

Figure 6: Median absolute change for health-related SDG index, MDG index, and 33 individual health-related SDG indicators (rescaled), (A) across all countries and in the (B) low-SDI quintile, (C) low-middle-SDI quintile, (D) middle-SDI quintile, (E) high-middle-SDI quintile, and (F) high-SDI quintile, 2000–15

Positive values indicate improvements between 2000–15, and negative values point to worsening performance for a given indicator during this time. Black stripes represent median absolute change and boxes represent IQR. Health-related indicators are colour coded according to the health-related goals they represent. Definitions of health-related SDG indicators are shown in table 1. SDG=Sustainable Development Goal. MDG=Millennium Development Goal. SDI=Socio-demographic Index. MMR=maternal mortality ratio. SBA=skilled birth attendance. Mort=mortality. NN mort=neonatal mortality. NTDs=neglected tropical diseases. NCDs=non-communicable diseases. FP need met, mod=family planning need met, modern contraception. Adol=adolescent. UHC=universal health coverage. Air poll mort=mortality attributable to air pollution. WaSH=water, sanitation, and hygiene. IPV=intimate partner violence. HH air poll=household air pollution. Occ risk burden=burden attributable to occupational risks. PM2.5=fine particulate matter smaller than 2.5 µm.

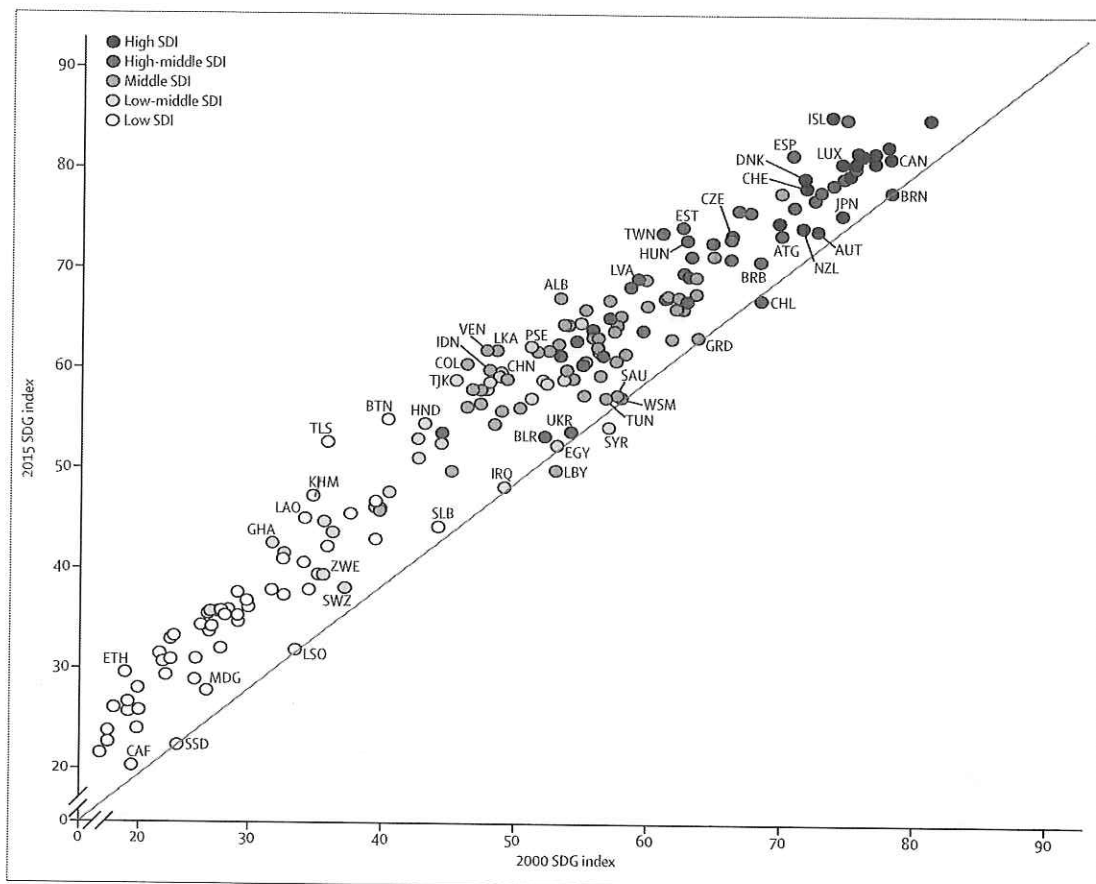


Figure 7: Health-related SDG index in 2015 versus 2000, by country
 The blue line shows the equivalence line, such that values that fall on this line are equivalent for both the health-related SDG index in 2000 and health-related SDG index in 2015. Only the top five and bottom five improvers in each SDI quintile, as determined by the absolute change from 2000 to 2015, are labelled; full results are shown in the results appendix. Countries are abbreviated according to the ISO3 code. SDI=Socio-demographic Index. SDG=Sustainable Development Goal.

These estimates also allow the identification of places that have made substantial progress on the health-related SDG indicators. These findings stand to strengthen the global evidence base of lessons learned for accelerating improvements in the health-related SDGs. The five geographies with the greatest improvement in the health-related SDG index between 2000 and 2015, stratified by SDI quintiles (Timor-Leste, Tajikistan, Colombia, Taiwan, and Iceland), have implemented a range of policies and interventions that might have contributed to their progress.

For instance, following acute conflict and violence during the late 1990s, Timor-Leste, in concert with the World Bank and other development partners, implemented a series of health sector rehabilitation and development projects in 2000 and 2001 to re-establish the country's health system and improve health service delivery to the poor.^{47,48} In more recent years, health-care reform and financing have topped policy agendas in Timor-Leste,⁴⁹ including the Ministry of Health's roll-out of a Basic Health Services Package and Hospital Services

Package in 2007 under the pursuit of achieving UHC.⁵⁰ Following almost a decade of civil conflict that severely disrupted health service provision, Tajikistan launched a series of health reforms beginning in the late 1990s⁵¹ and introduced a new benefits package for guaranteed health services in 2007.⁵² Moreover, after the civil war, the Tajik Government refocused policy attention for initiatives on particular diseases such as malaria;⁵³ indeed, the country's multipronged malaria programme, which emphasises strong surveillance and cross-border activities with Afghanistan,⁵⁴ has now brought Tajikistan close to eliminating the disease. Colombia, which experienced ongoing conflict and violence from the late 1980s to 2003,⁵⁵ is globally recognised for its expansion of health insurance and services, especially to the poor. While Colombia's health system reforms began well before 2000 (the country approved its universal health insurance scheme in 1993),⁵⁶ coverage increased substantially over time, as have the types of services covered by its insurance scheme (eg, cancer care).⁵⁷ During the mid-1990s, Taiwan adopted a universal

health insurance system,⁵⁸ which is viewed as one of its most successful public entities. Taiwan also enacted many road safety laws between the mid-1990s and early 2000s, including mandatory helmet laws for motorcyclists in 1996 and an extension of seat belt laws to general roads in 2001.⁵⁹ Iceland's tobacco control policies have been viewed as some of the world's most comprehensive,⁶⁰ and the country's long-standing publicly funded health system provides UHC,⁶¹ a factor that might have contributed to its declines in NCD mortality.

Such progress also highlights important interactions between development goals and wider contextual factors, such as post-conflict experiences in Timor-Leste, Tajikistan, and Colombia, as well as a rebound in health following the dissolution of Soviet rule for Tajikistan. Furthermore, Taiwan's gains underscore the interplay between advancing economic development and deliberate investments in improving UHC. These vignettes highlight only a fraction of the possible learning for informing action towards improving the health-related SDGs. An important future area of work will be to understand in detail how these and other high-performing geographies have achieved substantial improvements in key SDG indicators.

Besides showing the feasibility and value of measuring many of the health-related SDGs, our findings also affirm concerns voiced during the SDG development process and following the UN resolution. One criticism of the SDGs was the incredibly ambitious nature of some of the targets,⁵ such as Target 3.3, which calls for the end of the epidemics of HIV, tuberculosis, and malaria by 2030. Our analysis of these indicators in the past 15 years suggests that a substantial change in the present trajectory of HIV and tuberculosis incidence will be needed to meet this target, and major technological leaps coupled with universal delivery are likely to be necessary. The vague nature of many of the SDG targets has also been a common criticism.^{4,8,10,62} Of the 33 health-related SDG indicators in our study, we identified specific targets for only 21 of them. The absence of specific and attainable targets for SDG indicators, health related or otherwise, undermines the usefulness of the SDGs in driving development agendas, a limitation that can and should be addressed at this early stage of the SDG period.

Our analysis also represents a step towards producing a more cohesive understanding of the interactions between different SDG goals, targets, and indicators—a widely noted criticism.³⁴ We show the potential for quantifying these interactions by comparing the relations between education, income, and fertility—components of the SDI—and the 33 health-related SDG indicators and accompanying health-related SDG, MDG, and non-MDG indices. Although we acknowledge the ecological nature of this analysis and its usual caveats, SDI was a strong predictor of the overall

health-related SDG and MDG indices, highlighting the general importance of income, education, and fertility, as well as intersectoral action for health-related development. However, SDI was a weaker predictor of the non-MDG index, particularly for indicators such as violence (intimate partner, interpersonal, and collective violence) and ambient particulate matter pollution. This finding shows that a sole focus on increasing income and education and decreasing fertility is probably insufficient to meet the SDG targets. It also raises questions about whether other common drivers, analogous to income, education, and fertility, can be determined and their relations with SDG indicators assessed. Combining this initial assessment of the 33 health-related SDG indicators with an expanded quantification and analysis of other potential drivers is an important future area of work that could help to create a more concise, cohesive, and actionable monitoring framework for the SDGs.

