

Characterising acute and chronic care needs: insights from the Global Burden of Disease Study 2019

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GBD 2019 Acute and Chronic Care Collaborators*

Chronic care manages long-term, progressive conditions, while acute care addresses short-term conditions. Chronic conditions increasingly strain health systems, which are often unprepared for these demands. This study examines the burden of conditions requiring acute versus chronic care, including sequelae. Conditions and sequelae from the Global Burden of Diseases Study 2019 were classified into acute or chronic care categories. Data were analysed by age, sex, and socio-demographic index, presenting total numbers and contributions to burden metrics such as Disability-Adjusted Life Years (DALYs), Years Lived with Disability (YLD), and Years of Life Lost (YLL). Approximately 68% of DALYs were attributed to chronic care, while 27% were due to acute care. Chronic care needs increased with age, representing 86% of YLDs and 71% of YLLs, and accounting for 93% of YLDs from sequelae. These findings highlight that chronic care needs far exceed acute care needs globally, necessitating health systems to adapt accordingly.

The provision of healthcare services involves addressing a wide range of medical needs, each requiring specific attention and resources. Among these needs, two distinct categories stand out: chronic care and acute care¹. Chronic care focuses on the management and long-term treatment of medical conditions that are persistent, progressive despite treatment, and typically incurable. In contrast, acute care involves conditions that have a short, relatively severe course, and potentially curable or reversible^{2–6}. Some chronic conditions, such as HIV/AIDS or Tuberculosis (TB), have an infectious origin, while others, like cardiovascular diseases, cancer and type 2 diabetes, are classified as non-communicable diseases (NCDs). Globally, these three NCDs account for around 50% of all deaths in 2016⁷. In the United States of America (USA), it is estimated that 100 million people have at least one chronic disease, and managing these diseases accounted for 75% of national health expenditure⁸. In Tanzania, Setel et al.⁵ undertook a reclassification of the traditional categorization of diseases, namely communicable diseases, NCDs, and injuries, into acute or chronic groups. This reclassification aimed to align with the specific care needs associated with each condition, and found that 86% of disability-adjusted life years (DALYs)

could be attributed to chronic diseases. In addition, acute diseases and injuries can have non-fatal health outcomes, known as sequelae, and these must also be considered^{9,10}.

With the increase in the prevalence of NCDs¹¹ and advancements in medical treatments that transform communicable diseases like HIV/AIDS into chronic conditions¹², health systems need to integrate various factors to effectively plan, deliver, and sustain long-term healthcare. This includes primary, secondary and tertiary prevention. The management of chronic diseases poses a significant challenge for health systems worldwide¹³, spanning all the different World Health Organization (WHO)'s health system building blocks, including health policies, financing, delivery of care, access to medicines, leadership and governance, information management, and quality and safety^{13,14}. There have been numerous calls, including from the WHO, for a shift in health systems from reactive acute care responses to proactive and preventive chronic care^{13,15–17}.

The distinction between acute and chronic care in healthcare is crucial, as previously reported by the WHO Universal Health Coverage (UHC) compendium and the Disease Control Priorities Network (DCP-3). UHC aims to ensure that all individuals have access to essential healthcare services without encountering financial hardships,

*A list of authors and their affiliations appears at the end of the paper.

emphasizing equitable access to both acute and chronic care¹⁸. DCP-3, on the other hand, provides a comprehensive understanding of disease burdens and interventions, shedding light on effective strategies for addressing chronic conditions and their associated care needs within healthcare systems¹⁹. DCP-3 also acknowledges that the pursuit of essential UHC will differ across countries based on unique cost structures, epidemiological needs, and national priorities²⁰. Integrating the principles outlined in these frameworks allows for a more holistic approach to healthcare planning and delivery, emphasizing not only the treatment of acute conditions but also the management and prevention of chronic illnesses which, ultimately, has the overarching goal of improving health outcomes and promoting overall well-being. Understanding the dynamics and requirements of both acute and chronic care is therefore vital for creating robust healthcare systems capable of meeting the diverse and evolving needs of populations worldwide.

In this work we aim to characterise the burden of acute and chronic care needs using estimates from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019.

Results

Diseases and injuries

Global DALYs, YLDs and YLLs attributed to acute and chronic care needs. Globally, the leading cause of DALYs was ischemic heart disease (chronic care) followed by lower respiratory infections (acute

care). Six out of the ten top leading causes of DALYs were related to chronic care needs (Supplementary Figs. 1 and 2). Only around 27% of all-cause, all-age DALYs were attributable to conditions that required acute care, while around 68% were attributed to conditions that required chronic care. Around 5% of DALYs could not be attributed to acute or chronic needs (Fig. 1b and Supplementary Fig 1). Globally, 7% and 38% of YLDs and YLLs, respectively, were attributed to conditions requiring acute care across all age groups, whereas corresponding figures for conditions requiring chronic care were 86%, and 59%, respectively (Fig. 1).

Larger numbers and percentages of DALYs, YLDs, and YLLs were attributable to chronic care needs in people 25 years old and above. In contrast higher DALYs and YLLs attributed to acute care needs were observed in the first five years of life (Fig. 1). As a proportion, YLDs attributed to conditions requiring chronic care tended to be higher than the ones attributed to acute care needs while the contrary is observed for YLLs in people below 25 years old, where conditions requiring acute care needs represented a higher number and proportion of YLLs (Fig. 1d and 1f).

DALYs, YLDs and YLLs by location. When assessing metrics by country, a larger proportion of DALYs was attributed to chronic versus acute conditions across most countries and territories, except for certain countries in Central Africa (details for numbers and percentages of DALYs, YLDs, and YLLs attributed to acute

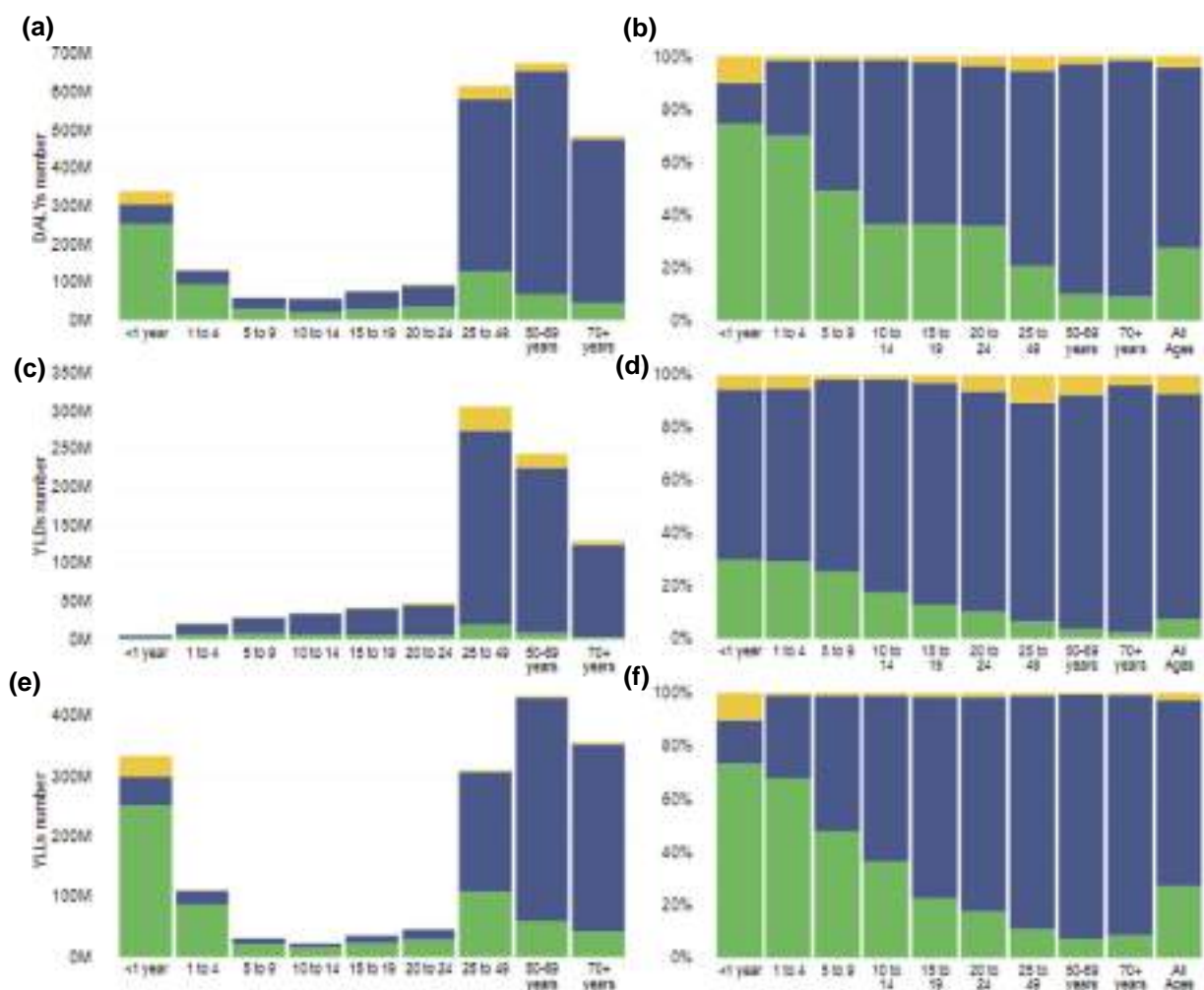


Fig. 1 | Number and percentage of DALYs, YLDs, and YLLs attributed to acute and chronic care conditions. Left figures show number and right figures show percentage of global (a, b) disability-adjusted life years (DALYs), (c, d) years lived

with disability (YLDs), and (e, f) years of life lost (YLLs) according to the care needs classification (i.e.: acute [green], chronic [blue], and undetermined [yellow]) by age group.



Fig. 2 | All-age number and percentage of Dalys by socio-demographic Index using the care needs classification. All-age number and percentage of disability-adjusted life years (DALYs) for 293 conditions classified according to their care

needs classification (i.e., acute [green], chronic [blue], and undetermined [yellow]) by Socio-Demographic Index (SDI).



Fig. 3 | Number and percentage of YLDs for both sexes by age group using the care needs classification for sequelae. Number (a) and percentage (b) of global years lived with disability (YLDs) according to the care needs classification (i.e.: acute [green], chronic [blue], and undetermined [yellow]) by age group.

and chronic care needs conditions by country are provided in Supplementary Tables 2 and 3). In some countries in Africa and Asia, DALYs attributed to conditions that required acute care were around or exceeded 50% of the total. Niger had the highest burden attributed to conditions that required acute care (72% of DALYs), and Italy had the lowest burden (6% of DALYs) (Supplementary Table 3).

When assessing the burden of care needs by SDI, a gradient was found in the proportion of DALYs attributed to conditions with acute care needs. Acute care needs were higher in low SDI locations (52%), decreasing (11%) as SDI increased for countries and territories characterized by a high SDI (Fig. 2). When assessing absolute numbers, middle SDI countries and territories had the highest DALYs attributable to chronic care needs (Fig. 2).

A higher burden of DALYs and YLLs of both types of care needs was observed in males when compared to females (Supplementary Fig. 3). In contrast, for YLDs, women showed a slightly higher burden (Supplementary Fig. 4). Of note, larger differences for DALYs and YLLs were observed between males and females for conditions requiring acute care (Supplementary Figs. 3, 5). For example, all-age DALYs and YLLs for men in high-middle SDI countries were almost double of what was found for women (Supplementary Figs. 3 and 5).

Most DALYs and YLDs attributed to chronic care needs increased with age across SDI country categories (Supplementary Figs. 6 and 7). In the age groups under 25 years old, YLLs attributed to conditions requiring acute care were higher than conditions requiring chronic care. This is the opposite for the age groups 25 years of age or older. (Supplementary Fig. 7).

Sequelae

Global YLDs attributed to sequelae requiring acute and chronic care. In 2019, 93.1% of all-cause and all-age YLDs were attributed to sequelae that required chronic care, 6.3% were attributed to sequelae that required acute care, and 0.6% that could not be attributed to acute or chronic care needs (Supplementary Fig. 8). This pattern was found in most countries and territories, with some variation. (Supplementary Table 5).

Globally, the number of YLDs increased with age, being higher in people aged 50-59 years when compared to the other age categories. As age increased, the percentage of YLDs attributed to chronic (versus acute) sequelae also increased, ranging from 56% at 1 to 4 years of age to more than 90% in age groups older than 25 years. (Fig. 3).

The sequelae accounting for the greatest YLDs by acute, chronic and undetermined care needs are shown in Supplementary Figs. 8 and 9. Type 2 diabetes sequelae were associated with the largest number of YLDs, and chronic care needs accounted for 8 out of 10 conditions with disabling sequelae (Supplementary Fig. 9).

YLDs attributed to acute and chronic sequelae by location. The proportion of YLDs attributed to sequelae with chronic care needs ranged from 59% in Liberia, to 98% in the USA and Niue (Supplementary Table 5). When grouping the location by SDI, in low SDI countries and territories, YLDs attributed to sequelae with chronic care needs were slightly lower (80.3%) than the global proportion (93%). In high-SDI countries and territories this proportion was 98% (Fig. 4).

When disaggregating by sex, all-age YLDs attributed to sequelae requiring chronic care were slightly higher in women living in low and low-middle SDI countries and in men living in high SDI countries when compared to their counterparts (Supplementary Fig. 10). In contrast,

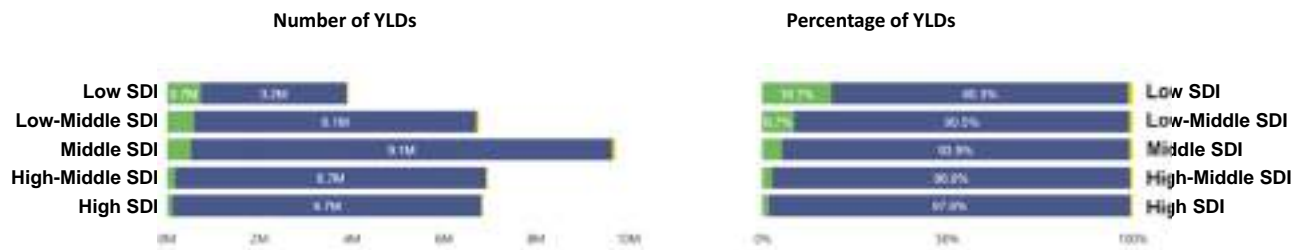


Fig. 4 | All-age number and percentage of YLDs by care needs classification and SDI attributed to sequelae. All-age number and percentage of years lived in disability for 379 sequelae classified by their care needs classification (i.e. acute [green], chronic [blue], and undetermined [yellow]) by Socio-demographic Index (SDI).

YLDs attributed to acute sequelae were slightly higher in women living in high SDI and in men living in low to middle SDI countries. Also, a higher number of YLDs were observed in older ages independently of SDI (Supplementary Fig. 11).

Discussion

This study aimed to quantify the burden of acute and chronic care for diseases and injuries and sequelae. Worldwide, two-thirds of all-cause, all-age DALYs were attributed to conditions that required chronic care. The proportion of DALYs attributed to chronic care needs was low in early life but increased as age increased. Of the 10 conditions associated with the greatest DALYs across age groups, 6 required chronic care. This burden was also reflected in all-age YLDs and YLLs with 86% and 59% of the overall burden attributable to conditions with chronic care needs, respectively. For both, conditions having acute and chronic care needs, DALYs and YLLs were slightly and consistently higher in men than in women, while YLDs were higher in women. Additionally, there was a socioeconomic gradient, with low SDI countries having the greatest proportion of DALYs and YLLs from acute care conditions and high SDI countries the greatest proportion of DALYs and YLLs from chronic care conditions. Except for the low SDI countries, in the rest of the territories by SDI, the proportion of DALYs from chronic care conditions was above 60%. Eight out of the top 10 sequelae were linked to chronic care needs, with complications related to type 2 diabetes being the leading condition associated with the largest number of YLDs due to sequelae.

The analysis conducted in this study highlights the overwhelming global burden of chronic care needs. While acute care needs still outweigh those for chronic care in Africa, decreases in childhood mortality²¹ and increasing life expectancy will translate to an increase in chronic and degenerative conditions²². Globally, health systems require a “paradigm shift”¹³ theorized by Wagner et al.²³ with their Chronic Care Model, which the WHO further developed into the Innovative Care for Chronic Conditions Framework (ICCCF)¹³. The ICCCF highlights that policy, health system, community and individuals and their carers are all necessary to develop a propitious environment for chronic care management¹³. Different challenges exist at each of these levels, both globally and in low SDI countries. At a policy level, it is argued that one of the prerequisites for addressing chronic care is UHC, ensuring the absence of financial barriers to care²⁴. All SDI groups face different challenges related to chronic diseases due to their cost²⁵. For countries with low and middle SDI, in the process of implementing UHC, the challenge lies in integrating costly chronic diseases into their UHC packages²⁶. In high SDI countries, given the overwhelming burden of chronic care needs, these represent a threat to UHC due to the cost of these diseases.

At a system level, various elements need to be put in place to ensure the continuity of care across ages as well as disease progression to not only prevent or delay the onset of chronic conditions, but also their sequelae²⁷. The focus on primary health care (PHC) and health-care delivery structures alone, fails to recognize the complexity of the management of chronic diseases and the multifactorial determinants

of health, including household, neighborhood, community, economic, and societal factors. Many health systems, especially at the PHC level, do not have the tools to address this²⁸. The ICCCF highlights the importance of health professionals serving as a links between the health system and the community, which is a key consideration for guaranteeing continuity of chronic care beyond the walls of the formal health system²⁹. This is especially important as the onus of chronic care is on the individual and their caregivers³⁰. Studies have shown the challenges chronic disease management for individuals within the community ranging from financial challenges, individuals feeling like a burden on their families or lacking the understanding to manage their condition³¹. Poorly managed chronic care can itself result in acute and downstream chronic sequelae, highlighting the self-perpetuating cycle that can result from inadequate systems to optimize care. As shown in this study, type 2 diabetes sequelae had the largest number of YLDs, confirming overall challenges in the management of such a condition both in low- and high-income settings resulting in poor control and resulting in complications and increased mortality^{32,33}.

Amenable mortality, which measures deaths that can be avoided with timely and effective healthcare, can provide an insight into how access to and quality healthcare varies worldwide and over time³⁴. Reports using this metric have shown a worldwide improvement in the quality of health systems³⁵, although it should be mentioned that there is great heterogeneity in death patterns when assessing the healthcare systems across countries, regions, or globally^{35,36}.

As previously reported, the conventional broad cause classification approach may be limited because it is based on an arbitrary list of conditions that depends on the medical definition used³⁴. Acknowledging that this may vary not only among the definitions used but also among the scenarios assessed, a more overarching approach, like the one used in the present study, classifying all the conditions based on the type of care they require, either acute or chronic⁵, may be more useful when it comes to assessed and plan around the healthcare. The WHO within the ICCCF calls for integration of care. In many contexts such integration has happened for HIV/AIDS³⁷, but is still failing for those with other chronic diseases. The result of integration of care is for the individual to have a continuum of care needs met across ages and conditions³⁸. For health professionals, this integration requires coordination and cooperation with different medical specialties as well as actors outside the formal health system. Finally, for policy makers, it is the recognition of how different policies may impact health. This was especially true during the COVID-19 pandemic, when people with chronic diseases were not only at higher risk of complications from COVID-19 but are also vulnerable to the disruptions in care that were caused by the epidemic and required a range of supportive services from the government^{39,40}. Beyond strengthening health systems to manage those already with chronic diseases, governments need to also invest in health prevention and promotion activities at a societal level.

On the other hand, certain health conditions, such as ischemic heart disease, stroke, and type 2 diabetes, among others, exhibit both chronic and acute manifestations. While our study primarily aimed to offer a comprehensive overview of chronic and acute care needs over

recent decades, many chronic conditions pose intricate challenges due to their acute manifestations that require different health system responses beyond chronic continuous care. Additionally, it must also be considered that people with chronic conditions must also deal with acute presentation conditions⁴¹. Recognizing the urgency associated with managing acute episodes within chronic diseases underscores further critical considerations for health system preparedness for more effective health planning and resource allocation. Understanding the interplay between major chronic diseases and their acute phases or acute infectious events is a crucial direction for future research.

Furthermore, the presence of multimorbidity, where patients experience multiple chronic conditions simultaneously, poses significant challenges for healthcare delivery and patient outcomes. However, GBD data does not allow the assessment of multimorbidity. Addressing multimorbidity requires comprehensive strategies considering patients' complex health needs, which is crucial for guiding efforts to enhance the preparedness of the health system⁴². Our study, despite the current data limitations, intrinsically underscores the importance of considering multimorbidity when evaluating chronic care requirements.

Previous studies have identified and described the overall limitations of the GBD data^{11,42,43}. In our study and other studies using GBD Study data, we acknowledge a fundamental limitation in calculating YLDs. The current GBD methodology, especially since 2010, utilises a prevalence-based approach for YLD estimations⁹. This approach involves multiplying the prevalence of a sequela by the associated disability weight, without explicitly factoring in disease duration. Consequently, there is a risk of overestimating YLDs, especially for chronic conditions, particularly in settings where high treatment coverage can enable longer lifespans for affected individuals. Additionally, the accuracy of GBD estimates is highly dependent on the quality of the data sources⁴³. Considering the vast scope of the study, covering 204 countries and territories, with numerous diseases, injuries, and sequelae, different locations may exhibit variations in data quality, particularly in resource-poor settings⁴⁴. Furthermore, the GBD methodology itself has been subject to discussion due to its complex and evolving nature⁴⁵. However, it is important to note that the GBD continually improves its statistical models and analysis, incorporating data and methodological updates to enhance the accuracy and timeliness of its results¹¹. In this study, a limitation arises from the coding of acute versus chronic care needs for both conditions and sequelae. It is acknowledged that the chronicity of certain conditions may vary in different settings. Nevertheless, the option for "undetermined" was available to address such circumstances, with a relatively small percentage falling into this category (around 4% to 5%).

This study highlights the need for further research in various areas related to the burden of chronic conditions. These areas include examining gender differences in the burden, addressing the training needs of healthcare professionals, understanding the impact on caregivers, assessing the economic consequences for individuals, households, and health systems, implementing person-centered care approaches, evaluating policy environments in the context of Universal Health Coverage (UHC), considering psychological factors and their effects on individuals and families, exploring innovative service delivery models, examining the impact of COVID-19, and assessing how prevention and health promotion efforts can influence morbidity and mortality⁴⁶.

Globally, many healthcare systems have been designed, and are still struggling, to respond to acute conditions. However, they are not adequately organized to address chronic conditions or sequelae. This study provides much needed information to develop national and global policies to address the actual and increasing burden of chronic diseases. Presenting the burden of disease in this way enhances the traditional view of the global burden of disease and sequelae which has been largely focused on single diseases or conditions. This current

approach is more suitable for our future health strategy where health services will be managed and delivered in a way making them more integrated and person-centered. Population-based strategies with a multidisciplinary approach for disease prevention and management aggressively pursued and promoted at the national and global level. This is possible through efficient community engagement, identifying structural and systemic determinants of health, and collective sharing and learning across countries. High-quality long-term care for chronic conditions and its sequelae is essential and health systems and societies must embrace this transformation as a priority.

Methods

Overview

The GBD 2019 estimates, among other health metrics, years lived with disability (YLDs), years of life lost (YLLs) and DALYs. All estimates generated and reported are in accordance with the Guidelines for Accurate and Transparent Health Estimates Reporting⁴⁷. For this paper, 297 diseases and injuries, and 379 sequelae were classified according to whether these required chronic or acute care, adapting the approach used by Setel et al.⁵ and is described in Section "Classification of conditions according to their care needs" of this paper.

Data description

The GBD 2019 compiles burden of health metrics from 204 countries and territories that are grouped into 21 regions and seven super-regions^{11,46,48–51}. Here, data are presented by location, which refers to countries and territories as well as to socio-demographic index (SDI, a composite average of income per capita, average educational attainment, and fertility rates in females categorized by low SDI, low-middle SDI, middle SDI, high-middle SDI, and high SDI).

The number of DALYs, YLDs, and YLLs by locations, age and sex categories were extracted using the GHDx (Global Health Data Exchange) tool (<http://ghdx.healthdata.org>) from the Institute for Health Metrics and Evaluation (IHME). For sequelae, only numbers of YLDs are available by request to IHME. These were requested and obtained by location, age, and sex.

Data were extracted for nine age categories for diseases and injuries (<1 year, 1 to 4, 5 to 9, 10 to 14, 15 to 19, 20 to 24, 25 to 49, 50 to 69, 70+ years), and for 12 age categories for sequelae (1 to 4, 5 to 9, 10 to 14, 15 to 19, 20 to 24, 25 to 29, 30 to 34, 35 to 39, 40 to 44, 45 to 49, 50 to 69, 70+ years), both aggregated and disaggregated by sex.

All visualisations and graphs presented in this study were created using Power BI (version 2.116.921.0), ensuring clarity and accessibility in data representation.

Causes of diseases and injuries

The GBD 2019 list of diseases and injuries has a hierarchical organisation. Level 1 comprises three groups of conditions: communicable, maternal, neonatal, and nutritional diseases (Group A); non-communicable diseases (Group B); and injuries (Group C). These Level 1 aggregates are subdivided at Level 2 into 22 cause groupings, Group A is divided into seven sub-groups, Group B into twelve sub-groups, and Group C, in three. The disaggregation into Levels 3 and 4 contains the finest level of detail for causes captured in GBD 2019. For this study, the complete list of Levels 3 and 4 diseases and injuries (Supplementary Table 1) was extracted and classified based on the given care needs for the specific condition (see Section "Classification of conditions according to their care needs").

Sequelae

The GBD 2019 Sequelae, defined as the direct consequences of diseases and injuries, do not have a hierarchical organisation. The complete list of sequelae, containing 379 items, were classified based on their care needs (see Section "Classification of conditions according to their care needs"). The full list is included in Supplementary Table 4.

Classification of conditions according to their care needs

For each disease and sequelae, two physicians (BA and JC) ascertained if the care needs of the condition were acute or chronic, independently. To aid in this classification, the approach used by Setel et al.⁵ was adapted and the definitions of the United States National Library of Medicine thesaurus Medical Subject Headings (MeSH) were used⁶. The definition used for conditions that require chronic care was: “Condition which has one or more of the following characteristics: they are permanent, leave residual disability, are caused by non-reversible pathological alteration, require special training of the patient for rehabilitation, or may be expected to require a long period of supervision, observation, or care. Additionally, the condition is either incurable or requires more than a month of appropriate treatment”^{5,6}. For conditions requiring acute care, the definition used was: “Condition having a short and relatively severe course. Potentially curable within a month of current appropriate treatment”^{5,6}. The definitions were extended to include sequelae as well. Those, despite their association with chronic diseases, have been classified independently based on their unique care needs. This ensures a distinct classification, irrespective of their linkage to chronic conditions.

Any discrepancies or inconsistencies were thoroughly examined and resolved through discussions, involving a third party (CA-R), to reach a consensus. Additionally, the classifications made were reviewed and confirmed by colleagues at IHME, providing further validation to the decisions.

In line with Setel et al.⁵, injuries causing YLDs were classified as having chronic care needs, while injuries causing YLLs were classified as having acute care needs. This is the reason Injuries are classified as Chronic / Acute in Supplementary Table 1. The number of YLDs and YLLs was extracted for each condition and added to obtain the number of DALYs. Some conditions fall into the definition of both acute and chronic, depending on different factors. In this case the conditions were classified as undetermined, then fitted separate. (Supplementary Table 1 for diseases and injuries, and Supplementary Table 4, for sequelae).

Reporting summary

Further information on research design is available in Nature Portfolio Reporting Summary linked to this article.

Data availability

All data can be accessed at: Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019 (GBD 2019) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2020. Available from <https://vizhub.healthdata.org/gbd-results/>. If any required data, such as specific categorised sequelae data, are not available, requests can be sent to engage@healthdata.org, and they will respond in the coming days to assist with the request.

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Author contributions

Please see the Supplementary Information for more detailed information about individual author contributions to the research, divided into the following categories: managing the overall research enterprise; writing the first draft of the manuscript; primary responsibility for applying analytical methods to produce estimates; primary responsibility for seeking, cataloging, extracting, or cleaning data; designing or coding figures and tables; providing data or critical feedback on data sources; developing methods or computational machinery; providing critical feedback on methods or results; drafting the manuscript or revising it critically for important intellectual content; and managing the estimation or publications process.

Competing interests

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Correspondence and requests for materials should be addressed to Cecilia Anza-Ramirez.

