The escalating global burden of serious health-related suffering: projections to 2060 by world regions, age groups, and health conditions

Katherine E Sleeman, Maja de Brito, Simon Etkind, Kennedy Nkhoma, Ping Guo, Irene J Higginson, Barbara Gomes, Richard Harding

Summary

Background Serious life-threatening and life-limiting illnesses place an enormous burden on society and health systems. Understanding how this burden will evolve in the future is essential to inform policies that alleviate suffering and prevent health system weakening. We aimed to project the global burden of serious health-related suffering requiring palliative care until 2060 by world regions, age groups, and health conditions.

Methods We projected the future burden of serious health-related suffering as defined by the *Lancet* Commission on Palliative Care and Pain Relief, by combining WHO mortality projections (2016–60) with estimates of physical and psychological symptom prevalence in 20 conditions most often associated with symptoms requiring palliative care. Projections were described in terms of absolute numbers and proportional change compared with the 2016 baseline data. Results were stratified by World Bank income regions and WHO geographical regions.

Findings By 2060, an estimated 48 million people (47% of all deaths globally) will die with serious health-related suffering, which represents an 87% increase from 26 million people in 2016. 83% of these deaths will occur in low-income and middle-income countries. Serious health-related suffering will increase in all regions, with the largest proportional rise in low-income countries (155% increase between 2016 and 2060). Globally, serious health-related suffering will increase most rapidly among people aged 70 years or older (183% increase between 2016 and 2060). In absolute terms, it will be driven by rises in cancer deaths (16 million people, 109% increase between 2016 and 2060). The condition with the highest proportional increase in serious-related suffering will be dementia (6 million people, 264% increase between 2016 and 2060).

Interpretation The burden of serious health-related suffering will almost double by 2060, with the fastest increases occurring in low-income countries, among older people, and people with dementia. Immediate global action to integrate palliative care into health systems is an ethical and economic imperative.

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Introduction

Palliative care and the relief of suffering have been described as some of the most neglected dimensions of global health.[1] In 2018, the *Lancet* Commission on Palliative Care and Pain Relief[2] stated that no other important health intervention is as lacking or inequitably distributed as pain relief, the pillar of palliative care. Despite the 2014 World Health Assembly resolution[3] calling for all member states to develop, strengthen, and implement palliative care services as part of universal health coverage, such services remain underdeveloped or non-existent in many parts of the world. Currently, 45% of countries have no access to palliative care.[4]

Access to palliative care is an emerging challenge and public health priority, crucial for global health. Patients with serious illness experience a substantial burden of suffering, with associated costs to society.[5] Improving health through the avoidance of suffering is an essential component of high-quality health systems and has the potential to generate economic benefits.[6] Evidence that investment in palliative care services can relieve suffering for patients and families, and save money for health systems and society as a whole, is increasing.[7] This evidence applies to high-income, middle-income, and low-income countries, where palliative care can be delivered frequently at lower cost than the alternatives, with more favourable patient-reported outcomes.[8,9]

The integration of palliative care within health systems requires an understanding of population needs. Several epidemiological approaches have been developed to quantify population palliative care needs, all of which rely on mortality data.[10–15] Approaches to estimate the population palliative care need include applying a fixed proportion to the total number of deaths in a population,[10] use of expert consensus to identify the causes of death

Research in context

Evidence before this study

Palliative care can relieve suffering for patients and families, and save money for health systems and society. To direct effective health-care planning and policy development, it is essential to understand both the current and future level of palliative care need. We searched PubMed, MEDLINE, Embase, and CINAHL from inception to Oct 26, 2018, using search terms "palliative care" (and "terminal care", "end of life care") and "needs assessment", without language restrictions, to identify population-based approaches to assess palliative care need. We examined the reference lists and citations for 15 relevant papers and searched relevant chapters of the Oxford Textbook of Palliative Medicine (fifth edition) and Textbook of Palliative Medicine and Supportive Care (second edition). We identified seven approaches to population-based assessment of palliative care need. In 2018, the *Lancet* Commission on Palliative Care and Pain Relief assessed the global need for palliative care through a new measure of serious health-related suffering that incorporates mortality data for 20 life-threatening and life-limiting health conditions with 15 corresponding symptoms. The *Lancet* Commission estimated that over 25 million people who died in 2015 experienced serious health-related suffering. No studies that projected the future global need for palliative care were identified.

Added value of this study

We have produced the first worldwide projections of the future need for palliative care, based on serious health-related suffering. We have shown that the global burden caused by this type of suffering is projected to increase in both absolute and relative terms. By 2060, an estimated 48 million people (47% of all deaths globally) will die each year with serious health-related suffering, and 83% of these deaths will occur in low-income and middle-income countries, which represents an 87% increase in global suffering compared with 2016. This increase is mainly driven by increases in the number of cancer deaths, with suffering projected to increase most rapidly among people with dementia. Low-income countries are projected to have the most dramatic rise in suffering (155% increase between 2016 and 2060, compared with 87% in lower-middle income countries, 88% in upper-middle income countries, and 57% in high-income countries). Globally, the burden of serious health-related suffering is projected to increase most rapidly in people aged 70 years or older, with an increase among younger age groups, including children, expected in low-income countries.