Future directions for GBD monitoring efforts

In this report, we focused on measuring indicators proposed by the IAEG-SDGs. In future years, we plan to address three related sets of issues: first, improved assessment of the health-related SDG indicators measured at present; second, inclusion of the 14 currently excluded health-related indicators in the annualised GBD study; and third, potential expansion of indicators consistent with the framing of the targets. We address each of these issues in turn.

Improving the measurement of currently included health-related indicators

With the present analysis, we made several modifications that we believe improve several health-related indicators for the purposes of measuring progress towards each health-related SDG target. Future iterations are likely to incorporate further modifications to these and other indicators. First, as noted in the Methods section, rather than reporting on the combined prevalence of childhood wasting and overweight, we assessed and measured them separately. Our results support this decision, since they had divergent relations over time (ie, childhood wasting improved for most countries, whereas the prevalence of childhood overweight generally increased) and with SDI (ie, childhood wasting and overweight were negatively and positively correlated with SDI, respectively).

Second, the IAEG-SDGs' proposed indicator for harmful use of alcohol is the average national-level consumption per person in litres of pure alcohol. The health and non-health risks associated with harmful alcohol use are a function of not only average consumption at the population level but also use patterns (ie, amount consumed at a given time and frequency of consumption). For this analysis, we reported on the summary exposure value of harmful alcohol use, which

takes into account the distribution of consumption and the prevalence of binge drinking.³⁹

Third, we made two modifications to the measurement of disaster (Indicators 1.5.1, 11.5.1, and 13.1.2). For mortality attributable to disasters, we chose to report on the lagged 5 year average of disaster mortality. One of the corresponding health-related SDG targets (Target 1.5) is to “build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters”. Focusing solely on the observed mortality caused by natural disaster ignores the role of chance in the occurrence of natural disasters; for example, nations with weak resilience to natural disasters might not experience a natural disaster during a given period of time, whereas those with strong resilience might encounter them more frequently. Taking the moving average of disaster mortality lessens the contribution of chance in assessing progress for this indicator. Nonetheless, this adjustment cannot account for background risk of natural disasters, which varies by geography, and future research efforts could include developing a risk-standardised version of the indicator. For natural disasters, data on missing people and people affected by disaster are not readily available across countries and over time.

Fourth, for occupational health (Indicator 8.8.1), we reported on age-standardised all-cause DALY rate attributable to occupational risks rather than the suggested indicator, which is limited to fatal and non-fatal occupational injuries. This revision captures a wider set of occupational risks instead of only those that result in injuries, which supports the stated target of promotion of “safe and secure working environments for all workers” (Target 8.8). Fifth, for tobacco use prevalence (Indicator 3.a.1), GBD does not presently assess smokeless tobacco use. Furthermore, smokeless tobacco use has a notably different risk profile to smoked tobacco use,⁶³ and thus it might warrant a subindicator akin to childhood malnutrition. Sixth, for clean fuels and technology (Indicator 7.1.2), we presently use a more limited definition that covers fuels used primarily for household cooking. Seventh, for homicide (Indicator 16.1.1), GBD does not measure this indicator by displacement or migratory status, and similarly for conflict-related deaths (Indicator 16.1.2), we do not measure deaths by displacement status or by more specified causes.

Eighth, data gaps also account for limitations in the estimation of the UHC tracer indicator (Indicator 3.8.1). We used a set of tracer interventions that were restricted to reproductive, maternal, and child health, as well as a subset of infectious diseases. There is a paucity of data for the coverage of NCD interventions in particular⁶⁴⁻⁶⁷ and for higher-level care. Furthermore, the UHC tracer indicator only captures the use of interventions and not the quality of the intervention provided.^{68,69} As more data

become available on the delivery of interventions for NCDs and the modification of key risk factors, this information will be incorporated into revisions of the UHC tracer indicator. Finally, data gaps mean that, in this initial assessment, we have also not been able to include a measure of financial risk protection. Substantial investments are needed in this area to address data gaps to be able to track the central role of health system delivery in improving health.

Indicators not presently measured

Of the 14 health-related SDG indicators that were not included in this analysis, there are several that the GBD does not currently measure but that could be assessed in the future through GBD (table 2). These indicators include the coverage of treatment interventions for substance use disorders (Indicator 3.5.1), which would leverage the work on quantifying incidence, prevalence, and mortality for these conditions. Estimating the proportion of women and girls aged 15 years and older who are subjected to sexual violence by people other than an intimate partner (Indicator 5.2.2) would leverage work already undertaken by GBD on measuring prevalence of intimate partner violence. As part of GBD, we have also assembled a host of population-level data that would facilitate measurement of the coverage of health insurance or public health systems (Indicator 3.8.2), health worker density and distribution (Indicator 3.c.1), and completeness of death registration (Indicator 17.19.2). Other indicators are more difficult to measure because of data gaps or unclear definitions. For example, data sources to measure the proportion of people that feel safe walking alone around the area they live (Indicator 16.1.4) are not readily available for most countries.

Strengthening the indicators for selected targets

Various commentaries have pointed out the absence of indicators for key health outcomes and determinants. Proponents have argued for indicators for mental health that go beyond substance abuse disorders and suicide,¹⁴⁻¹⁶ other NCDs beyond cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases;⁷⁰ diseases related to ageing, including osteoarthritis and Alzheimer's disease;^{71,72} non-fatal disorders that lead to substantial morbidity (eg, sensory disorders); and a host of major risk factors. Another example is Target 3.3, which aims to combat hepatitis—the indicator only tracks hepatitis B, although the data for hepatitis C monitoring are as robust as those for hepatitis B and a highly effective cure for hepatitis C is available. As shown in this report, our GBD collaboration provides the basis for measuring many of these indicators. The danger is that an exhaustive laundry list of indicators, a criticism already levelled at the present SDG list, would dilute the value of the SDGs in focusing attention on where it is most needed.

Comparison with other assessments

There are several important similarities and differences between our assessment of the health-related SDGs and those produced by WHO¹⁶ and the Sustainable Development Solutions Network (SDSN).¹⁷ Like WHO, we focused on the health-related SDG indicators and did not cover indicators across all goals as SDSN does. With our focus on health, we covered 33 health-related indicators, compared with 21 by SDSN and 32 by WHO. Similar to SDSN, we produced a summary measure for the health-related SDG indicators included in the analysis. Most importantly, GBD uses standardised and internally consistent approaches to generate estimates across causes, risk factors, and underlying indicators. For example, we constrain the aggregation of cause-specific deaths to equal all-cause deaths. Furthermore, GBD also produces a complete set of estimates for 188 countries and for individual years from 1990 to 2015. By contrast, WHO and SDSN draw on disparate sources and methods for estimation and, as a result, report on an incomplete set of estimates by country. SDSN provides estimates for 149 countries, whereas estimates for health-related SDG indicators produced by WHO range from 194 countries for under-5 mortality and neonatal mortality to 109 countries for HIV incidence. WHO and SDSN also do not generate estimates for a consistent set of years. WHO reports 2015 estimates for only seven indicators and combines data from a range of years for ten indicators; for example, WHO combined skilled birth attendance estimates by country ranging from 2006 to 2014. SDSN reports 2015 estimates for only four indicators and combines data from a range of years for eight indicators; for example, country estimates for smoking prevalence from the SDSN report range from 2006 to 2013. Complete, consistent, comparable, and contemporary estimates of health-related SDG indicators are necessary to properly track progress on the SDGs.

Limitations

This study has several limitations in addition to the ones we already described. First, all the limitations of GBD relevant to the 33 indicators used here apply.^{34,37–39} Second, we tried to summarise the complexity of the 33 indicators using a summary measure for the health-related SDGs. Many approaches are available for developing summary measures. Since the SDGs are the outcome of a political consensus building process, we opted to use the stated targets as preferences of UN member states that have agreed to the SDG declaration. Our sensitivity analysis shows that using alternative weighting schemes produces broadly similar results (methods appendix pp 312–13). Our sensitivity analysis also highlights the limitation of the statistical approach (ie, principal component analysis) for constructing an index for this purpose, with the first principal component including both positive correlations with indicators such as maternal mortality ratio and negative correlations with indicators such as alcohol use.

An alternative could be to weight each indicator by their contribution to healthy life expectancy. Third, we opted to construct the summary measure using the Human Development Index method of rescaling each component on a scale of 0 to 100, and then taking the geometric mean of the components. We chose to use the minimum and maximum observed values to rescale, as targets for all indicators are not clearly specified; however, the limitation of this approach is that minimum and maximum values might change in the future. In the next iteration of this analysis, we will use targets for all indicators and rescale them accordingly; to establish targets for indicators currently lacking explicit ones, we will determine plausible targets based on forecasts of trends through 2030. Fourth, a clear limitation, as highlighted by the UHC tracer indicator, is the need for broad investment in data systems in countries to properly assess progress on key health and development indicators such as the SDGs. As an example, there remains considerable uncertainty about levels and age patterns of mortality and the cause of death structure.³¹ Investments in high-quality vital registration systems and other related data collection systems, from censuses and household surveys to health management information systems, are crucial to the proper monitoring of progress towards the SDGs.

