Effect on longevity of one-third reduction in premature mortality from non-communicable diseases by 2030: a global analysis of the Sustainable Development Goal health target

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Summary

Background To curb the rising global burden of non-communicable diseases (NCDs), the UN Sustainable Development Goals (SDGs) include a target to reduce premature mortality from NCDs by a third by 2030. A quantitative assessment of the effect on longevity of meeting this target is one of the many important measures needed to advocate and inform national disease control policies. We did a global analysis to estimate improvements in average expected years lived between 30 and 70 years of age that would result from meeting the SDG target.

Methods We estimated age-specific mortality in 183 countries in 2015, for the four major NCDs (cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes) and all NCDs combined, using data from WHO Global Health Estimates. We then estimated the potential gains in average expected years lived between 30 and 70 years of age ($LE_{[30–70)}$) by eliminating all or a third of premature mortality from specific causes of death in countries grouped by World Bank income groups. The feasibility of reducing mortality to the targeted level over 15 years was also assessed on the basis of historical mortality trends from 2000 to 2015.

Findings Reducing a third of premature mortality from NCDs over 15 years is feasible in high-income and upper-middle-income countries, but remains challenging in countries with lower income levels. National longevity will improve if this target is met, corresponding to an average gain in $LE_{[30–70)}$ of 0·64 years worldwide from reduced premature mortality for the four major NCDs and 0·80 years for all NCDs. According to major NCD type, the largest gains attributable to cardiovascular diseases would be in lower-middle-income countries (a gain of 0·45 years), whereas gains attributable to cancer would be in low-income countries (0·33 years).

Interpretation A one-third reduction in premature mortality from the major NCDs in 2015–30 would have substantial effects on longevity. High-level political commitments to effective and equitable national surveillance and prioritised prevention, early detection, and treatment programmes tailored to the major NCD types are needed urgently in lower-resourced settings if this SDG target is to be met by 2030.

Funding None.

Introduction

Non-communicable diseases (NCDs) are the leading cause of death worldwide, contributing 70% of total deaths estimated in 2015 and representing a substantial barrier to healthy ageing.[1] Deaths due to NCDs have increased from 31·4 million in 2000 to 39·5 million in 2015, of which 15·0 million (or 38%) were premature deaths in people aged between 30 and 70 years.[1–3] The burden from NCDs is expected to continue to increase during the next decades as populations age and communicable diseases are successfully controlled, particularly in transitioning countries, where environmental factors and adoption of unhealthy lifestyle choices increase the risk of NCDs.[3–7] In an effort to curb the rapid growth in NCDs, the UN has set—as part of the Sustainable Development Goals (SDGs)—a global target to reduce the total premature mortality (in ages 30–70 years) from NCDs by a third by 2030.[1,8]

According to the estimates for 2015 from WHO, the four major NCDs caused 12·4 million premature deaths: 6·2 million due to cardiovascular diseases, 4·4 due to cancers, 1·1 due to chronic respiratory diseases, and 0·7 due to diabetes, equivalent to 82·7% of all premature deaths from NCDs annually.[2,3] Understanding the main contributors of the NCD burden supports policy makers to develop informed national plans and strategies.

In 48 countries, cancer has overtaken cardiovascular diseases as the predominant cause of mortality, partly because of successes in the prevention and management of cardiovascular diseases. In a further 65 countries undergoing major developmental transitions, cancer is the second to fourth most predominant cause of death,

Research in context

Evidence before this study

We searched PubMed with the terms "non-communicable diseases", "Sustainable Development Goals", "premature mortality", and "expected life-years lived" with no language or date restrictions. Many studies have assessed the burden of non-communicable diseases (NCDs) and a range of NCD control interventions at the local, national, or global level, but we found no previous assessments of the effect of meeting the NCD-related Sustainable Development Goal (SDG) target on longevity. Therefore, we sought to quantify the potential gain in the average expected life-years lived of countries if the target for NCD premature mortality reduction was attained by 2030; we assessed longevity according to national levels of income by use of the World Bank income groups.

Added value of this study

This study provides a novel overview of the global effect of the UN's SDG target for NCDs and its capacity to enable improvement in national longevity. We assessed the feasibility of reducing a third of the premature mortality from NCDs over 15 years, on the basis of historical mortality trends from 2000 to 2015. Furthermore, we quantified the potential gains in average expected life-years lived between 30 years and 70 years of age worldwide should the SDG target of a one-third reduction in premature mortality from the four major NCDs be achieved, as well as the maximum gains if all premature mortality from these diseases was eliminated. Given the estimated improvement in longevity from meeting the SDG target observed in our study, we further explored the determinants of the current global inequalities in NCD burden and better outcomes of the implementation of NCD control, highlighting prospective strategies for reaching this SDG target by 2030.

