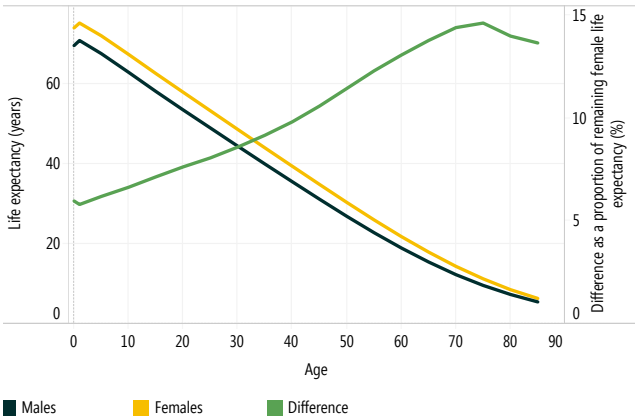
1 LIFE EXPECTANCY AND CAUSES OF DEATH

Women live longer than men, but the additional years are not always healthy

In 2019, more than 141 million children will be born: 73 million boys and 68 million girls *(1)*. Based on recent mortality risks the boys will live, on average, 69.8 years and the girls 74.2 years – a difference of 4.4 years. Life expectancy at age 60 years is also greater for women than men: 21.9 versus 19.0 years.

Women have a longer life expectancy than men at all ages (Fig. 1.1). Although the absolute difference in life expectancy decreases with age, the proportional difference increases from age 1 year up to age 80 years before it declines. Thus, women can expect to live 7.6% longer than men at age 20 years, and 14% longer at age 80 years. Differences in global life expectancy between men and women increased between 1950 and 1990 but have subsequently decreased (Table 1.1).

Fig. 1.1
Global life expectancy at different ages for men and women, 2016



Source: WHO (2018) *(2)*.

Table 1.1
Male deficit in life expectancy as a proportion of remaining female life expectancy, 1950–2015

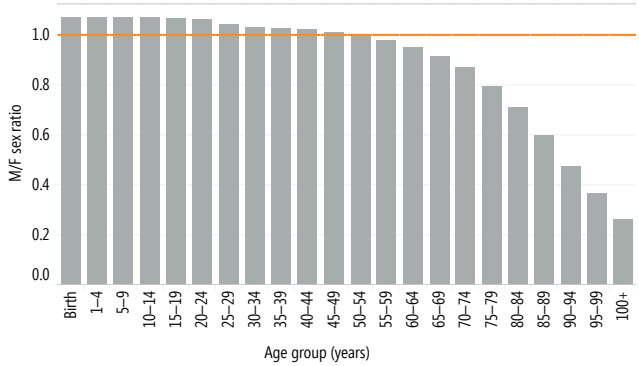
Age	1950–1955	1955–1960	1960–1965	1965–1970	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000	2000–2005	2005–2010	2010–2015
0–4	6%	6%	6%	7%	6%	7%	7%	7%	7%	7%	6%	6%	6%
5–9	5%	6%	6%	6%	6%	6%	7%	7%	7%	7%	6%	6%	6%
10–14	6%	6%	6%	6%	7%	7%	7%	7%	7%	7%	7%	7%	7%
15–19	6%	7%	7%	7%	7%	7%	8%	8%	8%	8%	7%	7%	7%
20–24	7%	7%	7%	7%	8%	8%	9%	8%	9%	9%	8%	8%	8%
25–29	7%	8%	8%	8%	8%	9%	9%	9%	9%	9%	9%	8%	8%
30–34	8%	9%	9%	9%	9%	9%	10%	9%	10%	10%	9%	9%	9%
35–39	9%	10%	10%	10%	10%	10%	11%	10%	11%	11%	10%	10%	9%
40–44	10%	11%	12%	11%	11%	11%	12%	11%	12%	11%	11%	10%	10%
45–49	12%	13%	13%	12%	12%	13%	13%	12%	13%	12%	11%	11%	11%
50–54	13%	14%	14%	13%	14%	14%	14%	13%	14%	13%	12%	12%	12%
55–59	13%	15%	15%	15%	15%	15%	15%	15%	15%	14%	13%	13%	12%
60–64	13%	15%	16%	16%	16%	16%	16%	16%	16%	16%	14%	14%	13%
65–69	13%	15%	16%	16%	17%	17%	17%	17%	17%	16%	15%	15%	14%
70–74	13%	14%	15%	16%	17%	18%	18%	17%	17%	17%	16%	15%	15%
75–79	13%	14%	15%	15%	16%	18%	18%	18%	18%	17%	16%	16%	15%
80–84	12%	12%	13%	14%	15%	17%	18%	18%	18%	17%	16%	16%	15%
85–89	10%	10%	11%	12%	13%	16%	17%	18%	17%	16%	15%	16%	15%
90–94	8%	8%	9%	9%	11%	14%	15%	17%	15%	15%	14%	15%	13%
95–99	6%	5%	6%	6%	8%	11%	13%	15%	13%	12%	12%	13%	12%
100+	4%	3%	4%	3%	5%	8%	10%	12%	10%	9%	9%	10%	9%

Source: World population prospects: the 2017 revision *(1)*.

The ratio of the number of men alive to the number of women alive changes through the life course

Globally, the male to female (M/F) sex ratio at birth has been in the range of 105–110 males to every 100 females *(1)*; however, because male mortality rates are higher across the life course, the sex ratio decreases throughout life (Fig. 1.2). Globally, it reaches 1.00 in the age group 50–54 and 0.95 in the age group 60–64 years, falling sharply thereafter. There are notable variations in sex ratios around the world, with some countries having higher M/F sex ratios that are partly associated with preference for male children.

Fig. 1.2
Global male to female (M/F) sex ratio by age, 2016



Source: World population prospects: the 2017 revision *(1)*.

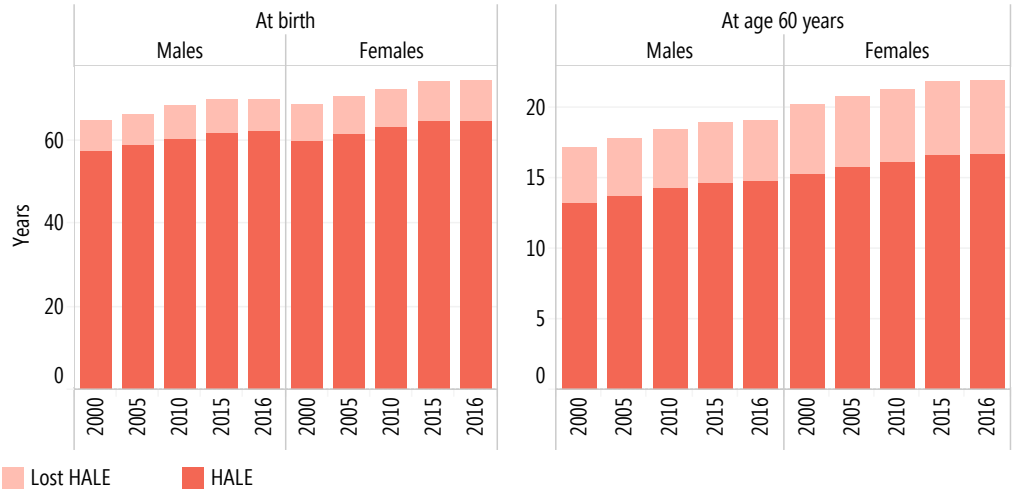
Because the incidence of different diseases varies with age, and women live longer than men, some diseases can be more common in women; for example, the lifetime risk for Alzheimer disease is greater in women than men, partly because more women survive to ages at which the disease most commonly occurs, although they also appear to be more susceptible in some locations *(3)*.

Healthy life expectancy is greater for women than men

Between 2000 and 2016 global life expectancy at birth, for both sexes combined, increased by 5.5 years, from 66.5 to 72.0 years. Healthy life expectancy (HALE) also increased, from 58.5 years in 2000 to 63.3 years in 2016; however, so did the number of equivalent years of full health lost through living in unhealthy states, increasing from 8.0 to 8.6 years. In 2016, an adult aged 60 years could expect to live another 20.5 years, while HALE at 60 years was 15.8 – that is, the equivalent years of full health lost was almost a quarter of the remaining life expectancy (4.7 years or 23%).

Women not only have a longer life expectancy than men at birth but also a longer HALE at birth (64.8 years versus 62.0) and at age 60 years (16.8 versus 14.8 years). However, the number of equivalent years of full health lost through living in unhealthy states is also larger (9.5 versus 7.8 years) (Fig. 1.3).

Fig. 1.3
Global life expectancy and HALE, 2000–2016

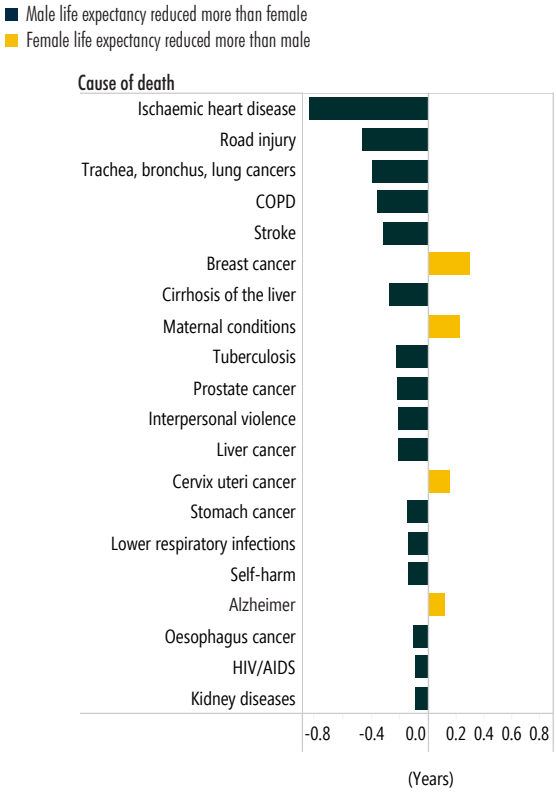


Source: WHO (2018) *(2)*.

Several conditions contribute to differences in life expectancy between men and women

Men's reduced life expectancy compared with women is not due to a single or a small number of causes. Of the 40 leading causes of death, 33 causes contribute more to reduced life expectancy in men than in women (Fig. 1.4). The causes of death that most contribute to a lower life expectancy for men than women are ischaemic heart disease (0.84 years), road injuries (0.47), lung cancer (0.40), chronic obstructive pulmonary disease (0.36), stroke (0.32), cirrhosis of the liver (0.27), tuberculosis (TB) (0.23), prostate cancer (0.22) and interpersonal violence (0.21). Breast cancer (0.30 years), maternal conditions (0.23 years) and cervical cancer (0.15) are the causes of death that have the strongest effect in lowering female global life expectancy in comparison with male global life expectancy *(3, 4)*. These conditions are not necessarily the most important causes of death globally; rather, they are the conditions that show the greatest differences between men and women; for example, malaria is an important cause of death, but is ranked low because most deaths occur in children, and death rates in male and female children are similar.

Fig. 1.4
Causes of death that most contribute to differences in life expectancy at birth globally for men and women, 2016



Sources: WHO (2018) *(2)* and see *(4)* for decomposition of life expectancy.

Both sex and gender contribute to differences in life expectancy

Some of the differences in life expectancy between men and women are due to biological sex differences. Some causes of death occur in one sex only; for example, those related to sexual and reproductive anatomy (e.g. cervical cancer in women or prostate cancer in men). Other conditions can occur in both women and men, but their prevalence is influenced by biological sex differences; for example, death rates from ischaemic heart disease are thought to be lower in women, partly because of higher levels of the hormone estrogen *(5)* whereas TB infection rates may be higher in men, partly due to immunological reasons *(6)*. For some conditions, death rates are similar in men and women if they are exposed to the same risk, but exposures to risk differ as a result of gender-related factors, such as occupation (e.g. road injury). Gender can also influence health outcomes

through differences in health literacy, availability of and access to health information and services, and provider knowledge and attitude. The exact contributions of sex and gender to health disparities are often hard to separate because they do not operate independently *(7)*.

The age of death varies greatly by country income group

Life expectancy at birth in low-income countries (62.7 years) is 18.1 years lower than in high-income countries (80.8 years) (Table 1.2). In high-income countries, the majority of people who die are old; however, in low-income countries almost one in three deaths are in children aged under 5 years (Fig. 1.5) *(2)*.

Table 1.2
Life expectancy and HALE by sex, WHO region and World Bank income group, 2016

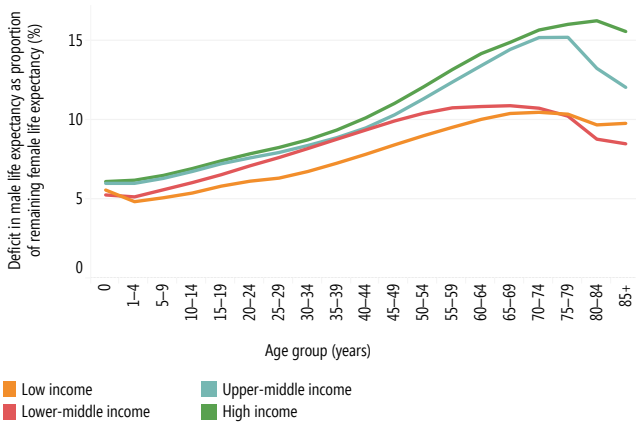
		Life expectancy	HALE	Life expectancy	HALE
		At birth (years)		At 60 years (years)	
Global	Male	69.8	62.0	19.0	14.8
	Female	74.2	64.8	21.9	16.8
	Both sexes	72.0	63.3	20.5	15.8
WHO region (both sexes)	AFR	61.2	53.8	16.6	12.5
	AMR	76.8	67.5	22.7	17.6
	SEAR	69.5	60.4	18.2	13.3
	EUR	77.5	68.4	22.3	17.4
	EMR	69.1	59.7	18.2	13.3
	WPR	76.9	68.9	21.0	16.6
World Bank income group (both sexes)	LI	62.7	54.9	17.1	12.9
	LMI	67.9	59.1	18.0	13.2
	UMI	75.2	67.0	20.2	15.8
	HI	80.8	71.2	24.3	19.0

Darker shading represents lower values of life expectancy.
Source: WHO (2018) *(2)*.

Differences in life expectancy between men and women are greater in higher-income countries

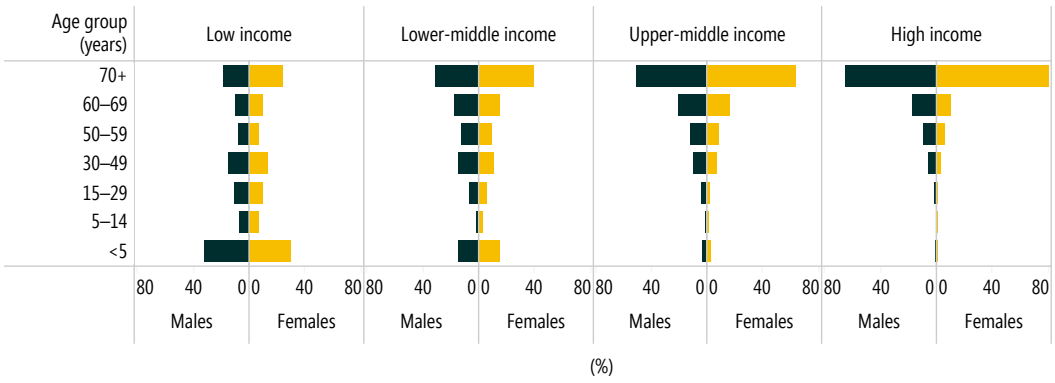
The differences in life expectancy between men and women are smaller in low-income countries than in high-income countries (Fig. 1.6). This should not necessarily be interpreted as meaning that there is greater gender equality in health in low-income countries.

Fig. 1.6
Male deficit in life expectancy as a proportion of remaining female life expectancy by World Bank income group, 2016



Source: WHO (2018) *(2)*.

Fig. 1.5
Proportion of deaths by age and World Bank income group, 2016 (%)



Source: WHO (2018) *(2)*.

The causes of death responsible for differences in life expectancy differ according to the wealth of countries

Communicable diseases, injuries and maternal conditions contribute most to differences in life expectancy between men and women in low-income countries, while noncommunicable diseases (NCDs) contribute most to life expectancy differences in high-income countries (Fig. 1.7) *(2, 4)*.

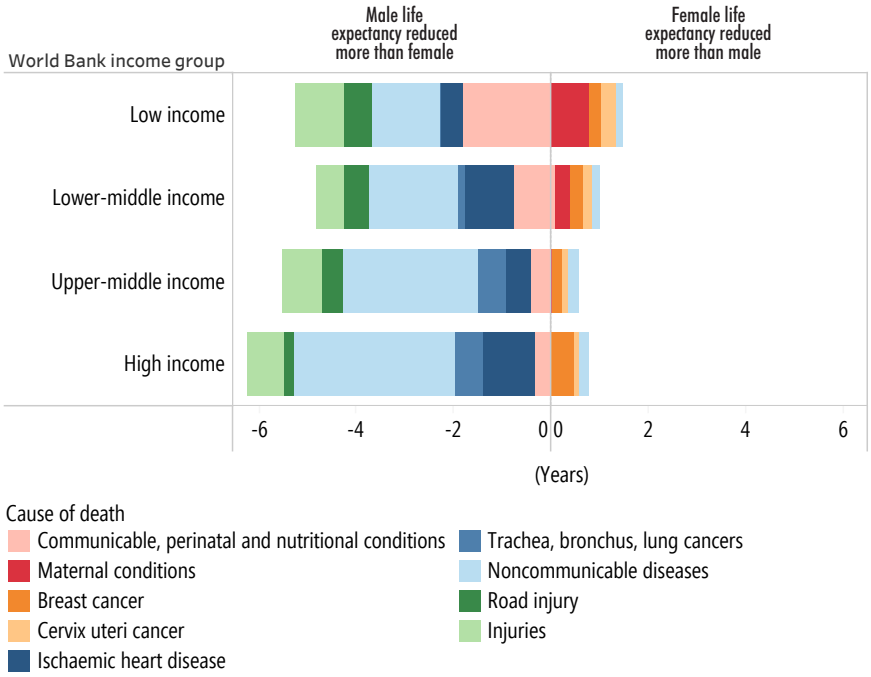
Maternal conditions contribute more to differences in life expectancy at birth between men and women than any other cause. They are concentrated in low-income countries, being related primarily to lack of access to essential health services. Although the life expectancy of men is reduced in comparison with that of women from most causes of death, and more so than in higher-income countries, the net effect of maternal conditions, breast and cervical cancer is to produce lower differences in life expectancy between men and women in low-income countries than in high-income countries.

Differences in life expectancy related to the wealth of countries are greater than those between men and women

Life expectancy at birth in low-income countries (62.7 years) is 18.1 years lower than in high-income countries (80.8 years) compared with a global difference of 4.4 years between men and women. The 10 conditions contributing most to the reduced life expectancy in low-income countries are, for both sexes, as follows: lower respiratory infections (life expectancy reduced by 2.09 years), diarrhoeal diseases (1.97 years), stroke (1.45 years), HIV/AIDS (1.45 years), TB (1.35 years), ischaemic heart disease (1.35 years), malaria (0.96 years), road injury (0.75 years), birth asphyxia and birth trauma (0.63 years), and protein-energy malnutrition (0.62 years) (Fig. 1.8) *(2, 4)*.

