Liberia	0.5	7.0	13.3 (11.6 to 15.1)	0.2	0.6	5.6 (4.9 to 6.2)	0.0	0.1	6.5 (5.7 to 7.4)	0.0	0.1	6.6 (5.9 to 7.3)	0.3	1.2	7.4 (6.5 to 8.3)	1.2	3.7	4.7 (4.2 to 5.2)
Libya	1.3	1.5	–0.3 (–1.1 to 0.6)	0.1	0.2	3.8 (3.2 to 4.3)	0.7	5.0	7.8 (7.4 to 8.3)	0.2	1.3	5.5 (4.8 to 6.2)	1.0	1.2	0.1 (–0.4 to 0.6)	1.1	2.9	3.0 (2.6 to 3.4)
Lithuania	8.6	49.9	6.6 (6.2 to 7.1)	4.9	14.9	4.0 (3.7 to 4.4)	11.7	27.3	2.8 (2.7 to 2.9)	1.9	6.7	4.4 (4.1 to 4.7)	4.4	11.0	3.4 (3.0 to 3.7)	5.7	15.2	3.6 (3.3 to 4.0)
Luxembourg	18.3	88.0	6.8 (6.1 to 7.4)	2.4	8.3	5.5 (5.1 to 5.8)	9.0	12.7	0.8 (0.6 to 1.0)	1.8	4.0	3.1 (2.9 to 3.2)	1.9	4.0	3.1 (2.8 to 3.3)	2.7	11.2	6.3 (5.9 to 6.8)
Madagascar	3.2	4.7	0.9 (0.5 to 1.2)	0.9	1.5	1.8 (1.6 to 2.0)	0.2	0.4	2.2 (2.0 to 2.3)	0.2	0.4	2.9 (2.7 to 3.2)	0.5	0.7	0.8 (0.6 to 1.0)	1.8	2.6	1.1 (0.9 to 1.2)
Malawi	1.2	6.7	7.4 (6.3 to 8.5)	0.4	1.3	4.3 (3.9 to 4.7)	0.1	0.3	2.5 (1.9 to 3.0)	0.1	0.3	5.4 (4.9 to 5.8)	0.2	0.7	4.3 (3.7 to 4.9)	1.0	2.4	3.5 (3.2 to 3.8)
Malaysia	2.0	7.7	4.9 (4.5 to 5.4)	2.1	3.9	1.7 (1.4 to 2.0)	1.3	4.8	4.5 (4.2 to 4.8)	1.0	2.7	3.3 (3.2 to 3.5)	2.4	4.2	1.8 (1.5 to 2.1)	0.7	0.9	0.8 (0.4 to 1.2)
Maldives	3.1	17.1	6.8 (6.1 to 7.4)	1.4	4.0	3.4 (3.1 to 3.7)	0.8	4.8	7.0 (6.6 to 7.5)	0.4	1.7	5.5 (5.2 to 5.8)	3.3	7.8	3.3 (2.8 to 3.8)	0.7	1.4	2.2 (2.0 to 2.5)
Mali	1.2	2.2	2.5 (2.2 to 2.8)	0.1	0.2	2.4 (2.1 to 2.7)	0.0	0.1	3.0 (2.7 to 3.3)	0.0	0.0	3.6 (3.3 to 3.8)	0.4	0.6	1.8 (1.6 to 2.1)	1.1	1.5	1.7 (1.4 to 2.0)
Malta	18.8	81.9	5.6 (5.4 to 5.8)	1.8	3.9	3.0 (2.8 to 3.3)	4.5	8.4	2.3 (2.2 to 2.4)	1.0	2.6	3.6 (3.5 to 3.7)	1.9	3.9	2.8 (2.7 to 3.0)	2.5	4.8	2.6 (2.4 to 2.9)
Mauritius	1.1	6.7	7.2 (6.7 to 7.7)	1.5	3.3	3.2 (2.9 to 3.5)	2.0	6.8	4.7 (4.4 to 4.9)	0.7	2.2	4.4 (4.1 to 4.6)	1.9	4.4	3.5 (3.1 to 3.8)	0.5	0.9	2.5 (2.1 to 2.8)
Mexico	9.3	20.9	3.2 (2.8 to 3.5)	3.5	6.4	1.9 (1.8 to 2.0)	5.8	8.9	0.8 (0.1 to 1.5)	0.9	2.2	3.2 (3.1 to 3.2)	1.9	2.8	1.3 (1.2 to 1.5)	7.7	12.9	1.6 (1.5 to 1.7)
Monaco	65.8	98.0	1.4 (1.1 to 1.7)	4.4	5.1	0.4 (0.2 to 0.6)	13.5	12.7	–0.4 (–0.5 to –0.3)	2.8	3.5	0.6 (0.4 to 0.8)	3.4	3.6	0.2 (–0.1 to 0.4)	5.5	5.9	0.1 (0.0 to 0.3)
Mongolia	2.1	11.2	6.6 (6.2 to 6.9)	1.2	3.8	4.3 (3.9 to 4.8)	1.0	3.9	5.1 (5.0 to 5.2)	0.1	0.5	5.1 (4.7 to 5.5)	0.6	1.8	4.4 (4.2 to 4.7)	1.8	4.8	3.9 (3.1 to 4.6)
Montenegro	5.5	13.0	2.6 (2.1 to 3.2)	4.2	7.0	1.3 (0.9 to 1.7)	4.8	8.3	2.1 (2.0 to 2.2)	1.1	2.3	2.8 (2.7 to 2.9)	1.6	2.7	1.5 (1.2 to 1.8)	5.3	7.4	0.4 (–0.2 to 1.0)
Morocco	0.2	1.3	7.0 (6.5 to 7.5)	0.0	0.1	2.7 (2.6 to 2.8)	0.5	1.5	4.0 (3.9 to 4.1)	0.1	0.5	4.9 (4.8 to 5.0)	0.6	1.3	3.6 (3.3 to 4.0)	0.7	1.2	1.8 (1.7 to 1.9)
Mozambique	1.7	4.2	2.9 (2.5 to 3.4)	0.2	0.4	1.6 (1.5 to 1.8)	0.1	0.2	2.7 (2.3 to 3.1)	0.0	0.1	3.1 (2.9 to 3.3)	0.1	0.3	2.2 (1.9 to 2.4)	0.6	0.7	0.6 (0.5 to 0.8)
Myanmar	0.1	3.3	14.5 (13.1 to 15.9)	0.6	3.0	6.1 (5.9 to 6.3)	0.3	2.2	7.5 (7.3 to 7.8)	0.2	1.4	8.1 (7.8 to 8.4)	0.7	4.4	7.6 (7.0 to 8.2)	0.3	1.0	4.9 (4.7 to 5.1)
Nepal	1.5	3.1	2.7 (2.2 to 3.1)	1.2	1.9	1.5 (1.3 to 1.7)	0.2	1.0	7.1 (6.5 to 7.8)	0.0	0.1	3.6 (3.4 to 3.8)	0.4	0.5	0.4 (0.2 to 0.7)	2.4	3.2	0.9 (0.7 to 1.0)
Netherlands	72.2	127.6	1.9 (1.8 to 2.0)	8.6	12.5	1.2 (1.0 to 1.4)	10.0	17.2	1.8 (1.8 to 1.9)	5.0	8.1	1.5 (1.3 to 1.7)	5.5	7.9	1.3 (1.1 to 1.5)	11.6	14.7	0.7 (0.5 to 0.9)
New Zealand	30.2	75.7	3.8 (3.5 to 4.1)	11.9	20.2	2.0 (1.8 to 2.3)	22.9	27.4	0.5 (0.3 to 0.6)	3.4	6.5	2.3 (2.1 to 2.5)	2.0	3.3	2.1 (1.9 to 2.3)	6.6	12.1	2.6 (2.2 to 2.9)
Nicaragua	2.3	6.5	4.1 (3.5 to 4.8)	0.2	0.7	5.1 (4.9 to 5.3)	1.9	3.4	1.7 (1.5 to 1.9)	0.1	0.7	6.8 (6.7 to 7.0)	0.8	2.1	4.0 (3.6 to 4.3)	0.9	2.5	4.2 (4.0 to 4.5)
Niger	1.0	1.4	1.4 (1.0 to 1.8)	0.1	0.2	1.6 (1.3 to 1.8)	0.0	0.0	1.8 (1.6 to 2.0)	0.0	0.0	2.3 (2.1 to 2.6)	0.4	0.5	1.3 (1.0 to 1.6)	1.1	1.3	1.0 (0.7 to 1.3)
Nigeria	0.9	3.1	5.8 (4.8 to 6.9)	1.0	1.9	2.5 (2.3 to 2.8)	0.2	0.4	4.4 (4.0 to 4.8)	0.0	0.1	4.1 (3.8 to 4.4)	0.5	0.8	2.3 (1.8 to 2.9)	1.9	2.7	1.6 (1.3 to 1.8)

North Macedonia	2.0	8.5	5.7 (4.9 to 6.4)	1.4	4.0	4.1 (3.8 to 4.4)	3.4	12.0	5.1 (4.8 to 5.3)	0.4	1.4	5.0 (4.7 to 5.3)	0.8	1.9	3.6 (3.2 to 4.0)	1.8	4.2	3.4 (3.1 to 3.7)
Northern Mariana Islands	13.3	13.8	−0.4 (−0.8 to 0.0)	5.6	7.9	0.9 (0.6 to 1.1)	8.6	10.8	0.1 (−0.4 to 0.5)	2.7	4.1	0.8 (0.3 to 1.2)	5.4	5.8	−0.1 (−0.3 to 0.2)	3.1	4.2	0.9 (0.7 to 1.1)
Norway	208.1	307.9	1.4 (1.1 to 1.6)	5.1	6.6	1.4 (0.9 to 1.9)	11.0	12.9	0.9 (0.7 to 1.1)	2.0	3.0	1.7 (1.5 to 1.9)	3.6	4.4	1.0 (0.9 to 1.1)	8.3	8.4	0.5 (0.0 to 1.0)
Oman	2.6	11.1	5.5 (4.6 to 6.5)	0.1	0.5	8.7 (8.2 to 9.1)	0.4	3.8	9.3 (8.9 to 9.7)	0.2	4.4	11.7 (11.2 to 12.2)	1.7	5.2	4.4 (3.7 to 5.1)	1.2	6.9	7.1 (6.7 to 7.6)
Pakistan	0.5	1.4	4.1 (3.6 to 4.5)	0.6	1.5	4.0 (3.7 to 4.3)	0.1	0.7	6.4 (6.1 to 6.7)	0.0	0.1	6.0 (5.6 to 6.3)	0.1	0.2	2.5 (2.2 to 2.8)	2.7	5.6	3.0 (2.7 to 3.3)
Palau	3.6	6.9	2.9 (2.3 to 3.4)	4.5	7.2	1.6 (1.5 to 1.8)	10.3	9.0	−1.5 (−1.9 to −1.0)	1.5	3.4	2.8 (2.6 to 3.0)	3.0	4.4	1.6 (1.3 to 1.9)	3.0	4.1	1.2 (1.0 to 1.3)
Palestine	0.3	0.7	3.2 (2.5 to 4.0)	0.0	0.1	3.7 (3.3 to 4.1)	0.4	0.8	2.9 (2.6 to 3.2)	0.1	0.3	5.5 (5.2 to 5.7)	0.5	0.7	1.4 (0.9 to 1.9)	0.6	1.3	2.9 (2.5 to 3.3)
Panama	7.0	26.0	5.0 (4.5 to 5.5)	0.9	2.1	3.2 (3.0 to 3.3)	5.6	12.8	2.9 (2.8 to 3.0)	0.9	2.8	4.2 (4.0 to 4.3)	2.3	5.0	2.9 (2.7 to 3.2)	3.1	6.4	2.7 (2.5 to 2.9)
Papua New Guinea	0.5	1.1	3.4 (2.8 to 3.9)	1.0	1.8	2.2 (2.0 to 2.5)	0.3	0.6	1.9 (1.8 to 2.1)	0.2	0.5	3.2 (3.0 to 3.5)	1.2	2.1	2.2 (1.9 to 2.6)	0.9	1.4	1.9 (1.6 to 2.1)
Paraguay	6.3	24.0	5.1 (4.2 to 6.0)	0.4	1.0	2.9 (2.4 to 3.4)	2.9	6.9	3.4 (3.2 to 3.6)	0.3	1.2	4.7 (4.4 to 5.0)	0.6	1.3	3.2 (2.6 to 3.7)	0.6	1.1	2.1 (1.6 to 2.7)
Peru	5.1	12.3	3.6 (3.2 to 3.9)	0.4	0.7	2.2 (2.0 to 2.4)	4.7	11.1	3.4 (3.2 to 3.7)	0.5	1.2	3.7 (3.4 to 4.0)	0.6	0.8	1.5 (1.3 to 1.8)	1.8	2.5	1.2 (0.9 to 1.6)
Philippines	0.8	2.0	3.6 (2.9 to 4.3)	1.1	1.8	1.8 (1.4 to 2.1)	3.2	8.1	3.0 (2.8 to 3.3)	0.4	1.1	3.0 (2.7 to 3.4)	1.0	1.8	2.5 (1.9 to 3.0)	0.4	0.5	1.1 (0.8 to 1.4)
Poland	10.3	27.6	3.4 (3.2 to 3.5)	3.1	8.9	4.1 (3.9 to 4.3)	6.3	10.7	1.7 (1.5 to 1.9)	1.5	3.7	3.2 (3.1 to 3.3)	2.0	2.9	1.2 (1.0 to 1.4)	2.1	5.1	3.7 (3.5 to 3.9)
Portugal	17.4	79.9	6.0 (5.5 to 6.6)	1.5	4.1	3.6 (3.4 to 3.8)	5.8	13.7	2.8 (2.3 to 3.3)	0.9	2.5	3.8 (3.7 to 3.9)	2.6	5.4	2.8 (2.7 to 2.9)	3.1	8.0	3.7 (3.5 to 3.9)
Puerto Rico	28.1	56.3	2.5 (2.3 to 2.8)	2.6	5.8	2.7 (2.6 to 2.8)	3.9	5.8	0.9 (0.7 to 1.2)	3.2	8.2	3.2 (3.1 to 3.4)	6.7	9.7	1.2 (1.1 to 1.3)	6.2	11.9	2.2 (2.2 to 2.3)
Qatar	16.0	36.8	3.1 (2.7 to 3.6)	0.3	1.0	4.2 (3.9 to 4.4)	4.3	11.0	3.6 (3.3 to 3.9)	1.8	9.4	6.3 (6.1 to 6.4)	6.9	11.9	2.3 (2.0 to 2.5)	5.5	12.7	3.2 (3.0 to 3.4)
Republic of Korea	2.4	25.5	9.8 (9.3 to 10.3)	1.8	7.8	5.8 (5.6 to 6.1)	4.6	18.1	5.0 (4.8 to 5.3)	1.9	9.2	5.9 (5.7 to 6.1)	1.3	4.6	5.2 (5.0 to 5.5)	0.9	3.6	5.6 (5.3 to 5.9)
Republic of Moldova	1.3	8.8	8.8 (7.6 to 10.1)	0.6	3.5	7.2 (6.7 to 7.6)	1.5	6.8	6.3 (5.9 to 6.7)	0.1	0.9	7.5 (7.1 to 7.9)	0.5	2.0	6.4 (5.7 to 7.1)	1.2	6.0	6.9 (6.4 to 7.4)
Romania	8.7	23.8	3.9 (3.6 to 4.3)	6.9	9.6	1.0 (0.9 to 1.0)	9.3	14.0	1.2 (1.0 to 1.3)	2.3	3.7	1.3 (1.2 to 1.4)	3.6	4.8	1.0 (0.8 to 1.1)	6.9	8.4	0.5 (0.4 to 0.6)
Russian Federation	18.4	33.7	3.1 (2.5 to 3.7)	13.0	23.7	2.6 (2.2 to 2.9)	9.2	15.2	2.1 (1.7 to 2.5)	3.8	6.6	2.1 (1.8 to 2.5)	7.1	9.2	1.5 (1.1 to 2.0)	33.7	56.3	2.3 (2.0 to 2.7)
Rwanda	0.5	2.1	7.3 (6.1 to 8.5)	0.1	0.2	4.2 (3.7 to 4.7)	0.1	0.2	6.1 (5.5 to 6.8)	0.0	0.1	5.4 (4.8 to 6.0)	0.0	0.1	3.9 (3.3 to 4.6)	0.9	2.4	4.8 (4.2 to 5.3)
Saint Kitts and Nevis	13.2	43.7	4.6 (4.4 to 4.7)	1.7	5.6	4.1 (3.9 to 4.3)	2.7	8.0	3.8 (3.6 to 4.1)	2.1	8.9	5.1 (4.9 to 5.3)	5.3	11.6	2.9 (2.8 to 3.0)	4.2	11.3	3.5 (3.4 to 3.7)
Saint Lucia	11.0	22.9	3.1 (2.6 to 3.5)	1.3	3.7	3.8 (3.6 to 4.0)	0.9	4.2	5.7 (5.4 to 6.1)	1.4	5.1	4.6 (4.4 to 4.9)	4.9	8.1	2.0 (1.8 to 2.2)	3.4	8.0	3.2 (3.0 to 3.3)

Saint Vincent and the Grenadines	4.8	8.5	2.0 (1.7 to 2.3)	0.8	1.6	2.3 (2.2 to 2.5)	0.7	1.9	3.4 (3.1 to 3.7)	0.8	2.1	3.3 (3.1 to 3.5)	2.7	3.8	1.0 (0.9 to 1.1)	2.1	3.6	1.8 (1.6 to 1.9)
San Marino	75.4	146.6	2.5 (2.3 to 2.6)	4.9	7.5	1.5 (1.4 to 1.5)	12.6	14.8	0.3 (0.2 to 0.5)	3.2	5.2	1.6 (1.5 to 1.8)	4.2	5.8	1.2 (1.1 to 1.2)	6.1	8.7	1.2 (1.2 to 1.3)
Saudi Arabia	3.7	16.7	4.9 (4.0 to 5.8)	0.1	0.4	4.2 (3.8 to 4.6)	0.7	6.2	8.3 (7.9 to 8.7)	0.4	3.9	7.5 (7.2 to 7.9)	2.3	5.5	2.6 (2.0 to 3.1)	2.2	5.6	2.6 (2.1 to 3.1)
Senegal	2.2	2.3	−0.4 (−1.0 to 0.1)	0.1	0.2	0.5 (0.1 to 0.9)	0.1	0.2	0.3 (−0.2 to 0.8)	0.0	0.1	1.9 (1.5 to 2.3)	0.3	0.3	−0.6 (−1.0 to −0.2)	0.9	0.9	−0.4 (−0.8 to 0.0)
Serbia	1.8	9.6	6.4 (5.9 to 6.9)	1.4	3.0	2.7 (2.5 to 2.8)	2.0	3.9	2.2 (2.0 to 2.4)	0.4	1.2	3.4 (3.2 to 3.6)	0.7	1.7	2.9 (2.7 to 3.1)	1.6	3.0	2.0 (1.8 to 2.1)
Seychelles	7.1	8.7	0.4 (−0.3 to 1.1)	2.9	5.6	2.4 (2.3 to 2.5)	4.2	11.9	3.5 (3.4 to 3.6)	1.4	3.4	3.1 (3.1 to 3.2)	5.2	5.9	0.4 (0.0 to 0.7)	0.9	1.6	1.9 (1.8 to 2.0)
Sierra Leone	2.6	3.7	1.7 (0.7 to 2.7)	0.2	0.3	1.3 (0.8 to 1.8)	0.0	0.1	4.0 (3.1 to 4.9)	0.0	0.1	2.3 (1.8 to 2.9)	0.8	1.0	0.7 (0.2 to 1.2)	1.6	1.8	0.6 (0.1 to 1.0)
Singapore	18.9	87.8	6.3 (5.9 to 6.7)	3.5	15.8	6.3 (5.8 to 6.7)	3.2	8.6	3.8 (3.6 to 4.0)	2.5	12.5	6.5 (6.1 to 6.9)	1.1	2.8	3.9 (3.7 to 4.1)	2.8	11.8	6.0 (5.6 to 6.4)
Slovakia	12.6	41.6	4.8 (4.5 to 5.2)	2.5	4.5	1.9 (1.8 to 2.0)	3.9	9.1	3.2 (3.1 to 3.3)	1.4	3.8	3.4 (3.3 to 3.5)	1.4	2.5	2.3 (2.0 to 2.7)	2.1	3.3	1.5 (1.3 to 1.6)
Slovenia	6.0	23.0	5.4 (4.6 to 6.1)	3.3	7.6	3.5 (3.0 to 4.0)	8.9	16.7	2.4 (1.5 to 3.2)	1.4	3.1	3.1 (2.6 to 3.6)	3.6	6.0	2.0 (1.6 to 2.4)	4.4	10.1	3.6 (3.1 to 4.1)
Solomon Islands	0.3	1.2	7.0 (6.0 to 8.1)	0.4	1.6	6.2 (5.6 to 6.7)	0.4	1.2	3.9 (3.6 to 4.2)	0.1	0.5	7.3 (6.8 to 7.8)	0.6	1.9	5.9 (5.1 to 6.7)	0.4	1.3	5.7 (5.1 to 6.3)
South Africa	9.5	18.0	2.5 (1.9 to 3.1)	0.7	1.1	1.6 (1.4 to 1.9)	2.0	2.5	0.2 (0.0 to 0.4)	0.2	0.5	2.2 (2.0 to 2.4)	0.6	0.7	0.5 (0.2 to 0.8)	0.6	0.7	0.2 (−0.1 to 0.4)
Spain	25.5	98.2	5.5 (4.9 to 6.0)	1.1	3.9	4.9 (4.5 to 5.4)	4.0	12.1	4.0 (3.7 to 4.3)	0.6	2.1	4.4 (4.0 to 4.9)	1.1	2.5	3.6 (3.2 to 4.0)	1.3	3.9	4.4 (4.0 to 4.9)
Sri Lanka	1.2	2.8	3.0 (2.8 to 3.2)	1.8	3.9	2.6 (2.4 to 2.7)	0.7	2.0	4.0 (3.8 to 4.2)	0.8	2.4	3.9 (3.7 to 4.1)	2.2	3.4	1.4 (1.3 to 1.6)	0.6	1.1	1.8 (1.6 to 1.9)
Suriname	22.5	35.3	2.1 (1.7 to 2.4)	2.1	4.9	3.4 (3.2 to 3.6)	0.8	2.6	5.0 (4.6 to 5.5)	2.0	5.8	4.3 (4.1 to 4.6)	7.9	11.5	1.7 (1.5 to 2.0)	5.8	11.6	2.7 (2.5 to 2.9)
Sweden	298.3	323.5	0.6 (0.4 to 0.8)	9.7	8.8	0.2 (−0.1 to 0.5)	12.2	14.6	1.1 (0.9 to 1.4)	4.1	5.2	1.3 (1.1 to 1.6)	4.7	5.3	1.2 (0.9 to 1.5)	14.9	10.6	−0.7 (−1.0 to −0.4)
Switzerland	43.2	118.3	3.7 (3.5 to 3.8)	6.7	14.3	2.9 (2.6 to 3.2)	12.3	17.8	1.3 (1.3 to 1.4)	6.7	11.8	1.9 (1.7 to 2.1)	6.4	10.3	1.6 (1.5 to 1.8)	22.1	46.0	2.8 (2.5 to 3.2)
Syrian Arab Republic	0.2	0.4	2.2 (1.6 to 2.7)	0.0	0.1	3.1 (2.8 to 3.5)	1.8	4.5	2.8 (2.4 to 3.3)	0.1	0.4	5.3 (4.9 to 5.7)	0.4	0.6	1.2 (0.9 to 1.6)	0.6	1.3	2.2 (1.9 to 2.5)
Taiwan (Province of China)	1.8	9.8	6.4 (5.9 to 6.9)	1.5	4.9	4.4 (4.2 to 4.6)	3.0	10.6	4.7 (4.3 to 5.1)	0.8	3.7	5.4 (5.2 to 5.7)	2.4	6.1	3.5 (3.3 to 3.7)	1.7	4.5	3.6 (3.5 to 3.7)
Tajikistan	0.1	1.6	10.9 (10.0 to 11.7)	0.3	1.3	5.8 (5.5 to 6.1)	0.4	1.4	4.6 (4.3 to 4.8)	0.0	0.2	5.9 (5.5 to 6.2)	0.1	0.4	7.0 (6.5 to 7.6)	0.2	0.8	4.7 (4.3 to 5.0)
Thailand	2.6	4.5	2.2 (1.7 to 2.7)	2.7	3.7	1.0 (0.9 to 1.1)	2.0	7.1	4.3 (4.0 to 4.6)	1.3	2.5	2.4 (2.2 to 2.5)	4.1	4.6	0.5 (0.3 to 0.8)	0.9	0.9	0.3 (0.1 to 0.4)

	Medical laboratory technicians			Nursing and midwifery staff			Pharmaceutical staff			Optometrists			Personal care workers			Doctors		
Tonga	0.5	0.9	2.2 (1.3 to 3.1)	0.9	1.4	1.1 (0.7 to 1.5)	1.9	2.9	0.4 (0.0 to 0.8)	0.3	0.6	2.0 (1.7 to 2.3)	0.7	1.0	0.8 (0.4 to 1.3)	0.6	0.9	0.8 (0.3 to 1.2)
Trinidad and Tobago	9.0	40.9	6.7 (6.1 to 7.4)	0.9	1.7	2.8 (2.5 to 3.0)	3.9	9.7	3.8 (3.3 to 4.3)	1.6	4.6	4.3 (3.9 to 4.7)	3.4	7.3	3.5 (3.1 to 3.9)	1.9	3.0	2.3 (2.0 to 2.5)
Tunisia	0.9	2.2	3.9 (3.6 to 4.3)	0.1	0.1	3.1 (2.9 to 3.2)	0.8	3.0	5.1 (4.8 to 5.3)	0.2	1.0	5.4 (5.2 to 5.6)	1.0	1.7	2.1 (1.9 to 2.4)	1.1	2.0	2.1 (2.0 to 2.2)
Turkey	0.7	3.2	5.0 (4.6 to 5.4)	0.3	1.0	3.7 (3.3 to 4.2)	1.3	4.9	4.6 (4.5 to 4.7)	0.2	0.7	5.0 (4.7 to 5.3)	0.7	1.4	2.2 (2.0 to 2.3)	1.6	3.1	2.1 (1.8 to 2.5)
Turkmenistan	1.9	14.5	8.6 (7.7 to 9.6)	0.8	4.0	6.8 (6.2 to 7.3)	1.4	3.9	4.0 (3.7 to 4.3)	0.1	0.6	7.5 (6.9 to 8.1)	0.3	1.5	6.5 (5.9 to 7.2)	0.5	1.7	5.5 (5.1 to 6.0)
Uganda	2.4	2.6	0.3 (−0.3 to 0.8)	0.5	1.0	2.1 (1.9 to 2.4)	0.2	0.3	1.0 (0.5 to 1.5)	0.1	0.2	4.1 (3.8 to 4.5)	0.4	0.5	0.7 (0.4 to 1.0)	1.5	2.0	0.7 (0.4 to 0.9)
Ukraine	20.5	41.7	4.1 (3.2 to 4.9)	2.3	4.6	2.9 (2.7 to 3.2)	5.3	9.9	2.8 (2.5 to 3.1)	0.7	1.6	3.2 (2.9 to 3.5)	2.0	3.0	2.2 (1.8 to 2.7)	6.9	14.1	3.0 (2.7 to 3.2)
United Arab Emirates	18.1	33.8	2.2 (2.0 to 2.4)	0.3	1.6	5.9 (5.5 to 6.3)	2.5	13.3	6.1 (5.7 to 6.5)	2.1	14.3	7.3 (6.8 to 7.8)	6.9	12.5	2.3 (2.2 to 2.4)	5.0	19.0	5.3 (5.0 to 5.6)
United Kingdom	25.8	100.6	5.4 (5.2 to 5.6)	2.7	6.0	3.0 (2.8 to 3.1)	5.8	11.0	2.2 (2.0 to 2.5)	1.8	4.2	2.9 (2.8 to 3.0)	2.3	4.9	2.9 (2.8 to 3.0)	4.4	9.3	2.8 (2.5 to 3.0)
United Republic of Tanzania	3.9	9.2	3.6 (2.9 to 4.3)	0.4	0.7	2.2 (2.0 to 2.5)	0.2	0.6	4.5 (4.1 to 4.8)	0.1	0.2	2.9 (2.6 to 3.2)	0.6	0.8	1.1 (0.8 to 1.4)	0.8	1.1	1.2 (1.1 to 1.3)
United States of America	46.3	81.6	1.9 (1.6 to 2.2)	5.2	8.4	1.7 (1.6 to 1.7)	18.1	24.3	0.6 (0.3 to 0.8)	3.7	6.3	1.8 (1.7 to 1.9)	3.8	5.1	1.1 (1.0 to 1.2)	19.8	29.4	1.5 (1.3 to 1.6)
United States Virgin Islands	39.4	97.3	4.0 (3.3 to 4.7)	2.8	6.9	3.4 (3.2 to 3.6)	4.9	7.5	1.3 (1.0 to 1.6)	3.7	12.0	4.5 (4.2 to 4.7)	8.7	14.7	2.2 (1.9 to 2.5)	6.4	12.9	2.6 (2.5 to 2.8)
Uruguay	24.6	54.6	3.0 (2.3 to 3.7)	0.6	1.4	3.2 (2.9 to 3.5)	9.5	20.2	2.4 (2.3 to 2.6)	1.7	5.2	4.2 (3.8 to 4.6)	0.3	0.5	1.8 (1.5 to 2.1)	3.4	5.5	1.9 (1.7 to 2.1)
Uzbekistan	0.7	6.5	9.2 (8.3 to 10.2)	0.6	3.9	8.1 (7.7 to 8.5)	0.8	3.0	4.9 (4.8 to 5.0)	0.1	0.5	8.5 (8.2 to 8.9)	0.2	1.0	7.1 (6.6 to 7.6)	0.3	1.8	6.9 (6.5 to 7.2)
Venezuela (Bolivarian Republic of)	6.4	5.8	0.8 (0.0 to 1.7)	1.2	2.0	1.7 (1.4 to 2.0)	4.3	7.1	1.8 (1.6 to 2.0)	1.1	2.2	2.3 (2.0 to 2.6)	3.5	3.3	0.3 (0.0 to 0.7)	4.5	6.6	1.5 (1.0 to 1.9)
Viet Nam	0.6	4.1	8.4 (7.8 to 9.1)	1.9	6.2	4.8 (4.6 to 5.1)	0.8	4.3	6.3 (6.2 to 6.5)	0.7	3.7	6.4 (6.2 to 6.6)	2.2	6.3	4.5 (4.2 to 4.9)	0.7	1.8	3.9 (3.7 to 4.2)
Zambia	3.0	7.1	3.5 (3.0 to 3.9)	0.8	1.6	2.4 (2.0 to 2.7)	0.2	0.4	3.5 (2.7 to 4.2)	0.2	0.4	3.8 (3.3 to 4.3)	0.3	0.4	1.6 (1.4 to 1.9)	1.3	2.0	1.6 (1.3 to 1.8)
Zimbabwe	4.5	3.0	−2.4 (−2.7 to −2.0)	0.5	0.6	−0.1 (−0.4 to 0.2)	0.2	0.2	−0.8 (−1.2 to −0.4)	0.1	0.2	0.7 (0.3 to 1.1)	0.5	0.4	−0.9 (−1.1 to −0.7)	0.6	0.6	−0.7 (−1.0 to −0.5)
	Medical laboratory technicians			**Nursing and midwifery staff**			**Pharmaceutical staff**			**Optometrists**			**Personal care workers**			**Doctors**		

Countries and territories	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)
Afghanistan	0.2	0.8	4.6 (3.7 to 5.5)	4.9	4.5	−0.5 (−0.7 to −0.2)	0.5	1.2	3.2 (2.4 to 4.0)	0.0	0.0	6.1 (5.0 to 7.2)	0.0	0.1	5.5 (4.4 to 6.7)	1.9	3.8	2.7 (1.9 to 3.5)
Albania	1.1	4.1	5.2 (4.9 to 5.5)	31.5	56.2	2.2 (2.1 to 2.3)	2.1	5.7	4.2 (4.0 to 4.5)	0.1	0.5	6.7 (6.4 to 7.0)	0.7	3.7	6.6 (6.3 to 6.9)	9.3	19.0	2.9 (2.8 to 3.1)
Algeria	0.5	2.3	5.9 (5.6 to 6.2)	9.1	21.8	3.4 (3.1 to 3.6)	0.9	4.0	5.9 (5.5 to 6.4)	0.0	0.2	7.8 (7.4 to 8.2)	0.0	0.3	7.4 (7.1 to 7.7)	4.2	13.8	4.6 (4.4 to 4.9)
American Samoa	1.7	3.2	2.3 (2.2 to 2.4)	38.0	50.3	0.9 (0.8 to 1.1)	5.4	7.2	0.8 (0.7 to 1.0)	0.2	0.6	3.3 (3.2 to 3.4)	3.9	8.6	2.7 (2.6 to 2.8)	6.8	7.0	0.1 (0.0 to 0.2)
Andorra	9.9	12.0	0.5 (0.4 to 0.7)	46.3	64.3	1.2 (1.1 to 1.3)	16.2	18.9	0.3 (0.2 to 0.4)	4.7	6.5	1.0 (0.8 to 1.1)	39.3	52.8	0.9 (0.8 to 1.0)	33.5	40.9	0.7 (0.6 to 0.8)
Angola	0.4	1.7	4.7 (4.2 to 5.2)	16.8	16.3	0.2 (−0.1 to 0.6)	0.7	3.3	6.1 (5.6 to 6.6)	0.1	0.6	7.2 (6.5 to 7.8)	0.4	2.2	6.1 (5.5 to 6.7)	1.3	4.6	5.1 (4.7 to 5.6)
Antigua and Barbuda	2.4	5.4	2.8 (2.6 to 3.0)	30.5	58.5	2.4 (2.3 to 2.5)	2.5	4.4	1.9 (1.8 to 2.1)	1.8	5.2	3.6 (3.4 to 3.9)	2.6	6.7	3.3 (3.1 to 3.5)	2.6	22.2	8.9 (8.3 to 9.6)
Argentina	2.6	4.6	1.8 (1.7 to 1.9)	12.1	23.2	3.7 (2.8 to 4.7)	3.3	9.6	4.3 (3.8 to 4.7)	0.4	1.1	3.2 (3.1 to 3.3)	22.1	48.1	2.6 (2.5 to 2.7)	30.4	37.5	0.6 (0.6 to 0.7)
Armenia	0.5	2.2	6.5 (6.1 to 7.0)	37.8	83.7	3.0 (2.8 to 3.2)	1.5	7.3	6.6 (6.1 to 7.1)	0.1	0.7	8.1 (7.6 to 8.7)	1.0	7.5	8.6 (8.0 to 9.2)	6.7	43.6	8.0 (7.5 to 8.5)
Australia	11.7	20.6	2.0 (1.7 to 2.2)	183.1	151.6	−1.3 (−1.5 to −1.0)	11.5	18.4	1.2 (0.9 to 1.5)	2.0	5.1	3.4 (3.1 to 3.7)	23.8	56.9	3.2 (2.9 to 3.5)	32.6	41.9	0.9 (0.8 to 1.0)
Austria	1.9	4.1	2.9 (2.8 to 3.0)	64.8	109.8	1.6 (1.4 to 1.8)	7.0	12.0	2.3 (2.1 to 2.4)	1.7	5.0	4.3 (4.1 to 4.4)	7.7	22.2	4.2 (3.9 to 4.5)	26.6	45.6	2.4 (2.2 to 2.6)
Azerbaijan	0.5	3.6	8.8 (8.0 to 9.7)	53.8	117.4	3.5 (3.0 to 3.9)	3.8	7.6	3.1 (2.6 to 3.7)	0.1	1.0	9.7 (8.8 to 10.7)	0.4	4.6	10.5 (9.5 to 11.6)	14.4	44.6	5.0 (4.5 to 5.4)
Bahamas	2.8	8.5	4.2 (3.9 to 4.6)	34.2	57.7	1.4 (1.0 to 1.9)	2.5	9.1	4.8 (4.3 to 5.3)	2.7	9.6	5.0 (4.5 to 5.4)	3.6	12.1	4.6 (4.2 to 5.1)	7.9	22.7	4.4 (3.7 to 5.1)
Bahrain	3.7	15.8	5.9 (5.6 to 6.3)	34.7	58.4	1.7 (1.6 to 1.8)	5.2	18.7	5.0 (4.7 to 5.3)	0.2	1.3	7.6 (7.3 to 8.0)	0.4	2.4	7.0 (6.6 to 7.3)	10.5	17.6	2.0 (1.9 to 2.1)
Bangladesh	0.3	1.5	5.8 (5.7 to 5.9)	2.2	5.0	2.8 (2.7 to 2.9)	2.5	8.4	4.6 (4.4 to 4.7)	0.0	0.4	7.5 (7.4 to 7.7)	1.2	6.5	6.3 (6.1 to 6.4)	2.6	6.5	3.5 (3.4 to 3.7)
Barbados	2.0	5.9	4.0 (3.9 to 4.1)	43.2	41.3	−0.5 (−1.0 to 0.1)	6.0	14.1	3.3 (3.1 to 3.5)	1.7	5.7	4.3 (4.2 to 4.4)	2.4	7.4	4.1 (4.0 to 4.2)	8.8	23.1	3.7 (3.6 to 3.9)
Belarus	2.3	7.7	5.2 (4.8 to 5.7)	53.1	106.1	2.9 (2.7 to 3.1)	5.1	11.3	3.5 (3.1 to 3.9)	0.6	2.7	6.5 (6.0 to 7.0)	2.7	12.6	6.7 (6.2 to 7.2)	21.3	43.7	3.1 (2.7 to 3.5)
Belgium	0.6	1.2	2.6 (2.5 to 2.6)	98.5	134.7	1.1 (0.8 to 1.4)	10.8	18.9	1.6 (1.5 to 1.8)	1.4	3.0	2.5 (2.4 to 2.7)	13.3	37.7	3.8 (3.7 to 4.0)	26.6	32.7	0.5 (0.4 to 0.7)
Belize	0.5	2.3	6.0 (5.9 to 6.2)	8.8	23.3	3.5 (3.4 to 3.5)	2.0	7.7	5.3 (5.0 to 5.5)	0.2	1.6	7.5 (7.3 to 7.7)	0.3	2.2	7.0 (6.8 to 7.2)	5.4	10.1	2.2 (2.0 to 2.3)
Bermuda	3.6	9.3	3.6 (3.4 to 3.8)	74.1	96.0	1.1 (0.9 to 1.4)	6.1	11.7	2.6 (2.0 to 3.2)	3.3	10.6	4.5 (4.3 to 4.6)	4.9	14.5	4.1 (4.0 to 4.3)	17.6	30.8	2.3 (2.1 to 2.4)