Our GBD collaboration aims to address several of the limitations noted above in future reporting of the health-related SDGs on an annual cycle. As noted, we will also leverage work that is underway to forecast country-specific disease burden, which will additionally provide information on the future trajectory of health-related SDG indicators based on historical trends and provide an explicit way to understand how those trajectories could be changed with different policy adoption. We will also address, in a staged manner, the absence of measures of geographical and socioeconomic inequality in the health-related SDG indicators.

Conclusions

The measurement of 33 health-related SDG indicators presented here is the product of an extensive, open collaboration that represents many countries across a broad range of development. We invite others to join in this effort to produce an independent, robust basis for monitoring and assessing progress towards the SDGs. Independent measurement is a crucial component of accountability, but it is not the only component. These results should ideally be used as the basis for review and action at the country level. We hope that this collaboration is a major contribution to creating a culture of accountability for the SDGs. Other actors, especially governments, civil society organisations, donors, and global development institutions, need to participate in the process of using this information to enhance accountability through open and transparent review and action.

GBD 2015 SDG Collaborators

Stephen S Lim, Kate Allen, Zulfiqar A Bhutta, Lalit Dandona, Mohammad H Forouzanfar, Nancy Fullman, Peter W Gething, Ellen M Goldberg, Simon I Hay, Mollie Holmberg, Yohannes Kinfu, Michael J Kutz, Heidi J Larson, Xiaofeng Liang, Alan D Lopez, Rafael Lozano, Claire R McNellan, Ali H Mokdad, Meghan D Mooney, Mohsen Naghavi, Helen E Olsen, David M Pigott, Joshua A Salomon, Theo Vos, Haidong Wang, Amanuel Alemu Abajobir*, Kalkidan Hassen Abate*, Cristiana Abbafati*, Kaja M Abbas*, Foad Abd-Allah*, Abdishakur M Abdulle*, Biju Abraham*, Ibrahim Abubakar*, Laith J Abu-Raddad*, Niveen M E Abu-Rmeileh*, Gebre Yitayih Abyu*, Tom Achoki*, Akindele Olupelumi Adebiji*, Isaac Akinkunmi Adedeji*, Kossivi Agbelenko Afanvi*, Ashkan Afshin*, Arnav Agarwal*, Anurag Agrawal*, Aliasghar Ahmad Kiadaliri*, Hamid Ahmadi*, Kadir Yimam Ahmed*, Ali Shafiq Akanda*, Rufus Olusola Akinyemi*, Tomi F Akinyemi*, Nadia Akseer*, Ziyad Al-Aly*, Khurshid Alam*, Uzma Alam*, Deena Alasfoor*, Fadia S AlBuhairan*, Saleh Fahed Aldhahri*, Robert William Aldridge*, Zewdie Aderaw Alemu*, Raghieb Ali*, Ala'a Alkerwi*, Mohammad AB Alkhateeb*, François Alla*, Peter Allebeck*, Christine Allen*, Rajaa Al-Raddadi*, Ubai Alsharif*, Khalid A Altirkawi*, Elena Alvarez Martin*, Nelson Alvis-Guzman*, Azmeraw T Amare*, Alemayehu Amberbir*, Adeladza Kofi Amegah*, Heresh Amini*, Walid Ammar*, Stephen Marc Amrock*, Hjalte H Andersen*, Benjamin O Anderson*, Gregory M Anderson*, Carl Abelardo T Antonio*, Palwasha Anwari*, Johan Årnlöv*, Al Artaman*, Hamid Asayesh*, Rana Jawad Asghar*, Suleman Atique*, Euripide Frinel G Arthur Avokpaho*, Ashish Awasthi*, Beatriz Paulina Ayala Quintanilla*, Peter Azzopardi*, Umar Bacha*, Alaa Badawi*, Kalpana Balakrishnan*, Amitava Banerjee*, Aleksandra Barac*, Ryan Barber*, Suzanne L Barker-Collo*, Till Bärnighausen*, Lope H Barrero*, Tonatiuh Barrientos-Gutierrez*, Sanjay Basu*, Tigist Assefa Bayou*, Shahrzad Bazargan-Hejazi*, Justin Beardsley*, Neeraj Bedi*, Ettore Beghi*, Yannick Béjot*, Michelle L Bell*, Aminu K Bello*, Derrick A Bennett*, Isabela M Bensenor*, Habib Benzian*, Adugnaw Berhane*, Eduardo Bernabé*, Oscar Alberto Bernal*, Balem Demtsu Betsu*, Addisu Shunu Beyene*, Neeraj Bhalra*, Samir Bhatt*, Sibhatu Biadgilign*, Kelly A Bienhoff*, Boris Bikbov*, Agnes Binagwaho*, Donal Bisanzio*, Espen Bjertness*, Jed Blore*, Rupert R A Bourne*, Michael Brainin*, Michael Brauer*, Alexandra Brazinova*, Nicholas J K Breitborde*, David M Broday*, Traolach S Brugha*, Rachelle Buchbinder*, Zahid A Butt*, Leah E Cahill*, Ismael Ricardo Campos-Nonato*, Julio Cesar Campuzano*, Hélène Carabin*, Rosario Cárdenas*, Juan Jesus Carrero*, Austin Carter*, Daniel Casey*, Valeria Caso*, Carlos A Castañeda-Orjuela*, Jacqueline Castillo Rivas*, Ferrán Catalá-López*, Fiorella Cavalleri*, Pedro Cecilio*, Hsing-Yi Chang*, Jung-Chen Chang*, Fiona J Charlson*, Xuan Che*, Alan Zian Chen*, Peggy Pei-Chia Chiang*, Mirriam Chibalabala*, Vesper Hichilombwe Chisumpa*, Jee-Young Jasmine Choi*, Rajiv Chowdhury*, Hanne Christensen*, Liliana G Ciobanu*, Massimo Cirillo*, Matthew M Coates*, Megan Coggeshall*, Aaron J Cohen*, Graham S Cooke*, Cyrus Cooper*, Leslie Trumbull Cooper*, Benjamin C Cowie*, John A Crump*, Solomon Abhra Damtew*, Rakhi Dandona*, Paul I Dargan*, José das Neves*, Adrian C Davis*, Kairat Davletov*, E Filipa de Castro*, Diego De Leo*, Louisa Deegenhardt*, Liana C Del Gobbo*, Kebede Deribe*, Sarah Derrett*, Don C Des Jarlais*, Aniruddha Deshpande*, Gabrielle A deVeber*, Subhojit Dey*, Samath D Dharmaratne*, Preet K Dhillon*, Eric L Ding*, E Ray Dorsey*, Kerrie E Doyle*, Tim R Driscoll*, Leilei Duan*, Manisha Dubey*, Bruce Bartholow Duncan*, Hedyeh Ebrahimi*, Aman Yesuf Endries*, Sergey Petrovich Ermakov*, Holly E Erskine*, Babak Eshraty*, Alireza Esteghamati*, Saman Fahimi*, Talha A Farid*, Carla Sofia e Sa Farinha*, André Faro*, Maryam S Farvid*, Farshad Farzadfar*, Valery L Feigin*, Manuela Mendonca Felicio*, Seyed-Mohammad Fereshtehnejad*, Jefferson G Fernandes*, Joao C Fernandes*, Alize J Ferrari*, Florian Fischer*, Joseph R A Fitchett*, Christina Fitzmaurice*, Nataliya Foigt*, Kyle Foreman*, F Gerry R Fowkes*, Elisabeth Barboza Franca*, Richard C Franklin*, Maya Fraser*, Joseph Friedman*, Joseph Frostad*, Thomas Fürst*, Belinda Gabbe*, Alberto I Garcia-Basteiro*, Teshome Gebre*, Tsegaye Tewelde Gebrehiwot*, Amanuel Tesfay Gebremedhin*, Alemseged Aregay Gebru*, Bradford D Gessner*, Richard F Gillum*, Ibrahim Abdelmageem Mohamed Ginawi*, Ababi Zergaw Giref*, Maurice Giroud*, Melkamu Dedefo Gishu*, Giorgia Giussani*, William Godwin*, Philimon Gona*, Amador Goodridge*, Sameer Vali Gopalani*, Carolyn C Gotay*, Atsushi Goto*, Hebe N Gouda*, Nicholas Graetz*, Karen Fern Greenwell*, Max Griswold*, Harish Gugmani*, Yuming Guo*, Rahul Gupta*, Rajeev Gupta*, Vipin Gupta*, Reyna A Gutiérrez*, Bishal Gyawali*, Juanita A Haagsma*, Annie Haakenstad*, Nima Hafezi-Nejad*, Demewoz Haile*, Gesessew Bugssa Hailu*, Yara A Halasa*, Randah Ribhi Hamadeh*, Samer Hamidi*, Mouhanad Hammami*, Graeme J Hankey*, Hilda L Harb*, Josep Maria Haro*, Mohammad Sadeq Hassanvand*, Rasmus Havmoeller*, Ileana Beatriz Heredia-Pi*, Hans W Hoek*, Masako Horino*, Nobuyuki Horita*, H Dean Hosgood*, Damian G Hoy*, Aung Soe Htet*, Guoqing Hu*, Hsiang Huang*, Kim Moesgaard Iburg*, Bulat T Idrisov*, Manami Inoue*, Farhad Islami*, Troy A Jacobs*, Kathryn H Jacobsen*, Nader Jahanmehri*, Mihajlo B Jakovljevic*, Peter James*, Henrica A F M Jansen*, Mehdi Javanbakt*, Sudha P Jayaraman*, Achala Upendra Jayatilleke*, Sun Ha Jee*, Panniyammakal Jeemon*, Vivekanand Jha*, Ying Jiang*, Tariku Jibat*, Ye Jin*, Jost B Jonas*, Zubair Kabir*, Yogeshwar Kalkonde*, Rital Kamal*, Haidong Kan*, Amit Kandel*, André Karch*, Corine Kakizi Karema*, Chante Karimkhani*, Palitha Karunapema*, Amir Kasaeian*, Nicholas J Kassebaum*, Anil Kaul*, Norito Kawakami*, Jeanne Françoise Kayibanda*, Peter Njenga Keiyoro*, Laura Kemmer*, Andrew Haddon Kemp*, Andre Pascal Kengne*, Andre Keren*, Chandrasekharan Nair Kesavachandran*, Yousef Saleh Khader*, Abdur Rahman Khan*, Ejaz Ahmad Khan*, Gulfaraz Khan*, Young-Ho Khang*, Tawfik Ahmed Muthafer Khoja*, Ardeshir Khosravi*, Jagdish Khubchandani*, Christian Kielsing*, Cho-il Kim*, Daniel Kim*, Sungroul Kim*, Yun Jin Kim*, Ruth W Kimokoti*, Niranjan Kissonoo*, Miia Kivipelto*, Luke D Knibbs*, Yoshihiro Kokubo*, Dhaval Kolte*, Soewarta Kosen*, Georgios A Kotsakis*, Parvaz A Kouli*, Ai Koyanagi*, Michael Kravchenko*, Hans Krueger*, Barthelémy Kuate Defo*, Ricardo S Kuchenbecker*, Ernst J Kuipers*, Xie Rachel Kulikoff*, Veena S Kulkarni*, G Anil Kumar*, Gene F Kwan*, Hmwe H Kyu*, Aparna Lal*, Dharmesh Kumar Lal*, Ratilal Lalloo*, Hilton Lam*, Qing Lan*, Sinead M Langan*, Anders Larsson*, Dennis Odoi Laryea*, Asma Abdul Latif*, Janet L Leasher*, James Leigh*, Mall Leinsalu*, Janni Leung*, Ricky Leung*, Miriam Levi*, Yichong Li*, Yongmei Li*, Margaret Lind*, Shai Linn*, Steven E Lippshultz*, Patrick Y Liu*, Shiwei Liu*, Yang Liu*, Belinda K Lloyd*, Loon-Tzian Lo*, Giancarlo Logroscino*, Paulo A Lotufo*, Robyn M Lucas*, Raimundas Lunevicius*, Mohammed Magdy Abd El Razek*, Carlos Magis-Rodriguez*, Mahdi Mahdavi*, Marek Majdan*, Azeem Majeed*, Reza Malekzadeh*, Deborah Carvalho Malta*, Chabala C Mapoma*, David Joel Margolis*, Randall V Martin*, Jose Martinez-Raga*, Felix Masiye*, Amanda J Mason-Jones*, João Massano*, Richard Matzopoulos*, Bongani M Mayosi*, John J McGrath*, Martin McKee*, Peter A Meaney*, Alem Mehari*, Alemayehu B Mekonnen*, Yohannes Adama Melaku*, Peter Memiah*, Ziad A Memish*, Walter Mendoza*, Gert B M Mensink*, Atte Meretoja*, Tuomo J Meretoja*, Yonatan Moges Mesfin*, Francis Apolinary Mhimbira*, Renata Micha*, Ted R Miller*, Edward J Mills*, Mojde Mirarefin*, Awoke Misganaw*, Philip B Mitchell*, Charles N Mock*, Alireza Mohammadi*, Shafiu Mohammed*, Lorenzo Monasta*, Jonathan de la Cruz Monis*, Julio Cesar Montañez Hernandez*, Marcella Montico*, Maziar Moradi-Lakeh*, Lidia Moravskaya*, Rintaro Mori*, Ulrich O Mueller*, Michele E Murdoch*, Brighton Murimira*, Joseph Murray*, Gudlavalleti Venkata Satyanarayana Murthy*, Srinivas Murthy*, Kamarul Imran Musa*, Jean B Nacheqa*, Gabriele Nagel*, Kevin S Naidoo*, Luigi Naldi*, Vinay Nangia*, Bruce Neal*, Chakib Nejjari*, Charles R Newton*, John N Newton*, Frida Namnyak Ngalesoni*, Peter Nguhiu*, Grant Nguyen*,