Implications of all the available evidence

The global burden of serious health-related suffering requiring palliative care is projected to almost double by 2060, with the biggest proportional increase in low-income countries. In these countries, for every 100 people dying with serious health-related suffering in 2016, we estimate that there will be 250 people dying with serious health-related suffering in 2060. Without improvement in palliative care integration into health systems, as well as failure to relieve the suffering of millions of dying people, there will be increased pressure on already vulnerable health systems that will compound poverty through placing a greater burden on families and informal care. These data call for global policies to strengthen health-care systems through availability of essential drugs, staff training, public education, and support to communities, with a focus on the populations that will experience the fastest rise of suffering and need: those who live in low-income countries, older people, and people with dementia.

most likely to benefit from palliative care,[11] and incorporation of information on hospital admissions or symptom prevalence in these assessments.[11–13] Although these methods have been influential in terms of global advocacy, they have been applied mainly in high-income countries, with limited cross-national comparison.[14] WHO did a global palliative care needs assessment in 2014. On the basis of mortality data for 12 relevant conditions, and by use of pain prevalence as an indicator of palliative care need, it was estimated that over 20 million people worldwide required palliative care at the end of life.[4] In 2018, the *Lancet* Commission on Palliative Care and Pain Relief[2] described a new construct of serious health-related suffering, defined as suffering associated with a need for palliative care, and estimated the global burden using mortality data for 20 conditions, adjusted for the prevalence of both physical and psychosocial symptoms. The *Lancet* Commission estimated that over 25 million people who died in 2015 (accounting for 45% of all deaths) experienced serious health-related suffering, 80% of whom were in low-income and middle-income countries (LMICs).

Planning effective and efficient health systems requires an understanding of both current and future population needs. Worldwide, a combination of population ageing and an increase in non-communicable diseases means that the total number of deaths is projected to increase from 57 million in 2016 to over 100 million in 2060,[16] which will result in an increase in the global need for palliative care, greater levels of unnecessary suffering, and will threaten vulnerable health systems. To generate data that will help health systems to anticipate and respond to future needs, our aim was to project the future global burden of serious health-related suffering requiring palliative care until 2060, and to identify the world regions, age groups, and health conditions for which suffering and palliative care need are expected to rise the most.

Methods

Study design

This study was a population-based projections study using secondary analysis of global mortality data. We projected the future burden of serious health-related suffering, as defined by the *Lancet* Commission on

	ICD-10 codes used to identify number deaths	Multiplier (%)
Haemorrhagic fevers	A02, A05, A20–28, A31, A32, A38, A40–49, A65–70, A74–79, A80–81, A87–89, A92–99, B0–04, B06–15, B25–49, B58–60, B64, B66–72, B74·3–74·9, B75, B78, B80–89, B91–99 (except B94·1)	All 5%
Tuberculosis	A15–19	Drug-resistant tuberculosis 100%, other types 90%
HIV	B20–24	All 100%
Malignant neoplasms (except leukaemia)	C0–97 (except C91–95)	All 90%
Leukaemia	C91–95	All 90%
Dementia	F01–03, G30, G31	All 80%
Inflammatory CNS diseases	A33–35, A39, A50–53, A82, A83–86, B05, B56, B94·1, G0, G03, G04	Syphilis 70%, measles 50%, tetanus 100%, meningitis 30%, encephalitis 30%, trypanosomiasis 100%, rabies 90%
Degenerative CNS diseases	G06–12, G20–21, G23–25, G35–37, G40–41, G45–98 (except G72·1)	Parkinson's disease 65%, epilepsy 50%, multiple sclerosis 100%, other neurological conditions 65%
Cerebrovascular diseases	I60–69	All 65%
Non-ischaemic heart diseases	B57, I01–15, I30–33, I38, I40, I42	Rheumatic heart disease 65%; hypertensive heart disease 70%; cardiomyopathy, myocarditis, and endocarditis 40%; Chagas disease 30%
Chronic ischaemic heart diseases	I20–25	All 5%
Lung diseases	J30–98	COPD 80%, other respiratory diseases except asthma 50%
Liver diseases	B65, K20–K22, K28–K31, K38–K66, K70–92	Cirrhosis of the liver 95%, other digestive disease 30%, schistosomiasis 70%
Renal failure	N0–19	All 45%
Birth trauma, low birth weight, and prematurity	P03, P05, P07, P10–P15, P20–22, P24–29	Preterm birth complications 75%, birth asphyxia and birth trauma 40%
Congenital malformation	Q0–99	All 60%
Injury	V01–Y98	All 30%
Atherosclerosis	I0, I26–28, I34–37, I44–51, I70–99	All 35%
Musculoskeletal disorders	M0–99	All 70%
Malnutrition	E40–46	All 10%

International Classification of Diseases, tenth revision (ICD-10) code breakdown corresponds to the WHO's Global Health Estimates for 2016. COPD=chronic obstructive pulmonary disease.

Table 1: **Health conditions (according to the International Classification of Diseases, tenth revision) that most often generate a need for palliative care with associated multiplier, based on methods of the *Lancet* Commission on Palliative Care and Pain Relief**

Palliative Care and Pain Relief,[2] by combining WHO mortality projections from 2016 to 2060,[16] with estimates of physical and psychological symptom prevalence in 20 conditions. We modelled future estimates of suffering by World Bank income classification, WHO region, age, gender, and condition causing death.