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GBD 2019 Acute and Chronic Care Collaborators

Cecilia Anza-Ramirez^{1,1691} ✉, J. Jaime Miranda^{1,2,3,4,1691}, Benedetta Armocida^{5,6}, Jorge César Correia⁷, Harriette Gillian Christine Van Spall^{8,9,10}, David Beran¹¹, Amiral Aali¹², Kalkidan Hassen Abate¹³, Semagn Mekonnen Abate¹⁴, Cristiana Abbafati¹⁵, Mohsen Abbasi-Kangevari¹⁶, Zeinab Abbasi-Kangevari^{16,17}, Hedayat Abbastabar¹⁸, Ahmed M. Abdel-Azeem¹⁹, Michael Abdelmasseh²⁰, Sherief Abd-Elsalam²¹, Ahmed Abdelwahab²², Gholamreza Abdoli²³, Mohammad Abdollahi^{24,25}, Meriem Abdoun²⁶, Deldar Morad Abdulah²⁷, Abu Yousuf Md Abdullah²⁸, Ame Mehadi Abdurehman²⁹, Getachew Abebe³⁰, Aidin Abedi^{31,32}, Vida Abedi^{33,34}, Hassan Abidi³⁵, Richard Gyan Aboagye³⁶, Hassan Abolhassani^{37,38}, Lucas Guimarães Abreu³⁹, Michael R. M. Abrigo⁴⁰, Yonas Derso Abtew⁴¹, Hiwa Abubaker Ali⁴², Eman Abu-Gharbieh⁴³, Ahmed Abu-Zaid^{44,45}, Manfred Mario Kokou Accrombessi^{46,47}, Juan Manuel Acuna^{48,49}, Denberu Eshetie Adane⁵⁰, Tigist Demssew Adane⁵¹, Isaac Yeboah Addo^{52,53}, Giovanni Addolorato⁵⁴, Oluwafemi Atanda Adeagbo^{55,56}, Victor Adekanmbi⁵⁷,

Miracle Ayomikun Adesina^{58,59}, Olatunji O. Adetokunboh^{60,61}, Daniel Adedayo Adeyinka^{62,63},
 Qorinah Estiningtyas Sakilah Adnani⁶⁴, Aanuoluwapo Adeyinka Afolabi⁶⁵, Muhammad Sohail Afzal⁶⁶, Saira Afzal^{67,68},
 Gina Agarwal⁶⁹, Prerna Agarwal⁷⁰, Pradyumna Agasthi⁷¹, Anurag Agrawal^{72,73}, Marcela Agudelo-Botero⁷⁴,
 Bright Opoku Ahinkorah⁷⁵, Aqeel Ahmad⁷⁶, Sajjad Ahmad^{77,78}, Sohail Ahmad⁷⁹, Tauseef Ahmad⁸⁰, Ali Ahmadi^{81,82},
 Keivan Ahmadi⁸³, Sepideh Ahmadi⁸⁴, Ali Ahmed^{85,86}, Ayman Ahmed^{87,88}, Haroon Ahmed⁸⁹, Jivan Qasim Ahmed⁹⁰,
 Luai A. Ahmed⁹¹, Janardhana P. Aithala⁹², Marjan Ajami^{93,94}, Budi Aji⁹⁵, Hossein Akbarialiabad⁹⁶, Yibeltal Akelew⁹⁷,
 Meisam Akhlaghdoust^{98,99}, Addis Aklilu¹⁰⁰, Maxwell Akonde¹⁰¹, Hanadi Al Hamad^{102,103}, Fares Alahdab¹⁰⁴, Ziyad Al-
 Aly^{105,106}, Khurshid Alam¹⁰⁷, Manjurul Alam¹⁰⁸, Nazmul Alam^{109,110}, Samiah Alam¹¹¹, Fahad Mashhour Alanezi¹¹²,
 Turki M. Alanzi¹¹³, Jacqueline Elizabeth Alcalde-Rabanal¹¹⁴, Astawus Alemayehu^{115,116},
 Birhanu Alamirew Alamirew Alemu¹¹⁷, Kefyalew Addis Alene^{118,119}, Abdelazeem M. Algamal¹²⁰, Khalid F. Alhabib¹²¹,
 Noora Alhajri¹²², Mohammed Khaled Al-Hanawi^{123,124}, Robert Kaba Alhassan¹²⁵, Liaqat Ali¹²⁶, Muhammad Ali^{127,128},
 Syed Shujait Ali¹²⁹, Shohreh Alian Samakkhah¹³⁰, Gianfranco Alicandro^{131,132}, Sheikh Mohammad Alif¹³³,
 Yousef Alimohamadi¹³⁴, Adel Al-Jumaily^{135,136}, Syed Mohamed Aljunid^{137,138}, François Alla¹³⁹, Mohammed J. Almalki^{140,141},
 Sadeq Al-Maweri¹⁴², Sami Almustanyir^{143,144}, Mahmoud A. Alomari^{145,146}, Jordi Alonso^{147,148}, Nivaldo Alonso¹⁴⁹,
 Rajaa M. Al-Raddadi¹⁵⁰, Salman Khalifah Al-Sabah^{151,152}, Ala'a B. Al-Tammemi^{153,154}, Khalid A. Altirkawi¹⁵⁵, Nelson Alvis-
 Guzman^{156,157}, Nelson J. Alvis-Zakzuk^{158,159}, Azmeraw T. Amare^{160,161}, Hiwot Amare¹⁶², Edward Kwabena Ameyaw¹⁶³,
 Tarek Tawfik Amin¹⁶⁴, Javad Aminian Dehkordi^{165,166}, Afreenish Amir¹⁶⁷, Hoda Amiri¹⁶⁸, Sohrab Amiri¹⁶⁹, Hubert Amu¹⁷⁰,
 John H. Amuasi^{171,172}, Dickson A. Amugsi¹⁷³, Ganiyu Adeniyi Amusa^{174,175}, Tadele Fentabil Anagaw¹⁷⁶, Julio Ancochea^{177,178},
 Robert Ancuceanu¹⁷⁹, Deanna Anderlini^{180,181}, Catalina Liliana Andrei¹⁸², Tudorel Andrei¹⁸³, Sofia Androudi¹⁸⁴,
 Ranjit Mohan Anjana¹⁸⁵, Amir Anoushiravani¹⁸⁶, Adnan Ansar^{187,188}, Alireza Ansari-Moghaddam¹⁸⁹, Benny Antony¹⁹⁰,
 Ernoiz Antriyandarti¹⁹¹, Maxwell Hubert Antwi¹⁹², Davood Anvari^{193,194}, Razique Anwer¹⁹⁵,
 Anayochukwu Edward Anyasodor¹⁹⁶, Stella Apostolaki¹⁹⁷, Francis Appiah^{198,199}, Jalal Arabloo²⁰⁰, Morteza Arab-Zozani²⁰¹,
 Demelash Areda^{202,203}, Hany Mohamed Amin Aref²⁰⁴, Zeleke Gebru Argaw²⁰⁵, Hany Ariffin^{206,207}, Johan Ärnlov^{208,209},
 Renato Arruda^{210,211}, Muhammad Arshad²¹², Al Artaman²¹³, Anton A. Artamonov²¹⁴, Kurnia Dwi Artanti²¹⁵,
 Judie Arulappan²¹⁶, Raphael Taiwo Aruleba²¹⁷, Ashokan Arumugam^{218,219}, Krishna K. Aryal²²⁰, Zahra Aryan^{16,221},
 Ali A. Asadi-Pooya^{222,223}, Zatollah Asemi²²⁴, Saeed Asgary^{225,226}, Mohammad Asghari-Jafarabadi²²⁷, Tahira Ashraf²²⁸,
 Ashagre Molla Assaye^{161,229}, Thomas Astell-Burt^{230,231}, Mahshid Ataei^{232,233}, Zahra Atafar²³⁴, Mohammad Athar^{235,236},
 Seyyed Shamsadin Athari²³⁷, Prince Atorkey^{238,239}, Alok Atreya²⁴⁰, Madhu Sudhan Atteraya²⁴¹, Sameh Attia²⁴²,
 Avinash Aujayeb²⁴³, Marcel Ausloos^{183,244}, Abolfazl Avan²⁴⁵, Beatriz Paulina Ayala Quintanilla^{246,247},
 Tegegn Mulatu Ayana¹¹⁷, Alemu Degu Ayele²⁴⁸, Meshesha Tsegazeab Ayele²⁴⁹, Birhanu Ayelign²⁵⁰,
 Olatunde O. Ayinde^{251,252}, Jose L. Ayuso-Mateos^{253,254}, Sina Azadnajafabad¹⁶, Mohammadreza Azangou-Khyavy^{16,17},
 Amirhossein Azari Jafari²⁵⁵, Ahmed Y. Azzam^{256,257}, Amirhesam Babajani²⁵⁸, Abraham Samuel Babu^{259,260},
 Muhammad Badar²⁶¹, Alaa Badawi^{262,263}, Ashish D. Badiye²⁶⁴, Nayereh Baghchehgi²⁶⁵, Nasser Bagheri^{266,267},
 Sara Bagherieh²⁶⁸, Saeed Bahadory^{269,270}, Atif Amin Baig²⁷¹, Mohan Bairwa²⁷², Jennifer L. Baker²⁷³,
 Shankar M. Bakkannavar²⁷⁴, Asaminew Birhanu Balta²⁷⁵, Ovidiu Constantin Baltatu^{276,277}, Amitava Banerjee²⁷⁸,
 Indrajit Banerjee²⁷⁹, Palash Chandra Banik²⁸⁰, Hansi Bansal²⁶⁴, Abere Tilahun Bantie²⁸¹, Mainak Bardhan²⁸²,
 Suzanne Lyn Barker-Collo²⁸³, Till Winfried Bärnighausen^{284,285}, Mark Thomaz Ugliara Barone^{286,287}, Francesco Barone-
 Adesi²⁸⁸, Hiba Jawdat Barqawi⁴³, Fabio Barra²⁸⁹, Amadou Barrow^{290,291}, Sandra Barteit²⁸⁴, Lingkan Barua²⁸⁰,
 Azadeh Bashiri²⁹², Pritish Baskaran²⁹³, Sanjay Basu^{83,294}, Saurav Basu²⁹⁵, Abdul-Monim Mohammad Batiha²⁹⁶,
 Bernhard T. Baune^{297,298}, Neeraj Bedi^{299,300}, Tahmina Begum^{301,302}, Diana Fernanda Bejarano Ramirez^{303,304},
 Hailu B. Y. Belay³⁰⁵, Moges Mareg Belay³⁰⁶, Uzma Iqbal Belgaumi³⁰⁷, Michelle L. Bell³⁰⁸, Luis Belo^{309,310},
 Salaheddine Bendak³¹¹, Derrick A. Bennett³¹², Isabela M. Bensenor³¹³, Habib Benzian³¹⁴, Alemshet Yirga Berhie³¹⁵,
 Adam E. Berman³¹⁶, Robert S. Bernstein^{317,318}, Akshaya Srikanth Bhagavathula³¹⁹, Dinesh Bhandari^{320,321},
 Nikha Bhardwaj³²², Pankaj Bhardwaj^{293,323}, Sonu Bhaskar^{324,325}, Ajay Nagesh Bhat³²⁶, Vivek Bhat³²⁷, Suraj Bhattarai^{328,329},
 Vijayalakshmi S. Bhojaraja³³⁰, Boris Bikbov³³¹, Corey B. Bills^{332,333}, Antonio Biondi³³⁴, Setognal Birara³³⁵, Atanu Biswas³³⁶,
 Raaj Kishore Biswas³³⁷, Saeid Bitaraf³³⁸, Oleg Blyuss^{339,340}, Micheal Kofi Boachie^{341,342}, Belay Boda Abule Bodicha³⁴³,
 Virginia Bodolica³⁴⁴, Hunduma Amensisa Bojia³⁴⁵, Archith Boloor³⁴⁶, João Silva Botelho³⁴⁷, Souad Bouaoud^{348,349},
 Rupert Bourne³⁵⁰, Nicola Luigi Bragazzi³⁵¹, Dejana Braithwaite^{352,353}, Luisa C. Brant³⁵⁴, Nicholas J. K. Breitborde^{355,356},
 Hermann Brenner³⁵⁷, Corstiaan Breugem³⁵⁸, Nikolay Ivanovich Briko³⁵⁹, Gabrielle Britton^{360,361}, Julie Brown^{362,363},
 Traolach Brughra³⁶⁴, Andre R. Brunoni^{313,365}, Rachelle Buchbinder^{366,367}, Norma B. Bulamu³⁶⁸, Danilo Buonsenso^{369,370},
 Katrin Burkart^{371,372}, Richard A. Burns²⁶⁶, Sharath Burugina Nagaraja³⁷³, Muhammad Hammad Butt³⁷⁴,
 Nadeem Shafique Butt³⁷⁵, Zahid A. Butt^{376,377}, Tianji Cai³⁷⁸, Daniela Calina³⁷⁹, Luis Alberto Cámara^{380,381},
 Luciana Aparecida Campos^{382,383}, Chao Cao³⁸⁴, Vera L. A. Carneiro^{385,386}, Giulia Carreras³⁸⁷, Andre F. Carvalho³⁸⁸,
 Márcia Carvalho^{310,389}, Joao Mauricio Castaldelli-Maia³⁶⁵, Giulio Castelpietra^{390,391}, Alberico L. Catapano^{392,393},

Maria Sofia Cattaruzza³⁹⁴, Christopher R. Cederroth^{395,396}, Francieli Cembranel³⁹⁷, Ester Cerin^{398,399}, Promit Ananyo Chakraborty⁴⁰⁰, Eeshwar K. Chandrasekar⁴⁰¹, Jung-Chen Chang^{402,403}, Gashaw Sisay Chanie⁴⁰⁴, Periklis Charalampous⁴⁰⁵, Vijay Kumar Chattu^{406,407}, Sarika Chaturvedi⁴⁰⁸, Akhilanand Chaurasia⁴⁰⁹, Meng Xuan Chen⁴¹⁰, Simiao Chen²⁸⁴, Nicolas Cherbuin²⁶⁶, Patrick R. Ching⁴¹¹, Abdulaal Chitheer⁴¹², William C. S. Cho⁴¹³, Yuen Yu Chong⁴¹⁴, Hitesh Chopra⁴¹⁵, Tzu-Chieh Chou⁴¹⁶, Sonali Gajanan Choudhari⁴¹⁷, Enayet Karim Chowdhury^{418,419}, Rajiv Chowdhury^{420,421}, Hanne Christensen⁴²², Steffan Wittrup McPhee Christensen^{423,424}, Devasahayam J. Christopher⁴²⁵, Dinh-Toi Chu⁴²⁶, Isaac Sunday Chukwu⁴²⁷, Sheng-Chia Chung^{428,429}, Raffaella Ciuffreda⁴³⁰, Scott Richard Clark⁴³¹, Rafael M. Claro⁴³², Kaleb Coberly³⁷¹, Joao Conde⁴³³, Barbara Corso⁴³⁴, Michael H. Criquei⁴³⁵, Marita Cross^{436,437}, Natália Cruz-Martins^{438,439}, Omid Dadras^{440,441}, Xiaochen Dai^{371,372}, Albertino Antonio Moura Damasceno⁴⁴², Giovanni Damiani^{443,444}, Hadi A. Danawi⁴⁴⁵, Jai K. Das⁴⁴⁶, Saswati Das⁴⁴⁷, Ana Maria Dascalu^{448,449}, Anna Dastiridou^{450,451}, Claudio Alberto Dávila-Cervantes⁴⁵², Kairat Davletov⁴⁵³, Fernando Pio De la Hoz⁴⁵⁴, Maia De Luca⁴⁵⁵, Sisay Abebe Debelu⁴⁵⁶, Natanim Degefu⁴⁵⁷, Amin Dehghan²⁶⁸, Azizallah Dehghan⁴⁵⁸, Hiwot Dejene⁴⁵⁹, Robert Paul Dellavalle^{460,461}, Andreas K. Demetriades^{462,463}, Biniyam Demisse¹¹⁷, Fitsum Wolde Demisse⁴⁶⁴, Solomon Demissie²⁴⁹, Edgar Denova-Gutiérrez⁴⁶⁵, Diriba Dereje⁴⁶⁶, Mrganaw Derese⁴⁶⁷, Nikolaos Dervenis^{468,469}, Hardik Dineshbhai Desai⁴⁷⁰, Rupak Desai⁴⁷¹, Fikadu Nugusu Dessalegn⁴⁷², Gashaw Dessie⁴⁷³, Abebaw Alemayehu Desta⁴⁷⁴, Keshab Deuba^{475,476}, Sagnik Dey⁴⁷⁷, Arkadeep Dhali⁴⁷⁸, Meghnath Dhimal⁴⁷⁹, Sameer Dhingra⁴⁸⁰, Nancy Diao⁴⁸¹, Diana Dias da Silva^{310,482}, Diriba Tolesa Dibaba⁴⁷², Lankamo Ena Digesa⁴⁸³, Mengistie Diress⁴⁸⁴, Abhinav Dixit⁴⁸⁵, Shilpi Gupta Dixit³²², Shirin Djalalinia⁴⁸⁶, Saeid Doaei^{487,488}, Milad Dodangeh⁴⁸⁹, Mohamed Fahmy Doheim⁴⁹⁰, Paul Narh Doku⁴⁹¹, Deepa Dongarwar⁴⁹², Bezabih Terefe Dora⁴⁶⁴, Fariba Dorostkar⁴⁹³, Wendel Mombahe dos Santos^{494,495}, Chirag P. Doshi³², Rajkumar Doshi⁴⁹⁶, Leila Doshmangir⁴⁹⁷, Abdel Douiri⁴⁹⁸, Haneil Larson Dsouza^{499,500}, John Dube⁵⁰¹, Andre Rodrigues Duraes^{502,503}, Oyewole Christopher Durojaiye⁵⁰⁴, Hisham Atan Edinur⁵⁰⁵, David Edvardsson^{187,506}, Kristina Edvardsson⁵⁰⁷, Ferry Efendi^{187,508}, Elham Ehsani-Chimeh⁵⁰⁹, Ebrahim Eini⁵¹⁰, Michael Ekholuenetale^{511,512}, Temitope Cyrus Ekundayo⁵¹³, Nevine El Nahas²⁰⁴, Iman El Sayed⁵¹⁴, Maha El Tantawi⁵¹⁵, Hassan El-Abid⁵¹⁶, Iffat Elbarazi⁹¹, Teshome Bekele Elema^{517,518}, Frank J. Elgar⁵¹⁹, Islam Y. Elgendy^{520,521}, Ghada Metwally Tawfik ElGohary^{522,523}, Hala Rashad Elhabashy⁵²⁴, Muhammed Elhadi⁵²⁵, Mohamed A. Elmonem⁵²⁶, Luchuo Engelbert Bain⁵²⁷, Ryenchindorj Erkhembayar⁵²⁸, Hawi Leul Esayas⁴⁶⁴, Christopher Imokhuede Esezobor^{529,530}, Babak Eshtrati⁵³¹, Sharareh Eskandarieh⁵³², Juan Espinosa-Montero⁵³³, Francesco Esposito⁵³⁴, Farshid Etaee⁵³⁵, Werku Etafa⁵³⁶, Sayeh Ezzikouri⁵³⁷, Adeniyi Francis Fagbamigbe^{511,538}, Shahriar Faghani⁵³⁹, Luca Falzone^{540,541}, Emerito Jose A. Faraon⁵⁴², Somayeh Farhang Dehghan⁵⁴³, Carla Sofia e. Sá Farinha^{544,545}, Andre Faro⁵⁴⁶, Umar Farooq⁵⁴⁷, Md Omar Faruk^{548,549}, Abidemi Omolara Fasanmi^{550,551}, Akinlolu O. Fasanmi^{552,553}, Ali Fatehizadeh⁵⁵⁴, Nazir Fattahi⁵⁵⁵, Nelsensius Klau Fauk^{556,557}, Valery L. Feigin^{371,558,559}, Ginenus Fekadu^{560,561}, Xiaoqi Feng^{562,563}, Seyed-Mohammad Fereshtehnejad^{208,564}, Abdullah Hamid Feroze^{221,565}, Pietro Ferrara⁵⁶⁶, Allegra Ferrari⁵⁶⁷, Simone Ferrero⁵⁶⁸, Getahun Fetensa⁵⁶⁹, Bikila Regassa Feyisa⁵⁷⁰, Irina Filip^{571,572}, Florian Fischer⁵⁷³, Joanne Flavel⁵⁷⁴, David Flood^{575,576}, Morenike Oluwatoyin Folayan^{577,578}, Ana Catarina Fonseca^{579,580}, Arianna Fornari⁵⁸¹, Behzad Foroutan⁵⁸², Kayode Raphael Fowobaje^{511,583}, Alberto Freitas^{584,585}, Marisa Freitas⁵⁸⁶, Sara D. Friedman⁵⁸⁷, Takeshi Fukumoto⁵⁸⁸, Peter Andras Gaal^{589,590}, Muktar A. Gadanya^{591,592}, Abhay Motiramji Gaidhane⁴¹⁷, Santosh Gaihe⁵³⁸, Yaseen Galali^{593,594}, Nasrin Galehdar⁵⁹⁵, Silvano Gallus⁵⁹⁶, Balasankar Ganesan^{597,598}, M. A. Garcia-Gordillo⁵⁹⁹, Priyanka Garg⁶⁰⁰, Mariana Gaspar Fonseca⁶⁰¹, Federica Gazzelloni⁶⁰², Semiu Olatunde Gbadamosi⁶⁰³, Mesfin Gebrehiwot⁶⁰⁴, Kahsu Gebrekirstos Gebrekidan⁶⁰⁵, Teferi Gebru Gebremeskel^{606,607}, Yibeltal Yismaw Gela⁴⁸⁴, Leta Adugna Geleta⁶⁰⁸, Urge Gerema⁶⁰⁹, Lemma Getacher⁶¹⁰, Tamirat Getachew⁶¹¹, Keyghobad Ghadiri^{612,613}, Fariborz Ghaffarpasand⁶¹⁴, Mansour Ghafourifard⁶¹⁵, Sulmaz Ghahramani⁶¹⁶, Seyyed-Hadi Ghamari^{16,17}, Reza Ghanbari⁶¹⁷, Mohammad Ghasemi Nour⁶¹⁸, Ahmad Ghashghaee⁶¹⁹, Farzaneh Ghazi Sherbaf⁶²⁰, Zahra Ghods^{621,622}, Maryam Gholamalizadeh⁶²³, Ali Gholami^{624,625}, Ali Gholamrezanezhad⁶²⁶, Ghozali Ghozali⁶²⁷, Sherief Ghozy⁶²⁸, Tiffany K. Gill⁶²⁹, Themba G. Ginindza⁶³⁰, James C. Glasbey⁶³¹, Laszlo Göbölös^{632,633}, Amit Goel⁶³⁴, Mahaveer Golechha⁶³⁵, Pouya Goleij⁶³⁶, Davide Golinelli⁶³⁷, Nelson G. M. Gomes^{586,638}, Sameer Vali Gopalani^{639,640}, Giuseppe Gorini⁶⁴¹, Houman Goudarzi^{642,643}, Alessandra C. Goulart^{313,644}, Bárbara Niegia Garcia Goulart⁶⁴⁵, Michal Grivna^{646,647}, Jenny S. Guadamuz⁶⁴⁸, Habtamu Alganah Guadie⁶⁴⁹, Mohammed Ibrahim Mohialdeen Gubari⁶⁵⁰, Zewdie Gudisa⁶⁵¹, Avirup Guha^{652,653}, Rafael Alves Guimarães⁶⁵⁴, Bhawna Gupta⁶⁵⁵, Rajeev Gupta^{656,657}, Sapna Gupta⁶⁵⁸, Veer Bala Gupta⁶⁵⁹, Vijai Kumar Gupta⁶⁶⁰, Vivek Kumar Gupta⁶⁶¹, Alemu Guta⁶⁶², Wilmer Cristobal Guzman-Vilca⁶⁶³, Mojtaba Habibi Asgarabad^{664,665}, Parham Habibzadeh⁶⁶⁶, Vladimir Hachinski^{667,668}, Mostafa Hadei⁶⁶⁹, Nima Hafezi-Nejad^{670,671}, Adel Hajj Ali⁶⁷², Arvin Haj-Mirzaian^{673,674}, Esam S. Halboub^{675,676}, Aram Halimi⁶⁷⁷, Brian J. Hall⁶⁷⁸, Rabih Halwani^{43,679}, Randah R. Hamadeh⁶⁸⁰, Mitiku Teshome Hambisa^{238,681}, Sajid Hameed²⁷¹, Samer Hamidi⁶⁸², Mohammad Hamiduzzaman⁶⁸³, Asif Hanif²⁷¹, Graeme J. Hankey^{684,685}, Md Abdul Hannan^{686,687}, Md Nuruzzaman Haque⁶⁸⁸, Harapan Harapan⁶⁸⁹, Arief Hargono²¹⁵, Ninuk Hariyani^{690,691}, Josep Maria Haro^{692,693},

Mehdi Harorani⁶⁹⁴, Risky Kusuma Hartono⁶⁹⁵, Ahmed I. Hasaballah⁶⁹⁶, Faizul Hasan⁶⁹⁷, M. Tasdik Hasan⁶⁹⁸, Md Mehedi Hasan^{699,700}, Hamidreza Hasani⁷⁰¹, Abbas M. Hassan⁷⁰², Amr Hassan⁷⁰³, Shoaib Hassan^{704,705}, Hossein Hassanian-Moghaddam⁷⁰⁶, Soheil Hassanipour^{707,708}, Hadi Hassankhani^{709,710}, Rasmus J. Havmoeller⁷¹¹, Khezar Hayat^{712,713}, Jeffrey J. Hebert^{714,715}, Khedidja Hedna^{716,717}, Mohammad Heidari⁷¹⁸, Reza Heidari-Soureshjani⁷¹⁹, Delia Hendrie⁴¹⁸, Brenda Yuliana Herrera-Serna⁷²⁰, Demisu Zenbaba Heyi⁷²¹, Kamal Hezam^{722,723}, Yuta Hiraike⁷²⁴, Ramesh Holla⁷²⁵, Nobuyuki Horita^{726,727}, Md Mahbub Hossain^{728,729}, Sahadat Hossain^{730,731}, Mehdi Hosseinzadeh^{732,733}, Mihaela Hostiuc⁷³⁴, Sorin Hostiuc^{735,736}, Soodabeh Hoveidamanesh⁷³⁷, Mohamed Hsairi⁷³⁸, Alexander Kevin Hsiao⁷³⁹, Junjie Huang⁷⁴⁰, Irene Lena Hudson^{741,742}, Salman Hussain^{743,744}, Zakir Hussain^{745,746}, Nawfal R. Hussein⁷⁴⁷, Foziya Mohammed Hussien⁷⁴⁸, Bing-Fang Hwang^{749,750}, Segun Emmanuel Ibitoye⁷⁵¹, Olayinka Stephen Ilesanmi^{65,752}, Irena M. Ilic⁷⁵³, Milena D. Ilic⁷⁵⁴, Mustapha Immurana¹²⁵, Leeberk Raja Inbaraj⁷⁵⁵, Lalu Muhammad Irham⁷⁵⁶, Md Rafiqul Islam⁶⁸⁸, Mohammad Mainul Islam⁷⁵⁷, Rubana Islam⁷⁵⁸, Sheikh Mohammed Shariful Islam^{759,760}, Farhad Islami⁷⁶¹, Nahlah Elkudssiah Ismail^{762,763}, Hiroyasu Iso⁷⁶⁴, Gaetano Isola³³⁴, Ademola Joshua Itiola⁷⁶⁵, Masao Iwagami^{766,767}, Chidozie C. D. Iwu⁷⁶⁸, Chinwe Juliana Iwu-Jaja^{769,770}, Ihoghosa Osamuyi Iyamu^{400,771}, Linda Merin J⁷⁷², Jalil Jaafari⁷⁷³, Louis Jacob^{774,775}, Farhad Jadidi-Niaragh⁷⁷⁶, Haitham Jahrami^{777,778}, Rajesh Jain^{779,780}, Abhishek Jaiswal²⁷², Mihajlo Jakovljevic^{781,782}, Elham Jamshidi^{98,783}, Chinmay T. Jani⁷⁸⁴, Manthan Dilipkumar Janodia⁷⁸⁵, Tahereh Javaheri⁷⁸⁶, Krishnamurthy Jayanna^{787,788}, Sathish Kumar Jayapal⁷⁸⁹, Umesh Jayarajah^{790,791}, Shubha Jayaram⁷⁹², Seyed Behzad Jazayeri⁷⁹³, Rime Jebai⁶⁰³, Jayakumar Jeganathan³²⁶, Digisie Mequanint Jemere⁷⁹⁴, Angeline Jeyakumar^{795,796}, Vivekanand Jha^{797,798}, John S. Ji⁷⁹⁹, Olatunji Johnson⁸⁰⁰, Jost B. Jonas^{801,802}, Tamas Joo^{589,803}, Abel Joseph⁸⁰⁴, Nitin Joseph⁸⁰⁵, Vasna Joshua⁸⁰⁶, Farahnaz Joukar^{707,708}, Jacek Jerzy Jozwiak⁸⁰⁷, Mikk Jürisson⁸⁰⁸, Billingsley Kaambwa^{809,810}, Ali Kabir⁸¹¹, Zubair Kabir⁸¹², Vidya Kadashetti⁸¹³, Dler Hussein Kadir⁸¹⁴, Pradnya Vishal Kakodkar⁸¹⁵, Rizwan Kalani⁸¹⁶, Laleh R. Kalankesh⁸¹⁷, Leila R. Kalankesh⁸¹⁸, Rohollah Kalhor^{819,820}, Feroze Kaliyadan⁸²¹, Vineet Kumar Kamal^{822,823}, Ashwin Kamath^{725,798}, Rajesh Kamath^{824,825}, Zahra Kamiab^{826,827}, Naser Kamyari⁸²⁸, Tanuj Kanchan⁸²⁹, Himal Kandel^{830,831}, Rami S. Kantar^{832,833}, Neeti Kapoor²⁶⁴, Hassan Karami^{834,835}, Shama D. Karanth⁸³⁶, Ibraheem M. Karaye⁸³⁷, Salah Eddin Karimi⁸³⁸, Samad Karkhah⁸³⁹, Faizan Zaffar Kashoo⁸⁴⁰, Gizat M. Kassie⁸⁴¹, Patrick D. M. C. Katoto^{770,842}, Mohammad Obadah Kattea⁸⁴³, Joonas H. Kauppila^{844,845}, Gbenga A. Kayode^{846,847}, Leila Keikavoosi-Arani⁸⁴⁸, Gemechu Gemechu Kejela⁸⁴⁹, John H. Kempen^{850,851}, Jessica A. Kerr^{852,853}, Cumali Keskin⁸⁵⁴, Mohammad Keykhaei^{16,855}, Yousef Saleh Khader⁸⁵⁶, Himanshu Khajuria⁸⁵⁷, Mohammad Khalafi⁸⁵⁸, Nauman Khalid⁸⁵⁹, Mohammad Khammarnia⁸⁶⁰, Asaduzzaman Khan⁸⁶¹, Atif A. Khan⁸⁶², Ejaz Ahmad Khan⁸⁶³, Imteyaz A. Khan⁸⁶⁴, Maseer Khan⁸⁶⁵, Md Jobair Khan⁸⁶⁶, Moien A. B. Khan^{867,868}, M. Nuruzzaman Khan^{869,870}, Yusra H. Khan⁸⁷¹, Javad Khanali^{16,17}, Khaled Khatab^{872,873}, Moawiah Mohammad Khatatbeh⁸⁷⁴, Mona M. Khater⁸⁷⁵, Sorour Khateri⁸⁷⁶, Mahalaqua Nazli Khatib⁸⁷⁷, Hamid Reza Khayat Kashani⁸⁷⁸, Zahra Khazaeipour⁸⁷⁹, Ahmad Khosravi⁸⁸⁰, Jagdish Khubchandani⁸⁸¹, Gyu Ri Kim⁸⁸², Jihee Kim⁸⁸³, Yun Jin Kim⁸⁸⁴, Ruth W. Kimokoti⁸⁸⁵, Adnan Kisa^{886,887}, Sezer Kisa⁸⁸⁸, Mika Kivimäki^{889,890}, Cameron J. Kneib⁸⁹¹, Sonali Kochhar^{892,893}, David S. Q. Koh^{894,895}, Ali-Asghar Kolahi¹⁷, Pavel Kolkhir^{896,897}, Kamrun Nahar Koly⁸⁹⁸, Farzad Kompani⁸⁹⁹, Hamid Reza Koohestani⁹⁰⁰, Vladimir Andreevich Korshunov³⁵⁹, Oleksii Korzh⁹⁰¹, Soewarta Kosen⁹⁰², Parvaiz A. Koul⁹⁰³, Sindhura Lakshmi Koulmane Laxminarayana⁹⁰⁴, Ai Koyanagi⁹⁰⁵, Kewal Krishan⁹⁰⁶, Vijay Krishnamoorthy^{907,908}, Estie Kruger⁹⁰⁹, Barthelemy Kuate Defo^{910,911}, Burcu Kucuk Bicer⁹¹², Mohammed Kuddus⁹¹³, Nuworza Kugbey⁹¹⁴, Akshay Kumar^{915,916}, Manasi Kumar^{917,918}, Narinder Kumar⁹¹⁹, Naveen Kumar⁹²⁰, Nithin Kumar⁸⁰⁵, Om P. Kurmi^{921,922}, Dian Kusuma^{923,924}, Ambily Kuttikkattu⁹²⁵, Carlo La Vecchia⁹²⁶, Ben Lacey^{312,927}, Lucie Laflamme^{928,929}, Dharmesh Kumar Lal⁹³⁰, Ratilal Laloo⁹³¹, Tea Lallukka⁸⁹⁰, Judit Lám^{589,932}, Faris Hasan Lami⁹³³, Qing Lan⁹³⁴, Iván Landires^{935,936}, Justin J. Lang⁹³⁷, Berthold Langguth⁹³⁸, Bagher Larijani⁹³⁹, Anders O. Larsson^{940,941}, Kamaluddin Latief^{942,943}, Sum Yuet Joyce Lau⁹⁴⁴, Matthew B. Laurens⁶⁶⁶, Paolo Lauriola⁹⁴⁵, Habib Layoun⁶⁷², Doo Woong Lee^{882,946}, Paul H. Lee³⁶⁴, Sang-woong Lee⁹⁴⁷, Seung Won Lee⁹⁴⁸, Shaun Wen Huey Lee^{85,949}, Wei-Chen Lee⁹⁵⁰, Yo Han Lee⁸⁸³, Samson Mideksa Legesse⁹⁵¹, James Leigh⁹⁵², Matilde Leonardi⁹⁵³, Elvynna Leong⁹⁵⁴, An Li^{955,956}, Ming-Chieh Li⁹⁵⁷, Massimo Libra⁵⁴¹, Andrew Tiyamike Makhiringa Likaka⁹⁵⁸, David Lim Lim^{959,960}, Lee-Ling Lim^{961,962}, Stephen S. Lim^{371,372}, Ro-Ting Lin^{416,963}, Christine Linehan⁹⁶⁴, Shai Linn⁹⁶⁵, Gang Liu^{966,967}, Jue Liu⁹⁶⁸, Shiwei Liu⁹⁶⁹, Wei Liu⁹⁷⁰, Chun-Han Lo⁹⁷¹, Graciliana Lopes⁹⁷², Platon D. Lopukhov³⁵⁹, Arianna Maeve Loreche^{973,974}, László Lorenzovici^{975,976}, Mojgan Lotfi^{615,977}, Joana A. Loureiro^{978,979}, Giancarlo Lucchetti⁹⁸⁰, Raimundas Lunevicius^{981,982}, Vanessa Sintra Machado⁹⁸³, Farzan Madadzadeh⁹⁸⁴, Ralph Maddison⁹⁸⁵, Hassan Magdy Abd El Razek⁹⁸⁶, D. R. Mahadeshwara Prasad^{987,988}, Preetam Bhalchandra Mahajan⁹⁸⁹, Phetole Walter Mahasha⁹⁹⁰, Soleiman Mahjoub^{991,992}, Mansour Adam Mahmoud⁹⁹³, Razzagh Mahmoudi⁹⁹⁴, Marzieh Mahmoudimanesh⁹⁹⁵, Azeem Majeed⁹⁹⁶, Jeadran N. Malagón-Rojas^{997,998}, Elaheh Malakan Rad⁹⁹⁹, Ahmad Azam Malik^{271,1000}, Tauqeer Hussain Mallhi⁸⁷¹, Yosef Manla¹⁰⁰¹, Ali Mansour^{1002,1003}, Borhan Mansouri¹⁰⁰⁴, Mohammad Ali Mansournia¹⁰⁰⁵, Lorenzo Giovanni Mantovani^{1006,1007}, Abdoljalal Marjani¹⁰⁰⁸, Carlos Alberto Marrugo Arnedo^{157,1009}, Ramon Martinez-Piedra¹⁰¹⁰, Adolfo Martinez-Valle^{74,1011}, Santi Martini^{1012,1013},