Implications of all the available evidence

This study serves as a crucial reference for NCD prevention and for control specialists and health policy makers worldwide seeking to implement more effective interventions, under a backdrop of a rising burden of NCDs globally. A successful reduction of premature mortality from NCDs by a third could lead to growth in average expected life-years lived among people aged 30–70 years, underscoring the substantial health, societal, and economic impact of the SDG target for NCDs. To ensure the timely attainment of this target and to close the inequality gap between countries at different levels of income, it is imperative that governments should act upon their high-level political commitments through the strengthening of health systems, alongside the development of established effective and equitable programmes of national surveillance and control tailored to the major NCD types.

but is projected to take the leading position in most of these countries over the next few decades.[9] In many low-income countries, infection and injury are still ahead of cardiovascular diseases and cancer as the major causes of death.[3,10–13] The scale and profile of mortality patterns in individual countries is evidently diverse and dependent on local variations in the prevalence and distribution of risk factors, as well as the resources and effectiveness of health systems in disease management and prevention strategies.[1,14,15]

See Online for appendix

Assessing the potential of the NCD mortality target in extending life span is key to a better understanding of the NCD epidemic and the effect of a global response to prevention and control of these diseases. In this study, we quantified the potential gains in average expected life-years lived between 30 and 70 years of age if the global target of a one-third reduction in premature deaths from NCDs by 2030 is achieved in 183 WHO member states with available data, categorised by World Bank income groups. We assessed the relative contribution of mortality reductions from cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes to illustrate how efforts to control each of the major NCDs will affect longevity worldwide. Additionally, we assessed the feasibility of attaining the targeted level of premature mortality reduction in a 15-year window, on the basis of historical mortality trends from 2000 to 2015.

Methods

Data sources

We obtained estimated death counts for all causes and for cancers (International Classification of Diseases 10th edition, C00–97), cardiovascular diseases (I00–99), chronic respiratory diseases (J30–98), diabetes (E10–14), other NCDs (appendix), and injuries (V01-Y89, not classified as a subtype of NCDs) in 2015, by 5-year age group and sex, from the WHO Global Health Estimates 2015.[2] The four major NCDs were also aggregated as a single group, in accordance with the SDG target for NCDs.[8] The baseline year for the SDGs was set to be 2015 and, therefore, we estimated death rates by applying the mid-year population in 2015, from the UN World Population Prospects (2015),[16] to the death counts in 2015. Additionally, we obtained death counts and mid-year population in 2000 from the same sources for evaluating countries' historical changes in premature mortality in a previous 15-year window (between 2000 and 2015). Detailed cause-specific death estimates are provided in the Global Health Estimates technical paper by WHO.[17]

For our results, countries were classified into four income groups (low income, lower-middle income, upper-middle income, and high income) according to the World Bank, on the basis of estimates of gross national income per capita in 2015.[18]

	World	Low-income countries	Lower-middle-income countries	Upper-middle-income countries	High-income countries
Average expected years lived between 30 years and 70 years (in years)	36·7	34·2	35·6	37·3	38·2
Age-standardised mortality (per 100 000)*					
All NCDs	489·9 (74·4%)	611·6 (54·7%)	643·4 (71·2%)	458·9 (80·8%)	310·1 (85·1%)
Major NCDs	406·5 (61·8%)	488·8 (43·7%)	526·0 (58·2%)	395·8 (69·7%)	246·5 (67·6%)
Cardiovascular diseases	203·4 (30·9%)	251·8 (22·5%)	295·0 (32·6%)	196·3 (34·6%)	84·8 (23·3%)
Cancer	143·9 (21·9%)	163·5 (14·6%)	131·6 (14·6%)	152·1 (26·8%)	135·0 (37·0%)
Chronic respiratory diseases	36·9 (5·6%)	44·9 (4·0%)	63·3 (7·0%)	28·6 (5·0%)	17·0 (4·7%)
Diabetes	22·3 (3·4%)	28·5 (2·6%)	36·1 (4·0%)	18·7 (3·3%)	9·7 (2·7%)
All other NCDs	83·5 (12·7%)	122·8 (11·0%)	117·3 (13.0%)	63·1 (11·1%)	63·6 (17·4%)
Injuries	68·9 (10·5%)	109·9 (9·8%)	84·6 (9·4%)	65·1 (11·5%)	39·5 (10·8%)
All other causes	99·4 (15·1%)	395·7 (35·4%)	175·7 (19·4%)	44·1 (7·8%)	15·0 (4·1%)
All	658·2 (100%)	1117·3 (100%)	903·7 (100%)	568·1 (100%)	364·6 (100%)

NCDs=non-communicable diseases. *Numbers in parentheses are proportions of cause-specific premature deaths.

Table 1: **Average expected years lived between 30 and 70 years in 2015, by causes of death and World Bank income group**

Analytical strategies

We assessed countries' NCD mortality reduction in 2000–15, which we used as an indicator for the feasibility of reducing premature mortality from the four major NCDs by a third in a 15-year window. Specifically, we applied the conventional demographic life table method to age-specific and cause-specific mortality for ages 30–70 years in 2000 and 2015, to estimate the risks of dying from any of the four major NCDs in 2000 and 2015 for people aged between 30 and 70 years and to examine whether the risks were reduced by a third or greater within the 15-year window.[19]

The age-specific and cause-specific mortality in 2015 was used to calculate the average expected life-years lived between ages 30 and 70 years ($LE_{[30–70)}$) at baseline by country, with life table methods.[19] Only ages 30–70 years were included, as per the SDG definition of premature deaths. Accordingly, $LE_{[30–70)}$ throughout this article refers to the length of time individuals in a population are expected to live between ages 30 and 70 years, truncating the years lived at ages 70 years and older.