Bolivia (Plurinational State of)	0.8	2.7	4.5 (4.0 to 5.0)	11.1	39.5	4.5 (4.0 to 5.1)	3.2	11.6	4.8 (4.2 to 5.4)	0.1	0.5	6.2 (5.6 to 6.8)	0.4	1.7	5.4 (4.8 to 6.0)	6.9	21.3	4.3 (4.0 to 4.6)
Bosnia and Herzegovina	0.6	4.5	7.4 (6.5 to 8.4)	19.2	57.7	4.0 (3.7 to 4.3)	0.8	2.8	4.8 (4.6 to 5.1)	0.1	1.5	9.9 (8.8 to 11.1)	0.3	4.9	9.7 (8.6 to 11.0)	3.4	12.0	4.4 (4.1 to 4.7)
Brazil	1.4	3.5	3.5 (3.3 to 3.6)	15.1	53.3	5.2 (4.9 to 5.5)	1.4	4.8	4.7 (4.4 to 5.1)	0.1	0.2	4.3 (4.1 to 4.4)	0.1	0.7	6.9 (6.2 to 7.7)	8.0	12.7	1.9 (1.7 to 2.2)
Brunei Darussalam	2.8	6.6	3.0 (2.9 to 3.0)	44.7	76.2	2.0 (1.9 to 2.1)	2.5	6.1	3.1 (3.0 to 3.2)	1.4	5.0	4.7 (4.6 to 4.8)	8.7	24.2	3.6 (3.5 to 3.7)	10.3	17.2	1.9 (1.7 to 2.0)
Bulgaria	4.0	11.8	4.2 (4.0 to 4.5)	66.6	70.3	0.1 (0.0 to 0.2)	6.2	17.3	4.4 (3.7 to 5.0)	1.8	7.2	5.1 (4.8 to 5.3)	4.0	14.5	4.9 (4.7 to 5.1)	20.7	36.8	2.7 (2.3 to 3.1)
Burkina Faso	0.1	0.3	2.2 (2.1 to 2.4)	6.8	11.2	1.8 (1.7 to 2.0)	0.4	0.5	0.8 (0.7 to 0.9)	0.0	0.1	3.8 (3.6 to 4.0)	0.1	0.2	3.1 (2.9 to 3.3)	0.7	0.9	1.0 (0.8 to 1.1)
Burundi	0.2	0.3	1.9 (1.7 to 2.1)	9.6	14.3	1.6 (1.5 to 1.8)	0.2	0.2	–0.6 (–0.8 to –0.4)	0.0	0.1	2.5 (2.3 to 2.8)	0.6	1.0	2.4 (2.2 to 2.6)	0.7	1.1	2.0 (1.8 to 2.3)
CÃ´te d'Ivoire	0.4	0.7	2.3 (2.2 to 2.4)	9.2	13.0	1.0 (0.9 to 1.1)	0.9	2.4	3.6 (3.0 to 4.2)	0.1	0.3	4.1 (4.0 to 4.2)	0.3	0.8	2.9 (2.8 to 3.1)	1.9	3.1	2.0 (1.8 to 2.2)
Cabo Verde	0.2	1.1	6.2 (6.0 to 6.3)	7.9	22.9	4.1 (3.9 to 4.2)	0.1	0.3	4.0 (3.8 to 4.1)	0.1	0.5	9.0 (8.8 to 9.2)	0.2	1.5	7.7 (7.5 to 7.9)	3.8	9.8	3.7 (3.6 to 3.9)
Cambodia	0.3	1.6	7.2 (6.8 to 7.6)	4.3	19.5	6.7 (6.1 to 7.3)	1.6	3.0	2.3 (2.1 to 2.5)	0.0	0.2	8.5 (8.0 to 9.0)	0.5	4.3	9.1 (8.6 to 9.6)	6.7	8.6	1.1 (0.6 to 1.6)
Canada	15.3	30.0	2.9 (2.7 to 3.2)	122.4	141.5	0.3 (0.2 to 0.4)	9.6	23.1	3.4 (3.2 to 3.6)	2.7	6.0	3.2 (2.9 to 3.5)	11.1	27.2	3.8 (3.5 to 4.1)	36.4	52.0	1.9 (1.5 to 2.3)
Chile	1.2	3.8	4.1 (4.0 to 4.2)	18.0	66.2	5.0 (4.4 to 5.7)	1.5	5.0	4.2 (4.1 to 4.3)	0.1	0.6	5.3 (5.1 to 5.4)	4.8	20.1	4.8 (4.6 to 5.0)	11.4	17.5	1.0 (0.4 to 1.6)
China	1.3	6.7	5.9 (5.5 to 6.3)	6.3	31.6	6.0 (5.8 to 6.2)	2.5	7.6	3.8 (3.7 to 4.0)	0.1	0.6	8.5 (8.0 to 8.9)	2.6	27.0	8.5 (8.1 to 8.9)	10.0	27.2	3.4 (3.3 to 3.6)
Colombia	3.2	7.6	3.3 (2.9 to 3.7)	10.7	26.4	3.5 (3.0 to 3.9)	1.5	3.5	3.4 (3.1 to 3.7)	0.6	2.2	5.1 (4.6 to 5.6)	0.9	2.9	4.4 (3.9 to 5.0)	15.4	25.9	1.9 (1.6 to 2.2)
Cook Islands	2.7	5.5	2.4 (2.3 to 2.5)	37.0	69.6	2.6 (2.4 to 2.8)	4.4	6.3	1.1 (0.9 to 1.2)	0.4	1.3	3.6 (3.5 to 3.6)	6.0	15.3	3.1 (3.0 to 3.2)	9.6	15.0	1.8 (1.7 to 1.9)
Costa Rica	3.5	7.0	2.4 (2.2 to 2.6)	12.3	35.8	4.1 (3.9 to 4.3)	6.8	15.5	3.1 (2.8 to 3.3)	1.7	4.6	3.3 (2.9 to 3.7)	0.6	1.9	3.9 (3.6 to 4.1)	14.4	18.7	0.8 (0.4 to 1.1)
Croatia	3.0	10.7	5.1 (4.7 to 5.4)	43.4	93.1	3.3 (2.9 to 3.6)	4.0	13.0	4.7 (4.5 to 4.9)	0.8	3.7	6.4 (6.1 to 6.7)	1.5	6.5	5.9 (5.6 to 6.2)	16.2	28.8	2.4 (2.1 to 2.7)
Cuba	1.1	3.2	4.2 (3.8 to 4.7)	54.0	104.6	2.8 (2.5 to 3.1)	9.1	23.3	3.8 (3.6 to 4.1)	1.5	5.2	4.8 (4.3 to 5.3)	0.8	2.9	5.3 (4.8 to 5.8)	29.4	84.4	4.0 (3.8 to 4.2)
Cyprus	1.2	4.1	4.5 (4.1 to 4.9)	32.7	64.3	2.3 (2.3 to 2.4)	13.2	20.4	1.0 (0.7 to 1.4)	1.1	5.2	5.6 (5.1 to 6.0)	3.6	16.1	5.4 (5.0 to 5.7)	21.3	32.1	1.0 (0.8 to 1.2)
Czechia	15.9	29.1	1.6 (1.2 to 1.9)	91.6	116.5	0.9 (0.8 to 0.9)	6.4	14.9	3.0 (2.9 to 3.1)	1.3	5.6	5.2 (4.9 to 5.6)	4.2	16.1	4.8 (4.4 to 5.1)	22.2	37.3	1.5 (1.2 to 1.8)

Country																		
Democratic Republic of the Congo	0.2	0.5	3.7 (2.7 to 4.7)	24.7	43.8	2.0 (1.5 to 2.5)	1.0	1.7	2.1 (1.5 to 2.6)	0.1	0.3	4.4 (3.1 to 5.8)	0.4	1.6	4.4 (3.1 to 5.7)	3.3	4.1	0.8 (0.5 to 1.0)
Denmark	7.4	10.8	1.4 (1.1 to 1.7)	119.5	127.0	0.3 (0.2 to 0.3)	16.5	25.8	2.1 (1.9 to 2.3)	3.8	6.1	1.5 (1.4 to 1.6)	30.3	35.8	0.2 (0.0 to 0.4)	33.2	40.8	1.0 (0.9 to 1.1)
Dominica	0.8	2.9	4.7 (4.6 to 4.9)	26.8	56.5	2.7 (2.6 to 2.8)	1.6	3.0	2.5 (2.3 to 2.6)	0.6	2.8	5.9 (5.7 to 6.1)	0.8	3.4	5.2 (5.1 to 5.3)	3.5	7.7	3.1 (2.5 to 3.6)
Dominican Republic	0.4	2.2	6.7 (6.1 to 7.4)	12.6	19.3	1.9 (1.4 to 2.5)	2.0	6.0	4.3 (3.8 to 4.8)	0.2	1.2	8.2 (7.5 to 8.8)	0.3	2.2	7.7 (7.2 to 8.2)	8.6	22.1	3.8 (3.4 to 4.3)
Ecuador	1.6	3.5	2.9 (2.8 to 3.0)	15.2	24.0	1.5 (1.0 to 2.1)	0.4	0.8	1.5 (1.2 to 1.8)	0.2	0.6	4.5 (4.3 to 4.7)	1.3	5.9	5.8 (5.6 to 5.9)	14.5	19.6	0.7 (0.6 to 0.8)
Egypt	0.6	2.7	5.2 (5.1 to 5.3)	13.1	25.8	2.2 (1.9 to 2.6)	4.0	9.4	2.6 (2.3 to 2.8)	0.0	0.2	7.9 (7.7 to 8.0)	0.0	0.2	6.4 (6.2 to 6.7)	6.1	10.8	2.2 (1.7 to 2.6)
El Salvador	0.9	3.1	4.7 (4.6 to 4.9)	10.5	23.3	3.2 (2.9 to 3.5)	0.4	1.0	4.0 (3.9 to 4.2)	0.2	0.9	7.1 (6.8 to 7.5)	0.2	1.3	7.1 (6.9 to 7.3)	9.5	15.7	1.9 (1.6 to 2.2)
Estonia	2.2	3.8	1.7 (1.5 to 1.8)	67.9	66.7	−0.3 (−0.5 to −0.2)	7.0	9.9	1.4 (1.2 to 1.5)	0.6	1.7	3.7 (3.5 to 3.8)	4.4	12.1	3.5 (3.4 to 3.7)	27.4	27.9	0.1 (−0.1 to 0.3)
Eswatini	0.1	0.3	5.9 (5.4 to 6.3)	17.1	38.8	2.7 (2.6 to 2.9)	0.4	0.8	2.7 (2.4 to 3.0)	0.0	0.2	7.8 (7.4 to 8.2)	0.2	1.7	8.2 (7.6 to 8.8)	0.7	1.9	3.9 (3.4 to 4.3)
Ethiopia	0.1	0.2	4.4 (3.8 to 4.9)	1.0	6.8	7.0 (6.7 to 7.4)	0.2	0.7	4.0 (3.1 to 4.8)	0.0	0.1	5.6 (4.9 to 6.4)	0.2	0.9	5.9 (5.2 to 6.6)	0.4	0.8	2.0 (1.2 to 2.9)
Fiji	1.1	2.7	3.3 (3.2 to 3.4)	20.6	34.3	2.0 (1.7 to 2.3)	3.7	5.9	1.9 (1.5 to 2.3)	0.1	0.5	4.6 (4.5 to 4.7)	2.0	6.1	4.0 (3.9 to 4.1)	4.2	8.4	2.9 (2.5 to 3.3)
Finland	16.6	18.8	0.3 (0.2 to 0.5)	182.0	150.8	−0.8 (−0.9 to −0.7)	20.1	18.7	−0.4 (−0.4 to −0.3)	1.7	2.8	1.8 (1.7 to 1.9)	29.3	48.8	2.0 (1.8 to 2.2)	34.7	32.4	−0.2 (−0.4 to 0.0)
France	8.8	11.8	1.1 (0.7 to 1.5)	72.2	87.7	0.9 (0.6 to 1.1)	10.8	10.6	0.3 (0.0 to 0.6)	2.7	5.0	2.4 (2.1 to 2.7)	18.8	29.9	1.6 (1.4 to 1.8)	31.9	24.8	−0.7 (−1.1 to −0.3)
Gambia	0.2	0.4	2.7 (2.5 to 2.9)	11.5	19.4	1.8 (1.5 to 2.0)	0.6	0.5	−1.4 (−1.7 to −1.2)	0.0	0.1	4.8 (4.6 to 4.9)	0.1	0.4	3.9 (3.6 to 4.1)	1.3	1.4	−0.2 (−0.4 to 0.0)
Georgia	0.2	0.3	2.1 (1.9 to 2.2)	36.3	56.9	1.2 (1.0 to 1.3)	9.1	18.7	2.3 (2.1 to 2.4)	0.2	0.3	2.3 (2.0 to 2.7)	2.5	6.8	3.6 (3.4 to 3.7)	18.9	49.8	3.6 (3.5 to 3.7)
Germany	10.6	16.8	1.6 (1.4 to 1.8)	95.0	176.1	2.4 (2.1 to 2.7)	5.3	10.1	2.6 (2.4 to 2.8)	2.4	7.5	4.5 (4.2 to 4.7)	9.8	21.0	2.7 (2.6 to 2.8)	30.0	46.9	1.7 (1.6 to 1.8)
Ghana	0.7	1.5	2.5 (2.4 to 2.6)	13.0	30.8	2.6 (2.4 to 2.8)	1.7	2.9	3.0 (2.3 to 3.8)	0.1	0.6	4.3 (4.2 to 4.5)	1.0	2.6	3.0 (2.3 to 3.7)	1.8	1.7	−0.4 (−0.8 to −0.1)
Greece	1.7	3.1	2.2 (1.9 to 2.5)	21.7	49.1	3.2 (2.8 to 3.5)	6.1	8.6	1.1 (0.9 to 1.4)	0.4	0.9	2.5 (2.2 to 2.8)	3.6	7.3	2.3 (2.0 to 2.7)	36.6	47.8	0.7 (0.6 to 0.8)
Greenland	10.2	17.4	2.3 (2.1 to 2.4)	71.8	89.1	1.0 (0.8 to 1.1)	5.6	9.5	2.1 (2.0 to 2.3)	1.2	2.8	3.5 (3.3 to 3.7)	7.4	16.8	3.5 (3.3 to 3.7)	21.8	26.5	0.8 (0.5 to 1.0)
Grenada	0.6	2.6	5.4 (4.8 to 5.9)	19.6	53.0	3.4 (3.1 to 3.7)	2.0	7.6	5.2 (4.9 to 5.6)	0.3	1.9	6.8 (6.1 to 7.6)	0.5	2.7	6.1 (5.4 to 6.7)	2.5	9.6	4.9 (4.7 to 5.0)
Guam	3.8	6.0	1.9 (1.7 to 2.1)	79.1	80.2	0.2 (0.1 to 0.3)	14.4	14.3	0.1 (0.0 to 0.3)	0.7	1.5	3.0 (2.7 to 3.3)	10.9	20.6	2.5 (2.3 to 2.8)	12.5	9.9	−0.6 (−0.7 to −0.5)
Guatemala	1.3	5.7	5.7 (5.5 to 5.9)	4.0	3.5	−0.5 (−1.4 to 0.4)	0.5	1.2	3.0 (2.9 to 3.1)	0.1	1.3	8.2 (7.9 to 8.5)	0.3	1.8	7.3 (7.1 to 7.5)	10.9	20.6	2.4 (2.3 to 2.5)
Guinea	0.2	0.5	3.7 (3.2 to 4.1)	3.1	5.4	2.0 (1.5 to 2.4)	0.4	0.5	0.5 (0.3 to 0.7)	0.0	0.1	5.2 (4.7 to 5.7)	0.1	0.4	4.6 (4.1 to 5.1)	1.5	1.5	−0.3 (−0.7 to 0.1)

Country																		
Guinea–Bissau	0.2	0.5	3.9 (3.7 to 4.1)	8.6	13.5	1.4 (1.2 to 1.6)	0.3	0.5	1.9 (1.8 to 2.1)	0.0	0.2	5.7 (5.5 to 6.0)	0.1	0.5	4.6 (4.3 to 4.8)	1.2	2.2	2.1 (1.7 to 2.5)
Guyana	0.7	2.9	5.3 (5.1 to 5.5)	14.4	14.7	−0.5 (−0.8 to −0.3)	0.7	1.9	3.9 (3.6 to 4.1)	0.4	2.1	6.4 (6.2 to 6.5)	0.6	2.7	5.9 (5.7 to 6.1)	3.4	8.2	3.2 (2.7 to 3.6)
Haiti	0.4	0.9	3.3 (3.0 to 3.6)	2.4	9.3	6.3 (5.5 to 7.1)	0.4	0.8	2.4 (1.8 to 3.0)	0.1	0.4	4.1 (3.8 to 4.4)	0.2	0.6	3.5 (3.1 to 3.9)	2.7	2.1	−2.2 (−2.9 to −1.5)
Honduras	0.5	3.0	6.6 (6.4 to 6.9)	10.3	18.4	2.0 (1.7 to 2.3)	0.4	1.2	3.9 (3.6 to 4.2)	0.1	0.4	8.3 (8.0 to 8.6)	0.1	1.0	7.9 (7.6 to 8.2)	3.6	8.4	3.4 (3.2 to 3.6)
Hungary	1.4	2.9	2.7 (2.5 to 2.8)	59.1	55.7	−0.6 (−0.8 to −0.5)	7.1	11.6	1.6 (1.4 to 1.8)	2.1	3.8	1.6 (1.4 to 1.8)	6.7	16.9	3.4 (3.1 to 3.6)	15.0	17.0	0.5 (0.3 to 0.7)
Iceland	7.0	11.1	1.2 (1.0 to 1.4)	153.4	173.0	0.1 (−0.1 to 0.3)	12.3	26.5	3.0 (2.8 to 3.3)	1.0	2.3	2.4 (2.2 to 2.7)	16.6	35.9	2.4 (2.2 to 2.6)	28.9	42.2	1.3 (1.1 to 1.5)
India	0.2	0.7	4.0 (3.9 to 4.1)	3.5	10.1	3.9 (3.8 to 4.0)	1.2	3.1	3.3 (3.2 to 3.4)	0.0	0.3	6.4 (6.3 to 6.6)	2.1	10.8	5.8 (5.7 to 5.9)	3.8	6.2	1.6 (1.5 to 1.6)
Indonesia	1.8	5.4	3.9 (3.6 to 4.3)	9.9	24.0	2.9 (2.8 to 3.0)	1.4	5.8	5.3 (4.8 to 5.7)	0.0	0.2	5.5 (5.0 to 5.9)	3.6	16.0	5.4 (4.9 to 5.9)	2.1	7.3	4.5 (4.3 to 4.7)
Iran (Islamic Republic of)	0.4	2.2	6.9 (6.3 to 7.5)	6.9	27.1	5.1 (4.6 to 5.6)	1.6	7.5	5.8 (5.5 to 6.1)	0.0	0.3	9.5 (8.7 to 10.3)	0.0	0.3	8.8 (8.1 to 9.6)	3.1	12.2	5.3 (5.1 to 5.5)
Iraq	0.1	1.0	7.8 (7.4 to 8.2)	6.2	19.1	4.0 (3.9 to 4.1)	1.8	6.3	4.2 (4.0 to 4.4)	0.0	0.2	9.8 (9.4 to 10.3)	0.0	0.4	8.9 (8.5 to 9.3)	2.9	6.3	2.6 (2.4 to 2.7)
Ireland	3.0	12.6	5.3 (4.5 to 6.0)	79.7	147.7	1.9 (1.7 to 2.2)	4.3	13.7	4.4 (3.9 to 4.9)	0.5	3.7	8.0 (7.2 to 8.8)	6.1	41.5	7.3 (6.4 to 8.3)	6.1	25.3	5.9 (5.3 to 6.5)
Israel	4.8	11.1	3.2 (3.1 to 3.4)	44.8	62.8	1.4 (1.2 to 1.6)	8.5	16.6	3.1 (2.8 to 3.5)	0.4	1.2	4.5 (4.4 to 4.7)	18.8	64.9	4.9 (4.7 to 5.2)	31.7	42.3	1.4 (1.1 to 1.7)
Italy	2.1	5.8	4.2 (3.9 to 4.4)	52.8	93.0	2.2 (2.0 to 2.3)	6.7	17.5	3.9 (3.6 to 4.1)	1.2	3.9	4.6 (4.3 to 5.0)	4.3	11.2	3.6 (3.5 to 3.8)	28.5	53.0	2.6 (2.5 to 2.8)
Jamaica	1.6	5.0	4.0 (4.0 to 4.1)	14.8	23.7	1.6 (1.5 to 1.7)	0.5	1.2	2.8 (2.8 to 2.9)	1.0	4.4	5.1 (5.1 to 5.2)	1.5	5.4	4.5 (4.4 to 4.5)	5.4	7.9	0.7 (0.3 to 1.0)
Japan	3.4	6.1	2.2 (2.1 to 2.2)	80.0	119.2	1.4 (1.3 to 1.5)	10.0	18.0	2.2 (2.1 to 2.3)	2.7	6.0	2.9 (2.8 to 3.0)	22.1	50.2	2.9 (2.9 to 3.0)	13.9	23.5	1.8 (1.7 to 1.9)
Jordan	0.9	2.5	3.4 (3.0 to 3.7)	20.8	38.6	1.6 (1.3 to 2.0)	3.3	11.0	4.0 (3.5 to 4.4)	0.1	0.2	5.2 (5.0 to 5.4)	0.1	0.4	4.8 (4.6 to 4.9)	8.7	13.0	1.0 (0.5 to 1.4)
Kazakhstan	0.9	3.7	5.4 (5.1 to 5.8)	71.1	108.1	1.8 (1.6 to 2.1)	6.1	16.9	5.0 (4.4 to 5.7)	0.2	1.1	6.6 (6.2 to 6.9)	0.9	5.0	6.6 (6.3 to 6.9)	21.0	42.6	2.9 (2.7 to 3.1)
Kenya	0.4	1.1	3.4 (3.2 to 3.5)	9.3	25.4	3.7 (3.5 to 3.9)	1.5	2.0	1.1 (0.7 to 1.5)	0.1	0.4	4.9 (4.7 to 5.1)	1.5	5.9	4.3 (4.1 to 4.5)	2.1	3.3	1.6 (1.6 to 1.7)
Kiribati	0.2	0.7	5.5 (5.0 to 6.0)	13.8	34.9	3.7 (3.4 to 4.1)	0.5	1.5	4.0 (3.7 to 4.4)	0.0	0.1	6.6 (6.0 to 7.2)	0.3	1.2	5.9 (5.3 to 6.4)	0.9	2.3	3.5 (3.1 to 3.9)
Kuwait	6.8	19.2	4.3 (4.1 to 4.5)	49.6	105.5	2.7 (2.6 to 2.8)	8.9	23.3	3.4 (3.2 to 3.6)	0.5	2.3	6.3 (6.0 to 6.7)	1.0	3.4	5.2 (5.0 to 5.5)	15.6	31.4	2.6 (2.5 to 2.8)
Kyrgyzstan	0.3	1.2	5.3 (5.0 to 5.6)	39.4	56.4	1.4 (1.2 to 1.6)	0.6	1.4	3.8 (3.3 to 4.2)	0.1	0.3	5.6 (5.3 to 5.8)	0.3	1.3	5.9 (5.6 to 6.2)	9.9	17.1	2.3 (2.0 to 2.5)
Latvia	2.8	7.6	3.6 (3.5 to 3.7)	72.9	66.5	−0.7 (−0.9 to −0.6)	9.8	16.8	1.9 (1.8 to 2.0)	1.2	4.5	4.8 (4.7 to 5.0)	3.5	13.9	5.1 (4.9 to 5.3)	27.7	32.4	0.5 (0.2 to 0.7)
Lebanon	0.7	4.2	7.0 (6.6 to 7.5)	7.3	22.6	4.3 (4.1 to 4.6)	5.1	18.6	4.8 (4.5 to 5.2)	0.0	0.3	9.8 (9.4 to 10.2)	0.1	0.6	8.2 (7.8 to 8.7)	13.3	22.4	1.6 (1.5 to 1.7)

Liberia	0.2	1.1	6.3 (5.7 to 7.0)	5.8	13.2	3.4 (3.0 to 3.8)	0.4	1.2	5.3 (4.6 to 5.9)	0.0	0.4	8.2 (7.4 to 9.0)	0.2	1.1	8.3 (7.5 to 9.1)	0.5	1.2	3.8 (3.3 to 4.4)
Libya	0.7	2.9	4.7 (4.0 to 5.4)	18.5	43.6	2.8 (2.3 to 3.3)	1.6	6.6	4.8 (4.5 to 5.1)	0.0	0.3	7.3 (6.3 to 8.4)	0.1	0.4	5.7 (4.8 to 6.6)	5.7	11.1	2.0 (1.7 to 2.3)
Lithuania	5.0	13.6	3.4 (3.2 to 3.5)	22.5	26.8	0.1 (–0.3 to 0.4)	6.9	15.8	3.0 (2.7 to 3.3)	1.9	7.8	4.9 (4.6 to 5.2)	3.2	11.7	4.3 (4.1 to 4.5)	28.3	42.6	1.2 (1.1 to 1.3)
Luxembourg	1.5	2.8	2.4 (2.2 to 2.6)	49.6	85.1	2.4 (2.0 to 2.7)	13.1	21.3	2.3 (2.1 to 2.5)	1.6	2.7	1.6 (1.5 to 1.8)	6.7	15.6	3.3 (3.2 to 3.4)	17.9	34.8	2.6 (2.3 to 2.9)
Madagascar	0.4	1.0	3.2 (2.9 to 3.5)	7.0	8.4	0.6 (0.5 to 0.8)	0.5	0.9	2.4 (2.3 to 2.6)	0.1	0.3	4.4 (4.0 to 4.8)	1.4	4.2	3.8 (3.5 to 4.2)	3.0	4.6	1.5 (1.4 to 1.6)
Malawi	0.2	0.7	5.3 (4.8 to 5.8)	6.8	13.0	2.3 (2.2 to 2.4)	0.5	0.8	2.2 (1.8 to 2.7)	0.0	0.2	6.8 (6.2 to 7.4)	0.6	3.0	6.7 (6.0 to 7.3)	0.4	0.9	2.9 (2.6 to 3.2)
Malaysia	1.5	3.9	3.2 (3.1 to 3.4)	24.9	59.0	3.2 (3.1 to 3.4)	2.7	8.3	4.2 (3.8 to 4.6)	0.1	0.4	5.1 (4.9 to 5.2)	7.5	29.2	4.6 (4.4 to 4.8)	5.6	12.7	3.1 (2.8 to 3.4)
Maldives	0.5	2.3	5.6 (5.3 to 5.9)	7.1	46.5	7.3 (6.9 to 7.7)	9.4	15.8	1.4 (1.2 to 1.6)	0.0	0.2	7.5 (7.2 to 7.8)	1.2	9.5	7.6 (7.3 to 7.9)	3.5	34.4	8.4 (8.2 to 8.6)
Mali	0.1	0.4	3.5 (3.3 to 3.7)	6.2	8.0	0.8 (0.6 to 0.9)	0.6	0.9	1.8 (1.6 to 1.9)	0.0	0.1	5.3 (5.0 to 5.6)	0.1	0.3	4.4 (4.2 to 4.6)	1.2	2.1	2.2 (1.9 to 2.4)
Malta	2.3	5.3	3.2 (3.1 to 3.2)	48.3	105.3	3.0 (2.8 to 3.2)	7.2	15.8	3.0 (2.9 to 3.1)	0.7	2.3	4.3 (4.2 to 4.3)	5.9	18.8	4.2 (4.1 to 4.2)	22.9	28.2	0.5 (0.4 to 0.7)
Mauritius	1.0	3.3	4.4 (4.2 to 4.5)	9.2	19.8	3.0 (2.8 to 3.1)	9.5	26.6	3.9 (3.6 to 4.2)	0.1	0.4	5.5 (5.3 to 5.7)	3.1	15.5	6.0 (5.8 to 6.2)	6.0	16.5	3.8 (3.4 to 4.2)
Mexico	5.1	11.0	2.4 (2.2 to 2.6)	21.1	57.7	4.1 (3.8 to 4.4)	0.9	7.1	8.5 (8.1 to 9.0)	0.6	2.1	4.0 (3.8 to 4.1)	3.5	9.5	3.3 (3.1 to 3.4)	12.9	26.6	2.9 (2.4 to 3.4)
Monaco	5.2	6.1	0.3 (0.1 to 0.6)	142.8	165.2	0.6 (0.5 to 0.7)	19.7	22.4	0.6 (0.5 to 0.7)	2.6	3.5	0.9 (0.7 to 1.2)	19.6	26.0	0.8 (0.6 to 1.1)	24.9	51.2	3.0 (2.6 to 3.4)
Mongolia	0.5	2.4	6.0 (5.6 to 6.4)	25.1	47.1	2.1 (1.7 to 2.5)	2.4	12.0	5.9 (5.6 to 6.2)	0.1	0.4	6.3 (5.9 to 6.7)	0.1	0.5	5.6 (5.2 to 6.1)	17.1	34.4	2.4 (2.2 to 2.7)
Montenegro	4.3	10.0	3.2 (2.9 to 3.5)	49.5	71.1	1.3 (1.2 to 1.4)	5.0	6.6	0.8 (0.7 to 1.0)	1.3	4.0	4.5 (4.1 to 5.0)	4.0	11.8	4.3 (3.9 to 4.6)	11.7	18.6	1.5 (1.4 to 1.7)
Morocco	0.4	1.7	5.1 (4.9 to 5.2)	5.1	13.5	3.5 (3.4 to 3.7)	1.3	2.6	2.6 (2.3 to 2.9)	0.0	0.1	6.6 (6.5 to 6.7)	0.0	0.2	6.5 (6.4 to 6.7)	2.9	6.6	3.1 (3.0 to 3.3)
Mozambique	0.1	0.2	3.2 (3.0 to 3.4)	3.4	9.4	3.8 (3.6 to 4.1)	0.4	0.7	2.0 (1.7 to 2.3)	0.0	0.1	4.4 (4.1 to 4.7)	0.6	1.4	2.4 (2.1 to 2.7)	0.7	0.8	0.1 (–0.1 to 0.3)
Myanmar	0.3	2.3	8.1 (7.9 to 8.4)	2.8	11.0	5.5 (5.3 to 5.8)	0.5	3.8	8.2 (7.8 to 8.6)	0.0	0.2	10.0 (9.6 to 10.3)	0.5	7.1	10.8 (10.4 to 11.2)	2.2	9.2	5.7 (5.5 to 6.0)
Nepal	0.4	1.2	3.7 (3.5 to 3.9)	8.5	27.8	4.6 (4.3 to 5.0)	0.6	2.7	5.1 (4.5 to 5.6)	0.0	0.2	5.7 (5.5 to 5.9)	1.4	5.1	4.4 (4.2 to 4.6)	3.5	6.8	2.6 (2.3 to 2.8)
Netherlands	7.3	9.6	0.6 (0.5 to 0.7)	147.1	193.8	1.0 (0.6 to 1.3)	15.5	24.2	1.9 (1.7 to 2.2)	3.5	6.7	2.0 (1.7 to 2.2)	20.5	30.8	1.1 (0.9 to 1.2)	19.1	44.8	3.7 (3.3 to 4.1)
New Zealand	6.2	11.0	1.9 (1.7 to 2.1)	140.4	155.9	0.4 (0.3 to 0.6)	13.7	31.2	3.3 (3.0 to 3.6)	4.0	8.0	2.2 (2.0 to 2.4)	15.6	29.6	2.1 (1.8 to 2.3)	28.2	39.6	1.6 (1.3 to 2.0)
Nicaragua	1.6	7.2	5.5 (5.4 to 5.6)	5.5	23.5	5.8 (5.5 to 6.0)	0.4	2.0	6.0 (5.3 to 6.7)	0.1	0.7	8.5 (8.3 to 8.6)	0.2	1.0	6.8 (6.7 to 6.9)	7.0	10.2	1.2 (0.7 to 1.8)
Niger	0.1	0.2	2.2 (2.0 to 2.4)	4.1	6.3	1.6 (1.5 to 1.8)	0.1	0.2	1.3 (1.1 to 1.5)	0.0	0.0	3.5 (3.2 to 3.7)	0.1	0.2	2.7 (2.4 to 2.9)	0.6	0.9	2.0 (1.8 to 2.3)
Nigeria	0.3	0.7	3.7 (3.4 to 4.0)	9.1	14.6	1.9 (1.6 to 2.2)	0.6	1.2	2.9 (2.6 to 3.1)	0.1	0.5	5.8 (5.5 to 6.1)	0.3	1.1	5.6 (5.2 to 6.0)	2.1	3.3	2.0 (1.6 to 2.3)

North Macedonia	2.1	6.8	4.7 (4.5 to 5.0)	25.3	49.4	2.5 (2.4 to 2.7)	2.7	7.9	4.2 (4.0 to 4.5)	0.5	2.4	6.3 (6.0 to 6.6)	1.6	7.4	6.1 (5.7 to 6.4)	10.8	19.3	2.3 (2.1 to 2.6)
Northern Mariana Islands	4.1	6.2	0.7 (0.3 to 1.2)	64.9	82.3	0.4 (0.2 to 0.6)	9.0	12.4	0.6 (0.3 to 1.0)	0.8	1.5	1.1 (0.5 to 1.6)	12.0	19.0	0.6 (0.1 to 1.1)	11.1	10.7	−0.4 (−0.6 to −0.1)
Norway	9.7	12.2	0.7 (0.6 to 0.9)	166.8	211.0	1.2 (1.0 to 1.4)	11.1	16.2	2.0 (1.5 to 2.6)	2.0	3.9	2.4 (2.3 to 2.5)	12.9	18.7	1.2 (1.0 to 1.4)	26.4	36.7	1.6 (1.4 to 1.8)
Oman	0.8	11.0	10.8 (10.3 to 11.4)	20.5	60.9	4.2 (4.0 to 4.4)	2.0	16.0	8.0 (7.7 to 8.4)	0.0	1.1	15.2 (14.6 to 15.7)	0.1	1.7	13.0 (12.5 to 13.6)	6.3	22.2	5.0 (4.8 to 5.3)
Pakistan	0.5	2.2	5.9 (5.6 to 6.2)	4.0	8.3	2.7 (2.6 to 2.8)	2.0	6.6	4.7 (4.4 to 5.0)	0.1	0.6	7.9 (7.6 to 8.3)	0.4	2.2	7.0 (6.7 to 7.4)	4.2	7.8	2.4 (2.2 to 2.5)
Palau	2.2	5.2	2.9 (2.7 to 3.2)	44.5	71.5	1.6 (1.4 to 1.7)	5.5	10.7	2.4 (2.3 to 2.6)	0.3	1.1	4.0 (3.7 to 4.3)	4.9	13.9	3.6 (3.3 to 3.9)	10.7	15.8	1.4 (1.2 to 1.6)
Palestine	0.3	0.9	4.7 (4.4 to 5.0)	3.6	13.1	4.2 (3.9 to 4.5)	1.0	2.4	3.6 (3.2 to 3.9)	0.0	0.1	7.2 (6.9 to 7.5)	0.0	0.1	6.2 (5.9 to 6.5)	3.8	13.5	4.9 (4.7 to 5.1)
Panama	2.3	6.9	4.0 (3.9 to 4.1)	23.6	54.0	3.0 (2.9 to 3.1)	1.5	4.3	3.9 (3.7 to 4.1)	0.7	3.1	5.3 (5.1 to 5.4)	1.0	3.9	5.0 (4.9 to 5.2)	11.8	19.5	1.7 (1.7 to 1.8)
Papua New Guinea	0.4	1.1	3.5 (3.3 to 3.7)	6.3	6.2	−0.9 (−1.2 to −0.5)	1.2	2.1	2.3 (2.1 to 2.5)	0.0	0.1	4.3 (4.1 to 4.5)	0.5	1.5	4.0 (3.8 to 4.2)	0.9	1.5	2.1 (1.8 to 2.3)
Paraguay	0.3	1.1	5.0 (4.8 to 5.2)	13.7	16.3	0.3 (−0.2 to 0.7)	2.3	4.8	2.8 (2.7 to 2.9)	0.3	1.5	6.4 (6.2 to 6.6)	0.7	3.8	6.3 (6.1 to 6.5)	6.7	16.8	3.6 (3.3 to 3.9)
Peru	2.3	6.0	3.9 (3.6 to 4.2)	14.4	35.3	3.9 (3.5 to 4.3)	4.1	5.7	1.0 (0.8 to 1.3)	0.3	1.1	5.3 (5.0 to 5.6)	1.5	5.4	5.1 (4.8 to 5.5)	16.9	20.5	0.7 (0.6 to 0.8)
Philippines	1.4	3.2	3.0 (2.5 to 3.4)	21.4	19.8	−1.0 (−1.3 to −0.7)	2.9	2.9	−0.3 (−0.4 to −0.1)	0.0	0.1	4.1 (3.8 to 4.5)	3.7	10.2	3.4 (3.1 to 3.6)	4.2	3.8	−0.8 (−1.2 to −0.3)
Poland	2.8	6.8	3.1 (3.0 to 3.2)	49.6	55.8	0.1 (0.0 to 0.2)	8.9	20.1	3.0 (2.9 to 3.2)	1.7	7.0	5.0 (4.9 to 5.2)	4.4	14.8	4.2 (4.1 to 4.4)	17.3	20.2	0.5 (0.4 to 0.6)
Portugal	1.9	5.9	4.2 (4.0 to 4.4)	34.7	74.9	3.1 (2.7 to 3.5)	5.4	11.6	2.7 (2.4 to 2.9)	0.3	1.1	4.1 (4.0 to 4.2)	3.4	14.9	5.6 (5.3 to 5.8)	13.8	36.3	3.7 (3.3 to 4.1)
Puerto Rico	1.8	4.7	3.3 (3.1 to 3.4)	40.5	47.3	0.2 (0.0 to 0.5)	3.6	5.5	1.0 (0.6 to 1.4)	1.6	5.5	4.3 (4.1 to 4.4)	2.3	7.0	3.7 (3.6 to 3.9)	9.5	15.3	1.6 (1.5 to 1.7)
Qatar	5.1	23.6	6.0 (5.8 to 6.1)	44.0	106.8	3.3 (3.1 to 3.4)	11.7	29.6	3.5 (3.1 to 3.9)	0.3	2.6	8.3 (8.1 to 8.5)	0.6	4.2	7.2 (7.0 to 7.4)	19.7	33.8	2.4 (2.0 to 2.7)
Republic of Korea	1.6	5.9	4.6 (4.5 to 4.8)	16.4	52.6	4.4 (4.3 to 4.6)	4.7	17.0	5.1 (4.9 to 5.3)	1.4	7.9	6.2 (5.8 to 6.5)	1.7	9.8	6.3 (6.0 to 6.6)	6.4	16.2	3.5 (3.4 to 3.7)
Republic of Moldova	0.5	2.5	6.7 (6.4 to 7.0)	28.0	38.2	1.3 (1.0 to 1.6)	2.7	6.1	3.9 (3.2 to 4.5)	0.1	0.9	7.9 (7.6 to 8.2)	0.4	2.7	7.8 (7.3 to 8.2)	11.5	24.0	2.9 (2.7 to 3.2)
Romania	6.2	6.1	−0.8 (−1.1 to −0.6)	19.6	44.0	3.2 (2.8 to 3.5)	8.3	14.0	1.8 (1.7 to 2.0)	3.4	6.9	2.1 (1.9 to 2.2)	8.7	16.2	1.8 (1.7 to 1.9)	16.1	17.4	0.1 (0.1 to 0.2)
Russian Federation	2.8	4.1	1.4 (1.0 to 1.7)	31.8	52.3	2.1 (1.5 to 2.6)	7.6	10.6	1.4 (1.2 to 1.7)	1.1	2.2	2.6 (2.2 to 3.0)	2.7	4.2	1.6 (1.1 to 2.0)	42.7	58.4	1.8 (1.4 to 2.2)
Rwanda	0.3	0.9	5.4 (4.9 to 6.0)	5.4	16.8	4.8 (4.2 to 5.3)	0.3	1.2	5.8 (5.0 to 6.6)	0.0	0.1	6.7 (6.0 to 7.4)	0.1	0.3	5.9 (5.3 to 6.5)	1.5	3.1	3.2 (2.8 to 3.5)
Saint Kitts and Nevis	1.5	6.1	5.1 (4.9 to 5.3)	52.9	57.0	0.0 (−0.3 to 0.4)	2.6	5.2	2.0 (1.5 to 2.4)	1.1	6.2	6.3 (6.1 to 6.5)	1.5	7.9	5.8 (5.6 to 6.0)	4.9	21.0	5.4 (5.1 to 5.7)
Saint Lucia	1.0	3.7	4.6 (4.3 to 4.9)	18.8	37.3	2.1 (1.7 to 2.4)	1.7	7.0	5.4 (5.2 to 5.7)	0.6	3.1	5.9 (5.5 to 6.3)	0.9	4.0	5.2 (4.9 to 5.5)	3.1	13.1	6.1 (5.4 to 6.7)

Saint Vincent and the Grenadines	0.6	1.6	3.4 (3.2 to 3.6)	21.3	60.2	3.8 (3.7 to 4.0)	1.6	3.0	2.1 (1.8 to 2.4)	0.3	1.2	4.4 (4.1 to 4.7)	0.5	1.6	3.9 (3.7 to 4.1)	4.0	5.2	0.4 (0.2 to 0.6)
San Marino	6.3	9.5	1.3 (1.2 to 1.5)	111.3	132.9	0.6 (0.3 to 0.8)	11.7	15.3	0.8 (0.7 to 0.8)	2.9	5.1	1.9 (1.7 to 2.1)	22.6	38.7	1.8 (1.6 to 2.0)	36.1	56.0	1.7 (1.6 to 1.7)
Saudi Arabia	1.3	9.9	7.4 (7.1 to 7.7)	16.2	68.8	5.2 (5.1 to 5.3)	3.8	16.6	4.6 (4.2 to 5.0)	0.1	1.0	10.8 (10.6 to 11.0)	0.1	1.7	9.5 (9.2 to 9.8)	6.4	25.4	5.3 (5.1 to 5.5)
Senegal	0.2	0.4	1.9 (1.5 to 2.3)	8.7	12.3	1.1 (0.9 to 1.3)	0.5	0.6	–0.2 (–0.5 to 0.1)	0.0	0.1	3.5 (3.1 to 3.9)	0.2	0.6	2.7 (2.3 to 3.1)	2.1	2.1	–0.5 (–0.8 to –0.1)
Serbia	2.4	5.9	3.1 (2.9 to 3.3)	25.7	58.1	3.0 (2.8 to 3.3)	2.4	7.5	4.1 (4.0 to 4.3)	0.6	2.1	4.5 (4.2 to 4.8)	1.9	6.8	4.6 (4.3 to 4.8)	7.6	12.6	1.6 (1.4 to 1.7)
Seychelles	1.9	4.6	3.1 (3.0 to 3.2)	24.2	42.6	1.8 (1.6 to 1.9)	7.4	20.3	3.6 (3.4 to 3.9)	0.2	0.6	4.1 (4.0 to 4.3)	7.1	21.5	3.8 (3.6 to 3.9)	7.6	12.9	1.8 (1.7 to 2.0)
Sierra Leone	0.2	0.5	2.4 (2.0 to 2.8)	5.7	10.4	2.3 (1.8 to 2.8)	0.7	1.3	2.0 (1.5 to 2.5)	0.1	0.3	3.9 (3.4 to 4.5)	0.2	0.5	3.3 (2.7 to 3.8)	0.6	1.9	4.4 (3.2 to 5.5)
Singapore	3.0	10.3	4.9 (4.6 to 5.2)	31.6	77.9	3.6 (3.4 to 3.8)	4.2	16.0	5.3 (5.0 to 5.5)	1.4	8.4	7.0 (6.5 to 7.4)	8.9	42.7	6.2 (5.8 to 6.5)	11.3	24.3	3.1 (3.0 to 3.2)
Slovakia	9.4	20.4	2.5 (2.4 to 2.6)	77.9	116.3	1.2 (1.1 to 1.3)	5.5	11.5	2.7 (2.6 to 2.8)	1.8	6.4	4.4 (4.3 to 4.6)	13.7	54.2	5.1 (4.9 to 5.4)	18.1	32.0	2.2 (2.1 to 2.4)
Slovenia	7.4	13.7	2.2 (1.7 to 2.7)	55.2	118.0	3.0 (2.6 to 3.3)	5.8	20.0	5.0 (4.3 to 5.7)	2.0	4.3	2.8 (2.3 to 3.3)	3.8	10.0	3.6 (3.1 to 4.1)	9.5	25.3	3.7 (3.0 to 4.4)
Solomon Islands	0.2	0.9	7.6 (7.0 to 8.1)	6.4	23.5	5.8 (5.3 to 6.4)	0.8	2.6	5.5 (5.1 to 6.0)	0.0	0.1	8.8 (8.3 to 9.2)	0.2	1.3	8.2 (7.7 to 8.7)	0.9	2.4	4.6 (4.1 to 5.0)
South Africa	0.6	1.1	2.0 (1.8 to 2.2)	20.0	34.6	1.5 (1.2 to 1.9)	3.0	3.9	0.5 (0.3 to 0.8)	0.3	0.7	3.3 (3.1 to 3.6)	2.3	16.5	7.8 (7.1 to 8.6)	4.1	8.3	2.4 (2.0 to 2.8)
Spain	1.2	4.8	5.6 (5.3 to 6.0)	33.8	86.0	3.8 (3.5 to 4.0)	5.7	18.8	4.4 (4.1 to 4.8)	0.8	3.2	5.2 (4.7 to 5.7)	3.6	13.6	5.1 (4.7 to 5.5)	19.4	46.0	3.4 (3.2 to 3.6)
Sri Lanka	1.1	3.5	3.9 (3.7 to 4.0)	7.6	16.1	2.7 (2.6 to 2.8)	1.5	4.2	3.3 (3.2 to 3.5)	0.1	0.4	5.3 (5.1 to 5.5)	3.2	14.0	5.1 (5.0 to 5.3)	2.6	9.3	4.6 (4.4 to 4.9)
Suriname	1.3	4.0	4.6 (4.3 to 4.9)	30.3	55.6	2.4 (2.0 to 2.8)	1.6	2.8	2.0 (1.9 to 2.1)	0.7	3.0	5.6 (5.3 to 5.9)	1.2	4.2	4.9 (4.6 to 5.1)	7.3	20.6	4.5 (4.1 to 4.9)
Sweden	7.0	7.5	0.3 (0.1 to 0.5)	139.9	148.9	0.4 (0.2 to 0.5)	23.8	24.2	0.9 (0.4 to 1.5)	2.3	4.1	2.4 (2.1 to 2.8)	63.9	71.2	0.2 (–0.2 to 0.6)	32.3	37.9	1.3 (0.9 to 1.7)
Switzerland	1.9	3.0	1.3 (1.2 to 1.5)	127.8	163.0	0.5 (0.3 to 0.7)	12.3	23.5	2.4 (2.1 to 2.7)	2.2	4.3	2.1 (2.0 to 2.2)	12.1	24.8	2.5 (2.4 to 2.6)	33.7	64.2	2.5 (2.4 to 2.6)
Syrian Arab Republic	0.2	1.0	5.0 (4.5 to 5.4)	7.0	12.5	1.5 (1.2 to 1.8)	1.9	7.3	5.0 (4.8 to 5.1)	0.0	0.1	7.4 (6.7 to 8.0)	0.0	0.1	6.2 (5.6 to 6.8)	3.9	7.2	2.0 (1.7 to 2.2)
Taiwan (Province of China)	1.9	7.1	5.0 (4.7 to 5.2)	17.2	55.3	4.5 (4.3 to 4.7)	4.6	14.3	4.2 (4.1 to 4.3)	0.9	5.1	6.5 (6.2 to 6.9)	1.3	7.2	6.4 (6.0 to 6.7)	4.1	9.6	3.4 (3.1 to 3.6)
Tajikistan	0.7	2.8	6.0 (5.6 to 6.4)	24.9	50.9	2.9 (2.6 to 3.3)	0.7	2.7	5.8 (5.4 to 6.1)	0.0	0.1	6.4 (5.8 to 7.0)	0.1	0.6	7.0 (6.5 to 7.5)	8.7	22.8	4.1 (3.8 to 4.3)
Thailand	1.8	3.2	2.1 (2.0 to 2.3)	34.5	75.1	2.9 (2.8 to 3.0)	2.3	5.7	2.9 (2.7 to 3.1)	0.1	0.4	3.8 (3.6 to 4.0)	7.7	18.9	3.1 (3.0 to 3.3)	4.3	7.0	1.3 (1.1 to 1.5)