For lower respiratory diseases, the life expectancy of men and women is reduced by equal amounts if they live in a low-income country compared with a high-income

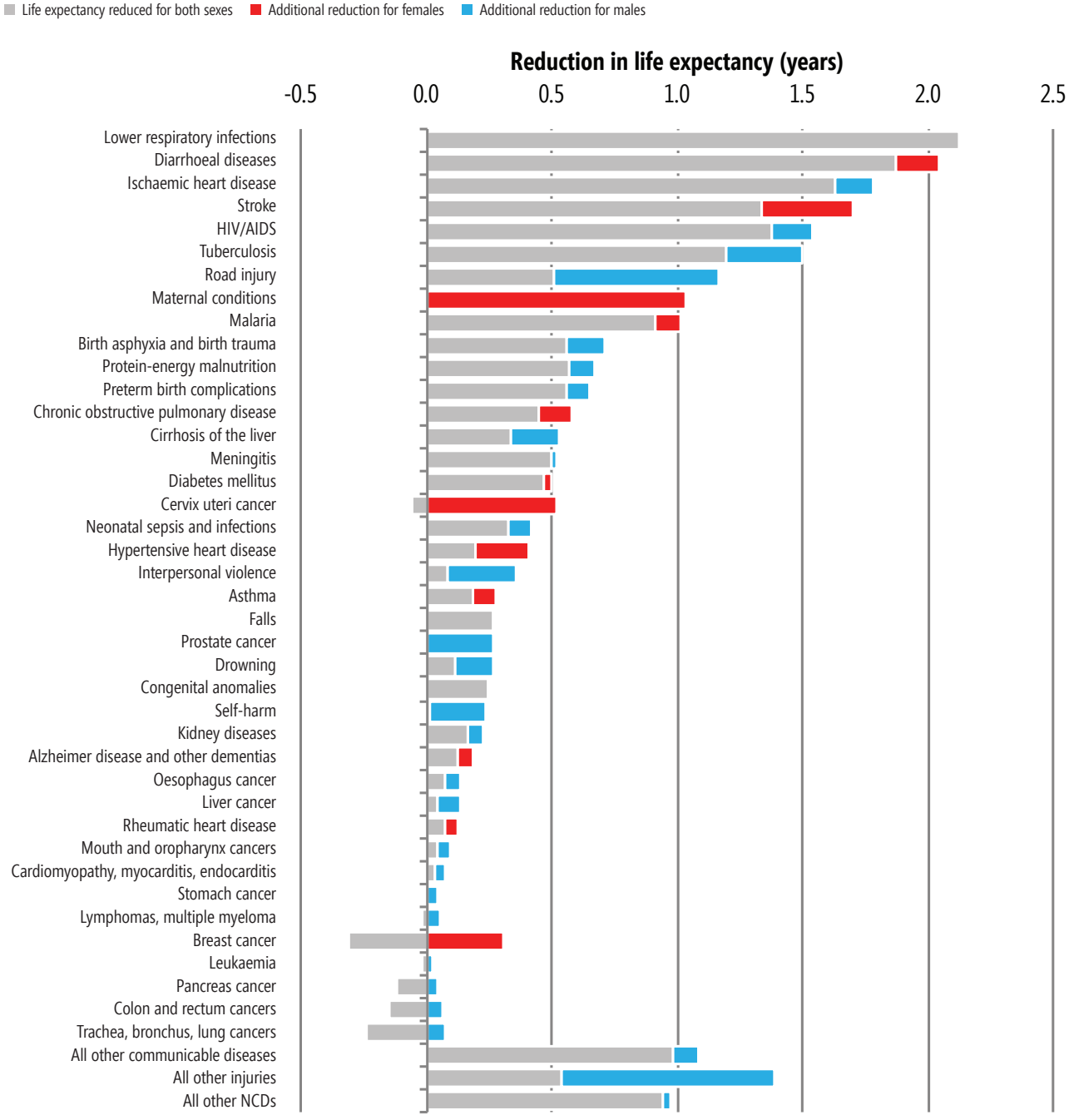
Fig. 1.7
Causes of death responsible for differences in life expectancy between men and women and World Bank income group, 2016



Sources: WHO (2018) *(2)* and see (4) for decomposition of life expectancy.

country. Women's life expectancy is particularly reduced in low-income countries through maternal conditions and cervical cancer. Men's life expectancy in low-income countries is reduced more than women's for road injuries, TB, interpersonal violence, prostate cancer, self-harm and drowning.

Fig. 1.8
Causes of death responsible for differences in life expectancy between women in high-income countries and men and women in low-income countries, 2016



Sources: WHO (2018) *(2)*, and see *(4)* for decomposition of life expectancy.

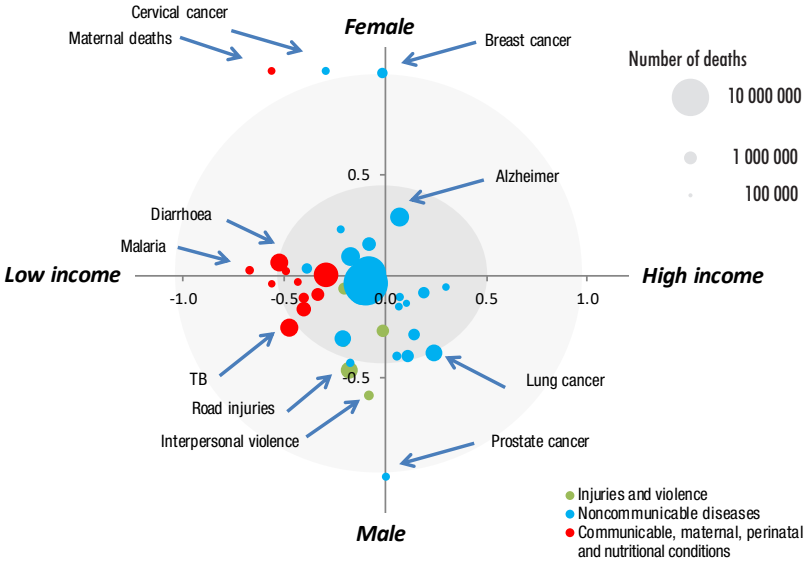
The responses to sex differences in health status will vary according to the circumstances of countries

In low-income countries, differences in life expectancy between men and women are due to causes that are frequently preventable or treatable through access to basic health services. In higher-income countries, premature deaths are frequently associated with environmental factors or poor lifestyle (Fig. 1.9).

Where there are differences in health outcomes between men and women, further analysis to disentangle determinants of outcomes for women and for men can help shape gender-sensitive responses that aim to take into account specific needs of women. The development of such responses requires better information on differences between men and women in exposure and responses to risk factors, access to and use of health services, and the effectiveness of interventions. Qualitative research is also needed to reveal factors underlying gender norms, roles, relations and expectations that lead to poor health outcomes.

Many of the factors that influence exposure to risks and access to health services are beyond the traditional remit of ministries of health. They require a multisectoral approach that addresses the underlying causes of gender and socioeconomic inequalities.

Fig. 1.9
Concentration of deaths according to national income of countries and sex, 2016



Points represent the 40 leading causes of death globally, with their areas being proportional to the number of deaths in 2016. Selected causes are labelled; space does not permit labelling of all causes. The concentration index is used to summarize the extent to which deaths from a disease are concentrated in high- or low-income countries, or in males or females. The index ranges from −1 to 1: a value of 0 indicates no association with national income or sex, and a value of −1 or 1 indicates that a disease occurs exclusively in males or females or in low-income or high-income countries (e.g. maternal deaths occur exclusively in women and are concentrated in low-income countries, whereas lung cancer is concentrated in high-income countries and occurs more in males).

Sources: WHO (2018) *(2)* and see *(8)* for calculation of concentration index.

2 REPRODUCTIVE AND MATERNAL HEALTH

The main targets of the SDGs relating to reproductive and maternal health reported in *World health statistics* are Targets 3.1, 3.2, and 3.7. Target 5.6 is also highly pertinent but is not discussed further here because data for Indicator 5.6.1 are only available for 41 countries since 2010; they are not currently available for Indicator 5.6.2.

In 2015, an estimated 303 000 women died during pregnancy and childbirth. In 2016, maternal mortality was the second leading cause of death for women of reproductive age, after HIV/AIDS, and was the leading cause among women aged 15–29 years (Fig. 2.1). Almost all maternal deaths (95%) occurred in low-income and lower-middle-income countries, and almost two thirds (65%) occurred in the World Health Organization (WHO) African Region (Fig. 2.2).

The risk of dying from maternal causes is related to the risk of getting pregnant and to the obstetric risk of developing a complication and dying while pregnant, during childbirth or within 42 days postpartum. In resource-poor settings, fertility rates are higher and the risks of dying in labour are greater *(9)*, so the lifetime risk of dying from maternal causes is greatly amplified; in 2015, one woman in 41 in low-income countries died from maternal causes (Fig. 2.3).

TARGET 3.1: By 2030, reduce the global maternal mortality ratio to less than 70 per 100 000 live births

INDICATORS

3.1.1 Maternal mortality ratio

3.1.2 Proportion of births attended by skilled health personnel

TARGET 3.7: By 2030, ensure universal access to sexual and reproductive health care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes

INDICATORS

3.7.1 Proportion of women of reproductive age (aged 15–49 years) who have their need for family planning satisfied with modern methods

3.7.2 Adolescent birth rate (aged 10–14 years; aged 15–19 years) per 1000 women in that age group

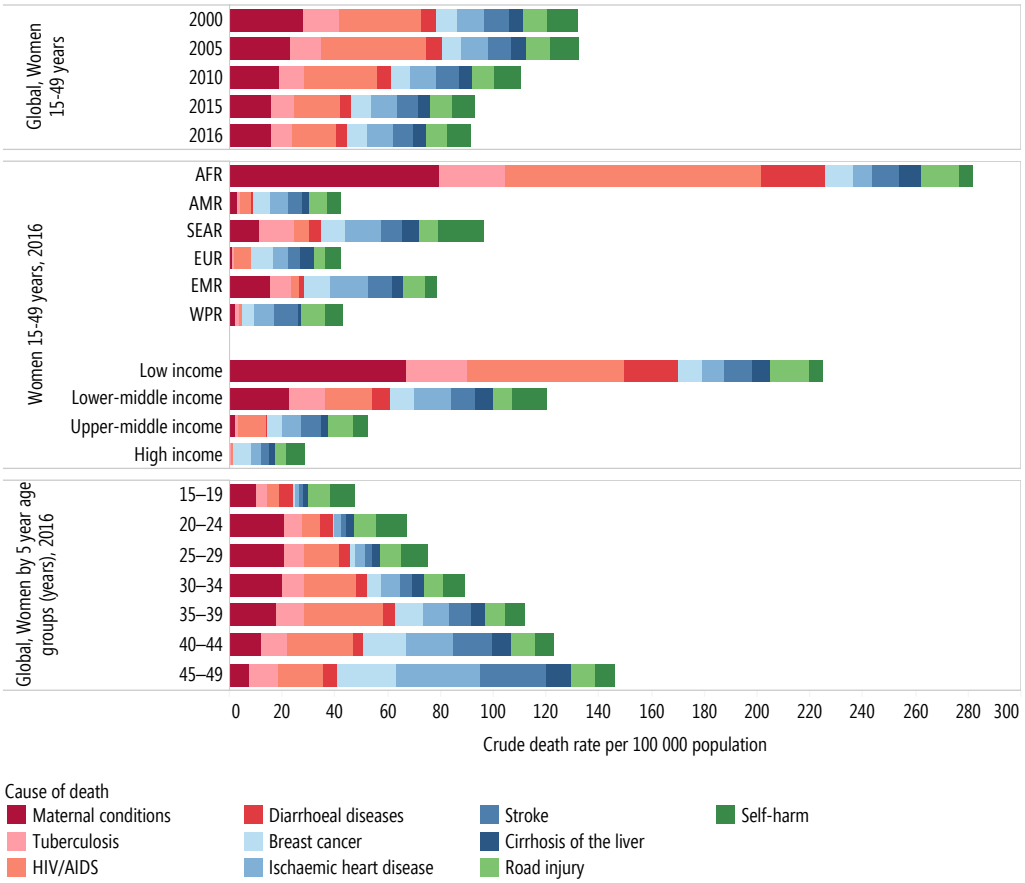
TARGET 5.6: Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences

INDICATORS

5.6.1 Proportion of women aged 15–49 years who make their own informed decisions regarding sexual relations, contraceptive use and reproductive health care

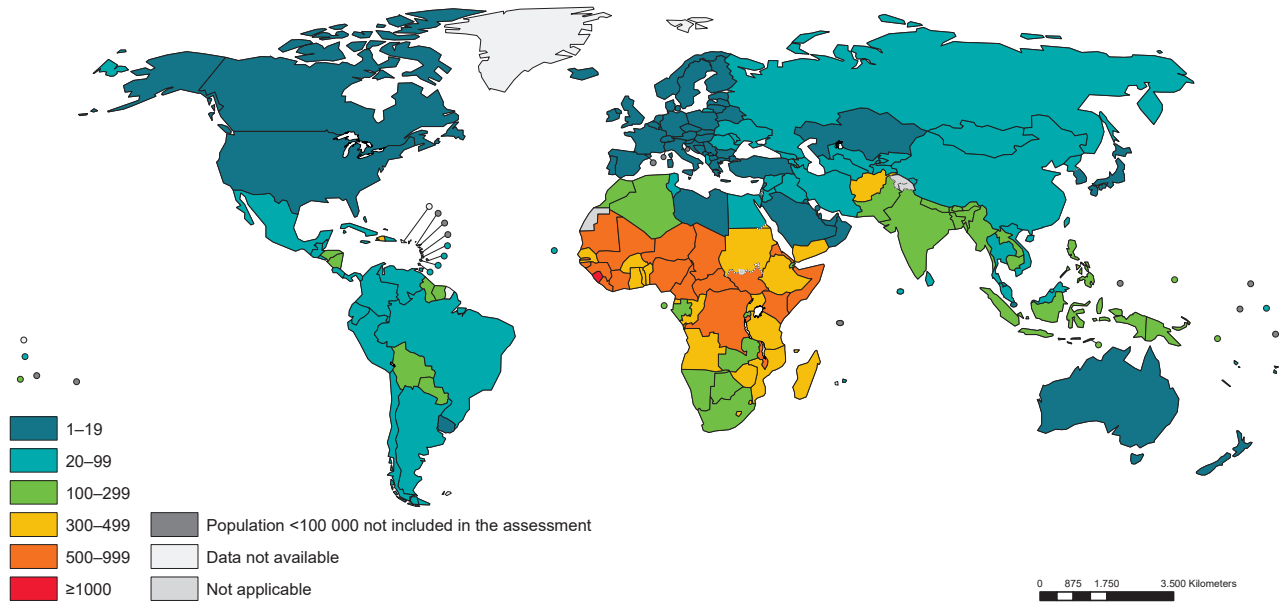
5.6.2 Number of countries with laws and regulations that guarantee full and equal access to women and men aged 15 years and older to sexual and reproductive health care, information and education

Fig. 2.1
Leading causes of death among women aged 15–49 years, 2016



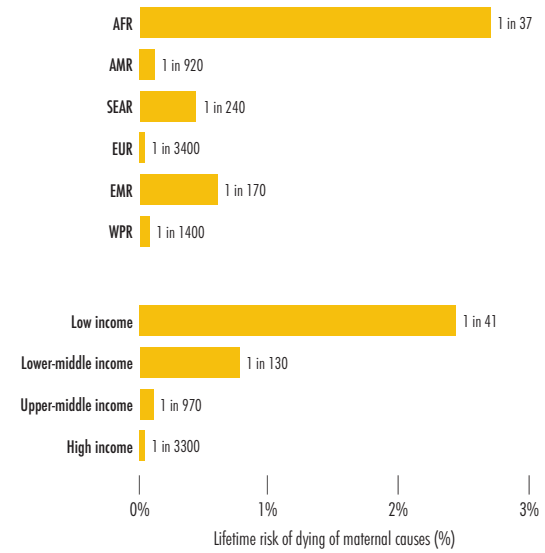
Source: WHO (2018) *(2)*.

Fig. 2.2
Maternal mortality ratio (maternal deaths per 100 000 live births), 2015



Source: WHO (2015) *(10)*.

Fig. 2.3
Lifetime risk of dying from maternal causes, 2015[a]



[a] The life time risk of dying from maternal causes is the probability of a 15-year-old girl eventually dying from a maternal cause, assuming that she is subjected throughout her lifetime to the fertility and maternal mortality risks, as estimated for 2015.

Source: WHO (2015) *(10)*.

assistance of a skilled birth attendant. However, there are wide disparities across regions. Coverage of deliveries by a skilled birth attendant ranges from 59% in the WHO African Region to over 90% in the Region of the Americas, and in the European and Western Pacific regions.

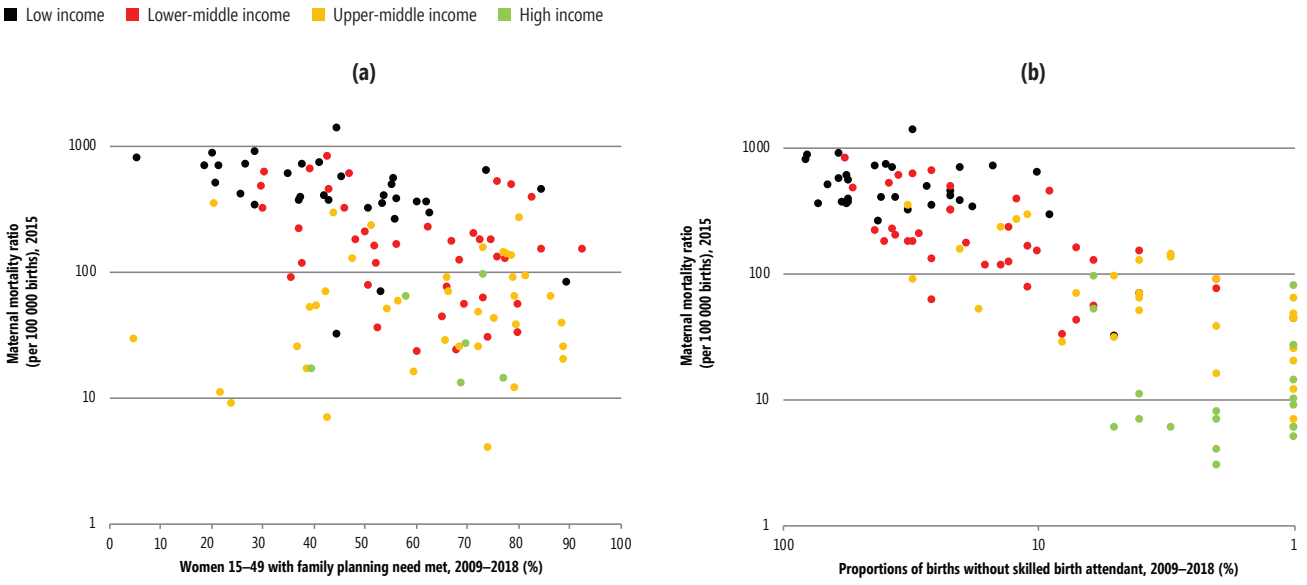
There is an inverse association between maternal mortality ratios (MMRs) and the proportion of women aged 15–49 years with their contraception needs met with modern methods; similarly, there is an inverse correlation between MMRs and the proportion of women receiving quality care from a skilled health professional (Fig. 2.4). Thus, critical services are least available, or least used, where MMRs are highest.

