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NCD
Countdown
2030



NCD Alliance



World Health
Organization

NCD Countdown 2030: worldwide trends in non-communicable disease mortality and progress towards Sustainable Development Goal target 3.4

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For more on the NCD
Countdown 2030 collaboration
see [www.thelancet.com/NCD-
Countdown-2030](http://www.thelancet.com/NCD-Countdown-2030)

The third UN High-Level Meeting on Non-Communicable Diseases (NCDs) on Sept 27, 2018, will review national and global progress towards the prevention and control of NCDs, and provide an opportunity to renew, reinforce, and enhance commitments to reduce their burden. NCD Countdown 2030 is an independent collaboration to inform policies that aim to reduce the worldwide burden of NCDs, and to ensure accountability towards this aim. In 2016, an estimated 40·5 million (71%) of the 56·9 million worldwide deaths were from NCDs. Of these, an estimated 1·7 million (4% of NCD deaths) occurred in people younger than 30 years of age, 15·2 million (38%) in people aged between 30 years and 70 years, and 23·6 million (58%) in people aged 70 years and older. An estimated 32·2 million NCD deaths (80%) were due to cancers, cardiovascular diseases, chronic respiratory diseases, and diabetes, and another 8·3 million (20%) were from other NCDs. Women in 164 (88%) and men in 165 (89%) of 186 countries and territories had a higher probability of dying before 70 years of age from an NCD than from communicable, maternal, perinatal, and nutritional conditions combined. Globally, the lowest risks of NCD mortality in 2016 were seen in high-income countries in Asia-Pacific, western Europe, and Australasia, and in Canada. The highest risks of dying from NCDs were observed in low-income and middle-income countries, especially in sub-Saharan Africa, and, for men, in central Asia and eastern Europe. Sustainable Development Goal (SDG) target 3.4—a one-third reduction, relative to 2015 levels, in the probability of dying between 30 years and 70 years of age from cancers, cardiovascular diseases, chronic respiratory diseases, and diabetes by 2030—will be achieved in 35 countries (19%) for women, and 30 (16%) for men, if these countries maintain or surpass their 2010–2016 rate of decline in NCD mortality. Most of these are high-income countries with already-low NCD mortality, and countries in central and eastern Europe. An additional 50 (27%) countries for women and 35 (19%) for men are projected to achieve such a reduction in the subsequent decade, and thus, with slight acceleration of decline, could meet the 2030 target. 86 (46%) countries for women and 97 (52%) for men need implementation of policies that substantially increase the rates of decline. Mortality from the four NCDs included in SDG target 3.4 has stagnated or increased since 2010 among women in 15 (8%) countries and men in 24 (13%) countries. NCDs and age groups other than those included in the SDG target 3.4 are responsible for a higher risk of death in low-income and middle-income countries than in high-income countries. Substantial reduction of NCD mortality requires policies that considerably reduce tobacco and alcohol use and blood pressure, and equitable access to efficacious and high-quality preventive and curative care for acute and chronic NCDs.

Introduction

Non-communicable diseases (NCDs) are the leading causes of ill health in the world and account for seven of ten worldwide deaths.^{1,2} NCD mortality is higher in low-income and middle-income countries, and, at least in high-income countries, in people with lower socioeconomic status,^{3–5} making NCDs an important obstacle to reducing global and national health inequalities.⁶

Following the first UN High-Level Meeting on the prevention and control of NCDs in 2011, WHO member states committed to reduce, by 2025, mortality from four NCDs (cancers, cardiovascular diseases, chronic respiratory diseases, and diabetes; referred to as NCD4

hereafter) in people aged 30–70 years by 25% relative to their rates in 2010 (termed the 25×25 target). NCDs are also included in Sustainable Development Goal (SDG) target 3.4, to “by 2030 reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being”. The indicator used to measure progress in reducing premature NCD mortality is the same as the 25×25 target, and suicide mortality is used as a tracer indicator for mental health.

2018 is an important year for action on NCDs,⁷ with the third UN High-Level Meeting on NCDs in September of this year set to review global and national

For more on the 25×25 target
see [http://www.who.int/nmh/
global_monitoring_framework/
en/](http://www.who.int/nmh/global_monitoring_framework/en/)

For more on Sustainable
Development Goal 3 see
[https://sustainabledevelopment.
un.org/sdg3](https://sustainabledevelopment.un.org/sdg3)

Key messages

In all but about 20 countries, people have a higher risk of dying prematurely from non-communicable diseases (NCDs) than from communicable, maternal, perinatal, and nutritional conditions combined. The risk of dying from NCDs is highest in low-income and middle-income countries, especially in sub-Saharan Africa, for both sexes, and in central Asia and eastern Europe for men.

Progress towards Sustainable Development Goal (SDG) target 3.4 varies markedly across countries. At the current rates of decline in NCD mortality, SDG target 3.4 is expected to be achieved for women in 35 countries (19% of all countries) and men in 30 countries (16%). A further 50 countries (for women) and 35 countries (for men) could achieve the target with a slight acceleration in decline.

Mortality from the four NCDs included in SDG target 3.4 (cancers, cardiovascular diseases, chronic respiratory diseases,

and diabetes) has stagnated or increased since 2010 among women in 15 and men in 24 countries. Another 86 countries (for women) and 97 (for men) are progressing too slowly, and need policies that substantially increase the rates of decline if they are to meet SDG target 3.4.

NCD deaths beyond the age range and causes of death included in SDG target 3.4 cause a larger mortality burden in low-income and middle-income countries than in high-income countries.

Substantial reduction of NCD mortality requires policies that considerably decrease tobacco and alcohol use and blood pressure, and that provide equitable access to efficacious and high-quality preventive and curative care for NCDs in the context of universal health coverage.

Panel 1: NCD Countdown 2030

NCD Countdown 2030 is an independent collaboration to inform policies that aim to reduce the worldwide burden of NCDs, and to ensure accountability towards this aim.

The Sustainable Development Goals (SDGs) have broadened the global development and health agenda to include non-communicable diseases (NCDs) and universal health coverage. Turning the SDG political commitments into an impact on NCDs requires implementation of effective interventions in the health, economic, and social sectors, as well as reliable information on whether strategies are being implemented and succeeding in reducing NCD outcomes. An independent system of accountability has been in place for maternal and child health since the era of the Millennium Development Goals, and has now been expanded to women's, children's, and adolescents' health to monitor progress towards the corresponding SDGs.^{8,9} The WHO Independent High-Level Commission on NCDs has also recommended an independent accountability system for NCDs.¹⁰

A key output of NCD Countdown 2030 will be regular reporting of progress towards SDG target 3.4 on NCD mortality. Additionally, NCD Countdown 2030 will monitor and report on a more comprehensive indicator that includes outcomes and age groups that go beyond SDG target 3.4, in the spirit of leaving no one behind. Over time, NCD Countdown 2030 will also analyse and report on important NCD risk factors, relevant health system interventions and multi-sectoral policies, and financial commitments by governments and donors.

NCD Countdown 2030 will be essential for evidence-based policies and programmes for reducing the health burden of NCDs and its global and national inequalities, and for raising public awareness about NCDs. NCD Countdown 2030 is a collaboration between WHO, *The Lancet*, NCD Alliance, the WHO Collaborating Centre on NCD Surveillance and Epidemiology at Imperial College London, and researchers and practitioners from all regions.

progress, and renew and enhance political commitment towards reducing NCD mortality. Supporting these deliberations and commitments requires data on how NCD mortality is changing in different countries, and on what interventions and policies can reduce their burden. NCD Countdown 2030 is an independent collaboration to inform policies that aim to reduce the worldwide burden of NCDs, and to ensure accountability towards this aim (panel 1). This first report from NCD Countdown 2030 examines the current worldwide status of mortality from NCDs and whether, based on recent trends, each country is expected to reduce mortality in line with SDG target 3.4. We also assess the importance of outcomes and age groups beyond those

included in this target and its indicators, and discuss the implications for NCD policies.