We estimated the potential gains in $LE_{[30–70)}$ if a target proportion of deaths from a specific cause was eliminated, by applying cause-deleted life table methods to cause-specific baseline mortality reported in 2015. We considered two hypothetical scenarios of mortality reduction from what was observed in baseline year 2015: eliminating all premature deaths from a specific cause to assess the maximum potential to increase $LE_{[30–70)}$, which we used as a reference to the current premature mortality burden from NCDs; and eliminating only a third (as targeted by the SDG) of premature deaths from a specific cause, which we used to assess the longevity effect of attaining the SDG target. The details of the analysis are provided in the appendix.

The 95% uncertainty intervals were simulated by repeating the corresponding procedures described 1000 times, with use of age-specific and cause-specific mortality randomly drawn for ages 30–70 years in 2015 from a normal distribution with the mean and 95% uncertainty intervals for the mortality estimates provided in the Global Health Estimates data.[20]

Role of the funding source

The funders of the study had no role in the study design, data collection, data analysis, data interpretation, or writing of the paper. The corresponding author had full access to all the data in the study. The last author had final responsibility for the decision to submit for publication.

Results

In 2015, the population worldwide was expected to live an average of 36·7 years (table 1) of the 40-year lifespan that corresponds to ages 30–70 years, ranging from 34·2 years in low-income countries to 38·2 years in high-income countries. Average age-standardised premature mortality from all causes was three times higher in low-income countries than in high-income countries (table 1). Of all premature deaths, 44% in low-income countries and 68% in high-income countries were caused by one of four major NCDs. Overall, the lowest premature mortality from NCDs, by individual cause or broad group of causes, was consistently observed in high-income and upper-middle-income countries, whereas the highest rates were observed in lower-middle-income countries, except for cancer, for which the lowest rates were found in lower-middle-income countries and the highest in low-income countries. Marked differences in the relative contributions of cardiovascular diseases and cancer to all premature deaths were observed: high income was the only group in which premature mortality from cancer exceeded that from cardiovascular diseases, whereas the lower-middle-income group was a striking opposite.

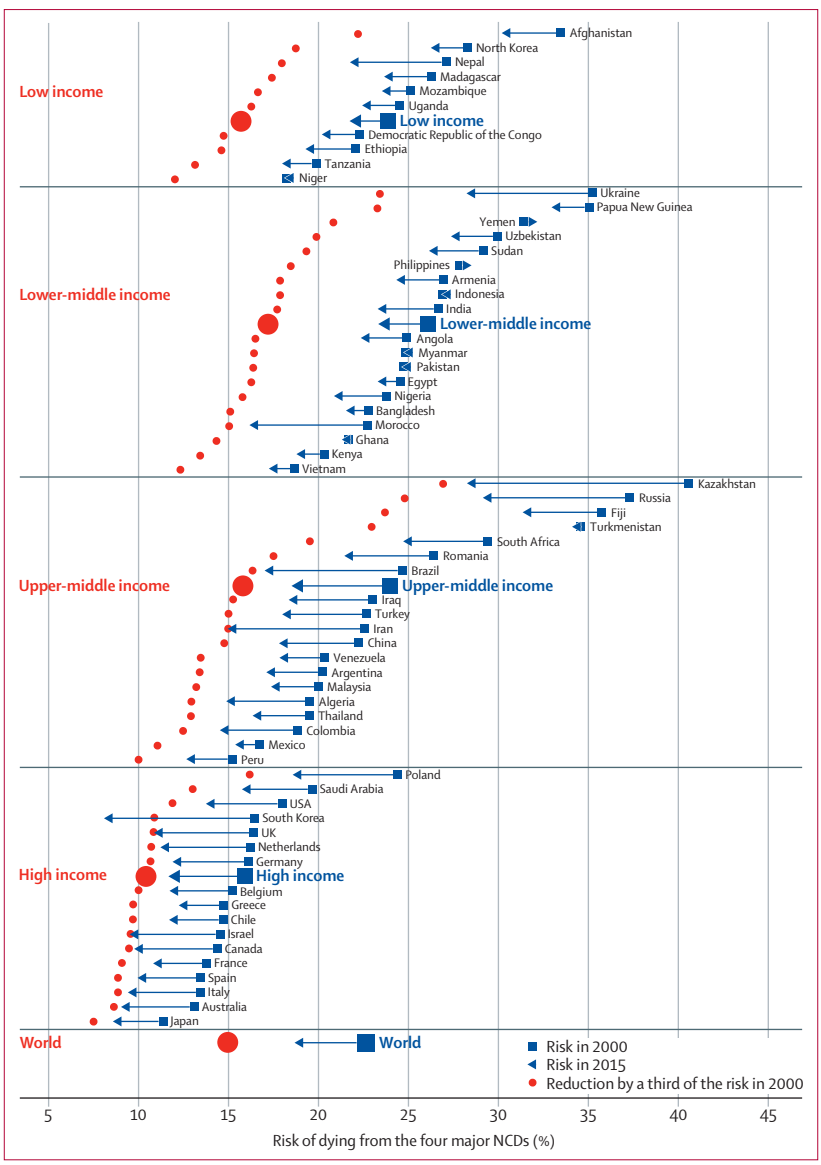


Figure 1: **Change in risk of dying from the four major non-communicable diseases (NCDs) at ages 30–70 years in 2000–15**