Data sources

Mortality projections for the years 2016–60 were obtained from WHO's website.[16] These projections use the WHO Global Health Estimates,[17] global cause-specific mortality estimates from 2000 to 2016, as a baseline. WHO projections use a set of relatively simple models to project future mortality by cause, sex, age, and geographical region. They include the following socio-economic variables: average income measured as gross domestic product, average years of schooling (referred to as human capital), and time in years (a proxy

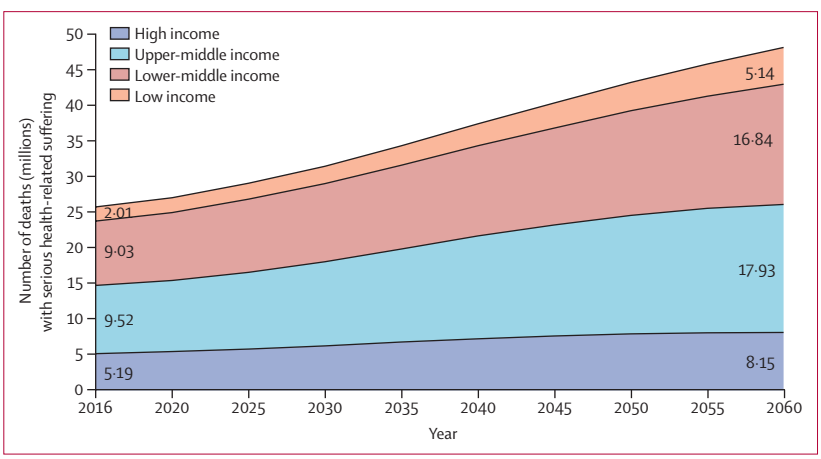

Figure 1: **Projected evolution of burden of serious health-related suffering in World Bank income regions until 2060**

	2016	2030	2045	2060	Difference 2016–60	Increase (%)	Proportion relative to all deaths in 2016*	Proportion relative to all deaths in 2060*
World	25 748 000	31 453 000	40 274 000	48 054 000	22 306 000	87%	45%	47%
Low-income countries	2 010 000	2 470 000	3 471 000	5 136 000	3 126 000	155%	38%	42%
Lower-middle income countries	9 028 000	10 952 000	13 607 000	16 840 000	7 812 000	87%	41%	42%
Upper-middle income countries	9 516 000	11 792 000	15 539 000	17 927 000	8 411 000	88%	50%	52%
High-income countries	5 193 000	6 239 000	7 656 000	8 151 000	2 958 000	57%	51%	53%

Because of rounding numbers, numbers might not add up precisely to totals indicated. *Proportion of deaths with serious health-related suffering relative to all deaths during that year.

Table 2: **Projected number of people dying with serious health-related suffering globally and in World Bank income regions**

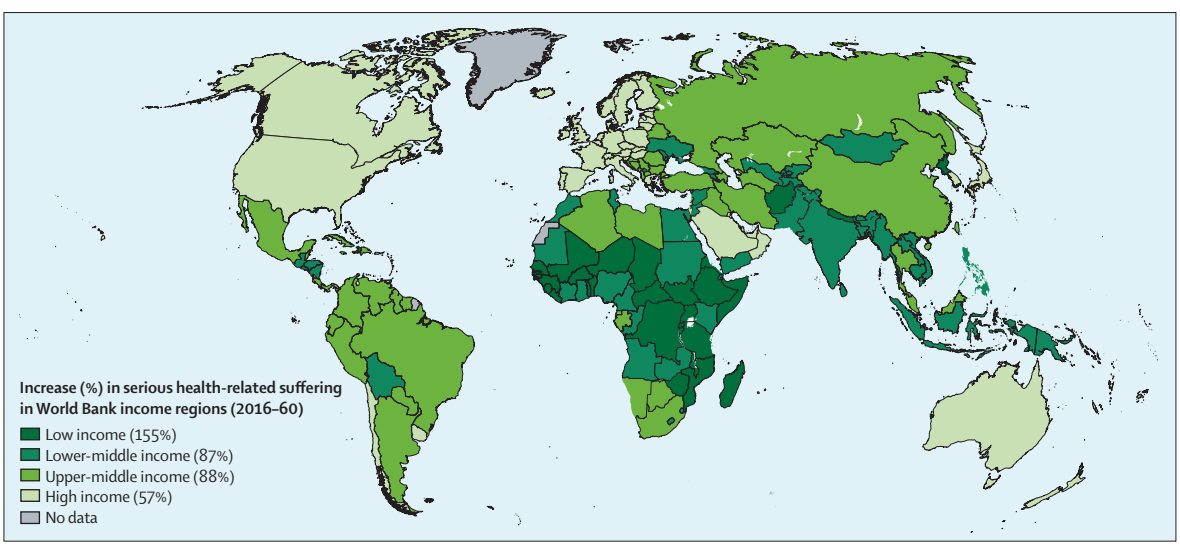

Figure 2: **Increase in serious health-related suffering from 2016 to 2060, by World Bank income region**

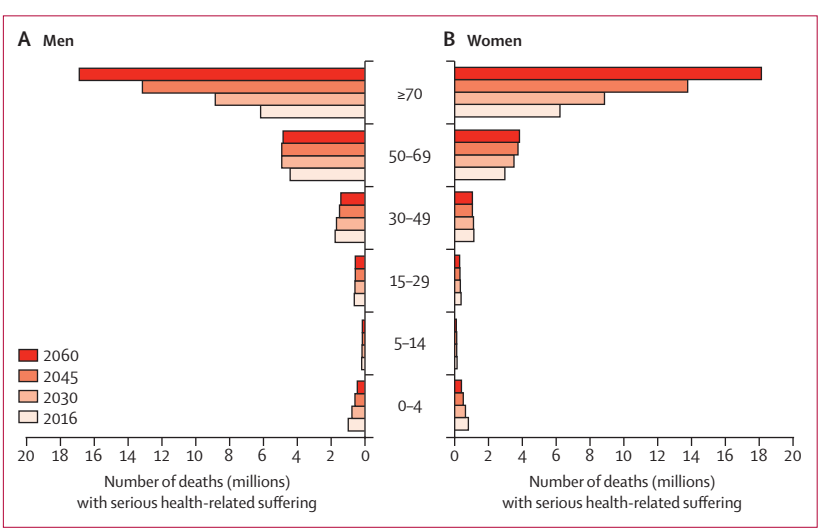

Figure 3: **Changes in the number of people dying with serious health-related suffering for global population stratified by age group and sex**