Country																		
Tonga	0.5	1.0	2.1 (1.9 to 2.4)	17.9	27.8	1.2 (0.9 to 1.4)	1.3	1.7	0.1 (–0.3 to 0.5)	0.1	0.2	3.1 (2.9 to 3.4)	0.9	2.2	2.8 (2.5 to 3.0)	2.1	3.9	2.2 (1.8 to 2.5)
Trinidad and Tobago	0.9	2.7	4.3 (3.9 to 4.8)	14.5	27.2	2.4 (2.2 to 2.6)	1.9	3.8	2.8 (2.5 to 3.1)	1.0	3.7	5.4 (5.0 to 5.8)	1.5	6.3	5.7 (5.2 to 6.3)	4.4	18.7	5.7 (5.4 to 6.0)
Tunisia	0.7	2.8	5.3 (5.0 to 5.5)	12.4	26.1	2.6 (2.4 to 2.8)	1.3	2.6	2.6 (2.4 to 2.9)	0.0	0.2	7.5 (7.2 to 7.9)	0.1	0.3	6.7 (6.4 to 7.0)	4.2	10.1	3.5 (3.3 to 3.7)
Turkey	2.1	8.1	4.5 (4.2 to 4.7)	9.7	23.0	3.0 (2.9 to 3.1)	2.4	8.4	4.3 (4.2 to 4.5)	0.0	0.4	7.1 (6.8 to 7.4)	0.4	2.9	6.4 (6.2 to 6.6)	4.9	9.9	2.3 (2.2 to 2.4)
Turkmenistan	0.4	2.2	7.5 (6.9 to 8.2)	37.2	83.9	3.1 (2.9 to 3.3)	1.9	5.8	4.5 (4.2 to 4.8)	0.1	0.6	8.7 (8.0 to 9.5)	0.4	2.8	8.6 (7.9 to 9.4)	11.4	30.6	4.1 (3.8 to 4.4)
Uganda	1.0	1.5	0.9 (0.5 to 1.2)	9.8	14.9	1.4 (1.2 to 1.5)	0.4	0.8	2.0 (1.7 to 2.2)	0.0	0.2	6.3 (5.8 to 6.8)	0.9	2.1	3.1 (2.5 to 3.7)	1.1	1.8	0.8 (0.4 to 1.2)
Ukraine	6.2	12.2	2.9 (2.6 to 3.2)	76.3	113.5	1.7 (1.5 to 1.9)	3.2	8.1	3.7 (3.4 to 3.9)	0.7	1.6	3.3 (3.0 to 3.6)	2.1	4.5	3.2 (2.9 to 3.6)	20.3	30.3	1.9 (1.7 to 2.1)
United Arab Emirates	6.0	32.7	6.4 (5.8 to 6.9)	49.0	88.2	1.7 (1.4 to 1.9)	8.5	47.5	6.7 (6.2 to 7.2)	0.4	4.2	8.9 (8.1 to 9.6)	0.8	6.0	7.4 (6.8 to 8.1)	13.9	30.4	2.6 (2.3 to 2.8)
United Kingdom	2.6	4.4	1.7 (1.6 to 1.9)	113.8	130.5	0.4 (0.4 to 0.4)	6.7	15.6	2.8 (2.6 to 3.1)	1.0	2.6	3.4 (3.2 to 3.6)	39.4	104.4	3.5 (3.2 to 3.8)	16.8	35.1	2.9 (2.8 to 3.0)
United Republic of Tanzania	0.2	0.5	2.9 (2.6 to 3.2)	12.2	22.0	2.2 (2.0 to 2.3)	0.5	1.6	5.0 (4.5 to 5.5)	0.0	0.2	4.5 (4.0 to 4.9)	1.5	7.0	6.0 (5.6 to 6.5)	1.9	4.9	4.2 (3.8 to 4.7)
United States of America	24.0	30.1	0.4 (0.2 to 0.6)	87.2	123.2	1.3 (1.2 to 1.4)	8.2	14.2	2.1 (1.9 to 2.3)	2.9	5.2	1.8 (1.7 to 2.0)	16.7	29.9	1.9 (1.8 to 2.0)	20.5	27.2	0.8 (0.6 to 1.0)
United States Virgin Islands	2.3	7.6	4.6 (4.3 to 4.9)	49.9	61.0	0.6 (0.4 to 0.8)	4.1	6.0	1.1 (0.6 to 1.5)	2.0	9.3	5.9 (5.6 to 6.2)	3.0	12.1	5.4 (5.1 to 5.7)	12.0	20.7	2.1 (2.0 to 2.2)
Uruguay	4.9	10.5	2.8 (2.6 to 2.9)	33.2	71.9	2.6 (2.1 to 3.2)	1.9	3.8	2.8 (2.5 to 3.2)	0.7	2.3	4.3 (4.1 to 4.6)	4.7	31.2	7.7 (7.3 to 8.1)	28.0	64.2	2.9 (2.5 to 3.3)
Uzbekistan	0.2	1.7	8.3 (7.9 to 8.6)	43.5	117.6	4.0 (3.7 to 4.3)	0.3	2.3	8.0 (7.6 to 8.3)	0.0	0.4	9.7 (9.4 to 10.1)	0.2	1.9	9.4 (9.0 to 9.8)	9.7	20.7	3.0 (2.7 to 3.3)
Venezuela (Bolivarian Republic of)	1.1	2.1	2.4 (2.1 to 2.7)	23.5	27.9	0.7 (0.3 to 1.1)	1.5	2.4	1.9 (1.6 to 2.2)	0.8	2.1	3.0 (2.6 to 3.4)	0.5	1.0	2.7 (2.3 to 3.1)	13.2	18.8	1.6 (1.3 to 2.0)
Viet Nam	0.6	2.9	6.0 (5.8 to 6.2)	4.9	9.9	2.5 (2.4 to 2.6)	1.5	6.7	6.6 (6.1 to 7.0)	0.1	0.5	8.0 (7.8 to 8.2)	1.9	14.2	7.9 (7.7 to 8.1)	3.5	7.7	3.3 (3.1 to 3.4)
Zambia	0.2	0.5	4.9 (4.5 to 5.2)	14.3	21.8	0.9 (0.5 to 1.3)	0.8	3.3	6.1 (5.5 to 6.8)	0.0	0.2	6.2 (5.5 to 6.9)	1.2	5.1	5.4 (4.9 to 5.9)	1.0	1.9	2.7 (2.4 to 3.0)
Zimbabwe	0.3	0.4	0.9 (0.5 to 1.3)	24.4	28.6	–0.2 (–0.5 to 0.2)	1.2	1.2	–1.3 (–1.7 to –0.9)	0.1	0.2	1.6 (1.0 to 2.1)	0.9	2.0	1.8 (1.4 to 2.2)	1.7	1.9	–0.2 (–0.5 to 0.1)
			Psychologists			**Physiotherapists**			**Radiographers**			**Traditional and complementary**						

Countries and territories	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)	1990	2019	EAPC (%, 95% CI)
Afghanistan	0.1	0.2	4.8 (3.8 to 5.9)	0.0	0.1	4.5 (3.5 to 5.5)	0.1	0.3	3.8 (2.9 to 4.7)	0.3	0.5	1.9 (1.3 to 2.5)
Albania	3.2	15.4	6.2 (6.0 to 6.5)	0.2	1.0	6.0 (5.8 to 6.1)	0.7	3.3	6.0 (5.8 to 6.2)	0.2	0.6	3.4 (3.2 to 3.5)
Algeria	0.2	0.9	7.0 (6.7 to 7.3)	0.1	0.4	6.8 (6.6 to 7.1)	0.2	0.8	5.9 (5.7 to 6.2)	0.2	0.4	2.9 (2.7 to 3.2)
American Samoa	1.2	2.3	2.3 (2.2 to 2.4)	3.1	5.3	1.8 (1.7 to 1.9)	0.7	1.2	1.9 (1.7 to 2.1)	1.5	1.8	0.8 (0.7 to 0.8)
Andorra	17.0	22.4	0.9 (0.8 to 1.0)	19.0	25.3	0.9 (0.8 to 1.1)	7.0	9.4	1.0 (0.9 to 1.1)	3.5	3.1	–0.5 (–0.6 to –0.4)
Angola	0.1	0.3	4.2 (3.6 to 4.8)	0.7	2.2	4.1 (3.5 to 4.8)	0.2	0.7	4.2 (3.7 to 4.7)	1.2	1.4	0.5 (0.2 to 0.8)
Antigua and Barbuda	5.1	12.8	3.4 (3.1 to 3.7)	10.4	22.3	2.8 (2.5 to 3.0)	0.9	2.1	2.7 (2.6 to 2.9)	2.2	2.6	0.6 (0.5 to 0.7)
Argentina	6.9	11.8	1.8 (1.7 to 2.0)	3.5	6.8	2.4 (2.1 to 2.6)	3.9	6.1	1.4 (1.3 to 1.6)	3.9	4.0	0.2 (0.1 to 0.3)
Armenia	0.2	1.5	8.6 (8.0 to 9.3)	0.3	2.4	9.1 (8.4 to 9.7)	0.8	4.5	6.9 (6.5 to 7.3)	0.5	1.6	4.5 (4.1 to 5.0)
Australia	13.9	23.5	1.7 (1.4 to 2.0)	8.9	23.0	3.6 (3.3 to 3.9)	5.4	15.7	4.0 (3.7 to 4.4)	2.5	3.1	1.0 (0.8 to 1.2)
Austria	2.9	7.6	4.0 (3.8 to 4.2)	4.9	12.7	3.8 (3.7 to 4.0)	1.7	3.8	3.4 (3.2 to 3.6)	0.6	0.9	1.7 (1.6 to 1.8)
Azerbaijan	0.3	3.4	11.3 (10.2 to 12.4)	0.3	3.9	11.7 (10.5 to 13.0)	0.2	1.1	7.8 (7.2 to 8.4)	0.3	1.8	7.7 (7.1 to 8.4)
Bahamas	6.3	21.2	4.7 (4.2 to 5.2)	13.1	37.6	4.0 (3.5 to 4.4)	1.3	5.7	5.4 (4.8 to 6.0)	1.8	3.1	1.9 (1.6 to 2.2)
Bahrain	1.6	7.2	6.0 (5.5 to 6.5)	0.8	3.3	5.7 (5.3 to 6.2)	1.5	7.0	6.0 (5.7 to 6.3)	1.1	2.1	3.0 (2.6 to 3.5)
Bangladesh	0.0	0.2	5.3 (5.0 to 5.6)	0.1	0.4	5.8 (5.5 to 6.1)	1.2	3.4	3.7 (3.5 to 3.8)	1.2	1.8	1.8 (1.6 to 1.9)
Barbados	4.5	14.0	4.4 (4.2 to 4.6)	9.2	24.3	3.7 (3.6 to 3.8)	0.8	2.9	4.7 (4.5 to 4.9)	1.5	2.8	2.4 (2.3 to 2.5)
Belarus	2.2	9.1	6.3 (5.7 to 6.8)	2.0	8.3	6.4 (5.8 to 7.0)	0.3	1.1	5.3 (4.9 to 5.7)	0.4	0.6	2.6 (2.3 to 3.0)
Belgium	4.1	11.7	4.0 (3.9 to 4.1)	9.2	20.4	2.8 (2.7 to 2.9)	2.7	6.1	2.8 (2.6 to 3.1)	0.8	0.9	0.8 (0.7 to 0.9)
Belize	0.9	5.0	6.6 (6.3 to 6.9)	1.9	8.4	5.9 (5.6 to 6.1)	0.2	0.7	5.8 (5.7 to 6.0)	1.1	2.1	2.8 (2.6 to 3.0)
Bermuda	10.1	29.5	4.2 (4.0 to 4.4)	22.0	54.2	3.5 (3.3 to 3.7)	1.9	7.5	5.4 (5.1 to 5.8)	2.5	3.4	1.2 (1.1 to 1.3)

Country												
Bolivia (Plurinational State of)	1.1	4.9	5.4 (4.8 to 6.0)	0.7	3.7	5.9 (5.3 to 6.4)	0.3	1.2	4.3 (3.8 to 4.8)	1.0	2.5	3.3 (2.9 to 3.8)
Bosnia and Herzegovina	0.3	4.0	9.3 (8.0 to 10.5)	0.2	2.9	9.4 (8.1 to 10.7)	0.2	1.4	7.7 (7.0 to 8.5)	0.1	0.5	3.9 (3.3 to 4.6)
Brazil	2.0	5.8	4.2 (4.0 to 4.4)	2.9	7.7	3.7 (3.5 to 3.9)	0.1	0.3	3.6 (3.4 to 3.9)	0.5	0.6	0.7 (0.5 to 0.8)
Brunei Darussalam	3.3	6.5	2.1 (2.0 to 2.2)	4.6	9.0	2.1 (1.9 to 2.2)	2.9	7.9	3.7 (3.5 to 3.8)	4.2	4.3	0.0 (–0.1 to 0.1)
Bulgaria	3.4	12.6	5.5 (5.1 to 5.9)	4.6	16.5	5.3 (5.0 to 5.7)	1.9	5.8	4.3 (4.0 to 4.6)	0.5	0.8	2.6 (2.3 to 2.9)
Burkina Faso	0.1	0.3	3.0 (2.7 to 3.3)	0.0	0.1	2.9 (2.6 to 3.3)	0.2	0.2	1.3 (1.1 to 1.5)	3.0	3.3	0.6 (0.5 to 0.8)
Burundi	0.1	0.1	2.3 (2.0 to 2.6)	0.1	0.2	2.1 (1.8 to 2.4)	0.1	0.1	1.7 (1.6 to 1.9)	1.7	1.8	0.3 (0.2 to 0.5)
Cà́te d'Ivoire	0.4	0.7	2.2 (2.1 to 2.4)	0.1	0.3	2.0 (1.8 to 2.2)	0.4	0.6	1.3 (1.1 to 1.4)	4.2	4.6	0.3 (0.2 to 0.4)
Cabo Verde	0.2	1.3	6.4 (6.2 to 6.7)	0.1	0.5	6.3 (6.1 to 6.6)	0.2	0.8	4.9 (4.7 to 5.1)	2.3	4.1	2.3 (2.2 to 2.5)
Cambodia	0.2	1.1	7.4 (6.8 to 8.1)	1.1	5.9	6.7 (6.1 to 7.3)	0.0	0.2	6.3 (5.8 to 6.8)	0.9	2.2	3.7 (3.3 to 4.1)
Canada	5.0	10.7	3.3 (3.0 to 3.6)	18.1	41.8	3.7 (3.4 to 4.0)	8.4	24.4	4.5 (4.2 to 4.9)	9.8	11.1	0.8 (0.6 to 1.0)
Chile	3.3	15.7	5.4 (5.3 to 5.6)	1.4	10.8	7.2 (7.0 to 7.5)	0.4	1.0	2.5 (2.2 to 2.7)	0.6	1.0	1.7 (1.6 to 1.8)
China	0.3	2.8	8.5 (8.1 to 8.9)	0.1	0.7	9.1 (8.8 to 9.5)	1.4	8.1	6.3 (6.0 to 6.6)	2.6	5.5	2.7 (2.4 to 3.0)
Colombia	2.2	6.2	3.9 (3.3 to 4.4)	2.6	6.3	3.3 (2.7 to 3.9)	1.1	2.1	2.0 (1.5 to 2.5)	0.8	0.9	0.9 (0.6 to 1.2)
Cook Islands	1.5	3.4	2.8 (2.7 to 3.0)	3.7	7.4	2.5 (2.3 to 2.7)	1.1	1.8	1.8 (1.6 to 1.9)	2.0	2.3	0.6 (0.5 to 0.6)
Costa Rica	2.4	6.1	3.6 (3.3 to 3.8)	5.3	11.8	2.9 (2.7 to 3.2)	0.4	0.8	2.8 (2.5 to 3.1)	0.5	0.5	0.4 (0.2 to 0.6)
Croatia	3.0	11.8	5.5 (5.2 to 5.9)	1.8	7.5	5.8 (5.4 to 6.1)	0.9	4.1	6.1 (5.8 to 6.4)	0.6	1.2	3.1 (2.9 to 3.3)
Cuba	0.9	3.7	6.2 (5.6 to 6.8)	5.5	25.6	6.5 (5.9 to 7.1)	3.6	13.7	5.5 (4.8 to 6.2)	1.4	3.0	3.4 (3.0 to 3.7)
Cyprus	1.8	6.1	4.4 (4.1 to 4.7)	2.0	7.0	4.6 (4.3 to 4.9)	1.4	4.7	4.4 (4.1 to 4.7)	0.6	0.9	1.5 (1.3 to 1.6)
Czechia	4.4	9.4	2.3 (2.1 to 2.5)	3.5	9.6	3.7 (3.5 to 3.9)	1.8	5.2	3.9 (3.8 to 4.1)	0.6	0.9	1.5 (1.3 to 1.8)

Democratic Republic of the Congo	0.0	0.1	3.6 (2.5 to 4.7)	0.2	0.5	4.0 (2.8 to 5.2)	0.4	1.1	3.3 (2.4 to 4.2)	2.2	4.0	2.3 (1.7 to 2.8)
Denmark	9.8	16.2	1.9 (1.7 to 2.1)	10.7	16.8	1.6 (1.5 to 1.7)	7.3	10.1	1.5 (1.3 to 1.7)	5.0	4.3	−0.5 (−0.6 to −0.5)
Dominica	1.6	5.6	4.8 (4.6 to 5.0)	3.2	9.4	4.0 (3.8 to 4.2)	0.3	0.9	4.6 (4.4 to 4.7)	0.9	1.4	1.9 (1.7 to 2.0)
Dominican Republic	1.7	10.5	7.5 (6.8 to 8.3)	1.4	8.6	7.3 (6.6 to 8.1)	0.1	0.5	6.1 (5.4 to 6.8)	1.0	2.5	3.8 (3.2 to 4.4)
Ecuador	1.5	5.1	4.7 (4.4 to 5.1)	1.1	4.2	5.2 (4.8 to 5.6)	0.4	0.9	3.1 (2.5 to 3.6)	0.4	0.7	1.9 (1.8 to 2.0)
Egypt	0.2	1.0	5.0 (4.8 to 5.1)	0.0	0.2	4.9 (4.8 to 5.1)	0.4	1.7	4.7 (4.4 to 4.9)	0.3	0.5	1.3 (1.2 to 1.4)
El Salvador	0.7	3.1	5.9 (5.7 to 6.1)	0.4	2.0	5.7 (5.5 to 6.0)	0.4	0.8	3.0 (2.8 to 3.2)	0.2	0.3	2.3 (2.2 to 2.5)
Estonia	2.8	7.3	3.7 (3.5 to 3.9)	2.1	4.7	3.1 (2.9 to 3.2)	0.8	1.7	3.3 (3.1 to 3.4)	0.6	0.6	0.0 (−0.1 to 0.1)
Eswatini	0.1	0.4	6.6 (6.0 to 7.3)	0.2	1.0	6.6 (5.9 to 7.3)	0.0	0.1	5.4 (5.0 to 5.9)	1.7	3.2	2.9 (2.4 to 3.5)
Ethiopia	0.0	0.1	5.2 (4.6 to 5.8)	0.1	0.3	4.8 (4.2 to 5.4)	0.0	0.1	4.7 (4.1 to 5.2)	0.9	1.1	0.6 (0.4 to 0.9)
Fiji	0.6	1.5	3.5 (3.4 to 3.7)	1.3	3.1	3.1 (2.9 to 3.3)	0.4	0.9	3.0 (2.5 to 3.4)	1.2	1.7	1.3 (1.1 to 1.5)
Finland	9.2	13.6	1.5 (1.4 to 1.6)	7.8	13.5	2.3 (2.2 to 2.4)	4.5	6.0	0.9 (0.8 to 1.1)	2.7	2.3	−0.6 (−0.6 to −0.5)
France	3.7	5.6	1.7 (1.5 to 1.8)	6.3	9.2	1.6 (1.3 to 1.9)	0.8	1.3	2.2 (1.9 to 2.5)	0.8	0.7	−0.1 (−0.3 to 0.1)
Gambia	0.2	0.4	3.5 (3.2 to 3.8)	0.1	0.1	3.5 (3.2 to 3.8)	0.3	0.3	−0.6 (−0.8 to −0.3)	2.3	2.5	0.3 (0.0 to 0.6)
Georgia	0.9	3.6	5.1 (4.8 to 5.3)	0.2	1.2	5.9 (5.6 to 6.2)	0.3	0.6	1.9 (1.7 to 2.2)	0.2	0.4	1.9 (1.5 to 2.3)
Germany	12.0	26.5	3.0 (2.8 to 3.2)	6.8	19.2	4.2 (3.9 to 4.5)	2.2	4.9	3.2 (3.1 to 3.4)	3.9	4.8	0.9 (0.7 to 1.1)
Ghana	0.4	0.9	2.8 (2.7 to 2.9)	0.1	0.1	2.6 (2.5 to 2.7)	0.3	0.6	1.7 (1.5 to 1.9)	4.0	3.3	−0.9 (−1.2 to −0.7)
Greece	2.9	6.0	2.8 (2.3 to 3.4)	1.7	2.9	1.8 (1.3 to 2.3)	1.7	3.6	2.6 (2.2 to 3.0)	0.9	0.8	−0.4 (−0.6 to −0.1)
Greenland	3.9	7.5	2.7 (2.6 to 2.9)	8.8	17.5	2.9 (2.7 to 3.1)	4.6	9.0	2.7 (2.6 to 2.9)	7.2	6.2	−0.6 (−0.7 to −0.5)
Grenada	1.3	5.8	5.4 (4.8 to 5.9)	2.8	9.9	4.5 (4.0 to 5.0)	0.2	0.9	5.1 (4.6 to 5.5)	1.1	1.9	2.1 (1.9 to 2.4)
Guam	3.3	5.5	2.2 (2.0 to 2.3)	8.5	13.1	1.7 (1.6 to 1.9)	1.7	2.1	1.1 (0.9 to 1.2)	2.3	2.3	0.1 (−0.1 to 0.2)
Guatemala	0.8	4.2	6.5 (6.1 to 6.9)	0.9	4.2	6.0 (5.6 to 6.3)	0.4	1.3	4.5 (4.4 to 4.6)	0.7	1.1	2.1 (1.9 to 2.2)
Guinea	0.1	0.3	3.7 (3.0 to 4.3)	0.1	0.2	3.5 (2.8 to 4.2)	0.1	0.3	3.3 (2.9 to 3.8)	0.9	1.4	1.4 (0.9 to 1.9)

Country												
Guinea–Bissau	0.2	0.5	3.7 (3.3 to 4.1)	0.1	0.2	3.5 (3.0 to 3.9)	0.2	0.4	2.8 (2.5 to 3.1)	2.7	3.9	1.6 (1.4 to 1.8)
Guyana	1.2	5.0	5.8 (5.4 to 6.2)	2.4	8.2	5.1 (4.7 to 5.4)	0.3	1.0	4.8 (4.6 to 5.0)	1.3	2.2	2.4 (2.1 to 2.7)
Haiti	0.7	1.5	3.1 (2.6 to 3.6)	1.3	2.4	2.2 (1.6 to 2.8)	0.1	0.3	3.1 (2.8 to 3.5)	1.3	1.6	0.9 (0.5 to 1.3)
Honduras	0.2	1.3	7.2 (6.9 to 7.5)	0.4	2.7	7.4 (7.1 to 7.8)	0.2	0.6	5.5 (5.1 to 5.8)	0.3	0.7	4.0 (3.7 to 4.3)
Hungary	3.6	8.4	3.3 (3.1 to 3.5)	4.9	7.2	1.0 (0.8 to 1.3)	2.1	4.6	2.9 (2.7 to 3.1)	0.9	0.9	0.2 (–0.1 to 0.4)
Iceland	6.7	13.8	2.4 (2.3 to 2.6)	4.6	8.0	1.6 (1.4 to 1.8)	3.3	10.1	4.5 (4.2 to 4.7)	1.5	1.7	0.2 (0.0 to 0.3)
India	0.0	0.1	4.6 (4.5 to 4.7)	0.1	0.3	5.2 (5.1 to 5.2)	2.1	3.8	1.8 (1.6 to 2.0)	0.8	0.7	–1.2 (–1.3 to –1.0)
Indonesia	0.7	2.4	4.9 (4.3 to 5.5)	0.2	0.8	4.8 (4.1 to 5.4)	0.1	0.3	3.3 (2.9 to 3.7)	2.0	2.4	1.0 (0.6 to 1.4)
Iran (Islamic Republic of)	0.1	0.7	7.7 (7.0 to 8.4)	0.1	0.8	7.7 (6.9 to 8.5)	0.3	1.5	6.6 (6.0 to 7.1)	0.1	0.1	2.7 (2.3 to 3.1)
Iraq	0.0	0.3	7.4 (7.1 to 7.8)	0.1	0.4	7.6 (7.2 to 7.9)	0.0	0.3	6.7 (6.6 to 6.8)	0.5	0.9	1.9 (1.8 to 2.1)
Ireland	1.9	10.4	6.6 (5.8 to 7.4)	1.5	8.4	6.6 (5.9 to 7.2)	1.0	5.4	6.4 (5.7 to 7.1)	0.9	2.1	3.2 (2.6 to 3.9)
Israel	3.3	11.4	5.1 (4.8 to 5.4)	4.1	12.5	4.5 (4.3 to 4.7)	2.9	7.3	4.0 (3.6 to 4.5)	2.9	5.2	2.5 (2.3 to 2.7)
Italy	1.5	4.2	4.4 (4.1 to 4.6)	5.9	13.0	3.1 (3.0 to 3.3)	0.9	2.6	4.1 (3.9 to 4.3)	1.5	2.1	1.4 (1.3 to 1.6)
Jamaica	3.1	9.4	4.0 (3.9 to 4.1)	6.2	15.6	3.2 (3.1 to 3.4)	0.6	1.8	3.8 (3.7 to 3.8)	2.0	2.9	1.2 (1.1 to 1.3)
Japan	2.6	6.0	3.1 (2.9 to 3.2)	5.0	12.8	3.6 (3.5 to 3.8)	3.7	7.7	2.5 (2.4 to 2.6)	6.0	7.2	0.8 (0.7 to 0.9)
Jordan	0.2	0.7	3.8 (3.6 to 4.0)	0.5	1.9	4.3 (4.0 to 4.6)	0.7	2.2	3.6 (3.4 to 3.9)	0.4	0.5	0.7 (0.6 to 0.8)
Kazakhstan	0.7	3.2	6.2 (5.8 to 6.5)	0.8	3.6	6.3 (6.0 to 6.6)	0.3	1.2	6.0 (5.6 to 6.4)	0.6	1.6	3.8 (3.5 to 4.1)
Kenya	0.2	0.5	3.4 (3.3 to 3.5)	0.3	0.7	3.1 (3.0 to 3.3)	0.2	0.4	3.2 (3.1 to 3.3)	2.1	2.4	0.2 (0.1 to 0.3)
Kiribati	0.1	0.4	5.4 (4.8 to 6.0)	0.2	0.8	4.8 (4.2 to 5.4)	0.1	0.5	5.0 (4.7 to 5.4)	0.3	0.9	4.1 (3.5 to 4.6)
Kuwait	3.1	7.9	3.6 (3.4 to 3.8)	1.5	3.5	3.2 (3.0 to 3.4)	3.0	8.9	4.0 (3.9 to 4.2)	1.1	1.4	0.8 (0.7 to 0.9)
Kyrgyzstan	0.2	0.8	6.1 (5.6 to 6.5)	0.2	0.9	6.2 (5.7 to 6.6)	0.1	0.3	5.2 (4.9 to 5.6)	0.3	0.8	5.1 (4.6 to 5.5)
Latvia	2.9	9.3	4.5 (4.2 to 4.8)	2.0	6.9	4.8 (4.5 to 5.1)	0.3	0.8	3.6 (3.5 to 3.8)	0.5	0.7	1.4 (1.2 to 1.6)
Lebanon	0.3	1.6	6.0 (5.4 to 6.5)	0.2	0.7	5.4 (4.9 to 5.9)	0.3	2.1	6.9 (6.4 to 7.4)	0.3	0.6	2.2 (1.8 to 2.7)

Liberia	0.1	1.2	9.4 (8.4 to 10.3)	0.1	0.5	9.8 (8.7 to 10.9)	0.2	0.9	5.8 (5.2 to 6.4)	2.7	7.4	4.4 (4.0 to 4.9)
Libya	0.3	0.8	3.4 (2.7 to 4.1)	0.1	0.3	2.9 (2.1 to 3.7)	0.3	1.4	5.0 (4.4 to 5.6)	0.3	0.3	0.3 (–0.1 to 0.6)
Lithuania	3.1	11.7	4.7 (4.5 to 5.0)	4.8	19.8	5.2 (4.8 to 5.6)	0.5	1.7	4.6 (4.4 to 4.8)	0.4	0.5	0.5 (0.3 to 0.7)
Luxembourg	10.6	16.8	1.6 (1.4 to 1.8)	4.8	9.4	2.6 (2.3 to 2.8)	2.1	10.5	7.0 (6.5 to 7.5)	1.2	1.3	0.7 (0.5 to 0.8)
Madagascar	0.2	0.4	2.8 (2.5 to 3.0)	0.2	0.5	2.5 (2.2 to 2.8)	0.2	0.4	2.6 (2.4 to 2.8)	3.0	3.5	0.5 (0.4 to 0.6)
Malawi	0.1	0.3	6.4 (5.8 to 7.1)	0.1	0.4	6.4 (5.7 to 7.1)	0.1	0.3	5.3 (4.9 to 5.8)	1.7	2.9	2.3 (2.0 to 2.6)
Malaysia	0.2	0.6	4.3 (4.2 to 4.5)	2.2	8.1	4.5 (4.4 to 4.7)	0.1	0.3	2.6 (2.2 to 2.9)	0.5	0.6	0.3 (0.1 to 0.6)
Maldives	0.3	1.9	6.6 (6.1 to 7.0)	2.1	12.3	6.8 (6.3 to 7.2)	0.1	0.4	4.3 (4.1 to 4.6)	1.1	1.8	2.0 (1.6 to 2.5)
Mali	0.1	0.4	3.8 (3.6 to 4.1)	0.1	0.1	3.7 (3.5 to 3.9)	0.2	0.3	2.5 (2.2 to 2.7)	3.0	4.1	1.5 (1.3 to 1.6)
Malta	2.8	8.3	4.1 (4.0 to 4.2)	2.9	9.1	4.3 (4.2 to 4.4)	1.4	3.5	3.6 (3.4 to 3.8)	1.6	2.0	1.0 (0.9 to 1.0)
Mauritius	0.5	2.0	5.6 (5.3 to 5.9)	2.6	12.1	5.8 (5.6 to 6.1)	0.1	0.4	3.9 (3.6 to 4.2)	0.8	1.3	1.9 (1.7 to 2.1)
Mexico	2.4	7.3	4.1 (4.0 to 4.3)	2.8	7.0	3.1 (2.8 to 3.3)	2.3	4.5	1.9 (1.7 to 2.1)	3.8	4.3	0.2 (0.0 to 0.5)
Monaco	7.4	9.6	0.8 (0.5 to 1.0)	8.0	10.5	0.9 (0.6 to 1.1)	4.3	5.2	0.6 (0.4 to 0.8)	1.7	1.4	–0.9 (–1.1 to –0.7)
Mongolia	0.2	0.8	5.5 (5.1 to 5.9)	0.4	2.0	6.0 (5.6 to 6.3)	0.1	0.5	5.7 (5.4 to 6.1)	0.7	1.8	3.5 (3.3 to 3.8)
Montenegro	3.0	7.9	3.7 (3.5 to 3.9)	2.2	5.5	3.5 (3.4 to 3.7)	2.3	4.3	1.8 (1.4 to 2.2)	0.5	0.7	1.5 (1.4 to 1.6)
Morocco	0.1	0.6	6.5 (6.2 to 6.8)	0.0	0.2	6.5 (6.2 to 6.8)	0.2	0.4	3.5 (3.4 to 3.6)	0.3	0.5	2.4 (2.2 to 2.7)
Mozambique	0.0	0.1	4.4 (4.2 to 4.7)	0.1	0.2	4.0 (3.8 to 4.3)	0.1	0.2	0.8 (0.5 to 1.2)	3.8	4.3	0.2 (0.1 to 0.4)
Myanmar	0.1	1.1	10.9 (10.2 to 11.5)	0.4	6.4	11.4 (10.6 to 12.1)	0.0	0.3	7.1 (6.9 to 7.4)	0.6	2.0	4.7 (4.4 to 5.0)
Nepal	0.1	0.2	3.4 (3.2 to 3.7)	0.1	0.4	4.0 (3.8 to 4.2)	1.5	2.5	1.3 (1.1 to 1.6)	2.3	2.0	–0.6 (–0.8 to –0.4)
Netherlands	9.1	19.9	2.9 (2.7 to 3.0)	11.0	22.1	2.4 (2.2 to 2.6)	6.2	10.0	1.6 (1.4 to 1.8)	2.7	3.2	0.5 (0.3 to 0.6)
New Zealand	6.1	12.3	2.5 (2.3 to 2.7)	11.3	22.6	2.5 (2.3 to 2.7)	4.3	9.1	2.9 (2.7 to 3.2)	5.8	7.1	0.8 (0.6 to 1.0)
Nicaragua	0.3	2.0	6.7 (6.5 to 7.0)	0.5	2.6	6.4 (6.1 to 6.7)	0.2	1.2	6.2 (6.1 to 6.4)	0.4	0.8	3.2 (3.0 to 3.4)
Niger	0.1	0.2	2.5 (2.3 to 2.8)	0.0	0.1	2.4 (2.1 to 2.7)	0.1	0.2	1.4 (1.2 to 1.7)	3.3	4.2	1.1 (0.9 to 1.3)
Nigeria	0.3	1.1	4.9 (4.4 to 5.4)	0.2	0.6	5.1 (4.5 to 5.7)	0.3	0.7	3.3 (3.1 to 3.6)	3.1	3.4	0.6 (0.2 to 1.0)

North Macedonia	1.4	5.4	5.4 (5.1 to 5.8)	1.0	3.8	5.4 (5.0 to 5.8)	0.7	2.3	4.8 (4.5 to 5.1)	0.3	0.6	2.6 (2.4 to 2.9)
Northern Mariana Islands	3.3	4.6	0.5 (0.1 to 0.9)	8.3	10.5	0.0 (−0.5 to 0.4)	1.2	1.9	1.4 (1.1 to 1.6)	2.2	2.6	0.4 (0.1 to 0.6)
Norway	4.9	10.2	2.8 (2.7 to 3.0)	9.0	17.7	2.6 (2.5 to 2.7)	5.4	6.6	1.0 (0.6 to 1.4)	4.5	4.0	−0.3 (−0.5 to −0.2)
Oman	0.4	4.2	9.8 (9.1 to 10.4)	0.2	1.8	9.2 (8.6 to 9.9)	0.3	3.8	10.6 (10.1 to 11.0)	0.4	1.1	3.7 (3.0 to 4.4)
Pakistan	0.0	0.2	5.4 (5.0 to 5.7)	0.1	0.5	5.4 (5.0 to 5.7)	0.2	0.8	4.6 (4.2 to 5.0)	2.8	4.5	2.2 (2.0 to 2.5)
Palau	1.2	3.2	3.4 (3.1 to 3.8)	2.9	6.9	3.1 (2.7 to 3.4)	0.9	1.7	2.3 (2.2 to 2.5)	1.7	2.4	1.5 (1.2 to 1.7)
Palestine	0.1	0.3	4.7 (4.3 to 5.1)	0.0	0.1	4.4 (4.0 to 4.7)	0.1	0.4	5.0 (4.6 to 5.3)	0.2	0.2	0.3 (0.0 to 0.7)
Panama	1.5	5.4	4.9 (4.7 to 5.1)	2.7	9.5	4.6 (4.4 to 4.8)	0.9	2.7	3.8 (3.6 to 3.9)	0.6	0.9	1.8 (1.8 to 1.9)
Papua New Guinea	0.2	0.6	4.0 (3.7 to 4.3)	0.4	1.1	3.5 (3.2 to 3.9)	0.1	0.3	2.9 (2.6 to 3.2)	1.4	2.3	2.3 (2.1 to 2.5)
Paraguay	1.4	5.5	5.1 (4.8 to 5.4)	1.9	8.1	5.3 (5.0 to 5.7)	0.6	2.0	4.2 (3.8 to 4.7)	1.7	3.1	2.3 (2.0 to 2.7)
Peru	2.8	8.8	4.6 (4.2 to 5.0)	2.1	6.9	4.7 (4.3 to 5.2)	0.8	1.7	2.7 (2.4 to 3.0)	1.3	1.9	1.7 (1.4 to 2.1)
Philippines	0.4	1.2	4.2 (3.5 to 4.8)	1.3	6.0	6.3 (5.1 to 7.6)	0.2	0.3	1.3 (1.0 to 1.7)	1.7	2.5	1.7 (1.3 to 2.1)
Poland	3.2	9.2	3.6 (3.5 to 3.7)	4.2	12.4	3.8 (3.7 to 4.0)	2.5	6.9	3.7 (3.6 to 3.8)	2.0	2.5	1.0 (0.9 to 1.2)
Portugal	6.2	19.9	4.3 (4.0 to 4.6)	1.2	3.6	3.8 (3.7 to 3.9)	1.5	4.9	4.3 (4.1 to 4.4)	0.8	1.3	1.7 (1.6 to 1.9)
Puerto Rico	4.5	12.4	3.6 (3.4 to 3.8)	9.6	21.9	2.8 (2.6 to 3.0)	1.1	3.1	3.4 (3.3 to 3.6)	1.3	1.6	0.7 (0.5 to 0.8)
Qatar	2.5	10.8	5.6 (5.4 to 5.8)	1.2	4.9	5.3 (5.0 to 5.5)	1.9	7.8	5.2 (5.0 to 5.5)	1.3	2.0	2.0 (1.7 to 2.3)
Republic of Korea	1.1	5.5	6.2 (6.0 to 6.5)	1.6	9.2	6.6 (6.4 to 6.8)	1.1	5.8	6.4 (6.2 to 6.6)	1.2	1.8	1.7 (1.6 to 1.8)
Republic of Moldova	0.4	2.6	7.6 (6.9 to 8.2)	0.4	2.5	7.8 (7.1 to 8.5)	0.1	0.5	7.7 (7.3 to 8.2)	0.1	0.4	4.6 (4.1 to 5.0)
Romania	7.2	17.5	3.3 (3.1 to 3.5)	4.6	9.6	2.5 (2.4 to 2.7)	1.1	1.9	1.6 (1.4 to 1.7)	0.4	0.3	−0.9 (−1.0 to −0.8)
Russian Federation	4.7	8.3	2.5 (2.1 to 3.0)	5.3	9.5	2.7 (2.2 to 3.2)	1.0	2.3	3.5 (3.1 to 3.9)	0.6	0.6	0.1 (−0.2 to 0.3)
Rwanda	0.0	0.1	6.2 (5.4 to 6.9)	0.1	0.2	6.8 (5.9 to 7.6)	0.1	0.3	3.8 (3.4 to 4.2)	0.5	0.8	2.1 (1.7 to 2.5)
Saint Kitts and Nevis	3.2	14.4	5.6 (5.4 to 5.8)	6.5	25.1	4.9 (4.8 to 5.1)	0.7	2.8	5.0 (4.8 to 5.2)	1.5	2.8	2.3 (2.2 to 2.4)
Saint Lucia	2.3	8.0	4.7 (4.4 to 5.0)	4.8	13.7	3.9 (3.7 to 4.2)	0.4	1.6	4.7 (4.4 to 5.0)	1.6	2.3	1.6 (1.4 to 1.7)