Figure 1 shows the risk of premature mortality from the four major NCDs in 2000 and 2015 and the estimated risk if the one-third reduction target was met for the years 2000–15. Data are shown for selected countries, including those with the largest population sizes or the highest premature mortality from NCDs in each income group, because these are among the countries that would benefit most from NCD mortality reductions. We observed an overall decrease in the risk of dying from the four main NCDs, but the largest improvements were made in countries with higher national incomes. The changes between 2000 and 2015 reveal the challenge, particularly for countries with lower national income levels, of achieving a one-third reduction in premature mortality from the four major NCDs within a 15-year window. The proportional changes in risks in the 15 years with 95% uncertainty intervals are provided in the appendix.

Eliminating all deaths from the four major NCDs could increase $LE_{[30–70)}$ by an average of 1·78 years worldwide, with the greatest increases in low-income and lower-middle-income countries (table 2). On average, eliminating deaths from all NCDs (compared with estimates for only the four major types) would lead to a further 25% increase in the gains in $LE_{[30–70)}$. Of the four major NCDs, the main contribution to the gains in $LE_{[30–70)}$ attributed to cardiovascular diseases would be in lower-middle-income countries, with Yemen having the highest estimated gains from eliminating deaths from cardiovascular diseases (table 2; appendix). The largest gains in $LE_{[30–70)}$ attributed to cancer would occur in low-income countries, with Armenia having the highest estimated gains from eliminating deaths from cancer.

Reducing deaths from all four major NCDs by a third by 2030 could increase $LE_{[30–70)}$ by an average of 0·64 years, with low-income and lower-middle-income countries having the greatest increases (table 2). Achieving a one-third reduction in all NCDs (compared with estimates for the four major types alone) would lead to a further gain of 20%. For individual countries, reaching the SDG target for the four major NCDs combined was estimated to yield the largest gains in $LE_{[30–70)}$ in several Pacific island states and former Soviet Union and eastern European countries (figure 2), including Turkmenistan (1·25 years), Fiji (1·21 years), Russia (1·05 years), and Kazakhstan (1·02 years; appendix).

Regarding individual NCDs, we estimated that achieving the target of a one-third premature mortality reduction for cancer could lead to gains in $LE_{[30–70)}$ in all four income level groups (table 2), although the gains differ markedly between income groups and between countries in each income group, ranging from 0·13 years in Kuwait to 0·48 years in Mozambique and Armenia (figure 3; appendix). Reducing premature mortality from cardiovascular diseases by a third by 2030 could lead to a gain of 0·15 years in high-income countries and 0·45 years in lower-middle-income countries (table 2; appendix). Marked differences in $LE_{[30–70)}$ gains by income group were similarly observed for diabetes and chronic respiratory diseases, with low-income and lower-middle-income countries potentially gaining more than twice as much as high-income countries (table 2; appendix).

Discussion

To the best of our knowledge, this is the first study to quantify the effect of NCD mortality reduction on longevity worldwide if the SDG target for NCDs is met. Currently, the life-year loss due to NCDs is highest in lower-middle-income countries, and our results highlight the current high mortality burden of NCDs worldwide and the effect that efforts to reduce it could