In 2018 there were an estimated 12.8 million births among adolescent girls aged 15–19 years, representing 44 births per 1000 adolescent girls. Adolescent birth rates are lowest in high-income countries (12 births per 1000 adolescent girls) and highest in low-income countries (97 births per 1000). Regionally, adolescent birth rates are lowest in the WHO Western Pacific Region (14 births per 1000) and highest in the African Region (99 births per 1000).

The risk of maternal death can be reduced through better access to modern methods of contraception, and by ensuring that women have access to high-quality care before, during and after childbirth. It is estimated that 76% of women of reproductive age have their family planning needs met with a modern contraceptive method. Globally between 2013 and 2018, 81% of births took place with the

Adolescent girls (aged 10–19 years) face higher risks of eclampsia, systemic infections and complications during childbirth than women aged 20–24 years *(11)*. Early childbearing can also have a negative effect on the health of newborn children, and on the health of the young mothers and pregnant adolescents, who may encounter stigma and stress and thus be less likely to complete schooling – in turn

Fig. 2.4
Maternal mortality ratios are highest where (a) the need for family planning is least met and (b) the proportion of births delivered by a skilled attendant is lowest[a]



[a] Six upper-middle-income countries and one high-income country deviate from the overall trend in 2.4a and have low values of met need for family planning with low MMRs. These are Albania, Armenia, Bosnia and Herzegovina, Libya, Montenegro, Oman and Serbia *(12)*.

Source: WHO (2015) *(10)*.

this reduces their lifetime opportunities and weakens their control over resources and their lives *(13, 14)*.

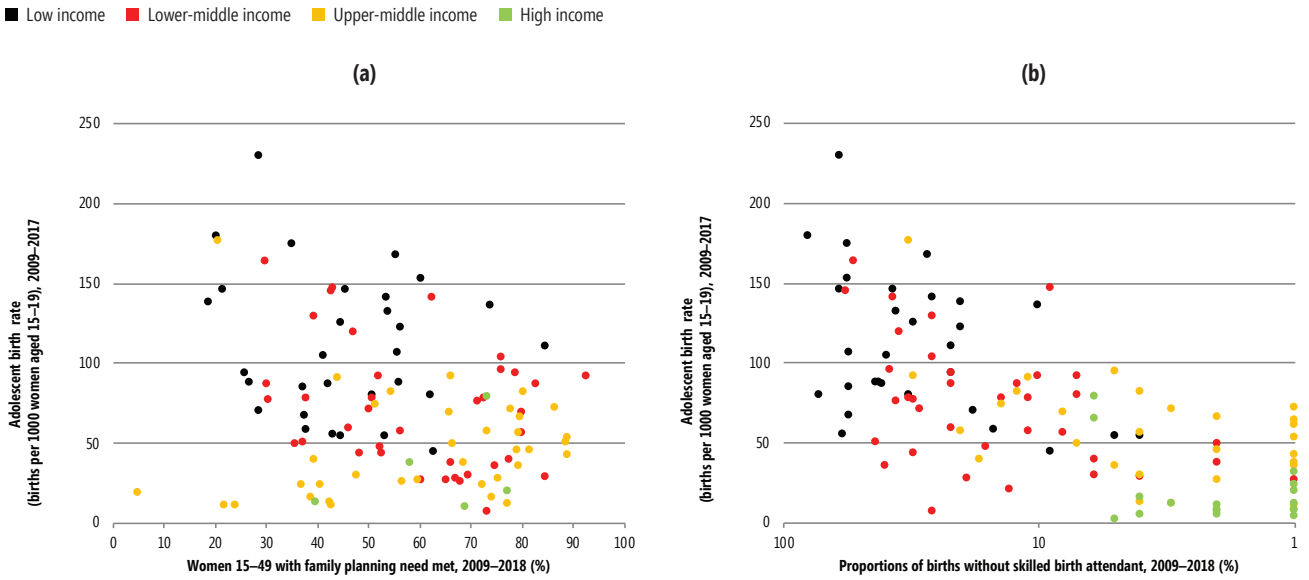
There is an inverse association between adolescent birth rates and the proportion of women aged 15–49 years with their contraceptive needs met, which is also related to the wealth of countries (Fig. 2.5). Similarly, there is an inverse association between adolescent birth rates and the proportion of women receiving quality care from a skilled health professional. Thus, not only do adolescents giving birth have less access to methods to prevent high-risk birth, the high-risk birth is less likely to be delivered by a skilled birth attendant.

In addition to the tragic loss of life, a maternal death can have negative effects on families, including on the physical and mental health of family members *(15, 16)*. Studies have shown greatly increased mortality among children whose mothers had died *(17–19)*. Other documented effects include catastrophic payments and reduced household income *(20–22)*; thus, not only are the risks of maternal deaths elevated by poverty, but their occurrence may perpetuate the cycle of poverty in poor communities from one generation to the next.

Many women, and their children, could be saved by increasing availability and use of modern methods of contraception, and high-quality pregnancy and childbirth care. However, most maternal deaths are also influenced by other factors associated with poverty, lack of freedom over reproductive health choices and lack of command of resources. Programmes to address upstream risk factors for maternal death, including women's economic empowerment and increased educational attainment, are also important for the well-being of women and their families.

The design and monitoring of maternal health programmes is impaired by incomplete information on the frequency and causes of death, and data are scarcest in countries where MMRs are highest. Investments are needed in monitoring systems that can, for example, investigate maternal deaths (without penalizing those who report maternal deaths), and survey the availability and quality of essential obstetric care. Such systems would supplement routine health information systems and household surveys.

Fig. 2.5
Adolescent birth rates are highest where (a) the need for family planning is least met and (b) the proportion of births delivered by a skilled attendant is lowest[a]



[a] Individual points represent the latest available survey results for a country since 2009 *(12)*.

Indicator 3.1.1 Maternal mortality ratio (per 100 000 live births)

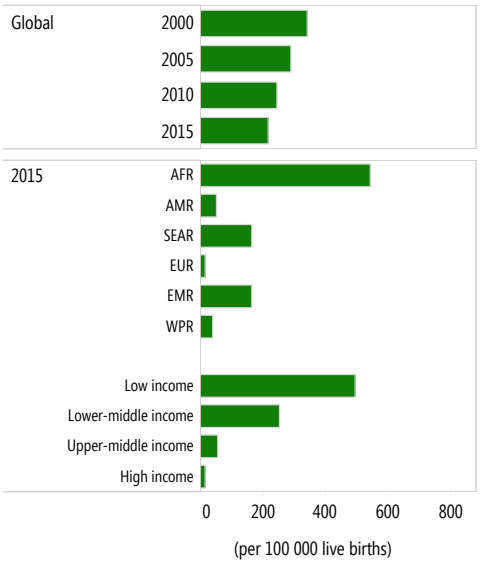
TREND
Globally, the MMR fell by 37% during 2000–2015. Even so, in 2015, 303 000 deaths occurred – more than one woman died for every 500 births.

GEOGRAPHICAL DISTRIBUTION
MMRs are highest in the WHO African Region where one woman dies for every 185 children born.

NATIONAL INCOME
MMRs are highest in low-income countries where one woman dies for every 202 children born compared to one woman in 5900 in high-income countries – a 29-fold difference.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



Indicator 3.1.2 Proportion of births attended by skilled health personnel (%)

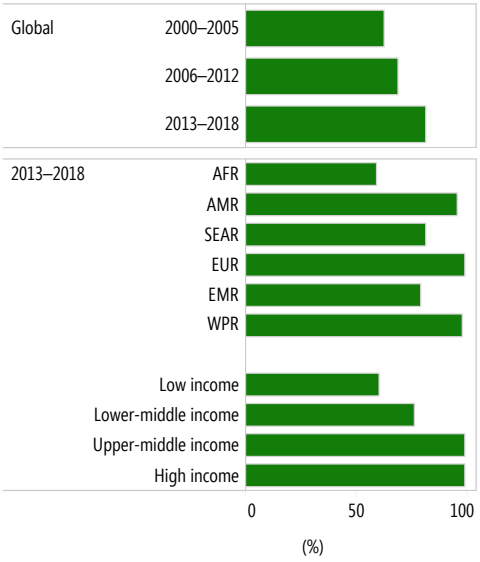
TREND
The proportion of births attended by skilled health personnel increased from 62% in 2000–2005 to 81% in 2013–2018.

GEOGRAPHICAL DISTRIBUTION
The proportion of births attended by skilled health personnel is lowest in the WHO African, Eastern Mediterranean and South-East Asia regions.

NATIONAL INCOME
Just 60% of births are attended by skilled health personnel in low-income countries compared to nearly 100% in upper-middle-income and high-income countries.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



Indicator 3.7.1 Proportion of women of reproductive age (aged 15–49 years) who have their need for family planning satisfied with modern methods (%)

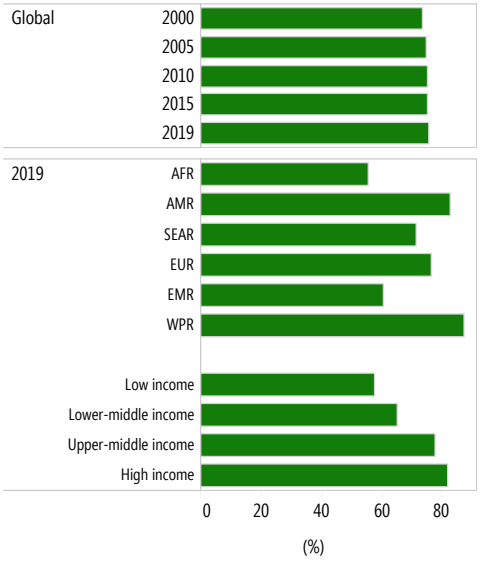
TREND
The proportion of women of reproductive age who have their need for family planning satisfied with modern methods of contraception increased between 2000–2015.

GEOGRAPHICAL DISTRIBUTION
The proportion of women who have their need for family planning satisfied with modern methods is lowest in the WHO African Region and highest in the Western Pacific Region.

NATIONAL INCOME
Not available.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not applicable because the denominator for Indicator 3.7.1 is women 15–49. However, information on method of contraception, including female and male methods, is collected in DHS. In the latest nationally representative DHS results from 39 countries for 2010–2017, condom use was the most common method reported in 26 countries, oral contraceptive pills in 9 countries, injections in 2 countries, female sterilization in 1 country and intrauterine devices in 1 country. Such surveys are undertaken predominantly in low- and middle-income countries (LMIC). Condoms may also be used to prevent transmission of sexually transmitted diseases.



Indicator 3.7.2 Adolescent birth rate (per 1000 women aged 15–19 years)

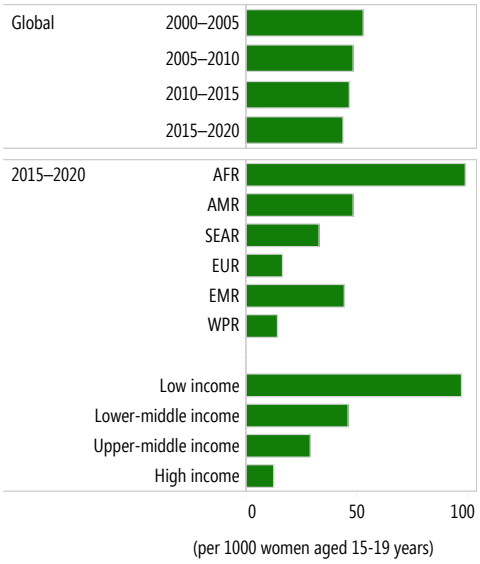
TREND
Globally, adolescent birth rates have fallen from 53 per 1000 women aged 15–19 years in 2000–2005 to 44 in 2015–2020.

GEOGRAPHICAL DISTRIBUTION
Adolescent birth rates are highest in the WHO African Region where one in 10 adolescent girls give birth each year.

NATIONAL INCOME
Adolescent birth rates are eight times higher in low-income countries (97 per 1000) than in high-income countries (12 per 1000).

AGE DISTRIBUTION
Adolescent birth rates are only available for adolescents aged 15–19 years, not for those aged 10–14 years.

SEX DISTRIBUTION
Not available.



3 NEWBORN AND CHILD HEALTH

This section discusses some of the SDG targets that focus on child health: those for nutrition (Target 2.2), child mortality (Target 3.2) and vaccines (Target 3.b). Other SDG targets critical for child health are those concerning reproductive and maternal health (Targets 3.7 and 3.1), safe drinking-water (Target 6.1), and sanitation and hygiene (Target 6.2); those targets are discussed in Sections 2 and 7 of this report.

Substantial progress has been made in reducing child deaths since 2000, with the global under-5 mortality rate dropping by 49%, from 77 deaths per 1000 live births in 2000 to 39 in 2017. This is the equivalent of 1 in 14 children dying before reaching age 5 in 2017, compared with 1 in 13 dying before age 5 in 2000. An estimated 5.4 million children aged under 5 years died in 2017, of whom 2.5 million were female and 2.9 million male. Of these deaths, 2.5 million occurred during the first 28 days of life. Globally, death rates in the first month of life fell by 41%, from 31 per 1000 live births in 2000 to 18 in 2017, a smaller reduction in mortality compared with the 54% reduction in mortality for children aged 1–59 months. Under-5 mortality rates are highest in the WHO African Region and in low-income countries, where one child dies out of 14 born.

TARGET 3.2: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births

INDICATORS

3.2.1 Under-5 mortality rate

3.2.2 Neonatal mortality rate

TARGET 2.2: By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons

INDICATORS

2.2.1 Prevalence of stunting (height for age <–2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age

2.2.2 Prevalence of malnutrition (weight for height >+2 or <–2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight).

TARGET 3.b: Support the research and development of vaccines and medicines for the communicable and noncommunicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines

INDICATOR

3.b.1 Proportion of the target population covered by all vaccines included in their national programme

More than half of under-5 child deaths are due to diseases that are preventable and treatable through simple, affordable interventions (Fig. 3.1). The leading causes of death in young children over 28 days of age remain pneumonia, diarrhoea, birth defects and malaria (in malaria endemic countries). Rates of death from all conditions are higher in low-income countries, but children in low-income countries are more than 100 times more likely to die from infectious diseases than those in high-income countries.

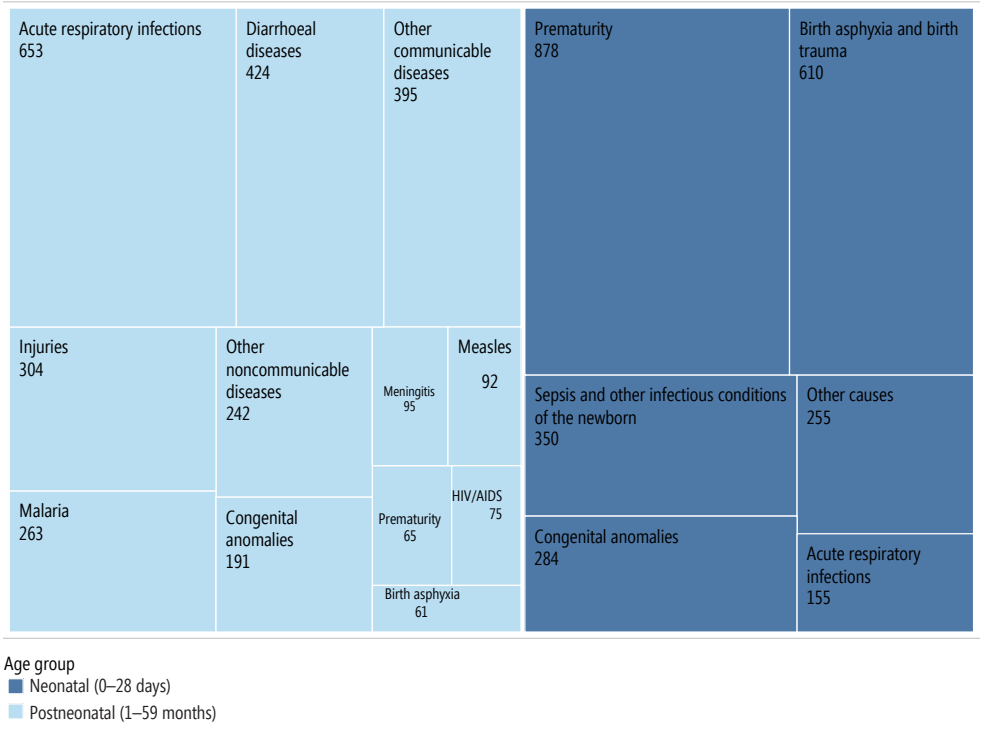
Children who die within the first 28 days of birth (neonatal mortality) suffer from conditions and diseases associated with lack of quality care at birth, or skilled care and treatment immediately after birth and in the first days of life. Preterm birth, intrapartum-related complications (birth asphyxia or lack of breathing at birth), infections and birth defects caused the most neonatal deaths in 2017. Most newborn deaths take place in low- and middle-income countries (LMIC), and two regions accounted for almost 70% of newborn deaths in 2017 – the WHO African Region and South-East Asia Region. It is possible to improve the survival and health of newborns by achieving high coverage of quality antenatal care, skilled care at birth, postnatal care for mother and baby, and care of small and sick newborns.

In 2017, male children were 11% more likely to die before the age of 5 years. Boys have a higher probability of dying before reaching the age of 5 years than girls for biological reasons, including less lung maturity at birth and less resistance to infectious diseases *(24, 25)*. Newborn boys often weigh more at birth, but have higher perinatal mortality and more frequent congenital malformations. Immunoregulatory genes linked to the X-chromosome confer greater resistance to infectious diseases on girls, who have two X-chromosomes compared with boys, who have one X-chromosome.

Because boys have a higher biological risk of death than girls, an assessment of gender bias in health outcomes cannot be based on equality of the under-5 mortality rate. Rather, mortality rates close to unity are indicative of female disadvantage. The risk of dying before the age of 5 years is higher in boys in all income groups set by the World Bank and in all regions. However, in the WHO South-East Asia Region, the risk is almost equal, indicating high rates of avoidable mortality among females aged under 5 years.