NCDs as a global health challenge

We used data on deaths from NCDs—including cancers; cardiovascular diseases; diabetes; endocrine, blood, and immune disorders; non-infectious respiratory, digestive (including liver), and genitourinary diseases; neurological conditions; mental and substance-use disorders; congenital anomalies; and sense organ, skin, musculoskeletal, and oral or dental conditions—by sex and age group for 186 countries and territories from the 2016 WHO Global Health Estimates (three countries or territories were not WHO member states and were

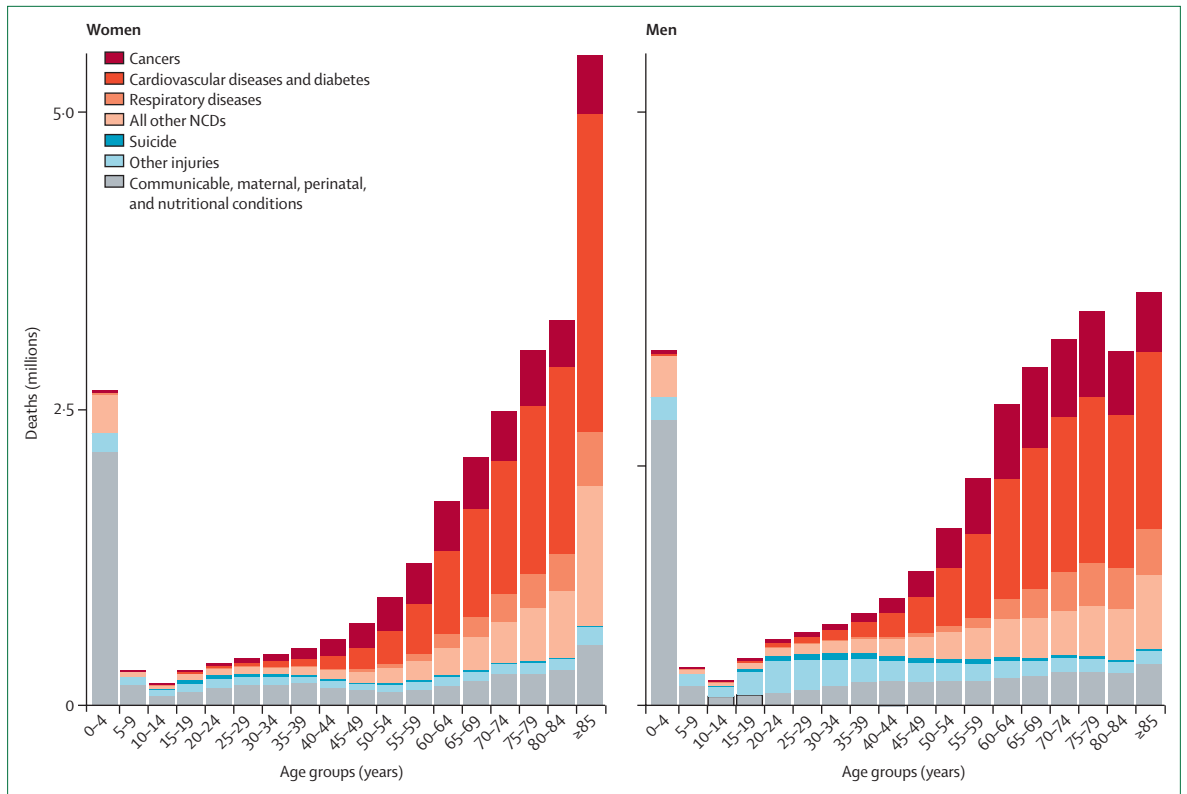


Figure 1: Number of deaths in 2016 from non-communicable diseases (NCDs), injuries, and communicable, maternal, perinatal, and nutritional conditions

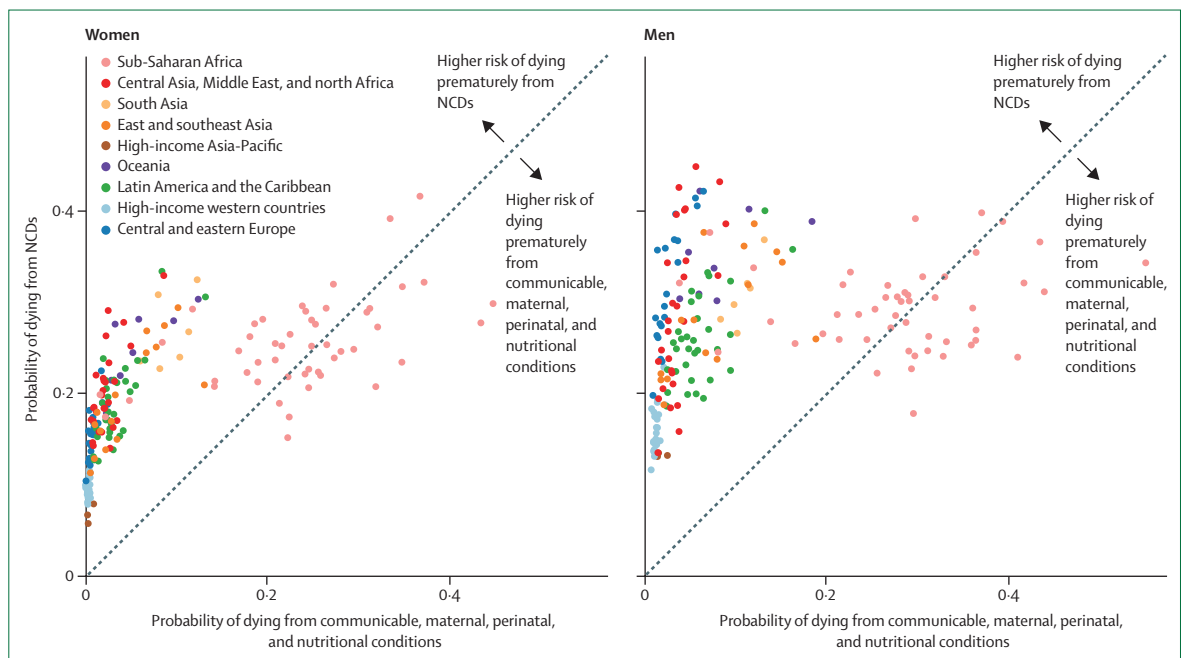


Figure 2: Comparison of the probability of dying prematurely (ie, between birth and 70 years of age) from non-communicable diseases (NCDs) with that of dying from communicable, maternal, perinatal, and nutritional conditions. All probabilities are calculated in the absence of competing causes of death as described in the appendix. Each point shows one country. In countries lying above the dashed line, there is a higher probability of dying prematurely from an NCD than from communicable, maternal, perinatal, and nutritional conditions, and vice versa.