	World		Low-income countries		Lower-middle-income countries		Upper-middle-income countries		High-income countries	
	Scenario A	Scenario B	Scenario A	Scenario B	Scenario A	Scenario B	Scenario A	Scenario B	Scenario A	Scenario B
All NCDs	2·22 (2·06–2·37)	0·80 (0·74–0·85)	2·75 (2·31–3·21)	1·01 (0·84–1·18)	2·82 (2·58–3·05)	1·03 (0·94–1·12)	1·98 (1·86–2·12)	0·72 (0·67–0·77)	1·46 (1·43–1·49)	0·52 (0·51–0·53)
Major NCDs	1·78 (1·62–1·94)	0·64 (0·59–0·70)	2·18 (1·80–2·57)	0·80 (0·67–0·94)	2·20 (1·96–2·47)	0·81 (0·72–0·90)	1·66 (1·54–1·80)	0·61 (0·56–0·65)	1·11 (1·07–1·15)	0·40 (0·38–0·41)
Cardiovascular diseases	0·87 (0·79–0·93)	0·32 (0·30–0·35)	1·01 (0·84–1·17)	0·39 (0·32–0·44)	1·20 (1·09–1·31)	0·45 (0·41–0·49)	0·78 (0·73–0·82)	0·30 (0·28–0·31)	0·40 (0·39–0·41)	0·15 (0·15–0·16)
Cancer	0·69 (0·63–0·74)	0·26 (0·24–0·28)	0·85 (0·70–1·00)	0·33 (0·27–0·38)	0·65 (0·59–0·71)	0·26 (0·24–0·28)	0·72 (0·67–0·77)	0·27 (0·26–0·29)	0·61 (0·59–0·62)	0·22 (0·22–0·23)
Chronic respiratory diseases	0·17 (0·15–0·19)	0·09 (0·08–0·10)	0·23 (0·19–0·27)	0·12 (0·10–0·13)	0·26 (0·22–0·29)	0·13 (0·11–0·14)	0·14 (0·12–0·15)	0·08 (0·07–0·08)	0·09 (0·08–0·10)	0·05 (0·05–0·05)
Diabetes	0·14 (0·12–0·15)	0·08 (0·07–0·08)	0·17 (0·15–0·20)	0·10 (0·08–0·11)	0·19 (0·17–0·22)	0·10 (0·10–0·12)	0·12 (0·11–0·13)	0·07 (0·07–0·08)	0·07 (0·07–0·08)	0·04 (0·04–0·04)
All other NCDs	0·44 (0·43–0·46)	0·18 (0·17–0·19)	0·58 (0·54–0·62)	0·24 (0·22–0·25)	0·59 (0·56–0·61)	0·24 (0·23–0·25)	0·34 (0·33–0·35)	0·14 (0·14–0·15)	0·36 (0·35–0·37)	0·14 (0·14–0·14)
Injuries	0·52 (0·47–0·57)	0·20 (0·19–0·22)	0·76 (0·63–0·89)	0·30 (0·25–0·34)	0·59 (0·54–0·66)	0·24 (0·22–0·26)	0·50 (0·46–0·53)	0·20 (0·19–0·21)	0·31 (0·29–0·32)	0·12 (0·12–0·12)
All other causes	0·62 (0·59–0·66)	0·24 (0·23–0·25)	2·22 (1·99–2·47)	0·80 (0·72–0·89)	0·94 (0·89–0·98)	0·36 (0·34–0·37)	0·32 (0·27–0·37)	0·14 (0·12–0·16)	0·10 (0·08–0·12)	0·05 (0·04–0·06)

Data are in years (95% uncertainty interval). The sum of estimates from subgroups approximate, but do not equal precisely, those from a broad group of causes, because the calculation for an individual cause is independent from the other causes. Scenario A: elimination of all deaths from specific diseases in people aged 30–70 years. Scenario B: reduction in deaths from specific disease in people aged 30–70 years by a third (Sustainable Development Goal). NCDs=non-communicable diseases.

Table 2: **Potential gain in average expected years lived between ages 30 and 70 years in 2015, by cause of death and World Bank income group**