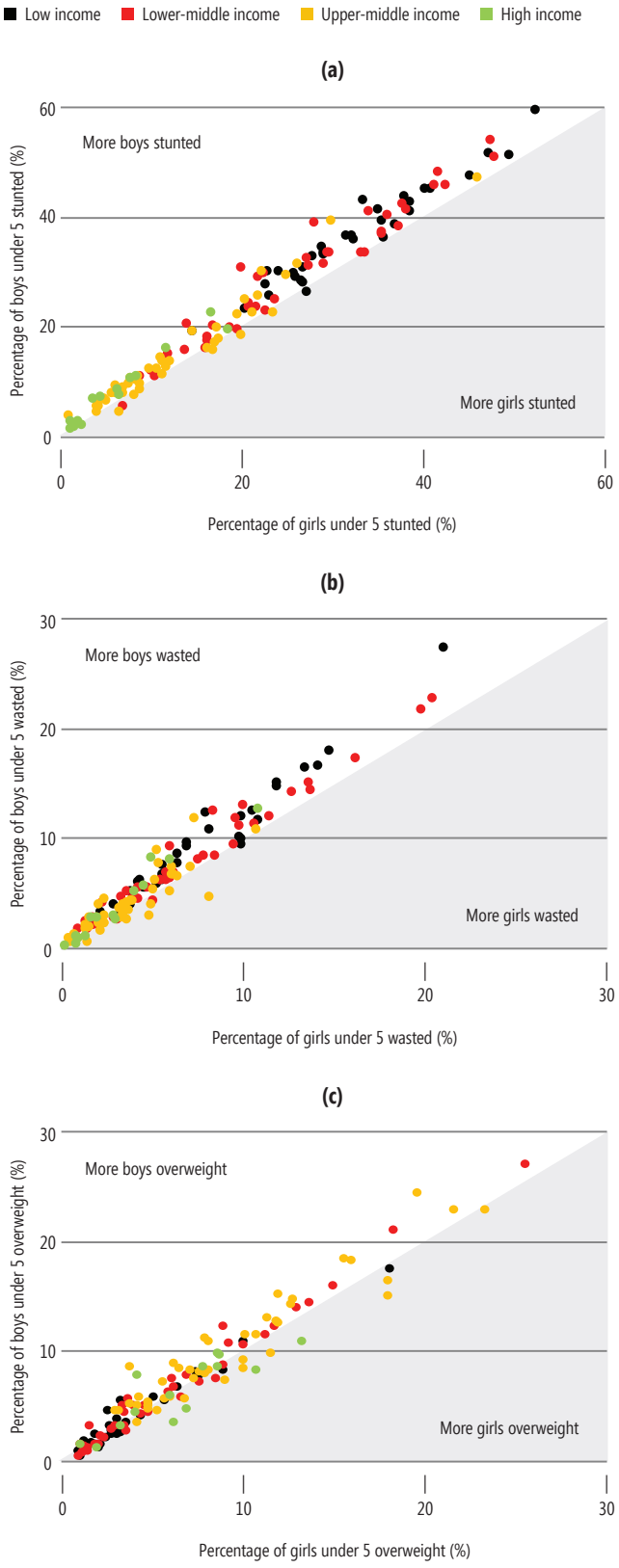
Nutrition-related factors contribute to about 45% of deaths in children aged under 5 years. Malnourished children, particularly those with severe acute malnutrition, have a higher risk of death from common childhood illnesses such as diarrhoea, pneumonia and malaria. In most countries, a higher proportion of boys are malnourished than girls in the age group 0–5 years (this refers to overweight, stunting and wasting) (Fig. 3.2). Sex differences in nutritional status have been attributed to biological differences in morbidity between boys and girls in early life *(24, 26)*. In addition, boys grow faster during infancy, resulting in greater energy needs.

Fig. 3.1
Number of deaths (thousands) among children under 5 years by cause, 2017



Source: WHO-MCEE (2018) *(23)*.

Fig. 3.2
Malnutrition rates in male and female children[a]: (a) stunting, low height for age, (b) wasting, low weight for height, and (c) overweight



[a] Individual points represent the latest available survey results for a country since 2000 *(12)*.

Use of health care services can contribute to differences in mortality rates between boys and girls. However, most studies find that boys and girls are equally likely to be taken for care when ill *(27)*, although a bias is observed in some locations. In a United Nations Children's Fund (UNICEF) review, a higher proportion of boys were taken to treatment centres for pneumonia in six countries out of 67 with data, whereas a higher proportion of girls were taken to treatment centres in one of those 67 countries *(28)*. Hospitalizations for pneumonia, diarrhoea and fever were found to be higher in boys than in girls, whereas case fatality rates were higher in girls than in boys, perhaps as a result of greater delays in care-seeking or poorer quality of care. Gender-based discrimination in health care affecting girls is reported mainly from South Asia and China, with sporadic reports from Africa and South America *(29)*.

Vaccines are available for some of the most deadly childhood diseases, such as measles, polio, diphtheria, tetanus, pertussis, pneumonia due to *Haemophilus influenzae* type B and *Streptococcus pneumonia* and diarrhoea due to rotavirus. Vaccination rates are similar between boys and girls (Fig. 3.3). Use of pneumococcal conjugate and rotavirus vaccines is lagging, especially in middle-income countries without donor support. Vaccination against both these diseases has the potential to substantially reduce deaths of children aged under 5 years, because pneumonia and diarrhoea are the leading causes of death in this age group.

Fig. 3.3
Vaccination rates in male and female children, 2000–2015[a]

[a] Individual points represent the latest available survey results for a country since 2000.
Source: Health equity assessment toolkit *(30)*.

Globally, countries with a low under-5 mortality rate have high M/F mortality ratios *(31, 32)*, partly because congenital diseases predominate when mortality is low. Countries with a high under-5 mortality rate have low M/F mortality ratios. Both high under-5 mortality rate and low M/F mortality ratios are associated with low socioeconomic status and gender inequality *(33)*. Progress in reducing the under-5 mortality rate since 2000 was accompanied by an increase in the M/F mortality ratio from 1.06 in 2000 to 1.11 in 2017, indicating that the decline in the female under-5 mortality rate was faster than that for males.

Reductions in the under-5 mortality rate are accompanied not only by higher M/F mortality ratios but also by reductions in fertility. Smaller families reduce the chances of a couple having a child of any given sex. In societies with a preference for male children, reductions in the under-5 mortality rate have been accompanied by another type of female disadvantage – that is, a disadvantage in natality – through selective abortion of female fetuses. Increases in the M/F sex ratio at birth have been seen in parts of East Asia, South Asia and the South Caucuses. M/F sex ratios at birth have been seen to be higher if a couple's previous children have been female; also, multiparous women are more likely to have prenatal knowledge of the sex of their fetus, resulting in sex selection and more male births than in primiparous women *(34)*.

A number of actions can be envisaged to address female disadvantage in populations with an atypically high female under-5 mortality rate, including policies to discourage sex-selective abortions, financial incentives to have female children, and policies that address the marginalized status of women or the provision of social protection in old age *(35)*. The development of policies that will improve child health requires better information on sex differentials in child morbidity and mortality, and more qualitative research that can reveal the harmful gender norms and expectations that result in discriminatory treatment of boys or girls.

Female disadvantage is of widespread concern and must be tackled. In addition, the specific needs of boys should be addressed. Boys experience higher rates of mortality than girls in most of the world, and as the under-5 mortality rate falls globally, the M/F mortality ratio is increasing. In countries that have achieved large reductions in the under-5 mortality rate, additional actions may need to be taken to improve health outcomes for boys, to ensure continued progress towards SDG Target 3.2.

Indicator 3.2.1: Under-5 mortality rate (per 1000 live births)

TREND
Under-5 mortality rates fell by 49% since 2000; nevertheless, in 2017, one child in every 14 born died before his or her fifth birthday, amounting to 5.4 million deaths.

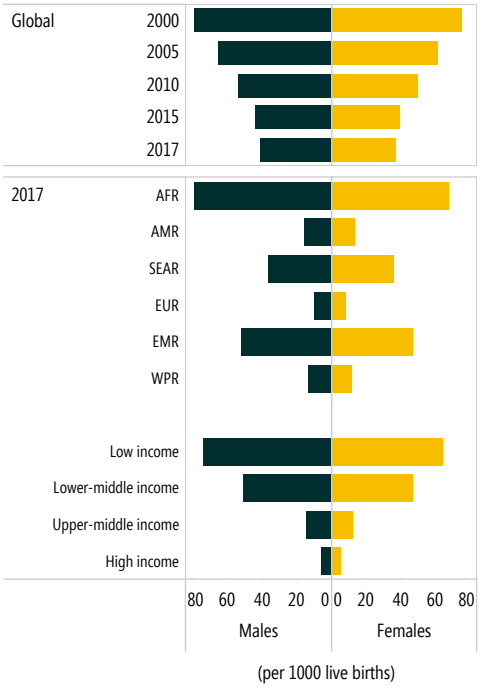
GEOGRAPHICAL DISTRIBUTION
Higher under-5 mortality rates are seen in the WHO African Region and Eastern Mediterranean Region. The risk of death before the age of 5 years is eight times higher in the WHO African Region than in the European Region.

NATIONAL INCOME
Higher under-5 mortality rates are seen in low-income and lower-middle-income countries. The risk of death in low-income countries is more than 13 times higher than that in high-income countries.

AGE DISTRIBUTION
See Indicator 3.2.2 for neonatal mortality rate (first 28 days after birth).

SEX DISTRIBUTION
In 2017, male children were 11% more likely to die before the age of 5 years than female children. Progress in reducing the under-5 mortality rate since 2000 has been accompanied by an increase in the M/F mortality ratio from 1.06 in 2000 to 1.11 in 2017 (i.e. the decline in the female under-5 mortality rate has been faster than the male rate).

The risk of dying before the age of 5 years is higher in boys in all income groups from the World Bank and all WHO regions, but is almost equal in the WHO South-East Asia Region. Because boys have a higher biological risk of death than girls, mortality ratios close to unity are indicative of female disadvantage and are of concern.



Indicator 3.2.2: Neonatal mortality rate (per 1000 live births)

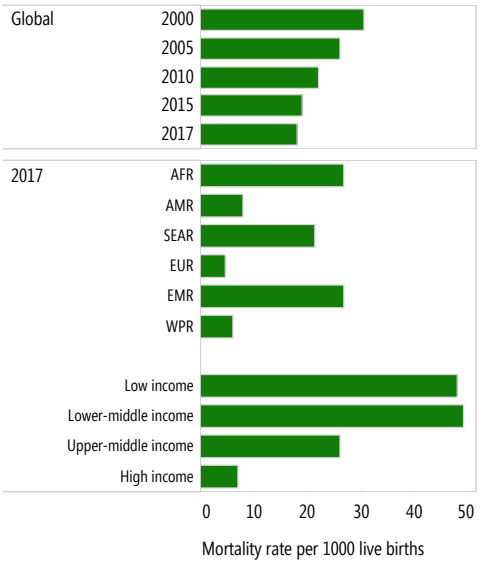
TREND
Globally, the neonatal mortality rate fell by 41% between 2000 and 2017; nevertheless, in 2017, 2.5 million deaths occurred in children aged under 1 month: one child in every 55 born.

GEOGRAPHICAL DISTRIBUTION
Neonatal mortality rates are highest in the WHO African Region and Eastern Mediterranean Region; regions where one child in 37 born dies before they are 1 month old.

NATIONAL INCOME
Neonatal mortality rates are highest in low-income and lower-middle-income countries, where approximately one child in 20 born dies before they are 1 month old. The risk of death before a child reaches the age of 1 month is seven times higher in low-income and lower-middle-income countries than in high-income countries.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Global estimates are not available, but individual country surveys suggest that neonatal mortality rates are higher in boys than girls.



Indicator 2.2.1: Prevalence of stunting in children under 5 (%)

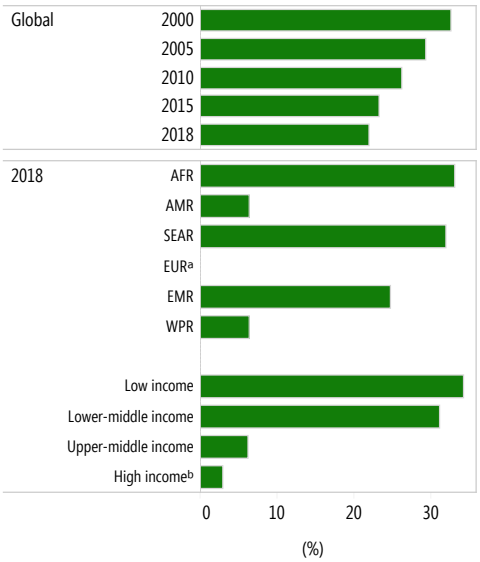
TREND
Globally, the proportion of children aged under 5 years who are stunted fell by nearly a third between 2000 and 2018; nevertheless, in 2018, more than a fifth of children were shorter than global standards for their age.

GEOGRAPHICAL DISTRIBUTION
Rates of stunting are highest in the WHO African Region and South-East Asia Region, where about one in three children are stunted.

NATIONAL INCOME
Rates of stunting are highest in low-income and lower-middle-income countries, where the risk of stunting is five times higher than in upper-middle-income countries, and more than 10 times higher than in high-income countries.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Global estimates are not available, but individual country surveys suggest that rates of stunting are generally higher in boys than girls.



[a] Not available.
[b] Low coverage, interpret with caution.

Indicator 2.2.2.a: Prevalence of wasting in children under 5 (%), 2018

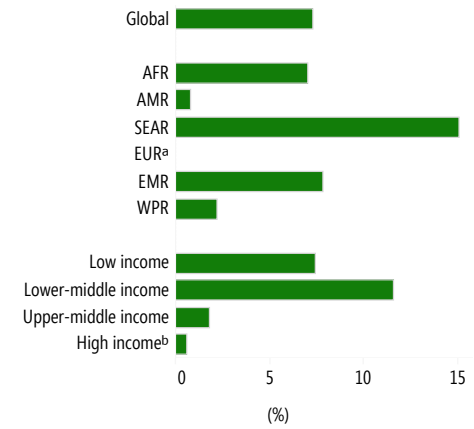
TREND
Not available.

GEOGRAPHICAL DISTRIBUTION
Rates of wasting are highest in the WHO South-East Asia Region where one in seven children are considered to be too light (thin) for their height.

NATIONAL INCOME
Rates of wasting are highest in low-income and lower-middle-income countries. The greater proportion of children that are wasted in lower-middle-income countries reflects large inequalities in nutritional status within countries, as well as between countries.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Global estimates are not available, but individual country surveys suggest that rates of wasting are generally higher in boys than girls.



[a] Not available.
[b] Low coverage, interpret with caution.

Indicator 2.2.2.b: Prevalence of overweight in children under 5 (%)

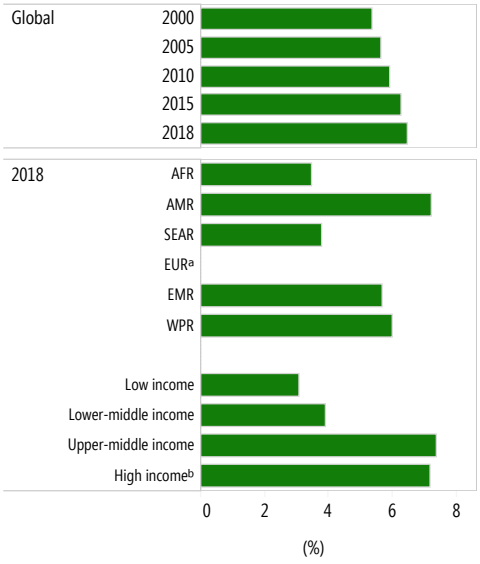
TREND
Globally, the proportion of children aged under 5 years who are overweight increased by 20% between 2000 and 2018; in 2018, one in 17 children were heavier than global standards for their height.

GEOGRAPHICAL DISTRIBUTION
The proportion of children considered overweight is highest in the WHO Region of the Americas where one child in 14 is overweight.

NATIONAL INCOME
The proportion of children considered overweight is highest in upper-middle-income countries, where one child in 14 is overweight. In low-income countries, one child in 32 is considered to be heavier than global standards for their height.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Global estimates are not available, but individual country surveys suggest that the proportion of children overweight is higher in boys than in girls.



[a] Not available.
[b] Low coverage, interpret with caution.

Indicator 3.b.1: Proportion of the target population covered by all vaccines included in their national programme

Indicator 3.b.1 is tracked using the coverage of three vaccine doses: the third dose of diphtheria-tetanus-pertussis (DTP3), the measles-containing vaccine second dose (MCV2) and the pneumococcal conjugate vaccine third dose (PCV3). These are reported separately below.

DIPHTHERIA-TETANUS-PERTUSSIS (DTP3) IMMUNIZATION COVERAGE AMONG 1-YEAR-OLDS (%)

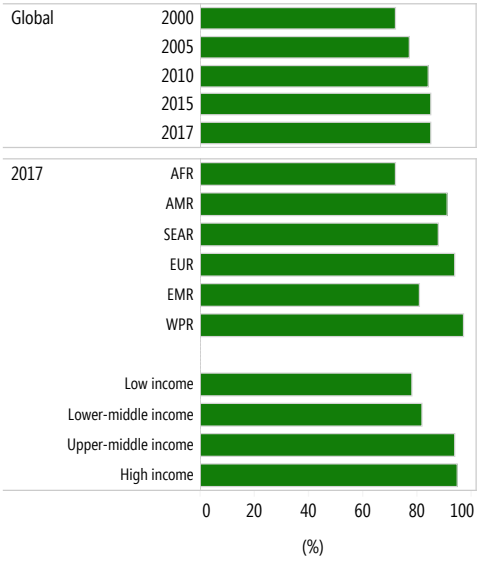
TREND
Global coverage rose from 72% in 2000 to 85% in 2017, representing a 15% increase. All countries are using DTP-containing vaccines for the administration of the three primary doses. Most countries are using vaccines combined with other antigens such as hepatitis B or *Haemophilus* type b.

GEOGRAPHICAL DISTRIBUTION
The WHO African Region has had the highest increase in coverage since 2000 (38%), but the coverage level in 2017 was still the lowest among WHO regions, at 72%. The WHO Western Pacific Region had the highest level of coverage in 2017, at 97%.

NATIONAL INCOME
Low-income countries have lower vaccine coverage rates. The gap between low- and high-income countries has decreased since 2000, but was still 17 percentage points in 2017.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Global estimates are not available, but individual country surveys suggest that vaccination rates are similar between boys and girls.



MEASLES-CONTAINING-VACCINE SECOND-DOSE (MCV2) IMMUNIZATION COVERAGE BY THE NATIONALLY RECOMMENDED AGE (%)

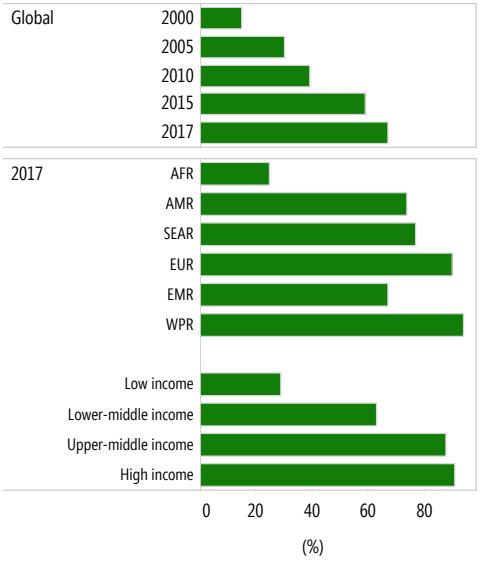
TREND
Global coverage has increased more than fourfold since 2000; two thirds of children received two doses of measles vaccine according to national immunization schedules in 2017. In 2017, 167 of the 194 WHO Member States had introduced a second dose of measles-containing vaccine in their national immunization schedules.

GEOGRAPHICAL DISTRIBUTION
In 2017, just 26 of the 47 countries in the WHO African Region had introduced the second dose in their national immunization schedule, translating to vaccination coverage of 25%, the lowest of all WHO regions. The WHO Eastern Mediterranean Region had the second lowest coverage among WHO regions, despite 95% of the Member States already having introduced MCV2 in their national immunization schedules. The WHO Western Pacific Region had the highest coverage in 2017, at 94%, followed by the European Region at 90%.