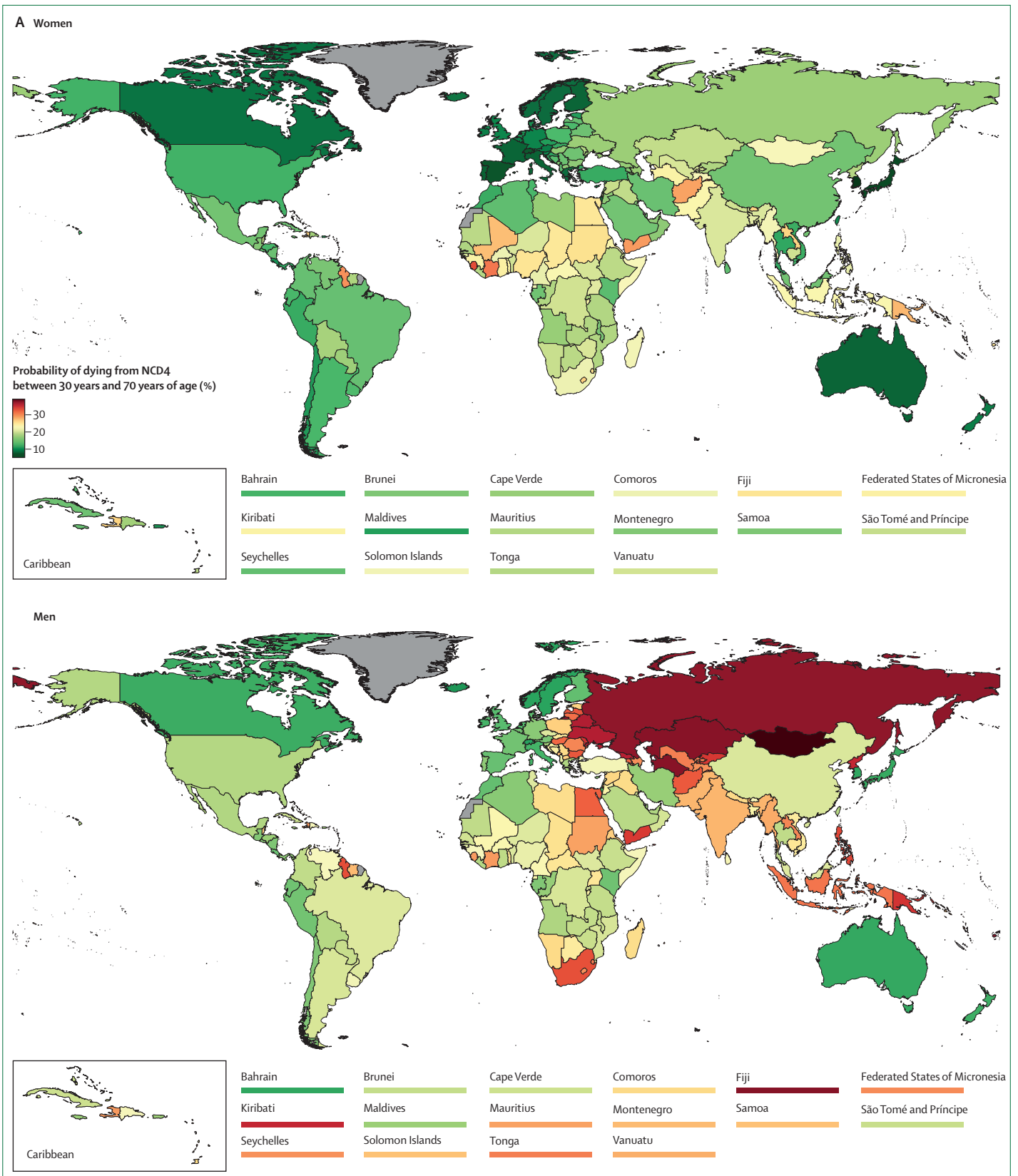
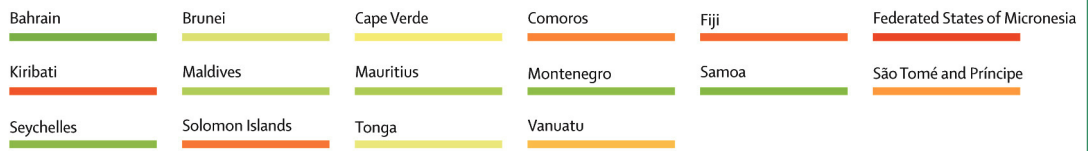
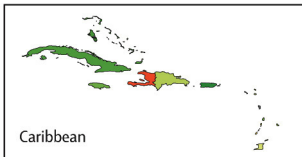
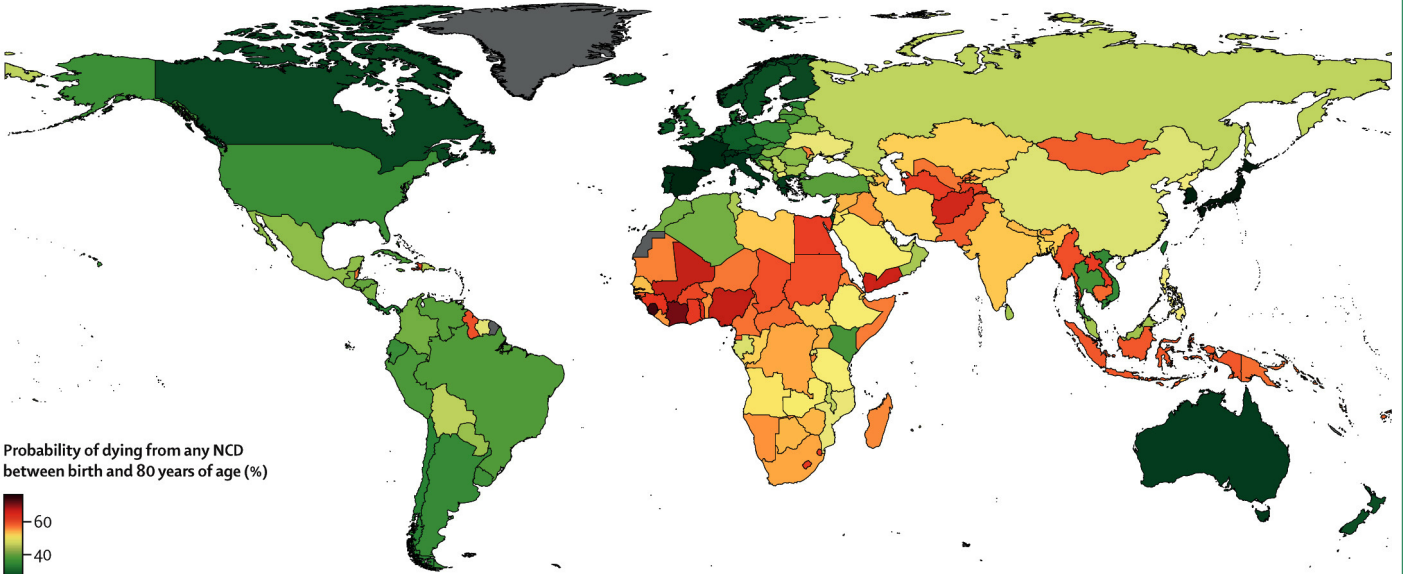
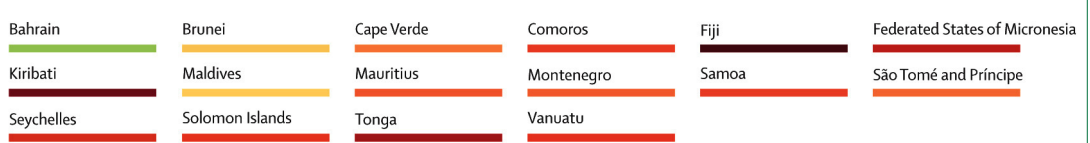
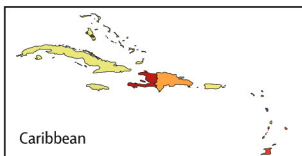
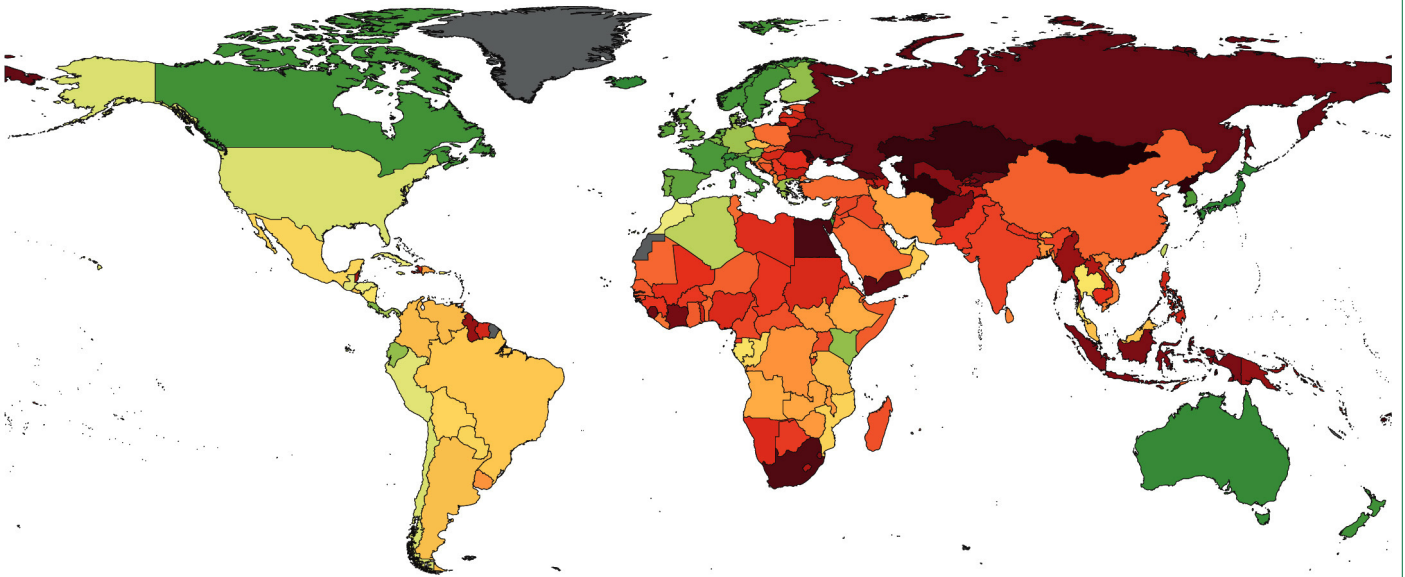


Figure 3 continues on next page

B Women



Men



included for consistency with the global totals).¹ The data sources and methods are described in detail elsewhere,¹¹ and are summarised in the appendix.

NCDs accounted for an estimated 40·5 million (71%) of the 56·9 million worldwide deaths in 2016, and for an estimated 17·0 million (57%) of the 29·8 million deaths in people less than 70 years of age—the age commonly used to define premature death.¹² NCDs were responsible for a substantial share of deaths in people of all ages, except very young people, accounting for at least 25% of all deaths in every age group above 10 years, and for more than half of deaths in age groups above 40 years (figure 1). Women in 164 countries (88% of all countries) and men in 165 (89%) countries were estimated to have a higher probability of dying prematurely (before 70 years of age) from NCDs than from communicable, maternal, perinatal, and nutritional conditions combined (figure 2).

Current status of NCD mortality and progress towards SDG target 3.4

Figure 3A maps the probability of dying from NCD4 between exactly 30 years and exactly 70 years of age in the absence of competing causes of death (the indicator used to measure progress towards SDG target 3.4) in 2016. SDG target 3.4 is calculated in the absence of competing causes of death so that it measures only the risk of dying from the causes of interest (NCD4).¹³ In addition, SDG target 3.4 uses deaths from suicides as a tracer for mental health (panel 2, figure 4).