Quyen Le Nguyen*, Muhammad Imran Nisar*, Patrick Martial Nkamedjie Pete*, Sandra Nolte*, Marika Nomura*, Ole F Norheim*, Bo Norrving*, Carla Makhlof Obermeyer*, Felix Akpojene Ogbo*, In-Hwan Oh*, Olanrewaju Oladimeji*, Pedro R Olivares*, Bolajoko Olubukunola Olusanya*, Jacob Olusegun Olusanya*, John Nelson Opio*, Eyal Oren*, Alberto Ortiz*, Richard H Osborne*, Erika Ota*, Mayowa O Owolabi*, Mahesh PA*, Eun-Kee Park*, Hye-Youn Park*, Charles D Parry*, Mahboubeh Parsaeian*, Tejas Patel*, Vikram Patel*, Angel J Paternina Caicedo*, Snehal T Patil*, Scott B Patten*, George C Patton*, Deepak Paudel*, João Mário Pedro*, David M Pereira*, Norberto Perico*, Konrad Pesudovs*, Max Petzold*, Michael Robert Phillips*, Frédéric B Piel*, Julian David Pillay*, Christine Pinho*, Farhad Pishgar*, Suzanne Polinder*, Richie G Poulton*, Farshad Pourmalek*, Mostafa Qorbani*, Rynaz H S Rabiee*, Amir Radfar*, Vafa Rahimi-Movaghar*, Mahfuzar Rahman*, Mohammad Hifz Ur Rahman*, Sajjad Ur Rahman*, Rajesh Kumar Rai*, Sasa Rajsic*, Murugesan Raju*, Usha Ram*, Saleem M Rana*, Chhabi Lal Ranabhat*, Kavitha Ranganathan*, Puja C Rao*, Aman H Refaat*, Marissa B Reitsma*, Giuseppe Remuzzi*, Serge Resnikoff*, Antonio L Ribeiro*, Maria Jesus Rios Blancas*, Hirbo Shore Roba*, Bayard Roberts*, Alina Rodriguez*, David Rojas-Rueda*, Luca Ronfani*, Gholamreza Roshandel*, Gregory A Roth*, Dietrich Rothenbacher*, Ambuj Roy*, Nobhojit Roy*, Ben Benasco Sackey*, Rajesh Sagar*, Muhammad Muhammad Saleh*, Juan R Sanabria*, João Vasco Santos*, Damian F Santomauro*, Itamar S Santos*, Rodrigo Sarmiento-Suarez*, Benn Sartorius*, Maheswar Satpathy*, Miloje Savić*, Monika Sawhney*, Susan M Sawyer*, Josef Schmidhuber*, Maria Inês Schmidt*, lone J C Schneider*, Aletta E Schutte*, David C Schwebel*, Soraya Seedat*, Sadaf G Sepanlou*, Edson E Servan-Mori*, Katya Shackelford*, Amira Shaheen*, Masood Ali Shaikh*, Teresa Shamah Levy*, Rajesh Sharma*, Jun She*, Sara Sheikhabaei*, Jiabin Shen*, Kevin N Sheth*, Mukti Shey*, Peilin Shi*, Kenji Shibuya*, Mika Shigematsu*, Min-Jeong Shin*, Rahman Shiri*, Kawkab Shishani*, Ivy Shiue*, Inga Dora Sigfusdottir*, Naris Silpakit*, Diego Augusto Santos Silva*, Jonathan I Silverberg*, Edgar P Simard*, Shireen Sindi*, Abhishek Singh*, Gitanjali M Singh*, Jasvinder A Singh*, Om Prakash Singh*, Prashant Kumar Singh*, Vegard Skirbekk*, Amber Sligar*, Samir Soneji*, Kjetil Søreide*, Reed J D Sorensen*, Joan B Soriano*, Sergey Soshnikov*, Luciano A Sposito*, Chandrashekhar T Sreeramreddy*, Hans-Christian Stahl*, Jeffrey D Stanaway*, Vasiliki Stathopoulou*, Nadine Steckling*, Nicholas Steel*, Dan J Stein*, Caitlyn Steiner*, Heidi Stöckl*, Saverio Stranges*, Mark Strong*, Jiandong Sun*, Bruno F Sunguya*, Patrick Sur*, Sourmya Swaminathan*, Bryan L Sykes*, Cassandra E I Szoek*, Rafael Tabarés-Seisdedos*, Karen M Tabb*, Roberto Tchio Talongwa*, Mohammed Rasoul Tarawneh*, Mohammar Tavakkoli*, Bineyam Teye*, Hugh R Taylor*, Bemnet Amare Tedla*, Worku Tefera*, Teketo Kassaw Tegenge*, Dejen Yemane Tekle*, Girma Temam Shifa*, Abdullah Suliaman Terkawi*, Gizachew Assefa Tessema*, J S Thakur*, Alan J Thomson*, Andrew L Thorne-Lyman*, Amanda G Thrift*, George D Thurston*, Taavi Tillmann*, Ruoyan Tobe-Gai*, Marcello Tonelli*, Roman Topor-Madry*, Fotis Topouzis*, Bach Xuan Tran*, Thomas Truelsen*, Zacharie Tsala Dimbuene*, Abera Kenay Tura*, Emin Murat Tuzcu*, Stefanos Tyrovolas*, Kingsley Nnanna Ukwaja*, Eduardo A Undurraga*, Chigozie Jesse Uneke*, Olalekan A Uthman*, Aaron van Donkelaar*, Yuri Y Varakin*, Tommi Vasankari*, Ana Maria Nogales Vasconcelos*, J Lennert Veerman*, Narayanaswamy Venketasubramanian*, Raj Kumar Verma*, Francesco S Violante*, Vasilij Victorovich Vlassov*, Patricia Volkow*, Stein Emil Vollset*, Gregory R Wagner*, Mitchell T Wallin*, Linhong Wang*, Valentine Wanga*, David A Watkins*, Scott Weichenthal*, Elisabete Weiderpass*, Robert G Weintraub*, Daniel J Weiss*, Andrea Werdecker*, Ronny Westerman*, Harvey A Whiteford*, James D Wilkinson*, Charles Shey Wiysonge*, Charles D A Wolfe*, Ingrid Wolfe*, Sungho Won*, Anthony D Woolf*, Shimelash Bitew Workie*, Mammo Wubshet*, Gelin Xu*, Ajit Kumar Yadav*, Bereket Yakob*, Ayalneshe Zemene Yalew*, Lijing L Yan*, Yuichiro Yano*, Mehdi Yaseri*,