NATIONAL INCOME
Nine in 10 children in high-income countries received two doses of measles vaccine according to national immunization schedules in 2017, yet only about three in 10 children in low-income countries received two doses.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Global estimates are not available, but individual country surveys suggest that vaccination rates are similar between boys and girls.



PNEUMOCOCCAL CONJUGATE 3RD DOSE (PCV3) IMMUNIZATION COVERAGE AMONG 1-YEAR-OLDS (%)

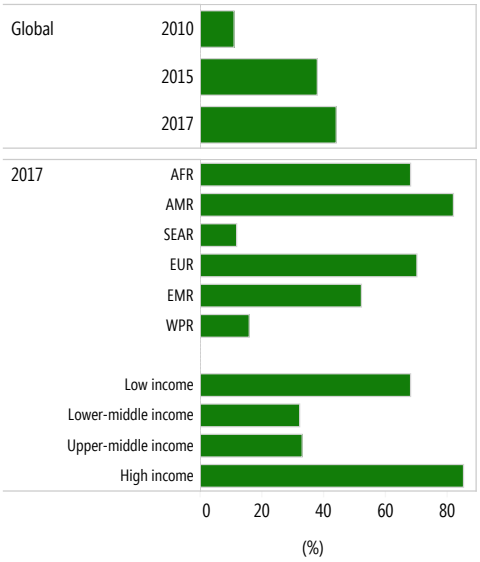
TREND
Global coverage has increased 4-fold since 2010, reaching 44% in 2017. By 2017, 141 countries had introduced PCV in their national immunization schedules, the WHO South-East Asia Region being the region with the fewest number of introductions (proportionally).

GEOGRAPHICAL DISTRIBUTION
In 2017, coverage ranged from 12% in the WHO South-East Asia Region to 82% in the Region of the Americas.

NATIONAL INCOME
Middle-income countries are lagging in the uptake of pneumococcal vaccine, with 33% estimated coverage in 2017, compared with 68% in low-income countries and 85% in high-income countries. Most middle-income countries do not benefit from donor support, and Gavi gives preferential pricing to newer and more expensive vaccines.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Global estimates are not available, but individual country surveys suggest that vaccination rates are similar between boys and girls.



4 INFECTIOUS DISEASES

The main SDG target concerning infectious diseases is Target 3.3. Indicators of progress consider HIV, TB, malaria, hepatitis and neglected tropical diseases (NTDs)[1]. Collectively, these diseases accounted for an estimated 4.3 million deaths in 2016 (1.7 million female and 2.7 million male), down from 5.3 in 2000 (2.2 million female and 3.1 million male) (Fig. 4.1).

The risk of dying from these infectious diseases is highest in the WHO African Region and South-East Asia Region, and in low-income and lower-middle-income countries.

The risk of death varies across the life course by disease. The risk of death from malaria is greatest in children aged under 5 years. Deaths from HIV peak in reproductive years, whereas the risk of death from TB, hepatitis B and NTDs increases with age (Fig. 4.2).

TARGET 3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

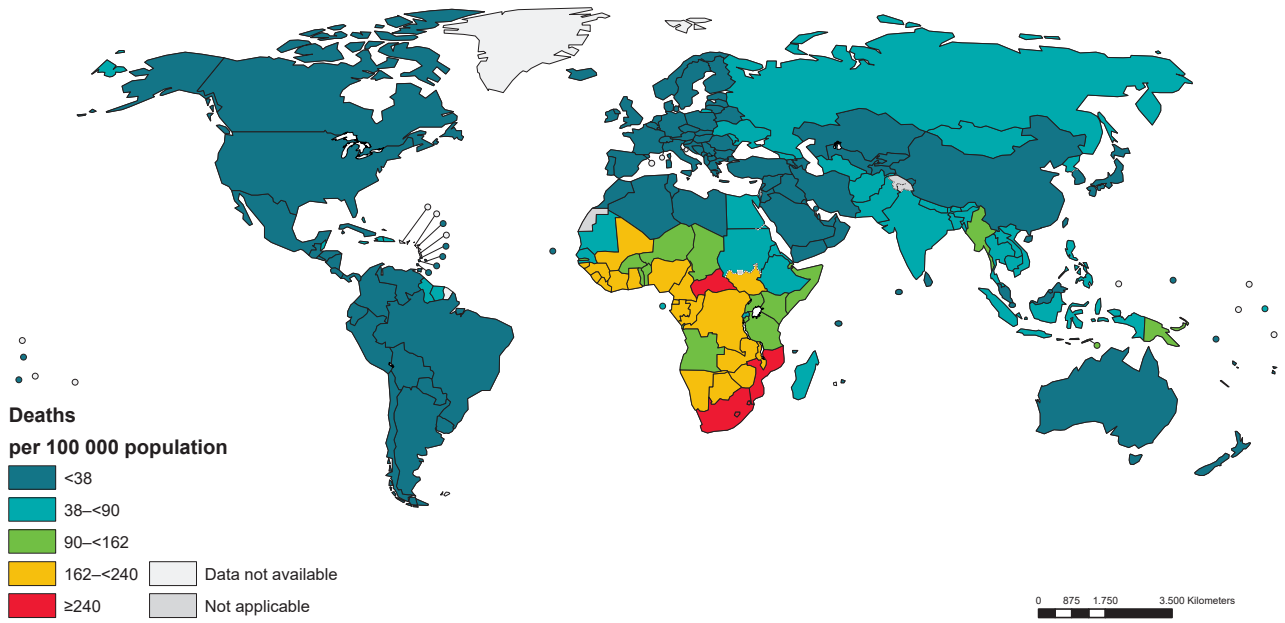
INDICATORS

- **3.3.1 Number of new HIV infections per 1000 uninfected population, by sex, age and key populations**
- **3.3.2 Tuberculosis incidence per 1000 population**
- **3.3.3 Malaria incidence per 1000 population**
- **3.3.4 Hepatitis B incidence per 100 000 population**
- **3.3.5 Number of people requiring interventions against neglected tropical diseases**

There are two male deaths from TB for every female TB death, and two male deaths from hepatitis for every female hepatitis death. There are also almost 40% more male deaths than female deaths from HIV, but the M/F death rate ratio varies from 1.1 in the WHO African Region to 3.5 in the Western Pacific Region, and from 1.1 in low-income countries to 3.0 in high-income countries, reflecting the different predominant modes of transmission. Deaths from NTDs and malaria are more evenly spread across the sexes.

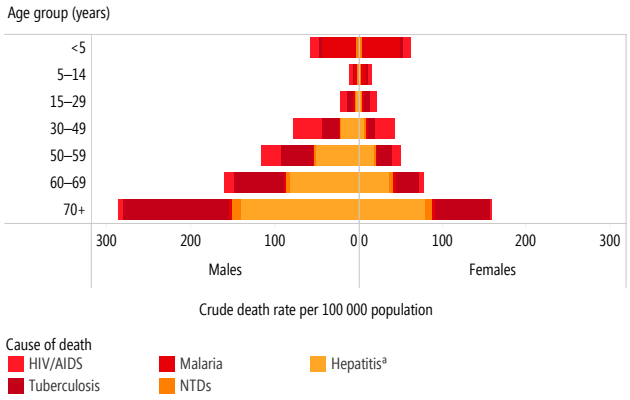
[1] Buruli ulcer, Chagas' disease, dengue and chikungunya, dracunculiasis (guinea-worm disease), echinococcosis, foodborne trematodiases, human African trypanosomiasis (sleeping sickness), leishmaniasis, leprosy (Hansen's disease), lymphatic filariasis, mycetoma, chromoblastomycosis and other deep mycoses, onchocerciasis (river blindness), rabies, scabies and other ectoparasites, schistosomiasis, soil-transmitted helminthiases, snake-bite envenoming, taeniasis/cysticercosis, trachoma and yaws (endemic treponematoses).

Fig. 4.1
Deaths per 100 000 population from infectious diseases covered by SDG Target 3.3, 2016[a]



[a] Thresholds based on Jenks natural breaks optimization. Hepatitis includes acute hepatitis, cirrhosis due to hepatitis B and C, and liver cancer secondary to hepatitis B and C.
Source: WHO (2018) *(2)*.

Fig. 4.2
Age distribution of deaths from infectious diseases covered by SDG Target 3.3, 2016



[a] Hepatitis includes acute hepatitis, cirrhosis due to hepatitis B and C, and liver cancer secondary to hepatitis B and C.
Source: WHO (2018) *(2)*.

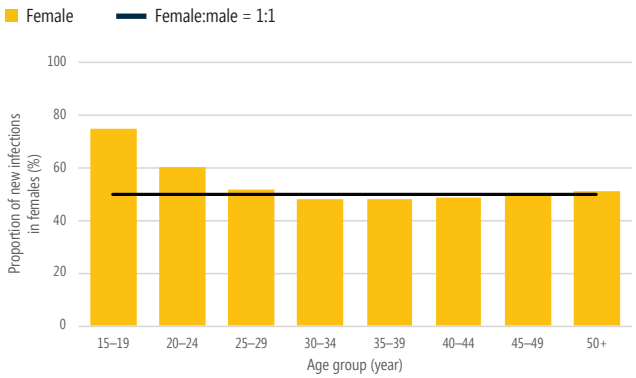
HIV

Globally, the incidence of HIV infection declined from 0.40 per 1000 uninfected population in 2005 to 0.25 per 1000 uninfected population in 2017. In total, there were an estimated 1.8 million new HIV infections in 2017 – 851 000 in females and 940 000 in males. Sub-Saharan Africa remained the most heavily affected region, where 59% of the 980 000 new adult HIV infections were in women. In other parts of the world, men accounted for 63% of the 650 000 new adult HIV infections.

In 2017, an estimated 47% of new infections occurred among key populations at high risk of HIV infection and their sexual partners. These key populations include gay men and other men who have sex with men, people who inject drugs, people in prisons and other closed settings, sex workers and their clients, and transgender people. Available data suggest that, in 2017, the risk of HIV acquisition among gay men and other men who have sex with men was 28 times higher than it was among heterosexual men. Similarly, the risk of acquiring HIV for people who inject drugs was 22 times higher than for people who do not inject drugs, 13 times higher for female sex workers than for women aged 15–49 years, and 13 times higher for transgender women than for people aged 15–49 years *(36)*. Risk behaviours (e.g. unprotected anal sex, the sharing of injecting equipment and unprotected transactional sex) within these populations are exacerbated by laws and policies that criminalize same-sex sexual relationships, sex work and drug use, which give licence for discrimination, harassment and violence, and hinder affected populations from accessing HIV and health services *(37-42)*.

In sub-Saharan Africa there were three times as many new infections in girls aged 15–19 years as there were in boys aged 15–19 years, and 1.5 times as many infections in women aged 20–24 years as there were in men aged 20–24 years (Fig. 4.3). The pattern of infection in the region reflects gender inequalities and harmful gender norms that create unequal power dynamics in the home and wider society, limit women's and girls' access to education, deny them control over their lives, restrict their access to HIV prevention and sexual and reproductive health services,

Fig. 4.3
Proportion of new HIV infections in females in sub-Saharan Africa, 2017



Source: UNAIDS (2018) *(36)*.

expose them to intimate partner and sexual violence, and cause a heightened risk of HIV, other sexually transmitted infections, unwanted pregnancies and maternal mortality *(43-47)*.

Condoms are one of the most effective methods for reducing the sexual transmission of HIV and other sexually transmitted infections. However, in half of the 27 countries in sub-Saharan Africa that had undertaken a recent household survey, condom use among men at last sex with non-regular partners was lower than 60%. Reported condom use among women was even lower, at less than 40% *(36)*. Male circumcision reduces the risk of female-to-male transmission of HIV. Between 2015 and 2017, almost 10 million adolescent boys and men underwent voluntary medical male circumcision in 14 priority countries in eastern and southern Africa, but circumcision rates remained at less than 30% in six of these countries.

Oral pre-exposure prophylaxis (PrEP) is among the most promising recent additions to HIV prevention for people at high risk of infection. The enormous potential of PrEP is already evident in North America, western Europe and Australia, where the addition of PrEP to areas with high coverage of antiretroviral therapy is contributing to declines in new diagnoses of HIV infection among gay men and other men who have sex with men. The impact of PrEP on a broader population within a high-prevalence setting remains to be seen, because large-scale PrEP programmes in eastern and southern Africa are in their early stages.

A record 21.7 million people were receiving antiretroviral therapy by the end of 2017, a net increase of 2.3 million people since the end of 2016. However, 41% of people living with HIV were still not receiving treatment. The uptake of these services can be low if HIV testing and treatment services are difficult to access; for example, where people must travel long distances to a clinic, where clinic hours are not suited to individuals or groups, or where clinic staff discriminate against people living with HIV and key populations at risk of HIV. Food insecurity, costs associated with HIV and viral load testing (including for the tests themselves), other health care costs, transport costs, lost income and opportunity costs contribute to later treatment initiation, lower treatment adherence and higher rates of AIDS-related mortality. Fear of stigma and discrimination also results in delays in a person seeking an HIV test, and in accessing and adhering to treatment, which can result in poor health outcomes *(48–50)*. Key populations often face multiple barriers to access, including stigma and discrimination in health care settings, and lack of appropriate services provided in a manner that respects confidentiality and privacy.

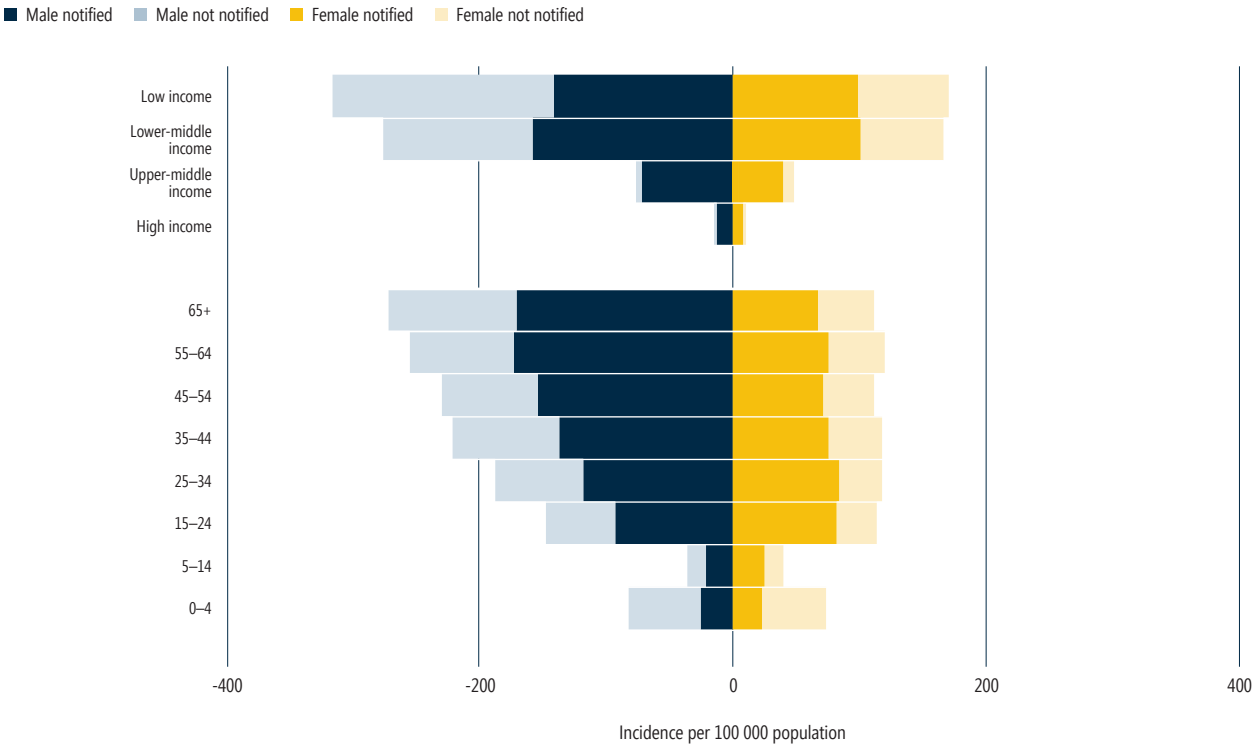
In countries with generalized HIV epidemics, men are less likely than women to take an HIV test, less likely to access antiretroviral therapy and more likely to die of AIDS-related illnesses than women *(51)*. Men have fewer entry points to health care services compared with women who often access HIV services through maternal health services; also, men are less likely to seek care for many illnesses, and are thus less likely to be diagnosed and treated. When men living with HIV are not diagnosed, do not start on HIV treatment or fail to remain on treatment, it jeopardizes both their own health, and the well-being and prospects of their partners, households, extended families and communities.

Tuberculosis

The higher estimated incidence and death rates of TB among men may be partly explained by men being more likely to smoke or drink *(52, 53)*; however, other risk factors, such as exposure to indoor air pollution and HIV infection, are more common in women. Immunological reasons for an excess of TB disease in men have also been proposed *(6)*.

Male TB patients appear to be less likely to seek care than female TB patients, as reflected in lower rates of case notification compared with the estimated total of cases (Fig. 4.4) *(54)*. As a consequence, male patients remain infectious in the community longer than female patients. Combined with a higher disease burden, and their social mixing patterns, men are considered to generate a greater number of secondary infections than women *(55)*. Hence, there is a need for strategies to improve access to and use of health services among men, not only to address gender inequities but also to maximize reductions in disease incidence. Potential strategies include the more active targeting of men with routine diagnostic and screening services, with risk reduction strategies for tobacco smoking, type 2 diabetes, untreated HIV infection, undernutrition and air pollution.

Fig. 4.4
Estimated incidence of tuberculosis in comparison to case notification, 2017



Sources: WHO (2018) *(54)* and World Bank (2018) *(12)*.

Drug-resistant TB is a continuing threat and in 2017 there were 558 000 new cases resistant to rifampicin (the most effective first-line drug), of which 460 000 were multidrug-resistant. There is no evidence of an association between sex of patient and the risk of drug resistance.