measure for the effect of technological change on health status). A fourth variable, smoking impact, is included in projections for malignant neoplasms, cardiovascular disease, and respiratory disease.[18] Projection models are developed for men and women, and for six age groups, in ten cause-of-death clusters, adjusted according to historically observed cause-specific mortality trends.[16,18,19] For some causes of death, projection models take into account special circumstances (eg, the scale-up of antiretroviral coverage in HIV). Projected death rates are converted to absolute numbers of deaths using the median population projections of the World Population Prospects 2017.[20] Changes in the absolute number of future deaths are thus a function of mortality rates and of demographic change in the size and age structure of the population.

Analysis

We used methods developed by the *Lancet* Commission on Palliative Care and Pain Relief.[2] Briefly, the *Lancet* Commissioners worked with an expert panel to identify

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health conditions most often associated with palliative care needs and developed multipliers to estimate the proportion of people with each condition likely to experience serious health-related suffering. Relevant health conditions were major causes of death (according to WHO Global Health Estimates)[17] that also typically cause serious health-related suffering; or common causes of serious health-related suffering even if the condition can be cured (eg, some malignancies), the person can recover (eg, serious injuries), the person might survive for 1 year or more with chronic severe disability (eg, cerebrovascular disease), the condition can be controlled for many years (eg, HIV/AIDS), or has a slowly progressive course (eg, dementia). The resulting list was revised by senior physicians with palliative care expertise from LMICs, producing a final list of 20 health conditions most often associated with symptoms requiring palliative care. The multiplier is a percentage applied to the total number of deaths in each condition to calculate the number of decedents who need palliative care. Multipliers were based on empirical evidence of the prevalence of 11 physical and four psychological symptoms frequently associated with the need for palliative care and refined based on expert consensus (including experts from LMICs) to provide global averages. For example, the multiplier for malignant neoplasms is 90% (average worldwide), indicating that 90% of all deaths with an underlying cause of malignant neoplasm would experience serious health-related suffering (table 1).[21]

We projected the future burden of serious health-related suffering from 2016 to 2060 in 5-year increments from 2020 (for WHO regions, data were available only for 2016, 2030, 2045, and 2060). The proportion of people dying with serious health-related suffering was calculated using the total number of projected deaths as the denominator. Projections were described in terms of absolute numbers and proportional change compared with the 2016 baseline data, for the global population, and separately for World Bank income regions (low income, lower-middle income, upper-middle income, and high income) and WHO regions (Africa, America, southeast Asia, Europe, eastern Mediterranean, and western Pacific), and by the condition causing death. The projected demographic structure associated with serious health-related suffering was described by age group (0–4 years, 5–14 years, 15–29 years, 30–49 years, 50–69 years, and 70 years or older) and gender, in 2016, 2030, 2045, and 2060, for global and regional populations. For presentation, estimates were rounded to the nearest 1000.

Role of the funding source

The funder had no role in study design, data collection, analysis and interpretation of data, decision to publish, or preparation of the manuscript. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