Francisco Rogerlândio Martins-Melo¹⁰¹⁴, Miquel Martorell^{1015,1016}, Sahar Masoudi¹⁸⁶, Elezebeth Mathews¹⁰¹⁷, Alexander G. Mathioudakis^{1018,1019}, Richard James Maude^{1020,1021}, Pallab K. Maulik^{1022,1023}, Sazan Qadir Maulud¹⁰²⁴, Enkeleint A. Mechili^{1025,1026}, Jitendra Kumar Meena¹⁰²⁷, Salima Meherali Meherali¹⁰²⁸, Khalid Mehmood¹⁰²⁹, Man Mohan Mehndiratta^{1030,1031}, Entezar Mehrabi Nasab¹⁰³², Kala M. Mehta¹⁰³³, Laychiluh Bantie Mekonnen^{161,1034}, Ziad A. Memish^{143,1035}, Walter Mendoza¹⁰³⁶, Oliver Mendoza-Cano¹⁰³⁷, Ritesh G. Menezes¹⁰³⁸, Alexios-Fotios A. Mentis¹⁰³⁹, Atte Meretoja^{1040,1041}, Tuomo J. Meretoja^{1042,1043}, Belsity Temesgen Meselu¹⁰⁴⁴, Bezawit Afework Mesfin⁴⁶⁴, Tomislav Mestrovic^{371,1045}, Tomasz Miazgowski¹⁰⁴⁶, Georgia Micha¹⁰⁴⁷, Irmia Maria Michalek^{1048,1049}, Ana Carolina Micheletti Gomide Nogueira de Sá¹⁰⁵⁰, Gedefaye Nibret Mihrtie²⁴⁸, Ted R. Miller^{418,1051}, Seyed Peyman Mirghaderi⁸⁵⁵, Mojgan Mirghafourvand¹⁰⁵², Andreea Mirica¹⁸³, Antonio Mirijello¹⁰⁵³, Seyyedmohammadsadeq Mirmoeeni²⁵⁵, Erkin M. Mirrahimov^{1054,1055}, Moonis Mirza¹⁰⁵⁶, Maryam Mirzaei¹⁰⁵⁷, Roya Mirzaei^{1058,1059}, Awoke Misganaw^{372,1060}, Sanjeev Misra¹⁰⁶¹, Prasanna Mithra⁸⁰⁵, Chaitanya Mittal¹⁰⁶², Javad Moghadas¹⁰⁶³, Ashraf Mohamadkhani¹⁸⁶, Abdalla Z. Mohamed¹⁰⁶⁴, Karzan Abdulmuhsin Mohammad¹⁰²⁴, Sakineh Mohammad-Alizadeh-Charandabi^{838,1065}, Esmaeil Mohammadi^{719,1066}, Soheil Mohammadi⁶⁷¹, Hussien Mohammed¹⁰⁶⁷, Shafiu Mohammed^{1068,1069}, Syam Mohan^{1070,1071}, Nagabhishek Moka^{1072,1073}, Ali H. Mokdad^{371,372}, Mariam Molokhia¹⁰⁷⁴, Sara Momtazmanesh^{16,671}, Lorenzo Monasta¹⁰⁷⁵, T. J. Robinson T. Moncater⁵⁴², Stefania Mondello¹⁰⁷⁶, Mohammad Ali Moni⁸⁶¹, Md Moniruzzaman¹⁰⁷⁷, Fateme Montazeri^{16,1078}, Delaram Moosavi⁴⁸⁹, Yousef Moradi¹⁰⁷⁹, Maziar Moradi-Lakeh⁵³¹, Paula Moraga¹⁰⁸⁰, Rafael Silveira Moreira^{1081,1082}, Joana Morgado-da-Costa¹⁰⁸³, Negar Morovatdar¹⁰⁸⁴, Meg E. Morris^{1085,1086}, Shane Douglas Morrison¹⁰⁸⁷, Elias Mossialos^{1088,1089}, Ebrahim Mostafavi^{1090,1091}, Majid Motaghinejad¹⁰⁹², Simin Mouodi¹⁰⁹³, Amin Mousavi Khaneghah¹⁰⁹⁴, Sumaira Mubarik¹⁰⁹⁵, Lorenzo Muccioli⁶³⁷, Ulrich Otto Mueller^{1096,1097}, Soumyadeep Mukherjee¹⁰⁹⁸, Francesk Mulita^{1099,1100}, Getaneh Baye Mulu¹¹⁰¹, Daniel Munblit^{1102,1103}, Efrén Murillo-Zamora^{1104,1105}, Shruti Murthy¹¹⁰⁶, Ana-Maria Musina^{1107,1108}, Ghulam Mustafa^{1109,1110}, Saravanan Muthupandian^{407,1111}, Julius C. Mwita¹¹¹², Ashraf F. Nabhan^{1113,1114}, Ahamarshan Jayaraman Nagarajan^{1115,1116}, Mukhammad David Naimzada^{1117,1118}, Tapas Sadasivan Nair¹¹¹⁹, Zhila Najafpour¹¹²⁰, Luigi Naldi^{1121,1122}, Vinay Nangia¹¹²³, Atta Abbas Naqvi¹¹²⁴, Sreenivas Narasimha Swamy¹¹²⁵, Aparna Ichalangod Narayana¹¹²⁶, Bruno Ramos Nascimento^{1127,1128}, Gopalakrishnan Natarajan¹¹²⁹, Zuhair S. Natto^{1130,1131}, Biswa Prakash Nayak⁸⁵⁷, Vinod C. Nayak²⁷⁴, Rawlance Ndejo¹¹³², Sabina Onyinye Nduaguba¹¹³³, Ionut Nego^{1134,1135}, Ruxandra Irina Nego^{1136,1137}, Seyed Aria Nejadghaderi^{1078,1138}, Evangelia Nena¹¹³⁹, Samata Nepal¹¹⁴⁰, Henok Biresaw Netsere^{1141,1142}, Georges Nguefack-Tsague¹¹⁴³, Josephine W. Ngunjiri¹¹⁴⁴, Che Henry Ngwa¹¹⁴⁵, Robina Khan Niazi¹¹⁴⁶, Solomon Gedlu Nigatu¹¹⁴⁷, Ali Nikoobar¹⁷, Amin Reza Nikpoor¹¹⁴⁸, Muhammad A. Nizam¹¹⁴⁹, Chukwudi A. Nnaji^{1150,1151}, Shuhei Nomura^{1152,1153}, Nurulamin M. Noor^{1154,1155}, Nafise Noroozi¹¹⁵⁶, Bo Norrving¹¹⁵⁷, Jean Jacques Noubiap¹¹⁵⁸, Hasti Nouraei¹¹⁵⁹, George Ntaios¹¹⁶⁰, Mpiko Ntsekhe^{1161,1162}, Dieta Nurrika^{1163,1164}, Jerry John Nutor¹¹⁶⁵, Chimezie Igwegbe Nzoputam¹¹⁶⁶, Ogochukwu Janet Nzoputam^{1167,1168}, Felix Chukwudi Abrahams Obi^{1169,1170}, Oluwakemi Ololade Odukoya^{1171,1172}, Onome Bright Oghenetega¹¹⁷³, Abiola Ogunkoya⁷⁵¹, In-Hwan Oh¹¹⁷⁴, Akin Ojagbemi^{1175,1176}, Hassan Okati-Aliabad⁸⁶⁰, Akinkunmi Paul Okekunle^{1177,1178}, Osaretin Christabel Okonji¹¹⁷⁹, Adeolu Olufunso Oladunjoye^{1180,1181}, Olubunmi Omotola Oladunjoye¹¹⁸⁴, Andrew T. Olagunju^{1182,1183}, Antonio Olivas-Martinez^{1184,1185}, Arão Belitardo Oliveira^{644,1186}, Gláucia Maria Moraes Oliveira¹¹⁸⁷, Isaac Iyinoluwa Olufadewa^{58,512}, Bolajoko Olubukunola Olusanya¹¹⁸⁸, Jacob Olusegun Olusanya¹¹⁸⁸, Ahmed Omar Bali¹¹⁸⁹, Sokking Ong^{1190,1191}, Obinna E. Onwujekwe¹¹⁹², Doris V. Ortega-Altamirano¹¹⁹³, Alberto Ortiz^{178,1194}, Adrian Otoiu¹⁸³, Nikita Otstavnov¹¹¹⁷, Stanislav S. Otstavnov^{1117,1195}, Abderrahim Oulhaj¹¹⁹⁶, Amel Ouyahia^{1197,1198}, Simon Øverland¹¹⁹⁹, Mayowa O. Owolabi^{1200,1201}, Mahesh P. A¹²⁰², Kevin Pacheco-Barrios^{1203,1204}, Alicia Padron-Monedero¹²⁰⁵, Jagadish Rao Padubidri¹²⁰⁶, Pramod Kumar Pal¹²⁰⁷, Tamás Palicz^{589,803}, Raffaele Palladino^{996,1208}, Songhomitra Panda-Jonas¹²⁰⁹, Seithikurippu R. Pandi-Perumal^{1210,1211}, Helena Ullayrtha Pangaribuan¹²¹², Suman Pant¹²¹³, Paraskevi Papadopoulou^{197,1214}, Shahina Pardhan³⁵⁰, Eun-Cheol Park^{882,1215}, Eun-Kee Park¹²¹⁶, Seoyeon Park¹²¹⁷, Deepak Kumar Pasupula¹²¹⁸, Jay Patel^{1219,1220}, Jenil R. Patel^{1221,1222}, Rikinkumar S. Patel^{1223,1224}, Urvis K. Patel¹²²⁵, Aslam Ramjan Pathan^{1226,1227}, Ronit Patnaik Patnaik¹²²⁸, Uttam Paudel^{1229,1230}, Shrikant Pawar¹²³¹, Hamidreza Pazoki Toroudi^{1232,1233}, Amy E. Peden^{758,1234}, Paolo Pedersini¹²³⁵, Minjin Peng^{1236,1237}, Umberto Pensato¹²³⁸, Veincent Christian Filipino Pepito¹²³⁹, Emmanuel K. Peprah⁵⁸⁷, João Perdigão¹²⁴⁰, Marcos Pereira¹²⁴¹, Renato B. Pereira⁶³⁸, Norberto Perico¹²⁴², Simone Perna¹²⁴³, Richard G. Pestell^{1244,1245}, Konrad Pesudovs¹²⁴⁶, Ionela-Roxana Petcu¹⁸³, Raffaele Pezzani^{1247,1248}, Michael R. Phillips^{1249,1250}, Cristiano Piccinelli¹²⁵¹, David M. Pigott^{371,372}, Julian David Pillay¹²⁵², Zahra Zahid Piracha¹²⁵³, Saeed Pirouzpanah¹²⁵⁴, Meghdad Pirsaeheb⁵⁵⁵, Evgenii Plotnikov^{1255,1256}, Indrashis Podder¹²⁵⁷, Vivek Podder^{1258,1259}, Riccardo Pofi¹²⁶⁰, Roman V. Polibin³⁵⁹, Kevan R. Polkinghorne¹²⁶¹, Ramesh Poluru¹²⁶², Constance Dimity Pond¹²⁶³, Fabio Porru⁴⁰⁵, Maarten J. Postma^{1264,1265}, Naeimeh Pourtaheri¹²⁶⁶, Sergio I. Prada^{1267,1268}, Pranil Man Singh Pradhan^{1269,1270}, V. Prakash¹²⁷¹, Narayan Prasad¹²⁷², Luís Proença¹²⁷³, Ibrahim Qattee¹²⁷⁴,

Zahiruddin Quazi Syed⁴¹⁷, Navid Rabiee^{1275,1276}, Amir Radfar¹²⁷⁷, Raghu Anekal Radhakrishnan¹¹²⁶, Venkatraman Radhakrishnan¹²⁷⁸, Ata Rafiee¹²⁷⁹, Alberto Raggi⁹⁵³, Pankaja Raghav Raghav²⁹³, Fakher Rahim¹²⁸⁰, Majid Rahimi¹²⁸¹, Vafa Rahimi-Movaghar⁶²¹, Azizur Rahman¹²⁸², Md Obaidur Rahman^{1283,1284}, Mohammad Hifz Ur Rahman¹²⁸⁵, Mosiur Rahman⁶⁸⁸, Muhammad Aziz Rahman^{187,1286}, Amir Masoud Rahmani¹²⁸⁷, Shayan Rahmani^{16,1078}, Vahid Rahmanian¹²⁸⁸, Diego Raimondo¹²⁸⁹, Ivano Raimondo^{1290,1291}, Sheetal Raj Moolambally¹²⁹², Prashant Rajput¹²⁹³, Sasa Rajsic¹²⁹⁴, Sree Bhushan Raju¹²⁹⁵, Pradhum Ram¹²⁹⁶, Sheena Ramazanu¹²⁹⁷, Juwel Rana^{1298,1299}, Chhabhi Lal Ranabhat^{1300,1301}, Chythra R. Rao¹³⁰², Sowmya J. Rao¹³⁰³, Temam Beshir Raru⁴⁵⁷, Sina Rashedi^{1138,1304}, Mohammad-Mahdi Rashidi^{16,17}, Prateek Rastogi⁴⁹⁹, Azad Rasul¹³⁰⁵, Zubair Ahmed Ratan^{230,1306}, Ramin Ravangard¹³⁰⁷, David Laith Rawaf^{1308,1309}, Reza Rawassizadeh¹³¹⁰, Rabail Zehra Raza¹²⁶, Iman Razeghian-Jahromi¹³¹¹, Elrashdy Moustafa Mohamed Redwan^{1312,1313}, Giuseppe Remuzzi¹²⁴², Andre M. N. Renzaho^{1314,1315}, Bhageerathy Reshmi^{798,1316}, Nazila Rezaei¹⁶, Negar Rezaei^{16,939}, Nima Rezaei^{37,1317}, Zahed Rezaei¹³¹⁸, Mohsen Rezaeian¹³¹⁹, Abanoub Riad^{1320,1321}, Mavra A. Riaz¹³²², Muhammad Riaz¹³²³, Antonio Luiz P. Ribeiro^{354,1324}, Daniel Cury Ribeiro¹³²⁵, Daniela Ribeiro^{586,1326}, Tércia Moreira Ribeiro da Silva¹³²⁷, Jennifer Rickard^{1328,1329}, Mónica Rodrigues¹³³⁰, Jefferson Antonio Buendia Rodriguez^{1331,1332}, Leonardo Roeber¹³³³, Esperanza Romero-Rodríguez¹³³⁴, Michele Romoli¹³³⁵, Luca Ronfani¹⁰⁷⁵, Betty Roosierhermatie¹²¹², Victor Daniel Rosenthal¹³³⁶, Morteza Rostamian¹³³⁷, Bedanta Roy¹³³⁸, Enrico Rubagotti^{1339,1340}, Susan Fred Rumisha^{1341,1342}, Godfrey M. Rwegerera¹¹¹², Manjula S¹³⁴³, Chandan S. N¹³⁴³, Aly M. A. Saad¹³⁴⁴, Michela Sabbatucci^{1345,1346}, Maha Mohamed Saber-Ayad^{43,1347}, Siamak Sabour⁸², Simona Sacco¹³⁴⁸, Perminder S. Sachdev^{1349,1350}, Rajesh Sachdeva^{1351,1352}, Basema Saddik¹³⁵³, Erfan Sadeghi¹³⁵⁴, Malihe Sadeghi¹³⁵⁵, Masoumeh Sadeghi¹³⁵⁶, Saeid Sadeghian¹³⁵⁷, Mohammad Reza Saeb¹³⁵⁸, Umar Saeed^{1359,1360}, Sahar Saeedi Moghaddam¹⁶, Muhammad Aamir Safdar Safdar¹³⁶¹, Mahdi Safdarian^{1362,1363}, Sher Zaman Safi^{1364,1365}, Rajesh Sagar¹³⁶⁶, Dominic Sagoe¹³⁶⁷, Amirhossein Sahebkar^{1368,1369}, Harihar Sahoo¹³⁷⁰, Mohammad Ali Sahraian⁵³², K. M. Saif-Ur-Rahman¹³⁷¹, Mirza Rizwan Sajid¹³⁷², Sateesh Sakhamuri^{1373,1374}, Rehab Salah^{1375,1376}, Saina Salahi¹³⁷⁷, Sarvenaz Salahi^{811,1378}, Nasir Salam¹³⁷⁹, Payman Salamat⁶²¹, Marwa Rashad Salem¹³⁸⁰, Hossein Samadi Kafil¹³⁸¹, Yoseph Leonardo Samodra¹³⁸², Abdallah M. Samy^{1383,1384}, Juan Sanabria^{20,1385}, Francesco Sanmarchi⁶³⁷, Itamar S. Santos^{313,644}, Milena M. Santric-Milicevic^{753,1386}, Bruno Piassi Sao Jose¹³⁸⁷, Muhammad Arif Nadeem Saqib^{1388,1389}, Sivan Yegnanarayana Iyer Saraswathy¹³⁹⁰, Yaser Sarikhani^{616,1391}, Rakesh Kumar Saroj¹³⁹², Nizal Sarrafzadegan^{400,1393}, Arash Sarveazad¹³⁹⁴, Brijesh Sathian^{102,1395}, Thirunavukkarasu Sathish¹³⁹⁶, Maheswar Satpathy^{1397,1398}, Davide Sattin¹³⁹⁹, Monika Sawhney¹⁴⁰⁰, Ganesh Kumar Saya¹⁴⁰¹, Nicolas Sayegh¹⁴⁰², Nikolaos Scarmeas^{1403,1404}, Markus P. Schlaich^{1405,1406}, Winfried Schlee¹⁴⁰⁷, Ione Jayce Ceola Schneider¹⁴⁰⁸, David C. Schwebel¹⁴⁰⁹, Abdul-Aziz Seidu¹⁴¹⁰, Subramanian Senthilkumaran¹⁴¹¹, Dragos Serban^{1134,1412}, Edson Serván-Mori¹¹⁴, SeyedAhmad SeyedAlinaghi¹⁴¹³, Allen Seylani¹⁴¹⁴, Melika Shafeghat⁶⁷¹, Zahra Shaghaghi¹⁴¹⁵, Syed Mahboob Shah^{91,1416}, Saeed Shahabi⁶¹⁶, Ataollah Shahbani¹⁴¹⁷, Amira A. Shaheen¹⁴¹⁸, Fariba Shahraki-Sanavi⁸⁶⁰, Hamid R. Shahsavari¹⁴¹⁹, Masood Ali Shaikh¹⁴²⁰, KS Shaji¹⁴²¹, Reza Shakaib¹⁴²², Ali S. Shalash²⁰⁴, Mohd Shanawaz¹⁴²³, Mequannent Melaku Sharew¹⁴²⁴, Nigussie Tadesse Sharew^{1425,1426}, Azam Sharifi¹⁴²⁷, Sakineh Sharifian¹⁴²⁸, Javad Sharifi-Rad¹⁴²⁹, Purva Sharma¹⁴³⁰, Saurab Sharma^{1431,1432}, Vishal Sharma¹⁴³³, Bereket Beyene Shashamo¹¹⁷, Amin Amin Shavandi¹⁴³⁴, Maryam Shayan^{1435,1436}, Blerta Shehaj^{1437,1438}, Aziz Sheikh^{1439,1440}, Rahim Ali Sheikh¹⁴⁴¹, Abbas Sheikhtaheri¹⁴⁴², Shashank Shekhar¹⁴⁴³, Adithi Shetty¹⁴⁴⁴, B. Suresh Kumar Shetty⁴⁹⁹, Jeevan K. Shetty¹⁴⁴⁵, Pavanchand H. Shetty⁴⁹⁹, Peilin Shi¹⁴⁴⁶, Yi Shi¹⁴⁴⁷, Amir Shiani¹⁴⁴⁸, Mika Shigematsu¹⁴⁴⁹, Jae Il Shin¹⁴⁵⁰, Rahman Shiri¹⁴⁵¹, Maryam Shirvani Shiri¹⁴⁵², Kawkab Shishani¹⁴⁵³, K. M. Shivakumar¹⁴⁵⁴, Velizar Shivarov^{1455,1456}, Parnian Shobeiri^{1066,1457}, Seyed Afshin Shorofi^{1458,1459}, Dhan Bahadur Dhan Shrestha¹⁴⁶⁰, Sunil Shrestha¹⁴⁶¹, Kanwar Hamza Shuja¹⁴⁶², Kerem Shuval¹⁴⁶³, Inga Dora Sigfusdottir^{1464,1465}, Luís Manuel Lopes Rodrigues Silva^{1466,1467}, Ali Reza Sima^{186,1468}, Wudneh Simegn¹⁴⁶⁹, Biagio Simonetti^{430,1470}, Ehsan Sinaei¹⁴⁷¹, Anjali Singal¹⁴⁷², Ambrish Singh¹⁹⁰, Balbir Bagicha Singh^{1473,1474}, Garima Singh^{1475,1476}, Harpreet Singh¹⁴⁷⁷, Jasvinder A. Singh^{1478,1479}, Kuldeep Singh¹⁴⁸⁰, Narinder Pal Singh¹⁴⁸¹, Paramdeep Singh¹⁴⁸², Surjit Singh¹⁴⁸³, Robert Sinto^{1484,1485}, Md Shahjahan Siraj¹⁴⁸⁶, Søren T. Skou^{1487,1488}, Valentin Yurievich Skryabin^{1489,1490}, Anna Aleksandrovna Skryabina¹⁴⁹¹, David A. Sleet^{553,1492}, Bogdan Socea^{1134,1493}, Yonatan Solomon¹⁴⁹⁴, Mohammad Sadegh Soltani-Zangbar⁷⁷⁶, Ranjani Somayaji^{1495,1496}, Suhang Song¹⁴⁹⁷, Yimeng Song³⁰⁸, Prashant Sood¹⁴⁹⁸, Joan B. Soriano^{1499,1500}, Raúl A. R. C. Sousa¹⁵⁰¹, Ireneous N. Soyiri¹⁵⁰², Chandrashekhar T. Sreeramareddy¹⁵⁰³, Antonina V. Starodubova^{1504,1505}, Nicholas Steel^{1506,1507}, Simona Catalina Stefan¹⁵⁰⁸, Dan J. Stein¹⁵⁰⁹, Paschalis Steiropoulos¹¹³⁹, Jacqueline H. Stephens⁹⁶⁰, Mark A. Stokes¹⁵¹⁰, Konstantinos Stroumpoulis¹⁵¹¹, Parminder S. Suchdev¹⁵¹², Muhammad Suleman¹⁵¹³, Abida Sultana^{1514,1515}, Jing Sun^{1516,1517}, Johan Sundström^{940,1518}, Mindy D. Szeto⁴⁶⁰, Miklós Szócska¹⁵¹⁹, Seidamir Pasha Tabaeian¹⁵²⁰, Rafael Tabarés-Seisdedos^{1521,1522}, Seyed-Amir Tabatabaeizadeh¹⁵²³, Shima Tabatabai¹⁵²⁴, Karen M. Tabb¹⁵²⁵, Mohammad Tabish¹²²⁶, Takahiro Tabuchi¹⁵²⁶, Santosh Kumar Tadakamadla¹⁵²⁷, Majid Taheri^{1528,1529}, Yasaman Taheri Abkenar¹⁵³⁰, Moslem Taheri Soodejani¹⁵³¹

Iman M. Talaat^{43,1532}, Mircea Tampa^{1533,1534}, Ker-Kan Tan¹⁵³⁵, Ingan Ukur Tarigan¹²¹², Elvis Enowbeyang Tarkang^{170,1536}, Nathan Y. Tat^{1537,1538}, Vivian Y. Tat¹⁵³⁹, Yibekal Manaye Tefera¹⁵⁴⁵, Hadi Tehrani¹⁵⁴⁰, Worku Animaw Temesgen¹⁵⁴¹, Mohamad-Hani Tamsah¹⁵⁵, Masayuki Teramoto¹⁵⁴², Getaye Worku Tesema¹⁵⁴³, Azene Tesfaye¹⁰⁰, Pugazhenthann Thangaraju¹⁵⁴⁴, Kavumpurathu Raman Thankappan¹⁵⁴⁵, Rekha Thapar⁸⁰⁵, Friedrich Thienemann^{1546,1547}, Nihal Thomas¹⁵⁴⁸, Nikhil Kenny Thomas¹⁵⁴⁹, James Douglas Thornton^{1550,1551}, Ales Tichopad¹⁵⁵², Jansje Henny Vera Ticoalu¹⁵⁵³, Marius Belmondo Tincho^{1554,1555}, Marcello Tonelli¹⁴⁹⁵, Roman Topor-Madry^{1556,1557}, Marcos Roberto Tovani-Palone^{1558,1559}, Mai Thi Ngoc Tran^{1560,1561}, Manjari Tripathi¹⁵⁶², Niharika Tripathi¹⁵⁶³, Jaya Prasad Tripathy¹⁵⁶⁴, Thomas Clement Truelsen¹⁵⁶⁵, Nikolaos Tsilimparis¹⁵⁶⁶, Lorainne Tudor Car¹⁵⁶⁷, Derara Girma Tufa¹⁵⁶⁸, Biruk Shalmeno Tusa¹⁵⁶⁹, Deinzel Robles Uezono¹⁵⁷⁰, Saif Ullah¹⁵⁷¹, Sana Ullah^{1572,1573}, Srikanth Umakanthan¹⁵⁷⁴, Krishna Kishore Umapathi¹⁵⁷⁵, Chukwuma David Umeokonkwo¹⁵⁷⁶, Brigid Unim¹⁵⁷⁷, Bhaskaran Unnikrishnan¹⁵⁷⁸, Era Upadhyay⁹²⁰, Marco Vacante³³⁴, Alireza Vakilian^{1579,1580}, Sahel Valadan Tahbaz^{1581,1582}, Pascual R. Valdez^{1583,1584}, Rohollah Valizadeh¹⁵⁸⁵, Jef Van den Eynde¹⁵⁸⁶, Constantine Vardavas¹⁵⁸⁷, Ravi Prasad Varma¹⁵⁸⁸, Priya Vart¹⁵⁸⁹, Santosh Varughese¹⁵⁹⁰, Tommi Juhani Vasankari^{1591,1592}, Milena Vasic¹⁵⁹³, Siavash Vaziri¹⁵⁹⁴, Narayanaswamy Venketasubramanian^{1595,1596}, Madhur Verma¹⁵⁹⁷, Massimiliano Veroux¹⁵⁹⁸, Dominique Vervoort¹⁵⁹⁹, Jorge Hugo Villafaña¹²³⁵, Francesco S. Violante^{1600,1601}, Prashant M. Vishwanath¹⁶⁰², Vasily Vlassov¹⁶⁰³, Bay Vo¹⁶⁰⁴, Victor Volovic^{1605,1606}, Linh Gia Vu^{1607,1608}, Yanzhong Wang¹⁶⁰⁹, Yu Wang¹⁶¹⁰, Yuan-Pang Wang³⁶⁵, Ziyue Wang^{1611,1612}, Paul Ward¹⁶¹³, Abdul Waris¹⁶¹⁴, Melissa Y. Wei^{1615,1616}, Yi Feng Wen¹⁶¹⁷, Ronny Westerman¹⁶¹⁸, Taweewat Wiangkham¹⁶¹⁹, Nuwan Darshana Wickramasinghe¹⁶²⁰, Abay Tadesse Woday³³⁵, Daniel Sisay Wolde Tsadik¹⁶²¹, Melat Woldemariam¹⁰⁰, Charles D. A. Wolfe^{1609,1622}, Anthony D. Woolf^{1623,1624}, Ai-Min Wu¹⁶²⁵, Gedif Ashebir Wubetie¹⁶²⁶, Ratna D. W. I. Wulandari¹⁶²⁷, Hong Xiao^{1628,1629}, Yang Xie¹⁶³⁰, Hanzhang Xu¹⁶³¹, Suowen Xu^{1632,1633}, Xiaoyue Xu^{562,1634}, Sajad Yaghoubi¹⁶³⁵, Gahin Abdulraheem Tayib Yahya Yahya⁹⁰, Seyed Hossein Yahyazadeh Jabbari¹⁵⁸¹, Tomohide Yamada¹⁶³⁶, Kazumasa Yamagishi^{1637,1638}, Lin Yang^{1639,1640}, Yuichiro Yano¹⁶⁴¹, Sanni Yaya^{1642,1643}, Fereshteh Yazdanpanah^{1644,1645}, Pengpeng Ye^{1646,1647}, Siyan Yi^{895,1648}, Arzu Yiğit¹⁶⁴⁹, Vahit Yiğit¹⁶⁴⁹, Paul Yip^{1650,1651}, Eshetu Yisihak⁴⁶⁴, Dong Keon Yon¹⁶⁵², Naohiro Yonemoto^{1653,1654}, Yuyi You^{830,1655}, Mustafa Z. Younis^{1656,1657}, Zabihollah Yousefi¹⁶⁵⁸, Taraneh Yousefinezhadi¹⁶⁵⁹, Hossein Yusefi¹⁶⁶⁰, Siddhesh Zadey¹⁶⁶¹, Vesna Zadnik¹⁶⁶², Farbod Zahedi Tajrishi¹⁶⁶³, Mazyar Zahir¹⁶⁶⁴, Farima Zakaryaei¹⁶⁶⁵, Nazar Zaki¹⁶⁶⁶, Sojib Bin Zaman¹⁶⁶⁷, Nelson Zamora¹⁶⁶⁸, Alireza Zangeneh²³⁴, Moein Zangiabadian¹⁰⁷⁸, Iman Zare¹⁶⁶⁹, Ali Zare Dehnavi¹⁶⁷⁰, Kourosh Zarea¹⁶⁷¹, Zahra Zarehshahrabadi¹¹⁵⁹, Mikhail Sergeevich Zastrozhin^{1672,1673}, Zelalem Banjaw Zegeye⁴⁶⁶, Jean-David Zeitoun^{1674,1675}, Getachew Assefa Zenebe¹⁶⁷⁶, Nejimu Biza Zepro^{1677,1678}, Jianrong Zhang^{1679,1680}, Zhi-Jiang Zhang¹⁶⁸¹, Xiu-Ju George Zhao^{1682,1683}, Chenwen Zhong⁷⁴⁰, Boback Ziaieian¹⁶⁸⁴, Mohammad Zoladl¹⁶⁸⁵, Liesl J. Zuhlke^{1546,1686}, Alimuddin Zumla^{1687,1688} & Yves Miel H. Zuniga^{1689,1690}

¹CRONICAS Center of Excellence in Chronic Diseases, Universidad Peruana Cayetano Heredia, Lima, Peru. ²School of Medicine, Universidad Peruana Cayetano Heredia, Lima, Peru. ³Sydney School of Public Health, Faculty of Medicine and Health, University of Sydney, Sydney, NSW, Australia. ⁴Faculty of Epidemiology and Population Health, London School of Hygiene & Tropical Medicine, London, UK. ⁵Division of Tropical and Humanitarian Medicine, University of Geneva, Geneva, Switzerland. ⁶Department of Cardiovascular, Endocrine-metabolic Diseases and Aging, Istituto Superiore di Sanità, Rome, Italy. ⁷Division of Endocrinology, Diabetology, Nutrition and Therapeutic Patient Education, Department of Medicine, Geneva University Hospitals, Geneva, Switzerland. ⁸Department of Medicine and Department of Health Research, Evidence, and Impact, McMaster University, Hamilton, ON, Canada. ⁹Research Institute of St. Joe's, Hamilton, ON, Canada. ¹⁰Population Health Research Institute, Hamilton, Canada. ¹¹Geneva University Hospitals, Geneva, Switzerland. ¹²Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran. ¹³Department of Nutrition and Dietetics, Jimma University, Jimma, Ethiopia. ¹⁴Anesthesiology Department, Dilla University, Addis Ababa, Ethiopia. ¹⁵Department of Juridical and Economic Studies, La Sapienza University, Rome, Italy. ¹⁶Non-Communicable Diseases Research Center, Tehran University of Medical Sciences, Tehran, Iran. ¹⁷Social Determinants of Health Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ¹⁸Advanced Diagnostic and Interventional Radiology Research Center, Tehran University of Medical Sciences, Tehran, Iran. ¹⁹Faculty of Science, Botany and Microbiology Department, Suez Canal University, Ismailia, Egypt. ²⁰Department of Surgery, Marshall University, Huntington, WV, USA. ²¹Tropical Medicine Department, Tanta University, Tanta, Egypt. ²²Department of Internal Medicine, Baylor College of Medicine, Houston, FL, USA. ²³Department of Epidemiology, Kermanshah University of Medical Sciences, Kermanshah, Iran. ²⁴The Institute of Pharmaceutical Sciences (TIPS), Tehran University of Medical Sciences, Tehran, Iran. ²⁵School of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran. ²⁶Department of Medicine, University of Sétif Algeria, Sétif, Algeria. ²⁷Community and Maternity Nursing Unit, University of Duhok, Duhok, Iraq. ²⁸School of Planning, University of Waterloo, Waterloo, ON, Canada. ²⁹Department of Emergency and Critical Care Nursing, Haramaya University, Harar, Ethiopia. ³⁰Department of Medical Anatomy, Arba Minch University, Arba Minch, Ethiopia. ³¹Department of Neurosurgery, University of Southern California, Los Angeles, CA, USA. ³²Keck School of Medicine, University of Southern California, Los Angeles, CA, USA. ³³Department of Public Health Sciences, Pennsylvania State University, Hershey, PA, USA. ³⁴Biocomplexity Institute, Virginia Tech, Blacksburg, VA, USA. ³⁵Laboratory Technology Sciences Department, Yasuj University of Medical Sciences, Yasuj, Iran. ³⁶Department of Family and Community Health, University of Health and Allied Sciences, Ho, Ghana. ³⁷Research Center for Immunodeficiencies, Tehran University of Medical Sciences, Tehran, Iran. ³⁸Department of Biosciences and Nutrition, Karolinska University Hospital, Huddinge, Sweden. ³⁹Department of Pediatric Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil. ⁴⁰Department of Research, Philippine Institute for Development Studies, Quezon City, Philippines. ⁴¹Department of Biomedical Science, Arba minch, Ethiopia. ⁴²Department of Banking and Finance, University of Human Development, Sulaymaniyah, Iraq. ⁴³Clinical Sciences Department, University of Sharjah, Sharjah, United Arab Emirates. ⁴⁴Department of Surgery, Alfaisal University, Riyadh, Saudi Arabia. ⁴⁵College of Graduate Health Sciences, University of Tennessee, Memphis, TN, USA.