For women, the probability of dying from NCD4 between 30 years and 70 years of age was less than 6% in South Korea and Japan, and was also low in some high-income countries in western Europe (eg, Spain and Switzerland), Singapore, and Australia (figure 3A). The highest probabilities for women were seen in parts of sub-Saharan Africa (eg, Sierra Leone and Côte d'Ivoire), and in Guyana, Yemen, Afghanistan, and Papua New Guinea, where 30-year-old women had a one-in-four to one-in-three risk of dying from NCD4 before reaching their 70th birthday—about three-times to seven-times more likely than in the aforementioned high-income countries.

For men, the probabilities of dying from NCD4 were highest in central Asia (eg, Mongolia and Kazakhstan), eastern Europe (eg, Russia and Belarus), parts of Oceania (eg, Fiji and Kiribati), North Korea, and Yemen, with 30-year old men having a more than one-in-three risk of dying from one of these four diseases before their 70th birthday. The lowest probabilities, ranging

from 10% to 12%, were those in certain high-income countries in western Europe (eg, Iceland and Switzerland), Bahrain, South Korea, Australia, Japan, Canada, New Zealand, and Singapore.

Progress towards SDG target 3.4 is shown in figure appendix 1A, and figure 5 shows the year when a one-third reduction, relative to 2015 levels, is expected to be achieved if the average rate of decline from 2010 to 2016 continues (note that, because the target is formulated as relative to 2015 levels, countries with higher mortality in 2015 would need a larger absolute reduction to achieve the same relative reduction). 35 countries (19% of all countries) for women and 30 countries (16%) for men are expected to achieve SDG target 3.4 if they maintain or surpass their 2010–16 average rate of decline. Another 50 countries (27%) for women and 35 for men (19%) are projected to achieve such a reduction in the subsequent decade (ie, by 2040) and, with slight acceleration of their decline, could meet the 2030 target. 86 countries (46%) for women and 97 countries (52%) for men require policies that substantially increase the rates of decline. The probability of dying from NCD4 between 30 years and 70 years of age has stagnated or increased since 2010 among women in 15 countries (8%) and men in 24 countries (13%).

With the exception of the USA (women), Iceland (women), and Cyprus (men), mortality from NCD4 is declining in high-income regions of Asia-Pacific, Australasia, North America, and western Europe, with some countries in these regions progressing sufficiently fast to achieve SDG target 3.4. In Denmark, Luxembourg, New Zealand, Norway, Singapore, and South Korea, both sexes are on track for such a reduction (figure appendix 1A, figure 5); men in another nine high-income countries are also on track. Risk of dying from NCD4 is also declining rapidly in central and eastern Europe, from very high levels in men, with many countries in this region on track to achieve a one-third reduction by 2030.

In other regions, NCD4 mortality among women and men in Bahrain, Brazil, Iran, Kazakhstan, Maldives, and Timor-Leste is declining fast enough that these countries are on track to achieve the target of a one-third reduction by 2030. Women in Armenia, Azerbaijan, Republic of the Congo, Costa Rica, Grenada, Kuwait, Oman, Qatar, Samoa, Thailand, and Zambia and men in Argentina are also on track. Some other countries, mainly in Latin America and southern Africa, are also making progress in reducing premature NCD deaths, but will miss the target by up to 10 years. However, progress has been slow throughout Asia and Oceania, and in other parts of sub-Saharan Africa, and Latin America and the Caribbean. In several countries in these regions, mortality from the NCD4 has increased since 2010. NCD4 mortality has also declined in China and India, the two most populous countries in the world, but the rate of decline is not sufficient to meet SDG target 3.4.

The countries where mortality from NCD4 has stagnated or even increased (15 countries for women and

See Online for appendix

Figure 3: Probabilities of dying (reported as percentage points) in 2016 from cancers, diabetes, cardiovascular diseases, or chronic respiratory diseases (NCD4) between 30 years and 70 years of age (A), and from any non-communicable disease (NCD) between birth and 80 years of age (B) See appendix for numerical values.

Panel 2: Global status of suicide deaths

SDG target 3.4 uses deaths from suicides as a tracer for mental health (according to the International Classification of Disease system, suicides are classified as injuries and not NCDs). In addition to data gaps and limitations for NCD causes of death described in the paper, data on suicide deaths are affected by stigma and medicolegal factors that generally lead to an underestimation of deaths due to suicides.^{14,15}

Suicides accounted for an estimated 793 000 deaths in 2016, and were the second leading cause of death among people aged 15–29 years globally. The specific SDG target 3.4 indicator is crude death rate, reported as number of deaths from suicide per 100 000 people (2016 data is shown in figure 4). For women, the suicide death rate was highest in parts of sub-Saharan Africa, south and southeast Asia, and Latin America, and in South Korea.

For men, it was highest in eastern Europe, parts of sub-Saharan Africa and Latin America, Japan, and South Korea. Male suicide death rates were higher than female rates in most countries.

Many mental health conditions—including depression, psychoses, and substance-use disorders—increase the risk of suicides.¹⁶ Therefore, pharmacological and psychosocial interventions are not only important for reducing the considerable morbidity burden of mental health conditions, but also for reducing deaths from suicides.¹⁷ Effective interventions for reducing suicides include restricting access to lethal means (eg, firearms¹⁸ and pesticides) and targeted prevention in high-risk groups who have experienced conflict, physical or sexual abuse, displacement, and substantial livelihood losses.^{17,19,20}

24 for men) comprise a heterogeneous group from different regions, including three high-income western countries (Iceland and the USA for women, and Cyprus for men). In the USA, cancer mortality has continued to decrease, whereas the decline from other causes has slowed down or reversed, especially in poorer rural communities, leading to a stagnation or increase in mortality depending on age.^{21–23} Other large countries (with sex-specific populations of 10 million or larger in 2016) in this group were Bangladesh (men), Egypt (women), Ghana (men and women), Côte d'Ivoire (men and women), Kenya (men and women), Mexico (men), Sri Lanka (women), and Tanzania (men), all of which showed stagnation or small increases in mortality. Low-income and middle-income countries with substantial worsening of NCD mortality included Haiti, Papua New Guinea, and the sparsely populated islands of Antigua and Barbuda, and Saint Vincent and the Grenadines. The reasons for a lack of progress in these countries are not known, but might be that major NCD risk factors (eg, blood pressure, diabetes, obesity, alcohol use, and tobacco use) either failed to improve or worsened,^{24–28} or that these countries' health systems are not able to adequately prevent, treat, and manage NCDs.

NCD mortality beyond SDG target 3.4

The WHO 25×25 target and SDG target 3.4 both refer to deaths from NCD4 between exactly 30 years and 70 years of age. In 2016, there were 12·5 million deaths from NCD4 in this age group. However, the indicator used for these targets excludes other NCDs and age groups.

First, an estimated 1·7 million NCD deaths in people younger than 30 years of age (4% of all 40·5 million NCD deaths; 18% of all 9·3 million deaths in this age group) are not included in the indicator. Of these, about 0·6 million deaths were estimated to be from NCD4 and 1·2 million from all other NCDs. In this age group, the largest NCD-related causes of death in 2016 were congenital heart anomalies (about 230 000 deaths; 2·5% of all

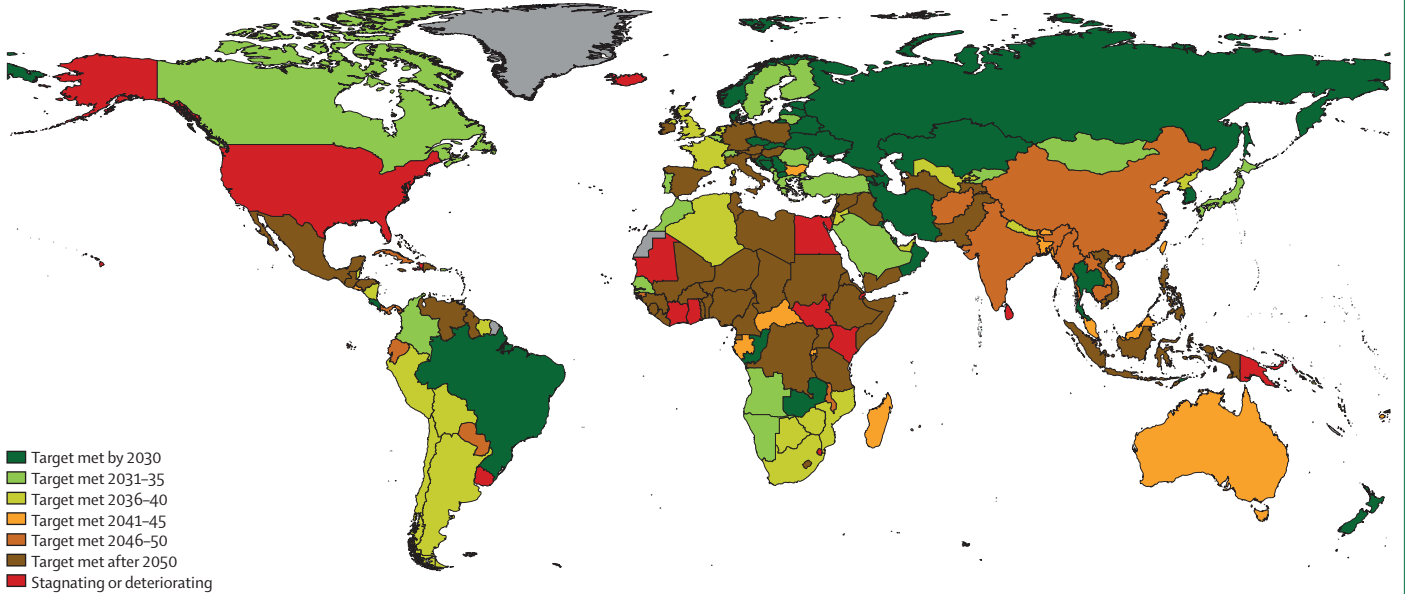
9·3 million deaths; 13·3% of 1·7 million NCD deaths), sickle cell disorders (71 000; 0·8%; 4·1%), ischaemic heart disease (67 000; 0·7%; 3·9%), stroke (63 000; 0·7%; 3·7%), kidney diseases (61 000; 0·7%; 3·6%), and leukaemia (58 000; 0·6%; 3·4%).