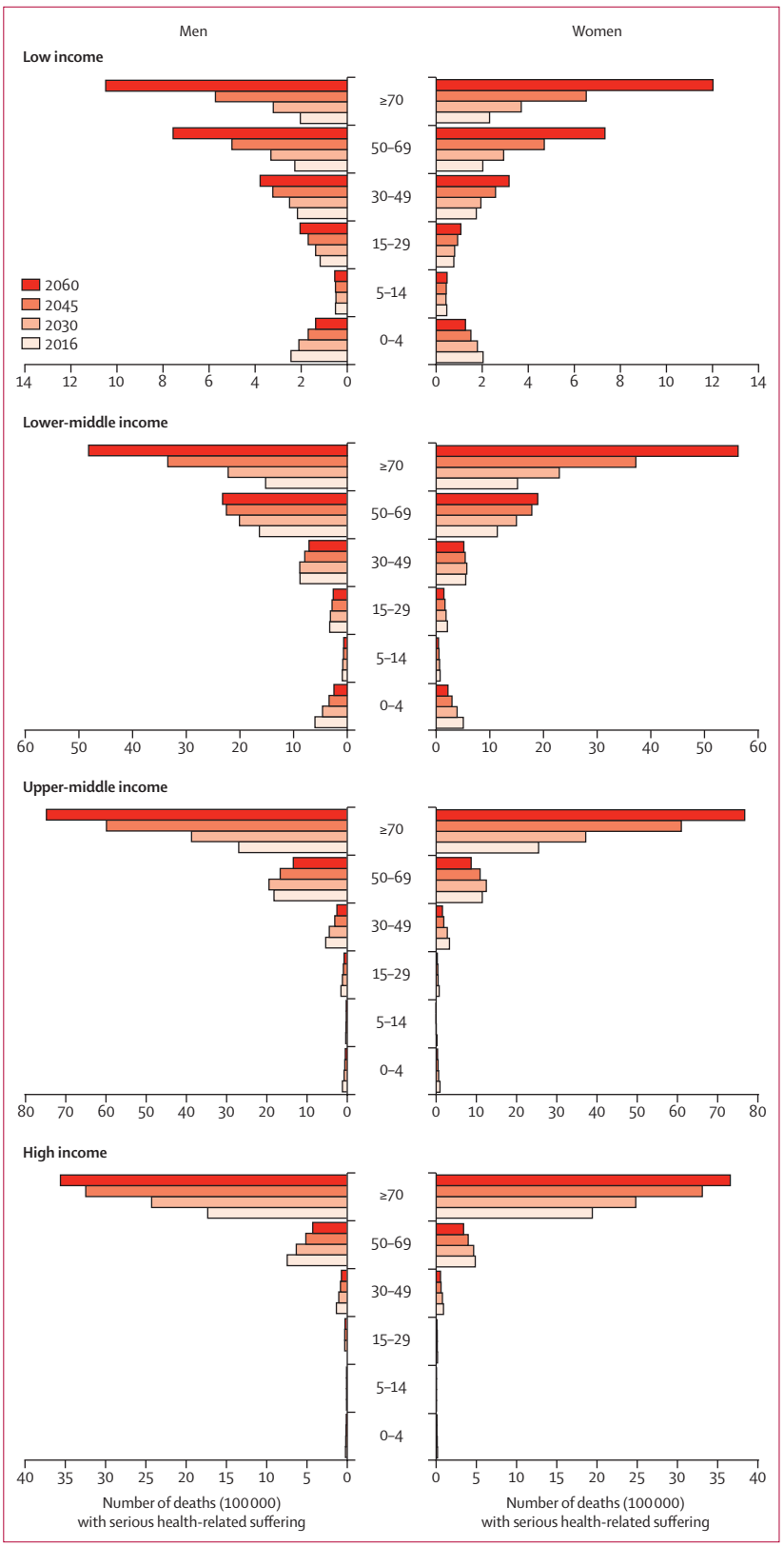

Figure 4: **Changes in the number of people dying with serious health-related suffering, stratified by age group and sex, for World Bank income regions**

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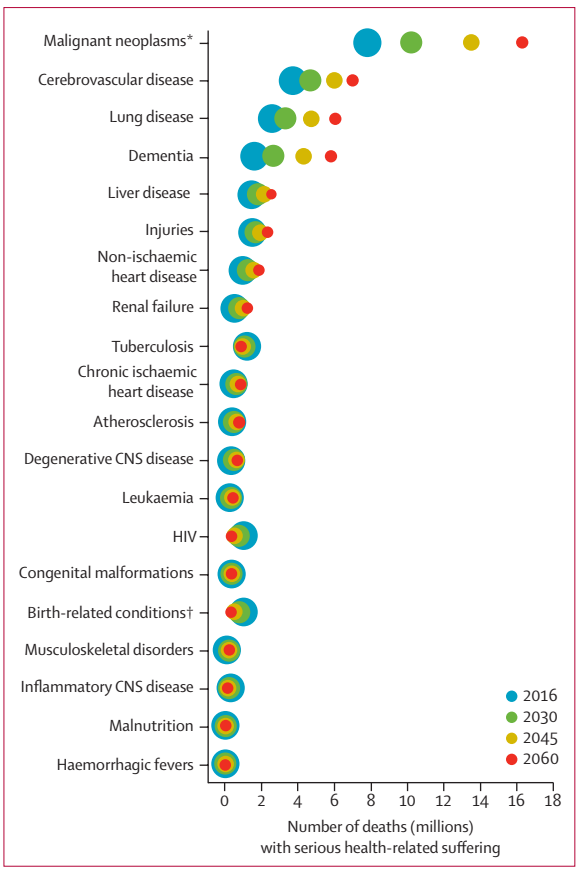


Figure 5: **Health conditions driving the global burden of serious health-related suffering (2016–60)**
*Excluding leukaemia. †Including birth trauma, low birthweight, and prematurity.

Results

The global burden of serious health-related suffering requiring palliative care is projected to increase between 2016 and 2060 in both absolute and relative terms. Globally, we estimated that the proportion of people dying with serious health-related suffering will increase from 45% of all deaths in 2016 to 47% in 2060. In absolute terms, in 2060, more than 48 million people will die with serious-health related suffering, 22 million more people compared with 2016, which represents an 87% increase in the number of people suffering (figure 1, table 2).