⁴⁶Department of Disease Control, London School of Hygiene and Tropical Medicine, London, UK. ⁴⁷Department of Clinical Research, Clinical Research Institute of Benin (IRCB), Abomey-Calavi, Benin. ⁴⁸Department of Clinical Medicine, American University of Antigua, Osbourn, Antigua and Barbuda. ⁴⁹FIU Robert Stempel College of Public Health and Social Work, Florida International University, Miami, FL, USA. ⁵⁰Department of Anesthesia and Critical Care, Debre Tabor University, Debre Tabor, Ethiopia. ⁵¹Department of Clinical and Psychosocial Epidemiology, University of Groningen, Groningen, Netherlands. ⁵²Centre for Social Research in Health, University of New South Wales, Sydney, NSW, Australia. ⁵³Quality and Systems Performance Unit, Cancer Institute NSW, Sydney, NSW, Australia. ⁵⁴Department of Internal Medicine, Catholic University of Rome, Rome, Italy. ⁵⁵Department of Health Promotion, Education and Behavior, University of South Carolina, Columbia, SC, USA. ⁵⁶Department of Public Health, University of KwaZulu-Natal, Durban, South Africa. ⁵⁷Department of Obstetrics and Gynecology, University of Texas, Galveston, TX, USA. ⁵⁸Slum and Rural Health Initiative Research Academy, Slum and Rural Health Initiative, Ibadan, Nigeria. ⁵⁹Department of Physiotherapy, University of Ibadan, Ibadan, Nigeria. ⁶⁰DSI-NRF Centre of Excellence for Epidemiological Modelling and Analysis (SACEMA), Stellenbosch University, Stellenbosch, South Africa. ⁶¹Division of Epidemiology and Biostatistics, Stellenbosch University, Cape Town, South Africa. ⁶²Department of Community Health and Epidemiology, University of Saskatchewan, Saskatoon, SK, Canada. ⁶³Department of Public Health, Federal Ministry of Health, Abuja, Nigeria. ⁶⁴Faculty of Medicine, Universitas Padjadjaran (Padjadjaran University), Bandung, Indonesia. ⁶⁵Department of Community Medicine, University of Ibadan, Ibadan, Nigeria. ⁶⁶Department of Life Sciences, University of Management and Technology, Lahore, Pakistan. ⁶⁷Department of Community Medicine, King Edward Memorial Hospital, Lahore, Pakistan. ⁶⁸Department of Public Health, Public Health Institute, Lahore, Pakistan. ⁶⁹Department of Family Medicine, McMaster University, Hamilton, ON, Canada. ⁷⁰Department of Physiology, Government Medical College, Greater Noida, India. ⁷¹Department of Cardiovascular Medicine, Mayo Clinic, Scottsdale, AZ, USA. ⁷²Trivedi School of Biosciences, Ashoka University, Sonapat, India. ⁷³Section of General Internal Medicine, Baylor College of Medicine, Houston, TX, USA. ⁷⁴Health Policy and Population Research Center (CIPPS), National Autonomous University of Mexico, Mexico City, Mexico. ⁷⁵School of Public Health, University of Technology Sydney, Sydney, NSW, Australia. ⁷⁶Department of Medical Biochemistry, Shaqra University, Shaqra, Saudi Arabia. ⁷⁷Department of Health and Biological Sciences, Abasyn University, Peshawar, Pakistan. ⁷⁸Department of Natural Sciences, Labanese American University, Beirut, Lebanon. ⁷⁹Faculty of Pharmacy, MAHSA University, Kuala Langat, Malaysia. ⁸⁰Department of Epidemiology and Health Statistics, Southeast University, Nanjing, China. ⁸¹Department of Epidemiology and Biostatistics, Shahrekord University of Medical Sciences, Shahrekord, Iran. ⁸²Department of Epidemiology, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁸³School of Public Health, Imperial College London, London, UK. ⁸⁴School of Advanced Technologies in Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁸⁵School of Pharmacy, Monash University, Bandar Sunway, Malaysia. ⁸⁶Department of Pharmacy, Quaid I Azam University Islamabad, Islamabad, Pakistan. ⁸⁷Institute of Endemic Diseases, University of Khartoum, Khartoum, Sudan. ⁸⁸Swiss Tropical and Public Health Institute, University of Basel, Basel, Switzerland. ⁸⁹Department of Biosciences, COMSATS Institute of Information Technology, Islamabad, Pakistan. ⁹⁰Department of Pathology and Microbiology, University of Duhok, Duhok, Iraq. ⁹¹Institute of Public Health, United Arab Emirates University, Al Ain, United Arab Emirates. ⁹²Department of Orthopedics, Yenepoya Medical College, Mangalore, India. ⁹³Department of Food and Nutrition Policy and Planning Research, National Institute of Nutrition, Tehran, Iran. ⁹⁴National Nutrition and Food Technology Research Institute, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁹⁵Faculty of Medicine and Public Health, Jenderal Soedirman University, Purwokerto, Indonesia. ⁹⁶Trauma Research Center, Shiraz University of Medical Sciences, Shiraz, Iran. ⁹⁷Medical Laboratory Sciences, Debre Markos University, Debre Markos, Ethiopia. ⁹⁸Functional Neurosurgery Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁹⁹USERN Office, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ¹⁰⁰Department of Medical Laboratory Sciences, Arba Minch University, Arba Minch, Ethiopia. ¹⁰¹Department of Epidemiology and Biostatistics, University of South Carolina, Columbia, SC, USA. ¹⁰²Geriatric and Long Term Care Department, Hamad Medical Corporation, Doha, Qatar. ¹⁰³Rumailah Hospital, Hamad Medical Corporation, Doha, Qatar. ¹⁰⁴Evidence-Based Practice Center, Mayo Clinic Foundation for Medical Education and Research, Rochester, MN, USA. ¹⁰⁵John T. Milliken Department of Internal Medicine, Washington University in St. Louis, St. Louis, MO, USA. ¹⁰⁶Clinical Epidemiology Center, US Department of Veterans Affairs (VA), St Louis, MO, USA. ¹⁰⁷Murdoch Business School, Murdoch University, Perth, WA, Australia. ¹⁰⁸Department of Bioengineering, George Mason University, Fairfax, VA, USA. ¹⁰⁹Department of Public Health, Asian University for Women, Chittagong, Bangladesh. ¹¹⁰Asian University for Women, McGill University, Chittagong, Bangladesh. ¹¹¹Department of Community Health and Epidemiology, Dalhousie University, Halifax, NS, Canada. ¹¹²Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia. ¹¹³Health Information Management and Technology Department, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia. ¹¹⁴Center for Health System Research, National Institute of Public Health, Cuernavaca, Mexico. ¹¹⁵Department of Public Health, Harar Health Science College, Harar, Ethiopia. ¹¹⁶Department of Public Health, Rift Valley University, Harar, Ethiopia. ¹¹⁷Department of Nursing, Arba Minch University, Arba Minch, Ethiopia. ¹¹⁸Faculty of Health Sciences, Curtin University, Perth, WA, Australia. ¹¹⁹Wesfarmers Centre of Vaccines and Infectious Diseases, Telethon Kids Institute, Perth, WA, Australia. ¹²⁰Department of Bacteriology, Immunology, and Mycology, Suez Canal University, Ismailia, Egypt. ¹²¹Department of Cardiac Sciences, King Saud University, Riyadh, Saudi Arabia. ¹²²Epidemiology and Population Health, Johns Hopkins University, Baltimore, MD, USA. ¹²³Department of Health Services and Hospital Administration, King Abdulaziz University, Jeddah, Saudi Arabia. ¹²⁴Health Economics Research Group, King Abdulaziz University, Jeddah, Saudi Arabia. ¹²⁵Institute of Health Research, University of Health and Allied Sciences, Ho, Ghana. ¹²⁶Department of Biological Sciences, National University of Medical Sciences (NUMS), Rawalpindi, Pakistan. ¹²⁷Department of Biotechnology, Quaid-i-Azam University, Islamabad, Pakistan. ¹²⁸Member, Pakistan Academy of Sciences, Islamabad, Pakistan. ¹²⁹Centre for Biotechnology and Microbiology, University of Swat, Swat, Pakistan. ¹³⁰Department of Food Hygiene, Amol University of Special Modern Technologies, Amol, Iran. ¹³¹Department of Pathophysiology and Transplantation, Università degli Studi di Milano (University of Milan), Milan, Italy. ¹³²Cystic Fibrosis Center, Fondazione IRCCS Ospedale Maggiore Policlinico (IRCCS “Ca’ Granda Maggiore Policlinico” Hospital Foundation), Milan, Italy. ¹³³School of Public Health and Preventive Medicine, Monash University, Melbourne, VIC, Australia. ¹³⁴Pars Advanced and Minimally Invasive Medical Manners Research Center, Iran University of Medical Sciences, Tehran, Iran. ¹³⁵School of Computing, Mathematics and Engineering, Charles Sturt University, Wagga Wagga, NSW, Australia. ¹³⁶Information and Communication Technology Research Lab, ENSTA Bretagne, Brest, France. ¹³⁷Department of Health Policy and Management, Kuwait University, Kuwait, Kuwait. ¹³⁸International Centre for Casemix and Clinical Coding, National University of Malaysia, Bandar Tun Razak, Malaysia. ¹³⁹Bordeaux School of Public Health, University of Bordeaux, Bordeaux, France. ¹⁴⁰Public Health and Tropical Medicine Department, Jazan University, Jazan, Saudi Arabia. ¹⁴¹Jazan University, Jazan, Saudi Arabia. ¹⁴²College of Dental Medicine, Qatar University, Doha, Qatar. ¹⁴³College of Medicine, Alfaisal University, Riyadh, Saudi Arabia. ¹⁴⁴Ministry of Health, Riyadh, Saudi Arabia. ¹⁴⁵Department of Physical Education, Qatar University, Doha, Qatar. ¹⁴⁶Department of Rehabilitation Sciences and Physical Therapy, Jordan University of Science and Technology, Irbid, Jordan. ¹⁴⁷Research Program of Epidemiology and Public Health, Pompeu Fabra University, Barcelona, Spain. ¹⁴⁸Department of Experimental and Health Sciences, Biomedical Research Networking Center in Epidemiology and Public Health (CiberESP), Madrid, Spain. ¹⁴⁹Department of Surgery, University of São Paulo, São Paulo, Brazil. ¹⁵⁰Department of Community Medicine, King Abdulaziz University, Jeddah, Saudi Arabia. ¹⁵¹Department of Surgery, Kuwait University, Kuwait, Kuwait. ¹⁵²Chairman of Surgery, Ministry of Health, Kuwait, Kuwait. ¹⁵³Applied Science Research Center, Applied Science Private University, Amman, Jordan. ¹⁵⁴Migration Health Division, International Organization for Migration, Amman, Jordan. ¹⁵⁵Pediatric Intensive Care Unit, King Saud University, Riyadh, Saudi Arabia. ¹⁵⁶Research Group in Hospital Management and Health

Policies, Universidad de la Costa (University of the Coast), Barranquilla, Colombia. ¹⁵⁷Research Group in Health Economics, University of Cartagena, Cartagena, Colombia. ¹⁵⁸Department of Economic Sciences, Universidad de la Costa (University of the Coast), Barranquilla, Colombia. ¹⁵⁹National Health Observatory, National Institute of Health, Bogota, Colombia. ¹⁶⁰School of Medicine, University of Adelaide, Adelaide, SA, Australia. ¹⁶¹College of Medicine and Health Science, Bahir Dar University, Bahir Dar, Ethiopia. ¹⁶²Department of Internal Medicine, Jimma University, Jimma, Ethiopia. ¹⁶³School of Graduate Studies, Lingnan University, Hong Kong, China. ¹⁶⁴Public Health Department, Cairo University, Cairo, Egypt. ¹⁶⁵Department of Applied Science and Technology, University of California Berkeley, Berkeley, CA, USA. ¹⁶⁶Chemical Engineering Department, Tarbiat Modares University, Tehran, Iran. ¹⁶⁷Public Health Laboratories, National Institute of Health, Islamabad, Pakistan. ¹⁶⁸Department of Environmental Health, Kerman University of Medical Sciences, Kerman, Iran. ¹⁶⁹Medicine, Quran and Hadith Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran. ¹⁷⁰Department of Population and Behavioural Sciences, University of Health and Allied Sciences, Ho, Ghana. ¹⁷¹Department of Global Health, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. ¹⁷²Department of Global Health and Infectious Diseases, Kumasi Center for Collaborative Research in Tropical Medicine, Kumasi, Ghana. ¹⁷³Maternal and Child Wellbeing, African Population and Health Research Center, Nairobi, Kenya. ¹⁷⁴Department of Medicine, University of Jos, Jos, Nigeria. ¹⁷⁵Department of Internal Medicine, Jos University Teaching Hospital, Jos, Nigeria. ¹⁷⁶Department of Health Promotion, Bahir Dar University, Bahir Dar, Ethiopia. ¹⁷⁷Department of Pneumology Service, Autonomous University of Madrid, Madrid, Spain. ¹⁷⁸Department of Medicine, Autonomous University of Madrid, Madrid, Spain. ¹⁷⁹Faculty of Pharmacy, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania. ¹⁸⁰Centre for Sensorimotor Performance, The University of Queensland, Brisbane, QLD, Australia. ¹⁸¹Neurology Department, Royal Brisbane and Women's Hospital, Brisbane, QLD, Australia. ¹⁸²Cardiology Department, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania. ¹⁸³Department of Statistics and Econometrics, Bucharest University of Economic Studies, Bucharest, Romania. ¹⁸⁴Department of Medicine, University of Thessaly, Volos, Greece. ¹⁸⁵Department of Diabetology, Madras Diabetes Research Foundation, Chennai, India. ¹⁸⁶Digestive Diseases Research Institute, Tehran University of Medical Sciences, Tehran, Iran. ¹⁸⁷School of Nursing and Midwifery, La Trobe University, Melbourne, VIC, Australia. ¹⁸⁸Special Interest Group International Health, Public Health Association of Australia, Canberra, ACT, Australia. ¹⁸⁹Department of Epidemiology and Biostatistics, Zahedan University of Medical Sciences, Zahedan, Iran. ¹⁹⁰Menzies Institute for Medical Research, University of Tasmania, Hobart, TAS, Australia. ¹⁹¹Agribusiness Study Program, Sebelas Maret University, Surakarta, Indonesia. ¹⁹²Department of Medical Laboratory Science, Koforidua Technical University, Koforidua, Ghana. ¹⁹³Department of Parasitology, Mazandaran University of Medical Sciences, Sari, Iran. ¹⁹⁴Department of Parasitology, Iranshahr University of Medical Sciences, Iranshahr, Iran. ¹⁹⁵Department of Pathology, Imam Mohammad Ibn Saud Islamic University, Riyadh, Saudi Arabia. ¹⁹⁶School of Dentistry and Medical Sciences, Charles Sturt University, Orange, NSW, Australia. ¹⁹⁷Department of Science and Mathematics, The American College of Greece, Athens, Greece. ¹⁹⁸Department of Social Sciences, Berekum College of Education, Berekum, Ghana. ¹⁹⁹School of Public Health, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. ²⁰⁰Health Management and Economics Research Center, Iran University of Medical Sciences, Tehran, Iran. ²⁰¹Social Determinants of Health Research Center, Birjand University of Medical Sciences, Birjand, Iran. ²⁰²College of Art and Science, Ottawa University, Surprise, AZ, USA. ²⁰³College of Liberal Arts and Sciences, Arizona State University, Tempe, AZ, USA. ²⁰⁴Neurology Department, Ain Shams University, Cairo, Egypt. ²⁰⁵Department of Public Health, Arba Minch University, Arba Minch, Ethiopia. ²⁰⁶Department of Paediatrics, University of Malaya, Kuala Lumpur, Malaysia. ²⁰⁷University of Malaya Medical Centre, University of Malaya, Kuala Lumpur, Malaysia. ²⁰⁸Department of Neurobiology, Care Sciences, and Society, Karolinska Institute, Stockholm, Sweden. ²⁰⁹School of Health and Social Studies, Dalarna University, Falun, Sweden. ²¹⁰Neuroscience and Behavioral Sciences, University of São Paulo, Ribeirão Preto, Brazil. ²¹¹Department of Neuroscience, Glia Institute, Ribeirão Preto, Brazil. ²¹²Center of Biotechnology and Microbiology, University of Peshawar, Peshawar, Pakistan. ²¹³Department of Health Sciences, Zayed University, Dubai, United Arab Emirates. ²¹⁴Department of Biophysics, Russian Academy of Sciences, Moscow, Russia. ²¹⁵Department of Epidemiology, Universitas Airlangga (Airlangga University), Surabaya, Indonesia. ²¹⁶Department of Maternal and Child Health, Sultan Qaboos University, Muscat, Oman. ²¹⁷Department of Molecular and Cell Biology, University of Cape Town, Cape Town, South Africa. ²¹⁸Department of Physiotherapy, University of Sharjah, Sharjah, United Arab Emirates. ²¹⁹Community Medicine and Rehabilitation - Physiotherapy Section, Umeå University, Umeå, Sweden. ²²⁰Monitoring Evaluation and Operational Research Project, Abt Associates Nepal, Lalitpur, Nepal. ²²¹Brigham and Women's Hospital, Harvard University, Boston, MA, USA. ²²²Epilepsy Research Center, Shiraz University of Medical Sciences, Shiraz, Iran. ²²³Neurology Department, Thomas Jefferson University, Philadelphia, PA, USA. ²²⁴Research Center for Biochemistry and Nutrition in Metabolic Diseases, Kashan University of Medical Sciences, Kashan, Iran. ²²⁵Research Institute of Dental Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ²²⁶National Agency for Strategic Research in Medical Education (SRME), Ministry of Health and Medical Education, Tehran, Iran. ²²⁷Cabrini Research, Cabrini Health, Malvern, VIC, Australia. ²²⁸University Institute of Radiological Sciences and Medical Imaging Technology, The University of Lahore, Lahore, Pakistan. ²²⁹Adelaide School of Nursing, University of Adelaide, Adelaide, SA, Australia. ²³⁰School of Health and Society, University of Wollongong, Wollongong, NSW, Australia. ²³¹Menzies Centre for Health Policy, University of Sydney, Sydney, NSW, Australia. ²³²Department of Toxicology and Pharmacology, Tehran University of Medical Sciences, Tehran, Iran. ²³³Birjand University of Medical Sciences, Birjand University of Medical Sciences, Birjand, Iran. ²³⁴Social Development and Health Promotion Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran. ²³⁵Department of Medical Genetics, Umm Al-Qura University, Makkah, Saudi Arabia. ²³⁶Science and Technology Unit, Umm Al-Qura University, Makkah, Saudi Arabia. ²³⁷Department of Immunology, Zanjan University of Medical Sciences, Zanjan, Iran. ²³⁸School of Medicine and Public Health, University of Newcastle, Newcastle, NSW, Australia. ²³⁹Hunter New England Population Health, Wallsend, NSW, Australia. ²⁴⁰Department of Forensic Medicine, Lumbini Medical College, Palpa, Nepal. ²⁴¹Department of Social Welfare, Keimyung University, Daegu, South Korea. ²⁴²Department of Oral and Maxillofacial Surgery, Justus Liebig University of Giessen, Giessen, Germany. ²⁴³Northumbria HealthCare NHS Foundation Trust, Newcastle upon Tyne, UK. ²⁴⁴School of Business, Leicester, UK. ²⁴⁵Department of Public Health, Mashhad University of Medical Sciences, Mashhad, Iran. ²⁴⁶The Judith Lumley Centre, La Trobe University, Melbourne, VIC, Australia. ²⁴⁷San Martín de Porres University, Lima, Peru. ²⁴⁸Department of Midwifery, Debre Tabor University, Debre Tabor, Ethiopia. ²⁴⁹Department of Anatomy, Arba Minch University, Arba Minch, Ethiopia. ²⁵⁰Department of Immunology and Molecular Biology, University of Gondar, Gondar, Ethiopia. ²⁵¹Psychiatry Department, University College Hospital, Ibadan, Ibadan, Nigeria. ²⁵²University College Hospital, Ibadan, Ibadan, Nigeria. ²⁵³Department of Psychiatry, Universidad Autónoma de Madrid (Autonomous University of Madrid), Madrid, Spain. ²⁵⁴Biomedical Research Networking Center for Mental Health Network (CiberSAM), Institute of Health Carlos III, Madrid, Spain. ²⁵⁵School of Medicine, Shahrood University of Medical Sciences, Shahrood, Iran. ²⁵⁶Department of Neurovascular Research, Nested Knowledge, Inc., Saint Paul, MN, USA. ²⁵⁷Faculty of Medicine, October 6 University, 6th of October City, Egypt. ²⁵⁸Department of Pharmacology, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ²⁵⁹Department of Physiotherapy, Manipal Academy of Higher Education, Manipal, India. ²⁶⁰Department of Medicine, University of Melbourne, Melbourne, VIC, Australia. ²⁶¹Gomal Center of Biochemistry and Biotechnology, Gomal University, Dera Ismail Khan, Pakistan. ²⁶²Public Health Risk Sciences Division, Public Health Agency of Canada, Toronto, ON, Canada. ²⁶³Department of Nutritional Sciences, University of Toronto, Toronto, ON, Canada. ²⁶⁴Department of Forensic Science, Government Institute of Forensic Science, Nagpur, India. ²⁶⁵Department of Nursing, Saveh University of Medical Sciences, Saveh, Iran. ²⁶⁶Research School of Population Health, Australian National University, Canberra, ACT, Australia. ²⁶⁷Health Research Institute, University of Canberra, Canberra, ACT, Australia. ²⁶⁸School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran. ²⁶⁹Department of Parasitology, Tarbiat Modares University,

Tehran, Iran. ²⁷⁰Department of Parasitology, Alborz University of Medical Sciences, Karaj, Iran. ²⁷¹University Institute of Public Health, The University of Lahore, Lahore, Pakistan. ²⁷²Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi, India. ²⁷³Center for Clinical Research and Prevention, Bispebjerg University Hospital, Frederiksberg, Denmark. ²⁷⁴Department of Forensic Medicine and Toxicology, Manipal Academy of Higher Education, Manipal, India. ²⁷⁵Department of Clinical Anatomy, Arba Minch University, Arba Minch, Ethiopia. ²⁷⁶Department of Pharmacology and Therapeutics, Khalifa University, Abu Dhabi, United Arab Emirates. ²⁷⁷Center of Innovation, Technology and Education (CITE), Anhembi Morumbi University, Sao Jose dos Campos, Brazil. ²⁷⁸Institute of Health Informatics, University College London, London, UK. ²⁷⁹Department of Pharmacology, Sir Seewoosagar Ramgoolam Medical College, Mauritius, Belle Rive, Mauritius. ²⁸⁰Department of Non-communicable Diseases, Bangladesh University of Health Sciences, Dhaka, Bangladesh. ²⁸¹Department of Anesthesiology, Adigrat University, Adigrat, Ethiopia. ²⁸²Miami Cancer Institute, Baptist Health South Florida, Miami, FL, USA. ²⁸³School of Psychology, University of Auckland, Auckland, New Zealand. ²⁸⁴Heidelberg Institute of Global Health (HIGH), Heidelberg University Hospital, Heidelberg, Germany. ²⁸⁵T.H. Chan School of Public Health, Harvard University, Boston, MA, USA. ²⁸⁶Department of Programs, Partnerships, Research and Education, International Diabetes Federation, São Paulo, Brazil. ²⁸⁷International Diabetes Federation, Brussels, Belgium. ²⁸⁸Department of Translational Medicine, University of Eastern Piedmont, Novara, Italy. ²⁸⁹Academic Unit of Obstetrics and Gynecology, University of Genoa, Genoa, Italy. ²⁹⁰Department of Public and Environmental Health, University of The Gambia, Brikama, The Gambia. ²⁹¹Epidemiology and Disease Control Unit, Ministry of Health, Kotu, The Gambia. ²⁹²Health Information Management, Shiraz University of Medical Sciences, Shiraz, Iran. ²⁹³Department of Community and Family Medicine, All India Institute of Medical Sciences, Jodhpur, India. ²⁹⁴Center for Primary Care, Harvard University, Boston, MA, USA. ²⁹⁵Department of Academics, Indian Institute of Public Health, Gurgaon, India. ²⁹⁶Faculty of Nursing, Philadelphia University, Amman, Jordan. ²⁹⁷Department of Psychiatry, University of Münster, Münster, Germany. ²⁹⁸Department of Psychiatry, Melbourne Medical School, Melbourne, VIC, Australia. ²⁹⁹School of Public Health, Dr. D. Y. Patil University, Mumbai, India. ³⁰⁰Jazan University, Jazan, Saudi Arabia. ³⁰¹Center of Research Excellence in Stillbirth, The University of Queensland, Brisbane, QLD, Australia. ³⁰²Health System and Population Studies Division, International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh. ³⁰³Department of Medicine, El Bosque University, Bogota, Colombia. ³⁰⁴Transplant Service, University Hospital Foundation Santa Fe de Bogotá, Bogotá, Colombia. ³⁰⁵College of Medicine and Health Science, Adigrat University, Adigrat, Ethiopia. ³⁰⁶Department of Reproductive Health, Dilla University, Dilla, Ethiopia. ³⁰⁷Department of Oral Pathology and Microbiology, Krishna Institute of Medical Sciences Deemed To Be University, Karad, India. ³⁰⁸School of the Environment, Yale University, New Haven, CT, USA. ³⁰⁹Biological Sciences Department, University of Porto, Porto, Portugal. ³¹⁰Research Unit on Applied Molecular Biosciences (UCIBIO), University of Porto, Porto, Portugal. ³¹¹Department of Industrial Engineering, Haliç University, İstanbul, Türkiye. ³¹²Nuffield Department of Population Health, University of Oxford, Oxford, UK. ³¹³Department of Internal Medicine, University of São Paulo, São Paulo, Brazil. ³¹⁴Department of Epidemiology and Health Promotion, New York University, New York, NY, USA. ³¹⁵School of Health Science, Bahir Dar University, Bahir Dar, Ethiopia. ³¹⁶Department of Medicine, Medical College of Georgia at Augusta University, Augusta, GA, USA. ³¹⁷Hubert Department of Global Health, Emory University, Atlanta, GA, USA. ³¹⁸Butte County Department of Public Health, Chico, CA, USA. ³¹⁹Department of Health, Human Performance and Recreation, University of Arkansas, Fayetteville, AR, USA. ³²⁰School of Nursing and Midwifery, Monash University, Clayton, VIC, Australia. ³²¹Public Health Research Laboratory, Tribhuvan University, Kathmandu, Nepal. ³²²Department of Anatomy, All India Institute of Medical Sciences, Jodhpur, India. ³²³School of Public Health, All India Institute of Medical Sciences, Jodhpur, India. ³²⁴Global Health Neurology Lab, NSW Brain Clot Bank, Sydney, NSW, Australia. ³²⁵Department of Neurology and Neurophysiology, South West Sydney Local Health District and Liverpool Hospital, Sydney, NSW, Australia. ³²⁶Department of General Medicine, Manipal Academy of Higher Education, Mangalore, India. ³²⁷Department of Internal Medicine, St. John's National Academy of Health Sciences, Bangalore, India. ³²⁸Global Health Division, Global Health Research and Medical Interventions for Development, Kathmandu, Nepal. ³²⁹Department of Clinical Research, London School of Hygiene and Tropical Medicine, London, UK. ³³⁰Department of Anatomy, Royal College of Surgeons in Ireland Medical University of Bahrain, Busaiteen, Bahrain. ³³¹Scientific-Tools, Bergamo, Italy. ³³²Department of Emergency Medicine, University of Colorado, Aurora, CO, USA. ³³³Department of Emergency Medicine, University of California San Francisco, San Francisco, CA, USA. ³³⁴Department of General Surgery and Medical-Surgical Specialties, University of Catania, Catania, Italy. ³³⁵Department of Public Health, Samara University, Samara, Ethiopia. ³³⁶Department of Neurology, Institute of Post-Graduate Medical Education and Research and Seth Sukhlal Karnani Memorial Hospital, Kolkata, India. ³³⁷University of Sydney, Sydney, NSW, Australia. ³³⁸Department of Biostatistics and Epidemiology, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. ³³⁹Wolfson Institute of Population Health, Queen Mary University of London, London, UK. ³⁴⁰Department of Pediatrics and Pediatric Infectious Diseases, I.M. Sechenov First Moscow State Medical University, Moscow, Russia. ³⁴¹Department of Health Policy Planning and Management, University of Health and Allied Sciences, Ho, Ghana. ³⁴²SAMRC/Wits Centre for Health Economics and Decision Science (PRICELESS SA), University of the Witwatersrand, Johannesburg, South Africa. ³⁴³Department of Biomedical Sciences, Arba Minch University, Arba Minch, Ethiopia. ³⁴⁴School of Business Administration, American University of Sharjah, Sharjah, United Arab Emirates. ³⁴⁵School of Pharmacy, Haramaya University, Harar, Ethiopia. ³⁴⁶Department of Internal Medicine, Manipal Academy of Higher Education, Mangalore, India. ³⁴⁷Clinical Research Unit, Centro de Investigação Interdisciplinar Egas Moniz (Egas Moniz Interdisciplinary Research Center), Almada, Portugal. ³⁴⁸Department of Medicine, University Ferhat Abbas of Sétif, Sétif, Algeria. ³⁴⁹Department of Epidemiology and Preventive Medicine, University Hospital Saadna Abdenour, Sétif, Algeria. ³⁵⁰Vision and Eye Research Institute, Anglia Ruskin University, Cambridge, UK. ³⁵¹University of Genoa, Genoa, Italy. ³⁵²Department of Epidemiology, University of Florida, Gainesville, FL, USA. ³⁵³Cancer Population Sciences Program, University of Florida Health Cancer Center, Gainesville, FL, USA. ³⁵⁴Department of Internal Medicine, Federal University of Minas Gerais, Belo Horizonte, Brazil. ³⁵⁵Psychiatry and Behavioral Health Department, Ohio State University, Columbus, OH, USA. ³⁵⁶Department of Psychology, Ohio State University, Columbus, OH, USA. ³⁵⁷Division of Clinical Epidemiology and Aging Research, German Cancer Research Center, Heidelberg, Germany. ³⁵⁸Department of Plastic and Reconstructive Surgery, University of Amsterdam, Amsterdam, Netherlands. ³⁵⁹Department of Epidemiology and Evidence-Based Medicine, I.M. Sechenov First Moscow State Medical University, Moscow, Russia. ³⁶⁰Department of Neuroscience, Institute for Scientific Research and High Technology Services, Panama, Panama. ³⁶¹Department of Infectious Diseases, Gorgas Memorial Institute for Health Studies, Panama, Panama. ³⁶²Department of Injury, The George Institute for Global Health, Newtown, NSW, Australia. ³⁶³Faculty of Medicine, University of New South Wales, Kensington, NSW, Australia. ³⁶⁴Department of Health Sciences, University of Leicester, Leicester, UK. ³⁶⁵Department of Psychiatry, University of São Paulo, São Paulo, Brazil. ³⁶⁶Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, VIC, Australia. ³⁶⁷Monash Department of Clinical Epidemiology, Cabrini Institute, Melbourne, VIC, Australia. ³⁶⁸Flinders Health and Medical Research Institute, Flinders University, Adelaide, SA, Australia. ³⁶⁹Department of Woman and Child Health and Public Health, Fondazione Policlinico Universitario A. Gemelli IRCCS (Agostino Gemelli University Polyclinic), Roma, Italy. ³⁷⁰Global Health Research Institute, Università Cattolica del Sacro Cuore (Catholic University of Sacred Heart), Roma, Italy. ³⁷¹Institute for Health Metrics and Evaluation, University of Washington, Seattle, WA, USA. ³⁷²Department of Health Metrics Sciences, School of Medicine, University of Washington, Seattle, WA, USA. ³⁷³Department of Community Medicine, Employee State Insurance Post Graduate Institute of Medical Sciences and Research, Bangalore, India. ³⁷⁴Faculty of Pharmacy, University of Central Punjab, Lahore, Pakistan. ³⁷⁵Department of Family and Community Medicine, King Abdulaziz University, Jeddah, Saudi Arabia. ³⁷⁶School of Public Health and Health Systems, University of Waterloo, Waterloo, ON, Canada. ³⁷⁷Al Shifa School of Public Health, Al Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