Pengpeng Ye*, Paul Yip*, Naohiro Yonemoto*, Seok-Jun Yoon*, Mustafa Z Younis*, Chuanhua Yu*, Zoubida Zaidi*, Maysaa El Sayed Zaki*, Carlos Zambrana-Torrel*, Tomas Zapata*, Elias Asfaw Zegeye*, Yi Zhao*, Maigeng Zhou*, Sanjay Zodpey*, David Zonies*, Christopher J L Murray†.

*Authors listed alphabetically. †Corresponding author.

Affiliations

Institute for Health Metrics and Evaluation (Prof S S Lim PhD, K Allen BA, Prof L Dandona MD, M H Forouzanfar MD, N Fullman MPH, E M Goldberg BSc, Prof S I Hay DSc, M Holmberg BS, M J Kutz BS, H J Larson PhD, Prof A D Lopez PhD, C R McNellan BA, Prof A H Mokdad PhD, M D Mooney BS, Prof M Naghavi PhD, H E Olsen MA, D M Pigott DPhil, Prof T Vos PhD, H Wang PhD, T Achoki MD, A Afshin MD, C Allen BA, G M Anderson MSEE, R Barber BS, K A Bienenhoff MA, J Blore PhD, Prof M Brauer ScD, A Carter BS, D Casey BA, F J Charlson PhD, A Z Chen BS, M M Coates MPH, M Coggeshall BA, A J Cohen DSc, A Deshpande MPH, H E Erskine PhD, A J Ferrari PhD, C Fitzmaurice MD, K Foreman PhD, M Fraser BA, J Friedman BA, J Frostad MPH, W Godwin BS, N Graetz MPH, M Griswold MS, J A Haagsma PhD, A Haakenstad MA, N J Kassebaum MD, L Kemmer PhD, X R Kulikoff BA, H H Kyu PhD, J Leung PhD, M Lind BS, P Y Liu BA, F Masiye PhD, M Mirarefin MPH, A Misganaw PhD, M Moradi-Lakeh MD, G Nguyen MPH, C Pinho BA, P C Rao MPH, M B Reitsma BS, G A Roth MD, D F Santomauro PhD, K Shackelford BA, N Silpakit BS, A Sligar MPH, R J D Sorensen MPH, J D Stanaway PhD, C Steiner MPH, P Sur BA, Prof S E Vollset DrPH, V Wanga MS, Prof H A Whiteford PhD, Y Zhao MS, Prof M Zhou PhD, Prof C J L Murray DPhil), School of Dentistry (G A Kotsakis DDS), Harborview Injury Prevention and Research Center (C N Mock PhD), University of Washington, Seattle, WA, USA (Prof B O Anderson MD, D A Watkins MD); Centre of Excellence in Women and Child Health (Z A Bhutta PhD), Aga Khan University, Karachi, Pakistan (M I Nisar MSc); Centre for Global Child Health, The Hospital for Sick Children, Toronto, ON, Canada (Z A Bhutta PhD, N Akseer MSc, G A deVeber MD); Centre for Control of Chronic Conditions (P Jeemon PhD), Public Health Foundation of India, New Delhi, India (Prof L Dandona MD, R Dandona PhD, G A Kumar PhD); Department of Zoology (P W Gething PhD), Oxford Big Data Institute, Li Ka Shing Centre for Health Information and Discovery (Prof S I Hay DSc), Nuffield Department of Medicine (D Bisanzio PhD), NIHR Musculoskeletal Biomedical Research Centre (Prof C Cooper FMedSci), University of Oxford, Oxford, UK (R Ali FRCP, D A Bennett PhD, Prof V Jha DM, D J Weiss PhD); Centre for Research & Action in Public Health, Faculty of Health, University of Canberra, Canberra, ACT, Australia (Y Kinfa PhD); Department of Infectious Disease Epidemiology (H J Larson PhD), Centre for Global Mental Health (Prof V Patel PhD), London School of Hygiene & Tropical Medicine, London, UK (S M Langan PhD, Prof M McKee DSc, Prof C V S Murthy MD, B Roberts PhD, H Stöckl DPhil); National Center for Chronic and Noncommunicable Disease Control and Prevention (L Duan MD, Y Jin MS, Y Li MPH, S Liu PhD, Prof L Wang MD, P Ye MPH, Prof M Zhou PhD), Chinese Center for Disease Control and Prevention, Beijing, China (Prof X Liang MD); Melbourne School of Population and Global Health (Prof A D Lopez PhD), Department of Paediatrics (P Azzopardi MEpi), The Peter Doherty Institute for Infection and Immunity (Prof B C Cowie PhD), Department of Medicine (A Meretoja PhD), Murdoch Childrens Research Institute (Prof G C Patton MD, K Alam PhD, P Azzopardi MEpi, R G Weintraub MBBS), Department of Pediatrics (Prof S M Sawyer MD), Institute of Health and Ageing (Prof C E I Szoek PhD), The University of Melbourne, Melbourne, VIC, Australia (K Alam PhD, Prof H R Taylor AC, R G Weintraub MBBS); National Institute of Public Health, Cuernavaca, Mexico (R Lozano MD, T Barrientos-Gutierrez PhD, I R Campos-Nonato PhD, J C Campuzano PhD, I B Heredia-Pi PhD, J C Montañez Hernandez MSc, M J Rios Blancas MPH, Prof E E Servan-Mori MSc, T Shamah Levy PhD); Department of Global Health and Population, Harvard T H Chan School of Public Health (Prof J A Salomon PhD), Department of Global Health and Social Medicine, Harvard Medical School (Prof A Binagwaho PhD), Department of Epidemiology (P James ScD) Harvard T H Chan School