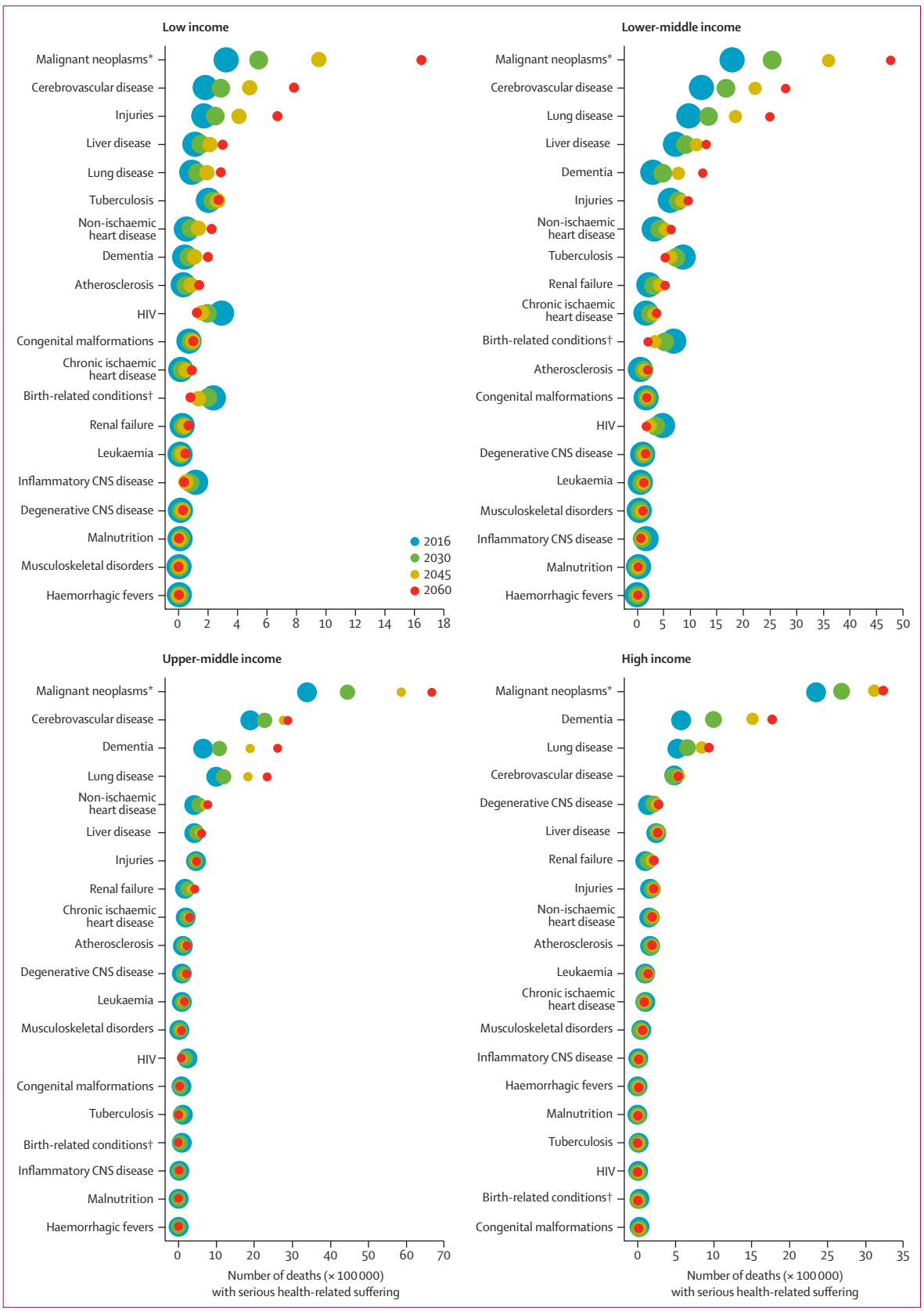
The burden of serious health-related suffering is projected to increase in all World Bank income regions between 2016 and 2060. By 2060, LMICs will account for 83% of serious health-related suffering (figure 1). Low-income countries will have the largest proportional rise: the proportion of people who experience serious health-related suffering will increase from 38% of all deaths in 2016, to 42% in 2060. The proportion of people with serious health-related suffering will increase from 41% to 42% in lower-middle income countries, from 50% to 52% in upper-middle income countries, and from 51% to 53% in high-income countries. In absolute terms, over 3 million more people will die in low-income countries with serious health-related suffering in 2060 compared with 2016, an increase of 155%. The highest absolute level of serious health-related suffering will occur in lower-middle and upper-middle income countries, with each region having 8 million more people with serious health-related suffering in 2060 compared with 2016. In high-income countries, almost 3 million more people will die with serious health-related suffering in 2060, an increase of 57% compared with 2016 (figure 2). In high-income countries the rise in serious health-related suffering is expected to slow down and plateau around 2050. By contrast, in low-income and lower-middle income countries, the burden of serious health related suffering will continue to increase (figure 1).

An increase in the burden of serious health-related suffering between 2016 and 2060, will occur in all WHO regions, with the highest proportional increases in the eastern Mediterranean (170% increase) and African (126% increase) regions. In absolute terms, the burden of serious health-related suffering will increase most in the western Pacific region (over 6 million more people in 2060, 87% increase compared with 2016; appendix p 3).

Globally, the burden of serious health-related suffering is projected to increase most rapidly in the oldest age group (≥70 years), with over 22 million more people in this group experiencing serious health-related suffering in 2060 compared with 2016 (183% increase; figure 3, appendix p 4). The shift of serious health-related suffering towards older age will occur in all regions but is most marked in low-income countries, where the number of people older than 70 years with serious health-related suffering will increase by more than 400% between 2016 and 2060 (compared with 243% in lower-middle income countries, 189% in upper-middle income countries, and 97% in high-income countries; calculated from appendix p 4). The shift towards the oldest age group in low-income countries will occur later than in higher-income countries, with a relatively greater increase between 2045 and 2060 than in higher-income countries (figure 4, appendix p 4). Globally, suffering is projected to decrease among younger age groups (0–4 years, 5–14 years, 15–29 years, and 30–49 years), except in low-income countries (5% increase in serious health-related suffering among children aged 5–14 years, between 2016 and 2060). Serious health-related suffering among infants (aged 0–4 years) will decline in all World Bank regions. For the age distribution of serious health-related suffering in WHO regions, see appendix (pp 5, 6).