Saint Vincent and the Grenadines	1.2	3.2	3.5 (3.3 to 3.8)	2.4	5.5	2.8 (2.7 to 2.9)	0.3	0.7	3.1 (2.9 to 3.4)	1.0	1.2	0.7 (0.5 to 0.8)
San Marino	8.9	14.7	1.8 (1.6 to 1.9)	9.6	16.3	1.9 (1.7 to 2.0)	4.6	7.5	1.7 (1.6 to 1.8)	2.3	2.4	0.1 (0.0 to 0.1)
Saudi Arabia	0.6	4.6	7.5 (7.0 to 8.1)	0.3	2.1	7.2 (6.7 to 7.8)	0.6	3.3	5.6 (5.2 to 6.0)	0.5	0.9	1.8 (1.3 to 2.2)
Senegal	0.2	0.5	1.7 (1.4 to 2.1)	0.1	0.2	1.5 (1.0 to 1.9)	0.7	1.0	0.8 (0.4 to 1.2)	1.1	1.0	–0.6 (–0.9 to –0.3)
Serbia	1.5	5.2	4.6 (4.3 to 4.8)	1.1	3.8	4.7 (4.4 to 4.9)	0.7	2.0	3.5 (3.3 to 3.7)	1.3	1.7	0.8 (0.6 to 1.0)
Seychelles	1.3	2.6	2.3 (2.0 to 2.5)	8.1	15.6	2.1 (1.8 to 2.4)	0.3	0.6	3.0 (2.9 to 3.1)	1.5	1.7	0.6 (0.4 to 0.8)
Sierra Leone	0.3	0.6	2.8 (2.2 to 3.5)	0.4	1.0	2.9 (2.2 to 3.5)	0.2	0.2	1.4 (0.9 to 1.9)	7.1	7.6	0.3 (0.1 to 0.5)
Singapore	3.3	11.9	5.2 (5.0 to 5.3)	4.4	17.0	5.4 (5.2 to 5.6)	2.2	12.3	7.0 (6.6 to 7.5)	4.1	6.0	1.7 (1.6 to 1.9)
Slovakia	5.7	15.9	3.8 (3.7 to 3.9)	1.8	6.2	4.7 (4.4 to 4.9)	1.3	3.1	3.0 (2.9 to 3.1)	0.3	0.5	1.4 (1.1 to 1.6)
Slovenia	7.7	15.1	2.4 (2.0 to 2.9)	5.3	11.2	2.7 (2.2 to 3.2)	2.7	8.0	4.4 (3.9 to 4.9)	4.6	5.3	0.6 (0.3 to 0.8)
Solomon Islands	0.1	0.5	7.9 (7.2 to 8.7)	0.2	1.0	7.5 (6.8 to 8.2)	0.1	0.3	7.0 (6.4 to 7.6)	0.6	1.9	5.9 (5.2 to 6.6)
South Africa	0.8	1.5	2.4 (2.1 to 2.7)	2.1	3.5	1.8 (1.5 to 2.1)	0.3	0.6	2.1 (1.9 to 2.3)	9.8	9.6	–0.2 (–0.4 to 0.0)
Spain	3.3	9.2	4.0 (3.6 to 4.3)	2.3	8.4	5.3 (4.9 to 5.7)	1.1	4.4	5.3 (4.8 to 5.8)	1.3	1.7	1.2 (0.9 to 1.5)
Sri Lanka	0.5	1.5	3.9 (3.8 to 4.1)	2.7	8.4	3.9 (3.7 to 4.1)	0.2	0.4	3.3 (3.1 to 3.5)	1.0	1.4	0.9 (0.8 to 1.0)
Suriname	3.2	9.3	4.4 (4.1 to 4.7)	6.8	16.0	3.5 (3.3 to 3.8)	0.7	2.1	4.2 (3.9 to 4.4)	2.0	3.0	1.9 (1.7 to 2.1)
Sweden	5.6	9.6	2.5 (2.2 to 2.8)	7.7	13.8	2.8 (2.5 to 3.1)	11.3	9.9	–0.1 (–0.3 to 0.1)	1.5	0.9	–1.6 (–1.7 to –1.5)
Switzerland	9.5	17.0	1.8 (1.7 to 1.9)	17.4	33.0	2.2 (2.1 to 2.3)	4.9	9.7	2.8 (2.7 to 3.0)	8.2	10.8	1.1 (1.0 to 1.2)
Syrian Arab Republic	0.1	0.3	4.7 (4.2 to 5.1)	0.0	0.1	4.3 (3.7 to 4.8)	0.1	0.5	4.2 (3.9 to 4.6)	0.1	0.2	1.0 (0.8 to 1.2)
Taiwan (Province of China)	1.2	5.8	5.8 (5.4 to 6.1)	1.3	5.9	5.7 (5.3 to 6.0)	1.0	4.2	5.2 (5.0 to 5.4)	4.4	7.5	2.1 (2.0 to 2.3)
Tajikistan	0.1	0.4	7.8 (7.2 to 8.3)	0.1	0.4	8.0 (7.5 to 8.6)	0.1	0.2	6.0 (5.6 to 6.4)	0.2	0.6	5.5 (5.1 to 5.9)
Thailand	0.8	1.6	2.6 (2.3 to 2.9)	3.9	7.8	2.6 (2.3 to 2.9)	0.2	0.3	1.5 (1.3 to 1.6)	1.6	1.3	–0.5 (–0.7 to –0.3)

Tonga	0.2	0.5	2.6 (2.2 to 3.1)	0.6	1.1	2.2 (1.8 to 2.7)	0.1	0.3	1.8 (1.4 to 2.3)	0.6	0.7	0.6 (0.3 to 0.8)
Trinidad and Tobago	1.2	4.4	5.3 (4.8 to 5.9)	5.1	18.3	5.4 (5.0 to 5.9)	0.2	0.6	3.8 (3.5 to 4.2)	0.9	1.4	2.0 (1.6 to 2.4)
Tunisia	0.2	1.0	5.6 (5.3 to 5.8)	0.1	0.4	5.3 (5.1 to 5.5)	0.3	0.9	4.1 (4.0 to 4.3)	0.3	0.5	1.5 (1.3 to 1.7)
Turkey	0.6	2.9	5.2 (5.1 to 5.4)	0.5	2.5	5.4 (5.3 to 5.6)	0.8	2.7	4.2 (3.9 to 4.6)	0.3	0.5	0.9 (0.7 to 1.1)
Turkmenistan	0.3	2.1	8.2 (7.4 to 8.9)	0.4	2.4	8.3 (7.5 to 9.0)	0.1	0.6	7.3 (6.7 to 7.9)	0.3	1.2	5.8 (5.3 to 6.3)
Uganda	0.1	0.3	5.7 (5.3 to 6.1)	0.2	0.4	3.8 (3.5 to 4.2)	0.1	0.1	3.1 (2.8 to 3.4)	2.0	1.7	−0.8 (−1.0 to −0.6)
Ukraine	2.5	4.8	3.0 (2.6 to 3.5)	5.0	10.1	3.5 (2.9 to 4.0)	0.4	0.9	3.4 (3.1 to 3.6)	0.4	0.5	0.9 (0.7 to 1.2)
United Arab Emirates	3.0	12.9	5.3 (5.0 to 5.7)	1.5	5.6	4.8 (4.4 to 5.1)	2.0	12.7	7.1 (6.7 to 7.6)	1.3	2.1	2.1 (1.9 to 2.3)
United Kingdom	4.2	8.4	2.4 (2.3 to 2.5)	4.7	14.7	4.5 (4.2 to 4.7)	5.3	9.2	1.7 (1.3 to 2.2)	5.4	6.5	0.7 (0.6 to 0.7)
United Republic of Tanzania	0.1	0.3	3.4 (3.0 to 3.8)	0.1	0.3	3.1 (2.7 to 3.5)	0.1	0.3	3.0 (2.7 to 3.3)	1.9	2.1	0.2 (0.1 to 0.3)
United States of America	6.7	9.9	1.2 (1.0 to 1.3)	17.0	28.1	1.7 (1.6 to 1.8)	7.3	12.8	2.0 (1.8 to 2.1)	6.7	5.1	−1.4 (−1.5 to −1.2)
United States Virgin Islands	6.2	22.0	5.1 (4.7 to 5.6)	13.3	40.1	4.4 (4.0 to 4.8)	1.2	3.7	4.3 (4.0 to 4.6)	1.7	2.5	1.5 (1.4 to 1.6)
Uruguay	8.1	27.0	4.6 (4.0 to 5.2)	4.9	12.4	3.5 (3.0 to 4.0)	2.1	4.7	3.0 (2.8 to 3.2)	0.6	0.9	1.6 (1.4 to 1.9)
Uzbekistan	0.2	1.3	8.7 (8.2 to 9.2)	0.2	1.4	8.8 (8.3 to 9.3)	0.1	0.6	8.8 (8.5 to 9.2)	0.2	1.1	6.2 (5.8 to 6.6)
Venezuela (Bolivarian Republic of)	1.4	2.2	1.9 (1.4 to 2.3)	3.5	4.6	1.3 (0.9 to 1.8)	0.8	1.4	2.3 (1.9 to 2.7)	0.1	0.1	0.7 (0.5 to 0.9)
Viet Nam	0.3	1.5	7.2 (6.9 to 7.5)	1.4	8.4	7.4 (7.1 to 7.8)	0.1	0.2	6.0 (5.7 to 6.3)	0.6	1.0	2.6 (2.4 to 2.9)
Zambia	0.1	0.5	5.4 (5.1 to 5.7)	0.2	0.6	4.6 (4.1 to 5.1)	0.1	0.3	4.0 (3.8 to 4.3)	1.8	2.0	0.4 (0.3 to 0.6)
Zimbabwe	0.4	0.5	0.2 (−0.2 to 0.5)	0.8	1.0	−0.3 (−0.7 to 0.1)	0.2	0.2	−0.1 (−0.5 to 0.2)	7.1	7.1	−0.2 (−0.5 to 0.1)

Supplementary Table S9. Trends of concentration index on HRH from 1990 to 2019

Year	Concentration index	Lower confidence interval	Upper confidence interval	P value
1990	0.43	0.39	0.46	<0.001*
1991	0.43	0.39	0.46	<0.001*
1992	0.43	0.39	0.46	<0.001*
1993	0.43	0.39	0.46	<0.001*
1994	0.42	0.39	0.46	<0.001*
1995	0.42	0.39	0.46	<0.001*
1996	0.42	0.39	0.46	<0.001*
1997	0.42	0.39	0.46	<0.001*
1998	0.42	0.39	0.46	<0.001*
1999	0.43	0.39	0.46	<0.001*
2000	0.43	0.39	0.46	<0.001*
2001	0.43	0.39	0.46	<0.001*
2002	0.42	0.39	0.45	<0.001*
2003	0.42	0.39	0.45	<0.001*
2004	0.42	0.39	0.45	<0.001*
2005	0.42	0.39	0.45	<0.001*
2006	0.42	0.39	0.44	<0.001*
2007	0.41	0.39	0.44	<0.001*
2008	0.41	0.38	0.44	<0.001*
2009	0.41	0.38	0.43	<0.001*
2010	0.41	0.38	0.43	<0.001*
2011	0.40	0.38	0.43	<0.001*
2012	0.40	0.37	0.43	<0.001*
2013	0.40	0.37	0.42	<0.001*
2014	0.40	0.37	0.42	<0.001*
2015	0.39	0.37	0.42	<0.001*
2016	0.39	0.37	0.42	<0.001*
2017	0.39	0.37	0.41	<0.001*
2018	0.39	0.36	0.41	<0.001*
2019	0.38	0.36	0.41	<0.001*
Total	0.43	0.42	0.43	<0.001*

Notes: * P value<0.05.

Supplementary Table S10. Trends of concentration index on 16 cadres of human resources for health

Specific types of human resources for health	Concentration index	Lower confidence interval	Upper confidence interval	P value
Doctors	0.37	0.36	0.37	<0.001*
Nursing and midwifery staff	0.38	0.37	0.38	<0.001*
Dentistry staff	0.43	0.42	0.44	<0.001*
Pharmaceutical staff	0.41	0.41	0.42	<0.001*
Medical assistants and CHWs	0.36	0.35	0.37	<0.001*
Aides and emergency medical workers	0.57	0.56	0.59	<0.001*
Medical laboratory technicians	0.46	0.45	0.46	<0.001*
Dieticians and nutritionists	0.43	0.42	0.43	<0.001*
Optometrists	0.48	0.47	0.49	<0.001*
Audiologists and counsellors	0.40	0.39	0.40	<0.001*
Psychologists	0.46	0.46	0.47	<0.001*
Environmental health officers	0.28	0.27	0.29	<0.001*
Personal care workers	0.54	0.53	0.55	<0.001*
Traditional and complementary medicine practitioners	0.07	0.06	0.08	<0.001*
Physiotherapists	0.42	0.41	0.43	<0.001*
Radiographers	0.51	0.50	0.52	<0.001*
All health workers	0.43	0.42	0.43	<0.001*

Notes: CHWs, Community health workers. *P value<0.05

Supplementary Table S11. EAPC of all cause mortality per 100 000 population by country and territory, from 1990 to 2019

Countries and territories	All cause mortality (per 100 000 population)		EAPC (%, 95% CI)	P value
	1990	**2019**		
Solomon Islands	2170.0	1919.9	–0.3 (–0.4 to –0.3)	<0.001*
Kiribati	2161.5	1720.5	–0.8 (–0.9 to –0.8)	<0.001*
Eswatini	1426.7	1676.4	1.0 (–0.1 to 2.1)	0.07
Mozambique	1890.9	1589.4	–0.3 (–0.5 to –0.1)	0.002*
Zimbabwe	1351.5	1505.9	0.0 (–1.0 to 0.9)	0.96
Guinea-Bissau	2199.3	1484.7	–1.3 (–1.5 to –1.2)	<0.001*
Afghanistan	1884.7	1433.4	–1.2 (–1.4 to –1.0)	<0.001*
Guinea	1771.2	1372.7	–0.7 (–0.8 to –0.6)	<0.001*
Uzbekistan	936.4	1372.7	1.3 (0.8 to 1.8)	<0.001*
Zambia	1975.1	1340.2	–2.1 (–2.7 to –1.5)	<0.001*
Burkina Faso	1898.2	1323.8	–1.4 (–1.5 to –1.3)	<0.001*
Sierra Leone	1857.9	1313.3	–1.1 (–1.4 to –0.9)	<0.001*
Burundi	2258.7	1287.4	–2.8 (–3.3 to –2.3)	<0.001*
Mali	1929.7	1273.9	–1.5 (–1.5 to –1.4)	<0.001*
Papua New Guinea	1340.2	1269.0	–0.1 (–0.2 to 0.1)	0.34
Haiti	1792.3	1267.1	–1.0 (–1.8 to –0.2)	0.02*
Niger	2024.9	1263.8	–1.7 (–1.8 to –1.7)	<0.001*
Democratic Republic of the Congo	1783.4	1219.8	–1.4 (–1.7 to –1.2)	<0.001*
CÃ´te d'Ivoire	1673.7	1217.1	–1.4 (–1.8 to –1.0)	<0.001*
Madagascar	1642.9	1206.0	–1.1 (–1.2 to –1.0)	<0.001*
Angola	2082.5	1204.7	–2.1 (–2.3 to –2.0)	<0.001*
Malawi	2012.2	1203.8	–2.4 (–3.0 to –1.8)	<0.001*
Mongolia	1552.3	1197.8	–1.3 (–1.5 to –1.0)	<0.001*
Palau	1348.1	1189.0	–0.4 (–0.4 to –0.3)	<0.001*
Gambia	1427.5	1172.0	–0.7 (–0.8 to –0.6)	<0.001*
Fiji	1282.3	1157.3	–0.6 (–0.7 to –0.4)	<0.001*
Pakistan	1373.1	1149.9	–0.7 (–0.9 to –0.6)	<0.001*
Nigeria	1650.3	1142.6	–1.4 (–1.6 to –1.2)	<0.001*
Tajikistan	988.0	1139.9	0.3 (0.1 to 0.5)	0.02
Ghana	1479.6	1139.0	–0.8 (–1.0 to –0.6)	<0.001*
Kenya	1299.8	1135.2	–0.9 (–1.4 to –0.4)	0.001*
South Africa	1097.1	1134.9	0.3 (–0.5 to 1.2)	0.47
Guyana	1483.7	1129.3	–0.9 (–1.0 to –0.8)	<0.001*
Liberia	2050.0	1122.5	–1.9 (–2.1 to –1.7)	<0.001*
Uganda	2139.4	1121.6	–2.7 (–3.0 to –2.4)	<0.001*
Azerbaijan	1037.0	1101.0	0.1 (–0.1 to 0.3)	0.24

United Republic of Tanzania	1665.6	1065.8	–1.9 (–2.3 to –1.6)	<0.001*
Egypt	1336.8	1022.9	–0.7 (–0.8 to –0.6)	<0.001*
Senegal	1501.8	1021.0	–1.4 (–1.5 to –1.4)	<0.001*
Rwanda	2176.1	1017.0	–4.4 (–5.7 to –3.1)	<0.001*
Cambodia	1597.0	1009.9	–1.8 (–1.9 to –1.7)	<0.001*
Myanmar	1733.0	998.3	–2.0 (–2.2 to –1.8)	<0.001*
Ethiopia	2386.9	993.5	–3.3 (–3.5 to –3.1)	<0.001*
Ukraine	979.1	988.2	–0.6 (–1.0 to –0.3)	<0.001*
Nepal	1539.1	959.8	–1.6 (–1.8 to –1.4)	<0.001*
Indonesia	1211.1	951.2	–0.7 (–0.8 to –0.6)	<0.001*
North Macedonia	1035.2	928.8	–0.4 (–0.6 to –0.3)	<0.001*
Kazakhstan	1049.1	923.1	–0.9 (–1.3 to –0.5)	<0.001*
Oman	1275.5	914.1	–0.9 (–1.0 to –0.8)	<0.001*
India	1593.8	906.6	–2.1 (–2.2 to –2.0)	<0.001*
Turkmenistan	1127.4	906.3	–1.2 (–1.5 to –1.0)	<0.001*
Honduras	885.6	900.1	0.2 (–0.1 to 0.5)	0.19
Bolivia (Plurinational State of)	1334.3	896.5	–1.4 (–1.6 to –1.3)	<0.001*
Bulgaria	1123.0	894.8	–1.2 (–1.4 to –1.0)	<0.001*
Saint Kitts and Nevis	1361.7	891.1	–1.3 (–1.5 to –1.1)	<0.001*
American Samoa	987.2	886.4	–0.4 (–0.4 to –0.3)	<0.001*
Qatar	1153.8	876.7	–0.9 (–1.1 to –0.7)	<0.001*
Syrian Arab Republic	1035.3	871.8	0.1 (–0.6 to 0.8)	0.876
Brunei Darussalam	1234.2	867.6	–1.0 (–1.1 to –0.9)	<0.001*
Philippines	1021.5	867.3	–0.2 (–0.3 to –0.2)	<0.001*
Dominica	945.7	857.0	–0.2 (–0.3 to –0.1)	0.007*
Morocco	1086.2	851.5	–0.9 (–1.0 to –0.8)	<0.001*
Northern Mariana Islands	996.3	845.6	–0.4 (–0.5 to –0.4)	<0.001*
Saint Vincent and the Grenadines	981.3	840.4	–0.6 (–0.8 to –0.4)	<0.001*
United Arab Emirates	1268.7	835.1	–1.6 (–2.0 to –1.1)	<0.001*
Guatemala	1430.6	827.5	–2.2 (–2.3 to –2.1)	<0.001*
Tonga	916.4	825.9	–0.3 (–0.5 to –0.2)	<0.001*
Grenada	1047.7	824.7	–0.8 (–0.9 to –0.6)	<0.001*
Iraq	1079.4	819.9	–0.9 (–1.1 to –0.7)	<0.001*
Serbia	1005.9	817.6	–0.9 (–1.1 to –0.7)	<0.001*
Georgia	1096.5	813.3	–0.9 (–1.1 to –0.7)	<0.001*
Russian Federation	1019.4	811.5	–1.3 (–1.8 to –0.8)	<0.001*
Kyrgyzstan	1012.0	809.3	–0.8 (–1.2 to –0.5)	<0.001*
Greenland	1295.6	806.0	–2.0 (–2.2 to –1.8)	<0.001*
Seychelles	951.8	806.0	–0.6 (–0.7 to –0.6)	<0.001*
Cabo Verde	844.1	805.4	–0.8 (–1.1 to –0.6)	<0.001*
Palestine	1073.2	796.6	–1.1 (–1.3 to –0.8)	<0.001*
Belarus	907.9	786.9	–0.9 (–1.3 to –0.5)	<0.001*

Suriname	946.9	777.9	−0.8 (−1.0 to −0.5)	<0.001*
United States Virgin Islands	831.9	777.8	0.0 (−0.1 to 0.1)	0.62
Viet Nam	1000.0	768.0	−0.8 (−0.9 to −0.7)	<0.001*
Dominican Republic	763.5	766.3	0.5 (0.3 to 0.7)	<0.001*
Saudi Arabia	1088.7	759.0	−1.2 (−1.3 to −1.1)	<0.001*
Bahamas	887.2	755.2	−0.8 (−0.9 to −0.7)	<0.001*
Montenegro	748.8	751.0	0.1 (0.0 to 0.3)	0.07
Republic of Moldova	1111.0	744.7	−1.6 (−1.8 to −1.3)	<0.001*
Malaysia	868.3	742.9	−0.8 (−1.0 to −0.7)	<0.001*
Algeria	1228.0	733.8	−1.8 (−1.9 to −1.7)	<0.001*
Bahrain	1239.1	731.6	−1.9 (−2.1 to −1.6)	<0.001*
Armenia	946.6	725.1	−1.3 (−1.5 to −1.2)	<0.001*
Nicaragua	719.7	725.0	−0.1 (−0.4 to 0.1)	0.23
Romania	1048.6	716.5	−1.7 (−1.9 to −1.5)	<0.001*
Bangladesh	1509.3	714.4	−2.6 (−2.8 to −2.3)	<0.001*
Cook Islands	1094.6	714.1	−1.4 (−1.5 to −1.2)	<0.001*
Saint Lucia	1037.8	709.9	−1.6 (−1.9 to −1.4)	<0.001*
Belize	757.7	695.3	−0.5 (−0.8 to −0.1)	0.007*
Trinidad and Tobago	1022.0	690.5	−1.7 (−1.9 to −1.5)	<0.001*
Latvia	1002.2	685.3	−1.7 (−2.0 to −1.5)	<0.001*
Antigua and Barbuda	762.0	682.6	−0.6 (−0.7 to −0.4)	<0.001*
Bosnia and Herzegovina	839.9	682.6	−1.2 (−1.5 to −0.8)	<0.001*
Mauritius	983.2	678.9	−1.4 (−1.4 to −1.3)	<0.001*
Venezuela (Bolivarian Republic of)	785.6	672.9	−0.8 (−0.9 to −0.6)	<0.001*
Barbados	776.0	670.5	−0.7 (−0.8 to −0.6)	<0.001*
Hungary	1083.5	667.5	−1.9 (−1.9 to −1.8)	<0.001*
Lithuania	903.2	666.1	−1.2 (−1.5 to −1.0)	<0.001*
Lebanon	994.8	665.2	−1.0 (−1.2 to −0.8)	<0.001*
Mexico	870.1	660.3	−1.0 (−1.2 to −0.8)	<0.001*
Ecuador	802.9	655.4	−0.4 (−0.6 to −0.2)	0.001*
Libya	771.1	651.0	−0.3 (−0.6 to −0.1)	0.009*
Argentina	830.1	649.3	−0.9 (−1.0 to −0.8)	<0.001*
El Salvador	834.2	640.7	−0.8 (−1.0 to −0.6)	<0.001*
Jamaica	669.1	636.8	−0.2 (−0.4 to 0.0)	0.06
China	1127.4	634.3	−2.0 (−2.1 to −1.9)	<0.001*
Brazil	1019.9	633.1	−1.6 (−1.7 to −1.5)	<0.001*
Slovakia	976.5	623.9	−1.5 (−1.5 to −1.4)	<0.001*
Sri Lanka	1007.0	620.0	−1.4 (−1.6 to −1.2)	<0.001*
Paraguay	625.3	615.7	0.0 (−0.1 to 0.1)	0.94
Guam	865.0	614.2	−1.4 (−1.7 to −1.0)	<0.001*
Tunisia	817.8	608.0	−1.1 (−1.1 to −1.1)	<0.001*
Uruguay	801.5	597.5	−1.1 (−1.1 to −1.0)	<0.001*

Iran (Islamic Republic of)	1065.2	594.4	−1.9 (−2.0 to −1.8)	<0.001*
Croatia	930.2	591.3	−1.6 (−1.7 to −1.5)	<0.001*
Estonia	1014.7	584.3	−2.5 (−2.7 to −2.2)	<0.001*
Poland	957.8	583.8	−1.9 (−2.0 to −1.8)	<0.001*
Albania	830.8	575.2	−1.3 (−1.4 to −1.1)	<0.001*
Jordan	943.2	573.2	−2.1 (−2.3 to −1.9)	<0.001*
Turkey	953.4	563.6	−1.7 (−2.0 to −1.4)	<0.001*
Cuba	709.0	552.8	−1.0 (−1.2 to −0.8)	<0.001*
Czechia	998.6	541.0	−2.1 (−2.2 to −2.0)	<0.001*
Maldives	1232.2	537.0	−3.3 (−3.5 to −3.0)	<0.001*
Thailand	847.1	531.6	−2.0 (−2.2 to −1.9)	<0.001*
United States of America	668.9	528.2	−1.0 (−1.1 to −0.9)	<0.001*
Cyprus	922.2	519.4	−2.4 (−2.5 to −2.2)	<0.001*
Monaco	594.1	502.1	−0.5 (−0.5 to −0.4)	<0.001*
Chile	802.1	489.0	−1.6 (−1.7 to −1.5)	<0.001*
Taiwan (Province of China)	739.4	480.9	−1.6 (−1.8 to −1.5)	<0.001*
Costa Rica	606.0	479.2	−1.2 (−1.4 to −1.0)	<0.001*
Greece	655.0	472.9	−1.4 (−1.5 to −1.3)	<0.001*
Panama	600.2	469.0	−0.8 (−0.9 to −0.8)	<0.001*
United Kingdom	717.2	465.9	−1.7 (−1.9 to −1.6)	<0.001*
Peru	873.3	465.5	−2.2 (−2.3 to −2.0)	<0.001*
Colombia	816.8	463.8	−2.2 (−2.4 to −2.1)	<0.001*
Germany	725.9	462.5	−1.6 (−1.8 to −1.5)	<0.001*
Denmark	735.2	462.4	−1.8 (−1.9 to −1.8)	<0.001*
Puerto Rico	736.2	458.7	−1.9 (−2.1 to −1.7)	<0.001*
Belgium	695.2	449.5	−1.6 (−1.7 to −1.6)	<0.001*
Slovenia	808.8	447.4	−2.3 (−2.4 to −2.2)	<0.001*
Bermuda	847.6	444.5	−2.3 (−2.5 to −2.1)	<0.001*
Netherlands	647.0	443.1	−1.6 (−1.7 to −1.5)	<0.001*
Portugal	806.4	439.9	−2.3 (−2.4 to −2.2)	<0.001*
Kuwait	678.1	436.4	−1.3 (−1.7 to −0.9)	<0.001*
Ireland	796.1	430.5	−2.4 (−2.6 to −2.3)	<0.001*
New Zealand	698.8	429.5	−1.9 (−2.0 to −1.8)	<0.001*
Finland	722.7	428.4	−1.9 (−2.0 to −1.9)	<0.001*
Austria	706.7	420.8	−1.9 (−2.0 to −1.8)	<0.001*
Andorra	548.4	417.3	−1.0 (−1.1 to −0.9)	<0.001*
San Marino	517.1	417.0	−0.6 (−0.7 to −0.5)	<0.001*
Canada	611.4	410.3	−1.6 (−1.7 to −1.5)	<0.001*
Malta	687.6	400.4	−1.9 (−1.9 to −1.8)	<0.001*
Sweden	604.9	397.9	−1.5 (−1.6 to −1.5)	<0.001*
Norway	651.1	394.0	−1.8 (−1.9 to −1.8)	<0.001*
Republic of Korea	928.6	391.1	−3.2 (−3.3 to −3.1)	<0.001*

Israel	639.2	389.8	–2.0 (–2.2 to –1.9)	<0.001*
Australia	637.7	389.2	–1.9 (–2.0 to –1.7)	<0.001*
Luxembourg	746.0	389.2	–2.4 (–2.4 to –2.3)	<0.001*
France	625.4	387.5	–1.8 (–1.9 to –1.7)	<0.001*
Italy	640.7	386.8	–1.9 (–2.0 to –1.8)	<0.001*
Spain	646.1	385.9	–1.9 (–2.0 to –1.8)	<0.001*
Switzerland	591.5	353.2	–1.9 (–1.9 to –1.8)	<0.001*
Iceland	588.2	348.0	–2.0 (–2.1 to –1.9)	<0.001*
Singapore	719.1	324.1	–2.8 (–2.9 to –2.8)	<0.001*
Japan	534.7	323.3	–1.8 (–1.8 to –1.7)	<0.001*

Notes: *P value for trends <0.05.

CI=confidence interval; EAPC=estimated annual percentage change.

Supplementary Table S12. Trends of all cause mortality and cause specific mortality by decades (1990–1999, 2000–2009, 2010–2019)

Mortality (per 100 000 population)	Age-standardized mortality rate (IQR)						Trends from 1990 to 1999 EAPC (%, 95% CI)	Trends from 2000 to 2009 EAPC (%, 95% CI)	Trends from 2010 to 2019 EAPC (%, 95% CI)
	1990	1999	2000	2009	2010	2019			
All cause mortality	995.54 (790.87-1317.02)	908.55 (698.97-1262.33)	902.62 (680.64-1273.19)	820.73 (594.40-1155.80)	814.60 (588.17-1141.85)	743.81 (538.98-990.86)	–0.7 (–1.3 to 0.0)	–1.5 (–2.2 to –0.8)	–1.2 (–1.9 to –0.5)
Cause specific mortalities									
HIV/AIDS and sexually transmitted infections	2.01 (0.67-7.63)	3.51 (0.74-17.91)	3.62 (0.71-19.05)	3.56 (0.64-16.10)	3.59 (0.64-16.64)	3.40 (0.59-11.51)	7.5 (4.0 to 11.2)	–1.0 (–4.6 to 2.6)	–2.7 (–5.9 to 0.5)
Respiratory infections and tuberculosis	53.79 (31.45-152.37)	43.87 (27.36-121.50)	42.97 (25.67-118.19)	34.44 (21.10-96.03)	33.87 (19.86-91.51)	29.98 (17.65-77.84)	–1.5 (–3.1 to 0.1)	–2.7 (–4.3 to –1.0)	–1.6 (–3.2 to 0.0)
Enteric infections	9.57 (1.21-45.49)	5.02 (1.01-34.24)	4.82 (1.08-33.39)	3.05 (1.02-18.02)	3.05 (1.01-16.80)	2.63 (0.95-12.85)	–3.5 (–7.0 to 0.2)	–2.9 (–6.1 to 0.5)	–2.4 (–5.4 to 0.8)
Neglected tropical diseases and malaria	0.67 (0.11-7.39)	0.44 (0.08-4.95)	0.44 (0.08-4.66)	0.37 (0.05-3.15)	0.36 (0.05-2.94)	0.28 (0.05-2.18)	–3.7 (–8.2 to 1.1)	–3.1 (–7.7 to 1.6)	–3.5 (–7.9 to 1.1)
Other infectious diseases	8.73 (3.02-29.82)	5.49 (2.13-18.35)	5.24 (2.09-17.93)	3.52 (1.54-11.62)	3.32 (1.50-11.52)	2.72 (1.43-8.79)	–3.9 (–6.1 to –1.6)	–4.1 (–6.2 to –2.0)	–2.5 (–4.5 to –0.4)
Maternal and neonatal disorders	29.71 (13.13-53.00)	22.71 (8.77-44.55)	21.81 (8.37-43.75)	15.92 (6.19-33.65)	15.37 (5.96-32.27)	10.68 (4.34-25.35)	–2.8 (–4.2 to –1.2)	–2.9 (–4.5 to –1.2)	–3.2 (–4.8 to –1.5)
Nutritional deficiencies	2.95 (0.68-15.84)	2.78 (0.57-10.02)	2.51 (0.53-9.69)	1.61 (0.38-6.23)	1.57 (0.38-5.89)	1.33 (0.34-4.63)	–3.1 (–6.2 to 0.1)	–3.7 (–6.7 to –0.7)	–2.0 (–4.8 to 0.9)
Neoplasms	138.05 (111.22-164.59)	138.69 (107.84-164.45)	139.25 (107.63-163.23)	133.97 (109.98-156.62)	133.09 (108.98-155.01)	126.54 (109.17-147.22)	–0.1 (–0.6 to 0.3)	–0.1 (–0.6 to 0.3)	–0.3 (–0.7 to 0.1)
Cardiovascular diseases	346.62 (282.47-466.82)	309.32 (249.49-426.31)	305.14 (238.12-412.07)	282.08 (186.02-379.16)	279.19 (182.33-378.20)	257.95 (173.50-338.43)	–1.1 (–1.7 to –0.4)	–1.6 (–2.4 to –0.9)	–1.0 (–1.8 to –0.2)
Chronic respiratory diseases	43.30 (28.28-66.61)	39.44 (26.51-59.22)	38.28 (25.99-57.63)	31.88 (21.92-50.70)	31.35 (21.71-50.74)	28.88 (20.26-44.38)	–1.0 (–2.0 to 0.0)	–1.7 (–2.7 to –0.6)	–1.1 (–2.1 to –0.1)
Digestive diseases	40.76 (29.72-67.99)	38.13 (28.04-65.30)	37.46 (27.86-62.89)	34.08 (25.16-59.92)	33.83 (24.59-58.75)	32.27 (22.08-52.28)	–0.6 (–1.5 to 0.2)	–1.2 (–2.0 to –0.3)	–1.0 (–1.9 to –0.1)
Neurological disorders	31.02 (28.76-33.20)	31.40 (29.87-33.39)	31.43 (29.89-33.48)	31.58 (29.93-33.70)	31.62 (29.98-33.79)	31.45 (29.71-33.63)	0.2 (0.0 to 0.3)	0.1 (–0.1 to 0.2)	0.0 (–0.2 to 0.2)
Mental disorders	0.001 (0-0.002)	0.001 (0-0.002)	0.001 (0-0.002)	0.001 (0-0.003)	0.001 (0-0.003)	0.001 (0-0.003)	1.3 (–1.1 to 3.7)	1.7 (–0.7 to 4.1)	1.7 (–0.7 to 4.1)
Substance use disorders	2.16 (1.42-4.19)	2.45 (1.51-4.91)	2.46 (1.50-4.97)	2.03 (1.41-4.67)	2.01 (1.41-4.64)	2.06 (1.44-4.59)	1.5 (0.0 to 3.1)	–0.9 (–2.4 to 0.7)	0.1 (–1.5 to 1.6)
Diabetes and kidney diseases	50.20 (24.65-76.39)	56.34 (25.09-81.21)	55.59 (24.78-82.09)	53.01 (24.67-85.99)	53.15 (24.78-85.07)	53.99 (24.11-82.40)	0.9 (–0.4 to 2.1)	0.1 (–1.2 to 1.4)	–0.2 (–1.5 to 1.2)
Skin and subcutaneous diseases	1.46 (0.43-2.44)	1.58 (0.40-2.74)	1.59 (0.41-2.75)	1.62 (0.49-2.76)	1.64 (0.48-2.77)	1.65 (0.51-2.61)	0.5 (–1.5 to 2.5)	0.6 (–1.4 to 2.6)	0.5 (–1.4 to 2.4)

Musculoskeletal disorders	1.10 (0.56-1.71)	1.11 (0.63-1.85)	1.14 (0.64-1.86)	1.09 (0.74-1.83)	1.08 (0.75-1.84)	1.09 (0.78-1.84)	0.6 (–0.6 to 1.9)	0.4 (–0.7 to 1.5)	0.3 (–0.7 to 1.3)
Other non-communicable diseases	19.51 (14.55-26.31)	17.25 (12.34-24.00)	17.13 (12.30-24.00)	16.79 (11.69-22.98)	16.56 (11.39-22.83)	14.45 (10.25-20.79)	–1.4 (–2.2 to –0.7)	–0.9 (–1.7 to –0.1)	–1.1 (–1.9 to –0.3)
Transport injuries	22.44 (16.66-30.10)	18.85 (13.68-27.50)	18.88 (13.28-26.81)	16.22 (9.95-23.80)	15.52 (9.71-23.06)	14.16 (8.53-20.39)	–1.5 (–2.3 to –0.6)	–2.1 (–3.0 to –1.1)	–1.6 (–2.6 to –0.5)
Unintentional injuries	31.08 (21.33-40.64)	27.55 (18.61-38.57)	25.56 (17.83-37.85)	22.08 (14.92-32.44)	21.82 (14.62-30.95)	18.47 (13.17-27.57)	–1.2 (–2.0 to –0.4)	–1.5 (–2.4 to –0.7)	–1.5 (–2.3 to –0.7)
Self-harm and interpersonal violence	18.91 (12.75-27.67)	17.95 (12.06-27.60)	17.66 (12.57-27.98)	16.23 (10.60-26.65)	16.04 (10.43-25.12)	14.22 (9.41-23.05)	–0.2 (–1.4, 0.9)	–1.3 (–2.4, –0.2)	–1.1 (–2.2, 0.0)

Notes: Sense organ diseases were excluded in the analysis because of no data on cause specific mortality. *P value<0.05

Supplementary Table S13. Associations between total HRH and all cause mortality in GEE models.

Factors	Univariable model		Multivariable model	
	cIRR (95% CI)	P value	aIRR (95% CI)	P value
Human resources for health (HRH)				
Lowest	2.53 (2.28 to 2.81)	<0.001*	1.13 (0.95 to 1.34)	0.168
Low	1.83 (1.62 to 2.06)	<0.001*	1.15 (1.00 to 1.32)	0.049*
Middle	1.45 (1.31 to 1.61)	<0.001*	1.14 (1.01 to 1.29)	0.033*
High	1.35 (1.26 to 1.45)	<0.001*	1.18 (1.08 to 1.28)	<0.001*
Highest	Reference group		Reference group	
Year	0.987 (0.986 to 0.989)	<0.001*	0.998 (0.996 to 1.000)	0.010*
Population density	0.99995 (0.99991 to 0.99998)	0.004*	0.999979 (0.999963 to 0.999995)	0.012*
Percentage of the population living in urban areas	0.988 (0.986 to 0.990)	<0.001*	0.998 (0.996 to 0.999)	0.008*
Average years of schooling	0.92 (0.90 to 0.93)	<0.001*	1.048 (1.026 to 1.070)	<0.001*
GDP per capita	0.999989(0.999983 to 0.999995)	<0.001*	1.000003 (0.999999 to 1.000007)	0.136
Socio-Demographic Index (SDI)	0.17 (0.16 to 0.17)	<0.001*	-	-
Human Development Index (HDI)	0.11 (0.10 to 0.11)	<0.001*	0.060 (0.034 to 0.104)	<0.001*

Notes: *P value<0.05.

cIRR=crude incidence risk ratio; aIRR=adjusted incidence risk ratio; GDP=Gross Domestic Product; HDI=Human Development Index; HRH=Human resources for health.

Supplementary Table S14. Associations between specific HRH and all cause mortality between 1990 and 2019 in the univariable GEE models.