of Public Health (Prof T Bärnighausen MD, L E Cahill PhD, I R Campos-Nonato PhD, E L Ding ScD, M S Farvid PhD, A Haakenstad MA, G R Wagner MD), Department of Nutrition, Harvard T H Chan School of Public Health (A L Thorne-Lyman ScD), Channing Division of Network Medicine, Brigham & Women's Hospital, Harvard Medical School (P James ScD), Harvard University, Boston, MA, USA (J R A Fitchett MD); School of Public Health (A A Abajobir MPH, F J Charlson PhD, H E Erskine PhD, A J Ferrari PhD, L D Knibbs PhD, J Leung PhD, D F Santomauro PhD, J L Veerman PhD, Prof H A Whiteford PhD), School of Dentistry (Prof R Lalloo PhD), University of Queensland, Brisbane, QLD, Australia (H N Gouda PhD, Y Guo PhD, Prof J J McGrath MD); Jimma University, Jimma, Ethiopia (K H Abate MS, T T Gebrehiwot MPH, A T Gebremedhin MPH); La Sapienza, University of Rome, Rome, Italy (C Abbafati PhD); Virginia Tech, Blacksburg, VA, USA (Prof K M Abbas PhD); Department of Neurology, Cairo University, Cairo, Egypt (Prof F Abd-Allah MD); New York University Abu Dhabi, Abu Dhabi, United Arab Emirates (A M Abdulle PhD); NMSM Government College Kalpetta, Kerala, India (Prof B Abraham MPhil); Institute for Global Health Data Science, Institute of Health Informatics (R W Aldridge PhD), Farr Institute of Health Informatics Research (R W Aldridge PhD, A Banerjee DPhil), Department of Epidemiology and Public Health (H Benjian PhD, T Tillmann MSc), University College London, London, UK; Infectious Disease Epidemiology Group, Weill Cornell Medical College in Qatar, Doha, Qatar (L J Abu-Raddad PhD); Institute of Community and Public Health, Birzeit University, Ramallah, Palestine (N M Abu-Rmeileh PhD); School of Public Health (Y A Melaku MPH), Mekelle University, Mekelle, Ethiopia (Prof G Y Abyu MS, T A Bayou BS, B D Betsu MS, A A Gebru MPH, G B Hailu MSc, D Y Tekle MS, A Z Yalew MS); College of Medicine (A O Adebiyi MD), Department of Medicine (M O Owolabi Dr Med), University of Ibadan, Ibadan, Nigeria (R O Akinyemi PhD); University College Hospital, Ibadan, Nigeria (A O Adebiyi MD); Olabisi Onabanjo University, Ago-Iwoye, Nigeria (I A Adedeji MS); Direction du District Sanitaire de Haho, Notsé, Togo (K A Afanvi MD); Faculté des Sciences de Santé, Université de Lomé, Lomé, Togo (K A Afanvi MD); Friedman School of Nutrition Science and Policy (A Afshin MD, R Micha PhD), Tufts University, Boston, MA, USA (P Shi PhD, G M Singh PhD); Dalla Lana School of Public Health (N Akseer MSc), Department of Nutritional Sciences, Faculty of Medicine (A Badawi PhD), University of Toronto, Toronto, ON, Canada (A Agarwal BHS); McMaster University, Hamilton, ON, Canada (A Agarwal BHS); CSIR Institute of Genomics and Integrative Biology, Delhi, India (A Agrawal PhD); Department of Internal Medicine, Baylor College of Medicine, Houston, TX, USA (A Agrawal PhD); Department of Clinical Sciences Lund, Orthopedics, Clinical Epidemiology Unit (A Ahmad Kiadaliri PhD), Skane University Hospital, Department of Clinical Sciences Lund (Prof B Norrving PhD), Lund University, Lund, Sweden; Health Services Management Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran (A Ahmad Kiadaliri PhD); Ophthalmic Research Center (H Ahmadih MD, M Yaseri PhD), School of Public Health (N Jahanmehr PhD), Shahid Beheshti University of Medical Sciences, Tehran, Iran; Department of Ophthalmology, Labbafinejad Medical Center, Tehran, Iran (H Ahmadih MD); Debre Markos University, Debre Markos, Ethiopia (K Y Ahmed MPH, Z A Alemu MPH, T K Tegegne MPH); University of Rhode Island, Kingston, RI, USA (A S Akanda PhD); Newcastle University, Newcastle upon Tyne, UK (R O Akinyemi PhD); Department of Epidemiology (T F Akinyemiju PhD), University of Alabama at Birmingham, Birmingham, AL, USA (D C Schwebel PhD, J A Singh MD); Washington University in Saint Louis, St Louis, MO, USA (Z Al-Aly MD); Sydney School of Public Health (Prof T R Driscoll PhD), The University of Sydney, Sydney, NSW, Australia (K Alam PhD, J Leigh PhD, A B Mekonnen MS, Prof B Neal PhD); International Center for Humanitarian Affairs, Nairobi, Kenya (U Alam PhD); Ministry of Health, Al Khuwair, Oman (D Alasfoor MSc); King Abdullah Specialized Children's Hospital, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia (F S AlBuhairan MD); King Abdullah International Medical Research Center, Riyadh, Saudi Arabia (F S AlBuhairan MD); King Khalid University Hospital (M A Alkhateeb BA), King Saud University, Riyadh, Saudi Arabia (S F Aldhahri MD, K A Altirkawi MD); Department of Anesthesiology (A S Terkawi MD), King Fahad Medical City, Riyadh, Saudi Arabia (S F Aldhahri MD); Luxembourg Institute of Health (LIH), Strassen, Luxembourg (A Alkerwi PhD); School of Public Health, University of Lorraine, Nancy, France (Prof F Alla PhD); Department of Public Health Sciences (P Allebeck PhD, R H S Rabiee MPH, N Roy MD), Aging Research Center (Prof M Kivipelto PhD), Department of Clinical Science, Intervention and Technology (Prof J J Carrero PhD), Department of Neurobiology, Care Sciences and Society (NVS) (S M Fereshtehnejad PhD), Department of Medical Epidemiology and Biostatistics (E Weiderpass PhD), Karolinska Institutet, Stockholm, Sweden (R Havmoeller PhD, S Sindi PhD); Ministry of Health, Jeddah, Saudi Arabia (R Al-Raddadi PhD); Government, Madrid, Spain (E Alvarez Martin PhD); Universidad de Cartagena, Cartagena, Colombia (Prof N Alvis-Guzman PhD, A J Paternina Caicedo MD); School of Medicine (A T Amare MPH, Y A Melaku MPH), University of Adelaide, Adelaide, SA, Australia (L G Ciobanu MS, G A Tessema MPH); College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, Ethiopia (A T Amare MPH); Dignitas International, Zomba, Malawi (A Amberbir PhD); University of Cape Coast, Cape Coast, Ghana (A K Amegah PhD); Environmental Health Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran (H Amini MSPH); Department of Epidemiology and Public Health (H Amini MSPH, T First PhD), Swiss Tropical and Public Health Institute, Basel, Switzerland (C K Karema MSc); Ministry of Public Health, Beirut, Lebanon (W Ammar PhD, H L Harb MPH); Oregon Health & Science University, Portland, OR, USA (S M Amrock MD); Center for Sensory-Motor Interaction, Department of Health Science and Technology, Faculty of Medicine, Aalborg University, Aalborg, Denmark (H H Andersen MSc); Department of Health Policy and Administration, College of Public Health, University of the Philippines Manila, Manila, Philippines (C A T Antonio MD); Self-employed, Kabul, Afghanistan (P Anwari MD); Department of Medical Sciences, Uppsala University, Uppsala, Sweden (Prof J Ärnlöv PhD, Prof A Larsson PhD); Dalarna University, Falun, Sweden (Prof J Ärnlöv PhD); University of Manitoba, Winnipeg, MB, Canada (A Artaman PhD); Department of Medical Emergency, School of Paramedic, Qom University of Medical Sciences, Qom, Iran (H Asayesh PhD); South Asian Public Health Forum, Islamabad, Pakistan (R J Asghar MD); Graduate Institute of Biomedical Informatics, Taipei Medical University, Taipei, Taiwan (S Atique MS); Institut de Recherche Clinique du Bénin, Cotonou, Benin Republic (E F G A Avokpaho MPH); Laboratoire d'Etudes et de Recherche-Action en Santé (LERAS Afrique), Parakou, Benin Republic (E F G A Avokpaho MPH); Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India (A Awasthi MSc); The Judith Lumley Centre for Mother, Infant and Family Health Research, La Trobe University, Melbourne, VIC, Australia (B P Ayala Quintanilla PhD); Peruvian National Institute of Health, Lima, Peru (B P Ayala Quintanilla PhD); Wardliparingga Aboriginal Research Unit, South Australian Health and Medical Research Institute, Adelaide, SA, Australia (P Azzopardi MEpi); Centre for International Health, Burnet Institute, Melbourne, VIC, Australia (P Azzopardi MEpi); School of Health Sciences, University of Management and Technology, Lahore, Pakistan (U Bacha PhD); Public Health Agency of Canada, Toronto, ON, Canada (A Badawi PhD); Department of Environmental Health Engineering, Sri Ramachandra University, Chennai, India (K Balakrishnan PhD); Faculty of Medicine, University of Belgrade, Belgrade, Serbia (A Barac PhD); School of Psychology, University of Auckland, Auckland, New Zealand (S L Barker-Collo PhD); Africa Health Research Institute, Mtubatuba, South Africa (Prof T Bärnighausen MD); Institute of Public Health, Heidelberg University, Heidelberg, Germany (Prof T Bärnighausen MD, S Mohammed PhD); Department of Industrial Engineering, School of Engineering, Pontificia Universidad Javeriana, Bogotá, Colombia (I H Barrero ScD); Stanford University, Stanford, CA, USA (S Basu PhD, L C Del Gobbo PhD); College of Medicine, Charles R Drew University of Medicine and Science, Los Angeles, CA, USA (Prof S Bazargan-Hejazi PhD); David Geffen School of Medicine, University of California, Los Angeles, Los Angeles, CA, USA (Prof S Bazargan-Hejazi PhD); Kermanshah University of Medical Science, Kermanshah, Iran (Prof S Bazargan-Hejazi PhD);