Deaths from NCDs other than NCD4 in people aged 30–70 years are also not included in the indicator. These 2·8 million deaths accounted for 7% of all NCD deaths (18% of the 15·2 million NCD deaths in this age group). The largest of these causes are liver cirrhosis and kidney diseases.

Furthermore, an estimated 23·6 million NCD deaths in people aged 70 years and older (58% of all NCD deaths) are not included. Of these, an estimated 10·3 million (44%) were people aged 70–79 years, and 13·3 million (56%) in people aged 80 years and older. 11·4 million (48%) of these 23·6 million deaths were estimated to be from cardiovascular diseases, and another 7·8 million (33%) were from cancers, chronic respiratory diseases, and diabetes (figure 1).

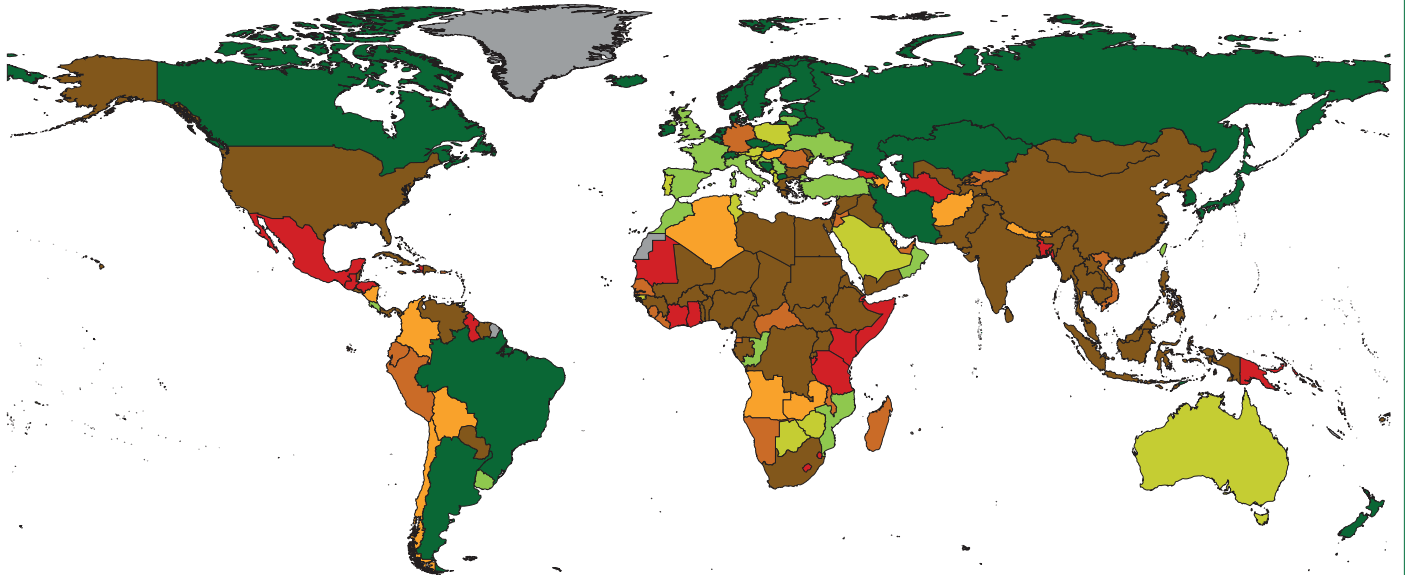
Many causes of death excluded from SDG target 3.4 have shared risk factors and interventions with NCD4. For example, high blood pressure and alcohol use are risk factors for deaths from NCD4 as well as from kidney disease, liver cirrhosis, and dementia.^{29–33} Exclusion of these diseases from the global target could alter intervention choices and policy priorities and their effects on overall NCD mortality and population health. In terms of age, with the key exception of some genetically determined and congenital conditions, NCD deaths in people less than 30 years of age can be largely avoided through prevention and treatment, as evidenced by very low mortality in this age group in high-income countries. Finally, some NCD deaths in people aged 70 years and older can be postponed through primary or secondary prevention and treatment, and lower mortality in this age group has contributed to increasing life expectancy in high-income and some middle-income countries.^{34–36} A target

Women



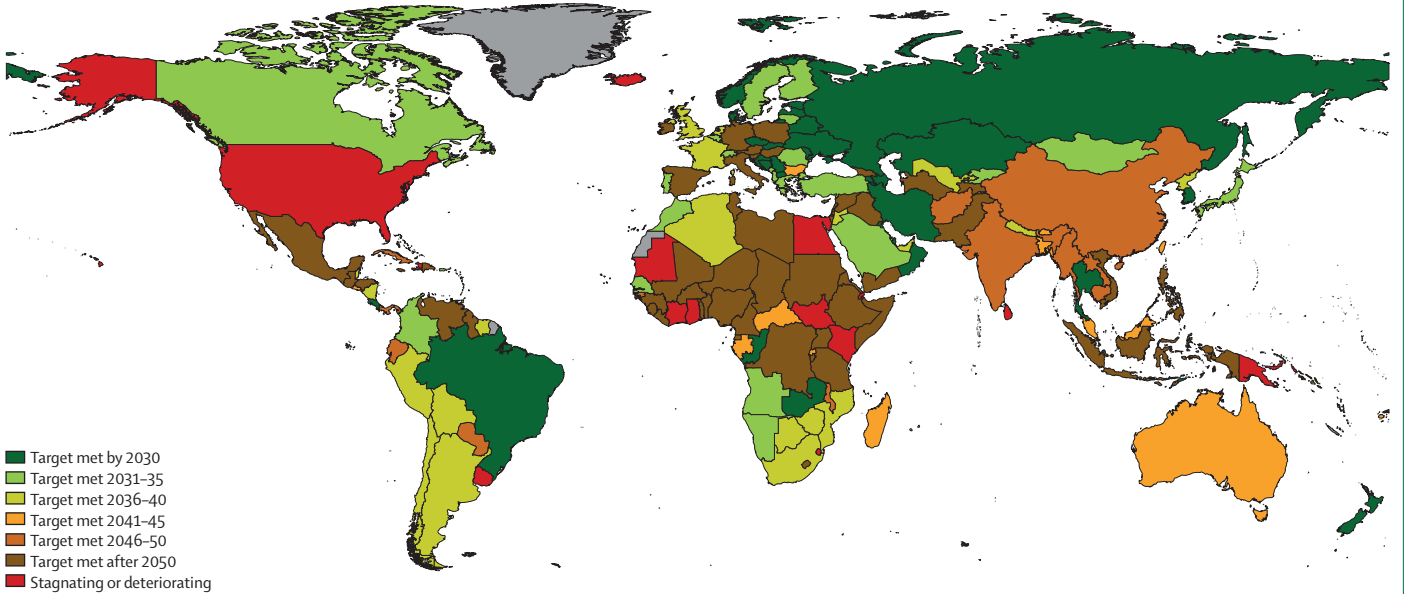
Bahrain	Brunei	Cape Verde	Comoros	Fiji	Federated States of Micronesia
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Seychelles	Solomon Islands	Tonga	Vanuatu		