Factors	All cause mortality (per 100 000 population, IQR)	cIRR (95% CI)	P value
Specific types of human resources for health (Workers per 10 000 population)			
Aides and emergency medical workers			
Lowest	1264.4 (971.2-1655.9)	2.25 (2.01 to 2.53)	<0.001*
Low	1104.6 (834.9-1484.3)	2.05 (1.83 to 2.31)	<0.001*
Middle	868.3 (712.1-1087.2)	1.61 (1.45 to 1.79)	<0.001*
High	744.4 (618.1-922.6)	1.33 (1.23 to 1.44)	<0.001*
Highest	543.2 (451.2-665.4)	Reference group	
Audiologists and counsellors			
Lowest	1122.7 (856.1-1574.5)	1.78 (1.53 to 2.07)	<0.001*
Low	1147.1 (753.9-1583.7)	1.73 (1.48 to 2.03)	<0.001*
Middle	890.4 (699.2-1149.9)	1.36 (1.20 to 1.55)	<0.001*
High	736.0 (583.4-905.0)	1.11 (1.00 to 1.24)	0.054
Highest	626.5 (471.4-855.1)	Reference group	
Dentistry staff			
Lowest	1550.4 (1335.7-1846.6)	2.53 (2.29 to 2.80)	<0.001*
Low	978.4 (843.0-1175.0)	1.64 (1.46 to 1.85)	<0.001*
Middle	806.5 (682.6-956.7)	1.33 (1.21 to 1.47)	<0.001*
High	728.1 (579.4-889.4)	1.20 (1.11 to 1.30)	<0.001*
Highest	570.4 (465.4-722.7)	Reference group	
Dieticians and nutritionists			
Lowest	1464.9 (1167.5-1826.1)	2.26 (2.00 to 2.55)	<0.001*
Low	1010.2 (818.7-1346.0)	1.67 (1.47 to 1.91)	<0.001*
Middle	820.2 (654.8-980.4)	1.26 (1.12 to 1.41)	<0.001*
High	714.4 (569.6-873.4)	1.12 (1.02 to 1.24)	0.023*
Highest	604.9 (476.9-779.5)	Reference group	
Environmental health officers			
Lowest	1391.3 (1054.7-1735.1)	1.93 (1.69 to 2.20)	<0.001*
Low	988.7 (755.1-1387.2)	1.50 (1.29 to 1.73)	<0.001*
Middle	827.4 (682.6-1056.2)	1.22 (1.07 to 1.38)	0.002
High	690.2 (531.6-890.3)	1.00 (0.89 to 1.11)	0.954
Highest	695.0 (528.4-870.9)	Reference group	
Medical assistants and CHWs			
Lowest	1080.7 (878.0-1602.7)	1.76 (1.51 to 2.05)	<0.001*
Low	1171.7 (795.9-1578.5)	1.72 (1.49 to 1.99)	<0.001*
Middle	924.5 (693.0-1190.6)	1.38 (1.21 to 1.57)	<0.001*
High	707.1 (563.1-897.3)	1.09 (0.98 to 1.22)	0.125
Highest	650.5 (486.1-830.1)	Reference group	

Medical laboratory technicians			
Lowest	1550.3 (1227.2-1847.6)	2.31 (2.03 to 2.63)	<0.001*
Low	1001.0 (843.8-1295.4)	1.61 (1.42 to 1.83)	<0.001*
Middle	796.6 (672.3-957.7)	1.24 (1.10 to 1.39)	<0.001*
High	717.7 (574.0-880.8)	1.12 (1.00 to 1.25)	0.050*
Highest	595.0 (478.3-793.8)	Reference group	
Nursing and midwifery staff			
Lowest	1384.6 (1007.4-1709.0)	2.15 (1.89 to 2.45)	<0.001*
Low	929.4 (722.0-1295.0)	1.66 (1.44 to 1.93)	<0.001*
Middle	867.5 (691.9-1073.0)	1.47 (1.27 to 1.69)	<0.001*
High	794.9 (627.0-973.5)	1.30 (1.17 to 1.44)	<0.001*
Highest	561.5 (462.5-725.5)	Reference group	
Optometrists			
Lowest	1403.8 (1064.2-1821.8)	2.34 (2.08 to 2.64)	<0.001*
Low	1043.1 (829.4-1405.0)	1.84 (1.63 to 2.07)	<0.001*
Middle	844.2 (697.2-1087.5)	1.47 (1.32 to 1.63)	<0.001*
High	716.8 (592.0-903.6)	1.23 (1.12 to 1.34)	<0.001*
Highest	562.5 (464.3-728.2)	Reference group	
Personal care workers			
Lowest	1210.8 (895.8-1660.9)	2.13 (1.88 to 2.42)	<0.001*
Low	1087.2 (800.2-1470.8)	2.00 (1.75 to 2.28)	<0.001*
Middle	927.2 (738.2-1172.6)	1.63 (1.47 to 1.81)	<0.001*
High	786.3 (649.1-931.4)	1.34 (1.24 to 1.45)	<0.001*
Highest	553.6 (459.3-670.9)	Reference group	
Pharmaceutical staff			
Lowest	1506.6 (1140.1-1844.3)	2.38 (2.08 to 2.72)	<0.001*
Low	962.6 (802.1-1257.5)	1.67 (1.46 to 1.90)	<0.001*
Middle	866.9 (719.3-1063.4)	1.44 (1.28 to 1.62)	<0.001*
High	740.5 (608.2-945.5)	1.26 (1.14 to 1.39)	<0.001*
Highest	551.1 (452.3-725.7)	Reference group	
Physiotherapists			
Lowest	1402.1 (1065.8-1769.2)	2.27 (2.02 to 2.54)	<0.001*
Low	1106.0 (843.8-1444.1)	1.90 (1.67 to 2.15)	<0.001*
Middle	850.0 (701.4-991.8)	1.40 (1.26 to 1.56)	<0.001*
High	706.8 (582.2-885.4)	1.20 (1.10 to 1.31)	<0.001*
Highest	574.3 (466.3-741.8)	Reference group	
Doctors			
Lowest	1600.2 (1344.3-1872.0)	2.47 (2.19 to 2.78)	<0.001*
Low	913.9 (813.8-1104.4)	1.48 (1.30 to 1.67)	<0.001*
Middle	805.1 (690.7-1014.6)	1.29 (1.14 to 1.46)	<0.001*
High	736.5 (590.8-918.0)	1.20 (1.08 to 1.33)	<0.001*
Highest	564.7 (464.8-730.2)	Reference group	

Psychologists			
Lowest	1448.1 (1106.0-1820.7)	2.40 (2.16 to 2.66)	<0.001*
Low	1093.3 (843.3-1365.9)	1.86 (1.66 to 2.09)	<0.001*
Middle	845.1 (693.0-1014.0)	1.39 (1.27 to 1.54)	<0.001*
High	704.8 (573.5-892.5)	1.21 (1.12 to 1.31)	<0.001*
Highest	578.9 (465.2-723.0)	Reference group	
Radiographers			
Lowest	1438.5 (1049.1-1825.0)	2.38 (2.08 to 2.71)	<0.001*
Low	1027.5 (836.7-1395.5)	1.86 (1.65 to 2.11)	<0.001*
Middle	855.2 (694.3-1061.3)	1.45 (1.30 to 1.63)	<0.001*
High	726.9 (614.6-890.4)	1.27 (1.15 to 1.41)	<0.001*
Highest	547.7 (456.4-679.4)	Reference group	
Traditional and complementary medicine practitioners			
Lowest	901.5 (744.2-1087.9)	0.95 (0.79 to 1.16)	0.629
Low	850.7 (672.1-1055.2)	0.93 (0.77 to 1.13)	0.484
Middle	868.5 (612.9-1221.2)	0.97 (0.79 to 1.18)	0.745
High	884.4 (670.3-1282.4)	1.05 (0.87 to 1.27)	0.589
Highest	731.0 (518.1-1426.3)	Reference group	

*P value<0.05.

cIRR=crude incidence risk ratio; CI=confidence interval; CHWs=community health workers.

Supplementary Table S15. Sensitivity analysis for the associations between HRH and all cause mortality between 1990 and 2019 in the multivariable GEE models.

Factors	aIRR (95% CI)	P value
Total human resources for health (Workers per 10 000 population)		
Lowest	1.13 (0.92 to 1.39)	0.259
Low	1.08 (0.91 to 1.27)	0.385
Middle	1.06 (0.93 to 1.22)	0.371
High	1.16 (1.06 to 1.26)	0.001*
Highest	Reference group	
Specific types of human resources for health (Workers per 10 000 population)		
Doctors		
Lowest	1.50 (1.23 to 1.84)	<0.001*
Low	1.11 (0.96 to 1.30)	0.167
Middle	1.11 (0.98 to 1.26)	0.091
High	1.10 (1.00 to 1.22)	0.053
Highest	Reference group	
Nursing and midwifery staff		
Lowest	0.80 (0.68 to 0.95)	0.010*
Low	0.87 (0.76 to 1.00)	0.047*
Middle	0.98 (0.87 to 1.11)	0.731
High	1.09 (0.98 to 1.21)	0.114
Highest	Reference group	
Dentistry staff		
Lowest	1.59 (1.30 to 1.94)	<0.001*
Low	1.24 (1.09 to 1.41)	0.001*
Middle	1.15 (1.04 to 1.28)	0.009*
High	1.12 (1.04 to 1.21)	0.004*
Highest	Reference group	
Pharmaceutical staff		
Lowest	1.12 (0.91 to 1.39)	0.271
Low	1.01 (0.88 to 1.17)	0.838
Middle	1.10 (0.98 to 1.23)	0.103
High	1.10 (1.01 to 1.19)	0.020*
Highest	Reference group	
Medical assistants and CHWs		
Lowest	0.98 (0.85 to 1.14)	0.820
Low	0.97 (0.86 to 1.08)	0.565
Middle	0.98 (0.89 to 1.09)	0.763
High	0.98 (0.89 to 1.08)	0.642
Highest	Reference group	
Aides and emergency medical workers		

Lowest	1.18 (1.00 to 1.40)	0.045*
Low	1.18 (1.02 to 1.37)	0.026*
Middle	1.18 (1.03 to 1.35)	0.019*
High	1.17 (1.04 to 1.30)	0.007*
Highest	Reference group	
Medical laboratory technicians		
Lowest	1.20 (1.00 to 1.44)	0.047*
Low	1.04 (0.91 to 1.19)	0.580
Middle	0.98 (0.88 to 1.08)	0.639
High	0.98 (0.89 to 1.08)	0.732
Highest	Reference group	
Dieticians and nutritionists		
Lowest	1.15 (0.96 to 1.37)	0.139
Low	1.09 (0.94 to 1.25)	0.243
Middle	0.99 (0.88 to 1.10)	0.809
High	0.99 (0.91 to 1.08)	0.834
Highest	Reference group	
Optometrists		
Lowest	1.21 (1.02 to 1.42)	0.025*
Low	1.15 (1.01 to 1.32)	0.033*
Middle	1.15 (1.02 to 1.29)	0.027*
High	1.12 (1.03 to 1.22)	0.010*
Highest	Reference group	
Audiologists and counsellors		
Lowest	0.99 (0.84 to 1.18)	0.939
Low	1.02 (0.86 to 1.20)	0.838
Middle	0.95 (0.84 to 1.08)	0.446
High	0.96 (0.88 to 1.05)	0.404
Highest	Reference group	
Psychologists		
Lowest	1.29 (1.10 to 1.50)	0.001*
Low	1.24 (1.09 to 1.41)	0.001*
Middle	1.14 (1.02 to 1.27)	0.022*
High	1.11 (1.02 to 1.20)	0.012*
Highest	Reference group	
Environmental health officers		
Lowest	1.07 (0.92 to 1.24)	0.404
Low	1.04 (0.92 to 1.18)	0.528
Middle	1.02 (0.92 to 1.14)	0.67
High	0.94 (0.85 to 1.05)	0.271
Highest	Reference group	
Personal care workers		

Lowest	1.17 (1.01 to 1.36)	0.041*
Low	1.18 (1.01 to 1.36)	0.033*
Middle	1.17 (1.02 to 1.33)	0.023*
High	1.14 (1.04 to 1.25)	0.004*
Highest	Reference group	
Traditional and complementary medicine practitioners		
Lowest	0.99 (0.88 to 1.11)	0.854
Low	0.98 (0.88 to 1.10)	0.743
Middle	1.01 (0.90 to 1.14)	0.831
High	1.02 (0.91 to 1.14)	0.763
Highest	Reference group	
Physiotherapists		
Lowest	1.24 (1.08 to 1.43)	0.003*
Low	1.26 (1.10 to 1.44)	0.001*
Middle	1.15 (1.02 to 1.31)	0.028*
High	1.08 (1.00 to 1.18)	0.062
Highest	Reference group	
Radiographers		
Lowest	1.26 (1.08 to 1.49)	0.004*
Low	1.22 (1.06 to 1.40)	0.005*
Middle	1.12 (0.99 to 1.27)	0.065
High	1.08 (0.98 to 1.19)	0.104
Highest	Reference group	

Notes: In the sensitivity analysis, we adjusted for health worker densities, year, population density, percentage of the population living in urban areas, average years of schooling, GDP per capita, and SDI (instead of HDI) in the multivariable model.

*P value<0.05.

aIRR=adjusted incidence risk ratio;

Supplementary Table S16. Associations between both total and specific HRH and all cause mortality between 1990 and 2019 in the multivariable GEE models.

Factors	All cause mortality (Per 100 000 population, IQR)	aIRR (95% CI)	P value
Total human resources for health (Workers per 10 000 population)			
Lowest	1478.8 (1186.2-1824.8)	1.13 (0.95 to 1.34)	0.168
Low	1021.4 (815.3-1243.9)	1.15 (1.00 to 1.32)	0.049*
Middle	828.5 (682.4-965.5)	1.14 (1.01 to 1.29)	0.033*
High	761.8 (642.4-935.9)	1.18 (1.08 to 1.28)	<0.001*
Highest	541.0 (449.9-655.0)	Reference group	
16 cadres of human resources for health (Workers per 10 000 population)			
Doctors			
Lowest	1600.2 (1344.3-1872.0)	1.29 (1.07 to 1.56)	0.009*
Low	913.9 (813.8-1104.4)	1.11 (0.98 to 1.27)	0.112
Middle	805.1 (690.7-1014.6)	1.10 (0.98 to 1.25)	0.114
High	736.5 (590.8-918.0)	1.09 (1.00 to 1.19)	0.058
Highest	564.7 (464.8-730.2)	Reference group	
Nursing and midwifery staff			
Lowest	1384.6 (1007.4-1709.0)	0.94 (0.82 to 1.09)	0.421
Low	929.4 (722.0-1295.0)	1.02 (0.90 to 1.15)	0.787
Middle	867.5 (691.9-1073.0)	1.08 (0.97 to 1.20)	0.175
High	794.9 (627.0-973.5)	1.13 (1.02 to 1.24)	0.016
Highest	561.5 (462.5-725.5)	Reference group	
Dentistry staff			
Lowest	1550.4 (1335.7-1846.6)	1.29 (1.08 to 1.55)	0.005*
Low	978.4 (843.0-1175.0)	1.22 (1.07 to 1.39)	0.002*
Middle	806.5 (682.6-956.7)	1.16 (1.05 to 1.28)	0.005*
High	728.1 (579.4-889.4)	1.12 (1.05 to 1.21)	0.001*
Highest	570.4 (465.4-722.7)	Reference group	
Pharmaceutical staff			
Lowest	1506.6 (1140.1-1844.3)	1.06 (0.91 to 1.23)	0.483
Low	962.6 (802.1-1257.5)	1.07 (0.96 to 1.19)	0.236
Middle	866.9 (719.3-1063.4)	1.12 (1.02 to 1.24)	0.022
High	740.5 (608.2-945.5)	1.12 (1.05 to 1.20)	0.001*
Highest	551.1 (452.3-725.7)	Reference group	
Medical assistants and CHWs			
Lowest	1080.7 (878.0-1602.7)	1.01 (0.91 to 1.13)	0.793
Low	1171.7 (795.9-1578.5)	1.03 (0.94 to 1.13)	0.495
Middle	924.5 (693.0-1190.6)	1.05 (0.96 to 1.14)	0.288
High	707.1 (563.1-897.3)	1.05 (0.97 to 1.14)	0.214
Highest	650.5 (486.1-830.1)	Reference group	

Aides and emergency medical workers			
Lowest	1264.4 (971.2-1655.9)	1.20 (1.05 to 1.38)	0.010*
Low	1104.6 (834.9-1484.3)	1.20 (1.06 to 1.37)	0.005*
Middle	868.3 (712.1-1087.2)	1.22 (1.09 to 1.38)	0.001*
High	744.4 (618.1-922.6)	1.21 (1.10 to 1.33)	<0.001*
Highest	543.2 (451.2-665.4)	Reference group	
Medical laboratory technicians			
Lowest	1550.3 (1227.2-1847.6)	1.04 (0.89 to 1.21)	0.606
Low	1001.0 (843.8-1295.4)	1.04 (0.94 to 1.16)	0.423
Middle	796.6 (672.3-957.7)	1.01 (0.93 to 1.10)	0.780
High	717.7 (574.0-880.8)	1.00 (0.92 to 1.09)	0.991
Highest	595.0 (478.3-793.8)	Reference group	
Dieticians and nutritionists			
Lowest	1464.9 (1167.5-1826.1)	1.04 (0.90 to 1.18)	0.613
Low	1010.2 (818.7-1346.0)	1.11 (0.99 to 1.24)	0.079
Middle	820.2 (654.8-980.4)	1.06 (0.97 to 1.16)	0.177
High	714.4 (569.6-873.4)	1.06 (0.99 to 1.14)	0.115
Highest	604.9 (476.9-779.5)	Reference group	
Optometrists			
Lowest	1403.8 (1064.2-1821.8)	1.23 (1.06 to 1.42)	0.006*
Low	1043.1 (829.4-1405.0)	1.19 (1.06 to 1.33)	0.004*
Middle	844.2 (697.2-1087.5)	1.21 (1.08 to 1.35)	0.001*
High	716.8 (592.0-903.6)	1.15 (1.07 to 1.24)	<0.001*
Highest	562.5 (464.3-728.2)	Reference group	
Audiologists and counsellors			
Lowest	1122.7 (856.1-1574.5)	1.08 (0.94 to 1.24)	0.271
Low	1147.1 (753.9-1583.7)	1.06 (0.93 to 1.22)	0.391
Middle	890.4 (699.2-1149.9)	1.04 (0.94 to 1.16)	0.432
High	736.0 (583.4-905.0)	1.02 (0.94 to 1.10)	0.632
Highest	626.5 (471.4-855.1)	Reference group	
Psychologists			
Lowest	1448.1 (1106.0-1820.7)	1.19 (1.04 to 1.36)	0.012*
Low	1093.3 (843.3-1365.9)	1.23 (1.09 to 1.38)	0.001*
Middle	845.1 (693.0-1014.0)	1.17 (1.05 to 1.30)	0.003*
High	704.8 (573.5-892.5)	1.13 (1.05 to 1.22)	0.002*
Highest	578.9 (465.2-723.0)	Reference group	
Environmental health officers			
Lowest	1391.3 (1054.7-1735.1)	0.98 (0.88 to 1.10)	0.776
Low	988.7 (755.1-1387.2)	1.04 (0.94 to 1.15)	0.466
Middle	827.4 (682.6-1056.2)	1.07 (0.98 to 1.17)	0.129
High	690.2 (531.6-890.3)	0.99 (0.90 to 1.08)	0.761

Highest	695.0 (528.4-870.9)	Reference group	
Personal care workers			
Lowest	1210.8 (895.8-1660.9)	1.18 (1.03 to 1.35)	0.014*
Low	1087.2 (800.2-1470.8)	1.20 (1.05 to 1.36)	0.007*
Middle	927.2 (738.2-1172.6)	1.17 (1.05 to 1.31)	0.006*
High	786.3 (649.1-931.4)	1.13 (1.05 to 1.23)	0.002*
Highest	553.6 (459.3-670.9)	Reference group	
Traditional and complementary medicine practitioners			
Lowest	901.5 (744.2-1087.9)	1.06 (0.96 to 1.17)	0.236
Low	850.7 (672.1-1055.2)	1.06 (0.96 to 1.16)	0.250
Middle	868.5 (612.9-1221.2)	1.08 (0.97 to 1.19)	0.155
High	884.4 (670.3-1282.4)	1.03 (0.94 to 1.14)	0.538
Highest	731.0 (518.1-1426.3)	Reference group	
Physiotherapists			
Lowest	1402.1 (1065.8-1769.2)	1.18 (1.04 to 1.34)	0.010*
Low	1106.0 (843.8-1444.1)	1.24 (1.10 to 1.40)	0.001*
Middle	850.0 (701.4-991.8)	1.19 (1.06 to 1.32)	0.002*
High	706.8 (582.2-885.4)	1.12 (1.03 to 1.21)	0.006*
Highest	574.3 (466.3-741.8)	Reference group	
Radiographers			
Lowest	1438.5 (1049.1-1825.0)	1.21 (1.06 to 1.38)	0.005*
Low	1027.5 (836.7-1395.5)	1.22 (1.08 to 1.37)	0.001*
Middle	855.2 (694.3-1061.3)	1.16 (1.04 to 1.29)	0.006*
High	726.9 (614.6-890.4)	1.10 (1.01 to 1.20)	0.037*
Highest	547.7 (456.4-679.4)	Reference group	

Notes: We adjusted for health worker densities, year, population density, percentage of the population living in urban areas, average years of schooling, GDP per capita, and HDI in the multivariable model.

*P value<0.05.

aIRR=adjusted incidence risk ratio; GDP=Gross Domestic Product; HDI=Human Development Index; HRH=Human resources for health; CHWs=community health workers.

Supplementary Table S17. Associations between HRH and cause specific mortalities in 172 countries and territories from 1990 to 2019 in the multivariable GEE models.

Factors	Cause specific mortalities (per 100 000 population)	aIRR (95% CI)	P value
Human resources for health	HIV/AIDS and sexually transmitted infections		
Lowest	35.18 (3.69-107.89)	0.12 (0.05 to 0.30)	<0.001*
Low	4.20 (1.09-23.96)	0.29 (0.15 to 0.55)	<0.001*
Middle	3.73 (1.23-9.03)	0.72 (0.33 to 1.61)	0.43
High	2.01 (0.58-5.45)	0.68 (0.49 to 0.96)	0.026*
Highest	0.81 (0.39-2.77)	Reference group	
Human resources for health	Respiratory infections and tuberculosis		
Lowest	211.95 (121.75-282.56)	1.27 (0.86 to 1.87)	0.23
Low	69.14 (39.46-156.94)	1.43 (1.06 to 1.91)	0.017*
Middle	36.98 (23.80-62.24)	1.26 (0.96 to 1.65)	0.10
High	28.45 (19.57-42.69)	1.15 (0.92 to 1.44)	0.22
Highest	19.43 (13.19-28.23)	Reference group	
Human resources for health	Enteric infections		
Lowest	111.25 (53.32-165.03)	5.52 (2.95 to 10.33)	<0.001*
Low	17.52 (5.74-57.90)	4.84 (3.15 to 7.43)	<0.001*
Middle	4.15 (1.83-9.12)	2.59 (1.78 to 3.77)	<0.001*
High	1.39 (0.38-3.17)	1.18 (0.83 to 1.67)	0.36
Highest	0.77 (0.39-1.54)	Reference group	
Human resources for health	Neglected tropical diseases and malaria		
Lowest	46.01 (4.80-141.69)	4.19 (1.81 to 9.74)	0.001*
Low	1.62 (0.53-6.95)	5.53 (2.81 to 10.88)	<0.001*
Middle	0.39 (0.16-0.83)	3.53 (1.89 to 6.58)	<0.001*
High	0.12 (0.05-0.36)	2.41 (1.64 to 3.54)	<0.001*
Highest	0.02 (0.01-0.06)	Reference group	
Human resources for health	Other infectious diseases		
Lowest	45.44 (26.12-71.36)	2.81 (1.85 to 4.28)	<0.001*
Low	10.42 (5.52-22.88)	2.57 (1.76 to 3.76)	<0.001*
Middle	3.80 (2.37-6.37)	1.58 (1.20 to 2.08)	0.001*
High	2.36 (1.37-3.79)	1.18 (0.98 to 1.41)	0.08
Highest	1.34 (1.03-1.92)	Reference group	
Human resources for health	Maternal and neonatal disorders		
Lowest	62.54 (48.47-78.88)	2.08 (1.49 to 2.91)	<0.001*
Low	31.37 (22.73-45.85)	2.22 (1.71 to 2.88)	<0.001*
Middle	18.31 (11.99-27.36)	1.97 (1.59 to 2.43)	<0.001*
High	10.00 (6.48-15.51)	1.47 (1.27 to 1.71)	<0.001*
Highest	4.49 (3.22-6.14)	Reference group	
Human resources for health	Nutritional deficiencies		
Lowest	16.86 (7.66-37.26)	1.21 (0.55 to 2.69)	0.64

Low	5.67 (1.71-14.62)	1.83 (1.02 to 3.29)	0.042*
Middle	2.17 (0.53-5.15)	1.55 (0.99 to 2.42)	0.06
High	0.66 (0.20-2.40)	1.05 (0.74 to 1.50)	0.79
Highest	0.38 (0.16-0.76)	Reference group	
Human resources for health	Neoplasms		
Lowest	110.25 (92.57-133.39)	0.65 (0.53 to 0.78)	<0.001*
Low	113.80 (99.06-136.17)	0.70 (0.61 to 0.81)	<0.001*
Middle	132.04 (111.92-159.70)	0.83 (0.73 to 0.94)	0.003*
High	155.43 (130.90-174.85)	0.94 (0.87 to 1.02)	0.13
Highest	151.69 (137.08-167.89)	Reference group	
Human resources for health	Cardiovascular diseases		
Lowest	328.65 (288.24-417.79)	1.47 (1.05 to 2.05)	0.025*
Low	332.63 (259.51-436.44)	1.46 (1.11 to 1.92)	0.006*
Middle	298.78 (216.80-426.80)	1.41 (1.13 to 1.77)	0.003*
High	297.45 (231.39-448.12)	1.44 (1.24 to 1.66)	<0.001*
Highest	185.00 (139.93-263.85)	Reference group	
Human resources for health	Chronic respiratory diseases		
Lowest	57.43 (44.01-78.13)	1.64 (1.01 to 2.68)	0.046*
Low	48.03 (30.92-67.19)	1.60 (1.12 to 2.28)	0.009*
Middle	32.81 (24.16-50.84)	1.31 (0.97 to 1.76)	0.08
High	28.13 (20.05-37.16)	1.20 (0.94 to 1.53)	0.14
Highest	21.04 (16.51-30.42)	Reference group	
Human resources for health	Digestive diseases		
Lowest	70.16 (57.65-83.35)	0.96 (0.73 to 1.25)	0.76
Low	52.06 (33.54-71.92)	1.18 (0.94 to 1.49)	0.14
Middle	35.73 (28.25-50.13)	1.14 (0.94 to 1.38)	0.18
High	33.14 (25.40-41.04)	1.12 (0.99 to 1.27)	0.06
Highest	23.30 (18.32-29.35)	Reference group	
Human resources for health	Neurological disorders		
Lowest	32.93 (30.69-35.29)	1.10 (1.01 to 1.19)	0.022*
Low	32.19 (30.30-34.19)	1.08 (1.02 to 1.15)	0.012*
Middle	31.13 (29.82-33.28)	1.05 (1.00 to 1.10)	0.042*
High	30.69 (29.29-32.89)	1.02 (0.99 to 1.05)	0.14
Highest	30.88 (29.78-32.00)	Reference group	
Human resources for health	Mental disorders		
Lowest	0.0005 (0.0004-0.0007)	0.23 (0.11 to 0.47)	<0.001*
Low	0.0009 (0.0003-0.0013)	0.38 (0.17 to 0.82)	0.014*
Middle	0.0008 (0.0004-0.0020)	0.36 (0.19 to 0.71)	0.003*
High	0.0014 (0.0004-0.0033)	0.40 (0.26 to 0.61)	<0.001*
Highest	0.0092 (0.0012-0.0169)	Reference group	
Human resources for health	Substance use disorders		
Lowest	1.79 (1.41-2.18)	0.21 (0.11 to 0.42)	<0.001*

Low	1.83 (1.38-3.75)	0.34 (0.19 to 0.59)	<0.001*
Middle	2.15 (1.34-4.31)	0.38 (0.25 to 0.57)	<0.001*
High	2.77 (1.57-6.38)	0.66 (0.49 to 0.88)	0.005*
Highest	4.62 (1.97-6.66)	Reference group	
Human resources for health	Diabetes and kidney diseases		
Lowest	68.40 (59.99-87.06)	2.83 (1.55 to 5.17)	0.001*
Low	66.84 (44.89-89.49)	3.33 (2.03 to 5.48)	<0.001*
Middle	56.59 (38.03-103.22)	3.13 (2.18 to 4.51)	<0.001*
High	38.78 (21.73-81.41)	2.28 (1.73 to 3.01)	<0.001*
Highest	19.14 (14.09-25.80)	Reference group	
Human resources for health	Skin and subcutaneous diseases		
Lowest	1.96 (1.62-2.35)	0.64 (0.22 to 1.82)	0.40
Low	1.68 (0.47-2.91)	0.87 (0.37 to 2.04)	0.75
Middle	1.52 (0.42-3.70)	1.46 (0.68 to 3.11)	0.33
High	1.31 (0.30-3.57)	1.46 (0.98 to 2.19)	0.06
Highest	0.91 (0.39-1.67)	Reference group	
Human resources for health	Musculoskeletal disorders		
Lowest	0.82 (0.64-1.16)	0.56 (0.35 to 0.89)	0.014*
Low	0.89 (0.66-1.45)	0.64 (0.45 to 0.90)	0.011*
Middle	1.26 (0.80-2.05)	0.82 (0.62 to 1.09)	0.18
High	1.21 (0.47-1.69)	0.79 (0.65 to 0.96)	0.018*
Highest	1.39 (0.97-2.21)	Reference group	
Human resources for health	Other non-communicable diseases		
Lowest	27.02 (21.33-33.20)	1.25 (0.95 to 1.66)	0.12
Low	17.99 (14.76-22.66)	1.16 (0.92 to 1.45)	0.21
Middle	17.02 (12.98-21.56)	1.22 (1.00 to 1.47)	0.045*
High	15.44 (10.96-19.88)	1.20 (1.04 to 1.39)	0.011*
Highest	11.24 (8.70-13.21)	Reference group	
Human resources for health	Transport injuries		
Lowest	25.36 (19.33-32.76)	1.70 (1.13 to 2.55)	0.011*
Low	20.47 (14.67-30.20)	2.00 (1.45 to 2.76)	<0.001*
Middle	19.10 (12.40-25.16)	1.86 (1.44 to 2.40)	<0.001*
High	16.50 (12.71-21.61)	1.62 (1.38 to 1.91)	<0.001*
Highest	9.40 (6.76-13.18)	Reference group	
Human resources for health	Unintentional injuries		
Lowest	38.63 (31.80-44.96)	1.08 (0.70 to 1.67)	0.74
Low	29.22 (21.14-36.37)	1.01 (0.75 to 1.35)	0.95
Middle	22.71 (16.61-29.66)	1.00 (0.78 to 1.27)	0.99
High	21.29 (14.65-28.58)	1.15 (0.97 to 1.36)	0.11
Highest	14.78 (11.50-19.60)	Reference group	
Human resources for health	Self-harm and interpersonal violence		
Lowest	20.44 (13.97-30.72)	0.65 (0.30 to 1.41)	0.28

Low	17.10 (10.06-29.39)	0.69 (0.39 to 1.22)	0.20
Middle	16.36 (10.85-26.20)	0.76 (0.53 to 1.09)	0.13
High	17.50 (10.73-25.69)	0.89 (0.71 to 1.11)	0.30
Highest	13.37 (10.18-18.38)	Reference group	

Notes: In the multivariable model, we adjusted for health worker densities, year, population density, percentage of the population living in urban areas, average years of schooling, GDP per capita, and HDI.

aIRR=adjusted incidence risk ratio; GDP=Gross Domestic Product; HDI=Human Development Index; HRH=Human resources for health.

*P value<0.05.

Supplementary Table S18. Associations between the proportion of doctors in nursing and midwifery staff and mortalities in 172 countries and territories from 1990 to 2019 in the multivariable GEE models.

Factors	Cause specific mortalities (per 100 000 population)	aIRR (95% CI)	P value
Doctors/Nursing and midwifery staff	HIV/AIDS and sexually transmitted infections		
Lowest	24.03 (5.30-119.91)	3.10 (1.85 to 5.20)	<0.001*
Low	3.18 (0.62-23.79)	2.66 (1.29 to 5.50)	0.008*
Middle	1.28 (0.44-4.38)	0.97 (0.63 to 1.49)	0.89
High	1.56 (0.50-6.49)	1.08 (0.69 to 1.69)	0.74
Highest	3.33 (1.35-6.60)	Reference group	
Doctors/Nursing and midwifery staff	Respiratory infections and tuberculosis		
Lowest	179.80 (42.67-270.51)	1.29 (1.06 to 1.56)	0.010*
Low	43.36 (21.14-135.25)	1.22 (0.94 to 1.59)	0.14
Middle	24.79 (17.96-53.86)	0.92 (0.75 to 1.14)	0.46
High	32.55 (22.42-52.56)	0.90 (0.75 to 1.08)	0.27
Highest	36.67 (22.87-76.56)	Reference group	
Doctors/Nursing and midwifery staff	Enteric infections		
Lowest	71.76 (4.68-129.80)	1.26 (0.82 to 1.93)	0.29
Low	2.82 (0.67-37.81)	1.37 (0.86 to 2.19)	0.18
Middle	1.61 (0.52-5.42)	0.88 (0.60 to 1.29)	0.52
High	3.70 (1.26-11.71)	0.83 (0.59 to 1.16)	0.28
Highest	3.85 (1.69-15.94)	Reference group	
Doctors/Nursing and midwifery staff	Neglected tropical diseases and malaria		
Lowest	18.74 (0.42-112.47)	1.40 (0.75 to 2.62)	0.29
Low	0.34 (0.03-4.25)	1.30 (0.71 to 2.38)	0.40
Middle	0.11 (0.03-0.50)	0.74 (0.41 to 1.33)	0.31
High	0.35 (0.09-1.58)	0.85 (0.51 to 1.40)	0.51
Highest	0.53 (0.11-1.92)	Reference group	
Doctors/Nursing and midwifery staff	Other infectious diseases		
Lowest	27.27 (4.65-50.36)	1.17 (0.86 to 1.59)	0.33
Low	4.08 (1.45-14.63)	1.09 (0.80 to 1.48)	0.60
Middle	2.77 (1.19-6.47)	0.97 (0.71 to 1.33)	0.86
High	3.63 (2.03-8.73)	0.95 (0.73 to 1.25)	0.72
Highest	3.65 (2.22-10.03)	Reference group	
Doctors/Nursing and midwifery staff	Maternal and neonatal disorders		
Lowest	43.69 (15.85-63.26)	0.84 (0.71 to 1.01)	0.06
Low	14.21 (5.80-42.26)	0.95 (0.78 to 1.15)	0.58
Middle	10.13 (5.15-27.15)	1.00 (0.85 to 1.18)	0.97
High	18.88 (8.11-33.62)	1.08 (0.92 to 1.27)	0.35

Highest	18.89 (10.50-34.64)	Reference group	
Doctors/Nursing and midwifery staff	Nutritional deficiencies		
Lowest	12.57 (4.31-28.83)	1.21 (0.76 to 1.94)	0.42
Low	1.53 (0.36-7.38)	0.91 (0.58 to 1.42)	0.67
Middle	0.69 (0.22-2.55)	0.74 (0.48 to 1.16)	0.19
High	1.13 (0.39-3.74)	0.80 (0.51 to 1.26)	0.34
Highest	2.14 (0.46-7.17)	Reference group	
Doctors/Nursing and midwifery staff	Neoplasms		
Lowest	138.31 (109.27-164.00)	1.12 (1.00 to 1.26)	0.05
Low	139.57 (114.75-161.83)	1.03 (0.92 to 1.15)	0.62
Middle	143.13 (113.33-167.71)	1.02 (0.90 to 1.15)	0.79
High	125.78 (98.21-150.47)	0.93 (0.84 to 1.03)	0.17
Highest	127.94 (109.50-153.92)	Reference group	
Doctors/Nursing and midwifery staff	Cardiovascular diseases		
Lowest	298.57 (264.22-344.68)	0.93 (0.79 to 1.10)	0.42
Low	289.10 (226.95-371.99)	1.01 (0.85 to 1.19)	0.96
Middle	294.13 (195.03-432.14)	1.17 (0.99 to 1.39)	0.07
High	331.72 (230.18-498.77)	1.25 (1.07 to 1.46)	0.005*
Highest	283.30 (192.55-399.61)	Reference group	
Doctors/Nursing and midwifery staff	Chronic respiratory diseases		
Lowest	48.72 (33.81-66.44)	0.96 (0.72 to 1.29)	0.80
Low	36.10 (22.11-57.62)	1.04 (0.79 to 1.37)	0.76
Middle	29.07 (19.20-44.17)	0.94 (0.74 to 1.18)	0.57
High	33.30 (22.68-51.07)	0.88 (0.73 to 1.06)	0.18
Highest	34.49 (24.47-52.40)	Reference group	
Doctors/Nursing and midwifery staff	Digestive diseases		
Lowest	61.98 (32.70-78.86)	0.94 (0.81 to 1.10)	0.44
Low	35.55 (25.29-57.90)	0.94 (0.81 to 1.10)	0.42
Middle	31.87 (21.28-46.13)	0.98 (0.83 to 1.15)	0.77
High	33.71 (24.62-51.28)	1.03 (0.85 to 1.25)	0.74
Highest	37.38 (26.91-54.87)	Reference group	
Doctors/Nursing and midwifery staff	Neurological disorders		
Lowest	33.02 (31.39-34.73)	1.09 (1.04 to 1.15)	<0.001*
Low	31.64 (30.32-33.31)	1.06 (1.02 to 1.09)	0.002*
Middle	31.06 (29.76-33.47)	1.06 (1.02 to 1.10)	0.002*
High	31.37 (29.93-33.40)	1.06 (1.02 to 1.09)	0.002*
Highest	30.01 (28.54-31.85)	Reference group	
Doctors/Nursing and midwifery staff	Mental disorders		
Lowest	0.0010 (0.0000-0.0010)	0.90 (0.56 to 1.45)	0.66
Low	0.0010 (0.0000-0.0030)	0.88 (0.56 to 1.39)	0.59
Middle	0.0010 (0.0000-0.0070)	0.80 (0.49 to 1.32)	0.39
High	0.0010 (0.0000-0.0030)	1.12 (0.77 to 1.63)	0.56

Highest	0.0010 (0.0000-0.0020)	Reference group	
Doctors/Nursing and midwifery staff	Substance use disorders		
Lowest	1.97 (1.53-3.25)	0.72 (0.43 to 1.22)	0.22
Low	2.34 (1.47-4.67)	0.69 (0.42 to 1.12)	0.13
Middle	3.22 (1.20-6.19)	0.87 (0.51 to 1.48)	0.60
High	2.05 (1.29-4.54)	0.70 (0.42 to 1.16)	0.17
Highest	2.21 (1.55-4.80)	Reference group	
Doctors/Nursing and midwifery staff	Diabetes and kidney diseases		
Lowest	72.39 (61.70-107.42)	1.36 (1.01 to 1.85)	0.046*
Low	59.42 (23.95-80.07)	1.32 (0.92 to 1.89)	0.13
Middle	30.41 (19.95-70.55)	0.95 (0.71 to 1.26)	0.70
High	49.91 (29.60-76.02)	1.05 (0.85 to 1.31)	0.64
Highest	46.32 (28.74-80.93)	Reference group	
Doctors/Nursing and midwifery staff	Skin and subcutaneous diseases		
Lowest	2.27 (1.86-4.51)	2.23 (1.53 to 3.25)	<0.001*
Low	1.77 (0.40-3.29)	1.61 (1.09 to 2.39)	0.017*
Middle	0.79 (0.30-2.14)	1.16 (0.72 to 1.87)	0.54
High	0.81 (0.38-1.96)	0.94 (0.67 to 1.32)	0.71
Highest	1.20 (0.47-2.08)	Reference group	
Doctors/Nursing and midwifery staff	Musculoskeletal disorders		
Lowest	1.16 (0.81-1.83)	1.05 (0.85 to 1.31)	0.65
Low	1.12 (0.71-1.97)	0.97 (0.77 to 1.22)	0.78
Middle	1.03 (0.56-1.87)	0.87 (0.68 to 1.13)	0.30
High	0.95 (0.55-1.40)	0.78 (0.63 to 0.96)	0.021*
Highest	1.20 (0.73-1.97)	Reference group	
Doctors/Nursing and midwifery staff	Other non-communicable diseases		
Lowest	23.41 (17.50-28.57)	1.16 (1.03 to 1.31)	0.013*
Low	15.73 (10.67-23.71)	1.04 (0.91 to 1.20)	0.55
Middle	14.98 (10.79-19.54)	1.10 (0.97 to 1.24)	0.13
High	16.94 (12.12-22.29)	1.13 (1.02 to 1.26)	0.02
Highest	15.77 (12.48-19.68)	Reference group	
Doctors/Nursing and midwifery staff	Transport injuries		
Lowest	22.18 (13.62-32.33)	1.02 (0.85 to 1.22)	0.85
Low	17.15 (11.70-23.48)	0.99 (0.82 to 1.21)	0.94
Middle	14.67 (9.20-20.51)	1.01 (0.82 to 1.25)	0.90
High	17.70 (10.19-26.64)	1.17 (0.98 to 1.40)	0.09
Highest	18.08 (13.48-23.58)	Reference group	
Doctors/Nursing and midwifery staff	Unintentional injuries		
Lowest	32.79 (24.89-40.37)	1.01 (0.84 to 1.21)	0.93
Low	22.76 (15.35-32.08)	0.94 (0.78 to 1.13)	0.49
Middle	19.38 (12.81-29.60)	0.98 (0.82 to 1.17)	0.81
High	22.38 (16.49-31.72)	1.02 (0.86 to 1.20)	0.86

Highest	24.34 (16.28-34.94)	Reference group	
Doctors/Nursing and midwifery staff	Self-harm and interpersonal violence		
Lowest	19.24 (13.24-26.71)	0.71 (0.50 to 1.02)	0.06
Low	17.61 (13.66-25.11)	0.84 (0.62 to 1.14)	0.26
Middle	15.55 (10.30-26.13)	1.06 (0.74 to 1.53)	0.75
High	13.42 (8.32-25.23)	0.79 (0.58 to 1.09)	0.15
Highest	17.25 (10.54-28.17)	Reference group	
Doctors/Nursing and midwifery staff	All cause mortality		
Lowest	1330.31 (857.35-1812.22)	1.12 (1.02 to 1.23)	0.014*
Low	868.44 (652.20-1248.91)	1.08 (0.98 to 1.18)	0.11
Middle	757.01 (553.78-1014.95)	1.07 (0.98 to 1.17)	0.16
High	854.91 (653.88-1063.99)	1.07 (0.99 to 1.15)	0.09
Highest	783.74 (653.01-998.54)	Reference group	

Notes: In the multivariable model, we adjusted for health worker densities, year, population density, percentage of the population living in urban areas, average years of schooling, GDP per capita, and HDI.

aIRR=adjusted incidence risk ratio; GDP=Gross Domestic Product; HDI=Human Development Index; HRH=Human resources for health.

*P value<0.05.

Supplementary Table S19. Associations between the proportion of doctors in total HRH and mortalities in 172 countries and territories from 1990 to 2019 in the multivariable GEE models.