Oxford University, Ho Chi Minh City, Vietnam (J Beardsley MBChB); College of Public Health and Tropical Medicine, Jazan, Saudi Arabia (N Bedi MD); IRCCS - Istituto di Ricerche Farmacologiche Mario Negri, Milan, Italy (E Beghi MD); University Hospital and Medical School of Dijon, University of Burgundy, Dijon, France (Prof Y B  jot PhD); School of Medicine (K N Sheth MD), Yale University, New Haven, CT, USA (Prof M L Bell PhD); University of Alberta, Edmonton, AB, Canada (A K Bello PhD); Internal Medicine Department (Prof I S Santos PhD), University of S  o Paulo, S  o Paulo, Brazil (I M Bensenor PhD, Prof P A Lotufo DrPH); Department of Epidemiology and Health Promotion, College of Dentistry (H Benzian PhD), New York University, New York, NY, USA; Debre Berhane University, Debre Berhan, Ethiopia (A Berhane PhD); Division of Health and Social Care Research (Prof C D Wolfe MD), King's College London, London, UK (E Bernab   PhD, I Wolfe PhD); University Andes, Bogot  , Colombia (O A Bernal PhD); College of Health and Medical Sciences (H S Roba MPH), Haramaya University, Harar, Ethiopia (A S Beyene MPH, Y M Mesfin MPH); Queen Elizabeth Hospital Birmingham, Birmingham, UK (N Bhala DPhil); University of Otago Medical School, Wellington, New Zealand (N Bhala DPhil); Imperial College, London, UK (S Bhatt DPhil); Independent Public Health Consultants, Addis Ababa, Ethiopia (S Biadgilign MPH); Department of Nephrology Issues of Transplanted Kidney, Academician V I Shumakov Federal Research Center of Transplantology and Artificial Organs, Moscow, Russia (B Bikbov MD); Department of Pediatrics & The Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine (Prof A Binagwaho PhD), Dartmouth College, Hanover, NH, USA (S Soneji PhD); The University of Global Health Equity, Kigali, Rwanda (Prof A Binagwaho PhD); Department of Community Medicine (Prof E Bjertness PhD), University of Oslo, Oslo, Norway (A S Htet MPhil); Vision & Eye Research Unit, Anglia Ruskin University, Cambridge, UK (Prof R R A Bourne FRCOphth); Danube-University Krems, Krems, Austria (Prof M Brainin PhD); School of Population and Public Health (H Krueger PhD), University of British Columbia, Vancouver, BC, Canada (Prof M Brauer ScD, C C Gotay PhD, Prof N Kisson MD, S Murthy MD, F Pourmalek PhD); Faculty of Health Sciences and Social Work, Department of Public Health, Trnava University, Trnava, Slovakia (A Brazinova PhD, M Majdan PhD); International Neurotrauma Research Organization, Vienna, Austria (A Brazinova PhD); College of Medicine (J Shen PhD), The Ohio State University, Columbus, OH, USA (Prof N J K Breitbart PhD); Technion, Haifa, Israel (Prof D M Broday DSc); University of Leicester, Leicester, UK (Prof T S Brugha MD); Monash Department of Clinical Epidemiology, Cabrini Institute, Melbourne, VIC, Australia (Prof R Buchbinder PhD); Department of Epidemiology and Preventive Medicine (Prof R Buchbinder PhD), School of Public Health and Preventive Medicine (Prof B Gabbe PhD), Department of Medicine, School of Clinical Sciences at Monash Health (Prof A G Thrift PhD), Monash University, Melbourne, VIC, Australia; Al Shifa Trust Eye Hospital, Rawalpindi, Pakistan (Z A Butt PhD); Department of Physics and Atmospheric Science (A van Donkelaar PhD), Dalhousie University, Halifax, NS, Canada (L E Cahill PhD, Prof R V Martin PhD); Department of Biostatistics and Epidemiology, University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA (H Carabin PhD); Metropolitan Autonomous University, Mexico City, Mexico (R C  rdenas ScD); Stroke Unit, University of Perugia, Perugia, Italy (V Caso MD); Colombian National Health Observatory, Instituto Nacional de Salud, Bogot  , Colombia (C A Casta  eda-Orjuela MSc); Epidemiology and Public Health Evaluation Group, Public Health Department, Universidad Nacional de Colombia, Bogot  , Colombia (C A Casta  eda-Orjuela MSc); Caja Costarricense de Seguro Social, San Jose, Costa Rica (Prof J Castillo Rivas MPH); Universidad de Costa Rica, San Pedro, Montes de Oca, Costa Rica (Prof J Castillo Rivas MPH); Department of Medicine, University of Valencia/INCLIVA Health Research Institute and CIBERSAM, Valencia, Spain (F Catal  -L  pez PhD); Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, ON, Canada (F Catal  -L  pez PhD); Faculty of Medicine, University of the Republic, Montevideo, Uruguay (F Cavalleri BS); I3S - Instituto de Investiga  o e Inova  o em Sa  de (P Cecilio MS, J das Neves PhD); Pharmacy Faculty (P Cecilio MS), INEB - Instituto de Engenharia Biom  dica (J das Neves PhD), Faculty of Medicine (J Massano MD, J V Santos BHLthSc), EPIUnit - Institute of Public Health (J M Pedro MS), University of Porto, Porto, Portugal; National Health Research Institutes, Zhunan Town, Taiwan (Prof H Chang DrPH); National Yang-Ming University, Taipei, Taiwan (Prof H Chang DrPH); School of Nursing, College of Medicine, National Taiwan University, Taipei, Taiwan (Prof J Chang PhD); Queensland Centre for Mental Health Research, Brisbane, QLD, Australia (F J Charlson PhD, H E Erskine PhD, A J Ferrari PhD, J Leung PhD, D F Santomauro PhD, Prof H A Whiteford PhD); African Centre for Statistics, United Nations Economic Commission for Africa, Addis Ababa, Ethiopia (X Che PhD); Clinical Governance Unit, Gold Coast Health, Southport, QLD, Australia (P P Chiang PhD); Crowd Watch Africa, Lusaka, Zambia (M Chibalabala BS); University of Zambia, Lusaka, Zambia (V H Chisumpa MPhil, C C Mapoma PhD, F Masiye PhD); University of Witwatersrand, Johannesburg, South Africa (V H Chisumpa MPhil); Seoul National University Medical Library, Seoul, South Korea (J J Choi PhD); Department of Public Health and Primary Care, University of Cambridge, Cambridge, UK (R Chowdhury PhD); Bispebjerg University Hospital, Copenhagen, Denmark (Prof H Christensen DMSci); University of Salerno, Baronissi, Italy (Prof M Cirillo MD); Health Effects Institute, Boston, MA, USA (A J Cohen DSc); Department of Infectious Disease Epidemiology (T F  rst PhD), Department of Epidemiology and Biostatistics (F B Piel PhD), Department of Epidemiology and Biostatistics, School of Public Health (Prof A Rodriguez PhD), Imperial College London, London, UK (G S Cooke DPhil, Prof A Majeed MD, Prof B Neal PhD); MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, UK (Prof C Cooper FMedSci); NIHR Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust, Southampton, UK (Prof C Cooper FMedSci); Mayo Clinic, Jacksonville, FL, USA (L T Cooper MD); WHO Collaborating Centre for Viral Hepatitis, Victorian Infectious Diseases Reference Laboratory, Melbourne, VIC, Australia (Prof B C Cowie PhD); Centre for International Health, Dunedin School of Medicine (Prof J A Crump MD), Injury Prevention Research Unit, Department of Preventive and Social Medicine, Dunedin School of Medicine (Prof S Derrett PhD), University of Otago, Dunedin, New Zealand (Prof R G Poulton PhD); Wolaita Sodo University, Wolaita Sodo, Ethiopia (S A Damtew MPH, S B Workie MPH); School of Public Health (K Deribe MPH), College of Health Sciences, School of Public Health (W Tefera MPH), Addis Ababa University, Addis Ababa, Ethiopia (S A Damtew MPH, A Z Giref PhD, D Haile MPH, G Temam Shifa MPH); Guy's and St Thomas' NHS Foundation Trust, London, UK (Prof P I Dargan FRCP); Public Health England, London, UK (Prof A C Davis PhD, Prof J N Newton FRCP, Prof N Steel PhD); School of Public Health, Kazakh National Medical University, Almaty, Kazakhstan (K Davletov PhD); National Institute of Public Health, Mexico City, Mexico (E F de Castro PhD); Griffith University, Brisbane, QLD, Australia (Prof D De Leo DSc); National Drug and Alcohol Research Centre (Prof L Degenhardt PhD), Brien Holden Vision Institute (Prof S Resnikoff MD), School of Optometry and Vision Science (Prof S Resnikoff MD), University of New South Wales, Sydney, NSW, Australia (Prof P B Mitchell MD); Brighton and Sussex Medical School, Brighton, UK (K Deribe MPH); Mount Sinai Beth Israel, New York, NY, USA (Prof D C Des Jarlais PhD); Icahn School of Medicine at Mount Sinai, New York, NY, USA (Prof D C Des Jarlais PhD); Indian Institute of Public Health-Delhi (S Dey PhD, Prof G V S Murthy MD), Centre for Control of Chronic Conditions (P Jeemon PhD), Centre for Chronic Conditions and Injuries (Prof V Patel PhD), Public Health Foundation of India, Gurgaon, India (P K Dhillon PhD, D K Lal MD, Prof S Zodpey PhD); Department of Community Medicine, Faculty of Medicine, University of Peradeniya, Peradeniya, Sri Lanka (S D Dharmaratne MD); University of Rochester Medical Center, Rochester, NY, USA (E R Dorsey MD); RMIT University, Bundoora, VIC, Australia (Prof K E Doyle PhD); The University of Sydney, Camperdown, NSW, Australia (Prof A H Kemp PhD); International Institute for Population Sciences, Mumbai, India (M Dubey MPhil, M H U Rahman MPhil, Prof U Ram PhD, A Singh PhD, R K Verma MPhil, A K Yadav MPhil); Federal University of Rio Grande do Sul, Porto Alegre, Brazil (B B Duncan PhD, C Kieling MD, Prof M I Schmidt MD); University of North Carolina, Chapel Hill, NC,