Men



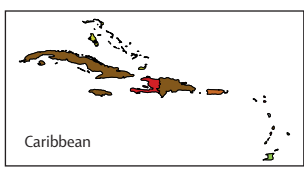
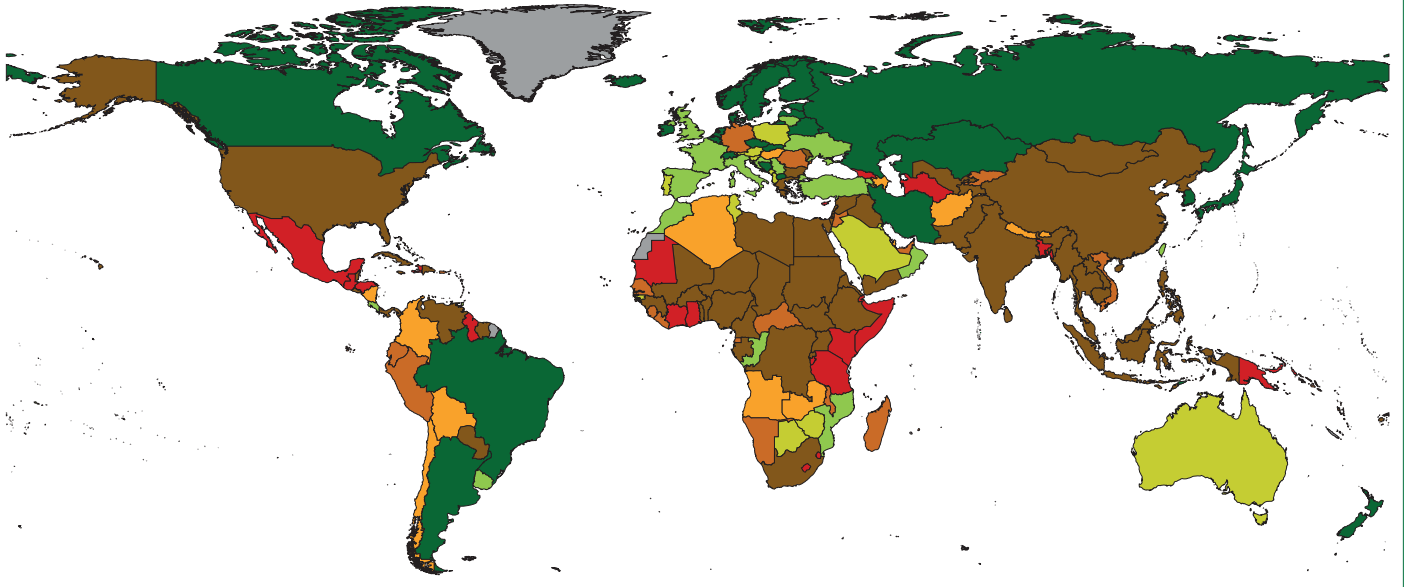
Bahrain	Brunei	Cape Verde	Comoros	Fiji	Federated States of Micronesia
Kiribati	Maldives	Mauritius	Montenegro	Samoa	São Tomé and Príncipe
Seychelles	Solomon Islands	Tonga	Vanuatu		

Women



Bahrain	Brunei	Cape Verde	Comoros	Fiji	Federated States of Micronesia
Kiribati	Maldives	Mauritius	Montenegro	Samoa	São Tomé and Príncipe
Seychelles	Solomon Islands	Tonga	Vanuatu		

Men



Bahrain	Brunei	Cape Verde	Comoros	Fiji	Federated States of Micronesia
Kiribati	Maldives	Mauritius	Montenegro	Samoa	São Tomé and Príncipe
Seychelles	Solomon Islands	Tonga	Vanuatu		

excluding these age groups is inconsistent with the SDG principle of leaving no one behind.

Figure 6 shows the difference between the indicator used for SDG target 3.4 and a more comprehensive indicator (the probability of dying from all NCDs between birth and 80 years of age) by country in 2016. We limited the age range of this comprehensive indicator to 80 years because the probability of death in the absence of competing causes reaches 100% when the entire life course is considered (ie, although death can be postponed, it cannot be avoided), making distinction between countries impossible. Furthermore, above 80 years of age, NCD mortality has larger error than in younger ages for two reasons: first, age in censuses or at the time of death might be misreported (ie, overstated or understated) with larger error than in younger ages, leading to incorrect estimates of age-specific population and deaths, and, therefore, death rates;^{37,38} and second, the assignment of cause of death in older ages is more difficult, often because people have multiple conditions.³⁹ As a result, a larger share of deaths are assigned to improbable or ill-defined causes of death in the oldest age groups.^{40,41}

The difference between the comprehensive indicator and the SDG 3.4 indicator was largest in low-income and middle-income countries with a high NCD burden, mainly those in sub-Saharan Africa and some countries in central Asia, the Middle East, and north Africa (eg, Egypt), especially for men. This difference was smallest in high-income countries, followed by those in Latin America and the Caribbean, and central and eastern Europe. This finding means that NCD deaths beyond the age range and causes of death included in SDG target 3.4 cause a larger mortality burden in low-income and middle-income countries than in high-income countries, which can only be revealed by taking a more comprehensive approach to NCDs and including all NCD deaths between birth and 80 years of age. By leaving out a larger burden in low-income and middle-income countries, the SDG 3.4 indicator only partially captures global inequalities in NCDs. To take a more epidemiologically coherent and inclusive approach, NCD Countdown 2030 will report on all NCD deaths in people less than 80 years of age, alongside monitoring progress towards SDG target 3.4.

The probability of dying between birth and 80 years of age from all NCDs is shown in figure 3B. This probability is highest in low-income and middle-income countries in sub-Saharan Africa and in south and

southeast Asia, parts of the Middle East and north Africa, Oceania, and, for men, in central Asia and eastern Europe, contrasting with the low mortality in high-income countries and some countries in southern Latin America. Men had a higher probability of dying from NCDs than women in all but a few countries in 2016 (figure 7A), with the largest male disadvantages being those in central Asia and central and eastern Europe. In most countries, the probability of dying between birth and 80 years of age from NCDs declined at a higher rate among women than among men (figure 7B). The notable exception was some high-income western countries, where trends in men were more favourable than those in women, including Iceland, the Netherlands, Norway, Finland, Sweden, Switzerland, Australia, France, Italy, and Belgium.³⁶

Average yearly changes from 2010 to 2016 in the SDG target 3.4 indicator and the comprehensive NCD outcome, as percentages of their corresponding 2015 level, were correlated (correlation coefficient 0.80 for women and 0.88 for men). However, the rate of reduction was smaller for the comprehensive NCD outcome (appendix), indicating that measuring progress using the SDG target 3.4 indicator gives a more optimistic picture of progress than is warranted according to the total NCD mortality burden in many populations. In particular, if progress were measured on the basis of all NCDs and all ages under 80 years, only 17 countries (9%) for women and five countries (3%) for men would be on track to reduce the probability of death by a third, relative to 2015 levels, by 2030, because progress is slower for causes and age groups that are not a part of SDG target 3.4.

Which NCDs are driving the declines in mortality?

Figure appendix 2 shows the contribution of changes in major disease clusters to the overall decline in the probability of dying from NCDs between birth and 80 years of age. In high-income countries, cancers have emerged as important contributors to the overall decrease in NCD mortality alongside cardiovascular diseases, which have declined for decades,⁴²⁻⁴⁴ and diabetes, the death rates of which are now declining.⁴⁵ In central and eastern Europe, where cardiovascular disease mortality is high, the decline in cardiovascular diseases was the largest driver (accounting for more than two-thirds) of the impressive reduction in premature NCD mortality since 2010. Cardiovascular diseases were also the largest contributor to the overall change in NCD mortality in most other low-income and middle-income countries, although cancers, chronic respiratory diseases, and other NCDs together accounted for as much as or more than cardiovascular diseases in some countries. In particular, in China, India, and a few other low-income and middle-income countries, chronic respiratory diseases accounted for a large part of the decline in premature NCD mortality, and for the majority of the decline in the case of Indian men.

Figure 5: Years in which non-communicable disease (NCD) reduction target is expected to be achieved

The colour scale indicates the years in which countries are expected to achieve a one-third reduction (relative to 2015 levels, if trends from 2010 to 2016 continue) in the probability of death from NCD4 (cancers, diabetes, cardiovascular diseases, and chronic respiratory diseases) between 30 years and 70 years of age.