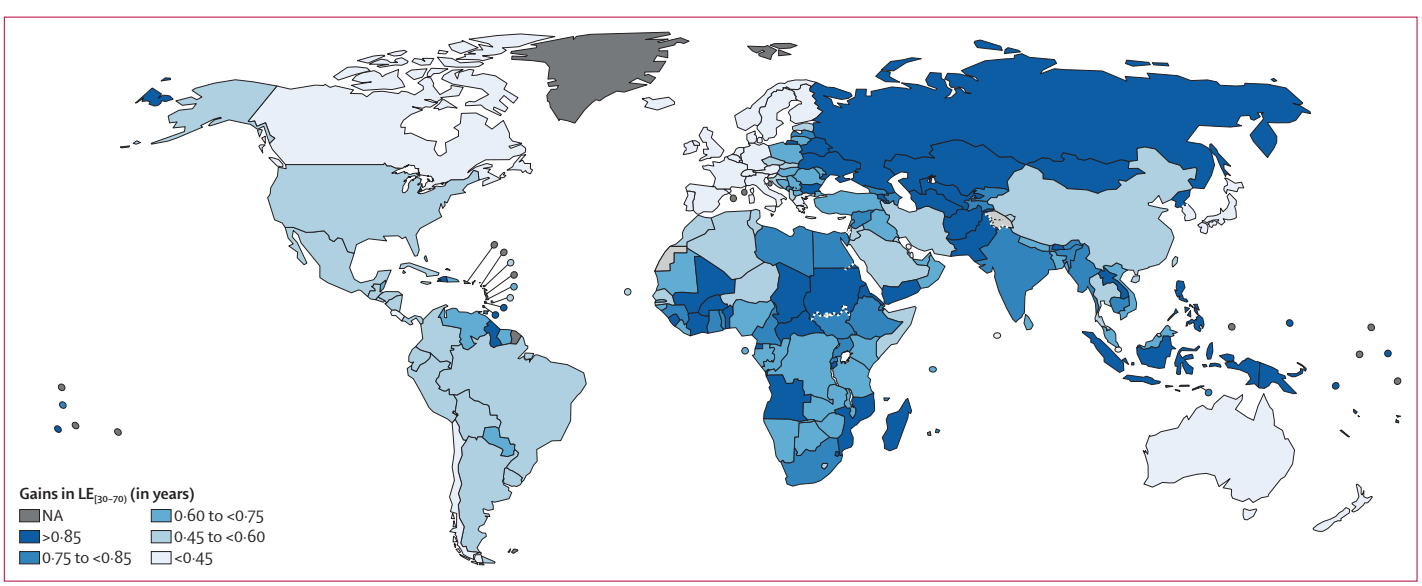
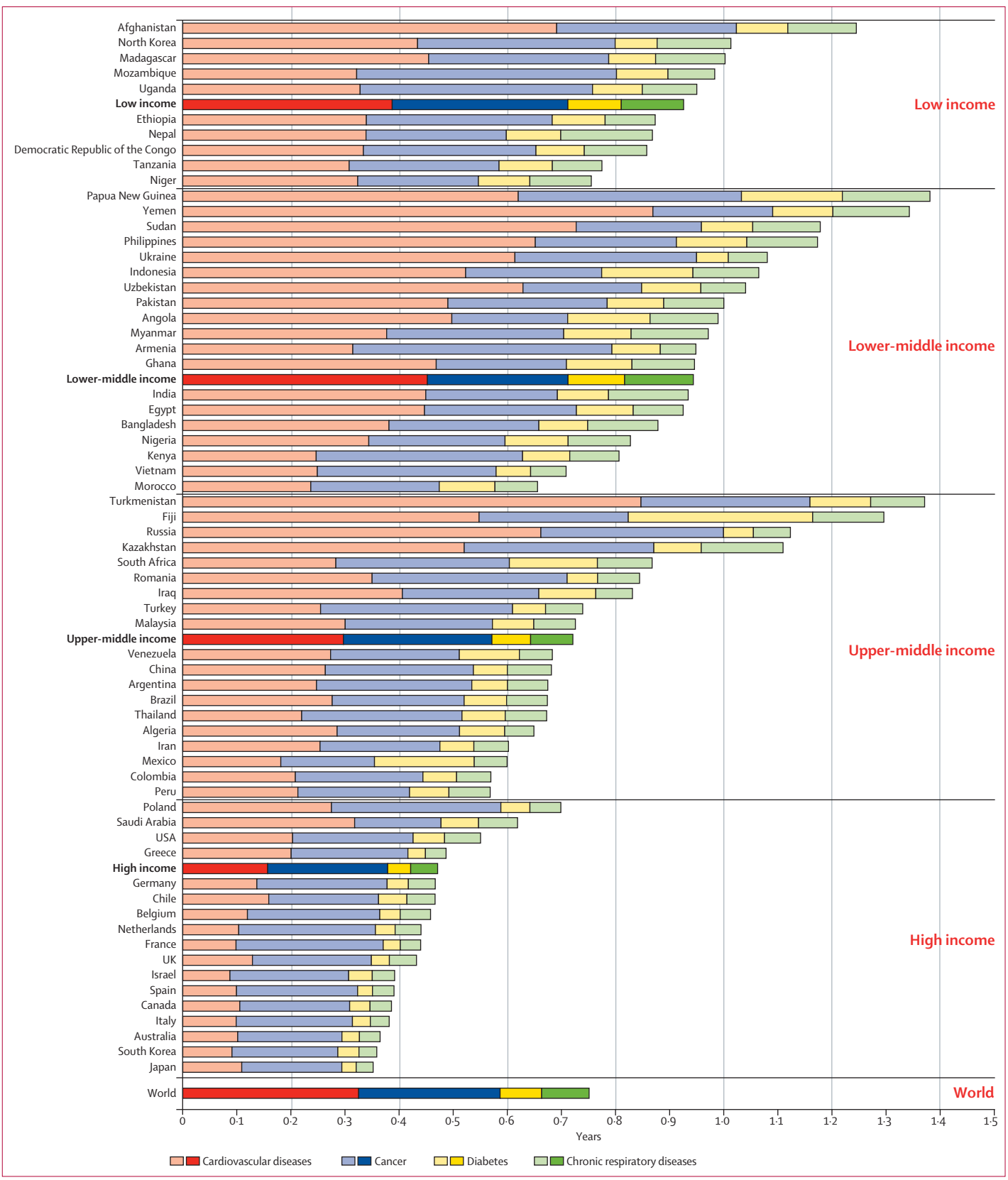


Figure 2: **Global map of estimated gains in average expected years lived between 30 and 70 years in 2015–30**
Estimated gains in average expected years lived if the Sustainable Development Goals target of a one-third reduction in premature mortality from the four major non-communicable diseases is attained. $LE_{[30–70)}$=average expected years lived between 30 and 70 years of age.

have. If the SDG target for the four major NCDs could be achieved by 2030 in the 183 countries studied, large gains in $LE_{[30–70)}$ would be seen worldwide. Achieving and securing such gains could result in an expanded working population, improved productivity, and reduced disparity, bringing substantial social, economic, and political returns.[21,22] However, our analysis indicates that attaining the targeted level of reduction in premature mortality from NCDs within a 15-year window is less feasible in low-income and lower-middle-income countries than in high-income and upper-middle-income countries, on the basis of the historical mortality trends from 2000 to 2015.