³⁷⁸Department of Sociology, University of Macau, Macau, China. ³⁷⁹Department of Clinical Pharmacy, University of Medicine and Pharmacy of Craiova, Craiova, Romania. ³⁸⁰Internal Medicine Department, Hospital Italiano de Buenos Aires (Italian Hospital of Buenos Aires), Buenos Aires, Argentina. ³⁸¹Board of Directors, Argentine Society of Medicine, Buenos Aires, Argentina. ³⁸²Center of Innovation, Anhembi Morumbi University, Sao Jose dos Campos, Brazil. ³⁸³College of Health Sciences, Abu Dhabi University, Abu Dhabi, United Arab Emirates. ³⁸⁴Dana-Farber Cancer Institute, Boston, MA, USA. ³⁸⁵School of Sciences, University of Minho, Braga, Portugal. ³⁸⁶Association of Licensed Optometry Professionals, Linda-a-Velha, Portugal. ³⁸⁷Institute for Cancer Research, Prevention and Clinical Network, Florence, Italy. ³⁸⁸IMPACT Strategic Research Center (the Institute for Mental and Physical Health and Clinical Translation), Deakin University, Geelong, VIC, Australia. ³⁸⁹Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal. ³⁹⁰Department of Medicine, University of Udine, Udine, Italy. ³⁹¹Department of Mental Health, Healthcare Agency "Friuli Occidentale", Pordenone, Italy. ³⁹²Department of Pharmacological and Biomolecular Sciences, Università degli Studi di Milano (University of Milan), Milan, Italy. ³⁹³MultiMedica, Istituto di Ricovero e Cura a Carattere Scientifico (IRCCS), Sesto San Giovanni, Italy. ³⁹⁴Department of Public Health and Infectious Diseases, La Sapienza University, Rome, Italy. ³⁹⁵Department of Physiology and Pharmacology, Karolinska Institute, Stockholm, Sweden. ³⁹⁶National Institute of Health Research Nottingham Biomedical Research Centre, University of Nottingham, Nottingham, UK. ³⁹⁷Department of Nutrition, Federal University of Santa Catarina, Florianópolis, Brazil. ³⁹⁸Mary MacKillop Institute for Health Research, Australian Catholic University, Melbourne, VIC, Australia. ³⁹⁹School of Public Health, University of Hong Kong, Hong Kong, China. ⁴⁰⁰School of Population and Public Health, University of British Columbia, Vancouver, BC, Canada. ⁴⁰¹Department of Anesthesiology and Perioperative Medicine, University of Rochester, Rochester, NY, USA. ⁴⁰²College of Medicine, National Taiwan University, Taipei, Taiwan. ⁴⁰³Department of Nursing, National Taiwan University Hospital, Taipei, Taiwan. ⁴⁰⁴Department of Clinical Pharmacy, University of Gondar, Gondar, Ethiopia. ⁴⁰⁵Department of Public Health, Erasmus University Medical Center, Rotterdam, Netherlands. ⁴⁰⁶Temerty Faculty of Medicine, University of Toronto, Toronto, ON, Canada. ⁴⁰⁷Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, India. ⁴⁰⁸Research Department, Dr. D. Y. Patil University, Pune, India. ⁴⁰⁹Department of Oral Medicine and Radiology, King George's Medical University, Lucknow, India. ⁴¹⁰Department of Oral Biological and Medical Sciences, University of British Columbia, Vancouver, BC, Canada. ⁴¹¹Division of Infectious Diseases, Washington University in St. Louis, St. Louis, MO, USA. ⁴¹²Iraq Field Epidemiology Training Program (I-FETP), Ministry of Health, Baghdad, Iraq. ⁴¹³Department of Clinical Oncology, Queen Elizabeth Hospital, Hong Kong, China. ⁴¹⁴The Nettersole School of Nursing, The Chinese University of Hong Kong, Hong Kong, China. ⁴¹⁵Chitkara College of Pharmacy, Chitkara University, Chandigarh, Punjab, India. ⁴¹⁶Department of Public Health, China Medical University, Taichung, Taiwan. ⁴¹⁷Department of Community Medicine, Datta Meghe Institute of Medical Sciences, Wardha, India. ⁴¹⁸School of Public Health, Curtin University, Perth, WA, Australia. ⁴¹⁹Department of Epidemiology and Preventative Medicine, Monash University, Melbourne, VIC, Australia. ⁴²⁰Florida International University, Florida International University, Miami, FL, USA. ⁴²¹Department of Epidemiology, University of Bern, Bern, Switzerland. ⁴²²Bispebjerg Hospital, University of Copenhagen, Copenhagen, Denmark. ⁴²³Department of Health Science and Technology, Aalborg University, Aalborg, Denmark. ⁴²⁴Department of Physiotherapy, University College of Northern Denmark, Aalborg, Denmark. ⁴²⁵Department of Pulmonary Medicine, Christian Medical College and Hospital (CMC), Vellore, India. ⁴²⁶Center for Biomedicine and Community Health, VNU-International School, Hanoi, Viet Nam. ⁴²⁷Department of Paediatric Surgery, Federal Medical Centre, Umuahia, Nigeria. ⁴²⁸Department of Health Informatics, University College London, London, UK. ⁴²⁹Health Data Research UK, London, UK. ⁴³⁰Department of Law, Economics, Management and Quantitative Methods, University of Sannio, Benevento, Italy. ⁴³¹Discipline of Psychiatry, University of Adelaide, Adelaide, SA, Australia. ⁴³²Department of Nutrition, Federal University of Minas Gerais, Belo Horizonte, Brazil. ⁴³³Nova Medical School, Nova University of Lisbon, Lisbon, Portugal. ⁴³⁴Institute of Neuroscience, National Research Council, Pisa, Italy. ⁴³⁵Department of Family Medicine and Public Health, University of California San Diego, La Jolla, CA, USA. ⁴³⁶Faculty of Medicine and Health, University of Sydney, Sydney, NSW, Australia. ⁴³⁷Global Alliance for Musculoskeletal Health, Sydney, NSW, Australia. ⁴³⁸Therapeutic and Diagnostic Technologies, Cooperativa de Ensino Superior Politécnico e Universitário (CESPU) (University Polytechnic Higher Education Cooperative), Gandra, Portugal. ⁴³⁹Institute for Research and Innovation in Health, University of Porto, Porto, Portugal. ⁴⁴⁰Section Global Health and Rehabilitation, Western Norway University of Applied Sciences, Bergen, Norway. ⁴⁴¹Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway. ⁴⁴²Faculty of Medicine, Eduardo Mondlane University, Maputo, Mozambique. ⁴⁴³IRCCS Istituto Ortopedico Galeazzi, Università degli Studi di Milano (University of Milan), Milan, Italy. ⁴⁴⁴Department of Dermatology, Case Western Reserve University, Cleveland, OH, USA. ⁴⁴⁵Walden University, Minneapolis, MN, USA. ⁴⁴⁶Division of Women and Child Health, Aga Khan University, Karachi, Pakistan. ⁴⁴⁷Department of Biochemistry, Ministry of Health and Welfare, New Delhi, India. ⁴⁴⁸Ophthalmology Department, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania. ⁴⁴⁹Ophthalmology Department, Emergency University Hospital Bucharest, Bucuresti, Romania. ⁴⁵⁰dummy2nd University Ophthalmology Department, Aristotle University of Thessaloniki, Thessaloniki, Greece. ⁴⁵¹Ophthalmology Department, University of Thessaly, Larissa, Greece. ⁴⁵²Department of Population and Development, Latin American Faculty of Social Sciences Mexico, Mexico City, Mexico. ⁴⁵³Health Research Institute, Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan. ⁴⁵⁴Department of Public Health, National University of Colombia, Bogota, Colombia. ⁴⁵⁵Academic Department of Pediatrics (DPUO), Bambino Gesù Children's Hospital, IRCCS, Rome, Italy. ⁴⁵⁶School of Public Health, Salale University, Fiche, Ethiopia. ⁴⁵⁷College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia. ⁴⁵⁸Department of Epidemiology and Community Medicine, Fasa University of Medical Sciences, Fasa, Iran. ⁴⁵⁹Public Health Department, Salale University, Fitcha, Ethiopia. ⁴⁶⁰Department of Dermatology, University of Colorado, Aurora, CO, USA. ⁴⁶¹Department of Dermatology Services, Department of Veterans Affairs, Aurora, CO, USA. ⁴⁶²Department of Neurosurgery, University of Edinburgh, Edinburgh, UK. ⁴⁶³Department of Neurosurgery, National Health Service (NHS) Scotland, Edinburgh, UK. ⁴⁶⁴Department of Midwifery, Arba Minch University, Arba Minch, Ethiopia. ⁴⁶⁵Center for Nutrition and Health Research, National Institute of Public Health, Cuernavaca, Mexico. ⁴⁶⁶Department of Biomedical Science, Jimma University, Jimma, Ethiopia. ⁴⁶⁷Department of Nursing, Mizan-Tepi University, Mizan-Aman, Ethiopia. ⁴⁶⁸St Paul's Eye Unit, Royal Liverpool University Hospital, Liverpool, UK. ⁴⁶⁹Department of Ophthalmology, Aristotle University of Thessaloniki, Thessaloniki, Greece. ⁴⁷⁰Graduate Medical Education, Gujarat Adani Institute of Medical Sciences, Bhuj, India. ⁴⁷¹Division of Cardiology, Atlanta Veterans Affairs Medical Center, Decatur, GA, USA. ⁴⁷²Department of Public Health, Madda Walabu University, Bale Goba, Ethiopia. ⁴⁷³Biochemistry Department, University of Gondar, Gondar, Ethiopia. ⁴⁷⁴Department of Surgical Nursing, University of Gondar, Gondar, Ethiopia. ⁴⁷⁵National Centre for AIDS and STD Control, Save the Children, Kathmandu, Nepal. ⁴⁷⁶Department of Global Public Health, Karolinska Institute, Stockholm, Sweden. ⁴⁷⁷Centre for Atmospheric Sciences, Indian Institute of Technology Delhi, New Delhi, India. ⁴⁷⁸Department of GI Surgery, Institute of Post-Graduate Medical Education and Research and Seth Sukhlal Karnani Memorial Hospital, Kolkata, India. ⁴⁷⁹Health Research Section, Nepal Health Research Council, Kathmandu, Nepal. ⁴⁸⁰Department of Pharmacy Practice, National Institute of Pharmaceutical Education and Research, Hajipur, India. ⁴⁸¹Department of Environmental Health, Harvard University, Boston, MA, USA. ⁴⁸²Toxicology Research Unit (TOXRUN), Cooperativa de Ensino Superior Politécnico e Universitário (CESPU) (University Polytechnic Higher Education Cooperative), Gandra, Portugal. ⁴⁸³Department of Comprehensive Nursing, Arba Minch University, Arba Minch, Ethiopia. ⁴⁸⁴Department of Human Physiology, University of Gondar, Gondar, Ethiopia. ⁴⁸⁵Department of Physiology, All India Institute of Medical Sciences, Jodhpur, India. ⁴⁸⁶Development of Research and Technology Center, Ministry of Health and Medical Education, Tehran, Iran. ⁴⁸⁷School of Health, Guilan University of Medical Sciences, Rasht, Iran. ⁴⁸⁸Department of Community Nutrition, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁴⁸⁹School of Medicine, Iran University of

Medical Sciences, Tehran, Iran. ⁴⁹⁰Neurology Department, Alexandria University, Alexandria, Egypt. ⁴⁹¹School of Nursing and Midwifery, University of Cape Coast, Cape Coast, Ghana. ⁴⁹²Health Science Center, University of Texas, Houston, TX, USA. ⁴⁹³Department of Medical Laboratory Sciences, Iran University of Medical Sciences, Tehran, Iran. ⁴⁹⁴Responsabilidade Social, Oswaldo Cruz German Hospital, São Paulo, Brazil. ⁴⁹⁵Brazilian Centre for Evidence-based Healthcare, Joanna Briggs Institute, São Paulo, Brazil. ⁴⁹⁶Department of Cardiology, St. Joseph's University Medical Center, Paterson, NJ, USA. ⁴⁹⁷Department of Health Policy and Management, Tabriz University of Medical Sciences, Tabriz, Iran. ⁴⁹⁸Department of Population Health Sciences, King's College London, London, UK. ⁴⁹⁹Department of Forensic Medicine and Toxicology, Manipal Academy of Higher Education, Mangalore, India. ⁵⁰⁰Department of Forensic Medicine and Toxicology, Kasturba Medical College Mangalore, Mangalore, India. ⁵⁰¹Office of Institutional Analysis, University of Windsor, Windsor, ON, Canada. ⁵⁰²School of Medicine, Federal University of Bahia, Salvador, Brazil. ⁵⁰³Department of Internal Medicine, Escola Bahiana de Medicina e Saúde Pública (Bahiana School of Medicine and Public Health), Salvador, Brazil. ⁵⁰⁴Department of Infection and Tropical Medicine, University of Sheffield, Sheffield, UK. ⁵⁰⁵School of Health Sciences, Universiti Sains Malaysia (University of Science Malaysia), Kubang Kerian, Malaysia. ⁵⁰⁶Department of Nursing, Umeå University, Umeå, Sweden. ⁵⁰⁷College of Science, Health and Engineering, La Trobe University, Bundoora, VIC, Australia. ⁵⁰⁸Department of Community Health Nursing, Universitas Airlangga (Airlangga University), Surabaya, Indonesia. ⁵⁰⁹National Institute for Health Research, Tehran University of Medical Sciences, Tehran, Iran. ⁵¹⁰Department of Orthodontics, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. ⁵¹¹Department of Epidemiology and Medical Statistics, University of Ibadan, Ibadan, Nigeria. ⁵¹²Faculty of Public Health, University of Ibadan, Ibadan, Nigeria. ⁵¹³Department of Biological Sciences, University of Medical Sciences, Ondo, Ondo, Nigeria. ⁵¹⁴Biomedical Informatics and Medical Statistics Department, Alexandria University, Alexandria, Egypt. ⁵¹⁵Pediatric Dentistry and Dental Public Health Department, Alexandria University, Alexandria, Egypt. ⁵¹⁶Direction de L'épidémiologie et la Lutte Contre les Maladies (Directorate of Epidemiology and Diseases Control), Ministry of Health, Rabat, Morocco. ⁵¹⁷Department of Food Science and Nutrition, Arsi University, Asella, Ethiopia. ⁵¹⁸Center for Food Science and Nutrition, Addis Ababa University, Addis Ababa, Ethiopia. ⁵¹⁹School of Population and Global Health, McGill University, Montreal, QC, Canada. ⁵²⁰Division of Cardiology, Massachusetts General Hospital, Boston, MA, USA. ⁵²¹Division of Cardiology, Harvard University, Boston, MA, USA. ⁵²²Department of Internal Medicine and Hematology Unit, Ain Shams University, Cairo, Egypt. ⁵²³Section of Adult Hematology, King Saud University, Riyadh, Saudi Arabia. ⁵²⁴Neurophysiology Department, Cairo University, Cairo, Egypt. ⁵²⁵Faculty of Medicine, University of Tripoli, Tripoli, Libya. ⁵²⁶Egypt Center for Research and Regenerative Medicine (ECRRM), Cairo, Egypt. ⁵²⁷Lincoln International Institute for Rural Health, University of Lincoln, Lincoln, UK. ⁵²⁸Department of International Cyber Education, Mongolian National University of Medical Sciences, Ulaanbaatar, Mongolia. ⁵²⁹Department of Paediatrics, University of Lagos, Lagos, Nigeria. ⁵³⁰Department of Paediatrics, Lagos University Teaching Hospital, Lagos, Nigeria. ⁵³¹Preventive Medicine and Public Health Research Center, Iran University of Medical Sciences, Tehran, Iran. ⁵³²Multiple Sclerosis Research Center, Tehran University of Medical Sciences, Tehran, Iran. ⁵³³Department of Obesity, Diabetes and Cardiovascular risk, National Institute of Public Health, Cuernavaca, Mexico. ⁵³⁴Dipartimento di Scienze Biomediche e Neuromotorie, University of Bologna, Bologna, Italy. ⁵³⁵Department of Internal Medicine, Yale University, New Haven, CT, USA. ⁵³⁶Department of Pediatrics and Child Health Nursing, Wollega University, Nekemte, Ethiopia. ⁵³⁷Department of Virology, Pasteur Institute of Morocco, Casablanca, Morocco. ⁵³⁸Institute of Applied Health Sciences, University of Aberdeen, Aberdeen, UK. ⁵³⁹Interdisciplinary Neuroscience Research Program, Tehran University of Medical Sciences, Tehran, Iran. ⁵⁴⁰Epidemiology and Biostatistics Unit, National Cancer Institute IRCCS Fondazione G. Pascale, Naples, Italy. ⁵⁴¹Department of Biomedical and Biotechnological Sciences, University of Catania, Catania, Italy. ⁵⁴²Department of Health Policy and Administration, University of the Philippines Manila, Manila, Philippines. ⁵⁴³Department of Occupational Health and Safety, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁵⁴⁴Dissemination Division, National Institute of Statistics, Lisbon, Portugal. ⁵⁴⁵Activity Planning and Control Unit, Directorate-General of Health (DGS), Lisbon, Portugal. ⁵⁴⁶Department of Psychology, Federal University of Sergipe, São Cristóvão, Brazil. ⁵⁴⁷Department of Nutrition and Dietetics, National University of Medical Sciences (NUMS), Rawalpindi, Pakistan. ⁵⁴⁸Department of Clinical Psychology, University of Dhaka, Dhaka, Bangladesh. ⁵⁴⁹Community-Based Inclusive Mental Health Department, Centre for Disability in Development (CDD), Bangladesh, Dhaka, Bangladesh. ⁵⁵⁰Satcher Health Leadership Institute, Morehouse School of Medicine, Atlanta, GA, USA. ⁵⁵¹School of Medicine, Emory University, Atlanta, GA, USA. ⁵⁵²Clinical Trials Office, Emory University, Atlanta, GA, USA. ⁵⁵³Rollins School of Public Health, Emory University, Atlanta, GA, USA. ⁵⁵⁴Department of Environmental Health Engineering, Isfahan University of Medical Sciences, Isfahan, Iran. ⁵⁵⁵Research Center for Environmental Determinants of Health, Kermanshah University of Medical Sciences, Kermanshah, Iran. ⁵⁵⁶Torrens University Australia, Adelaide, SA, Australia. ⁵⁵⁷Institute of Resource Governance and Social Change, Kupang, Indonesia. ⁵⁵⁸National Institute for Stroke and Applied Neurosciences, Auckland University of Technology, Auckland, New Zealand. ⁵⁵⁹Research Center of Neurology, Moscow, Russia. ⁵⁶⁰School of Pharmacy, The Chinese University of Hong Kong, Hong Kong, China. ⁵⁶¹Department of Pharmacy, Wollega University, Nekemte, Ethiopia. ⁵⁶²School of Population Health, University of New South Wales, Sydney, NSW, Australia. ⁵⁶³National Institute of Environmental Health, Chinese Center for Disease Control and Prevention, Beijing, China. ⁵⁶⁴Division of Neurology, University of Ottawa, Ottawa, ON, Canada. ⁵⁶⁵<city>, USA. ⁵⁶⁶Research Center on Public Health, University of Milan Bicocca, Monza, Italy. ⁵⁶⁷Department of Health Sciences (DISSAL), University of Genoa, Genoa, Italy. ⁵⁶⁸Academic Unit of Obstetrics and Gynecology, IRCCS Ospedale Policlinico San Martino, Genoa, Italy. ⁵⁶⁹Department of Nursing, Wollega University, Nekemte, Ethiopia. ⁵⁷⁰Institute of Health Sciences, Wollega University, Nekemte, Ethiopia. ⁵⁷¹Psychiatry Department, Kaiser Permanente, Fontana, CA, USA. ⁵⁷²School of Health Sciences, A.T. Still University, Mesa, AZ, USA. ⁵⁷³Institute of Public Health, Charité Universitätsmedizin Berlin (Charité Medical University Berlin), Berlin, Germany. ⁵⁷⁴School of Social Sciences, Stretton Health Equity, Adelaide, SA, Australia. ⁵⁷⁵Center for Research in Indigenous Health, Maya Health Alliance, Tecpán, Guatemala. ⁵⁷⁶Department of Internal Medicine, University of Michigan, Ann Arbor, MI, USA. ⁵⁷⁷Department of Child Dental Health, Ile-Ife, Nigeria. ⁵⁷⁸Department of Clinical Science, Nigerian Institute of Medical Research, Yaba, Nigeria. ⁵⁷⁹Department of Neurology, University of Lisbon, Lisbon, Portugal. ⁵⁸⁰Neurology Department, Hospital de Santa Maria, Lisbon, Portugal. ⁵⁸¹Neurology, Public Health, Disability Unit, Beijing Neurosurgical Institute, Milano, Italy. ⁵⁸²Department of Pharmacology, Iranshahr University of Medical Sciences, Iranshahr, Iran. ⁵⁸³Child Survival Unit, Centre for African Newborn Health and Nutrition, Ibadan, Nigeria. ⁵⁸⁴Department of Community Medicine, Information and Health Decision Sciences, University of Porto, Porto, Portugal. ⁵⁸⁵Center for Health Technology and Services Research (CINTESIS), Porto, Portugal. ⁵⁸⁶Associated Laboratory for Green Chemistry (LAQV), University of Porto, Porto, Portugal. ⁵⁸⁷School of Global Public Health, New York University, New York, NY, USA. ⁵⁸⁸Department of Dermatology, Kobe University, Kobe, Japan. ⁵⁸⁹Health Services Management Training Centre, Semmelweis University, Budapest, Hungary. ⁵⁹⁰Department of Applied Social Sciences, Sapientia Hungarian University of Transylvania, Târgu-Mureș, Romania. ⁵⁹¹Community Medicine Department, Bayero University, Kano, Kano, Nigeria. ⁵⁹²Department of Community Medicine, Aminu Kano Teaching Hospital, Kano, Nigeria. ⁵⁹³Food Technology Department, Salahaddin University-Erbil, Erbil, Iraq. ⁵⁹⁴Department of Nutrition and Dietetics, Cihan University-Erbil, Erbil, Iraq. ⁵⁹⁵Faculty of Paramedical, Lorestan University of Medical Sciences, Khorramabad, Iran. ⁵⁹⁶Department of Environmental Health Sciences, Mario Negri Institute for Pharmacological Research, Milan, Italy. ⁵⁹⁷School of Global Health, Institute of Health and Management, Melbourne, VIC, Australia. ⁵⁹⁸Department of Occupational Therapy, Mahatma Gandhi Occupational Therapy College, Jaipur, India. ⁵⁹⁹Faculty of Business and Management, Universidad Autónoma de Chile (Autonomous University of Chile), Talca, Chile. ⁶⁰⁰Department of Obstetrics and Gynecology, All India Institute of Medical Sciences, Bathinda, India. ⁶⁰¹National Health Service, London, UK. ⁶⁰²Pension Research Subcommittee, Institute and Faculty of Actuaries, London, UK. ⁶⁰³Department of Epidemiology, Florida

International University, Miami, FL, USA. ⁶⁰⁴Department of Environmental Health, Wollo University, Dessie, Ethiopia. ⁶⁰⁵Department of Nursing, Mekelle University, Mekelle, Ethiopia. ⁶⁰⁶Discipline of Population Health, Flinders University, Adelaide, SA, Australia. ⁶⁰⁷Department of Reproductive Health, Aksum University, Aksum, Ethiopia. ⁶⁰⁸Department of Public Health, Salale University, Fitcha, Ethiopia. ⁶⁰⁹Department of Public Health, Jimma University, Jimma, Ethiopia. ⁶¹⁰Department of Public Health, Debre Berhan University, Debre Berhan, Ethiopia. ⁶¹¹School of Nursing and Midwifery, Haramaya University, Harar, Ethiopia. ⁶¹²Infectious Disease Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran. ⁶¹³Pediatric Department, Kermanshah University of Medical Sciences, Kermanshah, Iran. ⁶¹⁴Department of Neurosurgery, Shiraz University of Medical Sciences, Shiraz, Iran. ⁶¹⁵Department of Medical Surgical Nursing, Tabriz University of Medical Sciences, Tabriz, Iran. ⁶¹⁶Health Policy Research Center, Shiraz University of Medical Sciences, Shiraz, Iran. ⁶¹⁷Department of Environmental Health Engineering, Qazvin University of Medical Sciences, Qazvin, Iran. ⁶¹⁸E-Learning Center, Mashhad University of Medical Sciences, Mashhad, Iran. ⁶¹⁹School of Public Health, Qazvin University of Medical Sciences, Qazvin, Iran. ⁶²⁰Neuroradiology Division, Johns Hopkins University, Baltimore, MD, USA. ⁶²¹Sina Trauma and Surgery Research Center, Tehran University of Medical Sciences, Tehran, Iran. ⁶²²Department of Midwifery, Islamic Azad University, Tuyserkan, Iran. ⁶²³Cancer Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁶²⁴Department of Epidemiology and Biostatistics, Neyshabur University of Medical Sciences, Neyshabur, Iran. ⁶²⁵Non-Communicable Diseases Research Center, Neyshabur University of Medical Sciences, Neyshabur, Iran. ⁶²⁶Department of Radiology, University of Southern California, Los Angeles, CA, USA. ⁶²⁷Department of Public Health, University of Muhammadiyah Kalimantan Timur, Samarinda, Indonesia. ⁶²⁸Department of Radiology, Mayo Clinic, Rochester, MN, USA. ⁶²⁹Adelaide Medical School, University of Adelaide, Adelaide, SA, Australia. ⁶³⁰Discipline of Public Health Medicine, University of KwaZulu-Natal, Durban, South Africa. ⁶³¹NIHR Global Health Research Unit on Global Surgery, University of Birmingham, Birmingham, UK. ⁶³²Department of Cardiac Surgery, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates. ⁶³³Lerner College of Medicine, Case Western Reserve University, Cleveland, USA. ⁶³⁴Department of Hepatology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India. ⁶³⁵Health Systems and Policy Research Department, Indian Institute of Public Health, Gandhinagar, India. ⁶³⁶Department of Genetics, Sana Institute of Higher Education, Sari, Iran. ⁶³⁷Department of Biomedical and Neuromotor Sciences, University of Bologna, Bologna, Italy. ⁶³⁸Department of Chemistry, University of Porto, Porto, Portugal. ⁶³⁹Hudson College of Public Health, University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA. ⁶⁴⁰Department of Health and Social Affairs, Government of the Federated States of Micronesia, Palikir, Federated States of Micronesia. ⁶⁴¹Oncological Network, Prevention and Research Institute, Institute for Cancer Research, Prevention and Clinical Network, Florence, Italy. ⁶⁴²Department of Respiratory Medicine, Hokkaido University, Sapporo, Japan. ⁶⁴³Center for Environmental and Health Sciences, Hokkaido University, Sapporo, Japan. ⁶⁴⁴Center for Clinical and Epidemiological Research, University of São Paulo, São Paulo, Brazil. ⁶⁴⁵Postgraduate Program in Epidemiology, Federal University of Rio Grande do Sul, Porto Alegre, Brazil. ⁶⁴⁶College of Medicine and Health Sciences, United Arab Emirates University, Al Ain, United Arab Emirates. ⁶⁴⁷Department of Public Health and Preventive Medicine, Charles University, Prague, Czech Republic. ⁶⁴⁸Department of Pharmacy Systems, Outcomes, and Policy, University of Illinois at Chicago, Chicago, IL, USA. ⁶⁴⁹Department of Health Informatics, Bahir Dar University, Bahir Dar, Ethiopia. ⁶⁵⁰Department of Family and Community Medicine, University Of Sulaimani, Sulaimani, Iraq. ⁶⁵¹Department of Anesthesia, Madda Walabu University, Goba, Ethiopia. ⁶⁵²Harrington Heart and Vascular Institute, Case Western Reserve University, Cleveland, OH, USA. ⁶⁵³Division of Cardiovascular Medicine, Ohio State University, Columbus, OH, USA. ⁶⁵⁴Faculty of Nursing, Federal University of Goiás, Goiânia, Brazil. ⁶⁵⁵Department of Public Health, Torrens University Australia, Melbourne, VIC, Australia. ⁶⁵⁶Department of Preventive Cardiology, Eternal Heart Care Centre and Research Institute, Jaipur, India. ⁶⁵⁷Department of Medicine, Mahatma Gandhi University Medical Sciences, Jaipur, India. ⁶⁵⁸Toxicology Department, Shriram Institute for Industrial Research, Delhi, India. ⁶⁵⁹School of Medicine, Deakin University, Geelong, VIC, Australia. ⁶⁶⁰Biorefining and Advanced Materials Research Center, Scotland's Rural College (SRUC), Edinburgh, UK. ⁶⁶¹Faculty of Medicine Health and Human Sciences, Macquarie University, Sydney, NSW, Australia. ⁶⁶²Department of Midwifery, Dire Dawa University, Dire Dawa, Ethiopia. ⁶⁶³School of Medicine "Alberto Hurtado", Cayetano Heredia University, Lima, Peru. ⁶⁶⁴Department of Psychology, Norwegian University of Science and Technology, Trondheim, Norway. ⁶⁶⁵Department of Health Psychology, Iran University of Medical Sciences, Tehran, Iran. ⁶⁶⁶School of Medicine, University of Maryland, Baltimore, MD, USA. ⁶⁶⁷Department of Clinical Neurological Sciences, The University of Western Ontario, London, ON, Canada. ⁶⁶⁸Lawson Health Research Institute, London, ON, Canada. ⁶⁶⁹Department of Health in Emergencies and Disasters, Tehran University of Medical Sciences, Tehran, Iran. ⁶⁷⁰Department of Radiology and Radiological Science, Johns Hopkins University, Baltimore, MD, USA. ⁶⁷¹School of Medicine, Tehran University of Medical Sciences, Tehran, Iran. ⁶⁷²Heart, Vascular and Thoracic Institute, Cleveland Clinic, Cleveland, OH, USA. ⁶⁷³Department of Radiology, Massachusetts General Hospital, Boston, MA, USA. ⁶⁷⁴Obesity Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁶⁷⁵College of Dentistry, Jazan University, Jazan, Saudi Arabia. ⁶⁷⁶School of Dentistry, Sana'a University, Sana'a, Yemen. ⁶⁷⁷Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁶⁷⁸NYU Shanghai, Shanghai, China. ⁶⁷⁹College of Medicine, University of Sharjah, Sharjah, United Arab Emirates. ⁶⁸⁰Department of Family and Community Medicine, Arabian Gulf University, Manama, Bahrain. ⁶⁸¹School of Public Health, Haramaya University, Harar, Ethiopia. ⁶⁸²School of Health and Environmental Studies, Hamdan Bin Mohammed Smart University, Dubai, United Arab Emirates. ⁶⁸³Faculty of Health, Southern Cross University, Bilinga, QLD, Australia. ⁶⁸⁴Medical School, University of Western Australia, Perth, WA, Australia. ⁶⁸⁵Perron Institute for Neurological and Translational Science, Perth, WA, Australia. ⁶⁸⁶Department of Biochemistry and Molecular Biology, Bangladesh Agricultural University, Mymensingh, Bangladesh. ⁶⁸⁷Department of Anatomy, Dongguk University, Gyeongju, South Korea. ⁶⁸⁸Department of Population Science and Human Resource Development, University of Rajshahi, Rajshahi, Bangladesh. ⁶⁸⁹Medical Research Unit, Universitas Syiah Kuala (Syiah Kuala University), Banda Aceh, Indonesia. ⁶⁹⁰Department of Dental Public Health, Universitas Airlangga (Airlangga University), Surabaya, Indonesia. ⁶⁹¹Australian Research Centre for Population Oral Health, University of Adelaide, Adelaide, SA, Australia. ⁶⁹²Research Unit, University of Barcelona, Barcelona, Spain. ⁶⁹³Biomedical Research Networking Center for Mental Health Network (CiberSAM), Barcelona, Spain. ⁶⁹⁴Department of Nursing, Arak University of Medical Sciences, Arak, Iran. ⁶⁹⁵Sekolah Tinggi Ilmu Kesehatan Indonesia Maju (Indonesian Advanced College of Health Sciences), Institution of Public Health Sciences, Jakarta, Indonesia. ⁶⁹⁶Department of Zoology and Entomology, Al Azhar University, Cairo, Egypt. ⁶⁹⁷Department of Nursing, Taipei Medical University, Taipei, Taiwan. ⁶⁹⁸Department of Human Centred Computing, Monash University, Melbourne, VIC, Australia. ⁶⁹⁹Institute for Social Science Research, The University of Queensland, Indooroopilly, QLD, Australia. ⁷⁰⁰ARC Centre of Excellence for Children and Families over the Life Course, The University of Queensland, Indooroopilly, QLD, Australia. ⁷⁰¹Department of Ophthalmology, Iran University of Medical Sciences, Karaj, Iran. ⁷⁰²Department of Plastic Surgery, University of Texas, Houston, TX, USA. ⁷⁰³Department of Neurology, Cairo University, Cairo, Egypt. ⁷⁰⁴Center for International Health (CIH), University of Bergen, Bergen, Norway. ⁷⁰⁵Bergen Center for Ethics and Priority Setting (BCEPS), University of Bergen, Bergen, Norway. ⁷⁰⁶Chapter of Addiction Medicine, University of Sydney, Sydney, NSW, Australia. ⁷⁰⁷Gastrointestinal and Liver Diseases Research Center, Guilan University of Medical Sciences, Rasht, Iran. ⁷⁰⁸Caspian Digestive Disease Research Center, Guilan University of Medical Sciences, Rasht, Iran. ⁷⁰⁹School of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran. ⁷¹⁰Independent Consultant, Tabriz, Iran. ⁷¹¹Skaane University Hospital, Skaane County Council, Malmö, Sweden. ⁷¹²Institute of Pharmaceutical Sciences, University of Veterinary and Animal Sciences, Lahore, Pakistan. ⁷¹³Department of Pharmacy Administration and Clinical Pharmacy, Xian Jiaotong University, Xian, China. ⁷¹⁴Faculty of Kinesiology, University of New Brunswick, Fredericton, NB, Canada. ⁷¹⁵School of Psychology and Exercise Science, Murdoch University, Murdoch, WA, Australia.