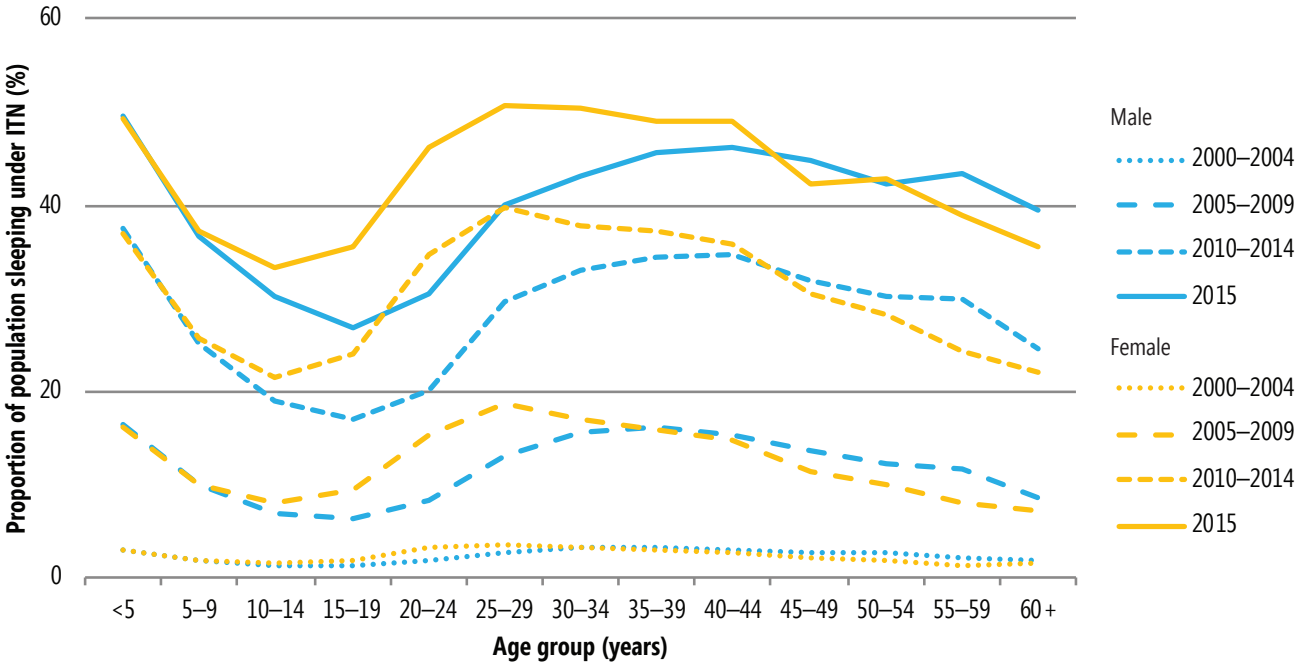
Malaria

The biting activity of the anopheline mosquitoes that transmit malaria is independent of the sex of the human host *(56, 57)*, and household surveys suggest that malaria infection rates are similar in male and female children aged under 5 years. However, differences in infection rates emerge in older ages, partly because gender roles influence exposure to mosquitoes. Men may be at high risk of malaria if they work in forests or fields at peak biting times, or if they migrate to areas of high endemicity for work. Women may be at increased risk if they perform household chores before dawn. Pregnant women are also more susceptible to malaria owing to their reduced immunity, with infection rates highest in the first and second pregnancies *(58)*. Malaria in pregnancy increases the risk of abortion, stillbirth, premature delivery and low-birthweight infants.

An effective intervention to reduce the risk of malaria infection is to sleep under a mosquito net *(59)*, and increased use of insecticide-treated mosquito nets (ITNs) since 2000 is estimated to account for half of the decline in parasite prevalence among children aged 2–10 years in sub-Saharan Africa between 2000 and 2015 *(60)*. Initially, bednet campaigns were targeted to children aged under 5 years and pregnant women (Fig. 4.5) *(61)*, but in 2008, WHO recommended that ITNs should be used by all people at risk. Nonetheless, coverage rates have remained highest in children aged under 5 years and in women of reproductive age. Coverage rates are lowest among children and young people aged 5–19 years and men aged 20–24 years, which is of concern given that parasite prevalence rates frequently peak between ages 5–15 years *(62)*, and infected school children are a source of infection for other household and community members *(63)*. Coverage rates are higher in young women, partly because they tend to marry and form new households at a younger age than men; smaller, newly formed households are more likely to have enough ITNs for all occupants compared with larger households (from which the young women moved), which generally have lower ITN to person ratios.

Evidence on the extent to which malaria patients seek treatment derives mostly from household surveys. These indicate that the proportion of febrile children for whom advice or treatment was sought is equal between boys and girls. The indicator's measurement is largely confined to sub-Saharan Africa and children aged under 5 years; further information on care-seeking in other age groups and outside of Africa is needed.

Fig. 4.5
Proportion of population sleeping under an ITN, sub-Saharan Africa, by age and sex, 2000–2015



Source: DHS and malaria indicator surveys (MIS) 2000–2015 *(61)*.

Hepatitis B

Most of the burden of disease from infection with hepatitis B virus (HBV) comes from infections acquired before the age of 5 years. A person may be infected with HBV for 30 years or more before developing any clinical symptoms of disease. Unless people are tested and diagnosed, they are not aware of their disease. Untreated viral hepatitis can progress to life-threatening complications. Depending on life expectancy, 20% or more of those with chronic infection develop end-stage chronic liver disease, such as cirrhosis or hepatocellular carcinoma. Mortality rates are similar in men and women aged below 30 years, but mortality rates among men aged 30–59 years are 2 times higher than in women. The incidence of HBV-related hepatocellular carcinoma is higher in men than women, and in postmenopausal females compared with other females, which may be related to levels of the hormones androgen and estrogen *(64)*. Cofactors (e.g. alcohol and HIV infection) can also accelerate progression towards end-stage liver disease.

NTDs

Sex differences in mortality rates for NTDs are slight compared with other infectious diseases covered by SDG Target 3.3, but mortality rates are 30% higher in men than in women aged 15–29 years. Interventions against NTDs largely rely on mass drug administration (to prevent disease) and early detection and treatment. Males are reported to face more barriers to accessing treatment than women owing to occupational roles that keep them away from households or villages for long periods, and they may be more distrustful of treatment *(65)*. Pregnant and breastfeeding women may also miss treatment if community distributors are unaware of which medicines can be safely used. Programmes often employ a higher proportion of men as community drug distributors than women. Some studies have identified underuse of female community drug distributors as being a factor that limits the effectiveness of ivermectin interventions against onchocerciasis in sub-Saharan Africa, but large-scale evaluations have not been undertaken *(66)*.

Indicator 3.3.1: New HIV infections (per 1000 uninfected population)

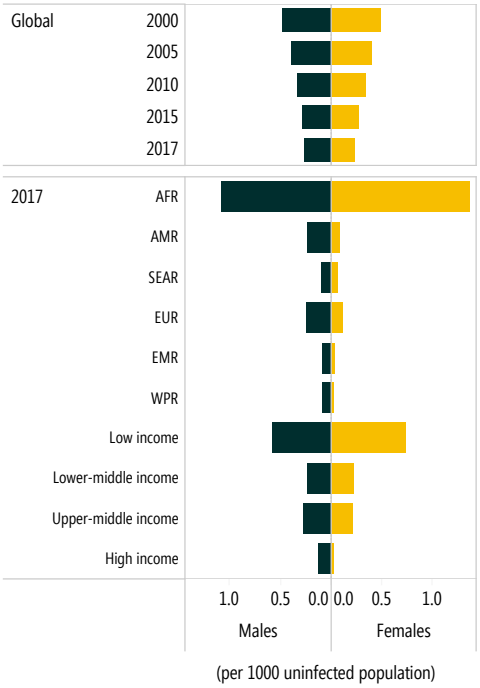
TREND
Between 2000 and 2017, the incidence of new HIV infections fell by 49% to 0.25 per 100 000, resulting in an estimated 1.8 million cases of HIV in 2017.

GEOGRAPHICAL DISTRIBUTION
The highest incidence rates are seen in the WHO African Region.

NATIONAL INCOME
The highest incidence rates are seen in low-income countries.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Global new HIV infection rates in women were 1.02 times higher than in men in 2000 but fell more rapidly between 2000–2017 so that they were 0.92 times that of men in 2017. Nonetheless, HIV adult infection rates were 1.3 times higher among women than men in the WHO African Region in 2017, though lower in women in other WHO regions.



Indicator 3.3.2: Tuberculosis incidence (per 100 000 population)

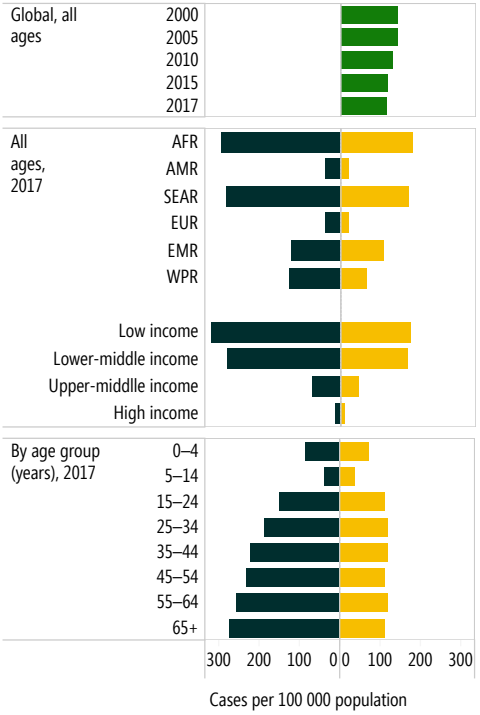
TREND
Between 2000 and 2017, the TB incidence rate fell by 21% to 134 per 100 000, resulting in an estimated 10 million cases of TB in 2017.

GEOGRAPHICAL DISTRIBUTION
Higher incidence rates are seen in the WHO African Region and South-East Asia Region.

NATIONAL INCOME
Higher incidence rates are seen in low-income and lower-middle-income countries.

AGE DISTRIBUTION
In 2017, 90% of cases were in those aged over 15 years.

SEX DISTRIBUTION
In 2017, 64% of cases were estimated to be in men and boys, and 36% in women and girls. Incidence rates in men increased with age while those in women aged over 15 years remained constant. The M/F ratio was 1.1 in children aged under 15 years but exceeded 2 from the age of 45 years.



Indicator 3.3.3: Malaria incidence (per 1000 population at risk)

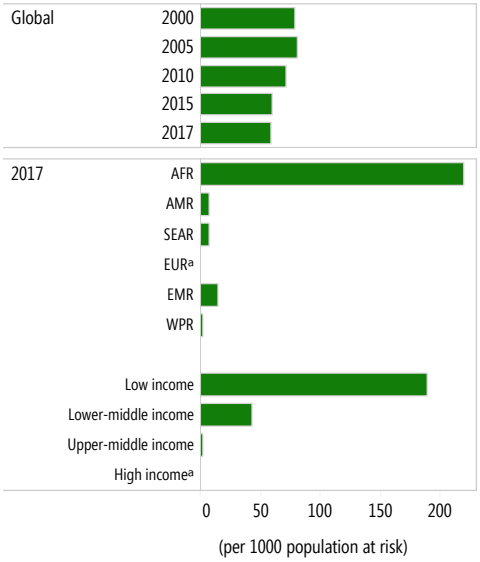
TREND
Global malaria incidence has remained at 59 per 1000 since 2015, after previously showing annual average reductions in incidence of 2.1% since 2000. An estimated 219 million cases of malaria occurred in 2017, leading to 435 000 deaths.

GEOGRAPHICAL DISTRIBUTION
The highest incidence rates are seen in the WHO African Region.

NATIONAL INCOME
Higher incidence rates are seen in low-income and lower-middle-income countries.

AGE DISTRIBUTION
An age breakdown of malaria incidence is not available; however, 61% of deaths and hence a similar proportion of cases are estimated to occur in children aged under 5 years. The percentage of deaths in children aged under 5 years is higher where case incidence rates are higher.

SEX DISTRIBUTION
Global estimates are not available. Nationally representative household surveys suggest that malaria infection rates are similar between male and female children, but that differences emerge in older age groups.



[a] The WHO European Region has reported zero indigenous malaria cases since 2015.

Indicator 3.3.4: Hepatitis B surface antigen (HBsAg) prevalence among children under 5 years (%)

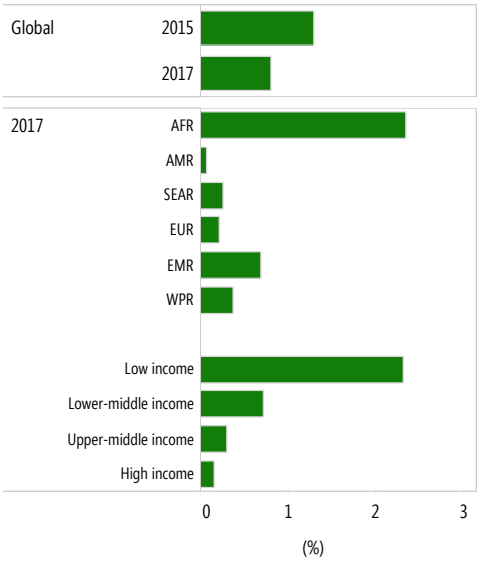
TREND
Hepatitis B prevalence among children aged under 5 years fell from 4.7% in the pre-vaccine era to 0.8% in 2017.

GEOGRAPHICAL DISTRIBUTION
Prevalence rates of hepatitis B are highest in the WHO African Region and the Eastern Mediterranean Region.

NATIONAL INCOME
The hepatitis B prevalence rate in low-income countries is 14 times that of high-income countries.

AGE DISTRIBUTION
Most hepatitis infections are acquired before the age of 5 years, although the most severe manifestations of the disease may not be noticed until late adulthood.

SEX DISTRIBUTION
Not available.



Indicator 3.3.5: Reported number of people requiring interventions against neglected tropical diseases

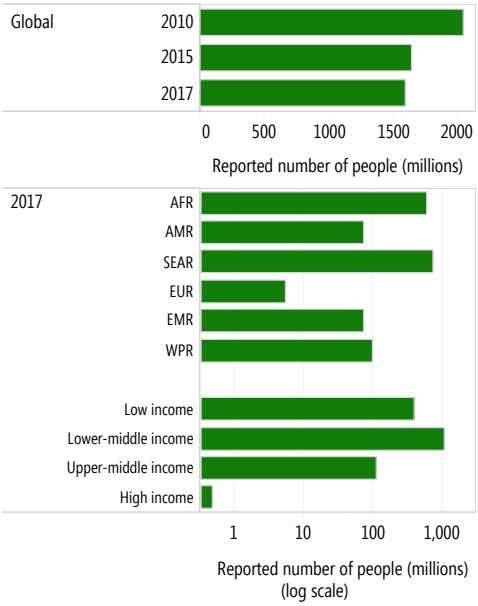
TREND
The number of people requiring interventions fell from 2.03 billion in 2010 to 1.58 billion in 2017.

GEOGRAPHICAL DISTRIBUTION
About 85% of people that require interventions are located in the WHO African Region and South-East Asia Region.

NATIONAL INCOME
Two thirds of those that require interventions live in lower-middle-income countries.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



5 NONCOMMUNICABLE DISEASES

The SDG targets concerning noncommunicable diseases (NCDs) are twofold; namely, improving health outcomes (Target 3.4) and lowering the exposure to NCD risk factors (Targets 3.5 and 3.A). Target 3.4 is assessed on the reduction in risk of premature death between the ages of 30 and 70 years from cardiovascular disease (CVD), cancer, diabetes and chronic respiratory disease (Indicator 3.4.1), and reduction in suicide mortality rates (Indicator 3.4.2).

NCDs collectively caused 41 million deaths worldwide in 2016, equivalent to 71% of all global deaths. Additionally, there were nearly 800 000 deaths from suicide.

Globally in 2016, the risk of a 30-year-old person dying from any of the four major NCDs before reaching the age of 70 years was 21.6% for men and 15.0% for women. The highest risks of premature death from NCDs by WHO region were seen in the WHO South-East Asia Region for men (26.5%) and in the WHO African Region for women (20.1%), whereas the highest risks by national income were in lower-middle-income countries for both sexes (26.6% for men and 19.9% for women). The risk of death from NCDs increased with age.

At a global level, CVD causes more premature deaths than cancer; however, for women in the WHO European Region and the Region of the Americas, cancer is the predominant cause of NCD premature deaths. Overall, in 2016, men were more likely than women to die from all four major NCDs, except in the WHO African Region and the Eastern Mediterranean Region, where women had higher age-standardized rates of premature death from cancer than men, and in the Western Pacific Region and the Eastern

TARGET 3.4: By 2030, reduce by one third premature mortality from noncommunicable diseases through prevention and treatment and promote mental health and well-being

INDICATORS

3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease

3.4.2 Suicide mortality rate

TARGET 3.5: Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

INDICATORS

3.5.1 Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services) for substance use disorders

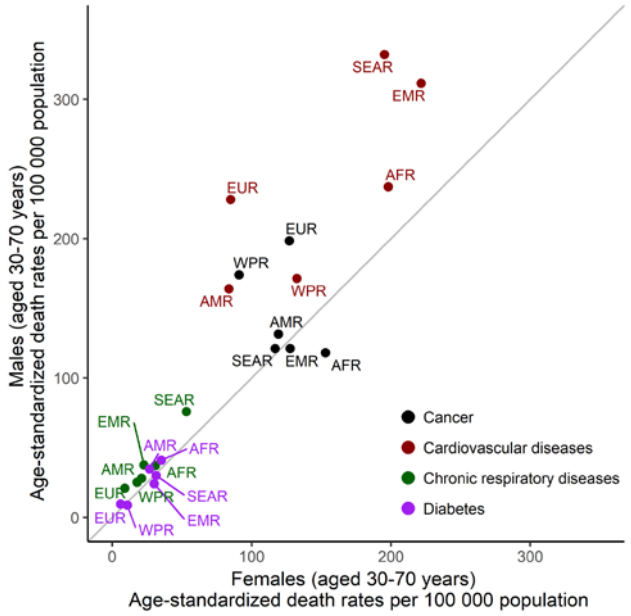
3.5.2 Harmful use of alcohol, defined according to the national context as alcohol per capita consumption (aged 15 years and older) within a calendar year in litres of pure alcohol

TARGET 3.a: Strengthen the implementation of the WHO Framework Convention on Tobacco Control in all countries, as appropriate

INDICATOR

3.a.1 Age-standardized prevalence of current tobacco use among persons aged 15 years and older

Fig. 5.1
Age-standardized rates (per 100 000 population) of premature death from the four major NCDs covered by SDG Target 3.4, 2016



Source: WHO (2018) *(2)*.

Mediterranean Region, where female death rates from diabetes were higher (Fig. 5.1).

From 2000 to 2016, the risks of premature NCD death decreased; the relative declines were slightly larger for women (19%) than for men (18%).

Worldwide, the crude suicide mortality rates dropped between 2000 and 2016, by 16% in men and 20% in women. In 2016, nearly 800 000 deaths were due to suicide, equivalent to an annual global crude suicide mortality rate of 10.6 per 100 000 population. Globally, for every female suicide death, there are nearly two male deaths (13.5 and 7.7 deaths per 100 000 population in men and women, respectively). Although suicide attempts are about two to four times more frequent among females *(67)*, men are more likely to use lethal means, partly explaining the reversed pattern in suicide mortality rates.

Men in the WHO European Region and in high-income countries suffer from the highest crude suicide mortality rates (24.7 and 21.0 per 100 000 population, respectively). The rates in women in these settings are substantially lower (6.6 and 7.6 per 100 000 population, respectively), yielding the largest M/F ratios (3.7 in the WHO European Region and 2.7 in high-income countries). The highest female suicide mortality rates were seen in the WHO South-East Asia Region (11.6 per 100 000 population) and in lower-middle-income countries (8.8 per 100 000 population). The lowest were seen in the WHO Eastern Mediterranean Region, and in low-income countries, for both men and women.

Biological differences between men and women are the main reasons for variation in the risk of death from some NCDs, such as cancers of organs associated with reproduction (e.g. cervical, breast, prostate and testicular cancer). Death rates may also be influenced by access to diagnosis and treatment; for example, cervical cancer rates are higher in low-income countries with poor access to health services *(68)*. However, for many NCDs, death rates in men and women are driven by exposure to the same major modifiable risk factors – for example, tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity – all of which vary by sex. Among these factors, tobacco use and harmful use of alcohol are currently of concern for the SDG targets, and are being assessed using Indicators 3.A.1 and 3.5.2, respectively.