Additionally, we observed distinct patterns of cause of death that could provide indicators of priority among different causes for mortality reduction in individual countries. Particularly, lower-middle-income countries are


Afghanistan
North Korea
Madagascar
Mozambique
Uganda
Low income
Ethiopia
Nepal
Democratic Republic of the Congo
Tanzania
Niger
Papua New Guinea
Yemen
Sudan
Philippines
Ukraine
Indonesia
Uzbekistan
Pakistan
Angola
Myanmar
Armenia
Ghana
Lower-middle income
India
Egypt
Bangladesh
Nigeria
Kenya
Vietnam
Morocco
Turkmenistan
Fiji
Russia
Kazakhstan
South Africa
Romania
Iraq
Turkey
Malaysia
Upper-middle income
Venezuela
China
Argentina
Brazil
Thailand
Algeria
Iran
Mexico
Colombia
Peru
Poland
Saudi Arabia
USA
Greece
High income
Germany
Chile
Belgium
Netherlands
France
UK
Israel
Spain
Canada
Italy
Australia
South Korea
Japan
World
Low income
Lower-middle income
Upper-middle income
High income
World
0
0·1
0·2
0·3
0·4
0·5
0·6
0·7
0·8
0·9
1·0
1·1
1·2
1·3
1·4
1·5
Years
Cardiovascular diseases
Cancer
Diabetes
Chronic respiratory diseases

at the peak of premature mortality from many types of NCD, whereas low-income countries still have disproportional mortality from infectious diseases and injuries. These findings are in line with the epidemiological transitions that many countries continue to undergo,[6,7] highlighting the urgency of prioritising prevention strategies and structuring health systems to manage the imminent NCD epidemic in low-income countries.

Reducing the exposure to modifiable NCD risk factors is key in NCD prevention, because several behavioural risk factors (eg, tobacco consumption, harmful use of alcohol, unhealthy diet, and physical inactivity) and metabolic risk factors (eg, high blood pressure, overweight and obesity, and high cholesterol concentrations) are among the predominant causes of the nearly 15 million deaths caused by NCDs annually.[1,23] NCD risk factors continue to prevail in many middle-income countries; for example, former Soviet Union and other central or eastern European countries have the highest smoking prevalences, harmful alcohol consumption, and elevated blood pressure globally,[1,24–26] explaining the high premature NCD mortality in these countries observed in this study. Furthermore, resource-constrained countries face an additional burden of poverty-related NCDs, including lung cancer and chronic respiratory diseases due to the use of coal for cooking and heating, cardiovascular diseases due to fetal and childhood undernutrition, and infection-related cancers, including stomach and cervix cancer.[27,28] With the increasing development and progression in epidemiological transitions, NCDs linked to poverty-related factors are anticipated to decline, but their diminishing effect is offset by an increasing exposure to many behavioural risk factors typical of developed nations, including tobacco use, harmful alcohol consumption, and physical inactivity.[29–35] The adoption of unhealthy lifestyles brings additional challenges for resource-constrained countries to attain the SDG target for reducing NCD mortality. Therefore, preventing the uptake of unhealthy behaviours will be essential for low-income countries to mitigate the rise of NCDs, while achieving the health benefits from falling incidences of infectious diseases, as seen in many higher-income countries that underwent epidemiological transition.[6,7]

Reducing the exposure to these modifiable risk factors, implementing vaccination programmes, and increasing access to treatment for NCDs have been included in the so-called best buys package proposed by WHO to curb the global NCD burden and to facilitate interventions that are feasible, affordable, and cost-effective.[1,36] This package presents an extended list of recommended options to reduce exposure to the four key risk factors (tobacco, harmful use of alcohol, unhealthy diet, and physical inactivity) and to control the four major NCDs.[37] The cost of this package requires an investment of less than US$1 per capita in low-income countries (corresponding to 4% of annual health expenditures in these countries in 2011–2025), $1·5 in lower-middle-income countries (2% in annual health expenditures), and $3 in upper-middle-income countries (1% in annual health expenditures).[38]

As the rate of premature deaths from cardiovascular diseases continues to decline, cancer is anticipated to replace cardiovascular diseases as the greatest threat to increasing life expectancy. Comprehensive national cancer plans are still in crucial need of implementation and funding in many low-income and lower-middle-income countries. The extension of preventive and early detection measures for cancer at the primary care level and the improvement of access to cancer services—as proposed by the WHO best buys and essential packages in the third edition of Disease Control Priorities in Developing Countries[39]—are expected to substantially reduce premature deaths from cancer by 2030.[40]