⁷¹⁶Department of Neuropsychiatric Epidemiology, University of Gothenburg, Gothenburg, Sweden. ⁷¹⁷Department of Statistics, Statistikkonsulterna, Sweden, United Arab Emirates. ⁷¹⁸Community-Oriented Nursing Midwifery Research Center, Shahrekord University of Medical Sciences, Shahrekord, Iran. ⁷¹⁹Tehran University of Medical Sciences, Tehran, Iran. ⁷²⁰Departamento de Salud Oral (Department of Oral Health), Universidad Autónoma de Manizales (Autonomous University of Manizales), Manizales, Colombia. ⁷²¹Department of Public Health, Madda Walabu University, Robe, Ethiopia. ⁷²²Department of Microbiology, Taiz University, Taiz, Yemen. ⁷²³School of Medicine, Nankai University, Tianjin, China. ⁷²⁴Division for Health Service Promotion, University of Tokyo, Tokyo, Japan. ⁷²⁵Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, India. ⁷²⁶Department of Pulmonology, Yokohama City University, Yokohama, Japan. ⁷²⁷National Human Genome Research Institute (NHGRI), National Institutes of Health, Bethesda, MD, USA. ⁷²⁸Social and Environmental Health Research, Nature Study Society of Bangladesh, Khulna, Bangladesh. ⁷²⁹Department of Health Promotion and Community Health Sciences, Texas A&M University, College Station, TX, USA. ⁷³⁰Department of Behavioural Science and Health, University College London, London, UK. ⁷³¹Department of Public Health and Informatics, Jahangirnagar University, Dhaka, Bangladesh. ⁷³²Institute of Research and Development, Duy Tan University, Da Nang, Viet Nam. ⁷³³Department of Computer Science, University of Human Development, Sulaymaniyah, Iraq. ⁷³⁴Internal Medicine Department, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania. ⁷³⁵Department of Legal Medicine and Bioethics, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania. ⁷³⁶Clinical Legal Medicine Department, National Institute of Legal Medicine Mina Minovici, Bucharest, Romania. ⁷³⁷Burn Research Center, Shahid Motahari Hospital, Tehran, Iran. ⁷³⁸Faculty of Medicine of Tunis, University Tunis El Manar, Tunis, Tunisia. ⁷³⁹Department of Outpatient Rehabilitation, Southcoast Health: Tobey Hospital, Wareham, MA, USA. ⁷⁴⁰Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong, Hong Kong, China. ⁷⁴¹Department of Mathematical Sciences, Royal Melbourne Institute of Technology (RMIT) University, Melbourne, VIC, Australia. ⁷⁴²School of Mathematical and Physical Sciences, University of Newcastle, Newcastle, NSW, Australia. ⁷⁴³Czech National Centre for Evidence-Based Healthcare and Knowledge Translation, Masaryk University, Brno, Czech Republic. ⁷⁴⁴Institute of Biostatistics and Analyses, Masaryk University, Brno, Czech Republic. ⁷⁴⁵Tephinet USA, Field Epidemiology and Laboratory Training Program Pakistan, Islamabad, Pakistan. ⁷⁴⁶Division of Field Epidemiology, National Institute of Health, Islamabad, Pakistan. ⁷⁴⁷Department of Biomolecular Sciences, University of Zakho, Zakho, Iraq. ⁷⁴⁸Department of Public Health, Wollo University, Dessie, Ethiopia. ⁷⁴⁹Department of Occupational Safety and Health, China Medical University, Taichung, Taiwan. ⁷⁵⁰Department of Occupational Therapy, Asia University, Taichung, Taiwan. ⁷⁵¹Department of Health Promotion and Education, University of Ibadan, Ibadan, Nigeria. ⁷⁵²Department of Community Medicine, University College Hospital, Ibadan, Ibadan, Nigeria. ⁷⁵³Faculty of Medicine, University of Belgrade, Belgrade, Serbia. ⁷⁵⁴Department of Epidemiology, University of Kragujevac, Kragujevac, Serbia. ⁷⁵⁵Department of Health Research, ICMR National Institute for Research in Tuberculosis, Chennai, India. ⁷⁵⁶Faculty of Pharmacy, University of Ahmad Dahlan, Yogyakarta, Indonesia. ⁷⁵⁷Department of Population Sciences, University of Dhaka, Dhaka, Bangladesh. ⁷⁵⁸School of Public Health and Community Medicine, University of New South Wales, Sydney, NSW, Australia. ⁷⁵⁹Institute for Physical Activity and Nutrition, Deakin University, Burwood, VIC, Australia. ⁷⁶⁰Sydney Medical School, University of Sydney, Sydney, NSW, Australia. ⁷⁶¹Surveillance and Health Services Research, American Cancer Society, Atlanta, GA, USA. ⁷⁶²Department of Clinical Pharmacy and Pharmacy Practice, Asian Institute of Medicine, Science and Technology, Kedah, Malaysia. ⁷⁶³Malaysian Academy of Pharmacy, Puchong, Malaysia. ⁷⁶⁴Public Health Department of Social Medicine, Osaka University, Suita, Japan. ⁷⁶⁵Centre for Health Services and Policy Research, University of British Columbia, Vancouver, BC, Canada. ⁷⁶⁶Department of Health Services Research, University of Tsukuba, Tsukuba, Japan. ⁷⁶⁷Department of Non-Communicable Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK. ⁷⁶⁸School of Health Systems and Public Health, University of Pretoria, Pretoria, South Africa. ⁷⁶⁹Department of Global Health, South African Medical Research Council, Cape Town, South Africa. ⁷⁷⁰Department of Global Health, Stellenbosch University, Cape Town, South Africa. ⁷⁷¹Knowledge Translation Program, Centre for Health Evaluation and Outcome Sciences, Vancouver, BC, Canada. ⁷⁷²Department of Orthodontics and Dentofacial Orthopedics, Dr. D. Y. Patil University, Pune, India. ⁷⁷³Department of Environmental Health Engineering, Guilan University of Medical Sciences, Rasht, Iran. ⁷⁷⁴Research and Development Unit, Biomedical Research Networking Center for Mental Health Network (CiberSAM), Sant Boi de Llobregat, Spain. ⁷⁷⁵Faculty of Medicine, University of Versailles Saint-Quentin-en-Yvelines, Montigny-le Bretonneux, France. ⁷⁷⁶Department of Immunology, Tabriz University of Medical Sciences, Tabriz, Iran. ⁷⁷⁷College of Medicine and Medical Sciences, Arabian Gulf University, Manama, Bahrain. ⁷⁷⁸Ministry of Health, Ministry of Health, Manama, Bahrain. ⁷⁷⁹Non-Communicable Disease Department, National Health Mission, Lucknow, India. ⁷⁸⁰Department of Medicine, Mahavir Sikshan Sansthan, Kanpur, India. ⁷⁸¹Institute of Advanced Manufacturing Technologies, Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia. ⁷⁸²Institute of Comparative Economic Studies, Hosei University, Tokyo, Japan. ⁷⁸³Division of Pulmonary Medicine, Lausanne University Hospital (CHUV), Lausanne, Switzerland. ⁷⁸⁴Department of Internal Medicine, Harvard University, Cambridge, MA, USA. ⁷⁸⁵Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher Education, Manipal, India. ⁷⁸⁶Health Informatic Lab, Boston University, Boston, MA, USA. ⁷⁸⁷Department of Public Health, M S Ramaiah University of Applied Sciences, Bangalore, India. ⁷⁸⁸Community Health Sciences Department, University of Manitoba, Winnipeg, MB, Canada. ⁷⁸⁹Centre of Studies and Research, Ministry of Health, Muscat, Oman. ⁷⁹⁰Postgraduate Institute of Medicine, University of Colombo, Colombo, Sri Lanka. ⁷⁹¹Department of Surgery, National Hospital, Colombo, Sri Lanka. ⁷⁹²Department of Biochemistry, Government Medical College, Mysuru, India. ⁷⁹³Urology Department, University of Florida, Jacksonville, FL, USA. ⁷⁹⁴Caring Futures Institute, Flinders University, Adelaide, SA, Australia. ⁷⁹⁵Interdisciplinary School of Health sciences, Savitribai Phule Pune University, Pune, India. ⁷⁹⁶Food Evolution Research Laboratory, College of Business and Economics School of Tourism and Hospitality Management, Johannesburg, South Africa. ⁷⁹⁷The George Institute for Global Health, New Delhi, India. ⁷⁹⁸Manipal Academy of Higher Education, Manipal, India. ⁷⁹⁹Vanke School of Public Health, Tsinghua University, Beijing, China. ⁸⁰⁰Department of Mathematics, University of Manchester, Manchester, UK. ⁸⁰¹Institute of Molecular and Clinical Ophthalmology Basel, Basel, Switzerland. ⁸⁰²Department of Ophthalmology, Heidelberg University, Mannheim, Germany. ⁸⁰³Hungarian Health Management Association, Budapest, Hungary. ⁸⁰⁴Department of Gastroenterology and Hepatology, Stanford University, Stanford, CA, USA. ⁸⁰⁵Department of Community Medicine, Manipal Academy of Higher Education, Mangalore, India. ⁸⁰⁶National Institute of Epidemiology, Indian Council of Medical Research, Chennai, India. ⁸⁰⁷Department of Family Medicine and Public Health, University of Opole, Opole, Poland. ⁸⁰⁸Institute of Family Medicine and Public Health, University of Tartu, Tartu, Estonia. ⁸⁰⁹Health Economics Unit, Flinders University, Adelaide, SA, Australia. ⁸¹⁰College of Medicine and Public Health, Flinders University, Adelaide, SA, Australia. ⁸¹¹Minimally Invasive Surgery Research Center, Iran University of Medical Sciences, Tehran, Iran. ⁸¹²School of Public Health, University College Cork, Cork, Ireland. ⁸¹³Department of Oral and Maxillofacial Pathology, Krishna Institute of Medical Sciences Deemed to be University, Karad, India. ⁸¹⁴Department of Statistics, Salahaddin University, Erbil, Iraq. ⁸¹⁵Independent Consultant, Pune, India. ⁸¹⁶Department of Neurology, University of Washington, Seattle, WA, USA. ⁸¹⁷Social Determinants of Health Research Center, Gonabad University of Medical Sciences, Gonabad, Iran. ⁸¹⁸School of Management and Medical Informatics, Tabriz University of Medical Sciences, Tabriz, Iran. ⁸¹⁹Institute for Prevention of Non-communicable Diseases, Qazvin University of Medical Sciences, Qazvin, Iran. ⁸²⁰Health Services Management Department, Qazvin University of Medical Sciences, Qazvin, Iran. ⁸²¹Dermatology Department, King Faisal University, Hofuf, Saudi Arabia. ⁸²²Division of Epidemiology and Biostatistics, National Institute of Epidemiology, Chennai, India. ⁸²³Department of Biostatistics, Indian Council of Medical Research, New Delhi, India. ⁸²⁴Prasanna School of Public Health, Manipal Academy of Higher Education, Manipal, India. ⁸²⁵Care and Public Health Research Institute (CAPHRI), Maastricht University, Maastricht, Netherlands. ⁸²⁶Family Medicine Department, Rafsanjan University of Medical Sciences, Rafsanjan, Iran. ⁸²⁷Clinical Research

Development Unit, Rafsanjan University of Medical Sciences, Rafsanjan, Iran. ⁸²⁸Department of Public Health, Abadan University of Medical Sciences, Abadan, Iran. ⁸²⁹Department of Forensic Medicine and Toxicology, All India Institute of Medical Sciences, Jodhpur, India. ⁸³⁰Save Sight Institute, University of Sydney, Sydney, NSW, Australia. ⁸³¹Sydney Eye Hospital, South Eastern Sydney Local Health District, Sydney, NSW, Australia. ⁸³²The Hansjörg Wyss Department of Plastic and Reconstructive Surgery, Nab' al-Al-Hayat Foundation for Medical Sciences and Health Care, New York, NY, USA. ⁸³³Department of Cleft Lip and Palate Surgery, Global Smile Foundation, Norwood, MA, USA. ⁸³⁴Department of Health Economics, Iran University of Medical Sciences, Tehran, Iran. ⁸³⁵Healthcare Network, Shiraz University of Medical Sciences, Farashband, Iran. ⁸³⁶UF Health Cancer Center, University of Florida, Gainesville, FL, USA. ⁸³⁷School of Health Professions and Human Services, Hofstra University, Hempstead, NY, USA. ⁸³⁸Social Determinants of Health Research Center, Tabriz University of Medical Sciences, Tabriz, Iran. ⁸³⁹Department of Medical-Surgical Nursing, Guilan University of Medical Sciences, Rasht, Iran. ⁸⁴⁰Department of Physical Therapy and Health Rehabilitation, Majmaah University, Majmaah, Saudi Arabia. ⁸⁴¹Quality Use of Medicines and Pharmacy Research Centre, University of South Australia, Adelaide, SA, Australia. ⁸⁴²Centre for Tropical Diseases and Global Health, Catholic University of Bukavu, Bukavu, Democratic Republic of the Congo. ⁸⁴³Department of Internal Medicine-Cardiology, University of Edinburgh, Scotland, UK. ⁸⁴⁴Surgery Research Unit, University of Oulu, Oulu, Finland. ⁸⁴⁵Department of Molecular Medicine and Surgery, Karolinska Institute, Stockholm, Sweden. ⁸⁴⁶International Research Center of Excellence, Institute of Human Virology Nigeria, Abuja, Nigeria. ⁸⁴⁷Julius Centre for Health Sciences and Primary Care, Utrecht University, Utrecht, Netherlands. ⁸⁴⁸Department of Healthcare Services Management, Alborz University of Medical Sciences, Karaj, Iran. ⁸⁴⁹Public Health Department, Wollega University, Nekemte, Ethiopia. ⁸⁵⁰Department of Ophthalmology, Harvard University, Boston, MA, USA. ⁸⁵¹Eye Unit, MyungSung Medical College, Addis Ababa, Ethiopia. ⁸⁵²Centre for Adolescent Health, Murdoch Childrens Research Institute, Melbourne, VIC, Australia. ⁸⁵³Department of Psychological Medicine, University of Otago, Christchurch, New Zealand. ⁸⁵⁴Vocational Higher School of Healthcare Studies, Mardin Artuklu University, Mardin, Türkiye. ⁸⁵⁵Students' Scientific Research Center (SSRC), Tehran University of Medical Sciences, Tehran, Iran. ⁸⁵⁶Department of Public Health, Jordan University of Science and Technology, Irbid, Jordan. ⁸⁵⁷Amity Institute of Forensic Sciences, Amity University, Noida, India. ⁸⁵⁸Radiology Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran. ⁸⁵⁹School of Food and Agricultural Sciences, University of Management and Technology, Lahore, Pakistan. ⁸⁶⁰Health Promotion Research Center, Zahedan University of Medical Sciences, Zahedan, Iran. ⁸⁶¹School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, QLD, Australia. ⁸⁶²Department of Medicine, University of Chicago, Chicago, IL, USA. ⁸⁶³Department of Epidemiology and Biostatistics, Health Services Academy, Islamabad, Pakistan. ⁸⁶⁴Department of Pediatrics, Rutgers University, New Brunswick, NJ, USA. ⁸⁶⁵Epidemiology Department, Jazan University, Jazan, Saudi Arabia. ⁸⁶⁶Department of Rehabilitation Sciences, Hong Kong Polytechnic University, Hong Kong, China. ⁸⁶⁷Family Medicine Department, United Arab Emirates University, Al Ain, United Arab Emirates. ⁸⁶⁸Primary Care Department, NHS North West London, London, UK. ⁸⁶⁹Population Science Department, Jatiya Kabi Kazi Nazrul Islam University, Mymensingh, Bangladesh. ⁸⁷⁰Department of Public Health, University of Sydney, Sydney, NSW, Australia. ⁸⁷¹Department of Clinical Pharmacy, Jouf University, Sakaka, Saudi Arabia. ⁸⁷²College of Health, Wellbeing and Life Sciences, Sheffield Hallam University, Sheffield, UK. ⁸⁷³College of Arts and Sciences, Ohio University, Zanesville, OH, USA. ⁸⁷⁴Department of Basic Medical Sciences, Yarmouk University, Irbid, Jordan. ⁸⁷⁵Department of Medical Parasitology, Cairo University, Cairo, Egypt. ⁸⁷⁶School of Medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran. ⁸⁷⁷Global Consortium for Public Health Research, Datta Meghe Institute of Higher Education and Research, Wardha, India. ⁸⁷⁸Department of Neurosurgery, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ⁸⁷⁹Brain and Spinal Cord Injury Research Center, Tehran University of Medical Sciences, Tehran, Iran. ⁸⁸⁰Department of Epidemiology, Shahroud University of Medical Sciences, Shahroud, Iran. ⁸⁸¹Department of Public Health, New Mexico State University, Las Cruces, NM, USA. ⁸⁸²Institute of Health Services Research, Yonsei University, Seoul, South Korea. ⁸⁸³Department of Preventive Medicine, Korea University, Seoul, South Korea. ⁸⁸⁴School of Traditional Chinese Medicine, Xiamen University Malaysia, Sepang, Malaysia. ⁸⁸⁵Department of Nutrition, Simmons University, Boston, MA, USA. ⁸⁸⁶School of Health Sciences, Kristiania University College, Oslo, Norway. ⁸⁸⁷Department of International Health and Sustainable Development, Tulane University, New Orleans, LA, USA. ⁸⁸⁸Department of Nursing and Health Promotion, Oslo Metropolitan University, Oslo, Norway. ⁸⁸⁹Department of Epidemiology and Public Health, University College London, London, UK. ⁸⁹⁰Department of Public Health, University of Helsinki, Helsinki, Finland. ⁸⁹¹Division of Plastic Surgery, University of Washington, Seattle, WA, USA. ⁸⁹²Department of Global Health, University of Washington, Seattle, WA, USA. ⁸⁹³Global Healthcare Consulting, New Delhi, India. ⁸⁹⁴Saw Swee Hock School of Public Health, National University of Singapore, Singapore. ⁸⁹⁵Saw Swee Hock School of Public Health, National University of Singapore, Singapore. ⁸⁹⁶Institute for Allergology, Charité Universitätsmedizin Berlin (Charité Medical University Berlin), Berlin, Germany. ⁸⁹⁷Division of Immune-Mediated Skin Diseases, First Moscow State Medical University (Sechenov University), Moscow, Russia. ⁸⁹⁸Center for Global Mental Health, London School of Hygiene and Tropical Medicine, London, UK. ⁸⁹⁹Children's Medical Center, Tehran University of Medical Sciences, Tehran, Iran. ⁹⁰⁰Social Determinants of Health Research Center, Saveh University of Medical Sciences, Saveh, Iran. ⁹⁰¹Department of General Practice, Kharkiv National Medical University, Kharkiv, Ukraine. ⁹⁰²Independent Consultant, Jakarta, Indonesia. ⁹⁰³Department of Internal and Pulmonary Medicine, Sheri Kashmir Institute of Medical Sciences, Srinagar, India. ⁹⁰⁴Kasturba Medical College, Udupi, India. ⁹⁰⁵San Juan de Dios Sanitary Park, Barcelona, Spain. ⁹⁰⁶Department of Anthropology, Panjab University, Chandigarh, India. ⁹⁰⁷Department of Anesthesiology, Duke University, Durham, NC, USA. ⁹⁰⁸Department of Anesthesiology and Pain Medicine, University of Washington, Seattle, WA, USA. ⁹⁰⁹School of Human Sciences, University of Western Australia, Perth, WA, Australia. ⁹¹⁰Department of Demography, University of Montreal, Montreal, QC, Canada. ⁹¹¹Department of Social and Preventive Medicine, University of Montreal, Montreal, QC, Canada. ⁹¹²Faculty of Medicine, Gazi University, Ankara, Türkiye. ⁹¹³Department of Biochemistry, University of Hail, Hail, Saudi Arabia. ⁹¹⁴University of Environment and Sustainable Development, Somanya, Ghana. ⁹¹⁵Department of Cardiothoracic Surgery, UN Mehta Institute of Cardiology and Research Center, Ahmedabad, India. ⁹¹⁶Department of Cardiothoracic Surgery, Medanta Hospital, Gurugram, India. ⁹¹⁷Department of Psychiatry, University of Nairobi, Nairobi, Kenya. ⁹¹⁸Division of Psychology and Language Sciences, University College London, London, UK. ⁹¹⁹Department of Orthopaedics, Medanta Hospital, Lucknow, India. ⁹²⁰Amity Institute of Biotechnology, Amity University Rajasthan, Jaipur, India. ⁹²¹Faculty of Health and Life Sciences, Coventry University, Coventry, UK. ⁹²²Department of Medicine, McMaster University, Hamilton, ON, Canada. ⁹²³Department of Health Services Research and Management, City University of London, London, UK. ⁹²⁴Faculty of Public Health, University of Indonesia, Depok, Indonesia. ⁹²⁵Department of Nephrology, Pushpagiri Institute of Medical Sciences and Research Centre, Thiruvalla, India. ⁹²⁶Department of Clinical Sciences and Community Health, University of Milan, Milan, Italy. ⁹²⁷National Institute for Health Research (NIHR) Oxford Biomedical Research Centre, Oxford, UK. ⁹²⁸Global Public Health, Karolinska Institute, Stockholm, Sweden. ⁹²⁹Institute for Social and Health Sciences, University of South Africa, Pretoria, South Africa. ⁹³⁰Public Health Foundation of India, Gurugram, India. ⁹³¹School of Dentistry, The University of Queensland, Brisbane, QLD, Australia. ⁹³²NEVES Society for Patient Safety, NEVES Society for Patient Safety, Budapest, Hungary. ⁹³³Department of Community and Family Medicine, University of Baghdad, Baghdad, Iraq. ⁹³⁴Division of Cancer Epidemiology and Genetics, National Cancer Institute, Rockville, MD, USA. ⁹³⁵Unit of Genetics and Public Health, Institute of Medical Sciences, Las Tablas, Panama. ⁹³⁶Ministry of Health, Herrera, Panama. ⁹³⁷Centre for Surveillance and Applied Research, Public Health Agency of Canada, Ottawa, ON, Canada. ⁹³⁸Department of Psychiatry and Psychotherapy, University of Regensburg, Regensburg, Germany. ⁹³⁹Endocrinology and Metabolism Research Institute, Tehran University of Medical Sciences, Tehran, Iran. ⁹⁴⁰Department of Medical Sciences, Uppsala University, Uppsala, Sweden. ⁹⁴¹Department of Clinical

Chemistry and Pharmacology, Uppsala University Hospital, Uppsala, Sweden. ⁹⁴²Centre for Family Welfare, University of Indonesia, Depok, Indonesia. ⁹⁴³Department of Global Health and Health Security, Taipei Medical University, Taipei, Taiwan. ⁹⁴⁴Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hong Kong, China. ⁹⁴⁵International Society Doctors for the Environment, Arezzo, Italy. ⁹⁴⁶Department of Public Health, Yonsei University, Seoul, South Korea. ⁹⁴⁷Pattern Recognition and Machine Learning Lab, Gachon University, Seongnam, South Korea. ⁹⁴⁸Department of Precision Medicine, Sungkyunkwan University, Suwon-si, South Korea. ⁹⁴⁹School of Pharmacy, Taylor's University Lakeside Campus, Subang Jaya, Malaysia. ⁹⁵⁰Department of Internal Medicine, University of Texas, Galveston, TX, USA. ⁹⁵¹Knowledge Translation Directorate, Ethiopian Public Health Institute, Addis Ababa, Ethiopia. ⁹⁵²Asbestos Diseases Research Institute, University of Sydney, Sydney, NSW, Australia. ⁹⁵³UO Neurologia, Salute Pubblica e Disabilità, Fondazione IRCCS Istituto Neurologico Carlo Besta (Carlo Besta Neurological Institute), Milan, Italy. ⁹⁵⁴Faculty of Science, Universiti Brunei Darussalam (University of Brunei Darussalam), Bandar Seri Begawan, Brunei. ⁹⁵⁵Center for Dentistry and Oral Hygiene, University of Groningen, Groningen, Netherlands. ⁹⁵⁶Stomatological Hospital, Southern Medical University, Guangzhou, China. ⁹⁵⁷Department of Health Promotion and Health Education, National Taiwan Normal University, Taipei, Taiwan. ⁹⁵⁸Directorate of Quality Management and Digital Health, Ministry of Health, Lilongwe, Malawi. ⁹⁵⁹School of Health Sciences, Western Sydney University, Campbelltown, NSW, Australia. ⁹⁶⁰College of Medicine and Public Health, Flinders University, Bedford Park, SA, Australia. ⁹⁶¹Department of Medicine, University of Malaya, Kuala Lumpur, Malaysia. ⁹⁶²Department of Medicine and Therapeutics, The Chinese University of Hong Kong, Shatin, China. ⁹⁶³Asbestos Diseases Research Institute, Concord, NSW, Australia. ⁹⁶⁴UCD Centre for Disability Studies, University College Dublin, Dublin, Ireland. ⁹⁶⁵School of Public Health, University of Haifa, Haifa, Israel. ⁹⁶⁶School of Life Sciences, University of Technology Sydney, Ultimo, NSW, Australia. ⁹⁶⁷Centre for Inflammation, Centenary Institute, Camperdown, NSW, Australia. ⁹⁶⁸Department of Epidemiology and Biostatistics, Peking University, Beijing, China. ⁹⁶⁹Chinese Center for Disease Control and Prevention, Beijing, China. ⁹⁷⁰Institute for Health and Environment, Chongqing University of Science and Technology, Chongqing, China. ⁹⁷¹Department of Internal Medicine, Kirk Kerkorian School of Medicine at UNLV, Las Vegas, NV, USA. ⁹⁷²Interdisciplinary Centre of Marine and Environmental Research, University of Porto, Matosinhos, Portugal. ⁹⁷³National Institutes of Health, University of the Philippines Manila, Manila, Philippines. ⁹⁷⁴School of Medicine and Public Health, Ateneo De Manila University, Pasig City, Philippines. ⁹⁷⁵Department of Health Economics, Syreon Research Romania, Targu Mures, Romania. ⁹⁷⁶Department of Doctoral Studies, George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Targu Mures, Romania. ⁹⁷⁷Medical Education Research Center, Tabriz University of Medical Sciences, Tabriz, Iran. ⁹⁷⁸Laboratory for Process Engineering, Environment, Biotechnology and Energy (LEPABE), University of Porto, Porto, Portugal. ⁹⁷⁹School of Health, Polytechnic Institute of Porto, Porto, Portugal. ⁹⁸⁰School of Medicine, Federal University of Juiz de Fora, Juiz de Fora, Brazil. ⁹⁸¹Department of General Surgery, Liverpool University Hospitals NHS Foundation Trust, Liverpool, UK. ⁹⁸²Department of Surgery, University of Liverpool, Liverpool, UK. ⁹⁸³Clinical Research Unit, Centro de Investigação Interdisciplinar Egas Moniz (Egas Moniz Interdisciplinary Research Center), Monte da Caparica, Portugal. ⁹⁸⁴Department of Biostatistics and Epidemiology, Yazd University of Medical Sciences, Yazd, Iran. ⁹⁸⁵Institute for Physical Activity and Nutrition, Deakin University, Melbourne, VIC, Australia. ⁹⁸⁶Mansoura Faculty of Medicine, Mansoura University, Mansoura, Egypt. ⁹⁸⁷Department of Forensic Medicine and Toxicology, Mysore Medical College and Research Institute, Mysooru, India. ⁹⁸⁸Department of Health and Family Welfare, Government of Karnataka, Bangalore, India. ⁹⁸⁹Department of Community Medicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Karaikal, India. ⁹⁹⁰Grants, Innovation and Product Development Unit, South African Medical Research Council, Cape Town, South Africa. ⁹⁹¹Cellular and Molecular Biology Research Center, Babol University of Medical Sciences, Babol, Iran. ⁹⁹²Department of Clinical Biochemistry, Babol University of Medical Sciences, Babol, Iran. ⁹⁹³Department of Clinical and Hospital Pharmacy, Taibah University, Al-Madinah Al-Munawwarah, Saudi Arabia. ⁹⁹⁴Department of Food Hygiene and Safety, Qazvin University of Medical Sciences, Qazvin, Iran. ⁹⁹⁵Department of Biostatistics and Epidemiology, Kerman University of Medical Sciences, Kerman, Iran. ⁹⁹⁶Department of Primary Care and Public Health, Imperial College London, London, UK. ⁹⁹⁷Department of Public Health Research, National Institute of Health, Bogota, Colombia. ⁹⁹⁸Faculty of Medicine, El Bosque University, Bogota, Colombia. ⁹⁹⁹Department of Pediatric Cardiology, Tehran University of Medical Sciences, Tehran, Iran. ¹⁰⁰⁰Rabigh Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia. ¹⁰⁰¹Heart and Vascular institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates. ¹⁰⁰²Département STIC, The École Nationale Supérieure de Techniques Avancées de Bretagne (ENSTA), Brest, France. ¹⁰⁰³Security, Intelligence et Integrity of Information (SI3), LABSTICC, Brest, France. ¹⁰⁰⁴Substance Abuse Prevention Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran. ¹⁰⁰⁵Department of Epidemiology and Biostatistics, Tehran University of Medical Sciences, Tehran, Iran. ¹⁰⁰⁶School of Medicine and Surgery, University of Milan Bicocca, Monza, Italy. ¹⁰⁰⁷Laboratory of Public Health, Istituto Auxologico Italiano IRCCS (Italian Auxological Institute), Milan, Italy. ¹⁰⁰⁸Department of Biochemistry, Golestan University of Medical Sciences, Gorgan, Iran. ¹⁰⁰⁹Department of Health Economics, Mayor University, Cartagena, Colombia. ¹⁰¹⁰Noncommunicable Diseases and Mental Health Department, Pan American Health Organization, Washington, DC, USA. ¹⁰¹¹Joint Learning Network for Universal Coverage, Arlington, VA, USA. ¹⁰¹²Faculty of Public Health, Universitas Airlangga (Airlangga University), Surabaya, Indonesia. ¹⁰¹³Indonesian Public Health Association, Surabaya, Indonesia. ¹⁰¹⁴Campus Caucaia, Federal Institute of Education, Science and Technology of Ceará, Caucaia, Brazil. ¹⁰¹⁵Department of Nutrition and Dietetics, University of Concepcion, Concepción, Chile. ¹⁰¹⁶Centre for Healthy Living, University of Concepcion, Concepción, Chile. ¹⁰¹⁷Department of Public Health and Community Medicine, Central University of Kerala, Kasaragod, India. ¹⁰¹⁸Division of Infection, Immunity and Respiratory Medicine, University of Manchester, Manchester, UK. ¹⁰¹⁹North West Lung Centre, Manchester University NHS Foundation Trust, Manchester, UK. ¹⁰²⁰Epidemiology Department, Mahidol Oxford Tropical Medicine Research Unit, Bangkok, Thailand. ¹⁰²¹Nuffield Department of Medicine, University of Oxford, Oxford, UK. ¹⁰²²Research Division, The George Institute for Global Health, New Delhi, India. ¹⁰²³School of Medicine, University of New South Wales, Sydney, NSW, Australia. ¹⁰²⁴Department of Biology, Salahaddin University-Erbil, Erbil, Iraq. ¹⁰²⁵Department of Healthcare, University of Vlora, Vlora city, Albania. ¹⁰²⁶Clinic of Social and Family Medicine, University of Crete, Heraklion, Greece. ¹⁰²⁷Department of Preventive Oncology, All India Institute of Medical Sciences, New Delhi, India. ¹⁰²⁸Faculty of Nursing, University of Alberta, Edmonton, AB, Canada. ¹⁰²⁹School of Atmospheric Physics, Nanjing University of Information Science and Technology, Nanjing, China. ¹⁰³⁰Neurology Department, Janakpuri Super Specialty Hospital Society, New Delhi, India. ¹⁰³¹Department of Neurology, Govind Ballabh Institute of Medical Education and Research, New Delhi, India. ¹⁰³²Tehran Heart Center, Tehran University of Medical Sciences, Tehran, Iran. ¹⁰³³Department of Epidemiology and Biostatistics, University of California San Francisco, San Francisco, CA, USA. ¹⁰³⁴Department of Clinical and Health Sciences, University of South Australia, Adelaide, SA, Australia. ¹⁰³⁵Research and Innovation Center, Ministry of Health, Riyadh, Saudi Arabia. ¹⁰³⁶Peru Country Office, United Nations Population Fund (UNFPA), Lima, Peru. ¹⁰³⁷Faculty of Civil Engineering, University of Colima, Colima, Mexico. ¹⁰³⁸Forensic Medicine Division, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia. ¹⁰³⁹International Dx Department, BGI Genomics, Copenhagen, Denmark. ¹⁰⁴⁰Neurology Unit, Helsinki University Hospital, Helsinki, Finland. ¹⁰⁴¹School of Health Sciences, University of Melbourne, Melbourne, VIC, Australia. ¹⁰⁴²Breast Surgery Unit, Helsinki University Hospital, Helsinki, Finland. ¹⁰⁴³University of Helsinki, Helsinki, Finland. ¹⁰⁴⁴Department of Midwifery, Debre Markos University, Debre Markos, Ethiopia. ¹⁰⁴⁵University Centre Varazdin, University North, Varazdin, Croatia. ¹⁰⁴⁶Department of Propedeutics of Internal Diseases and Arterial Hypertension, Pomeranian Medical University, Szczecin, Poland. ¹⁰⁴⁷Anaesthesiology Department, "Helena Venizelou" General and Maternity Hospital, Athens, Greece. ¹⁰⁴⁸Department of Epidemiology, Maria Skłodowska-Curie National Research Institute of Oncology, Warsaw, Poland. ¹⁰⁴⁹National Cancer Registry, Maria Skłodowska-Curie National Research Institute of Oncology, Warsaw, Poland. ¹⁰⁵⁰Department