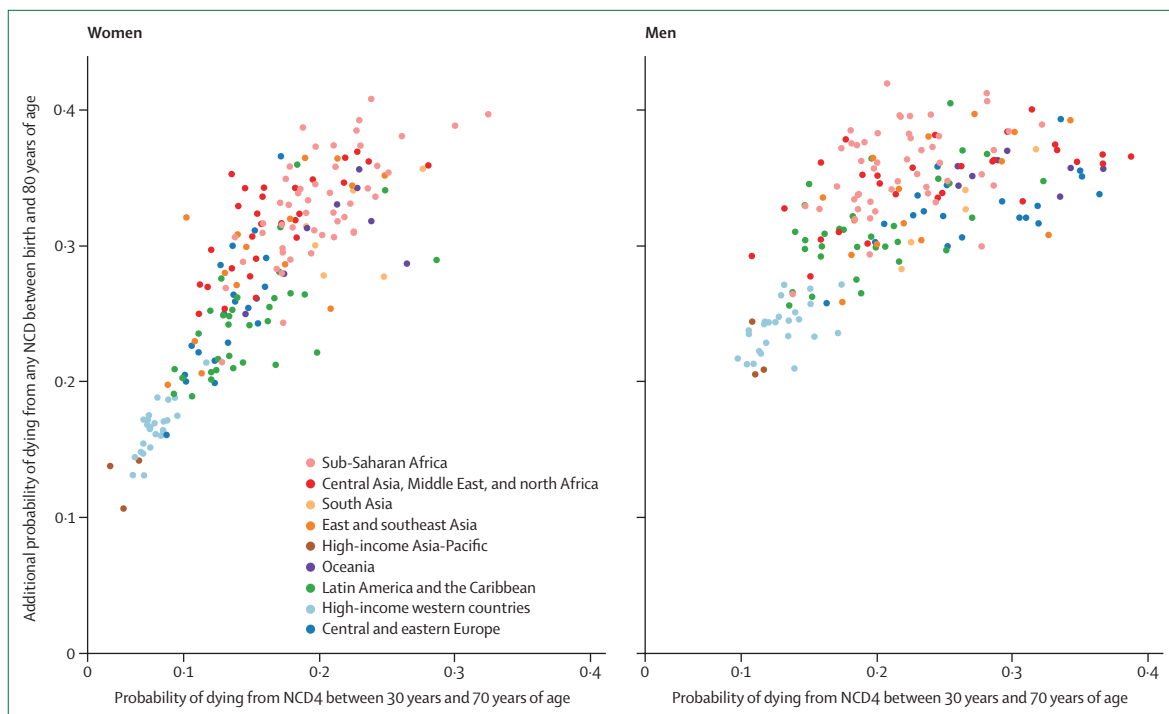


Figure 6: Additional probability of dying from any non-communicable disease (NCD) between birth and 80 years of age compared with dying from NCD4 (cancers, diabetes, cardiovascular diseases, and chronic respiratory diseases) between 30 years and 70 years of age
Each point represents one country, and countries are coloured by region. See appendix for the list of countries in each region.

The decrease in mortality from cancers amenable to health care⁴⁶ (colorectal, breast, cervical, uterine, testicular, bladder, and thyroid cancers, melanoma and non-melanoma skin cancers, Hodgkin lymphoma, and—for those aged 45 years and younger—leukaemia) was moderately correlated with the decrease in mortality from other cancers (correlation coefficient 0.38 for women and 0.59 for men; appendix). Most high-income countries had a larger decline in cancers amenable to health care than other cancers, as did some middle-income countries. Similarly, the declines in cancers related to smoking (mouth and oropharyngeal, oesophageal, stomach, colorectal, liver, pancreatic, tracheal, bronchial, lung, uterine cervical, bladder, and kidney cancers) and those unrelated to smoking were moderately correlated (correlation coefficient 0.57 for women and 0.65 for men; appendix). In particular, smoking-related cancers decreased more slowly than did those unrelated to smoking among women in many high-income western countries and in some countries in central and eastern Europe, and Latin America and the Caribbean.

Measurement and monitoring gaps

High-quality data on the numbers and causes of death, risk factors, preventive and curative interventions, and health-system infrastructure, use, and quality, are essential to monitor progress towards NCD targets, as well as their determinants and interventions.⁴⁷ In

particular, death registration with medical certification and International Classification of Diseases coding of the causes of death is the preferred source of information for monitoring mortality. If too few deaths are registered, or the quality of cause-of-death information is poor, death registration data cannot be used to reliably monitor mortality by cause. However, there are major gaps in the completeness of death registration and persisting issues with the quality of information on causes of death recorded by death registration systems. WHO rates whether death registration systems can be reliably used to track mortality by cause, taking into account the completeness of the death registration, the quality of the cause-of-death information, and the timeliness of publication of data (appendix; figure appendices 1, 2). 50 (27%) countries and territories represented in this analysis currently have high-quality death registration, with the share being 86% of high-income countries compared with 16% of low-income and middle-income countries. In other countries, demographic and epidemiological data and methods (appendix) are used to estimate all-cause and cause-specific mortality, leading to additional uncertainty.⁴⁷ Therefore, a priority area for strengthening accountability towards NCDs is expanding and strengthening death registration, including medical certification of cause of death.⁴⁸ In countries with few resources and an inadequate medical workforce, the first step might be implementing sample registration of deaths with medical diagnosis and verbal autopsy.^{49,50}

Actions to accelerate reductions in NCD mortality

Our independent evaluation shows that NCD mortality is decreasing in most countries, but the pace of decline varies substantially, even among countries in the same region. Many countries in high-income regions of Asia-Pacific, Australasia, North America, and western Europe, and in central and eastern Europe, and some other low-income and middle-income countries are on track for achieving SDG target 3.4, and more countries could achieve the target if they implement policies that slightly accelerate the decline. However, about the same number of countries are making slow progress, and need policies that significantly increase the rates of decline if they are to achieve SDG target 3.4. Of particular concern, NCD mortality is stagnant or deteriorating in a few countries, including in the USA.

The reduction in total NCD mortality in high-income countries, where cardiovascular disease mortality has declined for decades,⁴²⁻⁴⁴ is now driven by reductions in deaths from cancers, cardiovascular diseases, and diabetes. The main driver of decline in the NCD mortality in most low-income and middle-income countries is still reduction in cardiovascular disease deaths, albeit from higher rates of death than in high-income countries. For NCD mortality to decline faster in these countries, the decrease in cardiovascular disease mortality must accelerate, and there should be moderate-to-large reductions in mortality from cancers, chronic respiratory diseases, diabetes, and other NCDs.

The decline in cardiovascular disease mortality in high-income countries over the past half a century has benefited from reductions in blood pressure and, especially for men, smoking.^{42,51,52} Blood pressure, together with diabetes, is also an important risk factor for chronic kidney disease, which is a leading cause of death beyond NCD4, and smoking is the most important global risk factor for cancers and for chronic respiratory diseases.⁵³ Although blood pressure has declined sharply in high-income countries, and has begun to do so in better-off middle-income countries, especially in Latin America and the Caribbean, it is increasing in sub-Saharan Africa, south and east Asia, and Oceania.^{24,54} Tobacco use has also decreased in most high-income and increased in many low-income and middle-income countries, fuelled by the tobacco industry's aggressive tactics.^{28,55} Heavy and hazardous alcohol consumption is an important cause of deaths from cardiovascular diseases, other NCDs, and suicides in young and middle-aged adults, especially men, in central and eastern Europe and central Asia.^{27,56-63} Decreased alcohol use has been an important driver of