Factors	Cause specific mortalities (per 100 000 population)	aIRR (95% CI)	P value
Doctors/total HRH	HIV/AIDS and sexually transmitted infections		
Lowest	18.38 (5.06-95.13)	5.27 (3.00 to 9.26)	<0.001*
Low	4.67 (0.93-27.65)	4.32 (2.25 to 8.27)	<0.001*
Middle	1.53 (0.42-6.22)	1.99 (1.02 to 3.89)	0.044*
High	1.74 (0.55-5.51)	1.27 (0.81 to 2.00)	0.30
Highest	2.42 (1.02-5.26)	Reference group	
Doctors/total HRH	Respiratory infections and tuberculosis		
Lowest	124.22 (31.11-243.06)	1.22 (0.99 to 1.51)	0.06
Low	43.39 (23.88-94.37)	1.31 (1.06 to 1.62)	0.013*
Middle	28.81 (16.23-62.49)	1.07 (0.80 to 1.43)	0.63
High	32.23 (20.96-67.22)	0.94 (0.79 to 1.11)	0.45
Highest	40.70 (26.87-78.00)	Reference group	
Doctors/total HRH	Enteric infections		
Lowest	48.95 (2.21-118.30)	1.48 (1.00 to 2.20)	0.05
Low	3.08 (0.88-28.56)	1.47 (1.00 to 2.16)	0.050*
Middle	1.74 (0.37-10.71)	1.37 (0.86 to 2.17)	0.18
High	3.90 (0.89-11.85)	0.95 (0.71 to 1.28)	0.74
Highest	5.04 (1.91-16.84)	Reference group	
Doctors/total HRH	Neglected tropical diseases and malaria		
Lowest	1.75 (0.08-99.83)	1.27 (0.64 to 2.51)	0.49
Low	0.36 (0.04-5.44)	1.80 (0.97 to 3.33)	0.06
Middle	0.12 (0.03-0.78)	1.17 (0.62 to 2.21)	0.63
High	0.45 (0.14-1.84)	0.88 (0.52 to 1.48)	0.63
Highest	0.50 (0.13-1.64)	Reference group	
Doctors/total HRH	Other infectious diseases		
Lowest	20.26 (2.79-43.97)	1.00 (0.74 to 1.36)	0.98
Low	4.42 (1.52-15.98)	1.23 (0.89 to 1.71)	0.21
Middle	2.06 (1.18-6.91)	0.96 (0.70 to 1.30)	0.77
High	3.82 (2.28-9.80)	0.93 (0.68 to 1.27)	0.64
Highest	4.93 (2.64-10.73)	Reference group	
Doctors/total HRH	Maternal and neonatal disorders		
Lowest	36.26 (7.91-61.23)	0.78 (0.65 to 0.93)	0.007*
Low	14.54 (5.24-38.03)	0.89 (0.73 to 1.08)	0.23
Middle	8.37 (4.87-20.67)	0.82 (0.69 to 0.97)	0.023*
High	20.02 (10.90-34.54)	0.97 (0.83 to 1.12)	0.63
Highest	24.66 (14.72-36.66)	Reference group	
Doctors/total HRH	Nutritional deficiencies		

Lowest	9.16 (1.69-25.88)	1.62 (0.94 to 2.79)	0.08
Low	2.79 (0.47-8.68)	1.55 (0.94 to 2.56)	0.09
Middle	0.71 (0.17-2.91)	1.05 (0.63 to 1.76)	0.85
High	1.09 (0.41-5.40)	1.01 (0.57 to 1.81)	0.97
Highest	1.46 (0.43-5.83)	Reference group	
Doctors/total HRH	Neoplasms		
Lowest	137.49 (109.07-162.30)	1.12 (1.00 to 1.26)	0.05
Low	144.00 (119.12-163.54)	1.10 (0.98 to 1.23)	0.09
Middle	147.18 (116.37-168.68)	1.07 (0.95 to 1.20)	0.28
High	115.89 (97.56-152.17)	0.95 (0.86 to 1.05)	0.33
Highest	126.32 (101.51-147.68)	Reference group	
Doctors/total HRH	Cardiovascular diseases		
Lowest	293.59 (236.59-327.98)	0.74 (0.62 to 0.87)	<0.001*
Low	264.82 (193.66-326.82)	0.73 (0.63 to 0.85)	<0.001*
Middle	282.58 (205.35-400.67)	0.87 (0.74 to 1.02)	0.08
High	341.74 (253.92-492.58)	1.02 (0.87 to 1.21)	0.79
Highest	365.14 (225.95-549.00)	Reference group	
Doctors/total HRH	Chronic respiratory diseases		
Lowest	43.47 (26.10-57.27)	0.96 (0.72 to 1.28)	0.78
Low	33.75 (23.28-60.03)	1.03 (0.83 to 1.28)	0.78
Middle	28.93 (18.18-54.87)	1.08 (0.80 to 1.47)	0.61
High	34.61 (25.59-54.77)	0.96 (0.81 to 1.13)	0.62
Highest	36.33 (25.81-51.65)	Reference group	
Doctors/total HRH	Digestive diseases		
Lowest	50.53 (27.14-75.97)	0.84 (0.69 to 1.02)	0.08
Low	37.71 (25.21-60.97)	0.93 (0.77 to 1.11)	0.42
Middle	31.97 (22.53-44.16)	0.87 (0.72 to 1.04)	0.13
High	34.12 (24.67-53.91)	0.90 (0.75 to 1.07)	0.22
Highest	40.88 (28.76-61.24)	Reference group	
Doctors/total HRH	Neurological disorders		
Lowest	32.11 (30.49-34.16)	1.04 (0.99 to 1.09)	0.17
Low	31.76 (30.07-33.47)	1.02 (0.99 to 1.06)	0.19
Middle	31.07 (30.01-32.96)	1.03 (0.99 to 1.07)	0.14
High	31.53 (29.48-33.99)	1.02 (0.99 to 1.06)	0.22
Highest	30.63 (29.19-33.09)	Reference group	
Doctors/total HRH	Mental disorders		
Lowest	0.0010 (0.0000-0.0010)	0.98 (0.52 to 1.87)	0.96
Low	0.0010 (0.0000-0.0050)	1.11 (0.57 to 2.17)	0.76
Middle	0.0020 (0.0000-0.0070)	1.12 (0.58 to 2.17)	0.74
High	0.0010 (0.0000-0.0020)	1.04 (0.47 to 2.34)	0.92
Highest	0.0010 (0.0000-0.0020)	Reference group	
Doctors/total HRH	Substance use disorders		

Lowest	2.09 (1.56-4.65)	0.83 (0.50 to 1.37)	0.46
Low	2.20 (1.44-4.55)	0.63 (0.38 to 1.04)	0.07
Middle	2.60 (1.27-4.92)	0.64 (0.39 to 1.07)	0.09
High	1.90 (1.22-4.07)	0.70 (0.41 to 1.18)	0.18
Highest	2.28 (1.50-5.57)	Reference group	
Doctors/total HRH	Diabetes and kidney diseases		
Lowest	68.70 (50.02-97.63)	1.41 (1.03 to 1.92)	0.031*
Low	67.13 (21.46-99.13)	1.55 (1.19 to 2.02)	0.001*
Middle	37.01 (20.93-75.78)	1.57 (1.06 to 2.31)	0.024*
High	51.17 (31.75-77.22)	1.22 (0.98 to 1.53)	0.08
Highest	41.82 (25.64-63.89)	Reference group	
Doctors/total HRH	Skin and subcutaneous diseases		
Lowest	2.15 (1.75-4.42)	3.37 (2.36 to 4.82)	<0.001*
Low	2.18 (1.27-3.66)	3.42 (2.29 to 5.09)	<0.001*
Middle	0.74 (0.30-2.17)	1.92 (1.20 to 3.08)	0.006*
High	1.27 (0.35-2.19)	1.58 (1.12 to 2.22)	0.009*
Highest	0.61 (0.25-1.64)	Reference group	
Doctors/total HRH	Musculoskeletal disorders		
Lowest	1.23 (0.81-2.10)	1.35 (1.06 to 1.73)	0.017*
Low	1.41 (0.97-2.21)	1.38 (1.08 to 1.75)	0.009*
Middle	0.92 (0.47-1.32)	0.90 (0.69 to 1.16)	0.40
High	0.97 (0.61-1.55)	1.05 (0.84 to 1.31)	0.67
Highest	0.95 (0.52-1.56)	Reference group	
Doctors/total HRH	Other non-communicable diseases		
Lowest	21.71 (15.68-27.17)	1.11 (0.98 to 1.25)	0.12
Low	18.97 (11.86-25.80)	1.17 (1.03 to 1.33)	0.016*
Middle	12.04 (9.16-17.62)	0.95 (0.82 to 1.09)	0.44
High	16.77 (12.89-21.00)	1.04 (0.94 to 1.16)	0.46
Highest	16.38 (13.32-20.52)	Reference group	
Doctors/total HRH	Transport injuries		
Lowest	20.94 (12.00-29.73)	0.87 (0.71 to 1.07)	0.18
Low	16.21 (10.93-22.56)	0.92 (0.76 to 1.11)	0.40
Middle	14.85 (9.73-21.00)	0.93 (0.78 to 1.11)	0.42
High	19.00 (14.24-26.81)	1.15 (0.92 to 1.43)	0.22
Highest	19.30 (13.67-25.49)	Reference group	
Doctors/total HRH	Unintentional injuries		
Lowest	30.33 (18.31-40.02)	1.01 (0.83 to 1.24)	0.89
Low	22.47 (15.47-32.02)	0.96 (0.82 to 1.12)	0.61
Middle	20.24 (13.81-29.46)	1.01 (0.83 to 1.24)	0.90
High	25.38 (17.74-37.33)	1.10 (0.93 to 1.31)	0.28
Highest	25.20 (17.96-34.34)	Reference group	
Doctors/total HRH	Self-harm and interpersonal violence		

Lowest	19.33 (13.03-26.34)	0.80 (0.56 to 1.13)	0.21
Low	16.78 (11.94-28.12)	0.89 (0.65 to 1.22)	0.48
Middle	15.31 (11.88-20.95)	0.92 (0.67 to 1.26)	0.61
High	14.92 (7.79-25.02)	0.85 (0.58 to 1.26)	0.42
Highest	17.44 (10.16-33.30)	Reference group	
Doctors/total HRH	All cause mortality		
Lowest	1172.09 (647.39-1746.96)	1.03 (0.93 to 1.14)	0.54
Low	830.42 (586.48-1095.88)	1.02 (0.94 to 1.11)	0.69
Middle	778.24 (572.69-1028.55)	1.03 (0.93 to 1.13)	0.61
High	882.73 (668.65-1076.69)	1.03 (0.95 to 1.12)	0.50
Highest	887.27 (715.69-1149.58)	Reference group	

Notes: In the multivariable model, we adjusted for health worker densities, year, population density, percentage of the population living in urban areas, average years of schooling, GDP per capita, and HDI.

aIRR=adjusted incidence risk ratio; GDP=Gross Domestic Product; HDI=Human Development Index; HRH=Human resources for health.

*P value<0.05.

Supplementary Table S20. Associations between the proportion of nursing and midwifery staff in total HRH and mortalities in 172 countries and territories from 1990 to 2019 in the multivariable GEE models.

Factors	Cause specific mortalities (per 100 000 population)	aIRR (95% CI)	P value
Nursing and midwifery staff/total HRH	HIV/AIDS and sexually transmitted infections		
Lowest	4.02 (1.37-8.50)	1.23 (0.59 to 2.59)	0.58
Low	3.52 (0.54-12.50)	1.23 (0.64 to 2.39)	0.54
Middle	1.60 (0.42-7.29)	0.98 (0.37 to 2.56)	0.96
High	2.71 (0.62-11.29)	0.98 (0.46 to 2.07)	0.95
Highest	5.39 (1.38-75.11)	Reference group	
Nursing and midwifery staff/total HRH	Respiratory infections and tuberculosis		
Lowest	31.56 (19.62-63.84)	0.89 (0.74 to 1.08)	0.23
Low	32.71 (18.04-67.48)	0.90 (0.75 to 1.09)	0.29
Middle	31.45 (20.81-62.64)	0.89 (0.72 to 1.10)	0.29
High	45.86 (26.25-110.86)	1.07 (0.86 to 1.33)	0.56
Highest	90.00 (41.92-236.26)	Reference group	
Nursing and midwifery staff/total HRH	Enteric infections		
Lowest	2.78 (1.26-11.00)	1.11 (0.72 to 1.71)	0.64
Low	2.76 (1.07-10.36)	1.12 (0.75 to 1.67)	0.59
Middle	2.18 (0.56-11.25)	0.92 (0.58 to 1.46)	0.72
High	7.23 (0.79-27.87)	1.29 (0.84 to 1.98)	0.25
Highest	21.17 (3.18-117.79)	Reference group	
Nursing and midwifery staff/total HRH	Neglected tropical diseases and malaria		
Lowest	0.32 (0.07-1.88)	1.09 (0.59 to 2.04)	0.78
Low	0.25 (0.05-1.38)	1.16 (0.70 to 1.94)	0.57
Middle	0.20 (0.03-2.18)	1.07 (0.62 to 1.86)	0.80
High	0.45 (0.09-1.63)	1.06 (0.66 to 1.71)	0.80
Highest	1.66 (0.33-80.64)	Reference group	
Nursing and midwifery staff/total HRH	Other infectious diseases		
Lowest	2.98 (1.76-7.71)	0.91 (0.66 to 1.25)	0.56
Low	2.78 (1.40-8.38)	0.85 (0.64 to 1.12)	0.24
Middle	2.88 (1.36-8.76)	0.79 (0.61 to 1.02)	0.07
High	5.19 (2.25-17.37)	1.02 (0.80 to 1.29)	0.89
Highest	16.92 (4.92-41.16)	Reference group	
Nursing and midwifery staff/total HRH	Maternal and neonatal disorders		
Lowest	14.86 (6.25-30.15)	1.01 (0.84 to 1.21)	0.95
Low	13.63 (4.52-29.83)	0.98 (0.83 to 1.16)	0.81
Middle	12.50 (5.66-33.25)	1.00 (0.84 to 1.20)	0.97
High	18.15 (8.64-41.35)	1.01 (0.87 to 1.18)	0.87
Highest	34.69 (22.09-60.17)	Reference group	
Nursing and midwifery staff/total HRH	Nutritional deficiencies		

Lowest	2.29 (0.48-5.67)	1.51 (0.94 to 2.43)	0.089*
Low	1.99 (0.43-6.69)	1.49 (0.97 to 2.29)	0.07
Middle	0.83 (0.22-5.31)	1.00 (0.63 to 1.61)	0.99
High	1.73 (0.35-6.91)	1.03 (0.69 to 1.53)	0.89
Highest	6.43 (0.70-23.41)	Reference group	
Nursing and midwifery staff/total HRH	Neoplasms		
Lowest	137.71 (114.07-158.91)	0.95 (0.86 to 1.05)	0.27
Low	131.74 (111.65-152.53)	0.92 (0.84 to 1.02)	0.12
Middle	138.90 (108.90-160.95)	0.95 (0.86 to 1.05)	0.29
High	133.54 (104.00-171.02)	0.96 (0.86 to 1.07)	0.43
Highest	131.55 (108.24-158.64)	Reference group	
Nursing and midwifery staff/total HRH	Cardiovascular diseases		
Lowest	258.63 (180.75-347.56)	0.73 (0.61 to 0.88)	0.001*
Low	238.70 (162.17-317.17)	0.69 (0.59 to 0.82)	<0.001*
Middle	271.89 (212.05-353.77)	0.81 (0.69 to 0.95)	0.01
High	340.89 (278.93-470.38)	0.97 (0.84 to 1.13)	0.71
Highest	358.33 (289.57-571.96)	Reference group	
Nursing and midwifery staff/total HRH	Chronic respiratory diseases		
Lowest	31.14 (20.77-53.51)	1.07 (0.82 to 1.39)	0.64
Low	30.17 (21.33-44.78)	0.96 (0.77 to 1.21)	0.75
Middle	28.42 (20.53-47.75)	0.95 (0.76 to 1.20)	0.67
High	38.42 (27.84-54.60)	1.15 (0.87 to 1.51)	0.33
Highest	50.25 (34.00-68.12)	Reference group	
Nursing and midwifery staff/total HRH	Digestive diseases		
Lowest	33.17 (23.59-47.25)	0.95 (0.82 to 1.08)	0.41
Low	34.31 (24.02-49.80)	0.99 (0.87 to 1.14)	0.91
Middle	31.64 (23.35-54.32)	1.00 (0.87 to 1.15)	1.00
High	37.17 (28.08-62.76)	1.08 (0.91 to 1.29)	0.37
Highest	61.10 (35.76-74.76)	Reference group	
Nursing and midwifery staff/total HRH	Neurological disorders		
Lowest	30.02 (28.74-31.59)	0.89 (0.85 to 0.93)	<0.001*
Low	31.18 (29.63-32.90)	0.91 (0.88 to 0.95)	<0.001*
Middle	31.29 (29.82-33.52)	0.93 (0.89 to 0.97)	0.001*
High	31.97 (30.52-34.36)	0.96 (0.92 to 1.00)	0.041*
Highest	33.12 (31.13-35.61)	Reference group	
Nursing and midwifery staff/total HRH	Mental disorders		
Lowest	0.0010 (0.0000-0.0020)	1.00 (0.64 to 1.57)	1.00
Low	0.0010 (0.0000-0.0080)	1.21 (0.81 to 1.80)	0.35
Middle	0.0010 (0.0000-0.0100)	1.48 (1.03 to 2.12)	0.034*
High	0.0010 (0.0000-0.0020)	0.79 (0.61 to 1.02)	0.07
Highest	0.0010 (0.0000-0.0010)	Reference group	
Nursing and midwifery staff/total HRH	Substance use disorders		

Lowest	2.66 (1.67-5.58)	1.29 (0.81 to 2.04)	0.29
Low	2.62 (1.50-5.77)	1.24 (0.85 to 1.82)	0.26
Middle	2.00 (1.31-4.70)	0.98 (0.74 to 1.30)	0.88
High	1.71 (1.18-3.63)	0.77 (0.59 to 1.00)	0.05
Highest	2.15 (1.64-4.29)	Reference group	
Nursing and midwifery staff/total HRH	Diabetes and kidney diseases		
Lowest	47.90 (23.32-83.25)	0.96 (0.70 to 1.31)	0.78
Low	52.63 (23.19-79.02)	0.96 (0.71 to 1.29)	0.78
Middle	49.89 (21.90-76.43)	0.95 (0.72 to 1.27)	0.75
High	59.21 (28.77-87.43)	1.23 (0.85 to 1.79)	0.27
Highest	64.83 (37.68-84.59)	Reference group	
Nursing and midwifery staff/total HRH	Skin and subcutaneous diseases		
Lowest	1.75 (0.68-2.82)	1.11 (0.66 to 1.86)	0.70
Low	1.58 (0.71-2.44)	1.01 (0.62 to 1.63)	0.98
Middle	0.98 (0.36-2.31)	0.88 (0.52 to 1.50)	0.65
High	1.53 (0.35-2.47)	1.15 (0.72 to 1.85)	0.55
Highest	1.83 (0.34-2.87)	Reference group	
Nursing and midwifery staff/total HRH	Musculoskeletal disorders		
Lowest	1.40 (0.92-2.19)	1.41 (1.11 to 1.79)	0.006*
Low	1.36 (0.95-2.11)	1.33 (1.07 to 1.65)	0.011*
Middle	1.17 (0.64-1.70)	1.14 (0.92 to 1.41)	0.24
High	0.78 (0.49-1.19)	0.90 (0.73 to 1.11)	0.32
Highest	0.93 (0.65-1.37)	Reference group	
Nursing and midwifery staff/total HRH	Other non-communicable diseases		
Lowest	15.44 (11.74-19.81)	0.94 (0.82 to 1.07)	0.34
Low	17.10 (11.03-21.93)	0.98 (0.87 to 1.11)	0.77
Middle	14.50 (10.91-21.96)	0.88 (0.78 to 1.00)	0.04
High	17.11 (11.99-24.11)	0.95 (0.84 to 1.07)	0.38
Highest	21.42 (15.61-27.71)	Reference group	
Nursing and midwifery staff/total HRH	Transport injuries		
Lowest	15.94 (10.89-21.23)	0.74 (0.59 to 0.93)	0.010*
Low	15.69 (9.10-22.56)	0.70 (0.56 to 0.88)	0.002*
Middle	16.84 (11.19-24.23)	0.78 (0.63 to 0.97)	0.027*
High	17.93 (12.68-25.33)	0.91 (0.75 to 1.11)	0.35
Highest	23.81 (16.59-35.16)	Reference group	
Nursing and midwifery staff/total HRH	Unintentional injuries		
Lowest	22.11 (15.03-33.09)	1.07 (0.89 to 1.27)	0.48
Low	20.10 (14.17-28.88)	0.98 (0.85 to 1.14)	0.83
Middle	20.78 (13.71-31.98)	1.08 (0.87 to 1.34)	0.48
High	27.85 (17.52-34.11)	1.09 (0.92 to 1.28)	0.33
Highest	32.31 (24.08-41.76)	Reference group	
Nursing and midwifery staff/total HRH	Self-harm and interpersonal violence		

Lowest	17.26 (11.98-28.64)	1.15 (0.87 to 1.51)	0.33
Low	15.15 (9.76-23.42)	1.09 (0.83 to 1.45)	0.54
Middle	16.20 (10.41-22.41)	1.06 (0.81 to 1.39)	0.66
High	15.73 (10.82-24.64)	0.84 (0.65 to 1.10)	0.20
Highest	19.47 (13.38-32.28)	Reference group	
Nursing and midwifery staff/total HRH	All cause mortality		
Lowest	741.70 (608.11-931.14)	0.85 (0.78 to 0.93)	0.001*
Low	709.50 (529.86-921.41)	0.83 (0.76 to 0.91)	<0.001*
Middle	784.39 (570.78-1063.38)	0.89 (0.81 to 0.97)	0.01
High	964.79 (798.83-1239.65)	1.00 (0.92 to 1.08)	0.98
Highest	1202.92 (905.61-1755.64)	Reference group	

Notes: In the multivariable model, we adjusted for health worker densities, year, population density, percentage of the population living in urban areas, average years of schooling, GDP per capita, and HDI.

aIRR=adjusted incidence risk ratio; GDP=Gross Domestic Product; HDI=Human Development Index; HRH=Human resources for health.

*P value<0.05.

Supplementary Table S21. Associations between the proportion of dentistry staff in total HRH and mortalities in 172 countries and territories from 1990 to 2019 in the multivariable GEE models.

Factors	Cause specific mortalities (per 100 000 population)	aIRR (95% CI)	P value
Dentistry staff/total HRH	HIV/AIDS and sexually transmitted infections		
Lowest	65.88 (18.68-191.66)	4.15 (1.81 to 9.48)	0.001*
Low	2.23 (0.58-9.32)	1.69 (0.79 to 3.62)	0.17
Middle	1.30 (0.49-3.30)	1.59 (0.58 to 4.35)	0.37
High	1.80 (0.42-4.20)	0.78 (0.47 to 1.29)	0.33
Highest	3.43 (0.76-6.62)	Reference group	
Dentistry staff/total HRH	Respiratory infections and tuberculosis		
Lowest	217.70 (153.56-289.10)	1.04 (0.75 to 1.46)	0.81
Low	47.37 (29.80-79.51)	1.01 (0.80 to 1.26)	0.97
Middle	25.90 (17.46-46.22)	0.84 (0.66 to 1.08)	0.17
High	26.10 (17.50-40.42)	0.74 (0.61 to 0.90)	0.002*
Highest	33.07 (23.04-54.06)	Reference group	
Dentistry staff/total HRH	Enteric infections		
Lowest	110.34 (63.57-157.49)	1.18 (0.74 to 1.88)	0.50
Low	4.16 (1.37-15.21)	1.35 (0.92 to 1.99)	0.12
Middle	1.40 (0.55-4.09)	0.95 (0.61 to 1.47)	0.81
High	2.08 (0.47-5.85)	0.75 (0.56 to 0.99)	0.042*
Highest	3.37 (1.36-8.40)	Reference group	
Dentistry staff/total HRH	Neglected tropical diseases and malaria		
Lowest	60.81 (12.23-150.51)	1.33 (0.52 to 3.42)	0.56
Low	0.39 (0.06-1.28)	0.53 (0.32 to 0.90)	0.017*
Middle	0.12 (0.03-0.52)	0.40 (0.23 to 0.67)	0.001*
High	0.14 (0.04-0.46)	0.33 (0.20 to 0.56)	<0.001*
Highest	0.37 (0.10-1.53)	Reference group	
Dentistry staff/total HRH	Other infectious diseases		
Lowest	45.04 (28.11-69.92)	1.34 (0.93 to 1.94)	0.11
Low	4.91 (1.61-11.07)	1.21 (0.86 to 1.68)	0.28
Middle	2.71 (1.48-5.58)	1.02 (0.74 to 1.39)	0.92
High	2.55 (1.40-5.13)	0.92 (0.70 to 1.19)	0.51
Highest	2.86 (1.83-5.64)	Reference group	
Dentistry staff/total HRH	Maternal and neonatal disorders		
Lowest	62.71 (51.24-79.23)	1.05 (0.79 to 1.39)	0.74
Low	21.78 (7.38-34.00)	1.14 (0.94 to 1.38)	0.18
Middle	8.60 (4.67-21.80)	0.97 (0.80 to 1.19)	0.79
High	11.23 (5.59-18.65)	0.88 (0.74 to 1.05)	0.17
Highest	14.99 (7.73-25.54)	Reference group	

Dentistry staff/total HRH	Nutritional deficiencies		
Lowest	20.58 (10.24-34.35)	0.75 (0.41 to 1.39)	0.36
Low	2.18 (0.48-5.23)	0.82 (0.52 to 1.29)	0.40
Middle	0.66 (0.22-1.45)	0.55 (0.35 to 0.87)	0.011*
High	0.63 (0.23-1.95)	0.44 (0.29 to 0.67)	<0.001*
Highest	2.33 (0.40-5.97)	Reference group	
Dentistry staff/total HRH	Neoplasms		
Lowest	114.16 (98.32-137.81)	1.06 (0.95 to 1.19)	0.32
Low	136.61 (109.25-161.02)	1.03 (0.92 to 1.15)	0.61
Middle	145.61 (119.94-170.42)	1.05 (0.97 to 1.15)	0.23
High	142.22 (111.89-163.53)	1.03 (0.93 to 1.14)	0.55
Highest	134.80 (114.83-161.29)	Reference group	
Dentistry staff/total HRH	Cardiovascular diseases		
Lowest	305.15 (272.66-350.32)	0.80 (0.62 to 1.03)	0.08
Low	320.86 (243.82-491.65)	1.24 (1.02 to 1.51)	0.034*
Middle	295.88 (177.56-454.90)	1.23 (1.03 to 1.49)	0.026*
High	307.50 (233.15-423.79)	1.18 (1.00 to 1.39)	0.05
Highest	246.55 (189.30-350.93)	Reference group	
Dentistry staff/total HRH	Chronic respiratory diseases		
Lowest	53.06 (42.74-69.72)	0.79 (0.59 to 1.06)	0.12
Low	31.13 (18.37-61.48)	1.18 (0.94 to 1.49)	0.15
Middle	32.07 (21.10-48.43)	1.20 (1.00 to 1.44)	0.06
High	32.54 (20.27-47.37)	1.11 (0.94 to 1.31)	0.24
Highest	30.08 (23.33-39.45)	Reference group	
Dentistry staff/total HRH	Digestive diseases		
Lowest	71.07 (61.62-81.99)	0.84 (0.67 to 1.05)	0.13
Low	33.48 (25.35-54.15)	0.98 (0.82 to 1.17)	0.83
Middle	28.88 (20.90-41.00)	0.95 (0.81 to 1.11)	0.51
High	31.51 (23.76-43.78)	0.96 (0.84 to 1.09)	0.50
Highest	35.50 (27.41-46.82)	Reference group	
Dentistry staff/total HRH	Neurological disorders		
Lowest	32.63 (30.85-35.18)	1.01 (0.95 to 1.06)	0.83
Low	31.27 (30.18-33.15)	1.05 (1.00 to 1.10)	0.05
Middle	31.12 (29.67-33.21)	1.02 (0.99 to 1.06)	0.14
High	31.33 (29.83-34.13)	1.03 (1.00 to 1.06)	0.06
Highest	30.78 (29.32-32.66)	Reference group	
Dentistry staff/total HRH	Mental disorders		
Lowest	0.0010 (0.0000-0.0010)	1.17 (0.41 to 3.40)	0.77
Low	0.0010 (0.0000-0.0020)	0.69 (0.31 to 1.51)	0.35
Middle	0.0020 (0.0010-0.0100)	1.34 (0.62 to 2.87)	0.46
High	0.0010 (0.0000-0.0050)	1.18 (0.53 to 2.63)	0.69
Highest	0.0010 (0.0000-0.0030)	Reference group	

Dentistry staff/total HRH	Substance use disorders		
Lowest	1.82 (1.47-2.19)	0.54 (0.24 to 1.19)	0.13
Low	3.42 (1.56-5.40)	0.85 (0.50 to 1.46)	0.56
Middle	2.40 (1.23-5.39)	0.98 (0.57 to 1.69)	0.95
High	2.15 (1.40-7.09)	1.13 (0.65 to 1.94)	0.67
Highest	2.46 (1.55-4.79)	Reference group	
Dentistry staff/total HRH	Diabetes and kidney diseases		
Lowest	68.86 (62.06-82.33)	0.68 (0.45 to 1.03)	0.07
Low	66.74 (24.66-103.90)	1.15 (0.83 to 1.59)	0.40
Middle	29.38 (18.49-75.77)	0.89 (0.63 to 1.24)	0.48
High	38.57 (20.31-60.40)	0.92 (0.71 to 1.20)	0.53
Highest	48.01 (30.41-76.32)	Reference group	
Dentistry staff/total HRH	Skin and subcutaneous diseases		
Lowest	2.03 (1.79-2.39)	1.94 (1.07 to 3.51)	0.029*
Low	1.73 (0.60-5.99)	2.67 (1.64 to 4.36)	<0.001*
Middle	0.61 (0.29-2.56)	1.15 (0.76 to 1.76)	0.51
High	0.89 (0.39-2.06)	1.08 (0.72 to 1.63)	0.70
Highest	1.09 (0.38-2.09)	Reference group	
Dentistry staff/total HRH	Musculoskeletal disorders		
Lowest	1.02 (0.75-1.39)	1.32 (0.97 to 1.79)	0.07
Low	1.42 (0.65-2.18)	1.12 (0.88 to 1.42)	0.37
Middle	1.00 (0.47-1.59)	0.82 (0.63 to 1.05)	0.12
High	0.98 (0.64-1.39)	0.83 (0.67 to 1.04)	0.10
Highest	1.31 (0.80-1.88)	Reference group	
Dentistry staff/total HRH	Other non-communicable diseases		
Lowest	25.92 (21.05-32.61)	1.14 (0.95 to 1.36)	0.17
Low	18.90 (12.47-23.84)	1.25 (1.07 to 1.46)	0.005*
Middle	14.71 (10.69-19.41)	1.06 (0.92 to 1.23)	0.41
High	14.10 (10.35-18.29)	1.00 (0.88 to 1.14)	0.98
Highest	15.03 (11.47-18.80)	Reference group	
Dentistry staff/total HRH	Transport injuries		
Lowest	23.27 (17.95-31.32)	0.72 (0.53 to 0.97)	0.034*
Low	15.54 (9.57-23.69)	0.96 (0.77 to 1.20)	0.74
Middle	14.62 (8.37-22.47)	0.98 (0.81 to 1.18)	0.83
High	15.97 (11.11-23.73)	1.01 (0.88 to 1.16)	0.89
Highest	17.90 (14.59-23.39)	Reference group	
Dentistry staff/total HRH	Unintentional injuries		
Lowest	37.09 (31.75-42.98)	1.01 (0.77 to 1.32)	0.96
Low	23.90 (16.83-31.40)	1.06 (0.90 to 1.24)	0.49
Middle	18.21 (13.32-27.61)	1.04 (0.89 to 1.22)	0.64
High	20.37 (14.72-31.90)	1.12 (0.96 to 1.31)	0.14
Highest	21.38 (16.14-26.70)	Reference group	

Dentistry staff/total HRH	Self-harm and interpersonal violence		
Lowest	22.15 (16.46-31.62)	0.66 (0.41 to 1.07)	0.09
Low	14.43 (9.22-22.09)	0.73 (0.54 to 0.99)	0.041*
Middle	12.26 (8.29-23.08)	0.84 (0.63 to 1.11)	0.23
High	15.17 (10.45-22.52)	0.82 (0.61 to 1.10)	0.18
Highest	18.17 (13.73-27.70)	Reference group	
Dentistry staff/total HRH	All cause mortality		
Lowest	1490.96 (1272.22-1809.35)	1.05 (0.92 to 1.19)	0.49
Low	882.56 (684.46-1158.87)	1.12 (1.02 to 1.22)	0.020*
Middle	749.30 (534.06-1022.62)	1.09 (1.00 to 1.18)	0.06
High	791.79 (600.89-933.78)	1.05 (0.98 to 1.12)	0.20
Highest	738.12 (640.38-892.00)	Reference group	

Notes: In the multivariable model, we adjusted for health worker densities, year, population density, percentage of the population living in urban areas, average years of schooling, GDP per capita, and HDI.

aIRR=adjusted incidence risk ratio; GDP=Gross Domestic Product; HDI=Human Development Index; HRH=Human resources for health.

*P value<0.05.

Supplementary Table S22. Associations between the proportion of pharmaceutical staff in total HRH and mortalities in 172 countries and territories from 1990 to 2019 in the multivariable GEE models.

Factors	Cause specific mortalities (per 100 000 population)	aIRR (95% CI)	P value
Pharmaceutical staff/total HRH	HIV/AIDS and sexually transmitted infections		
Lowest	9.76 (3.14-35.80)	4.64 (2.59 to 8.33)	<0.001*
Low	7.70 (1.79-36.50)	3.65 (2.31 to 5.76)	<0.001*
Middle	1.87 (0.46-8.99)	3.67 (1.69 to 7.99)	0.001*
High	1.88 (0.70-6.37)	2.25 (1.40 to 3.61)	0.001*
Highest	1.19 (0.41-3.54)	Reference group	
Pharmaceutical staff/total HRH	Respiratory infections and tuberculosis		
Lowest	56.02 (29.88-187.56)	1.03 (0.82 to 1.29)	0.79
Low	44.58 (22.47-184.36)	0.97 (0.78 to 1.19)	0.76
Middle	32.62 (17.96-79.02)	1.09 (0.86 to 1.38)	0.48
High	34.13 (20.40-94.66)	1.11 (0.86 to 1.43)	0.42
Highest	37.96 (24.47-71.61)	Reference group	
Pharmaceutical staff/total HRH	Enteric infections		
Lowest	11.11 (2.28-75.23)	1.10 (0.77 to 1.57)	0.60
Low	4.20 (1.11-79.77)	0.82 (0.57 to 1.18)	0.29
Middle	1.70 (0.54-10.56)	0.93 (0.62 to 1.38)	0.71
High	2.65 (0.51-15.98)	1.15 (0.77 to 1.72)	0.50
Highest	4.15 (1.85-12.57)	Reference group	
Pharmaceutical staff/total HRH	Neglected tropical diseases and malaria		
Lowest	1.15 (0.31-13.18)	1.58 (0.85 to 2.94)	0.15
Low	0.52 (0.03-30.12)	1.12 (0.60 to 2.07)	0.73
Middle	0.16 (0.02-1.03)	1.05 (0.61 to 1.78)	0.87
High	0.30 (0.05-1.97)	1.35 (0.89 to 2.04)	0.16
Highest	0.39 (0.10-1.30)	Reference group	
Pharmaceutical staff/total HRH	Other infectious diseases		
Lowest	5.26 (2.90-27.62)	0.65 (0.48 to 0.89)	0.006*
Low	4.50 (1.65-31.69)	0.71 (0.52 to 0.96)	0.024*
Middle	2.59 (1.29-10.26)	0.76 (0.56 to 1.03)	0.08
High	3.94 (1.57-10.93)	0.83 (0.62 to 1.11)	0.21
Highest	5.82 (2.29-14.07)	Reference group	
Pharmaceutical staff/total HRH	Maternal and neonatal disorders		
Lowest	28.92 (14.69-52.75)	0.87 (0.73 to 1.04)	0.14
Low	22.78 (6.83-56.64)	0.83 (0.68 to 1.00)	0.047*
Middle	12.16 (4.74-35.77)	0.80 (0.66 to 0.96)	0.019*
High	12.95 (6.28-27.94)	0.75 (0.63 to 0.88)	<0.001*
Highest	19.37 (9.81-36.90)	Reference group	
Pharmaceutical staff/total HRH	Nutritional deficiencies		

Lowest	5.94 (2.30-16.59)	1.85 (1.19 to 2.87)	0.006*
Low	3.10 (0.48-16.21)	1.34 (0.87 to 2.06)	0.19
Middle	0.63 (0.28-5.42)	1.01 (0.67 to 1.52)	0.98
High	1.14 (0.18-6.11)	1.10 (0.73 to 1.64)	0.65
Highest	1.24 (0.58-3.91)	Reference group	
Pharmaceutical staff/total HRH	Neoplasms		
Lowest	131.06 (110.45-154.41)	1.14 (1.04 to 1.26)	0.008*
Low	139.85 (109.80-162.67)	1.15 (1.03 to 1.28)	0.011*
Middle	140.25 (115.99-161.48)	1.11 (1.02 to 1.21)	0.016*
High	143.54 (114.67-165.11)	1.12 (1.03 to 1.23)	0.011*
Highest	117.36 (92.85-147.91)	Reference group	
Pharmaceutical staff/total HRH	Cardiovascular diseases		
Lowest	285.70 (217.37-383.64)	0.76 (0.64 to 0.90)	0.002*
Low	269.26 (213.82-336.06)	0.69 (0.59 to 0.80)	<0.001*
Middle	290.93 (192.88-386.87)	0.78 (0.67 to 0.92)	0.002*
High	302.67 (230.28-401.39)	0.87 (0.76 to 1.01)	0.07
Highest	361.15 (268.39-458.74)	Reference group	
Pharmaceutical staff/total HRH	Chronic respiratory diseases		
Lowest	34.74 (24.18-61.10)	0.74 (0.58 to 0.96)	0.020*
Low	37.96 (23.21-50.46)	0.77 (0.61 to 0.99)	0.039*
Middle	29.80 (19.83-48.74)	0.72 (0.59 to 0.87)	0.001*
High	32.00 (21.35-65.94)	0.98 (0.78 to 1.24)	0.87
Highest	40.55 (28.55-58.67)	Reference group	
Pharmaceutical staff/total HRH	Digestive diseases		
Lowest	52.10 (32.14-72.02)	0.99 (0.81 to 1.22)	0.93
Low	40.72 (27.67-63.50)	0.89 (0.75 to 1.07)	0.21
Middle	31.18 (21.18-54.17)	0.89 (0.74 to 1.07)	0.21
High	34.24 (23.92-52.76)	0.94 (0.79 to 1.14)	0.54
Highest	34.07 (26.95-51.69)	Reference group	
Pharmaceutical staff/total HRH	Neurological disorders		
Lowest	31.71 (30.03-33.67)	0.98 (0.94 to 1.03)	0.42
Low	31.47 (30.02-33.72)	0.98 (0.94 to 1.02)	0.34
Middle	31.04 (29.16-32.89)	0.97 (0.93 to 1.00)	0.06
High	30.88 (29.19-33.16)	0.98 (0.94 to 1.01)	0.17
Highest	32.06 (30.40-34.57)	Reference group	
Pharmaceutical staff/total HRH	Mental disorders		
Lowest	0.0010 (0.0000-0.0010)	1.83 (1.26 to 2.68)	0.002*
Low	0.0010 (0.0010-0.0040)	2.41 (1.57 to 3.69)	<0.001*
Middle	0.0010 (0.0010-0.0060)	2.70 (1.80 to 4.04)	<0.001*
High	0.0010 (0.0000-0.0030)	2.42 (1.37 to 4.25)	0.002*
Highest	0.0000 (0.0000-0.0020)	Reference group	
Pharmaceutical staff/total HRH	Substance use disorders		

Lowest		2.66 (1.70-6.68)	2.33 (1.49 to 3.65)	<0.001*
Low		2.79 (1.66-5.53)	1.68 (1.14 to 2.48)	0.009*
Middle		2.13 (1.39-4.63)	1.43 (0.96 to 2.12)	0.08
High		2.14 (1.52-3.52)	1.14 (0.86 to 1.51)	0.37
Highest		1.63 (0.73-3.06)	Reference group	
Pharmaceutical staff/total HRH	Diabetes and kidney diseases			
Lowest		68.13 (44.80-98.69)	0.84 (0.61 to 1.15)	0.27
Low		51.53 (23.72-72.79)	0.66 (0.47 to 0.92)	0.016*
Middle		31.24 (17.54-61.01)	0.55 (0.39 to 0.76)	<0.001*
High		45.88 (22.18-82.00)	0.75 (0.53 to 1.05)	0.09
Highest		63.57 (41.39-92.71)	Reference group	
Pharmaceutical staff/total HRH	Skin and subcutaneous diseases			
Lowest		1.96 (1.40-3.60)	1.63 (1.07 to 2.49)	0.024*
Low		1.83 (0.78-2.44)	1.38 (0.88 to 2.15)	0.16
Middle		0.89 (0.37-2.24)	0.96 (0.62 to 1.48)	0.86
High		1.12 (0.42-2.85)	1.59 (1.00 to 2.53)	0.05
Highest		1.08 (0.42-2.78)	Reference group	
Pharmaceutical staff/total HRH	Musculoskeletal disorders			
Lowest		1.47 (1.00-2.22)	1.68 (1.29 to 2.18)	<0.001*
Low		1.38 (0.73-2.05)	1.45 (1.12 to 1.87)	0.005*
Middle		1.06 (0.66-1.62)	1.11 (0.86 to 1.44)	0.42
High		0.96 (0.57-1.28)	1.05 (0.81 to 1.36)	0.69
Highest		0.81 (0.49-1.33)	Reference group	
Pharmaceutical staff/total HRH	Other non-communicable diseases			
Lowest		19.42 (14.66-25.80)	1.04 (0.90 to 1.21)	0.58
Low		18.93 (12.92-26.86)	1.03 (0.90 to 1.18)	0.66
Middle		15.09 (10.72-20.09)	0.95 (0.83 to 1.08)	0.42
High		15.17 (10.38-20.84)	0.95 (0.83 to 1.09)	0.46
Highest		17.26 (12.89-22.42)	Reference group	
Pharmaceutical staff/total HRH	Transport injuries			
Lowest		19.60 (14.30-25.78)	0.71 (0.57 to 0.89)	0.003*
Low		16.59 (10.99-21.92)	0.65 (0.52 to 0.81)	<0.001*
Middle		15.42 (9.56-24.30)	0.69 (0.55 to 0.87)	0.002*
High		16.57 (11.10-24.76)	0.80 (0.66 to 0.96)	0.019*
Highest		20.60 (13.83-30.14)	Reference group	
Pharmaceutical staff/total HRH	Unintentional injuries			
Lowest		27.46 (20.19-37.22)	1.02 (0.83 to 1.24)	0.88
Low		24.59 (15.21-34.63)	0.85 (0.72 to 1.00)	0.05
Middle		20.44 (14.03-35.53)	0.93 (0.79 to 1.10)	0.39
High		24.83 (15.93-35.05)	1.07 (0.90 to 1.27)	0.43
Highest		23.99 (16.18-32.32)	Reference group	
Pharmaceutical staff/total HRH	Self-harm and interpersonal violence			

Lowest	23.98 (15.39-36.44)	1.41 (1.00 to 1.99)	0.050*
Low	17.73 (13.04-26.62)	1.27 (0.88 to 1.84)	0.21
Middle	16.75 (11.95-25.08)	1.10 (0.83 to 1.46)	0.50
High	15.16 (9.69-24.08)	1.01 (0.75 to 1.37)	0.96
Highest	12.29 (7.87-18.00)	Reference group	
Pharmaceutical staff/total HRH	All cause mortality		
Lowest	886.50 (704.97-1412.28)	0.94 (0.85 to 1.04)	0.24
Low	862.18 (626.41-1310.81)	0.90 (0.82 to 0.98)	0.019*
Middle	797.12 (559.70-1094.25)	0.93 (0.85 to 1.02)	0.11
High	835.81 (625.71-1071.37)	0.97 (0.90 to 1.06)	0.55
Highest	906.41 (722.46-1089.67)	Reference group	

Notes: In the multivariable model, we adjusted for health worker densities, year, population density, percentage of the population living in urban areas, average years of schooling, GDP per capita, and HDI.

aIRR=adjusted incidence risk ratio; GDP=Gross Domestic Product; HDI=Human Development Index; HRH=Human resources for health.