of Maternal and Child Nursing and Public Health, Federal University of Minas Gerais, Belo Horizonte, Brazil. ¹⁰⁵¹Pacific Institute for Research and Evaluation, Calverton, MD, USA. ¹⁰⁵²Department of Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran. ¹⁰⁵³Department of Medical Sciences, IRCCS Casa Sollievo della Sofferenza General Hospital (Home for the Relief of Suffering General Hospital), San Giovanni Rotondo, Italy. ¹⁰⁵⁴Internal Medicine Programme, Kyrgyz State Medical Academy, Bishkek, Kyrgyzstan. ¹⁰⁵⁵Department of Atherosclerosis and Coronary Heart Disease, National Center of Cardiology and Internal Disease, Bishkek, Kyrgyzstan. ¹⁰⁵⁶Department of Hospital Administration, All India Institute of Medical Sciences, Bathinda, India. ¹⁰⁵⁷Department of Rehabilitation and Sports Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran. ¹⁰⁵⁸Comprehensive Research Laboratory, Iran University of Medical Sciences, Tehran, Iran. ¹⁰⁵⁹Water Quality Research Center, Tehran University of Medical Sciences, Tehran, Iran. ¹⁰⁶⁰National Data Management Center for Health, Ethiopian Public Health Institute, Addis Ababa, Ethiopia. ¹⁰⁶¹Department of Surgical Oncology, All India Institute of Medical Sciences, Jodhpur, India. ¹⁰⁶²Department of Forensic Medicine and Toxicology, Dr. B. C. Roy Multi-Specialty Medical Research Centre, IIT Kharagpur, Kharagpur, India. ¹⁰⁶³Department of Higher Education Management, Islamic Azad University, Tehran, Iran. ¹⁰⁶⁴Thompson Institute, University of the Sunshine Coast, Birtinya, QLD, Australia. ¹⁰⁶⁵Midwifery Department, Tabriz University of Medical Sciences, Tabriz, Iran. ¹⁰⁶⁶Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran. ¹⁰⁶⁷Department of Public Health, Dire Dawa University, Dire Dawa, Ethiopia. ¹⁰⁶⁸Health Systems and Policy Research Unit, Ahmadu Bello University, Zaria, Nigeria. ¹⁰⁶⁹Department of Health Care Management, Technical University of Berlin, Berlin, Germany. ¹⁰⁷⁰Substance Abuse and Toxicology Research Center, Jazan University, Jazan, Saudi Arabia. ¹⁰⁷¹Center for Transdisciplinary Research, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, India. ¹⁰⁷²Oncology Department, Appalachian Regional Healthcare, Hazard, KY, USA. ¹⁰⁷³Department of Internal Medicine, University of Kentucky, Lexington, KY, USA. ¹⁰⁷⁴Faculty of Life Sciences and Medicine, King's College London, London, UK. ¹⁰⁷⁵Clinical Epidemiology and Public Health Research Unit, Burlo Garofolo Institute for Maternal and Child Health, Trieste, Italy. ¹⁰⁷⁶Department of Biomedical and Dental Sciences and Morphofunctional Imaging, Messina University, Messina, Italy. ¹⁰⁷⁷Faculty of Medicine, The University of Queensland, Brisbane, QLD, Australia. ¹⁰⁷⁸School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ¹⁰⁷⁹Social Determinants of Health Research Center, Kurdistan University of Medical Sciences, Kurdistan, Iran. ¹⁰⁸⁰Computer, Electrical, and Mathematical Sciences and Engineering Division, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia. ¹⁰⁸¹Department of Public Health, Oswaldo Cruz Foundation, Recife, Brazil. ¹⁰⁸²Department of Public Health, Federal University of Pernambuco, Recife, Brazil. ¹⁰⁸³University Hospital Center of Porto, University of Porto, Porto, Portugal. ¹⁰⁸⁴Clinical Research Development Unit, Mashhad University of Medical Sciences, Mashhad, Iran. ¹⁰⁸⁵Academic and Research Collaborative in Health (ARCH), La Trobe University, Melbourne, VIC, Australia. ¹⁰⁸⁶The Victorian Rehabilitation Centre, Healthscope, Glen Waverley, VIC, Australia. ¹⁰⁸⁷Division of Plastic and Reconstructive Surgery, University of Washington, Seattle, WA, USA. ¹⁰⁸⁸Department of Health Policy, London School of Economics and Political Science, London, UK. ¹⁰⁸⁹Department of Surgery and Cancer, Imperial College London, London, UK. ¹⁰⁹⁰Department of Medicine, Stanford University, Palo Alto, CA, USA. ¹⁰⁹¹Stanford Cardiovascular Institute, Stanford University, Palo Alto, CA, USA. ¹⁰⁹²Chronic Respiratory Disease Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ¹⁰⁹³Social Determinants of Health Research Center, Babol University of Medical Sciences, Babol, Iran. ¹⁰⁹⁴Department of Fruit and Vegetable Product Technology, Prof. Wacław Dąbrowski Institute of Agricultural and Food Biotechnology State Research Institute, Warsaw, Poland. ¹⁰⁹⁵Department of Epidemiology and Biostatistics, Wuhan University, Wuhan, China. ¹⁰⁹⁶Federal Institute for Population Research, Wiesbaden, Germany. ¹⁰⁹⁷Center for Population and Health, Wiesbaden, Germany. ¹⁰⁹⁸Health and Physical Education, Rhode Island College, Providence, RI, USA. ¹⁰⁹⁹Department of Surgery, General University Hospital of Patras, Patras, Greece. ¹¹⁰⁰Faculty of Medicine, University of Thessaly, Larissa, Greece. ¹¹⁰¹Department of Pediatrics and Child Health Nursing, Debre Berhan University, Debre Berhan, Ethiopia. ¹¹⁰²Department of Paediatrics and Paediatric Infectious Diseases, I.M. Sechenov First Moscow State Medical University, Moscow, Russia. ¹¹⁰³National Heart and Lung Institute, Imperial College London, London, UK. ¹¹⁰⁴Clinical Epidemiology Research Unit, Mexican Institute of Social Security, Villa de Alvarez, Mexico. ¹¹⁰⁵Postgraduate in Medical Sciences, Universidad de Colima, Colima, Mexico. ¹¹⁰⁶The George Institute for Global Health, Hyderabad, India. ¹¹⁰⁷Surgery Department, University of Medicine and Pharmacy Grigore T. Popa, Iași, Romania. ¹¹⁰⁸Second Surgical Unit, Regional Institute of Oncology Iasi, Iasi, Romania. ¹¹⁰⁹Department of Pediatrics, Shaqra University, Shaqra, Saudi Arabia. ¹¹¹⁰Department of Pediatrics and Pediatric Pulmonology, Institute of Mother and Child Care, Multan, Pakistan. ¹¹¹¹Department of Medical Microbiology and Immunology, Mekelle University, Mekelle, Ethiopia. ¹¹¹²Department of Internal Medicine, University of Botswana, Gaborone, Botswana. ¹¹¹³Department of Obstetrics and Gynecology, Ain Shams University, Cairo, Egypt. ¹¹¹⁴Department of Knowledge Translation and Utilization, Egyptian Center for Evidence Based Medicine, Cairo, Egypt. ¹¹¹⁵Research and Analytics Department, Initiative for Financing Health and Human Development, Chennai, India. ¹¹¹⁶Department of Research and Analytics, Bioinsilico Technologies, Chennai, India. ¹¹¹⁷Laboratory of Public Health Indicators Analysis and Health Digitalization, Moscow Institute of Physics and Technology, Dolgoprudny, Russia. ¹¹¹⁸Experimental Surgery and Oncology Laboratory, Kursk State Medical University, Kursk, Russia. ¹¹¹⁹Health Workforce Department, World Health Organisation, Geneva, Switzerland. ¹¹²⁰Department of Health Care Management, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. ¹¹²¹Department of Dermatology, San Bortolo Hospital, Vicenza, Italy. ¹¹²²Italian Group for Epidemiologic Research in Dermatology (GISED) Study Center, Bergamo, Italy. ¹¹²³Suraj Eye Institute, Nagpur, India. ¹¹²⁴School of Pharmacy, University of Reading, Reading, UK. ¹¹²⁵Mysore Medical College and Research Institute, Government Medical College, Mysore, India. ¹¹²⁶Manipal College of Dental Sciences, Manipal Academy of Higher Education, Manipal, India. ¹¹²⁷Department of Clinical Medicine, Federal University of Minas Gerais, Belo Horizonte, Brazil. ¹¹²⁸Clinical Hospital, Federal University of Minas Gerais, Belo Horizonte, Brazil. ¹¹²⁹Institute of Nephrology, Madras Medical College, Chennai, India. ¹¹³⁰Department of Dental Public Health, King Abdulaziz University, Jeddah, Saudi Arabia. ¹¹³¹Department of Health Policy and Oral Epidemiology, Harvard University, Boston, MA, USA. ¹¹³²Department of Disease Control and Environmental Health, Makerere University, Kampala, Uganda. ¹¹³³School of Pharmacy, West Virginia University, Morgantown, WV, USA. ¹¹³⁴Department of General Surgery, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania. ¹¹³⁵Department of General Surgery, Emergency Hospital of Bucharest, Bucharest, Romania. ¹¹³⁶Department of Anatomy and Embryology, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania. ¹¹³⁷Department of Cardiology, Cardio-Aid, Bucharest, Romania. ¹¹³⁸Department of Epidemiology, Non-Communicable Diseases Research Center (NCDRC), Tehran, Iran. ¹¹³⁹Department of Medicine, Democritus University of Thrace, Alexandroupolis, Greece. ¹¹⁴⁰Department of Community Medicine, Kathmandu University, Palpa, Nepal. ¹¹⁴¹School of Nursing, University of Gondar, Gondar, Ethiopia. ¹¹⁴²College of Medicine and Health Science, Bahir Dar University, Gondar, Ethiopia. ¹¹⁴³Department of Public Health, University of Yaoundé I, Yaoundé, Cameroon. ¹¹⁴⁴Department of Biological Sciences, University of Embu, Embu, Kenya. ¹¹⁴⁵Department of Public Health and Community Medicine, University of Gothenburg, Gothenburg, Sweden. ¹¹⁴⁶International Islamic University Islamabad, Islamabad, Pakistan. ¹¹⁴⁷Department of Epidemiology and Biostatistics, University of Gondar, Gondar, Ethiopia. ¹¹⁴⁸Department of Biomedical and Molecular Sciences, Queen's University, Kingston, ON, Canada. ¹¹⁴⁹Department of Internal Medicine, Ziauddin University, Karachi, Pakistan. ¹¹⁵⁰South African Medical Research Council, Cape Town, South Africa. ¹¹⁵¹School of Public Health and Family Medicine, University of Cape Town, Cape Town, South Africa. ¹¹⁵²Department of Health Policy and Management, Keio University, Tokyo, Japan. ¹¹⁵³Department of Global Health Policy, University of Tokyo, Tokyo, Japan. ¹¹⁵⁴Medical Research Council Clinical Trials Unit, University College London, London, UK. ¹¹⁵⁵Department of Gastroenterology, Cambridge University Hospitals, Cambridge, UK. ¹¹⁵⁶Department of Pharmacology, Tehran University of Medical Sciences, Tehran, Iran. ¹¹⁵⁷Department of Clinical Sciences, Lund University, Lund, Sweden. ¹¹⁵⁸Centre for Heart Rhythm Disorders, University of Adelaide, Adelaide, SA, Australia. ¹¹⁵⁹Department of Medical Mycology and

Parasitology, Shiraz University of Medical Sciences, Shiraz, Iran. ¹¹⁶⁰Department of Internal Medicine, University of Thessaly, Larissa, Greece. ¹¹⁶¹Division of Cardiology, University of Cape Town, Cape Town, South Africa. ¹¹⁶²The Cardiac Clinic, Groote Schuur Hospital, Cape Town, South Africa. ¹¹⁶³Public Health Department, Banten School of Health Science, South Tangerang, Indonesia. ¹¹⁶⁴Department of Ministry of Research, Technology and Higher Education, Higher Education Service Institutions (LL-DIKTI) Region IV, Bandung, Indonesia. ¹¹⁶⁵School of Nursing, Family Health Care Department, University of California San Francisco, San Francisco, CA, USA. ¹¹⁶⁶Center of Excellence in Reproductive Health Innovation (CERHI), University of Benin, Benin City, Nigeria. ¹¹⁶⁷Department of Physiology, University of Benin, Edo, Nigeria. ¹¹⁶⁸Department of Physiology, Benson Idahosa University, Benin City, Nigeria. ¹¹⁶⁹Health Policy Research Group, University of Nigeria Nsukka, Enugu, Nigeria. ¹¹⁷⁰Results for Development, Research and Academic Institution, Abuja, Nigeria. ¹¹⁷¹Department of Community Health and Primary Care, University of Lagos, Idi Araba, Nigeria. ¹¹⁷²Department of Family and Preventive Medicine, University of Utah, Salt Lake City, UT, USA. ¹¹⁷³Department of Obstetrics and Gynecology, University of Ibadan, Ibadan, Nigeria. ¹¹⁷⁴Department of Preventive Medicine, Kyung Hee University, Dongdaemun-gu, South Korea. ¹¹⁷⁵Department of Psychiatry, University of Ibadan, Ibadan, Nigeria. ¹¹⁷⁶Centre for Dementia Studies, Brighton and Sussex Medical School, Brighton, UK. ¹¹⁷⁷Department of Food and Nutrition, Seoul National University, Seoul, South Korea. ¹¹⁷⁸College of Medicine, University of Ibadan, Ibadan, Nigeria. ¹¹⁷⁹School of Pharmacy, University of the Western Cape, Cape Town, South Africa. ¹¹⁸⁰Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, Houston, FL, USA. ¹¹⁸¹Department of Medicine Critical Care, Boston Children's Hospital, Boston, USA. ¹¹⁸²Department of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, ON, Canada. ¹¹⁸³Department of Psychiatry, University of Lagos, Lagos, Nigeria. ¹¹⁸⁴Department of Medicine, Salvador Zubiran National Institute of Medical Sciences and Nutrition, Tlalpan, Mexico. ¹¹⁸⁵Department of Biostatistics, University of Washington, Seattle, WA, USA. ¹¹⁸⁶Associação Brasileira de Cefaleia em Salvas e Enxaqueca, ABRACES, São Paulo, Brazil. ¹¹⁸⁷Cardiology Department, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil. ¹¹⁸⁸Centre for Healthy Start Initiative, Lagos, Nigeria. ¹¹⁸⁹Diplomacy and Public Relations Department, University of Human Development, Sulaymaniyah, Iraq. ¹¹⁹⁰Non-communicable Disease Prevention Unit, Ministry of Health, Bandar Seri Begawan, Brunei. ¹¹⁹¹Early Detection and Cancer Prevention Services, Pantai Jerudong Specialist Centre, Bandar Seri Begawan, Brunei. ¹¹⁹²Department of Pharmacology and Therapeutics, University of Nigeria Nsukka, Enugu, Nigeria. ¹¹⁹³Health Systems Research Center, National Institute of Public Health, Cuernavaca, Mexico. ¹¹⁹⁴Department of Nephrology and Hypertension, The Institute for Health Research Foundation Jiménez Díaz University Hospital, Madrid, Spain. ¹¹⁹⁵Department of Project Management, National Research University Higher School of Economics, Moscow, Russia. ¹¹⁹⁶Department of Epidemiology and Population Health, Khalifa University, Abu Dhabi, United Arab Emirates. ¹¹⁹⁷Faculty of Medicine, University Ferhat Abbas of Sétif, Sétif, Algeria. ¹¹⁹⁸Department of Infectious Diseases, University Hospital of Sétif, Sétif, Algeria. ¹¹⁹⁹Section for Health Care Collaboration, Haukeland University Hospital, Bergen, Norway. ¹²⁰⁰Department of Medicine, University of Ibadan, Ibadan, Nigeria. ¹²⁰¹Department of Medicine, University College Hospital, Ibadan, Ibadan, Nigeria. ¹²⁰²Department of Respiratory Medicine, JSS Academy of Higher Education and Research, Mysore, India. ¹²⁰³Department of Physical Medicine and Rehabilitation, Harvard University, Boston, MA, USA. ¹²⁰⁴Vicerrectorado de Investigación, Universidad San Ignacio de Loyola, Lima, Peru. ¹²⁰⁵National School of Public Health, Institute of Health Carlos III, Madrid, Spain. ¹²⁰⁶Department of Forensic Medicine and Toxicology, Kasturba Medical College, Mangalore, India. ¹²⁰⁷Department of Neurology, National Institute of Mental Health and Neurosciences, Bangalore, India. ¹²⁰⁸Department of Public Health, University of Naples Federico II, Naples, Italy. ¹²⁰⁹Privatpraxis, Heidelberg, Germany. ¹²¹⁰Saveetha Medical College and Hospitals, Saveetha University, Chennai, India. ¹²¹¹Division of Research and Development, Lovely Professional University, Phagwara, India. ¹²¹²National Research and Innovation Agency, Jakarta, Indonesia. ¹²¹³Department of Clinical Research, Nepal Health Research Council, Kathmandu, Nepal. ¹²¹⁴Department of Biophysics, University of Athens, Athens, Greece. ¹²¹⁵Department of Preventive Medicine, Yonsei University, Seoul, South Korea. ¹²¹⁶Department of Medical Humanities and Social Medicine, Kosin University, Busan, South Korea. ¹²¹⁷Yonsei University College of Medicine, Seodaemun-gu, South Korea. ¹²¹⁸Cardiology Department, MercyOne North Iowa Medical Center, Mason City, IA, USA. ¹²¹⁹Global Health Governance Programme, University of Edinburgh, Edinburgh, UK. ¹²²⁰School of Dentistry, University of Leeds, Leeds, UK. ¹²²¹Department of Epidemiology, Human Genetics and Environmental Sciences, The University of Texas Health Science Center at Houston, Dallas, TX, USA. ¹²²²Department of Epidemiology, University of Arkansas for Medical Sciences, Little Rock, AR, USA. ¹²²³Department of Psychiatry, Oklahoma State University, Norman, OK, USA. ¹²²⁴Department of Psychiatry, Oklahoma State University, Tulsa, OK, USA. ¹²²⁵Department of Neurology and Public Health, Icahn School of Medicine at Mount Sinai, New York, NY, USA. ¹²²⁶Department of Pharmacology, Shaqra University, Shaqra, Saudi Arabia. ¹²²⁷Research Consultancy, Author Gate Publications, Malegaon, India. ¹²²⁸Department of General Surgery, University of Texas, Seattle, WA, USA. ¹²²⁹Research Section, Nepal Health Research Council, Kathmandu, Nepal. ¹²³⁰Faculty of Humanities and Social Sciences, Tribhuvan University, Kathmandu, Nepal. ¹²³¹Department of Genetics, Yale University, New Haven, CT, USA. ¹²³²Department of Physiology, Iran University of Medical Sciences, Tehran, Iran. ¹²³³Physiology Research Center, Iran University of Medical Sciences, Tehran, Iran. ¹²³⁴College of Public Health, Medical and Veterinary Sciences, James Cook University, Townsville, NSW, Australia. ¹²³⁵Clinical Research Department, IRCCS Fondazione Don Carlo Gnocchi, Milan, Italy. ¹²³⁶Department of Infection Control, Taihe Hospital, Shiyang, China. ¹²³⁷The First Clinical College, Hubei University of Medicine, Shiyang, China. ¹²³⁸Department of Neurology, IRCCS Humanitas Research Hospital, Milan, Italy. ¹²³⁹Center for Research and Innovation, Ateneo De Manila University, Pasig City, Philippines. ¹²⁴⁰Department of Pharmacy, Pharmacology and Health Technologies, University of Lisbon, Lisbon, Portugal. ¹²⁴¹Institute of Collective Health, Federal University of Bahia, Salvador, Brazil. ¹²⁴²Mario Negri Institute for Pharmacological Research, Bergamo, Italy. ¹²⁴³Department of Biology, University of Bahrain, Sakir, Bahrain. ¹²⁴⁴Pennsylvania Cancer and Regenerative Medicine Center, Baruch S Blumberg Institute, Doylestown, PA, USA. ¹²⁴⁵Department of Medicine, Xavier University School of Medicine, Woodbury, NY, USA. ¹²⁴⁶School of Optometry and Vision Science, University of New South Wales, Sydney, NSW, Australia. ¹²⁴⁷Department of Medicine, Endocrinology Unit, University of Padova, Padova, Italy. ¹²⁴⁸Associazione Italiana Ricerca Oncologica di Base (AIROB), Padova, Italy. ¹²⁴⁹Shanghai Mental Health Center, Shanghai Jiao Tong University, Shanghai, China. ¹²⁵⁰Department of Psychiatry, Columbia University, New York, NY, USA. ¹²⁵¹SSD Epidemiology Screening, City of Health and Science University Hospital of Turin, Turin, Italy. ¹²⁵²Basic Medical Sciences Department, Durban University of Technology, Durban, South Africa. ¹²⁵³International Center of Medical Sciences Research, Islamabad, Pakistan. ¹²⁵⁴Molecular Medicine Research Center, Tabriz University of Medical Sciences, Tabriz, Iran. ¹²⁵⁵Research School of Chemistry and Applied Biomedical Sciences, Tomsk Polytechnic University, Tomsk, Russia. ¹²⁵⁶Mental Health Research Institute, Tomsk National Research Medical Center of the Russian Academy of Sciences, Tomsk, Russia. ¹²⁵⁷Department of Dermatology, College of Medicine and Sagore Dutta Hospital, Kolkata, India. ¹²⁵⁸Medical College, Tairunnessa Memorial Medical College and Hospital, Gazipur, Bangladesh. ¹²⁵⁹School of Public Health, University of Adelaide, Adelaide, SA, Australia. ¹²⁶⁰Department of Experimental Medicine, Sapienza University of Rome, Rome, Italy. ¹²⁶¹Department of Medicine, Monash University, Melbourne, VIC, Australia. ¹²⁶²Department of Data Management and Analysis, The INCLIN Trust International, New Delhi, India. ¹²⁶³Discipline of General Practice, University of Newcastle, Callaghan, NSW, Australia. ¹²⁶⁴University Medical Center Groningen, University of Groningen, Groningen, Netherlands. ¹²⁶⁵Center of Excellence in Higher Education for Pharmaceutical Care Innovation, Universitas Padjadjaran (Padjadjaran University), Bandung, Indonesia. ¹²⁶⁶Non-Communicable Diseases Research Center, Bam University of Medical Sciences, Bam, Iran. ¹²⁶⁷Centro de Investigaciones Clínicas (Clinical Research Center), Fundación Valle del Lili (Valle del Lili Foundation), Cali, Colombia. ¹²⁶⁸Centro de Estudios en Protección Social y Economía (PROESA), Universidad Icesi (ICESI University), Cali, Colombia. ¹²⁶⁹Department of Community Medicine, Tribhuvan University, Kathmandu, Nepal. ¹²⁷⁰Harvard T.H. Chan School of Public Health, Harvard University, Boston, MA, USA. ¹²⁷¹Askok and Rita Patel Institute of

Physiotherapy, Charotar University of Science and Technology, Anand, India. ¹²⁷²Department of Nephrology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India. ¹²⁷³Center for Interdisciplinary Research (CiEM), Instituto Universitário Egas Moniz, Almada, Portugal. ¹²⁷⁴Department of Neonatology, Case Western Reserve University, Cleveland, OH, USA. ¹²⁷⁵School of Engineering, Macquarie University, Sydney, NSW, Australia. ¹²⁷⁶Pohang University of Science and Technology, Pohang, South Korea. ¹²⁷⁷College of Medicine, University of Central Florida, Orlando, FL, USA. ¹²⁷⁸Department of Medical Oncology, Cancer Institute (W.I.A), Chennai, India. ¹²⁷⁹Department of Medicine, University of Alberta, Edmonton, AB, Canada. ¹²⁸⁰Department of Anesthesia, Cihan University of Sulaimaniya, Sulaimaniya, Iraq. ¹²⁸¹Health education and promotion, Isfahan University of Medical Sciences, Isfahan, Iran. ¹²⁸²Data Mining Research Unit (DaMRA), Charles Sturt University, Wagga Wagga, NSW, Australia. ¹²⁸³National Institute of Infectious Diseases, Center for Surveillance, Immunization, and Epidemiologic Research, Tokyo, Japan. ¹²⁸⁴Center for Evidence-Based Medicine and Clinical Research, Dhaka, Bangladesh. ¹²⁸⁵Manipal TATA Medical College, Manipal Academy of Higher Education, Manipal, India. ¹²⁸⁶School of Nursing and Healthcare Professions, Federation University Australia, Berwick, VIC, Australia. ¹²⁸⁷Future Technology Research Center, National Yunlin University of Science and Technology, Yunlin, Taiwan. ¹²⁸⁸Department of Public Health, Torbat Jam Faculty of Medical Sciences, Torbat Jam, Iran. ¹²⁸⁹IRCCS Azienda Ospedaliero Universitaria di Bologna, Sant'Orsola Malpighi Hospital, Bologna, Italy. ¹²⁹⁰Department of Medical, Surgical and Experimental Sciences, University of Sassari, Sassari, Italy. ¹²⁹¹Gynecology and Breast Care Center, Mater Olbia Hospital, Olbia, Italy. ¹²⁹²Department of Medicine, Manipal Academy of Higher Education, Mangalore, India. ¹²⁹³Institute of Environment and Sustainable Development, Banaras Hindu University, Varanasi, India. ¹²⁹⁴Clinic for Anesthesia and Intensive Care, Medical University Innsbruck, Innsbruck, Austria. ¹²⁹⁵Department of Nephrology, Nizam's Institute of Medical Sciences, Hyderabad, India. ¹²⁹⁶Department of Cardiology, Emory University, Atlanta, GA, USA. ¹²⁹⁷Leadership Institute for Global Health Transformation (LIGHT), National University of, Singapore, Singapore. ¹²⁹⁸Department of Epidemiology, Biostatistics and Occupational Health, McGill University, Montreal, QC, Canada. ¹²⁹⁹Research and Innovation Division, South Asian Institute for Social Transformation (SAIST), Dhaka, Bangladesh. ¹³⁰⁰Research Department, Policy Research Institute, Kathmandu, Nepal. ¹³⁰¹Health and Public Policy Department, Global Center for Research and Development, Kathmandu, Nepal. ¹³⁰²Department of Community Medicine, Manipal Academy of Higher Education, Manipal, India. ¹³⁰³Department of Oral Pathology, Sharavathi Dental College and Hospital, Shimogga, India. ¹³⁰⁴Department of Cardiology, Tehran University of Medical Sciences, Tehran, Iran. ¹³⁰⁵Department of Geography, Soran University, Soran, Iraq. ¹³⁰⁶Department of Biomedical Engineering, Khulna University of Engineering and Technology, Khulna, Bangladesh. ¹³⁰⁷Department of Health Services Management, Shiraz University of Medical Sciences, Shiraz, Iran. ¹³⁰⁸WHO Collaborating Centre for Public Health Education and Training, Imperial College London, London, UK. ¹³⁰⁹Inovus Medical, St Helens, UK. ¹³¹⁰Department of Computer Science, Boston University, Boston, MA, USA. ¹³¹¹Cardiovascular Research Center, Shiraz University of Medical Sciences, Shiraz, Iran. ¹³¹²Department Biological Sciences, King Abdulaziz University, Jeddah, Egypt. ¹³¹³Department of Protein Research, Research and Academic Institution, Alexandria, Egypt. ¹³¹⁴School of Medicine, Western Sydney University, Campbelltown, NSW, Australia. ¹³¹⁵Translational Health Research Institute, Western Sydney University, Campbelltown, NSW, Australia. ¹³¹⁶Department of Health Information Management, Manipal Academy of Higher Education, Manipal, India. ¹³¹⁷Network of Immunity in Infection, Malignancy and Autoimmunity (NIIMA), Universal Scientific Education and Research Network (USERN), Tehran, Iran. ¹³¹⁸School of Public Health, Kermanshah University of Medical Sciences, Kermanshah, Iran. ¹³¹⁹Department of Epidemiology and Biostatistics, Rafsanjan University of Medical Sciences, Rafsanjan, Iran. ¹³²⁰Department of Public Health, Masaryk University, Brno, Czech Republic. ¹³²¹Czech National Centre for Evidence-based Healthcare and Knowledge Translation, Masaryk University, Brno, Czech Republic. ¹³²²The University of Lahore, Lahore, Pakistan. ¹³²³Department of Pharmacy, Shaheed Benazir Bhutto University Sheringal Pakistan, Dir Upper, Pakistan. ¹³²⁴Centre of Telehealth, Federal University of Minas Gerais, Belo Horizonte, Brazil. ¹³²⁵School of Physiotherapy, University of Otago, Dunedin, New Zealand. ¹³²⁶Faculty of Agrarian Sciences and Environment, University of the Azores, Angra do Heroísmo, Portugal. ¹³²⁷Escola de Enfermagem da UFMG, Federal University of Minas Gerais, Belo Horizonte, Brazil. ¹³²⁸Department of Surgery, University of Minnesota, Minneapolis, MN, USA. ¹³²⁹Department of Surgery, University Teaching Hospital of Kigali, Kigali, Rwanda. ¹³³⁰Department of Geography and Demography, University of Coimbra, Coimbra, Portugal. ¹³³¹Health Economics Research Centre, University of Oxford, Oxford, UK. ¹³³²Department of Pharmacology and Toxicology, Universidad de Antioquia (University of Antioquia), Medellin, Colombia. ¹³³³Department of Clinical Research, Federal University of Uberlândia, Uberlândia, Brazil. ¹³³⁴Clinical and Epidemiological Research in Primary Care (GICEAP), Maimonides Biomedical Research Institute of Cordoba (IMIBIC), Cordoba, Spain. ¹³³⁵Maurizio Bufalini Hospital, Cesena, Italy. ¹³³⁶Department of Public Health Sciences, University of Miami, Miami, FL, USA. ¹³³⁷School of Medicine, Gonabad University of Medical Sciences, Gonabad, Iran. ¹³³⁸Faculty of Medicine, Queset International University Perak, Ipoh, Malaysia. ¹³³⁹African Genome Center, Mohammed VI Polytechnic University (UM6P), Ben Guerir, Morocco. ¹³⁴⁰Center for Research in Congenital Anomalies and Rare Diseases, Universidad Icesi (ICESI University), Cali, Colombia. ¹³⁴¹Malaria Atlas Project, Telethon Kids Institute, Perth, WA, Australia. ¹³⁴²Department of Health Statistics, National Institute for Medical Research, Dar es Salaam, Tanzania. ¹³⁴³Department of Oral and Maxillofacial Surgery, JSS Academy of Higher Education and Research, Mysore, India. ¹³⁴⁴Cardiovascular Department, Zagazig University, Zagazig, Egypt. ¹³⁴⁵Directorate General Health Prevention, Ministry of Health, Rome, Italy. ¹³⁴⁶Department of Infectious Diseases, National Institute of Health, Rome, Italy. ¹³⁴⁷Department of Medical Pharmacology, Cairo University, Giza, Egypt. ¹³⁴⁸Department of Neurology, University of L'Aquila, L'Aquila, Italy. ¹³⁴⁹School of Psychiatry, University of New South Wales, Kensington, NSW, Australia. ¹³⁵⁰Neuropsychiatric Institute, Prince of Wales Hospital, Randwick, NSW, Australia. ¹³⁵¹Department of Cardiology, Department of Veterans Affairs, Decatur, GA, USA. ¹³⁵²Department of Cardiology, Medical College of Georgia at Augusta University, Augusta, GA, USA. ¹³⁵³Sharjah Institute for Medical Research, University of Sharjah, Sharjah, United Arab Emirates. ¹³⁵⁴Research Consultation Center (RCC), Shiraz University of Medical Sciences, Shiraz, Iran. ¹³⁵⁵Health Information Management, Semnan University of Medical Sciences, Semnan, Iran. ¹³⁵⁶Cardiac Rehabilitation Research Center, Isfahan University of Medical Sciences, Isfahan, Iran. ¹³⁵⁷Department of Pediatric Neurology, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. ¹³⁵⁸Department of Pharmaceutical Chemistry, Medical University of Gdańsk, Gdańsk, Poland. ¹³⁵⁹Multi-disciplinary Laboratory Foundation University School of Health Sciences (FUSH), Foundation University, Islamabad, Pakistan. ¹³⁶⁰International Center of Medical Sciences Research (ICMSR), Islamabad, Pakistan. ¹³⁶¹TB Control Pakistan, World Health Organisation, Islamabad, Pakistan. ¹³⁶²Department of Neurology, Christian-Doppler University Hospital, Salzburg, Austria. ¹³⁶³Spinal Cord Injury and Tissue Regeneration Center Salzburg (SCI-TReCS), Paracelsus Medical University, Salzburg, Austria. ¹³⁶⁴Faculty of Medicine, Bioscience and Nursing, MAHSA University, Selangor, Malaysia. ¹³⁶⁵Interdisciplinary Research Centre in Biomedical Materials (IRCBM), COMSATS Institute of Information Technology, Lahore, Pakistan. ¹³⁶⁶Department of Psychiatry, All India Institute of Medical Sciences, New Delhi, India. ¹³⁶⁷Department of Psychosocial Science, University of Bergen, Bergen, Norway. ¹³⁶⁸Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran. ¹³⁶⁹Biotechnology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran. ¹³⁷⁰Department of Development Studies, International Institute for Population Sciences, Mumbai, India. ¹³⁷¹Department of Public Health and Health Systems, Nagoya University, Nagoya, Japan. ¹³⁷²Department of Statistics, University of Gujrat, Pakistan, Gujrat, Pakistan. ¹³⁷³Department of Clinical Medical Sciences, The University of the West Indies, St. Augustine, Trinidad and Tobago. ¹³⁷⁴Thoracic Department, North Central Regional Health Authority, Champ Fleurs, Trinidad and Tobago. ¹³⁷⁵Department of Pediatrics, Ministry of Health and Population, <City>, Eritrea. ¹³⁷⁶Department of Pediatrics, Ohio State University, Columbus, OH, USA. ¹³⁷⁷Medical Laboratory, Azad University of Medical Sciences, Tehran, Iran. ¹³⁷⁸Advanced Therapy Medicinal Products Department, Royan Institution, Tehran, Iran. ¹³⁷⁹Department of Biosciences, New Delhi, India. ¹³⁸⁰Public Health and Community Medicine Department, Cairo