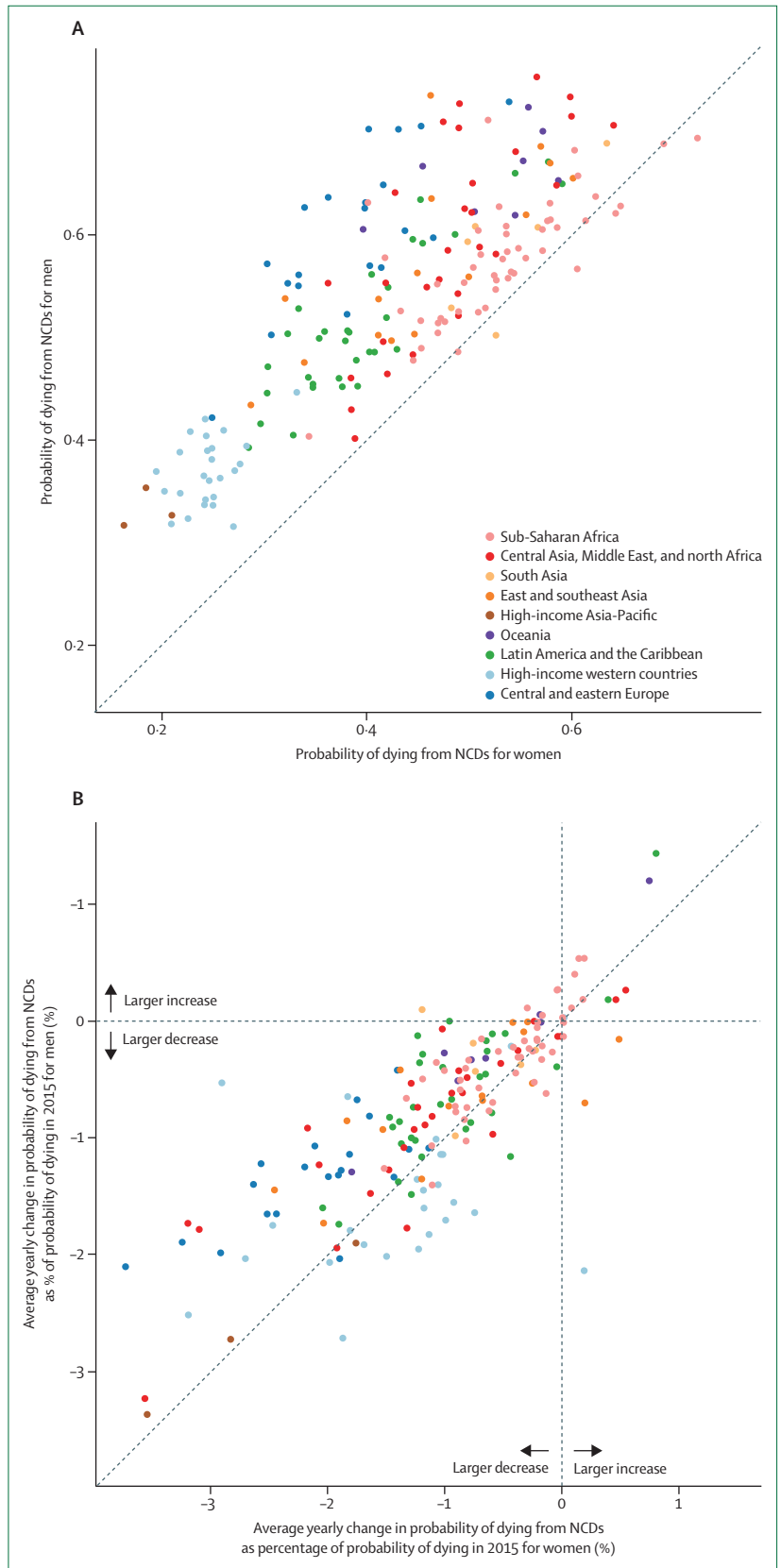


Figure 7: Comparison in women versus men of the probability of dying in 2016 from non-communicable diseases (NCDs) between birth and 80 years of age (A), and the annual average change in the probability of dying from NCDs between birth and 80 years of age, as a percentage of the probability in 2015 (B)

the declines in deaths from cardiovascular diseases and other NCDs in central and eastern Europe in the past decade,^{62,64–66} where many countries are projected to meet SDG target 3.4. Data from high-income and increasingly from middle-income countries show that, in addition to population-based prevention, substantial reductions in cardiovascular disease mortality also require high-quality health care, particularly primary and secondary prevention in high-risk individuals through multidrug treatment, management of comorbidities, and treatment of acute cases.^{42,67–71}

Alongside cardiovascular diseases, reduction of cancer deaths is essential to meet SDG target 3.4. Cancers are a heterogeneous group of diseases that can be caused by infections, health-related behaviours (such as tobacco and alcohol use), environmental exposures, and hormonal and metabolic traits.^{53,72–74} Vaccinations against human papillomavirus and hepatitis B virus are highly effective cancer-prevention measures for cervical and liver cancers—the burden of which is largest in low-income and middle-income countries^{4,75}—and should be used in all countries through school-based and community-based vaccination (including at birth for hepatitis B virus to prevent mother-to-child transmission).⁷⁶ However, the effects of immunisation on mortality will materialise decades beyond the current targets. With more than 20% of global cancer deaths being due to tobacco use,⁵³ effective tobacco control is essential for reducing cancer mortality.^{76–78} Although the overall burden of cancer related to alcohol use (around 5% of all cancer deaths) is smaller than that related to smoking (around 21%),⁵³ alcohol use affects some cancers with a large mortality burden (eg, breast, colorectal, and liver cancers),^{79,80} as well as other NCDs that are not affected by smoking (eg, liver cirrhosis). Finally, many cancers are amenable to treatment, especially if diagnosed and treated during precancerous or early stages.^{46,76} Closing the substantial cancer diagnosis and survival gap between high-income countries and low-income and middle-income countries,⁸¹ through screening and treatment, is essential for reducing NCD mortality.

Therefore, on the basis of the analysis of causes of death and their risk factors,^{77,78,82} policies and interventions that reduce tobacco use, alcohol use, and blood pressure are essential for accelerating reductions in NCDs, alongside primary and specialist health care. Reducing tobacco and alcohol use requires implementation of fiscal and regulatory measures, including taxation, warning labels, restriction of availability and sales, and banning of marketing, advertising, and public smoking.^{83–87} Remarkable progress has been made in tobacco control in the past decade. In 2008, the MPOWER policy package was introduced to help execute the WHO Framework Convention on Tobacco Control (FCTC) and to promote best-practice implementation of the convention's key demand-reduction measures at their highest level. From 2007 to 2014, 116 parties to the WHO FCTC had significant increases

in best-practice implementations of all five policy measures recommended by MPOWER; by contrast, there were no significant increases in any of the key measures in the ten non-party countries included in that analysis.⁸⁸ Nonetheless, in many countries, implementation has fallen short of the standards set by WHO FCTC.²⁸ Importantly, only 32 countries tax tobacco in accordance with the recommendation (ie, that total taxes should account for at least 75% of the retail price of the most-sold brand of cigarettes),²⁸ thus leaving a major implementation gap because tobacco taxation is the most cost-effective measure to reduce tobacco consumption. Implementation of effective alcohol policies—taxation, reduction of availability, and a ban on marketing—has been slow. Although most countries impose excise taxes on alcohol, the amount (in most cases, less than 25% of the price) is much lower than that of tobacco.²⁷ The situation regarding the reduction of availability is even worse, and alcohol seems to have become more available since 2010.⁸⁹ Finally, complete bans on marketing are rare, occurring in about 10% of the 159 countries (mainly in the Middle East and north Africa, where Islam is the main religion) that provided information to WHO about the status of their alcohol-marketing policies in 2012.^{27,89,90}

Where blood pressure has declined, these decreases have largely been achieved through a shift in the entire population distribution, although reductions in the high-blood-pressure tail of the distribution have also contributed.⁵⁴ The drivers of distributional shift, however, are largely unknown, and might include improvements in fetal and early-life nutrition and health,^{91,92} higher intake of fruits and vegetables (facilitated by more regular availability), lower salt intake, and improvements in the living environment.^{54,93–96} These factors change, often for the better, as countries become more affluent and their housing, food, and health care improve;⁴ however, there are few examples of active policy interventions that have changed these factors in entire populations, especially in low-income and middle-income countries.^{82,97–99} Diagnosis and use of off-patent medicines to treat hypertension at the primary-care level^{100–102} seem to be the most effective approaches to reducing blood-pressure-related NCD deaths, as has been done in high-income countries with effective hypertension programmes and in some middle-income countries.^{93,103–108} The Resolve to Save Lives initiative¹⁰⁹ aims to reduce salt intake and treat hypertension using a simplified protocol at the primary-care level in a number of low-income and middle-income countries. As the initiative is in its initial phases, it has not yet been evaluated; however, if successful, this project could inform the design of future national programmes. In addition to population-based prevention, reducing mortality from NCD4 and other NCDs requires high-quality health care for prevention, early diagnosis, and treatment of acute and chronic NCDs. Achieving access to high-quality care for the entire population is the

subject of SDG target 3.8 on achieving universal health coverage.^{110,111}

Financing, priority setting, and implementation

Low-income and some middle-income countries face a substantial financing gap for the implementation of NCD programmes,¹¹² especially for high-quality NCD care in the context of universal health coverage. The WHO Independent High-Level Commission on NCDs has recommended that higher percentages of national budgets are allocated to health, and that, within health, a higher percentage is allocated to NCDs and mental health, financed partly through higher taxes on tobacco and alcohol.¹⁰ The Commission also recommends that the international community should increase financing and lending for the prevention and management of NCDs through bilateral and multilateral channels, and through multi-donor funds and other innovative financing mechanisms, as has been done for HIV and AIDS.¹⁰ Though essential, additional fiscal resources can only lead to better NCD outcomes if national health systems are able to use them to deliver effective interventions for a diverse set of NCDs, which requires accessible and high-quality primary and specialist care,^{4,110} and designing a benefits package through priority setting based on local NCD epidemiology as well as the effectiveness and cost of interventions.^{113,114} NCD prevention, management, and treatment also need effective referral pathways from primary to specialist care, and the ability to maintain patients in long-term care, both of which are challenges in resource-constrained health systems that do not commonly deal with chronic conditions.^{101,115–117} Therefore, provision and quality of care for NCDs, which present a complex and dynamic disease mix, cannot be assumed, but must be achieved through enhancements and improvements in infrastructure, workforce, guidelines, procurement, and health information systems.^{118–120}

The third UN High-Level Meeting on NCDs in September of 2018 provides an opportunity to renew, reinforce, and enhance commitments to reducing the health burden of NCDs and reducing global health inequalities.⁷ Data-driven monitoring and reporting by NCD Countdown 2030 is an independent accountability mechanism for examining progress towards SDG target 3.4, while also presenting a more comprehensive perspective on NCDs in terms of diseases and age groups. Ongoing monitoring and reporting by NCD Countdown 2030 of NCD outcomes and their key risk factors and interventions is essential for creating accountability towards reducing the burden of NCDs. However, substantial progress can only be made through national and multilateral political and financial commitments and strong equitable health systems.

Contributors

RBe, RBo, KD, LMR, and ME developed the concept of NCD Countdown. JEB, GAS, CDM, and ME developed analytical design with input from other authors. JEB, GAS, and CDM analysed mortality data.

JEB prepared results with input from other authors. ME and JEB wrote the first draft of the paper, with input from RBo and RBe. The other authors commented on the draft paper and contributed to its finalisation and revision. ME oversaw the study.

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