Exposures to risk factors vary geographically, across income levels and between sexes (because gender roles and social norms expose men and women to different risks at different levels). Until the late 20th century, tobacco use and alcohol consumption were widely viewed as desired masculine norms in most of the world. In 2016, the worldwide age-standardized prevalence of tobacco smoking among persons aged 15 years and older was 34% in men and 6% in women, compared with 2000, when the prevalence was higher, at 43% and 11% in men and women, respectively. This corresponds to the historical trends and sex difference observed in many countries and the higher male mortality rates from smoking-related diseases, such as lung cancer (31.3 and 14.4 per 100 000 population in men and women in 2016, respectively) *(2)*.

A decline in smoking rate has been observed for both sexes in many high-income countries, but the decline has been slower among women, and the female smoking rate in some countries may even have increased owing to women having a greater control of resources, association of smoking with women's liberation , and the tobacco industry's marketing strategies that target women, particularly young women (resulting in M/F ratios of <2 in the WHO Region of the Americas and European Region) *(69)*. In contrast, in low- and middle-income settings, smoking prevalence in men is substantially higher than in women, reaching a M/F ratio of 15.5 in the WHO Eastern Mediterranean Region, where gender roles and social norms pose barriers for women to smoke.

Findings for alcohol are similar to those for smoking. On average, men consumed far more alcohol than women worldwide in 2016 (10.1 versus 2.7 L of pure alcohol per person), with the largest consumption for both sexes being in the WHO European Region and in high-income countries, and the smallest in the WHO Eastern Mediterranean Region and low-income countries. The largest M/F ratios were observed in the WHO Eastern Mediterranean, South-East Asia and African regions.

As a major type of substance abuse, the implication of harmful use of alcohol goes beyond the control of major NCDs, because it is also a modifiable risk factor for suicide, especially for young people at risk. The high average alcohol consumption in men is likely to be one of the drivers of men's excess rates of suicide mortality relative to women *(70)*. Yet, data for interventions for substance use disorders (Indicator 3.5.1) are currently unavailable and its methodology is still under development.

In addition to the unhealthier lifestyles and risk-taking behaviours among men compared with women, in many settings men tend to underuse health services and visit a doctor less frequently, due to norms of masculinity and other socioeconomic factors. However, some NCD risk factors are less in favour of women. For example, women are more likely to have insufficient physical activity (31.7% versus 23.4% of men) *(71)*, because women are often subject to financial restraint, lack of decision-making power and extra household workload, making it difficult for them to allocate adequate resources and time for physical activity *(72)*. In particular, a large proportion of the female population have to fulfil multiple roles – such as childrearing, household care-giving and professional duties – which consume women's time and energy. Moreover, many communities lack the exercise space and facilities that are intended for and accessible to women, giving women less motivation to undertake physical activity. The lack of physical activity interacts with sex-related biological factors (e.g. women generally are more likely to store fat subcutaneously, but have lower metabolism than men); hence, the prevalence of obesity is higher in women (15.3% versus 11.1% in men) *(73)*. The higher prevalence of obesity leads to women having greater vulnerability to some NCDs; for example, for diabetes, the M/F ratio in risks of premature death is nearly unity at global level, substantially lower than the ratios for other NCDs. Women with lower education or socioeconomic status are even more likely to suffer from these NCDs, because they also tend to have limited access to a healthy diet. Because physical activity could potentially reduce levels of stress and depression, the lack of it would also put women at greater risk of suffering mental health issues.

Women may also manifest different symptoms of some NCDs than men, and hence be more likely to experience delayed diagnosis and treatment. This delay occurs in part because, historically, male patients have been more widely used as the reference in medical research while female patients have been understudied. For example, women's symptoms for coronary heart disease – including back pain, nausea or fatigue – are usually considered "atypical", leading to underdiagnosis and under-treatment *(74)*. Moreover, women, particularly those in low-resourced settings, are likely to face increased economic burdens for the prevention and treatment of NCDs and mental health issues, while having less decision-making power for health expenditures. This situation means that women are more vulnerable than men once the diseases have developed, and it offsets their lower exposure to the risk factors relative to men. For example, the M/F ratio of premature NCD mortality in 2016 was lowest in the WHO African Region (M/F: 1.1) where women have the lowest access to quality health care, and was over 40% lower than the highest ratio, which was seen in the WHO European Region (M/F: 1.9).

To meet the SDG target for NCDs by 2030, more research is needed to better understand the differences between men and women in susceptibility, vulnerability and exposure to risk factors, presentation of symptoms, disease progression, access to diagnosis and treatment, and treatment response, in addition to other gender-related factors related to inequity in health systems. Policies and strategies must recognize the sex and gender differences, and address the different needs of men and women with better targeted measures to reduce exposure to risk factors, improve early diagnosis, and increase access to affordable and effective treatment.

Indicator 3.4.1 Probability of dying from any of CVD, cancer, diabetes, chronic respiratory disease between age 30 years and exact age 70 years (%)

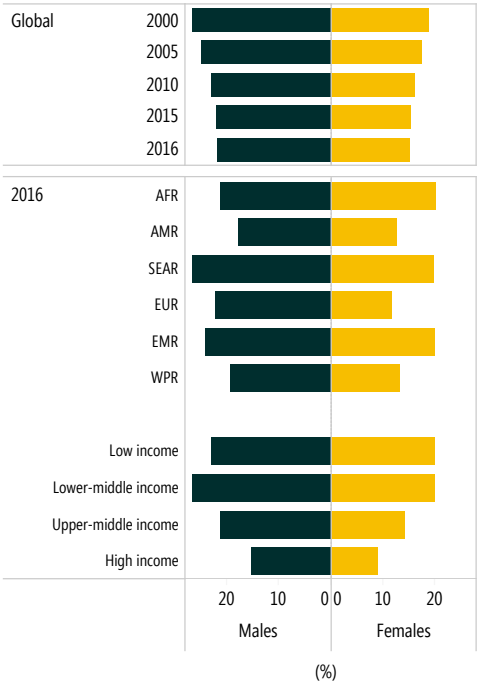
TREND
BThe global risk of premature NCD deaths declined by 18% for both sexes in 2000–2016, with the decline being slightly higher among women.

GEOGRAPHICAL DISTRIBUTION
The highest risk of premature NCD death occurred in the WHO South-East Asia Region for men and in the African Region for women.

NATIONAL INCOME
The highest risk of premature NCD deaths was seen in lower-middle-income countries.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Men face a greater risk of premature death from NCDs than women in all geographical regions and income groups. In 2016, the probability of a man aged 30 years dying from an NCD before the age of 70 years was 21.6% compared with 15.0% in women.



Indicator 3.4.2 Suicide mortality rate (per 100 000 population)

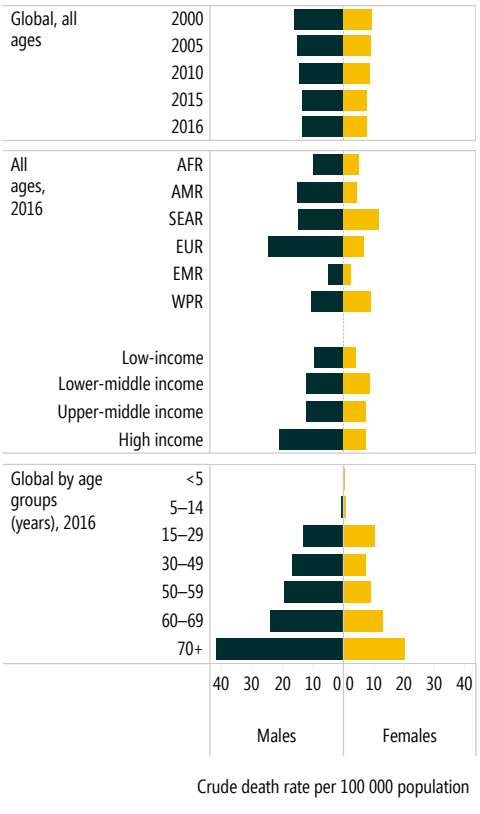
TREND
Global suicide mortality rates decreased in 2000–2016 by 16% in men and 20% in women.

GEOGRAPHICAL DISTRIBUTION
The highest suicide mortality rates were seen in the WHO European Region for men and in the South-East Asia Region for women.

NATIONAL INCOME
Higher suicide mortality rates were seen in high-income countries (for men) and lower-middle-income countries (for women).

AGE DISTRIBUTION
In men, suicide rates increased with age. In women, suicide rates increased with age from 30 years but peaked among those aged 15–29 years.

SEX DISTRIBUTION
Globally, suicide mortality rates were twice as high in men than in women (13.5 and 7.7 deaths per 100 000 population, respectively) in 2016.



Indicator 3.5.2 Total alcohol per capita (≥15 years of age) consumption (litres of pure alcohol), 2016

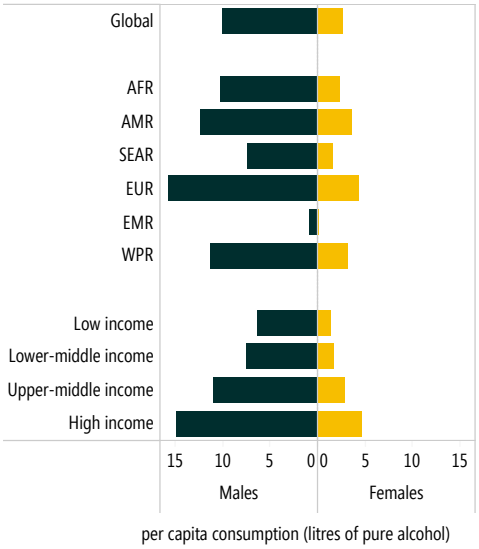
TREND
Not available.

GEOGRAPHICAL DISTRIBUTION
The highest alcohol consumption was seen in the WHO European Region, and the lowest in the Eastern Mediterranean Region.

NATIONAL INCOME
Alcohol consumption increased with national income of countries.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Globally in 2016, per capita alcohol consumption was five times higher in men than in women (10.1 versus 2.7 L of pure alcohol per capita). The largest M/F ratios were observed in the WHO Eastern Mediterranean, South-East Asia and African regions.



Indicator 3.a.1 Age-standardized prevalence of tobacco smoking among persons 15 years and older (%)

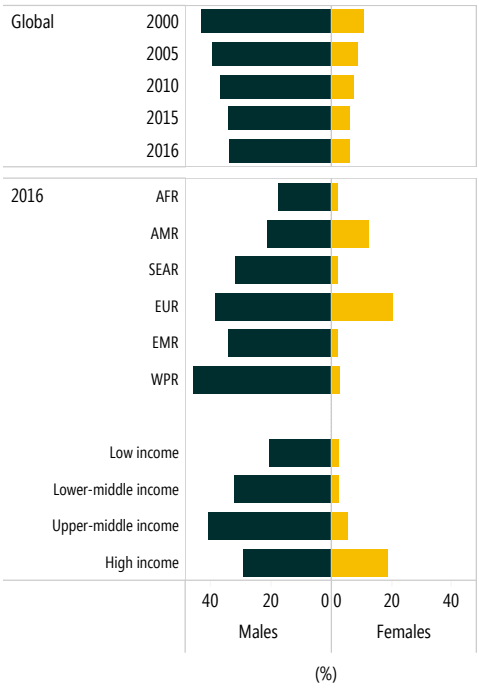
TREND
Globally, age-standardized prevalence decreased in 2000–2016 by 9 percentage points in men and 5 percentage points in women.

GEOGRAPHICAL DISTRIBUTION
Among men, the highest prevalence of tobacco smoking was seen in the WHO Western Pacific Region. Among women, the highest rates were seen in the WHO European Region.

NATIONAL INCOME
Among men, the highest rates of tobacco smoking were seen in upper-middle-income countries. Among women, the highest rates were seen in high-income countries.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Globally in 2016, the age-standardized prevalence of current tobacco smoking was five times higher in men than in women (33.7% versus 6.2%). The largest M/F ratio was observed in the WHO Eastern Mediterranean Region (M/F: 15).



6 INJURIES AND VIOLENCE

This section focuses on road traffic injuries (SDG 3.6.1) and interpersonal violence including homicide (SDG 16.1.1). Other key target areas are violence against women (SDGs 5.2.1 and 5.2.2) and harmful practices (SDGs 5.3.1 and 5.3.2). Injuries related to self-harm are addressed in the sections on NCDs and mental health, and unintentional poisonings in the environmental section.

There is a specific target for road traffic deaths, Target 3.6, which is to halve the number of global deaths and injuries from road traffic. The crude death rates due to road traffic have stabilized relative to the global population, yet the number continues to climb, and the SDG target will not be met in 2020. The number of annual road traffic deaths reached 1.35 million in 2016 and road traffic caused up to 50 million injuries. The burden of road traffic injuries and deaths largely falls on those living in LMIC, where 93% of the road traffic deaths occur, even though those countries have only 60% of the registered vehicles.

In 2016, there were an estimated 477 000 deaths globally due to homicides. Men are almost four times more likely to be murdered than women. Population structure is a key risk factor for homicide. Areas with a higher proportion of young people, especially young males, see higher crude death rates from homicide. The proportion of males aged 15–29

TARGET 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents

INDICATOR

3.6.1 Death rate due to road traffic injuries

TARGET 16.1: Significantly reduce all forms of violence and related death rates everywhere

INDICATOR

16.1.1 Number of victims of intentional homicide per 100 000 population, by sex and age

TARGET 5.2: Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation

INDICATORS

5.2.1 Proportion of ever-partnered women and girls aged 15 years and older subjected to physical, sexual or psychological violence by a current or former intimate partner in the previous 12 months, by form of violence and by age

5.2.2 Proportion of women and girls aged 15 years and older subjected to sexual violence by persons other than an intimate partner in the previous 12 months, by age and place of occurrence

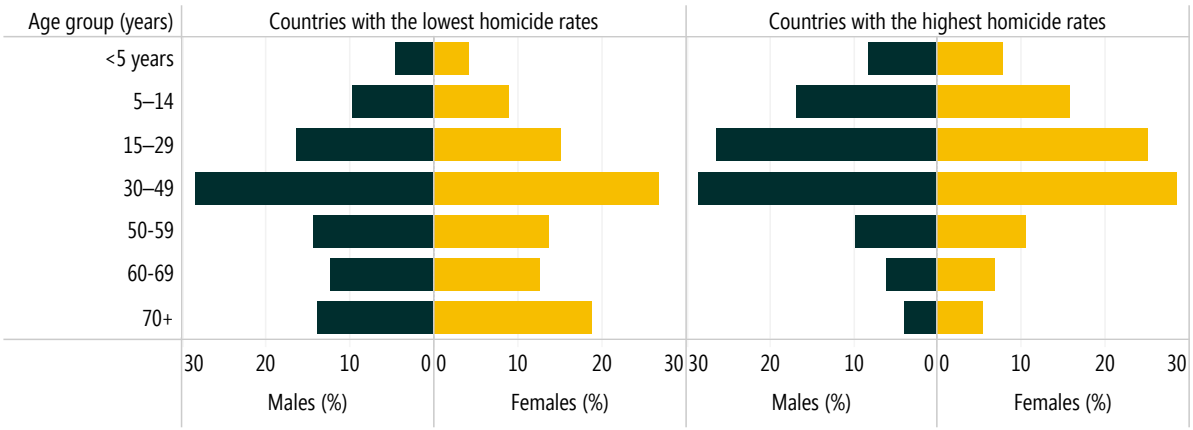
TARGET 5.3 Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation

INDICATORS

5.3.1 Proportion of women aged 20–24 years who were married or in a union before age 15 and before age 18

5.3.2 Proportion of girls and women aged 15–49 years who have undergone female genital mutilation/cutting, by age

Fig. 6.1
Population distribution by age and sex of the lowest and highest homicide rates countries, 2016



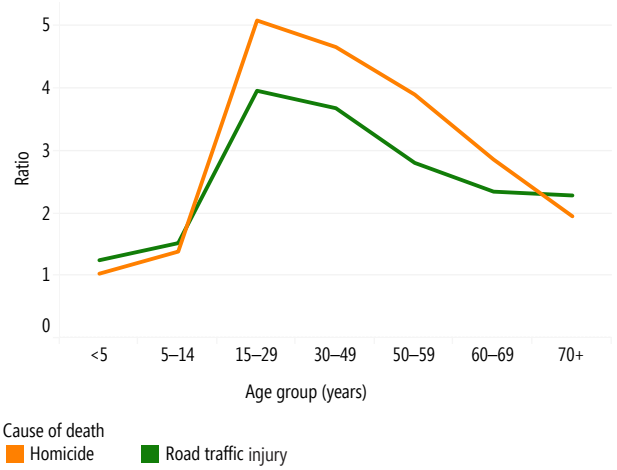
Sources: WHO (2018) *(2)* and World population prospects: the 2017 revision *(1)*.

years in the 10 countries with the highest homicide rates was 26%, compared with 16% in the 10 countries with the lowest homicide rate (Fig. 6.1). Other risk factors for homicide include poverty, availability of guns and alcohol.

Globally, one in five homicides is committed by an intimate partner or family member, with women making up the majority of those deaths *(75)*. In 2013, an estimated 38% of homicides among women were committed by their intimate partners as compared to 6% of homicides among men *(76)*.

Together, road traffic and homicide represented 38% of global deaths due to injuries in 2016 (43% among males and 28% among females). Road injury is the leading cause of injury death among both males and females, although the crude death rate among males is still 2.8 times higher than that among females, and in the age group of 15–29 years is almost four times higher (Fig. 6.2).

Fig. 6.2
Ratio of global M/F crude death rates by age and cause, 2016



Source: WHO, 2018 *(2)*.

Note: death rates for road traffic injury from this source may differ from figures presented elsewhere in report, but are used here for comparison with other causes of injury.

Beyond mortality and injuries, violence against women is not only widespread, but carries a high burden of morbidity and ill health more broadly. Unlike the violence experienced by men, violence against women is largely experienced in private spaces and mostly by people the women know. It includes intimate partner violence (the most common form of violence experienced by women), sexual violence, trafficking, femicide and acid attacks. Women also experience harmful practices such as female genital mutilation and child, early and forced marriages. Worldwide, one in three (35%) women and girls aged 15–49 years report physical or sexual intimate partner violence or non-partner sexual violence in their lifetime. Most of this is intimate partner violence, which affects 30% of women (aged 15–49 years) and 30% of adolescent girls (aged 15–19 years). Estimates of the proportion of women who have experienced intimate partner violence range from 23.2% in high-income countries and 24.6% in the WHO Western Pacific Region LMIC, to 37% in the Eastern Mediterranean Region LMIC and 37.7% in the South-East Asia Region LMIC *(76)*.

SDG 5 includes two specific targets on the elimination of violence against women and girls, and on ending harmful practices against women and girls. WHO estimates in 2013 show that violence against women increases the risk of adverse physical health outcomes including those related to sexual and reproductive health as well as mental health outcomes *(76)*.

Globally, the practice of child marriage of girls has continued to decline; for example, during the past decade, the proportion of young women who were married as children decreased from 25% to 21%. Nevertheless, about 650 million girls and women alive today were married before their 18th birthday *(77)*. Although the exact number of girls and women worldwide who have undergone female genital mutilation remains unknown, at least 200 million girls and women have been cut in 30 countries that have

representative data on prevalence *(78)*. Data for these indicators currently are from either stand-alone surveys or DHS. Work is ongoing to improve measures of child marriage, and data collection and reporting, to enhance comparability across studies.