USA (B B Duncan PhD); Non-Communicable Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute (H Ebrahimi MD, Prof A Esteghamati MD, F Farzadfar MD, N Hafezi-Nejad MD, A Kasaiean PhD, M Parsaeian PhD, F Pishgar MD, S Sheikhbahaee MD), Liver and Pancreaticobiliary Diseases Research Center, Digestive Disease Research Institute, Shariati Hospital (H Ebrahimi MD), Digestive Diseases Research Institute (S Fahimi PhD, Prof R Malekzadeh MD, G Roshandel PhD, S G Sepanlou PhD), Center for Air Pollution Research, Institute for Environmental Research (M S Hassanvand PhD), Hematology-Oncology and Stem Cell Transplantation Research Center (A Kasaiean PhD), Non-Communicable Diseases Research Center (A Khosravi PhD), Department of Epidemiology and Biostatistics, School of Public Health (M Parsaeian PhD), Uro-Oncology Research Center (F Pishgar MD), Sina Trauma and Surgery Research Center (Prof V Rahimi-Movaghar MD), Tehran University of Medical Sciences, Tehran, Iran (M Yaseri PhD); Arba Minch University, Arba Minch, Ethiopia (A Y Endries MPH, G Temam Shifa MPH); The Institute of Social and Economic Studies of Population, Russian Academy of Sciences, Moscow, Russia (Prof S P Ermakov DSc); Federal Research Institute for Health Organization and Informatics, Ministry of Health of the Russian Federation, Moscow, Russia (Prof S P Ermakov DSc, S Soshnikov PhD); Ministry of Health and Medical Education, Tehran, Iran (B Eshtrati PhD); Arak University of Medical Sciences, Arak, Iran (B Eshtrati PhD); University of Louisville, Louisville, KY, USA (T A Farid MD, A R Khan MD); DGS Directorate General of Health, Lisboa, Portugal (C S E S Farinha MSc); Universidade Aberta, Lisboa, Portugal (C S E S Farinha MSc); Federal University of Sergipe, Aracaju, Brazil (Prof A Faro PhD); Harvard/MGH Center on Genomics, Vulnerable Populations, and Health Disparities, Mongan Institute for Health Policy, Massachusetts General Hospital, Boston, MA, USA (M S Farvid PhD); National Institute for Stroke and Applied Neurosciences, Auckland University of Technology, Auckland, New Zealand (V L Feigin PhD); ARS Norte, I P, Departamento Saúde Pública, Porto, Portugal (M M Felicio MD); Institute of Education and Sciences, German Hospital Oswaldo Cruz, São Paulo, Brazil (Prof J G Fernandes PhD); Centre for Experimental Medicine & Rheumatology, William Harvey Research Institute, Barts and The London School of Medicine & Dentistry, Queen Mary University of London, London, UK (J C Fernandes PhD); Bielefeld University, Bielefeld, Germany (F Fischer MPH); Institute of Gerontology, Academy of Medical Science, Kyiv, Ukraine (N Foigt PhD); Alzheimer Scotland Dementia Research Centre (I Shiue PhD), University of Edinburgh, Edinburgh, UK (Prof F G R Fowkes PhD); Federal University of Minas Gerais, Belo Horizonte, Brazil (Prof E B Franca PhD); James Cook University, Townsville, QLD, Australia (R C Franklin PhD); University of Basel, Basel, Switzerland (T Füst PhD); Manhica Health Research Center, Manhica, Mozambique (A L Garcia-Basteiro MSc); Barcelona Institute for Global Health, Barcelona, Spain (A L Garcia-Basteiro MSc); The Task Force for Global Health, Decatur, GA, USA (T Gebre PhD); Ludwig Maximilians University, Munich, Germany (A T Gebremedhin MPH); Kille Awlaelo Health and Demographic Surveillance System, Mekelle, Ethiopia (A A Gebru MPH, G B Hailu MSc); Agence de Medecine Preventive, Paris, France (B D Gessner MD); College of Medicine, Howard University, Washington, DC, USA (R F Gillum MD, A Mehari MD); College of Medicine, University of Hail, Hail, Saudi Arabia (I A Ginawi MD); University Hospital of Dijon, Dijon, France (Prof M Giroud MD); College of Health and Medical Sciences (H S Roba MPH), Haramaya University, Dire Dawa, Ethiopia (M D Gishu MS, A K Tura MPH); Kersa Health and Demographic Surveillance System, Harar, Ethiopia (M D Gishu MS); University of Massachusetts Boston, Boston, MA, USA (Prof P Gona PhD); Instituto de Investigaciones Cientificas y Servicios de Alta Tecnologia - INDICASAT-AIP, Ciudad del Saber, Panamá (A Goodridge PhD); Department of Health and Social Affairs, Government of the Federated States of Micronesia, Palikir, Federated States of Micronesia (S V Gopalani MPH); Division of Epidemiology, Center for Public Health Sciences (A Goto PhD), National Cancer Center, Tokyo, Japan (M Inoue MD); Statts LLC, Chisinau, Moldova (K F Greenwell PhD); Department of Microbiology and Department of Epidemiology & Biostatistics, Saint James School of Medicine, The Quarter, Anguilla (Prof H Gughani PhD); West Virginia Bureau for Public Health, Charleston, WV, USA (R Gupta MD); Eternal Heart Care Centre and Research Institute, Jaipur, India (R Gupta PhD); Department of Anthropology, University of Delhi, Delhi, India (V Gupta PhD); National Institute of Psychiatry Ramon de la Fuente, Mexico City, Mexico (R A Gutiérrez PhD); Aarhus University, Aarhus, Denmark (B Gyawali MPH, K M Iburg PhD); Department of Public Health, Erasmus MC, University Medical Center, Rotterdam, Netherlands (J A Haagsma PhD); Brandeis University, Waltham, MA, USA (Y A Halasa MS, E A Undurraga PhD); Arabian Gulf University, Manama, Bahrain (Prof R R Hamadeh DPhil); Hamdan Bin Mohammed Smart University, Dubai, United Arab Emirates (S Hamidi PhD); Wayne County Department of Health and Human Services, Detroit, MI, USA (M Hammami MD); School of Medicine and Pharmacology, University of Western Australia, Perth, WA, Australia (Prof G J Hankey MD); Harry Perkins Institute of Medical Research, Nedlands, WA, Australia (Prof G J Hankey MD); Western Australian Neuroscience Research Institute, Nedlands, WA, Australia (Prof G J Hankey MD); Parc Sanitari Sant Joan de Déu - CIBERSAM, Sant Boi de Llobregat (Barcelona), Spain (J M Haro MD); Universitat de Barcelona, Barcelona, Spain (J M Haro MD); Department of Psychiatry, University Medical Center Groningen (Prof H W Hoek MD), University of Groningen, Groningen, Netherlands (A K Tura MPH); Department of Epidemiology, Mailman School of Public Health (Prof H W Hoek MD), Columbia University, New York, NY, USA (Prof V Skirbekk PhD); Nevada Division of Public and Behavioral Health, Department of Health and Human Services, Carson City, NV, USA (M Horino MPH); Department of Pulmonology, Yokohama City University Graduate School of Medicine, Yokohama, Japan (N Horita MD); Albert Einstein College of Medicine, Bronx, NY, USA (Prof H D Hosgood PhD); Public Health Division, The Pacific Community, Noumea, New Caledonia (D G Hoy PhD); International Relations Division, Ministry of Health, Nay Pyi Taw, Myanmar (A S Htet MPH); Department of Epidemiology and Health Statistics, School of Public Health, Central South University, Changsha, China (G Hu PhD); Cambridge Health Alliance, Cambridge, MA, USA (H Huang MD); Boston Medical Center (B T Idrisov MD), School of Medicine (G F Kwan MD), Boston University, Boston, MA, USA; Graduate School of Medicine (M Inoue MD), School of Public Health (Prof N Kawakami MD), University of Tokyo, Tokyo, Japan (K Shibuya MD); American Cancer Society, Atlanta, GA, USA (F Islami PhD); MCH Division, USAID - Global Health Bureau, HIDN, Washington, DC, USA (T A Jacobs MD); Department of Global and Community Health, George Mason University, Fairfax, VA, USA (K H Jacobsen PhD); Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia (Prof M B Jakovljevic PhD); UNFPA Asia and the Pacific Regional Office, Bangkok, Thailand (H A F Jansen Drs); University of Aberdeen, Aberdeen, UK (M Javanbakht PhD); Department of Surgery, Virginia Commonwealth University, Richmond, VA, USA (S P Jayaraman MD); Postgraduate Institute of Medicine, Colombo, Sri Lanka (A U Jayatilleke PhD); Institute of Violence and Injury Prevention, Colombo, Sri Lanka (A U Jayatilleke PhD); Graduate School of Public Health (Prof S H Jee PhD), Yonsei University, Seoul, South Korea; Centre for Chronic Disease Control, New Delhi, India (P Jeemon PhD); George Institute for Global Health India, New Delhi, India (Prof V Jha DM); Department of Health Development, Institute of Industrial Ecological Sciences, University of Occupational and Environmental Health, Kitakyushu, Japan (Y Jiang PhD); School of Public Health (K Deribe MPH), College of Health Sciences, School of Public Health (W Tefera MPH), Addis Ababa University, Debre Zeit, Ethiopia (T Jibat MS); Wageningen University, Wageningen, Netherlands (T Jibat MS); Department of Ophthalmology, Medical Faculty Mannheim, Ruprecht-Karls-University Heidelberg, Mannheim, Germany (Prof J B Jonas MD); University College Cork, Cork, Ireland (Z Kabir PhD); Society for Education, Action and Research in Community Health, Gadchiroli, India (Y Kalkonde MD); CSIR - Indian Institute of Toxicology Research, Lucknow, India (R Kamal MSc, C N Kesavachandran PhD); Department of Pulmonary Medicine, Zhongshan Hospital (J She MD), Fudan University, Shanghai, China (H Kan MD); University at Buffalo, Buffalo, NY, USA (A Kandel MBBS); Epidemiological and Statistical Methods Research Group, Helmholtz