Worldwide, the conditions contributing most to the increase in serious health-related suffering are malignant neoplasms, cerebrovascular disease, lung disease,

Figure 6: **Health conditions driving the global burden of serious health-related suffering in World Bank income regions (2016–60)**
*Excluding leukaemia. †Including birth trauma, low birthweight, and prematurity.


Low income
Malignant neoplasms*
Cerebrovascular disease
Injuries
Liver disease
Lung disease
Tuberculosis
Non-ischaemic heart disease
Dementia
Atherosclerosis
HIV
Congenital malformations
Chronic ischaemic heart disease
Birth-related conditions†
Renal failure
Leukaemia
Inflammatory CNS disease
Degenerative CNS disease
Malnutrition
Musculoskeletal disorders
Haemorrhagic fevers
0 2 4 6 8 10 12 14 16 18
2016
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2060
Lower-middle income
Malignant neoplasms*
Cerebrovascular disease
Lung disease
Liver disease
Dementia
Injuries
Non-ischaemic heart disease
Tuberculosis
Renal failure
Chronic ischaemic heart disease
Birth-related conditions†
Atherosclerosis
Congenital malformations
HIV
Degenerative CNS disease
Leukaemia
Musculoskeletal disorders
Inflammatory CNS disease
Malnutrition
Haemorrhagic fevers
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Upper-middle income
Malignant neoplasms*
Cerebrovascular disease
Dementia
Lung disease
Non-ischaemic heart disease
Liver disease
Injuries
Renal failure
Chronic ischaemic heart disease
Atherosclerosis
Degenerative CNS disease
Leukaemia
Musculoskeletal disorders
HIV
Congenital malformations
Tuberculosis
Birth-related conditions†
Inflammatory CNS disease
Malnutrition
Haemorrhagic fevers
0 10 20 30 40 50 60 70
Number of deaths (× 100 000) with serious health-related suffering
High income
Malignant neoplasms*
Dementia
Lung disease
Cerebrovascular disease
Degenerative CNS disease
Liver disease
Renal failure
Injuries
Non-ischaemic heart disease
Atherosclerosis
Leukaemia
Chronic ischaemic heart disease
Musculoskeletal disorders
Inflammatory CNS disease
Haemorrhagic fevers
Malnutrition
Tuberculosis
HIV
Birth-related conditions†
Congenital malformations
0 5 10 15 20 25 30 35
Number of deaths (× 100 000) with serious health-related suffering

and dementia (figure 5), with malignant neoplasms accounting for the highest number of deaths. We project that, by 2060, over 16 million people per year will die from malignant neoplasms and experience serious health-related suffering. This increase represents over 8 million more people (or double) compared with 2016. The condition with the largest proportional rise from 2016 to 2060 is dementia: the global burden of serious health-related suffering in dementia will increase from 1·5 million in 2016 to almost 6 million in 2060, a 4-fold increase. For other conditions, the global burden of serious health-related suffering is expected to decline. For example, the number of people with HIV dying with serious health-related suffering worldwide is expected to reduce from more than 1 million people in 2016 to less than 400 000 people in 2060 (figure 5, appendix p 7).

Across all World Bank income regions, an increase in deaths due to malignant neoplasms will be the biggest driver of serious health-related suffering from 2016 to 2060 (figure 6, appendix pp 8, 9). In relative terms, this increase will be most apparent in low-income countries, where the absolute burden of serious health-related suffering associated with malignant neoplasms will increase from 300 000 people in 2016 to 1·6 million people in 2060, a 5-fold increase. The burden of dementia-associated suffering will increase 4-fold in low-income countries, from fewer than 50 000 people in 2016 to more than 200 000 in 2060. By contrast, HIV (the second highest driver of serious health-related suffering in low-income countries in 2016, after malignant neoplasms) will become the tenth highest contributor to serious health-related suffering in 2060, which reflects a reduction in HIV-related palliative care need from 300 000 people in 2016, to 120 000 in 2060. Suffering associated with tuberculosis is projected to decline in all income regions, except low-income countries, where it will continue to increase until 2060. For conditions driving increases in serious health-related suffering in WHO regions, see appendix (pp 10–13).

Discussion

This study provides the first worldwide projections of serious health-related suffering and sends alarming messages for global health. We show that the global burden of serious health-related suffering requiring palliative care will increase in both absolute and relative terms. We estimate that 48 million people will die experiencing serious health-related suffering by 2060, compared with 26 million people in 2016. This increase means that the absolute number of world citizens in need of palliative care will almost double over the next four decades. The most rapid increases will occur in low-income countries, among people older than 70 years, and those with dementia. In relative terms, serious health-related suffering will become more prevalent in all world regions, meaning that a higher proportion of people will suffer before they die.

Palliative care is increasingly recognised by international health organisations as a cornerstone of global health and there have been strong, coordinated calls to integrate palliative care within health systems.[2,3] Available evidence indicates that palliative care improves quality of life, symptom control, and patient and caregiver satisfaction, often at lower cost than the alternative.[8,9] Despite these benefits, palliative care is frequently not mentioned in high-profile strategies in low-income, middle-income, and high-income countries,[22–24] and provision is often insufficient to meet population needs. It has been estimated that just 14% of the people who need palliative care receive it, and that most of those are in high-income settings.[4,25] More than half of low-income countries have no known hospice or palliative care activity.[26] An in-depth analysis of palliative care development in Africa found that only three of 48 African countries had composite scores of more than 50% when assessed with region-specific macroindicators (which included the presence of palliative care policies, the availability of specialist services and medicines, and the provision of education).[27] Given the projected increase in serious health-related suffering, integration of palliative care into health systems is an urgent priority requiring immediate attention, particularly in low-income countries, where needs are projected to increase most quickly. Failure to provide palliative care as a core component of universal health coverage will be catastrophic for these already vulnerable health systems.