*P value<0.05.
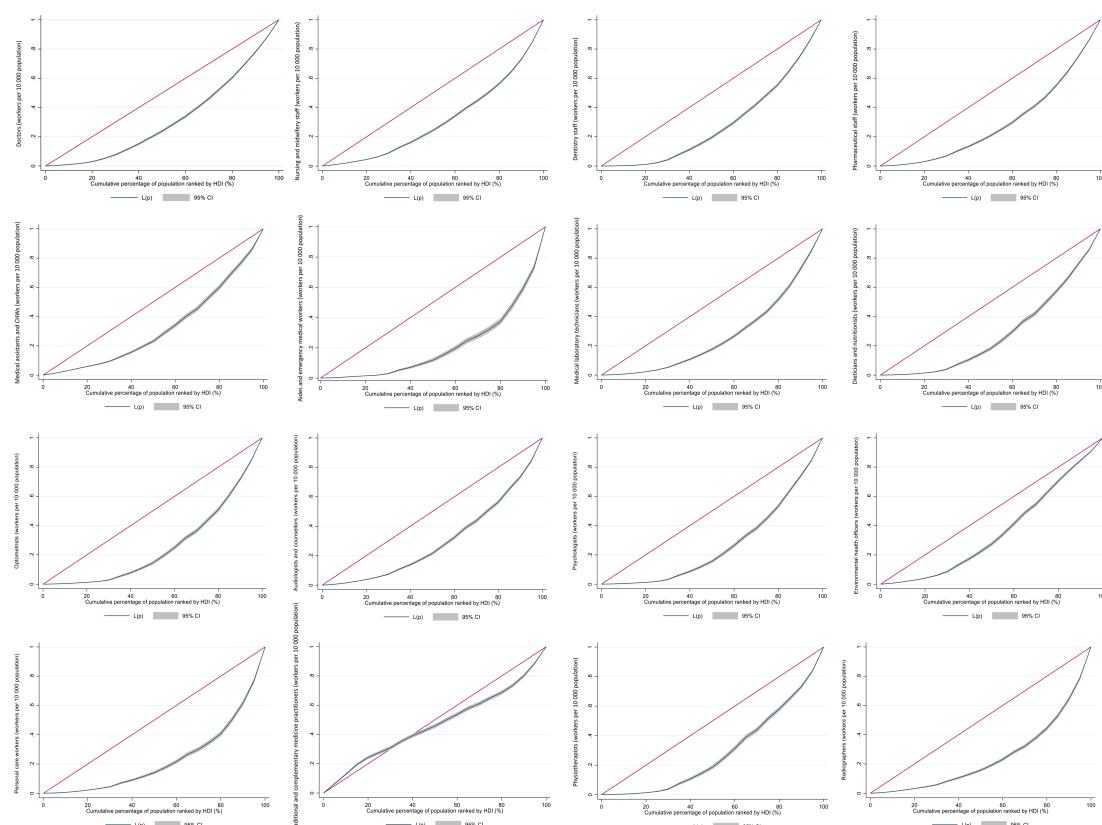
Supplementary Figure S1. Lorenz curve of health worker densities by 16 cadres

Notes: The Lorenz curve of health workers density stratified by 16 cadres lay below the equality line (except for traditional and complementary medicine practitioners) with the positive value of the concentration index, indicating that inequalities exist in the distribution of human resources for health and was more concentrated among population with higher HDI levels.

HDI=human development index
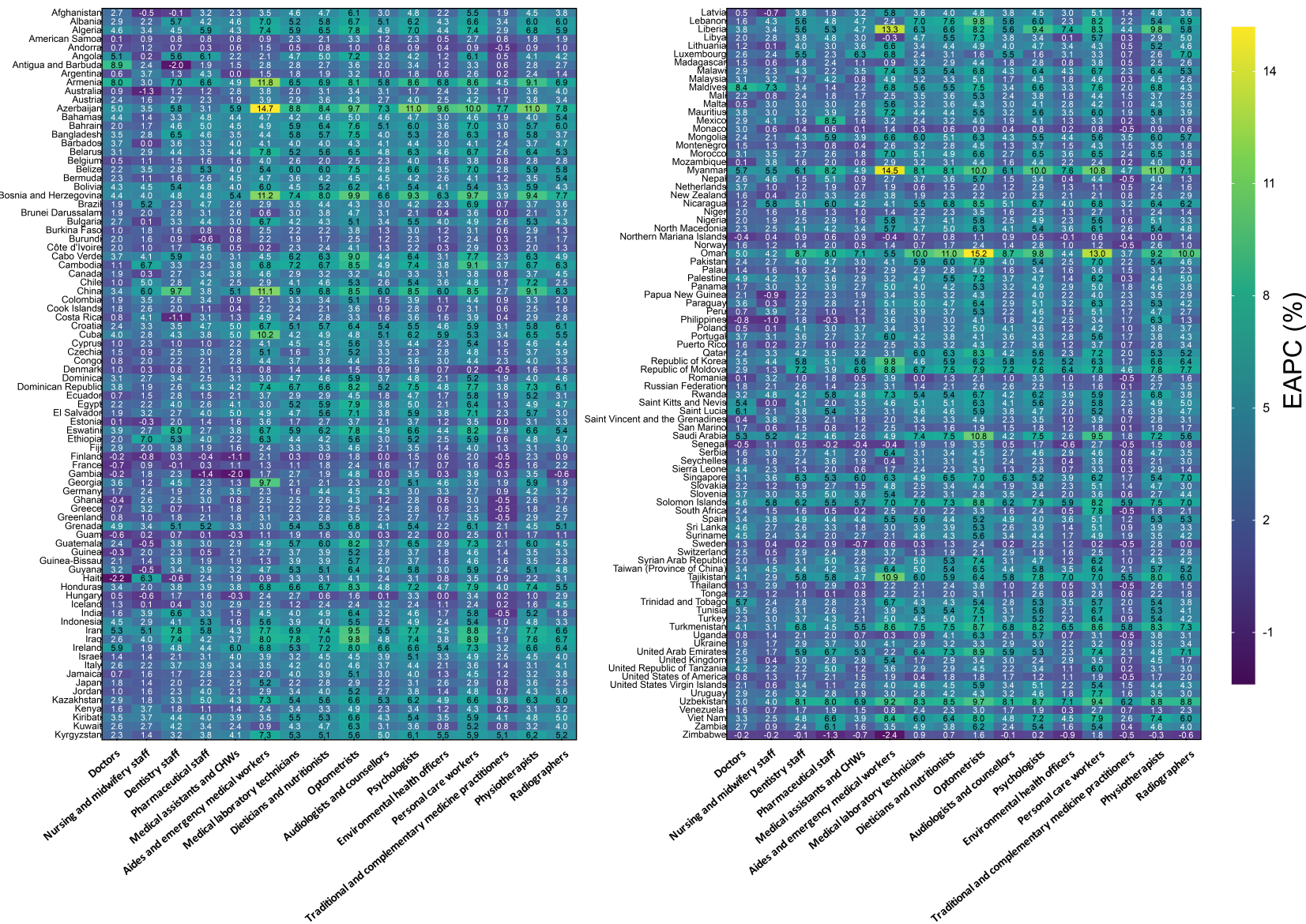
Supplementary Figure S2. EAPC of 16 cadres of HRH (per 10 000 population) by country and territory, from 1990 to 2019

Notes: EAPC, estimated annual percentage change
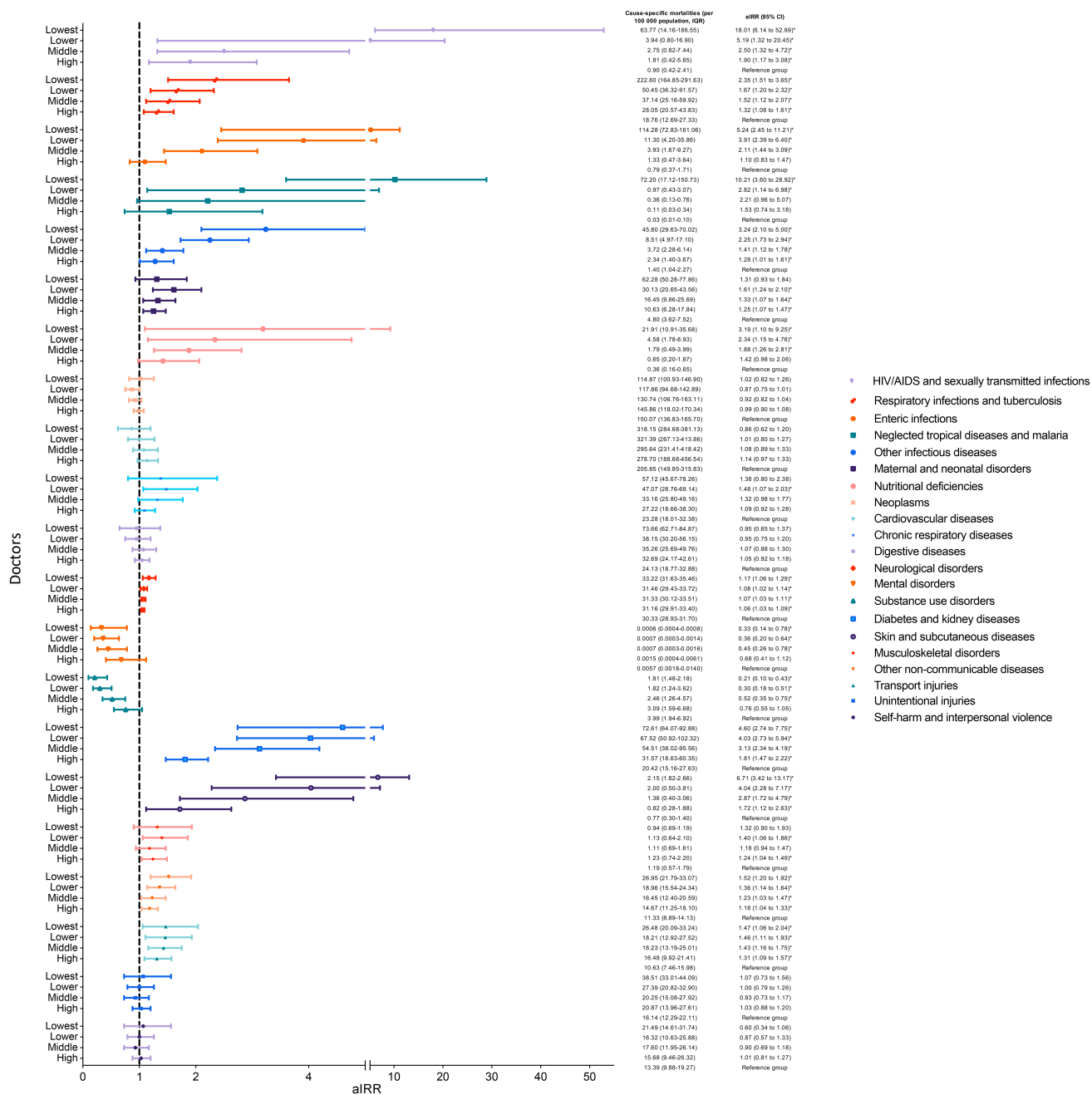
Supplementary Figure S3. Associations between density of doctors (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Supplementary Figure S4. Associations between density of nursing and midwifery staff (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Supplementary Figure S5. Associations between density of dentistry staff (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Legend (Dentistry staff):

- HIV/AIDS and sexually transmitted infections
- Respiratory infections and tuberculosis
- Enteric infections
- Neglected tropical diseases and malaria
- Other infectious diseases
- Maternal and neonatal disorders
- Nutritional deficiencies
- Neoplasms
- Cardiovascular diseases
- Chronic respiratory diseases
- Digestive diseases
- Neurological disorders
- Mental disorders
- Substance use disorders
- Diabetes and kidney diseases
- Skin and subcutaneous diseases
- Musculoskeletal disorders
- Other non-communicable diseases
- Transport injuries
- Unintentional injuries
- Self-harm and interpersonal violence

Level	Cause-specific mortalities (per 100 000 population, IQR)	aIRR (95% CI)
Lowest	64.14 (16.34-191.33)	6.02 (2.10 to 17.28)*
Lower	2.86 (0.84-12.35)	1.92 (0.62 to 5.98)
Middle	2.96 (0.73-7.44)	2.65 (1.06 to 6.59)*
High	2.04 (0.45-6.59)	1.55 (1.04 to 2.33)*
	1.11 (0.41-3.35)	Reference group
Lowest	222.36 (165.15-291.35)	1.64 (1.00 to 2.68)
Lower	53.84 (36.61-84.75)	1.23 (0.89 to 1.71)
Middle	35.96 (24.23-53.74)	1.20 (0.92 to 1.57)
High	27.08 (19.31-43.66)	1.19 (0.99 to 1.42)
	20.33 (13.42-28.54)	Reference group
Lowest	115.44 (76.32-165.68)	2.97 (1.58 to 5.55)*
Lower	9.86 (4.23-26.23)	2.21 (1.37 to 3.56)*
Middle	2.78 (1.38-6.04)	1.30 (0.91 to 1.85)
High	1.36 (0.39-4.26)	0.95 (0.75 to 1.20)
	0.97 (0.42-2.28)	Reference group
Lowest	63.37 (14.40-150.31)	3.96 (1.08 to 14.54)*
Lower	0.88 (0.39-2.48)	2.19 (0.88 to 5.42)
Middle	0.32 (0.11-0.72)	1.38 (0.63 to 3.03)
High	0.12 (0.03-0.40)	1.40 (0.70 to 2.82)
	0.03 (0.01-0.10)	Reference group
Lowest	47.62 (31.54-71.38)	3.01 (2.10 to 4.32)*
Lower	7.96 (4.94-15.79)	2.00 (1.54 to 2.61)*
Middle	3.64 (2.17-6.45)	1.48 (1.21 to 1.81)*
High	2.27 (1.23-3.63)	1.13 (0.98 to 1.30)
	1.46 (1.08-2.34)	Reference group
Lowest	63.80 (54.02-79.32)	1.79 (1.30 to 2.47)*
Lower	29.38 (22.46-40.47)	1.95 (1.54 to 2.46)*
Middle	16.43 (10.75-24.78)	1.61 (1.33 to 1.95)*
High	9.34 (5.36-15.41)	1.30 (1.10 to 1.53)*
	4.91 (3.48-7.63)	Reference group
Lowest	21.53 (11.39-36.14)	1.09 (0.40 to 2.95)
Lower	3.44 (1.27-7.23)	1.13 (0.60 to 2.13)
Middle	1.40 (0.42-4.52)	1.18 (0.80 to 1.74)
High	0.62 (0.18-2.72)	1.10 (0.79 to 1.53)
	0.41 (0.20-0.85)	Reference group
Lowest	113.43 (97.07-137.71)	0.88 (0.74 to 1.06)
Lower	114.89 (97.78-144.75)	0.84 (0.73 to 0.97)*
Middle	130.84 (106.75-159.19)	0.89 (0.80 to 0.99)*
High	151.31 (125.97-169.50)	0.99 (0.93 to 1.05)
	149.55 (135.48-171.01)	Reference group
Lowest	313.01 (280.71-374.81)	1.13 (0.83 to 1.53)
Lower	374.27 (293.02-511.85)	1.51 (1.19 to 1.92)*
Middle	297.01 (232.93-431.33)	1.36 (1.14 to 1.63)*
High	274.79 (184.40-374.36)	1.23 (1.07 to 1.40)*
	203.60 (142.38-284.40)	Reference group
Lowest	56.85 (45.31-79.62)	1.18 (0.81 to 1.71)
Lower	48.13 (29.16-72.65)	1.30 (0.98 to 1.72)
Middle	31.47 (22.33-46.99)	1.01 (0.79 to 1.28)
High	27.92 (18.94-37.49)	1.00 (0.87 to 1.16)
	24.44 (18.55-34.39)	Reference group
Lowest	72.07 (62.63-84.14)	0.96 (0.70 to 1.32)
Lower	42.33 (29.14-63.36)	1.13 (0.88 to 1.45)
Middle	34.59 (25.60-46.46)	1.06 (0.90 to 1.25)
High	32.83 (25.22-41.85)	1.12 (1.01 to 1.24)*
	24.02 (19.11-33.13)	Reference group
Lowest	32.65 (30.97-35.46)	1.10 (1.01 to 1.19)*
Lower	32.16 (30.23-34.38)	1.09 (1.03 to 1.15)*
Middle	31.23 (29.89-33.66)	1.05 (1.01 to 1.09)*
High	31.11 (29.60-32.66)	1.03 (1.00 to 1.05)
	30.50 (29.23-31.89)	Reference group
Lowest	0.0006 (0.0005-0.0008)	0.44 (0.18 to 1.03)
Lower	0.0006 (0.0003-0.0013)	0.35 (0.19 to 0.66)*
Middle	0.0010 (0.0003-0.0020)	0.57 (0.33 to 0.99)*
High	0.0022 (0.0004-0.0071)	0.79 (0.52 to 1.20)
	0.0037 (0.0004-0.0126)	Reference group
Lowest	1.79 (1.47-2.14)	0.22 (0.10 to 0.45)*
Lower	2.03 (1.13-4.02)	0.39 (0.24 to 0.63)*
Middle	2.20 (1.44-4.84)	0.75 (0.53 to 1.08)
High	3.21 (1.64-6.00)	0.93 (0.71 to 1.22)
	3.68 (1.59-6.16)	Reference group
Lowest	69.43 (62.15-84.79)	1.57 (0.89 to 2.78)
Lower	70.54 (45.67-104.80)	2.31 (1.47 to 3.63)*
Middle	57.67 (36.61-93.40)	1.99 (1.44 to 2.74)*
High	35.44 (18.63-66.79)	1.52 (1.25 to 1.86)*
	22.07 (15.58-31.54)	Reference group
Lowest	2.00 (1.75-2.35)	3.10 (1.49 to 6.44)*
Lower	1.82 (0.43-4.31)	2.99 (1.64 to 5.42)*
Middle	1.44 (0.40-3.64)	2.63 (1.56 to 4.43)*
High	1.08 (0.35-2.18)	1.34 (1.01 to 1.78)*
	0.86 (0.36-1.70)	Reference group
Lowest	0.94 (0.70-1.20)	1.15 (0.76 to 1.76)
Lower	0.89 (0.58-1.82)	1.02 (0.75 to 1.37)
Middle	1.14 (0.72-1.99)	1.07 (0.83 to 1.39)
High	1.30 (0.58-2.15)	1.05 (0.89 to 1.24)
	1.24 (0.92-1.88)	Reference group
Lowest	26.67 (21.52-32.96)	1.49 (1.14 to 1.94)*
Lower	19.43 (15.51-24.01)	1.43 (1.19 to 1.72)*
Middle	17.29 (12.91-21.20)	1.35 (1.14 to 1.59)*
High	13.66 (10.72-18.26)	1.17 (1.05 to 1.31)*
	11.18 (8.37-14.40)	Reference group
Lowest	24.68 (18.63-32.62)	1.17 (0.75 to 1.83)
Lower	20.05 (13.42-29.36)	1.52 (1.09 to 2.12)*
Middle	17.09 (12.34-25.21)	1.37 (1.09 to 1.73)*
High	16.84 (11.70-22.29)	1.28 (1.12 to 1.48)*
	10.79 (7.53-15.76)	Reference group
Lowest	38.26 (32.86-43.94)	1.06 (0.70 to 1.59)
Lower	28.08 (22.36-35.19)	1.06 (0.83 to 1.37)
Middle	20.45 (15.48-28.56)	0.97 (0.80 to 1.17)
High	19.67 (14.13-26.79)	1.07 (0.94 to 1.21)
	15.50 (12.51-21.95)	Reference group
Lowest	21.87 (16.23-31.10)	0.44 (0.21 to 0.94)*
Lower	15.13 (8.94-28.72)	0.63 (0.40 to 1.02)
Middle	14.98 (8.51-25.43)	0.80 (0.59 to 1.07)
High	17.56 (11.48-26.12)	0.96 (0.80 to 1.14)
	14.50 (11.17-19.99)	Reference group

Supplementary Figure S6. Associations between density of pharmaceutical staff (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Cause-specific mortalities (per 100 000 population, IQR)	aIRR (95% CI)
4.18 (1.21-34.15)	0.90 (0.22 to 3.75)
8.25 (1.28-59.68)	0.56 (0.25 to 1.24)
3.17 (0.58-14.72)	0.50 (0.25 to 0.96)*
2.42 (0.71-5.92)	0.66 (0.38 to 1.15)
1.85 (0.52-5.68)	Reference group
90.47 (46.08-206.41)	1.45 (1.09 to 1.93)*
86.17 (32.56-220.36)	1.34 (1.08 to 1.68)*
43.37 (21.76-133.22)	1.34 (1.10 to 1.64)*
29.43 (20.55-43.40)	1.22 (1.00 to 1.50)
22.52 (13.53-34.92)	Reference group
21.87 (7.95-82.02)	2.26 (1.36 to 3.73)*
25.93 (3.52-123.94)	1.97 (1.27 to 3.06)*
4.38 (1.03-41.07)	1.66 (1.13 to 2.44)*
2.12 (0.68-5.17)	1.45 (1.03 to 2.04)*
1.07 (0.45-2.09)	Reference group
2.30 (0.64-15.41)	1.73 (0.90 to 3.30)
1.62 (0.37-58.83)	1.40 (0.79 to 2.51)
0.41 (0.10-5.88)	2.18 (1.23 to 3.86)*
0.13 (0.03-0.51)	2.14 (1.19 to 3.85)*
0.04 (0.02-0.16)	Reference group
14.63 (6.64-34.13)	1.54 (1.14 to 2.09)*
16.62 (4.65-47.96)	1.53 (1.15 to 2.03)*
4.24 (1.94-16.68)	1.27 (1.04 to 1.55)*
2.54 (1.31-4.45)	1.05 (0.91 to 1.23)
1.89 (1.21-2.89)	Reference group
34.61 (23.62-55.68)	1.17 (0.91 to 1.51)
39.57 (21.06-62.36)	1.17 (0.94 to 1.46)
20.27 (9.89-45.84)	1.24 (1.01 to 1.52)*
10.28 (4.53-18.89)	1.09 (0.93 to 1.27)
6.63 (4.21-11.50)	Reference group
5.69 (1.49-16.08)	0.90 (0.47 to 1.74)
7.17 (0.95-25.48)	0.99 (0.53 to 1.85)
2.53 (0.41-10.16)	1.10 (0.66 to 1.84)
0.99 (0.34-3.68)	1.09 (0.72 to 1.66)
0.45 (0.20-1.65)	Reference group
116.48 (102.15-142.78)	0.84 (0.75 to 0.95)*
115.63 (97.45-145.15)	0.86 (0.76 to 0.97)*
130.67 (108.93-157.71)	0.91 (0.82 to 1.02)
152.09 (123.94-173.65)	1.01 (0.91 to 1.12)
147.50 (133.85-165.15)	Reference group
343.19 (278.25-476.76)	1.12 (0.91 to 1.39)
316.86 (274.25-408.70)	1.13 (0.92 to 1.38)
304.20 (240.70-403.19)	1.10 (0.92 to 1.32)
257.90 (182.92-365.27)	1.07 (0.91 to 1.25)
231.68 (157.33-343.48)	Reference group
57.53 (41.62-78.11)	1.49 (1.12 to 1.99)*
46.70 (32.36-61.79)	1.27 (0.96 to 1.69)
34.87 (24.44-51.64)	1.28 (1.01 to 1.64)*
27.84 (20.59-37.82)	1.21 (0.96 to 1.51)
22.41 (16.25-31.13)	Reference group
54.70 (35.97-69.34)	0.95 (0.78 to 1.17)
55.41 (31.38-77.84)	0.99 (0.84 to 1.18)
37.91 (28.91-66.37)	1.06 (0.91 to 1.24)
29.25 (23.25-35.48)	1.04 (0.91 to 1.20)
26.10 (19.17-38.92)	Reference group
31.52 (29.95-34.50)	1.06 (1.01 to 1.12)*
32.32 (30.93-34.34)	1.05 (1.01 to 1.09)*
32.06 (30.12-34.11)	1.04 (1.00 to 1.07)*
30.83 (29.42-32.32)	1.01 (0.98 to 1.03)
30.64 (29.43-32.28)	Reference group
0.0010 (0.0000-0.0020)	1.19 (0.51 to 2.74)
0.0010 (0.0000-0.0010)	1.02 (0.55 to 1.89)
0.0010 (0.0000-0.0020)	0.74 (0.43 to 1.28)
0.0010 (0.0000-0.0090)	0.90 (0.52 to 1.57)
0.0020 (0.0010-0.0100)	Reference group
1.88 (1.37-3.22)	0.36 (0.22 to 0.60)*
1.92 (1.40-2.70)	0.40 (0.25 to 0.62)*
2.03 (1.54-4.04)	0.53 (0.35 to 0.81)*
2.28 (1.26-5.24)	0.70 (0.50 to 0.98)*
4.83 (2.07-8.40)	Reference group
65.90 (46.51-87.78)	1.27 (0.89 to 1.81)
62.54 (41.08-73.82)	1.17 (0.78 to 1.75)
58.33 (36.82-87.55)	1.37 (0.99 to 1.90)
42.01 (20.93-92.62)	1.28 (0.97 to 1.67)
24.46 (15.71-70.53)	Reference group
1.96 (0.43-3.13)	0.58 (0.28 to 1.22)
1.72 (0.50-2.19)	0.48 (0.27 to 0.86)*
1.58 (0.40-2.71)	0.72 (0.41 to 1.25)
1.34 (0.52-3.30)	0.93 (0.66 to 1.32)
1.20 (0.41-2.26)	Reference group
0.83 (0.61-1.31)	0.64 (0.45 to 0.91)*
0.91 (0.61-1.37)	0.67 (0.50 to 0.90)*
1.09 (0.70-1.73)	0.75 (0.58 to 0.97)*
1.27 (0.85-2.07)	0.89 (0.72 to 1.09)
1.58 (0.96-2.25)	Reference group
19.05 (15.20-27.42)	0.91 (0.76 to 1.08)
21.48 (15.50-28.26)	0.94 (0.80 to 1.12)
17.74 (12.45-23.86)	0.95 (0.81 to 1.13)
13.84 (10.54-19.14)	0.93 (0.82 to 1.06)
13.01 (10.22-18.59)	Reference group
21.99 (16.07-32.77)	1.41 (1.10 to 1.80)*
21.99 (16.16-30.53)	1.29 (1.05 to 1.58)*
17.26 (12.44-24.45)	1.24 (1.02 to 1.52)*
15.39 (9.42-22.11)	1.16 (0.99 to 1.37)
12.53 (8.58-18.23)	Reference group
30.99 (22.69-40.53)	0.82 (0.67 to 0.99)*
31.63 (21.36-39.97)	0.90 (0.73 to 1.12)
26.50 (16.97-33.05)	0.92 (0.75 to 1.12)
18.33 (12.99-27.36)	0.96 (0.82 to 1.13)
17.56 (13.13-25.57)	Reference group
17.75 (10.72-31.66)	0.78 (0.55 to 1.12)
17.25 (11.94-26.74)	0.59 (0.42 to 0.84)*
15.36 (11.04-24.61)	0.66 (0.51 to 0.86)*
17.09 (11.75-24.32)	0.92 (0.76 to 1.13)
15.86 (10.28-26.28)	Reference group

Legend:
- HIV/AIDS and sexually transmitted infections
- Respiratory infections and tuberculosis
- Enteric infections
- Neglected tropical diseases and malaria
- Other infectious diseases
- Maternal and neonatal disorders
- Nutritional deficiencies
- Neoplasms
- Cardiovascular diseases
- Chronic respiratory diseases
- Digestive diseases
- Neurological disorders
- Mental disorders
- Substance use disorders
- Diabetes and kidney diseases
- Skin and subcutaneous diseases
- Musculoskeletal disorders
- Other non-communicable diseases
- Transport injuries
- Unintentional injuries
- Self-harm and interpersonal violence

(Vertical axis label: Medical assistants and CHWs; horizontal axis: aIRR, 0 to 5)

Supplementary Figure S7. Associations between density of medical assistants and CHWs (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval; CHWs, community health workers

Supplementary Figure S8. Associations between density of aides and emergency medical workers (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Cause-specific mortalities (per 100 000 population, IQR) — aIRR (95% CI)

Cause-specific mortalities (per 100 000 population, IQR)	aIRR (95% CI)
42.47 (5.32-144.83)	2.34 (0.92 to 5.96)
3.88 (1.08-23.98)	2.16 (0.71 to 6.52)
2.61 (0.86-7.75)	1.24 (0.79 to 1.94)
2.95 (0.61-6.35)	1.41 (0.95 to 2.08)
0.83 (0.34-2.94)	Reference group
219.61 (130.25-292.79)	1.40 (1.01 to 1.93)*
64.18 (37.16-136.19)	1.36 (1.07 to 1.72)*
35.84 (21.27-56.08)	1.19 (0.97 to 1.46)
29.57 (19.80-45.32)	1.24 (1.01 to 1.53)*
20.93 (13.83-29.40)	Reference group
113.46 (55.27-165.86)	2.61 (1.36 to 5.00)*
13.38 (4.17-49.12)	2.39 (1.51 to 3.78)*
2.95 (1.36-10.31)	1.57 (1.12 to 2.20)*
1.58 (0.53-4.60)	1.16 (0.83 to 1.64)
0.75 (0.36-2.12)	Reference group
46.01 (3.48-140.21)	3.29 (1.62 to 6.67)*
1.23 (0.41-7.80)	4.41 (2.48 to 7.81)*
0.40 (0.11-1.08)	3.26 (2.00 to 5.33)*
0.15 (0.05-0.42)	2.19 (1.32 to 3.63)*
0.03 (0.01-0.09)	Reference group
43.75 (25.29-69.92)	1.83 (1.22 to 2.76)*
10.36 (5.11-22.17)	1.81 (1.30 to 2.52)*
3.84 (2.20-6.79)	1.29 (1.03 to 1.61)*
2.60 (1.43-3.89)	1.05 (0.86 to 1.28)
1.42 (1.09-2.37)	Reference group
61.57 (44.78-78.19)	1.65 (1.27 to 2.15)*
32.55 (22.37-47.66)	1.81 (1.47 to 2.22)*
17.48 (9.99-26.31)	1.55 (1.31 to 1.84)*
10.61 (5.90-16.15)	1.22 (1.05 to 1.41)*
5.37 (3.71-8.19)	Reference group
19.16 (7.69-35.26)	0.97 (0.44 to 2.14)
5.14 (1.10-9.92)	1.22 (0.70 to 2.11)
1.82 (0.42-4.81)	1.24 (0.80 to 1.94)
0.86 (0.28-2.88)	1.10 (0.77 to 1.56)
0.37 (0.15-0.87)	Reference group
112.54 (95.98-136.55)	0.83 (0.70 to 0.98)*
116.43 (99.41-145.41)	0.84 (0.73 to 0.96)*
133.08 (112.40-160.84)	0.91 (0.81 to 1.01)
145.88 (123.36-164.64)	0.96 (0.88 to 1.05)
154.39 (136.56-172.23)	Reference group
329.03 (288.02-448.27)	1.04 (0.79 to 1.37)
338.21 (266.19-458.02)	1.17 (0.95 to 1.45)
297.91 (219.89-368.99)	1.09 (0.92 to 1.29)
255.60 (182.52-363.39)	1.02 (0.88 to 1.19)
226.86 (153.07-338.40)	Reference group
55.02 (43.23-78.43)	0.98 (0.65 to 1.46)
46.08 (31.52-64.66)	1.13 (0.87 to 1.47)
31.05 (23.96-48.93)	1.02 (0.82 to 1.27)
28.66 (19.92-39.47)	1.06 (0.84 to 1.34)
24.25 (16.45-35.22)	Reference group
70.93 (58.03-84.40)	0.92 (0.74 to 1.14)
46.50 (32.10-67.19)	1.07 (0.90 to 1.26)
34.97 (26.24-51.36)	1.08 (0.94 to 1.24)
29.27 (22.85-37.85)	0.99 (0.89 to 1.09)
25.89 (18.40-34.74)	Reference group
32.59 (30.50-35.20)	1.03 (0.96 to 1.11)
31.84 (30.25-33.66)	1.01 (0.97 to 1.06)
30.88 (29.50-33.34)	1.00 (0.97 to 1.03)
31.08 (29.16-33.00)	0.99 (0.97 to 1.02)
31.00 (29.90-32.39)	Reference group
0.0010 (0.0000-0.0010)	1.72 (0.57 to 5.13)
0.0010 (0.0000-0.0010)	1.10 (0.47 to 2.60)
0.0010 (0.0000-0.0030)	0.91 (0.47 to 1.76)
0.0010 (0.0000-0.0030)	0.78 (0.43 to 1.42)
0.0040 (0.0000-0.0120)	Reference group
1.86 (1.46-2.29)	0.32 (0.17 to 0.62)*
1.90 (1.41-3.97)	0.49 (0.30 to 0.80)*
3.01 (1.52-5.04)	0.76 (0.51 to 1.13)
2.09 (1.34-4.72)	0.74 (0.51 to 1.06)
4.45 (1.67-7.12)	Reference group
67.84 (59.08-86.16)	1.40 (0.84 to 2.33)
62.42 (43.73-91.10)	1.70 (1.17 to 2.47)*
55.66 (32.91-91.14)	1.72 (1.24 to 2.39)*
45.26 (23.69-84.47)	1.52 (1.15 to 1.99)*
21.58 (15.15-32.82)	Reference group
1.98 (1.62-2.37)	1.09 (0.61 to 1.97)
1.68 (0.43-2.90)	1.24 (0.76 to 2.03)
1.22 (0.47-3.34)	1.44 (0.95 to 2.17)
1.59 (0.51-3.57)	1.68 (1.22 to 2.31)*
0.87 (0.32-1.70)	Reference group
0.84 (0.65-1.23)	0.84 (0.56 to 1.25)
1.04 (0.61-1.84)	0.98 (0.72 to 1.33)
1.24 (0.78-1.88)	0.99 (0.78 to 1.25)
1.20 (0.87-2.03)	1.03 (0.84 to 1.25)
1.24 (0.57-2.15)	Reference group
27.26 (20.49-32.89)	1.12 (0.90 to 1.39)
19.35 (15.42-22.99)	1.11 (0.94 to 1.30)
16.55 (12.40-21.06)	1.13 (0.97 to 1.31)
14.54 (10.56-18.81)	1.07 (0.94 to 1.22)
11.80 (9.23-15.46)	Reference group
24.28 (18.67-32.95)	1.03 (0.78 to 1.37)
20.05 (13.43-28.76)	1.20 (0.96 to 1.50)
18.01 (12.34-25.67)	1.21 (1.01 to 1.45)*
15.17 (9.77-20.30)	1.05 (0.90 to 1.22)
11.83 (8.25-17.33)	Reference group
38.82 (32.58-44.80)	0.83 (0.63 to 1.09)
28.46 (21.99-34.84)	0.97 (0.79 to 1.17)
22.26 (16.27-30.30)	0.97 (0.83 to 1.15)
18.24 (12.88-25.61)	0.95 (0.80 to 1.12)
16.17 (12.16-22.62)	Reference group
21.56 (16.35-31.74)	0.63 (0.34 to 1.14)
17.34 (10.85-28.86)	0.81 (0.51 to 1.29)
15.86 (9.73-26.53)	0.87 (0.66 to 1.15)
16.01 (9.57-23.67)	0.88 (0.71 to 1.10)
13.99 (10.19-19.63)	Reference group

Legend:
- HIV/AIDS and sexually transmitted infections
- Respiratory infections and tuberculosis
- Enteric infections
- Neglected tropical diseases and malaria
- Other infectious diseases
- Maternal and neonatal disorders
- Nutritional deficiencies
- Neoplasms
- Cardiovascular diseases
- Chronic respiratory diseases
- Digestive diseases
- Neurological disorders
- Mental disorders
- Substance use disorders
- Diabetes and kidney diseases
- Skin and subcutaneous diseases
- Musculoskeletal disorders
- Other non-communicable diseases
- Transport injuries
- Unintentional injuries
- Self-harm and interpersonal violence

y-axis label: Medical laboratory technicians (Lowest, Lower, Middle, High groups)
x-axis label: aIRR

Supplementary Figure S9. Associations between density of medical laboratory technicians (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Dieticians and nutritionists

Legend:
- HIV/AIDS and sexually transmitted infections
- Respiratory infections and tuberculosis
- Enteric infections
- Neglected tropical diseases and malaria
- Other infectious diseases
- Maternal and neonatal disorders
- Nutritional deficiencies
- Neoplasms
- Cardiovascular diseases
- Chronic respiratory diseases
- Digestive diseases
- Neurological disorders
- Mental disorders
- Substance use disorders
- Diabetes and kidney diseases
- Skin and subcutaneous diseases
- Musculoskeletal disorders
- Other non-communicable diseases
- Transport injuries
- Unintentional injuries
- Self-harm and interpersonal violence

Cause-specific mortalities (per 100 000 population, IQR)	aIRR (95% CI)
39.74 (3.09-121.01)	0.39 (0.12 to 1.20)
3.37 (0.63-14.13)	0.59 (0.16 to 2.20)
2.48 (0.66-7.51)	0.45 (0.24 to 0.88)*
2.01 (0.45-5.88)	0.54 (0.31 to 0.92)*
1.79 (0.51-7.94)	Reference group
208.78 (112.27-282.62)	1.08 (0.82 to 1.42)
53.78 (29.79-161.30)	1.11 (0.87 to 1.42)
31.35 (19.97-54.84)	0.96 (0.80 to 1.15)
30.55 (19.15-46.94)	1.15 (0.96 to 1.39)
24.23 (16.54-36.46)	Reference group
108.00 (44.67-164.74)	1.50 (0.85 to 2.63)
9.03 (2.87-62.95)	1.47 (0.92 to 2.35)
2.91 (0.49-11.03)	1.14 (0.80 to 1.63)
1.98 (0.63-5.05)	1.17 (0.86 to 1.58)
1.37 (0.59-2.58)	Reference group
56.38 (2.91-150.71)	1.79 (0.68 to 4.76)
0.87 (0.30-7.17)	1.56 (0.86 to 2.84)
0.35 (0.09-1.35)	2.05 (1.30 to 3.23)*
0.13 (0.03-0.47)	2.39 (1.54 to 3.73)*
0.04 (0.01-0.17)	Reference group
41.57 (22.11-70.22)	1.39 (0.99 to 1.96)
8.52 (3.88-24.56)	1.43 (1.04 to 1.97)*
3.20 (1.79-6.79)	1.02 (0.84 to 1.24)
2.12 (1.21-4.69)	0.99 (0.85 to 1.16)
1.89 (1.18-3.22)	Reference group
63.45 (44.07-79.93)	1.24 (0.91 to 1.70)
32.03 (20.88-46.62)	1.37 (1.05 to 1.79)*
15.54 (8.71-25.03)	1.12 (0.89 to 1.40)
8.58 (4.66-16.42)	1.03 (0.88 to 1.22)
6.14 (3.94-11.13)	Reference group
15.54 (5.68-33.12)	0.35 (0.20 to 0.62)*
4.15 (0.60-13.83)	0.70 (0.43 to 1.14)
1.86 (0.35-5.79)	0.89 (0.57 to 1.40)
0.76 (0.23-2.99)	0.90 (0.68 to 1.19)
0.70 (0.30-1.84)	Reference group
113.20 (95.90-133.95)	0.84 (0.73 to 0.98)*
120.14 (101.10-150.31)	0.87 (0.77 to 0.99)*
132.95 (106.46-160.16)	0.88 (0.81 to 0.96)*
149.59 (127.77-172.28)	0.99 (0.94 to 1.04)
149.46 (133.46-169.71)	Reference group
317.39 (284.49-391.15)	1.24 (0.98 to 1.57)
381.13 (263.15-516.81)	1.49 (1.21 to 1.84)*
320.35 (231.96-443.74)	1.32 (1.10 to 1.58)*
266.56 (191.95-355.59)	1.12 (0.97 to 1.28)
213.85 (152.31-285.88)	Reference group
56.27 (44.78-82.88)	1.19 (0.79 to 1.80)
41.73 (31.38-63.76)	1.19 (0.91 to 1.55)
30.20 (23.12-52.65)	1.07 (0.85 to 1.34)
29.11 (21.10-38.77)	1.11 (0.92 to 1.34)
22.29 (16.61-33.04)	Reference group
68.42 (57.33-79.77)	0.89 (0.71 to 1.12)
48.20 (29.27-71.02)	1.10 (0.92 to 1.33)
34.62 (26.98-47.70)	1.13 (1.00 to 1.29)
32.26 (24.12-40.40)	1.15 (1.04 to 1.27)*
24.80 (19.47-33.23)	Reference group
32.65 (30.69-35.61)	1.06 (1.00 to 1.14)
32.05 (30.11-33.90)	1.05 (1.01 to 1.10)*
31.02 (29.34-32.94)	1.02 (0.98 to 1.05)
31.04 (29.98-32.38)	1.02 (0.99 to 1.04)
30.72 (29.23-32.89)	Reference group
0.0010 (0.0000-0.0010)	1.42 (0.75 to 2.69)
0.0010 (0.0000-0.0020)	1.20 (0.58 to 2.46)
0.0010 (0.0000-0.0030)	1.05 (0.56 to 1.95)
0.0020 (0.0000-0.0070)	0.81 (0.51 to 1.28)
0.0010 (0.0000-0.0120)	Reference group
1.87 (1.42-2.27)	0.43 (0.23 to 0.79)*
1.92 (1.47-3.82)	0.69 (0.40 to 1.18)
2.35 (1.43-5.12)	0.78 (0.48 to 1.26)
3.11 (1.50-5.44)	0.72 (0.52 to 1.01)
3.76 (1.44-6.29)	Reference group
66.97 (52.75-77.27)	0.47 (0.31 to 0.71)*
57.01 (38.12-86.88)	0.74 (0.53 to 1.03)
50.19 (29.92-83.81)	0.95 (0.70 to 1.29)
39.58 (20.32-86.63)	1.03 (0.82 to 1.28)
27.19 (17.66-83.78)	Reference group
1.92 (0.81-2.24)	0.15 (0.08 to 0.30)*
1.00 (0.37-2.77)	0.25 (0.14 to 0.47)*
1.34 (0.43-2.60)	0.49 (0.29 to 0.84)*
1.28 (0.45-3.34)	0.76 (0.50 to 1.16)
1.63 (0.75-3.81)	Reference group
0.86 (0.68-1.28)	0.62 (0.43 to 0.90)*
0.94 (0.59-1.39)	0.60 (0.45 to 0.81)*
0.99 (0.55-1.71)	0.64 (0.51 to 0.81)*
1.29 (0.81-2.03)	0.77 (0.65 to 0.92)*
1.59 (0.97-2.34)	Reference group
25.63 (19.92-32.10)	0.81 (0.65 to 1.00)
18.59 (14.88-22.50)	0.85 (0.71 to 1.01)
15.41 (11.86-19.61)	0.87 (0.75 to 1.02)
13.37 (10.25-20.29)	0.93 (0.82 to 1.06)
13.07 (10.04-18.62)	Reference group
22.91 (17.40-31.71)	0.88 (0.66 to 1.16)
20.38 (15.08-30.77)	1.24 (0.98 to 1.57)
17.95 (13.09-24.52)	1.23 (1.03 to 1.48)*
15.71 (9.91-21.95)	1.18 (1.00 to 1.38)*
11.82 (7.90-17.57)	Reference group
37.09 (31.14-43.52)	0.76 (0.54 to 1.08)
27.40 (20.24-38.21)	0.90 (0.71 to 1.14)
23.34 (16.15-32.36)	1.05 (0.86 to 1.30)
19.92 (13.94-26.83)	1.02 (0.89 to 1.18)
15.26 (12.31-22.68)	Reference group
20.67 (15.84-30.20)	0.61 (0.36 to 1.02)
16.09 (10.52-29.61)	0.73 (0.49 to 1.10)
15.07 (8.88-25.90)	0.78 (0.61 to 1.00)*
16.14 (11.27-23.26)	0.92 (0.78 to 1.09)
14.72 (9.84-22.62)	Reference group