Accelerated actions are required to achieve the SDG health target for NCDs in many resource-constrained countries undergoing major transitions, because their pace of progress is gravely insufficient and falls far behind that of high-income and upper-middle-income countries, given the observed trends in 2000–15. The SDG target for NCDs corresponds largely to the experience of higher-resourced countries that have already reduced NCDs in the first 15 years of this century, but it is not an unattainable target for resource-constrained countries in the longer term, because many NCDs can be prevented, treated, and managed. However, resource-constrained countries continue to have inadequate access to low-cost primary care, early detection, and treatment to effectively prevent and treat NCDs.[1,26] For instance, 95% of high-income countries have cancer surgery services available, whereas the equivalent figure in low-income countries is about 25%.[41] The lesser availability and affordability of effective treatment inevitably results in poorer prognosis and survival in patients with an NCD in low-income and lower-middle-income countries. Cancer case fatality is estimated to be 45% in high-income countries, but more than 70% in low-income and lower-middle-income countries.[42] As NCDs become an even more prominent cause of death in low-income and lower-middle-income countries, it is exceedingly important and appealing for these countries to promptly adopt the best buys packages to achieve the NCD-related SDG target. In addition to improved health outcomes, the economic return of these interventions will be especially impressive in low-income and lower-middle-income countries,[21] where half of the world's population lives, and the potential extension in

***Figure 3*: Estimated gains in average expected years lived between 30 and 70 years in 2015–30 by cause of death**

Data are the relative contribution to potential gains in life expectancy from each of the four major non-communicable diseases if the Sustainable Development Goals target of a one-third reduction in premature mortality from the four major non-communicable diseases is attained. The values for each cause should not be added together for the estimation of the broad group of causes.

life expectancy due to declining mortality from NCDs would be considerably large, leading to substantial increases in person-years lived in the most productive age groups.

Furthermore, it is imperative to establish comprehensive NCD surveillance systems, including reliable vital registration, cause of death reporting, population-based cancer registration, and statistics on risk factors, to plan and evaluate national responses to the SDG goals, particularly in low-income and lower-middle-income countries where such systems are scarce.[36] The NCD surveillance systems serve as early warning systems that can be integrated into national health information systems linked to multisectoral policy, and they aid in planning and implementing appropriate NCD prevention and control measures.

Although we sought to provide a comprehensive assessment of the effect of NCDs on longevity, several limitations should be considered. First, our analysis did not account for concurrent mortality trends from causes other than NCDs. Because mortality from other causes, particularly infectious diseases and injuries, are in decline,[3,43] attaining the SDG targets for NCDs is expected to lead to greater gains in $LE_{[30–70)}$ than our estimates indicate. Therefore, this limitation should not affect our conclusions, and our results serve as a lower bound of the effect of NCDs on future gains in $LE_{[30–70)}$ (appendix).

Second, factors leading to mortality reductions in people aged 30–70 years will also affect gains in life expectancy in people older than 70 years. We restricted our analysis to the ages 30–70 years to align with the UN's target on premature deaths from NCDs and to avoid making additional assumptions about the size of mortality reduction in people older than 70 years that are not specified in the SDG target. Therefore, our results are conservative estimates of the effect of premature NCD mortality reduction on longevity.

Third, the estimates for death counts by cause were derived from different sources that used various methods, and the quality of the source data varies by country, making cross-country and cross-cause comparisons challenging.[17] Therefore, our results should be viewed as best current estimates that merit updating as the quality of the source data improves, and we provide uncertainty intervals for our estimates as guidance for interpreting the results.

Fourth, we applied the same mortality reduction across all age groups in all countries. Given the historical and current disparities in health, economy, and society, countries will have varying levels of capacity to tackle NCDs, potentially leading to diverse and inequitable prospects for the future prevention of premature NCD mortality. In fact, many high-income countries have already achieved substantial NCD mortality decline in the past decades.[10] Whether this magnitude of mortality reduction is sustainable in these populations remains subject to debate.[1,44]

Finally, we used only data points from 2 years (2000 and 2015) to assess country-specific performance regarding the prospects of reducing premature mortality by a third within a 15-year period. A more rigorous time-series analysis, with higher quality data and additional variables over an extended period of time, would probably lead to a better quantification of the likelihood of achieving the mortality reduction target in the future.

In summary, our study illustrates that the SDG target of a one-third reduction in premature NCD mortality could lead to a sizable improvement in average expected years lived for people aged 30–70 years by 2030. Although increasing population longevity is a key marker of societal development, many barriers need to be dismantled to attain this target. Marked inequalities still exist between populations with different levels of income, calling for urgent action to close the current inequality gap by tailoring the implementation of comprehensive essential packages of NCD control that will work towards attaining the SDG global target at the national level.[39,45] To halt the rising global epidemic of NCDs and meet the SDG target by 2030, high-level commitments to effective and equitable implementation of national surveillance, prevention, and treatment programmes are urgently needed in every country worldwide.

Contributors

BC contributed to the conception and design of the study, data collection, data analysis, interpretation of the results, and drafting and finalising the manuscript. IS and FB contributed to study design and the interpretation of results. IS, FB, and AI contributed to critically reviewing and finalising the manuscript. All authors read and approved the final version of the manuscript.

Declaration of interests

We declare no competing interests.

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