

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

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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,

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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

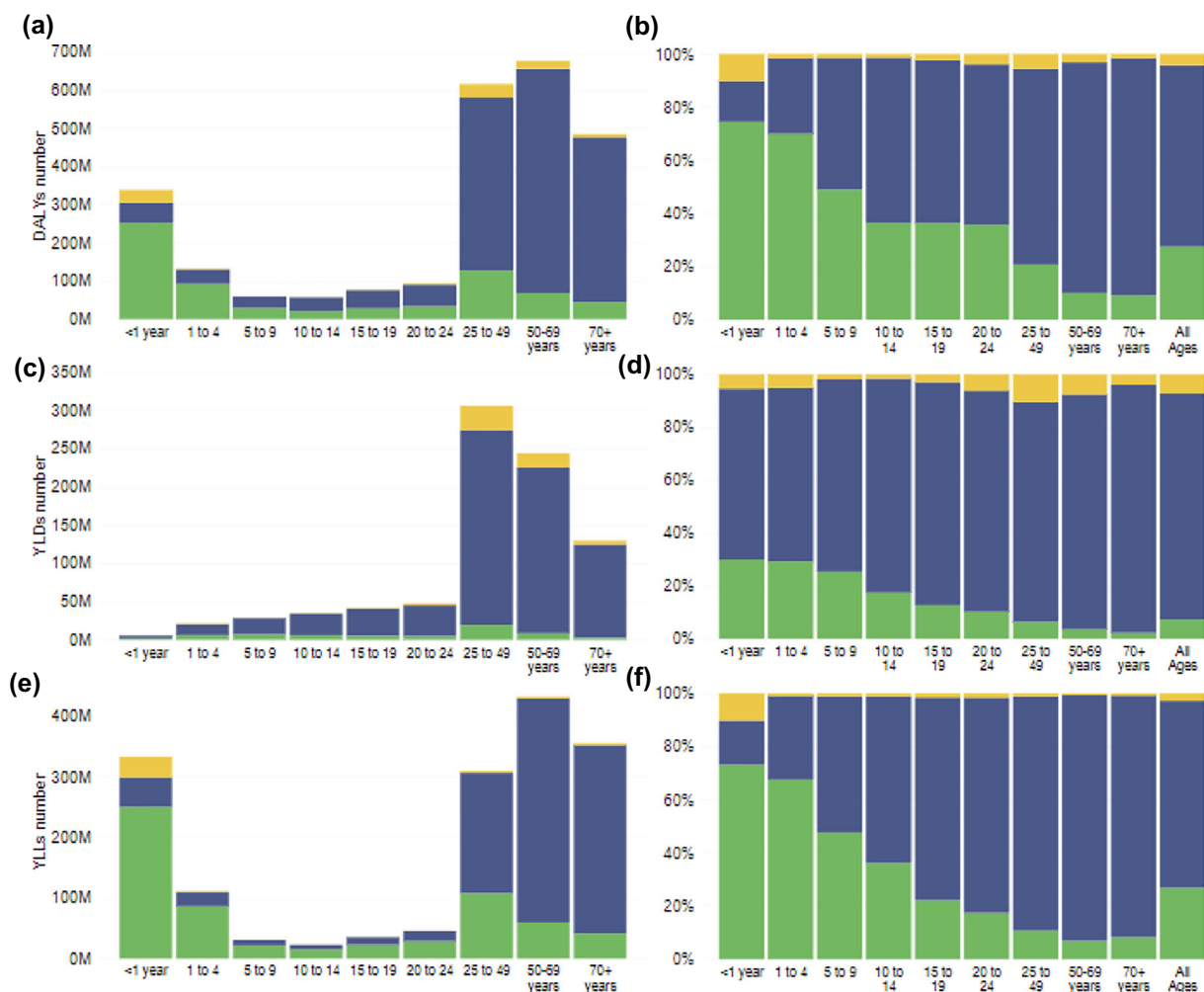


Fig. 1 | Number and percentage of DALYs, YLDs, and YLLs attributed to acute and chronic care conditions. Left figures show number and right figures show percentage of global (a, b) disability-adjusted life years (DALYs), (c, d) years lived

with disability (YLDs), and (e, f) years of live 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).

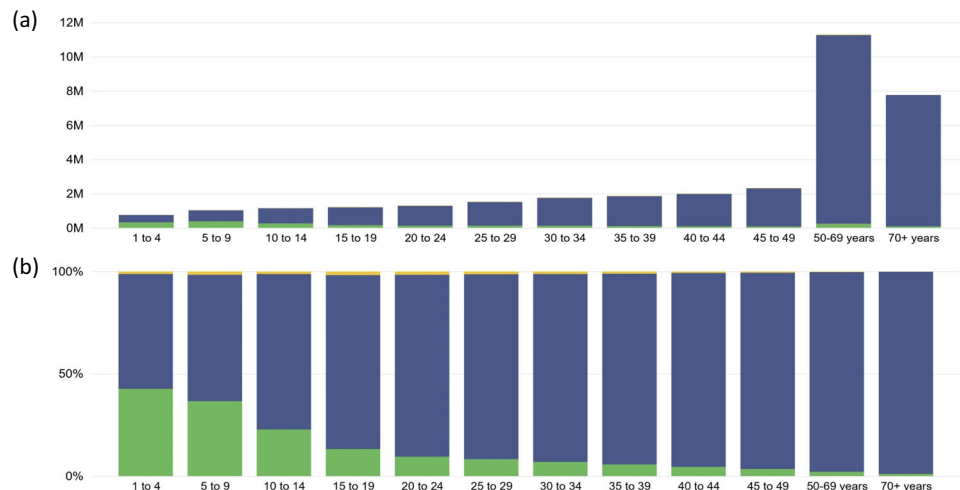


Fig. 3 | Number and percentage of YLDs for both sexes by age group using the care needs classification for sequelae. Number (a) and percentage (b) of global years lived with disability (YLDs) according to the care needs classification (i.e.: acute [green], chronic [blue], and undetermined [yellow]) by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

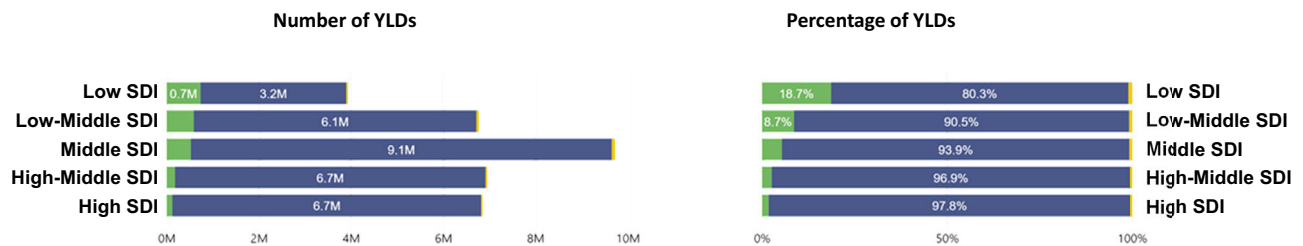


Fig. 4 | All-age number and percentage of YLDs by care needs classification and SDI attributed to sequelae. All-age number and percentage of years lived in disability for 379 sequelae classified by their care needs classification (i.e: acute [green], chronic [blue], and undetermined [yellow]) by Socio-demographic 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 cost.²⁵ 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.

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