University, Giza, Egypt. ¹³⁸¹Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran. ¹³⁸²School of Public Health, Taipei Medical University, Taipei, Taiwan. ¹³⁸³Department of Entomology, Ain Shams University, Cairo, Egypt. ¹³⁸⁴Medical Ain Shams Research Institute (MASRI), Ain Shams University, Cairo, Egypt. ¹³⁸⁵Department of Nutrition and Preventive Medicine, Case Western Reserve University, Cleveland, OH, USA. ¹³⁸⁶School of Public Health and Health Management, University of Belgrade, Belgrade, Serbia. ¹³⁸⁷Department of Infectious Diseases and Tropical Medicine, Federal University of Minas Gerais, Belo Horizonte, Brazil. ¹³⁸⁸Research Development Coordination Section, Pakistan Health Research Council, Islamabad, Pakistan. ¹³⁸⁹School of Sciences, University of Management and Technology, Lahore, Pakistan. ¹³⁹⁰Independent Consultant, Thiruvananthapuram, India. ¹³⁹¹Department of Public Health, Jahrom University of Medical Sciences, Jahrom, Iran. ¹³⁹²Department of Community Medicine, Manipal Academy of Higher Education, Gangtok, India. ¹³⁹³Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran. ¹³⁹⁴Colorectal Research Center, Iran University of Medical Sciences, Tehran, Iran. ¹³⁹⁵Faculty of Health and Social Sciences, Bournemouth University, Bournemouth, UK. ¹³⁹⁶Department of Family and Preventive Medicine, Emory University, Atlanta, GA, USA. ¹³⁹⁷UGC Centre of Advanced Study in Psychology, Utkal University, Bhubaneswar, India. ¹³⁹⁸Udyam-Global Association for Sustainable Development, Bhubaneswar, India. ¹³⁹⁹IRCCS Istituti Clinici Scientifici Maugeri (IRCCS Maugeri Scientific Clinical Institute), Milan, Italy. ¹⁴⁰⁰Department of Public Health Sciences, University of North Carolina at Charlotte, Charlotte, NC, USA. ¹⁴⁰¹Department of Preventive and Social Medicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, India. ¹⁴⁰²Department of Medical Oncology, Huntsman Cancer Institute, Salt Lake City, UT, USA. ¹⁴⁰³Department of Neurology, National and Kapodistrian University of Athens, Athens, Greece. ¹⁴⁰⁴Department of Neurology, Columbia University, New York, NY, USA. ¹⁴⁰⁵Dobney Hypertension Centre, University of Western Australia, Perth, WA, Australia. ¹⁴⁰⁶Hypertension and Kidney Disease Laboratory, Baker Heart and Diabetes Institute, Melbourne, VIC, Australia. ¹⁴⁰⁷Psychiatry and Psychotherapy, University of Regensburg, Regensburg, Germany. ¹⁴⁰⁸Department of Health Sciences, Federal University of Santa Catarina, Araranguá, Brazil. ¹⁴⁰⁹Department of Psychology, University of Alabama at Birmingham, Birmingham, AL, USA. ¹⁴¹⁰Department of Population and Health, University of Cape Coast, Cape Coast, Ghana. ¹⁴¹¹Emergency Department, Manian Medical Centre, Erode, India. ¹⁴¹²Fourth Department of General Surgery, Emergency University Hospital Bucharest, Bucuresti, Romania. ¹⁴¹³Iranian Research Center for HIV/AIDS, Tehran University of Medical Sciences, Tehran, Iran. ¹⁴¹⁴National Heart, Lung, and Blood Institute, National Institute of Health, Rockville, MD, USA. ¹⁴¹⁵Clinical Research Development Unit of Farshchian Heart Center, Hamedan University of Medical Sciences, Hamadan, Iran. ¹⁴¹⁶Department of Family Medicine, Aga Khan University, Karachi, Pakistan. ¹⁴¹⁷Department of Medicine, Tehran University of Medical Sciences, Tehran, Iran. ¹⁴¹⁸Public Health Division, An-Najah National University, Nablus, Palestine. ¹⁴¹⁹Department of Chemistry, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, Iran. ¹⁴²⁰Independent Consultant, Karachi, Pakistan. ¹⁴²¹Medical College, Kerala University of Health Sciences, Thrissur, India. ¹⁴²²Dental School, Mashhad University of Medical Sciences, mashhad, Iran. ¹⁴²³Department of Health Education and Promotion, Jazan University, Jazan, Saudi Arabia. ¹⁴²⁴Institute of Public Health, University of Gondar, Gondar, Ethiopia. ¹⁴²⁵Department of Nursing, Debre Berhan University, Debre Berhan, Ethiopia. ¹⁴²⁶Interdisciplinary Center Psychopathology and Emotion Regulation (ICPE), University of Groningen, Groningen, Netherlands. ¹⁴²⁷Nahavand School of Allied Medical Sciences, Hamadan University of Medical Sciences, Hamadan, Iran. ¹⁴²⁸Department of Nursing Management, Iran University of Medical Sciences, Tehran, Iran. ¹⁴²⁹Faculty of Medicine, Universidad del Azuay (University of Azuay), Cuenca, Ecuador. ¹⁴³⁰Department of Medical Oncology, Kent Hospital, Warwick, RI, USA. ¹⁴³¹Faculty of Medicine and Health, University of New South Wales, Sydney, NSW, Australia. ¹⁴³²Department of Physiotherapy, Kathmandu University, Dhulikhel, Nepal. ¹⁴³³Institute of Forensic Science and Criminology, Panjab University, Chandigarh, India. ¹⁴³⁴Department of Engineering, Free University of Brussels (ULB), Bruxelles, Belgium. ¹⁴³⁵Department of Ophthalmology, Harvard Medical School, Boston, MA, USA. ¹⁴³⁶Ophthalmic Research Center (ORC), Shahid Beheshti University of Medical Sciences, Tehran, Iran. ¹⁴³⁷Department of Health Policy and Community Health, Georgia Southern University, Statesboro, GA, USA. ¹⁴³⁸Faculty of Public Health, University of Medicine, Tirana, Albania. ¹⁴³⁹Centre for Medical Informatics, University of Edinburgh, Edinburgh, UK. ¹⁴⁴⁰Division of General Internal Medicine, Harvard University, Boston, MA, USA. ¹⁴⁴¹Department of Health in Disasters and Emergencies, Shahrekord University of Medical Sciences, Shahrekord, Iran. ¹⁴⁴²Department of Health Information Management, Iran University of Medical Sciences, Tehran, Iran. ¹⁴⁴³Department of Cardiovascular Medicine, Cleveland, OH, USA. ¹⁴⁴⁴Department of Obstetrics and Gynaecology, Manipal Academy of Higher Education, Mangalore, India. ¹⁴⁴⁵Department of Biochemistry, Royal College of Surgeons in Ireland Medical University of Bahrain, Busaiteen, Bahrain. ¹⁴⁴⁶Friedman School of Nutrition Science and Policy, Tufts University, Boston, MA, USA. ¹⁴⁴⁷Department of Population Study, China Population and Development Research Center, Beijing, China. ¹⁴⁴⁸Department of Speech Therapy, Kermanshah University of Medical Sciences, Kermanshah, Iran. ¹⁴⁴⁹National Institute of Infectious Diseases, Tokyo, Japan. ¹⁴⁵⁰Department of Pediatrics, Yonsei University College of Medicine, Seoul, South Korea. ¹⁴⁵¹Finnish Institute of Occupational Health, Helsinki, Finland. ¹⁴⁵²Department of Health Management and Economics, Tehran University of Medical Sciences, Tehran, Iran. ¹⁴⁵³Washington State University, Pullman, WA, USA. ¹⁴⁵⁴Department of Public Health Dentistry, Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, India. ¹⁴⁵⁵Department of Clinical Immunology and Hematology, Sofia University Hospital, Sofia, Bulgaria. ¹⁴⁵⁶Department of Genetics, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria. ¹⁴⁵⁷Department of International Studies, Non-Communicable Diseases Research Center (NCDC), Tehran, Iran. ¹⁴⁵⁸Department of Medical-Surgical Nursing, Mazandaran University of Medical Sciences, Sari, Iran. ¹⁴⁵⁹Department of Nursing and Health Sciences, Flinders University, Adelaide, SA, Australia. ¹⁴⁶⁰Department of Internal Medicine, Mount Sinai Hospital, Chicago, IL, USA. ¹⁴⁶¹School of Pharmacy, Monash University, Selangor Darul Ehsan, Malaysia. ¹⁴⁶²National Institute of Psychology, Quaid-i-Azam University, Islamabad, Pakistan. ¹⁴⁶³The Cooper Institute, Dallas, TX, USA. ¹⁴⁶⁴Department of Psychology, Reykjavik University, Reykjavik, Iceland. ¹⁴⁶⁵Department of Health and Behavior Studies, Columbia University, New York, NY, USA. ¹⁴⁶⁶Center of Potential and Innovation of Natural Resources, Polytechnic Institute of Guarda, Guarda, Portugal. ¹⁴⁶⁷Health Sciences Research Centre, University of Beira Interior, Covilhã, Portugal. ¹⁴⁶⁸Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran. ¹⁴⁶⁹Social and Administrative Pharmacy, University of Gondar, Gondar, Ethiopia. ¹⁴⁷⁰WSB University in Gdańsk, Gdańsk, Poland. ¹⁴⁷¹Department of Physical Therapy, Shiraz University of Medical Sciences, Shiraz, Iran. ¹⁴⁷²Department of Anatomy, All India Institute of Medical Sciences, Bathinda, India. ¹⁴⁷³School of Public Health and Zoonoses, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India. ¹⁴⁷⁴School of Veterinary Science, University of Sydney, Sydney, NSW, Australia. ¹⁴⁷⁵Department of Community Medicine, Lady Hardinge Medical College, New Delhi, India. ¹⁴⁷⁶Department of Community Medicine, All India Institute of Medical Sciences, Jodhpur, India. ¹⁴⁷⁷Department of Pulmonary and Critical Care Medicine, Medical College of Wisconsin, Milwaukee, WI, USA. ¹⁴⁷⁸School of Medicine, University of Alabama at Birmingham, Birmingham, AL, USA. ¹⁴⁷⁹Department of Medicine Service, US Department of Veterans Affairs (VA), Birmingham, AL, USA. ¹⁴⁸⁰Department of Pediatrics, All India Institute of Medical Sciences, Jodhpur, India. ¹⁴⁸¹Faculty of Medicine and Health Sciences, Shree Guru Gobind Singh Tricentenary University, Gurugram, India. ¹⁴⁸²Department of Radiodiagnosis, All India Institute of Medical Sciences, Bathinda, India. ¹⁴⁸³Department of Pharmacology, All India Institute of Medical Sciences, Jodhpur, India. ¹⁴⁸⁴Department of Internal Medicine, University of Indonesia, Jakarta Pusat, Indonesia. ¹⁴⁸⁵Department of Internal Medicine, Dr. Cipto Mangunkusumo National Hospital, Jakarta Pusat, Indonesia. ¹⁴⁸⁶Maternal and Child Health Division, International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh. ¹⁴⁸⁷Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark. ¹⁴⁸⁸Department of Physiotherapy and Occupational Therapy, Næstved-Slagelse-Ringsted Hospitals, Slagelse, Denmark. ¹⁴⁸⁹Clinical Branch, Moscow Research and Practical Centre on Addictions, Moscow, Russia. ¹⁴⁹⁰Addiction Psychiatry Department, Russian Medical Academy of Continuous Professional Education, Moscow, Russia. ¹⁴⁹¹Department of Infectious Diseases and Epidemiology,

Pirogov Russian National Research Medical University, Moscow, Russia. ¹⁴⁹²Division of Injury Prevention, The Bizzell Group, Atlanta, GA, USA. ¹⁴⁹³Department of Surgery, “Sf. Pantelimon” Emergency Clinical Hospital Bucharest, Bucharest, Romania. ¹⁴⁹⁴Department of Nursing, Dire Dawa University, Dire Dawa, Ethiopia. ¹⁴⁹⁵Department of Medicine, University of Calgary, Calgary, AB, Canada. ¹⁴⁹⁶Department of Medicine, University of Washington, Seattle, WA, USA. ¹⁴⁹⁷Department of Health Policy and Management, University of Georgia College of Public Health, Athens, GA, USA. ¹⁴⁹⁸Department of Microbiology, All India Institute of Medical Sciences, Bilaspur, India. ¹⁴⁹⁹Hospital Universitario de La Princesa (Princess University Hospital), Autonomous University of Madrid, Madrid, Spain. ¹⁵⁰⁰Centro de Investigación Biomédica en Red Enfermedades Respiratorias (CIBERES) (Center for Biomedical Research in Respiratory Diseases Network), Madrid, Spain. ¹⁵⁰¹Directive Board, Associação de Profissionais Licenciados de Optometria (Association of Licensed Optometry Professionals), Linda-a-Velha, Portugal. ¹⁵⁰²Hull York Medical School, University of Hull, Hull City, UK. ¹⁵⁰³Division of Community Medicine, International Medical University, Kuala Lumpur, Malaysia. ¹⁵⁰⁴Nutrition and Dietetics Department, Federal Research Institute of Nutrition, Biotechnology and Food Safety, Moscow, Russia. ¹⁵⁰⁵Department of Internal Disease, Pirogov Russian National Research Medical University, Moscow, Russia. ¹⁵⁰⁶Department of Primary Care and Public Health, University of East Anglia, Norwich, UK. ¹⁵⁰⁷Public Health England, London, UK. ¹⁵⁰⁸Management Department, Bucharest University of Economic Studies, Bucharest, Romania. ¹⁵⁰⁹Risk and Resilience in Mental Disorders Unit, South African Medical Research Council, Cape Town, South Africa. ¹⁵¹⁰Department of Psychology, Deakin University, Burwood, VIC, Australia. ¹⁵¹¹Department of Pathophysiology, European University Cyprus Medical School, Engomi, Cyprus. ¹⁵¹²Department of Pediatrics, Emory University, Atlanta, GA, USA. ¹⁵¹³School of Life Sciences, Xiamen University, China, Xiamen, China. ¹⁵¹⁴Department of Mental Health Research, Independent Consultant, Khulna, Bangladesh. ¹⁵¹⁵Division of Global Mental Health, EviSyn Health, Khulna, Bangladesh. ¹⁵¹⁶School of Medicine, Griffith University, Gold Coast, QLD, Australia. ¹⁵¹⁷School of Computing Sciences, University of Technology Sydney, Sydney, NSW, Australia. ¹⁵¹⁸The George Institute for Global Health, Sydney, NSW, Australia. ¹⁵¹⁹Faculty of Health and Public Administration, Semmelweis University, Budapest, Hungary. ¹⁵²⁰Department of Internal Medicine, Iran University of Medical Sciences, Tehran, Iran. ¹⁵²¹Department of Medicine, University of Valencia, Valencia, Spain. ¹⁵²²Carlos III Health Institute, Biomedical Research Networking Center for Mental Health Network (Ciber-SAM), Madrid, Spain. ¹⁵²³Department of Nutrition Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran. ¹⁵²⁴Department of Medical Education, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ¹⁵²⁵School of Social Work, University of Illinois, Urbana, IL, USA. ¹⁵²⁶Cancer Control Center, Osaka International Cancer Institute, Osaka, Japan. ¹⁵²⁷School of Dentistry and Oral Health, Griffith University, Gold Coast, QLD, Australia. ¹⁵²⁸Trauma and Injury Research Center, Iran University of Medical Sciences, Tehran, Iran. ¹⁵²⁹Medical Ethics and Law Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ¹⁵³⁰Living Systems Institute, University of Exeter, Exeter, UK. ¹⁵³¹Department of Biostatistics and Epidemiology, Shahid Sadoughi University of Medical Sciences, Yazd, Iran. ¹⁵³²Pathology Department, Alexandria University, Alexandria, Egypt. ¹⁵³³Department of Dermatology, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania. ¹⁵³⁴Department of Dermato-Venereology, Dr. Victor Babes Clinical Hospital of Infectious Diseases and Tropical Diseases, Bucharest, Romania. ¹⁵³⁵Department of Surgery, National University of Singapore, Singapore, Singapore. ¹⁵³⁶School of Nursing and Public Health, University of KwaZulu-Natal, Durban, South Africa. ¹⁵³⁷Department of Economics, Rice University, Houston, TX, USA. ¹⁵³⁸Department of Research and Innovation, Enventure Medical Innovation, Houston, TX, USA. ¹⁵³⁹Department of Pathology, University of Texas, Galveston, TX, USA. ¹⁵⁴⁰Department of Health Education and Health Promotion, Mashhad University of Medical Sciences, Mashhad, Iran. ¹⁵⁴¹Department of Nursing, Bahir Dar University, Bahir Dar, Ethiopia. ¹⁵⁴²Department of Social Medicine, Osaka University, Osaka, Japan. ¹⁵⁴³Department of Midwifery, Ethiopian Public Health Institute, Addis Ababa, Ethiopia. ¹⁵⁴⁴Department of Pharmacology, All India Institute of Medical Sciences, Raipur, India. ¹⁵⁴⁵Public Health Department, Amrita Institute of Medical Sciences, Kochi, India. ¹⁵⁴⁶Department of Medicine, University of Cape Town, Cape Town, South Africa. ¹⁵⁴⁷Department of Internal Medicine, University of Zürich, Zurich, Switzerland. ¹⁵⁴⁸Department of Endocrinology, Diabetes and Metabolism, Christian Medical College and Hospital (CMC), Vellore, India. ¹⁵⁴⁹Department of Gastroenterology, PSG Institute of Medical Sciences and Research, Coimbatore, India. ¹⁵⁵⁰Department of Pharmaceutical Health Outcomes and Policy, University of Houston, Houston, TX, USA. ¹⁵⁵¹Prescription Drug Misuse Education and Research Center, University of Houston, Houston, TX, USA. ¹⁵⁵²Faculty of Biomedical Engineering, Czech Technical University, Prague, Czech Republic. ¹⁵⁵³Faculty of Public Health, Universitas Sam Ratulangi, Manado, Indonesia. ¹⁵⁵⁴Department of Pathology, University of Cape Town, Cape Town, South Africa. ¹⁵⁵⁵Department of Biochemistry and Molecular Biology, University of Buea, Buea, Cameroon. ¹⁵⁵⁶Institute of Public Health, Jagiellonian University Medical College, Kraków, Poland. ¹⁵⁵⁷Agency for Health Technology Assessment and Tariff System, Warsaw, Poland. ¹⁵⁵⁸Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, India. ¹⁵⁵⁹SRM College of Pharmacy, SRM Institute of Science and Technology (SRMIST), Chennai, India. ¹⁵⁶⁰School of Public Health and Social Work, Queensland University of Technology, Brisbane, QLD, Australia. ¹⁵⁶¹Health Informatics Department, Hanoi Medical University, Ha Noi, Viet Nam. ¹⁵⁶²Department of Neurology, All India Institute of Medical Sciences, Delhi, India. ¹⁵⁶³National Institute of Medical Statistics, National Institute of Medical Statistics, New Delhi, India. ¹⁵⁶⁴Department of Community and Family Medicine, All India Institute of Medical Sciences, Nagpur, India. ¹⁵⁶⁵Rigshospitalet, University of Copenhagen, Copenhagen, Denmark. ¹⁵⁶⁶Department of Vascular Surgery, Ludwig Maximilians University, Munich, Germany. ¹⁵⁶⁷Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore, Singapore. ¹⁵⁶⁸Public Health Department, Salale University, Fiche, Ethiopia. ¹⁵⁶⁹Department of Epidemiology and Biostatistics, Haramaya University, Harar, Ethiopia. ¹⁵⁷⁰College of Public Health, University of the Philippines Manila, Manila, Philippines. ¹⁵⁷¹Institute of Soil and Environmental Sciences, University of Agriculture, Faisalabad, Faisalabad, Pakistan. ¹⁵⁷²Department of Zoology, University of Education, Lahore, Lahore, Pakistan. ¹⁵⁷³Division of Science and Technology, University of Education, Lahore, Lahore, Pakistan. ¹⁵⁷⁴Department of Paraclinical Sciences, The University of the West Indies, St. Augustine, Trinidad and Tobago. ¹⁵⁷⁵Department of Pediatric Cardiology, Rush University, Chicago, IL, USA. ¹⁵⁷⁶Department of Community Medicine, Alex Ekwueme Federal University Teaching Hospital Abakaliki, Abakaliki, Nigeria. ¹⁵⁷⁷Department of Cardiovascular, Endocrine-Metabolic Diseases and Aging, National Institute of Health, Rome, Italy. ¹⁵⁷⁸Kasturba Medical College, Manipal Academy of Higher Education, Mangalore, India. ¹⁵⁷⁹Department of Neurology, Rafsanjan University of Medical Sciences, Rafsanjan, Iran. ¹⁵⁸⁰Non-Communicable Diseases Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran. ¹⁵⁸¹Clinical Cancer Research Center, Milad General Hospital, Tehran, Iran. ¹⁵⁸²Department of Microbiology, Islamic Azad University, Tehran, Iran. ¹⁵⁸³Argentine Society of Medicine, Buenos Aires, Argentina. ¹⁵⁸⁴Velez Sarsfield Hospital, Buenos Aires, Argentina. ¹⁵⁸⁵Urmia University of Medical Sciences, Urmia, Iran. ¹⁵⁸⁶Department of Cardiovascular Sciences, Katholieke Universiteit Leuven (University of Leuven), Leuven, Belgium. ¹⁵⁸⁷Laboratory of Toxicology, University of Crete, Heraklion, Greece. ¹⁵⁸⁸Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, India. ¹⁵⁸⁹Department of Internal Medicine, University of Groningen, Groningen, Netherlands. ¹⁵⁹⁰Department of Nephrology, Christian Medical College and Hospital (CMC), Vellore, India. ¹⁵⁹¹UKK Institute, Tampere, Finland. ¹⁵⁹²Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland. ¹⁵⁹³Institute of Public Health of Serbia, Belgrade, Serbia. ¹⁵⁹⁴Department of Infectious Disease, Kermanshah University of Medical Sciences, Kermanshah, Iran. ¹⁵⁹⁵Raffles Neuroscience Centre, Raffles Hospital, Singapore, Singapore. ¹⁵⁹⁶Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore. ¹⁵⁹⁷Department of Community and Family Medicine, All India Institute of Medical Sciences, Bathinda, India. ¹⁵⁹⁸Department of Medical and Surgical Sciences and Advanced Technologies, University of Catania, Catania, Italy. ¹⁵⁹⁹Department of Health Policy and Management, Johns Hopkins University, Baltimore, MD, USA. ¹⁶⁰⁰Department of Medical and Surgical Sciences, University of Bologna, Bologna, Italy. ¹⁶⁰¹Occupational Health Unit, Sant’Orsola Malpighi

Hospital, Bologna, Italy. ¹⁶⁰²Department of Biochemistry, JSS Academy of Higher Education and Research, Mysore, India. ¹⁶⁰³Department of Health Care Administration and Economics, National Research University Higher School of Economics, Moscow, Russia. ¹⁶⁰⁴Faculty of Information Technology, HUTECH University, Ho Chi Minh City, Viet Nam. ¹⁶⁰⁵Department of Neurosurgery, Erasmus University Medical Center, Rotterdam, Netherlands. ¹⁶⁰⁶Center for Experimental Microsurgery, Iuliu Hațieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania. ¹⁶⁰⁷Institute for Global Health Innovations, Duy Tan University, Da Nang, Viet Nam. ¹⁶⁰⁸Faculty of Medicine, Duy Tan University, Da Nang, Viet Nam. ¹⁶⁰⁹School of Population Health and Environmental Sciences, King's College London, London, UK. ¹⁶¹⁰Department of Otolaryngology, Peking University Third Hospital, Beijing, China. ¹⁶¹¹Department of Family Medicine, McGill University, Montreal, QC, Canada. ¹⁶¹²China Centre for Health Development Studies, Peking University, Beijing, China. ¹⁶¹³Centre for Health Policy Research, Torrens University Australia, Adelaide, SA, Australia. ¹⁶¹⁴Department of Biomedical Sciences, City University of Hong Kong, Hong Kong, China. ¹⁶¹⁵Department of Medicine, General Internal Medicine and Health Services Research, University of California Los Angeles, Los Angeles, CA, USA. ¹⁶¹⁶Department of Medicine, Greater Los Angeles VA Healthcare System, Los Angeles, CA, USA. ¹⁶¹⁷Key Laboratory of Shaanxi Province for Craniofacial Precision Medicine Research, Stomatological Hospital (College) of Xi'an Jiaotong University, Xi'an, China. ¹⁶¹⁸Competence Center of Mortality-Follow-Up of the German National Cohort, Federal Institute for Population Research, Wiesbaden, Germany. ¹⁶¹⁹Department of Physical Therapy, Naresuan University, Phitsanulok, Thailand. ¹⁶²⁰Department of Community Medicine, Rajarata University of Sri Lanka, Anuradhapura, Sri Lanka. ¹⁶²¹Department of Epidemiology and Biostatistics, Dilla University, Dilla, Ethiopia. ¹⁶²²NIHR Biomedical Research Centre, Guy's and St. Thomas' Hospital and Kings College London, London, UK. ¹⁶²³Bone and Joint Research Group, Royal Cornwall Hospital, Truro, UK. ¹⁶²⁴Global Alliance for Musculoskeletal Health, St Leonards, Australia. ¹⁶²⁵Department of Orthopaedics, Wenzhou Medical University, Wenzhou, China. ¹⁶²⁶Department of Public Health, Arba Minch University, ARBA MINCH, Ethiopia. ¹⁶²⁷Department of Health Policy and Administration, Universitas Airlangga (Airlangga University), Surabaya, Indonesia. ¹⁶²⁸School of Public Health, Zhejiang University, Zhejiang, China. ¹⁶²⁹Department of Public Health Science, Fred Hutchinson Cancer Research Center, Seattle, WA, USA. ¹⁶³⁰Department of Behavior and Operation Management, Beijing Advanced Innovation Center for Big Data-based Precision Medicine, Beijing, China. ¹⁶³¹Department of Family Medicine and Community Health, Duke University, Durham, NC, USA. ¹⁶³²Department of Endocrinology, University of Science and Technology of China, Hefei, China. ¹⁶³³School of Medicine, University of Rochester, Rochester, NY, USA. ¹⁶³⁴Cardiovascular Program, The George Institute for Global Health, Sydney, NSW, Australia. ¹⁶³⁵Department of Clinical Microbiology, Iranshahr University of Medical Sciences, Iranshahr, Iran. ¹⁶³⁶Department of Diabetes and Metabolic Diseases, University of Tokyo, Tokyo, Japan. ¹⁶³⁷Research and Development Center for Health Services, University of Tsukuba, Tsukuba, Japan. ¹⁶³⁸Graduate School of Medicine, Osaka University, Suita, Japan. ¹⁶³⁹Cancer Epidemiology and Prevention Research, Alberta Health Services, Calgary, AB, Canada. ¹⁶⁴⁰Department of Oncology, University of Calgary, Calgary, AB, Canada. ¹⁶⁴¹Department of Family Medicine and Community Health, Duke University, Durham, IL, USA. ¹⁶⁴²School of International Development and Global Studies, University of Ottawa, Ottawa, ON, Canada. ¹⁶⁴³The George Institute for Global Health, Imperial College London, London, UK. ¹⁶⁴⁴Department of Pediatric Allergy and Immunology, Tabriz University of Medical Sciences, Tabriz, Iran. ¹⁶⁴⁵Department of Pediatric Allergy and Immunology, Tehran University of Medical Sciences, Tehran, Iran. ¹⁶⁴⁶National Center for Chronic and Non-communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China. ¹⁶⁴⁷The George Institute for Global Health, University of New South Wales, Sydney, NSW, Australia. ¹⁶⁴⁸Center for Population Health Research, KHAPhnom Penh, Cambodia. ¹⁶⁴⁹Department of Health Management, Süleyman Demirel Üniversitesi (Süleyman Demirel University), Isparta, Türkiye. ¹⁶⁵⁰Centre for Suicide Research and Prevention, University of Hong Kong, Hong Kong, China. ¹⁶⁵¹Department of Social Work and Social Administration, University of Hong Kong, Hong Kong, China. ¹⁶⁵²Department of Pediatrics, Kyung Hee University, Seoul, South Korea. ¹⁶⁵³Department of Neuropsychopharmacology, National Center of Neurology and Psychiatry, Kodaira, Japan. ¹⁶⁵⁴Department of Public Health, Juntendo University, Tokyo, Japan. ¹⁶⁵⁵Macquarie Medical School, Macquarie University, Sydney, NSW, Australia. ¹⁶⁵⁶Department of Health Policy and Management, Jackson State University, Jackson, MS, USA. ¹⁶⁵⁷School of Business and Economics, Universiti Putra Malaysia (University of Putra Malaysia), Kuala Lumpur, Malaysia. ¹⁶⁵⁸Department of Environmental Health, Mazandaran University of Medical Sciences, Sari, Iran. ¹⁶⁵⁹Injury Prevention and Safety Promotion Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ¹⁶⁶⁰Department of Internal Medicine, Qom University of Medical Sciences, Qom, Iran. ¹⁶⁶¹Duke Global Health Institute, Duke University, Durham, NC, USA. ¹⁶⁶²Epidemiology and Cancer Registry Sector, Institute of Oncology Ljubljana, Ljubljana, Slovenia. ¹⁶⁶³Department of Pulmonary and Critical Care Medicine, Tehran University of Medical Sciences, Baltimore, MD, USA. ¹⁶⁶⁴Urology and Nephrology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. ¹⁶⁶⁵Faculty of Medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran. ¹⁶⁶⁶Department of Computer Science and Software Engineering, United Arab Emirates University, Al Ain, United Arab Emirates. ¹⁶⁶⁷Department of Health Sciences, James Madison University, Harrisonburg, VA, USA. ¹⁶⁶⁸Hospital San Juan de Dios, Tarija, Bolivia. ¹⁶⁶⁹Research and Development Department, Sina Medical Biochemistry Technologies, Shiraz, Iran. ¹⁶⁷⁰Department of Psychiatry, Tehran University of Medical Sciences, Tehran, Iran. ¹⁶⁷¹Nursing Care Research Center in Chronic Diseases, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. ¹⁶⁷²Department of Bioengineering and Therapeutic Sciences, University of California San Francisco, San Francisco, CA, USA. ¹⁶⁷³Addictology Department, Russian Medical Academy of Continuous Professional Education, Moscow, Russia. ¹⁶⁷⁴Centre of Clinical Epidemiology, Hôtel Dieu Hospital, Assistance Publique Hôpitaux de Paris, Paris, France. ¹⁶⁷⁵Department of Gastroenterology and Nutrition, Assistance Publique Hôpitaux de Paris, Paris, France. ¹⁶⁷⁶Department of Public Health, Dilla University, Dilla, Ethiopia. ¹⁶⁷⁷Department of Epidemiology and Public Health, University of Basel, Basel, Switzerland. ¹⁶⁷⁸Department of Nursing, Samara University, Semera, Ethiopia. ¹⁶⁷⁹Department of General Practice, University of Melbourne, Melbourne, VIC, Australia. ¹⁶⁸⁰Victorian Comprehensive Cancer Centre, Melbourne, VIC, Australia. ¹⁶⁸¹School of Medicine, Wuhan University, Wuhan, China. ¹⁶⁸²School of Biology and Pharmaceutical Engineering, Wuhan Polytechnic University, Wuhan, China. ¹⁶⁸³School of Health Sciences, Wuhan University, Wuhan, China. ¹⁶⁸⁴David Geffen School of Medicine, University of California Los Angeles, Los Angeles, CA, USA. ¹⁶⁸⁵Department of Nursing, Yasuj University of Medical Sciences, Yasuj, Iran. ¹⁶⁸⁶Department of Paediatrics and Child Health, University of Cape Town, Cape Town, South Africa. ¹⁶⁸⁷Department of Infection, University College London, London, UK. ¹⁶⁸⁸NIHR-Biomedical Research Centre (NIHR-BRC), University College London Hospitals, London, UK. ¹⁶⁸⁹Health Technology Assessment Unit, Department of Health Philippines, Manila, Philippines. ¹⁶⁹⁰MentalHealthPH, Inc., Quezon City, Philippines. ¹⁶⁹¹These authors contributed equally: Cecilia Anza-Ramirez, J. Jaime Miranda. ✉ e-mail: cecilia.anza@upch.pe