Over the next four decades, the number of people dying with palliative care needs will increase rapidly among older people (≥70 years), with 22 million more people dying with serious health-related suffering in 2060 compared with 2016. Malignant neoplasms will remain the largest contributor to serious health-related suffering in all world regions in 2060, affecting over 16 million people. The condition associated with the fastest rise in serious health-related suffering will be dementia, for which the need for palliative care is expected to increase 4-fold from 2016 to 2060. Although national dementia strategies are increasingly common, these strategies frequently do not explicitly refer to palliative care provision.[28] New models of care tailored to the end of life care needs of people with dementia are needed.[29]

Our study has similar limitations to all population approaches to palliative care needs assessment because it is based on mortality data. Accurate, cause-specific information on mortality is available for only a third of the world's population; data for the remaining population depend on regional registries, epidemiological estimations, or cause of death models.[30] Limitations in death registration data particularly affect lower income countries; uncertainty ranges for all-cause mortality vary from 1% in high-income countries to 20% for sub-Saharan Africa.[19] Improvements in the recording of deaths worldwide would have numerous benefits, including more accurate projections of palliative care needs and the ability to explore variation at the level of individual countries.

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We used the most up-to-date global mortality projections available to predict the need for palliative care until 2060. WHO mortality projections are modelled using disease-specific mortality trends and are strongly based on the assumption that future mortality trends in lower-income countries will reflect the social and economic development that has occurred in high-income countries.[18] Unforeseen social, economic, and medical growth or crises could affect these projections. For example, the projected reduction in HIV mortality assumes the continued scale-up of antiretroviral therapy, whereas tuberculosis mortality projections do not incorporate potential accelerated improvement in response to the WHO End TB [tuberculosis] Strategy.[18] Deaths from malnutrition can be affected by unforeseeable events, such as disasters and conflict. Geopolitical events have an enormous potential to affect health outcomes but are difficult to predict reliably. WHO mortality projections are not intended as precise forecasts of what will happen in the future, but as projections of future trends based on explicit assumptions. Previous WHO mortality projections from 2002 to 2030, modelled optimistic and pessimistic scenarios and found variations from –11% to 10% relative to the baseline scenario.[19] Such scenarios are not available for the projections to 2060. Applying the previous variations to our projections gives an absolute global burden of serious health related suffering in 2060 of 43 million to 53 million people, a 66% to 105% relative increase compared with 2016. The data presented in this Article should be compared with actual mortality data in future years and repeated when updated WHO mortality projections (including optimistic and pessimistic scenarios) are available.

All methods to estimate population palliative care need have a degree of error. We used the method of the *Lancet* Commission on Palliative Care and Pain Relief,[2] which was developed to ensure relevance to LMICs. A strength is the use of multipliers to account for varying degrees of physical and psychological suffering in different conditions, which were developed following in-depth review of empirical data by an expert panel that included LMIC practitioners. These multipliers provide an indication, rather than a precise number, of the burden of serious health-related suffering and reflect, but might not be completely coincident with, palliative care need. The *Lancet* Commission method, like others, depends on single disease-associated mortality. Multimorbidity affects one in four people,[31] and the prevalence is projected to double over the next 20 years with population ageing.[32] Multimorbidity is associated with greater symptom burden;[33] therefore, our projections are likely to underestimate the future burden of serious health-related suffering. Methods to estimate population palliative care need that incorporate multimorbidity should be developed.

Decades of progress in reducing mortality from infectious diseases have left a worrying legacy: a dramatic projected increase in the global burden of serious health-related suffering at the end of life and need for palliative care. It is an ethical and economic imperative that governments plan for and provide services, education, and medicines to reduce suffering, alongside research to inform how such services are developed and implemented in different health-care settings and populations.[34] Whereas in high-income countries palliative care provision frequently relies on specialists, models of integration of palliative care within primary care are more likely to ensure equitable access in LMICs. The *Lancet* Commission called for universal access to an essential package of palliative care and pain relief interventions, supported by policies to guide opioid provision, public awareness, pain management guidelines, and resource allocation.[2] Provision of palliative care within universal health coverage has the potential to relieve suffering for millions of dying people, as well as strengthen health systems. Our projections provide the first quantification of the scale of suffering we will witness if nothing is done.

In conclusion, we have shown that the global burden of serious health-related suffering will almost double by 2060, that a higher proportion of people in all world regions will experience suffering before they die, and that the regions most affected by this change will be those that currently have the least well developed palliative care provision. Immediate and concerted action by governments to fully integrate palliative care into universal health coverage is essential to mitigate against catastrophic weakening of health systems, and to alleviate the suffering of millions of patients and their families.

Contributors

KES conceptualised the study, with input from RH, SE, KN, PG, IJH, and BG. All authors contributed to the study design. MdB did the literature search, and extracted and analysed the data, with input from KES. All authors contributed to interpretation of the results. KES wrote the manuscript and MdB produced the figures and tables. All authors revised the manuscript critically for important intellectual content and approved the final version.

Declaration of interests

We declare no competing interests.

Data sharing

The full data will be available via https://figshare.com/s/0daa28964f6af6c39812 from the day of publication.

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