Row labels (repeating for each group): Lowest, Lower, Middle, High

x-axis: aIRR (0 to 5)

Supplementary Figure S10. Associations between density of dieticians and nutritionists (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Supplementary Figure S11. Associations between density of optometrists (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.
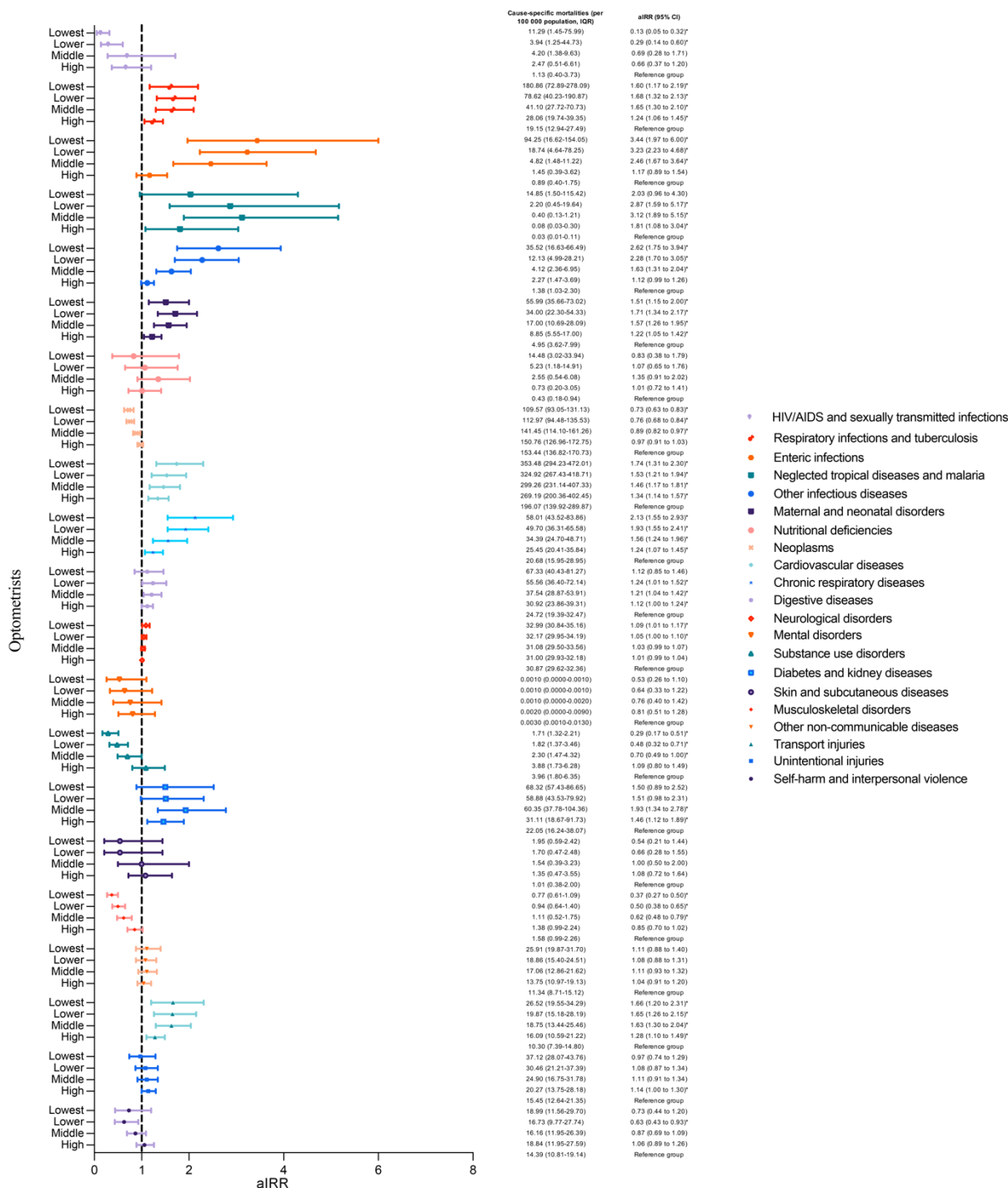
Supplementary Figure S12. Associations between density of audiologists and counsellors (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Supplementary Figure S13. Associations between density of psychologists (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Supplementary Figure S14. Associations between density of environmental health officers (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Supplementary Figure S15. Associations between density of personal care workers (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Supplementary Figure S16. Associations between density of traditional and complementary medicine practitioners (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Supplementary Figure S17. Associations between density of physiotherapists (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

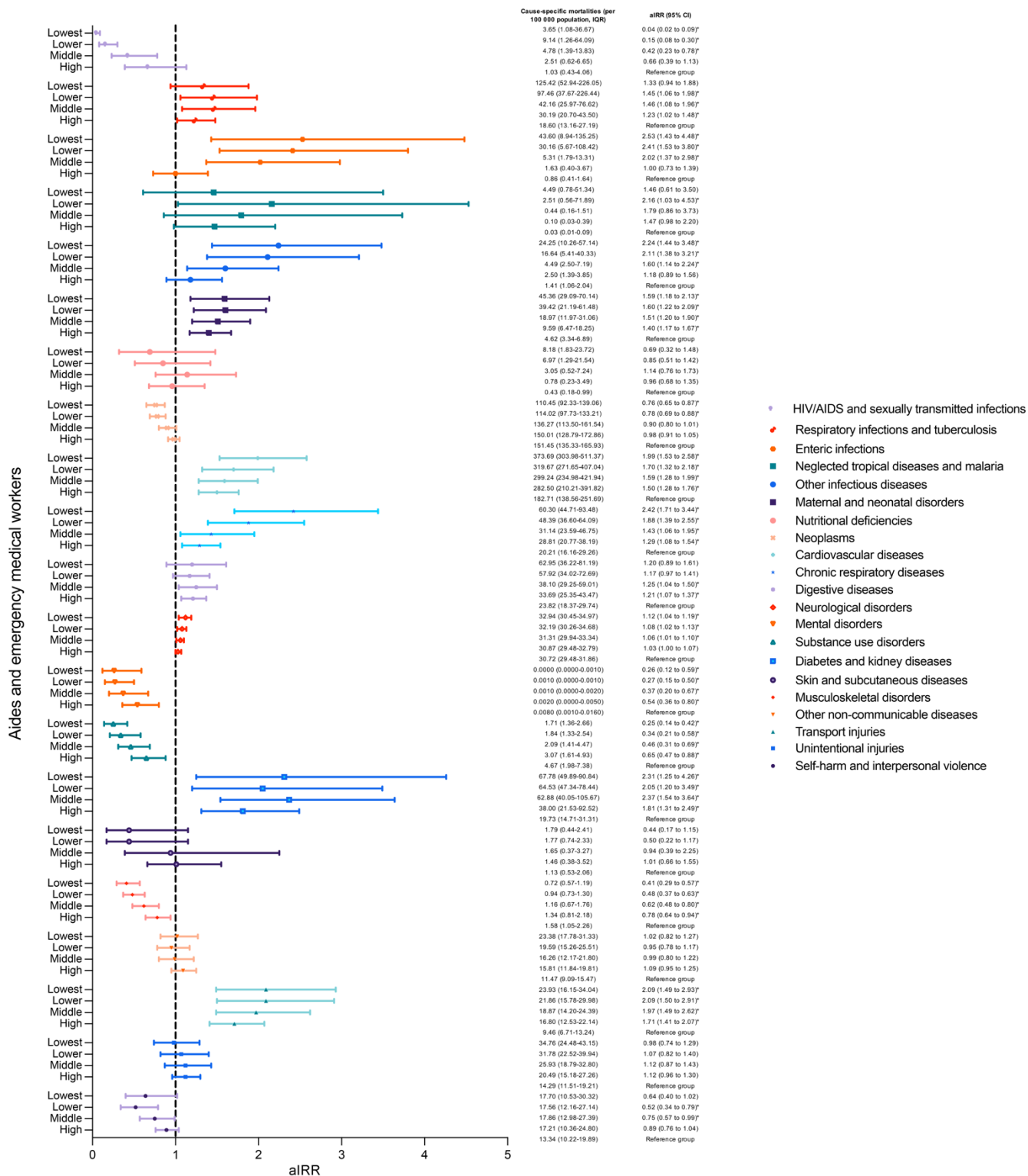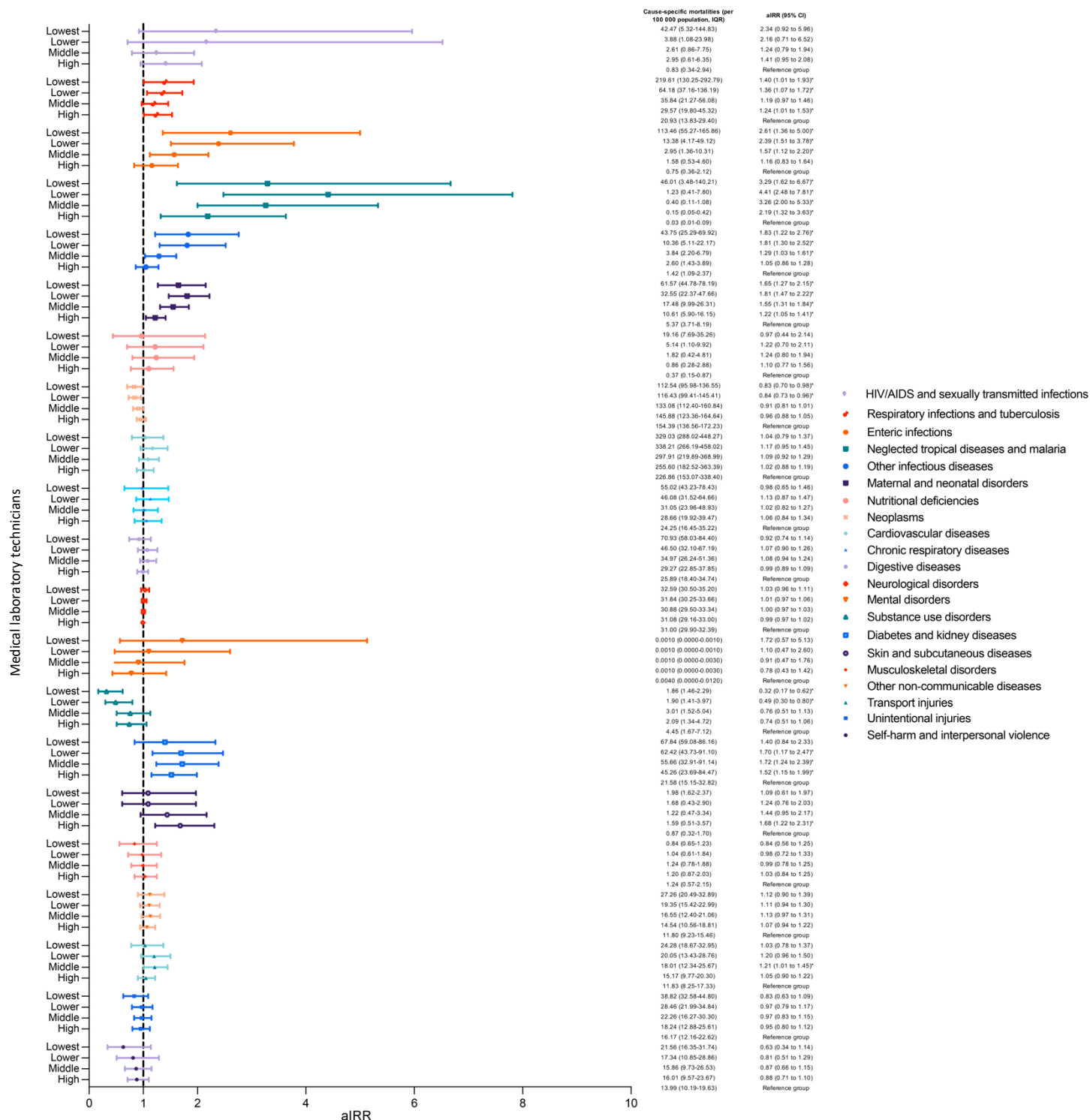*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Figure data — Radiographers (per 10 000 population), y-axis grouped by Lowest / Lower / Middle / High for each cause

Cause	Cause-specific mortalities (per 100 000 population, IQR)	aIRR (95% CI)
HIV/AIDS and sexually transmitted infections	16.70 (2.85-119.07)	2.10 (0.88 to 5.05)
	6.44 (2.05-45.80)	2.33 (0.95 to 5.71)
	3.76 (1.27-9.84)	1.62 (0.78 to 3.35)
	1.93 (0.48-6.87)	1.43 (0.94 to 2.18)
	0.67 (0.37-1.80)	Reference group
Respiratory infections and tuberculosis	183.62 (78.91-282.48)	1.29 (0.93 to 1.81)
	64.41 (35.46-178.29)	1.25 (0.94 to 1.67)
	37.63 (22.95-60.63)	1.08 (0.83 to 1.40)
	27.88 (18.51-39.63)	0.92 (0.74 to 1.15)
	21.50 (13.52-31.48)	Reference group
Enteric infections	73.36 (16.00-144.16)	1.50 (0.69 to 3.29)
	12.41 (4.17-71.98)	1.64 (0.90 to 3.01)
	4.07 (1.70-11.90)	1.16 (0.71 to 1.90)
	1.44 (0.37-4.14)	0.88 (0.63 to 1.24)
	0.93 (0.51-1.88)	Reference group
Neglected tropical diseases and malaria	11.42 (1.70-104.87)	2.16 (0.65 to 7.17)
	1.23 (0.40-22.26)	2.48 (0.81 to 7.62)
	0.43 (0.14-1.19)	1.89 (0.62 to 5.73)
	0.14 (0.05-0.40)	1.03 (0.41 to 2.55)
	0.03 (0.01-0.08)	Reference group
Other infectious diseases	30.58 (12.80-62.74)	1.85 (1.22 to 2.78)*
	9.04 (4.93-30.76)	1.89 (1.37 to 2.63)*
	3.98 (2.51-6.88)	1.33 (1.06 to 1.68)*
	2.34 (1.38-3.67)	1.02 (0.86 to 1.21)
	1.33 (1.03-2.01)	Reference group
Maternal and neonatal disorders	51.59 (33.79-66.95)	1.51 (1.12 to 2.05)*
	32.33 (21.13-51.90)	1.80 (1.38 to 2.34)*
	19.11 (11.62-30.10)	1.63 (1.29 to 2.07)*
	10.75 (6.11-17.29)	1.30 (1.08 to 1.56)*
	4.75 (3.28-7.03)	Reference group
Nutritional deficiencies	14.18 (3.82-33.16)	1.36 (0.75 to 2.46)
	5.26 (1.05-13.96)	1.56 (0.96 to 2.52)
	2.65 (0.47-5.74)	1.47 (0.94 to 2.29)
	0.78 (0.17-3.08)	1.07 (0.75 to 1.53)
	0.42 (0.18-0.81)	Reference group
Neoplasms	116.01 (99.98-138.56)	0.84 (0.70 to 1.01)
	117.41 (101.04-144.69)	0.84 (0.71 to 0.99)*
	134.19 (110.41-158.77)	0.88 (0.77 to 1.00)*
	147.13 (111.80-165.04)	0.92 (0.83 to 1.01)
	152.04 (137.00-174.05)	Reference group
Cardiovascular diseases	339.83 (291.56-471.15)	1.62 (1.27 to 2.07)*
	332.17 (274.53-468.08)	1.64 (1.31 to 2.05)*
	299.11 (227.81-436.95)	1.50 (1.22 to 1.84)*
	285.42 (221.65-370.10)	1.34 (1.16 to 1.55)*
	192.60 (141.06-264.03)	Reference group
Chronic respiratory diseases	58.84 (46.84-77.43)	0.87 (0.57 to 1.34)
	41.36 (30.56-57.89)	0.84 (0.60 to 1.19)
	30.28 (23.36-44.73)	0.81 (0.60 to 1.10)
	27.83 (19.63-40.74)	0.96 (0.78 to 1.18)
	24.65 (17.73-35.82)	Reference group
Digestive diseases	67.49 (50.46-82.82)	1.27 (1.00 to 1.61)*
	49.59 (33.57-72.45)	1.30 (1.07 to 1.58)*
	34.77 (28.07-53.75)	1.25 (1.07 to 1.46)*
	32.70 (23.79-42.91)	1.17 (1.03 to 1.32)*
	22.86 (18.16-28.89)	Reference group
Neurological disorders	32.32 (30.33-34.29)	1.06 (0.99 to 1.14)
	31.79 (29.96-33.93)	1.05 (0.99 to 1.10)
	31.64 (30.15-34.15)	1.04 (1.00 to 1.08)
	30.68 (29.05-33.02)	1.00 (0.97 to 1.03)
	30.91 (29.78-32.16)	Reference group
Mental disorders	0.0010 (0.0000-0.0010)	0.67 (0.27 to 1.65)
	0.0010 (0.0000-0.0020)	0.50 (0.24 to 1.06)
	0.0010 (0.0000-0.0020)	0.59 (0.29 to 1.17)
	0.0010 (0.0000-0.0030)	0.53 (0.31 to 0.89)*
	0.0080 (0.0010-0.0140)	Reference group
Substance use disorders	1.92 (1.46-2.54)	0.80 (0.39 to 1.64)
	1.94 (1.49-4.66)	1.14 (0.59 to 2.20)
	2.60 (1.43-5.07)	1.21 (0.68 to 2.17)
	2.43 (1.36-4.42)	0.88 (0.53 to 1.45)
	3.68 (1.47-5.88)	Reference group
Diabetes and kidney diseases	67.53 (56.01-88.35)	2.23 (1.57 to 3.17)*
	65.57 (45.99-89.38)	2.31 (1.65 to 3.24)*
	61.49 (37.29-99.10)	2.25 (1.67 to 3.03)*
	43.39 (23.54-79.36)	1.77 (1.42 to 2.20)*
	21.48 (15.92-31.17)	Reference group
Skin and subcutaneous diseases	1.96 (1.42-2.77)	1.54 (0.83 to 2.84)
	1.76 (0.46-2.71)	1.47 (0.86 to 2.49)
	1.41 (0.44-2.47)	1.63 (1.04 to 2.55)*
	1.38 (0.32-3.74)	1.88 (1.32 to 2.68)*
	0.92 (0.38-1.71)	Reference group
Musculoskeletal disorders	0.89 (0.66-1.16)	0.56 (0.40 to 0.76)*
	0.92 (0.57-1.51)	0.65 (0.48 to 0.88)*
	1.18 (0.67-1.99)	0.78 (0.62 to 1.00)
	1.21 (0.82-2.09)	0.85 (0.71 to 1.02)
	1.41 (1.00-2.18)	Reference group
Other non-communicable diseases	23.65 (18.94-31.62)	1.27 (1.04 to 1.54)*
	20.21 (15.96-24.88)	1.24 (1.04 to 1.49)*
	16.59 (12.92-22.77)	1.18 (1.00 to 1.40)*
	14.70 (10.70-19.03)	1.08 (0.95 to 1.23)
	11.41 (8.37-14.85)	Reference group
Transport injuries	25.77 (18.98-32.34)	1.83 (1.38 to 2.42)*
	20.59 (15.88-28.99)	1.89 (1.49 to 2.40)*
	18.56 (13.24-24.64)	1.71 (1.38 to 2.11)*
	15.25 (10.64-20.77)	1.40 (1.16 to 1.69)*
	9.93 (6.98-15.13)	Reference group
Unintentional injuries	38.18 (30.52-44.08)	1.31 (0.93 to 1.84)
	29.76 (23.06-35.96)	1.21 (0.94 to 1.57)
	24.79 (17.68-33.12)	1.26 (0.99 to 1.61)
	19.17 (12.96-27.44)	1.09 (0.90 to 1.32)
	14.97 (11.58-19.35)	Reference group
Self-harm and interpersonal violence	21.31 (13.38-33.84)	0.96 (0.57 to 1.60)
	20.03 (13.10-32.59)	1.07 (0.66 to 1.75)
	16.31 (12.31-29.56)	1.04 (0.72 to 1.50)
	15.99 (8.64-22.14)	0.89 (0.66 to 1.20)
	13.00 (9.79-17.85)	Reference group

Legend:
- HIV/AIDS and sexually transmitted infections
- Respiratory infections and tuberculosis
- Enteric infections
- Neglected tropical diseases and malaria
- Other infectious diseases
- Maternal and neonatal disorders
- Nutritional deficiencies
- Neoplasms
- Cardiovascular diseases
- Chronic respiratory diseases
- Digestive diseases
- Neurological disorders
- Mental disorders
- Substance use disorders
- Diabetes and kidney diseases
- Skin and subcutaneous diseases
- Musculoskeletal disorders
- Other non-communicable diseases
- Transport injuries
- Unintentional injuries
- Self-harm and interpersonal violence

Supplementary Figure S18. Associations between density of radiographers (per 10 000 population) and cause specific mortalities from 1990 to 2019 in the multivariable GEE models.

Notes: In GEE models, the highest level of HRH was considered as the reference group.

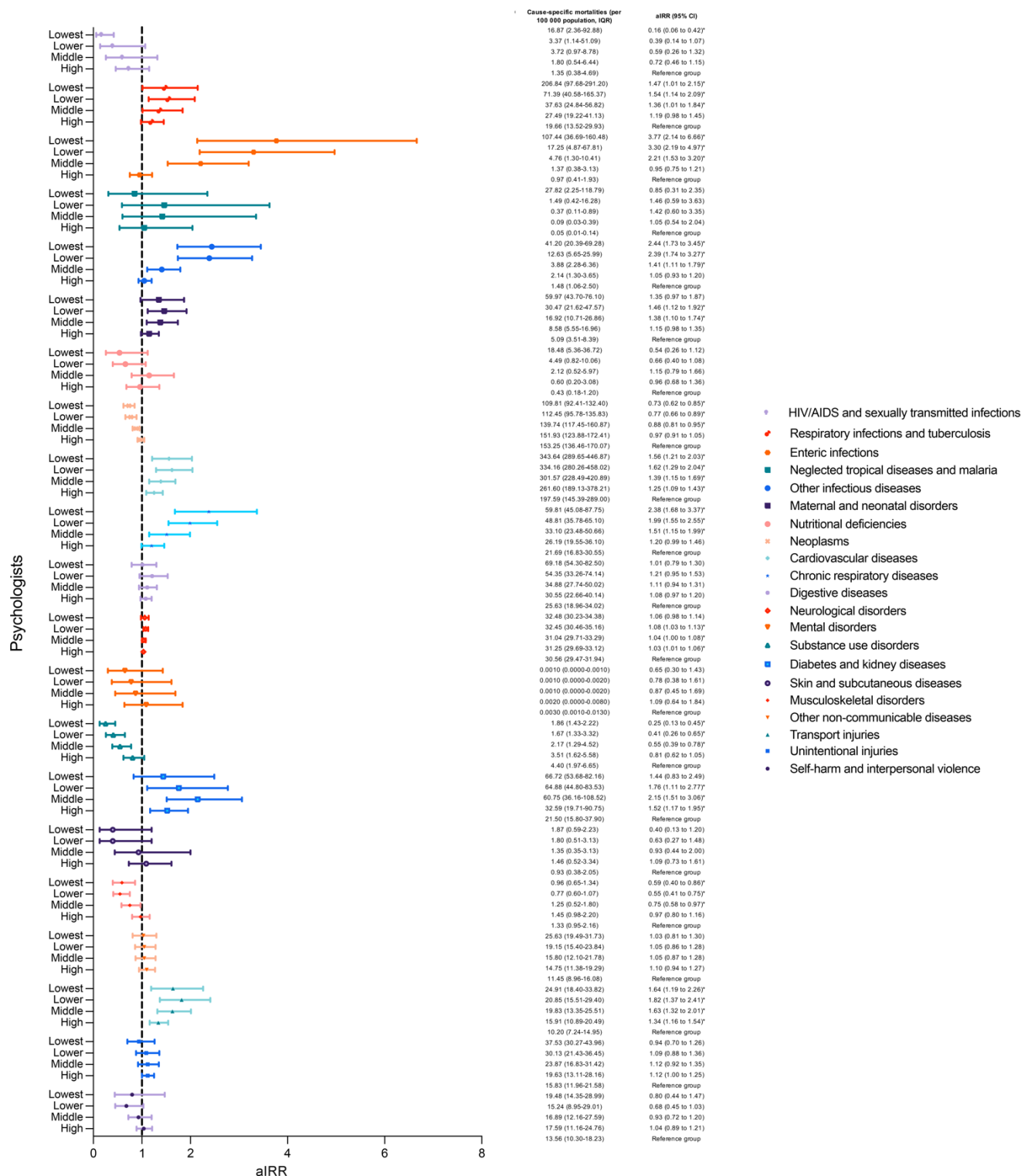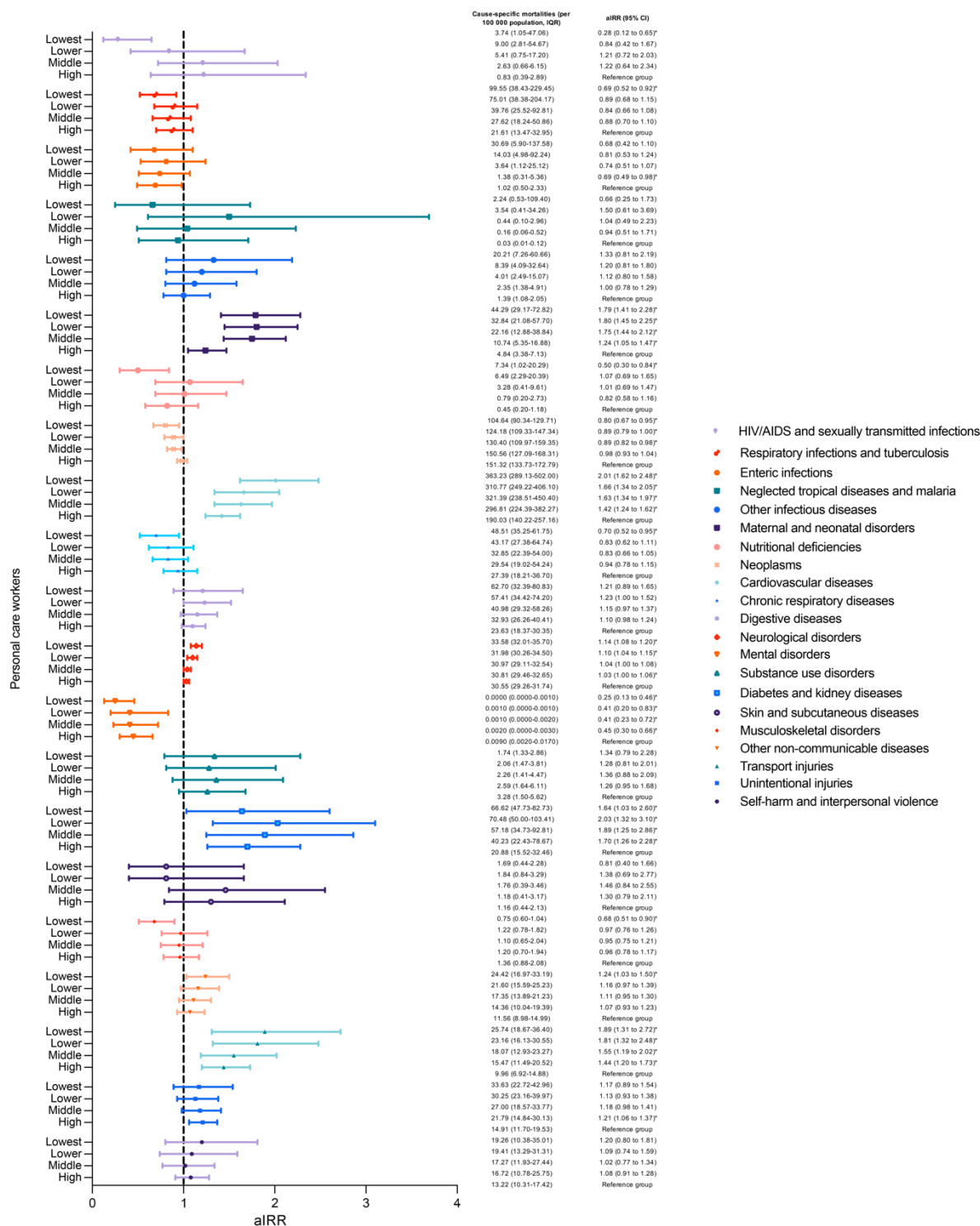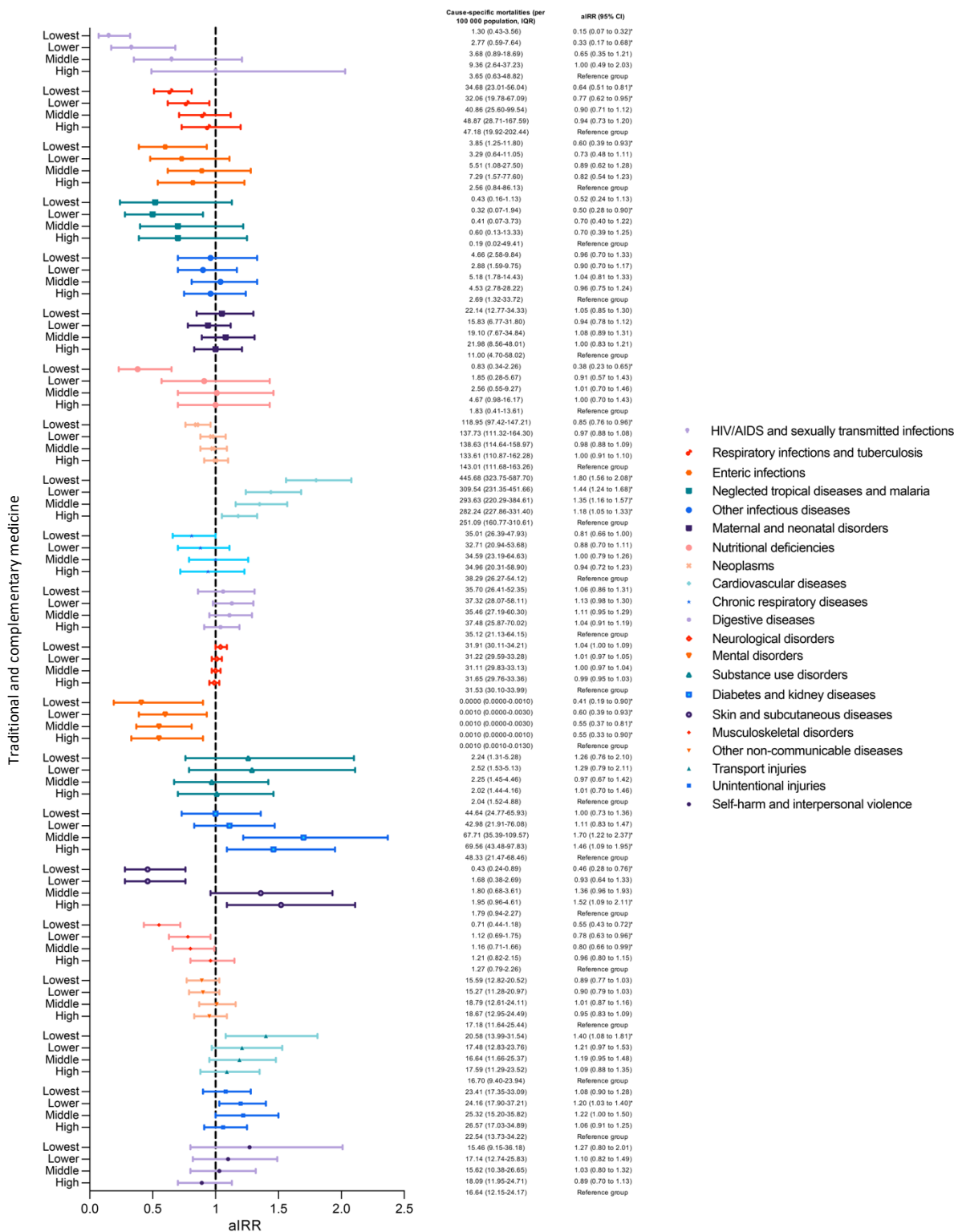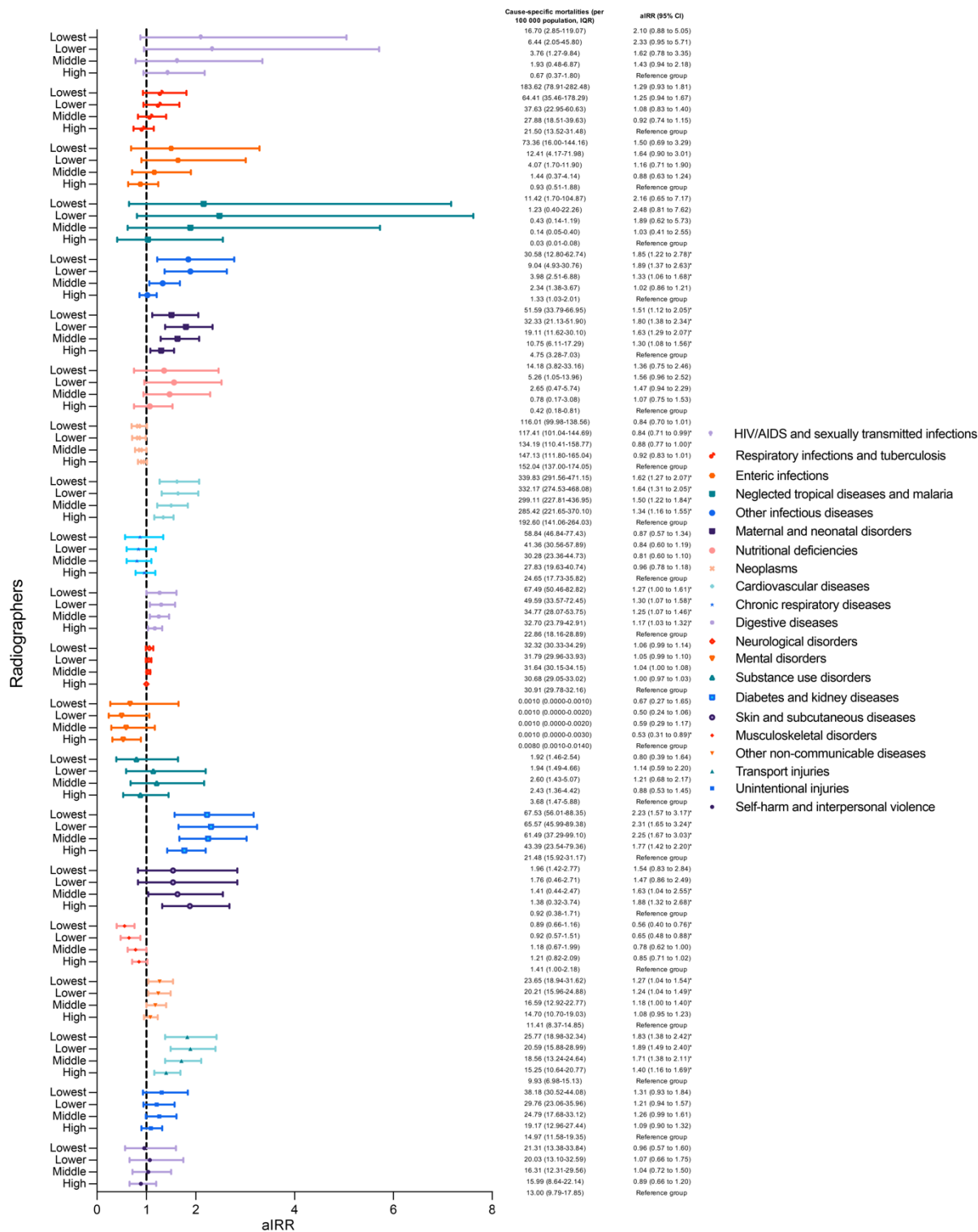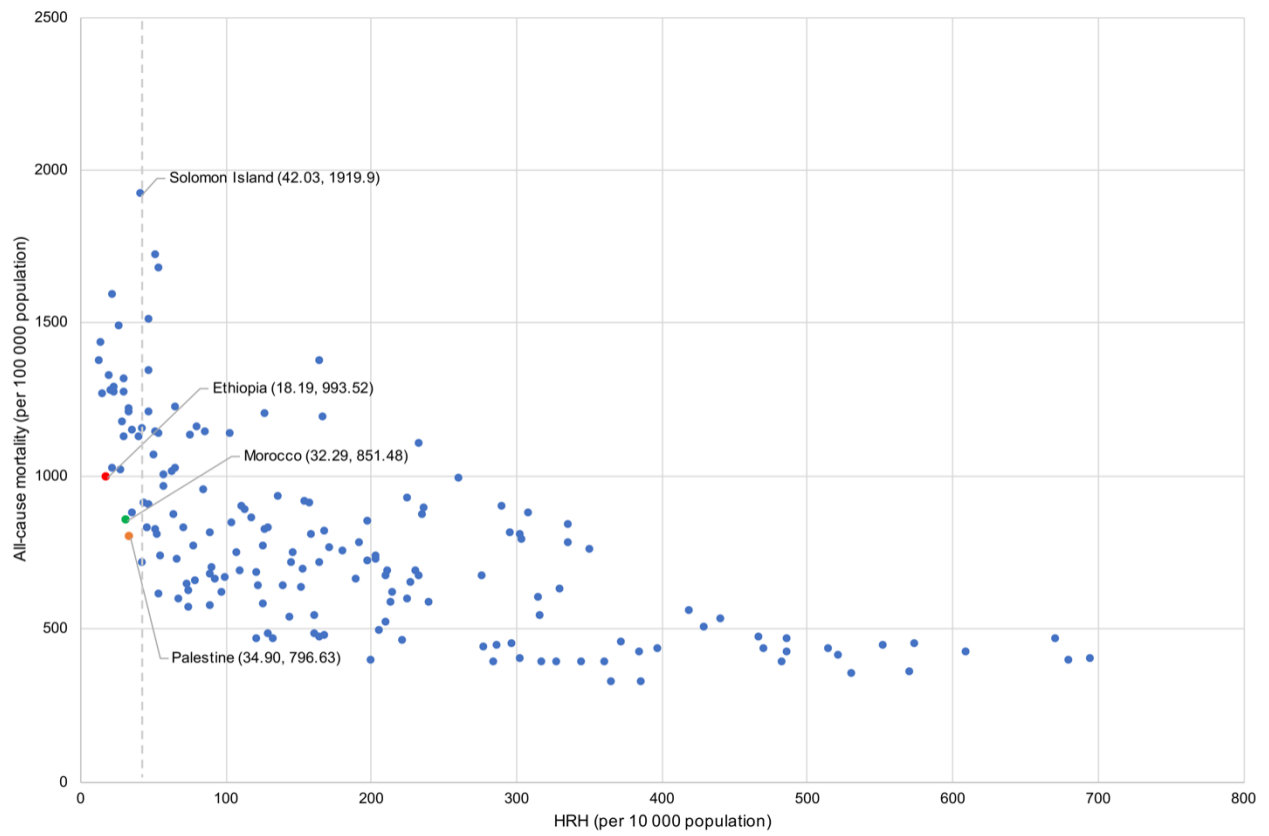*P value<0.05. aIRR, adjusted incidence risk ratio; CI, confidence interval.

Supplementary Figure S19. Scatterplot of human resources for health and all cause mortality