Preventing homicide and nonfatal violence requires a multisectoral approach that addresses underlying causes, such as gender, social and economic inequalities; cultural norms that support violence; and easy access to and misuse of alcohol, drugs and firearms. The health sector has an important role to play in addressing violence against women and girls. Thus, in May 2016, the Member States of WHO endorsed a global plan of action on strengthening the response of health systems in addressing interpersonal violence, in particular, against women and girls and against children. The plan of action urges Member States to demonstrate leadership in speaking out against violence; provide comprehensive services and train health care providers; contribute to prevention; and improve data collection including through surveillance, health management information systems and surveys. WHO has published clinical and policy guidelines and implementation tools for health care professionals and health managers, to strengthen capacities to respond to violence against women and to child and adolescent sexual abuse. Prevention of violence against women and girls requires gender inequalities to be addressed, including by transforming harmful gender norms that privilege men over women, empowering women, creating safe environments, and enforcing laws and policies that promote gender equality. WHO has also developed the technical package *INSPIRE: seven strategies for ending violence against children;* the package includes evidence-based strategies that have shown success in reducing violence *(79)*.

Indicator 3.6.1: Road traffic mortality rate (per 100 000 population), 2016

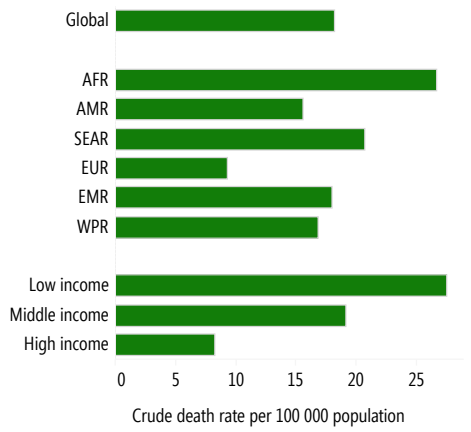
TREND
Not available.

GEOGRAPHICAL DISTRIBUTION
The rates of road traffic deaths are highest in the WHO African Region (26.6/100 000 people) and South-East Asia Region (20.7/100 000 people).

NATIONAL INCOME
Death rates in low-income countries are three times higher than those in high-income countries.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



Indicator 16.1.1: Mortality rate due to homicide (per 100 000 population)

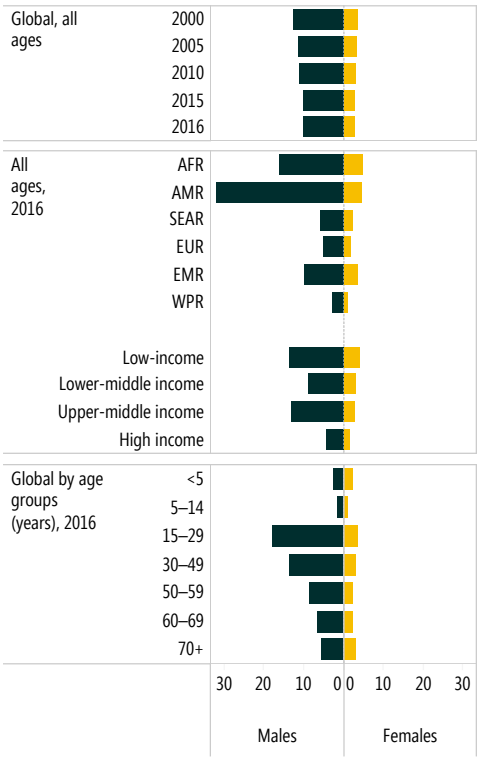
TREND
Globally, homicide rates fell from 8.1 to 6.4 (per 100 000 population) between 2000 and 2016, a reduction of 21%, which is twice the overall rate of decrease in all mortality.

GEOGRAPHICAL DISTRIBUTION
Higher death rates are seen in the WHO Region of the Americas and African Region. The male death rate in the WHO Region of the Americas is twice as high as that of the second highest region, the African Region.

NATIONAL INCOME
Female death rates decrease with an increase in income. Surprisingly, males in the upper-middle-income countries have higher death rates than those in the lower-middle-income countries; this is largely attributed to the high death rates in the WHO Region of the Americas which are mostly upper-middle-income countries (20 compared with five in the lower-middle-income countries).

AGE DISTRIBUTION
Deaths peaked at ages 15–29 years for both males and females.

SEX DISTRIBUTION
Males were almost four times as likely as females to be a victim of homicide. Males deaths rates are declining more slowly than female death rates, so the proportion of deaths occurring in males increased between 2000 and 2016.



Crude death rate per 100 000 population

7 ENVIRONMENTAL RISKS

The SDG targets principally focus on three types of environmental risk: air pollution (assessed with Indicators 3.9.1, 7.1.2 and 11.6.2), water and sanitation (assessed with Indicators 3.9.2, 6.1.1 and 6.2.1) and poisoning (assessed with Indicator 3.9.3).

TARGET 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

INDICATOR

11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)

TARGET 7.1: By 2030, ensure universal access to affordable, reliable and modern energy services

INDICATOR

7.1.2 Proportion of population with primary reliance on clean fuels and technology

TARGET 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

INDICATORS

3.9.1 Mortality rate attributed to household and ambient air pollution

3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)

3.9.3 Mortality rate attributed to unintentional poisoning

TARGET 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking-water for all

INDICATOR

6.1.1 Proportion of population using safely managed drinking-water services

TARGET 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

INDICATOR

6.2.1 Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water

TARGET 6.a: By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

INDICATOR

6.a.1 Amount of water and sanitation related official development assistance for water and sanitation related activities and programmes that is part of a government-coordinated spending plan

It is estimated that, globally, 9 out of 10 people dwelling in urban areas are exposed to air pollution from PM2.5 (i.e. particulate matter 2.5 micrometres in diameter) levels that are above the annual mean WHO air quality guideline levels of 10 μg/m^3, with the highest annual mean levels of urban PM2.5 concentration being in the WHO South-East Asia Region (57.3 μg/m^3) and Eastern Mediterranean Region (54.0 μg/m^3). Regarding household air pollution, the proportion of the global population with primary reliance on clean fuels and technologies has been increasing progressively, and in 2017 it nearly reached full coverage in the WHO European Region (>95%) and Region of the Americas (92%). Nevertheless, 3 billion people still cook with polluting fuels and technologies, putting their health at risk, especially in the WHO African Region (where only 17% have primary reliance on clean fuels) – a situation that has changed little in 3 decades.

Poor air quality is associated with increasing risk of stroke, heart disease, lung cancer, and chronic and acute respiratory diseases. Household and ambient air pollution were jointly responsible for 7 million deaths in 2016. Globally in 2016, men had nearly 30% higher age-standardized mortality rates attributed to household and ambient air pollution than women (128.5 and 101.1 per 100 000 population, respectively). High-income countries and the WHO European Region had the highest M/F mortality ratio, at about 1.8, whereas countries in the WHO African Region had the lowest M/F ratio, at only 1.1. The highest mortality burdens fall in the WHO African Region and LMIC, and the lowest in the WHO Region of the Americas and high-income countries, for both sexes.

In 2015, 71% of the world population used safely managed drinking-water services, and 39% used safely managed sanitation services; these percentages have increased progressively since 2000, when the figures were 61% and 29%, respectively. The WHO African Region again fell far behind other parts of the world, with only 44% of the rural population having at least basic drinking-water and only 21% having basic sanitation services. Globally in 2016, unsafe drinking-water, unsafe sanitation and lack of hygiene were responsible for nearly 0.9 million deaths, including over 470 000 deaths of children aged under 5 years from diarrhoea. Crude death rates decline substantially with increasing level of national income and level of development; for example, in 2016, the rates were nearly 150 times higher in low-income countries and the WHO African Region (42.4 and 45.8 per 100 000 population, respectively) than in high-income countries and the WHO European Region (0.3 per 100 000 population for both). The rates were slightly higher for women than men (12.1 compared with 11.4 per 100 000 population globally) in most parts of the world, except in the WHO African Region and Region of the Americas, and in low-income countries, where the rates for males were higher than those for females.

Similar geographical and economic trends were observed for crude death rates due to unintentional poisoning at global level in 2016, with the WHO African Region and low-income countries having the highest rates (2.7 and 2.8 per 100 000 population, respectively), and the WHO Region of the Americas and high-income countries the lowest (0.6 and 0.5 per 100 000 population, respectively). Infants and the elderly are more likely to die from exposure to chemicals such as pesticides and carbon monoxide. Children aged under 5 years and those aged over 70 years account for 37% of the estimated 107 000 deaths caused by unintentional poisonings. The WHO Eastern Mediterranean Region and Western Pacific Region and upper-middle-income countries have M/F ratios below 1 (0.68, 0.83 and 0.96, respectively); globally, males are more likely than females to succumb to unintentional poisoning. The decrease in unintentional poisonings has been faster globally in males than in females, and the global M/F ratio fell from 1.7 in 2000 to 1.3 in 2016.

Scaling up financial resources and technical capacity with increased external aid is required for ensuring water, sanitation and hygiene for all (WASH), which has been included as SDG Target 6.a, and is measured with Indicator 6.a.1. According to OECD data, official development assistance (ODA) disbursements to the water sector declined by 3% from 2016 to 2017, perhaps reflecting the fall in ODA commitments from US$ 12 billion in 2012 to US$ 9 billion in 2016, partly owing to donor stocktaking in the transition from Millennium Development Goals (MDGs) to SDGs. However, donors have renewed their focus on the water sector, with commitments jumping by 37% in 2016–2017.

For both social and biological reasons, men and women are at different levels of risk for negative health effects from environmental exposures. The differences include the level, frequency and duration of exposures, as well as the types of pollutants and chemicals to which they are exposed. For example, men constitute a majority of the workforce in many industries (e.g. mining and manufacturing) that expose workers to toxic chemicals. In contrast, women are more likely to be responsible for household work that involves direct contact with the natural environment and some pollution sources; for example, women are more likely to cook with polluting energy systems, manage household waste and use water sources or pesticides containing pollutants and chemicals on a daily basis for an extended time. Due to their caring and domestic roles, women, particularly those in low-resource settings, are more reliant on natural resources and more vulnerable to environmental risks, because alternative opportunities and sources of livelihood are limited. For example, women and children in rural areas bear the greatest burden of death due to high levels of black carbon produced by the inefficient burning of solid fuels in unventilated homes *(80)*.

Disadvantaged men are also at greater environmental risks compared with men and women in high-resource settings. Disadvantaged women often face an additional lack of ownership and negotiating power over natural resources in the household, making them more vulnerable to detrimental environmental effects. These negative health impacts could be readily mitigated by the adoption of clean natural resources and technologies, and by ensuring that women are in a better financial situation, with their own source of income or savings and stronger decision-making power to enable the household to upgrade to improve technologies. Women's participation in community and local decision-making in relation to water and sanitation policy should be further promoted, to help meet the targets under SDG 6, through measures such as gender parity for participation in public authorities, inclusive consultation processes, and the introduction of gender-specific objectives in national action plans and legislation in relation to WASH policy. Indeed, SDG Target 6b calls for supporting and strengthening the participation of local communities, including both women and men, in improving water and sanitation management.

The susceptibility to the health impact from exposure to environmental risks varies between men and women, and between children and adults, because it is influenced by many biological factors (e.g. physiological, hormonal and enzyme differences) and by body size. Depending on the types of polluting substance, the detoxifying capacity of men may be better than that of women, or vice versa *(81)*. Another key difference is that the percentage of body fat is generally higher in women, leaving them at higher risk of storing environmental pollutants in their tissues. However, evidence is still inadequate, given that data are not systematically disaggregated by sex, age and other factors, and meaningful gender analysis to understand the underlying causes of the observed differences is rarely undertaken. For example, critical data are missing on the gender dynamics of household energy use and the gender determinants of related health risks *(82)*. Most data – including those for SDG Indicators 6.1.1, 6.2.1, 7.1.2 and 11.6.2, discussed in this section – are currently limited, with surveys measuring across household instead of individuals. This limitation highlights the need for dedicated surveys and studies *(83)*. Even if disaggregated data are available, research gaps still need to be closed, because gender analyses for environmental risks are lacking.

Everyone should have equal opportunity for a healthy environment and access to clean energy and resources; hence, the lack of disaggregated data should not impede the actions to reduce environment risks. Disadvantaged groups should be equally covered by policies and measures to reduce environment risks, and to ultimately attain sustainable and equitable use of resources for better health. In particular, more disaggregated data should be collected, and analyses should be conducted to facilitate the formulation and implementation of environmental, health, economic and social policies that jointly tackle the inequity in the health impact of the environment, and in the distribution of resources and power at household, regional, national and global levels.

Indicator 3.9.1 Age-standardized mortality rate attributed to household and ambient air pollution (per 100 000 population), 2016

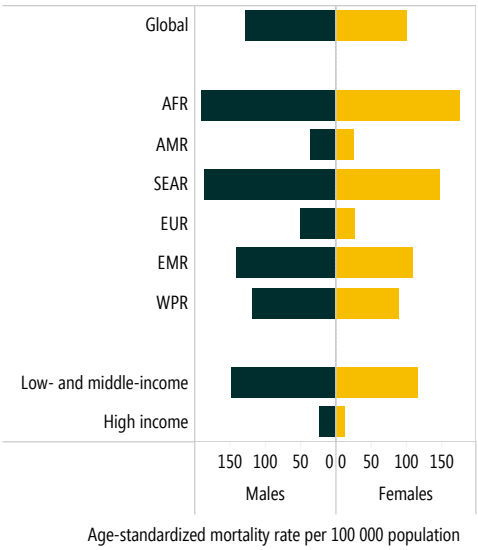
TREND
Not available.

GEOGRAPHICAL DISTRIBUTION
The WHO African Region has the highest age-standardized mortality rates (180.9 per 100 000 population), over six times as high as the lowest rates, which are seen in the WHO Region of the Americas (29.7 per 100 000 population).

NATIONAL INCOME
Low- and middle-income countries had the highest mortality rates (131.7 per 100 000 population), whereas high-income countries had the lowest (17.8 per 100 000 population).

AGE DISTRIBUTION
Limited availability.

SEX DISTRIBUTION
The global age-standardized death rate in men was about 27% higher than the rate in women.



Indicator 3.9.2 Mortality rate attributed to exposure to unsafe WASH services (per 100 000 population), 2016

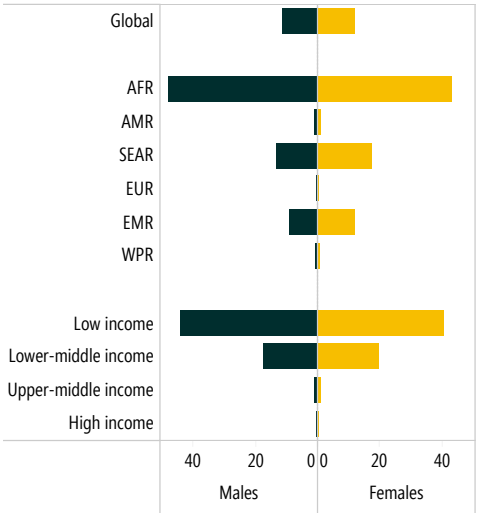
TREND
Not available.

GEOGRAPHICAL DISTRIBUTION
The WHO African Region had crude death rates three times that of the second highest region (the WHO South-East Asia Region) and 150 times that of the WHO European Region.

NATIONAL INCOME
Low-income countries had the greatest mortality burden, with crude death rates twice those of lower-middle-income countries and 145 times those of high-income countries.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Globally, this is one of only a few indicators where females are more likely than men to die (12.1 versus 11.4 deaths per 100 000 population), but the sex ratio varies. Only in low-income countries and the WHO African Region is the crude death rate higher in men than women, but elsewhere females are more likely to die from unsafe WASH (e.g. F/M ratios are 1.5 in high-income countries and 1.3 in the WHO Eastern Mediterranean Region and the South-East Asia Region).



Crude death rate per 100 000 population

Indicator 3.9.3 Mortality rate from unintentional poisoning (per 100 000 population)

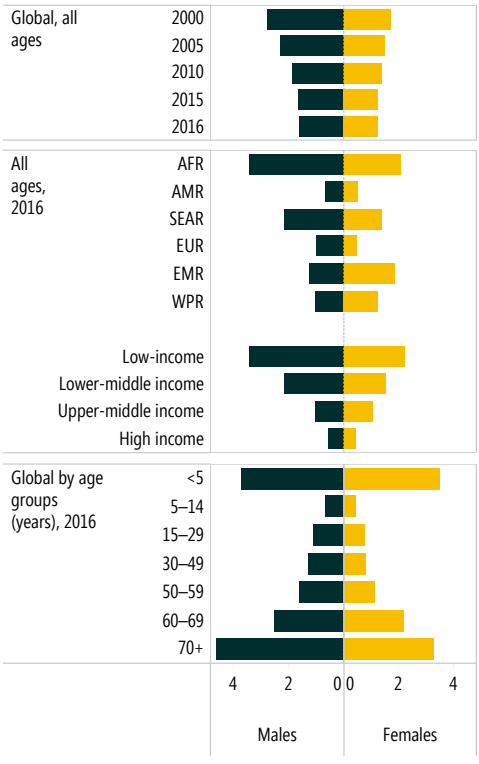
TREND
Crude death rates from unintentional poisonings decreased 36% from 2000 to 2016, which was faster than the decrease in injuries overall (12%).

GEOGRAPHICAL DISTRIBUTION
The crude death rates were highest in the WHO African Region (2.7 per 100 000 population), and lowest in the Region of the Americas (0.6 per 100 000 population).

NATIONAL INCOME
Low-income countries had the highest crude death rates (2.8 per 100 000 population), and high-income countries had the lowest (0.5 per 100 000 population).

AGE DISTRIBUTION
Children aged under 5 years and the elderly (those aged over 70 years) have the highest death rates.

SEX DISTRIBUTION
The global M/F ratio is 1.3, and ranges from 0.7 to 2.3 across WHO regions.



Crude death rate per 100 000 population

Indicator 6.1.1 Proportion of population using safely managed drinking-water services (%)

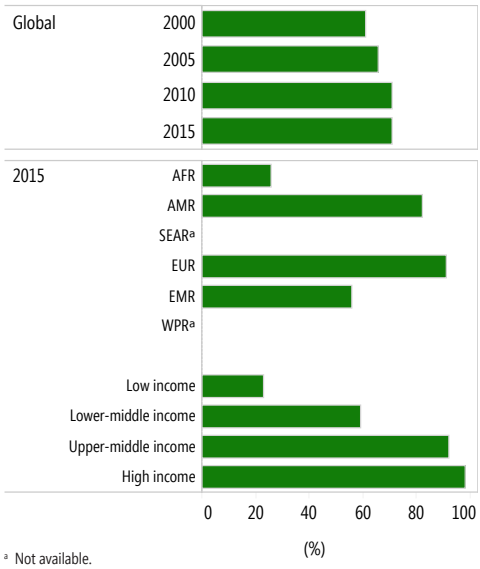
TREND
The proportion slowly increased, from 61% in 2000 to 71% in 2015.

GEOGRAPHICAL DISTRIBUTION
Among regions with available data, the proportion was lowest in the WHO African Region (26%) and highest in the European Region (91%).

NATIONAL INCOME
Low-income countries had the lowest proportion (23%), and upper-middle-income and high-income countries had the highest (92% and 98%, respectively).

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



[a] Not available.

Indicator 6.2.1 Proportion of population using safely managed sanitation services (%)

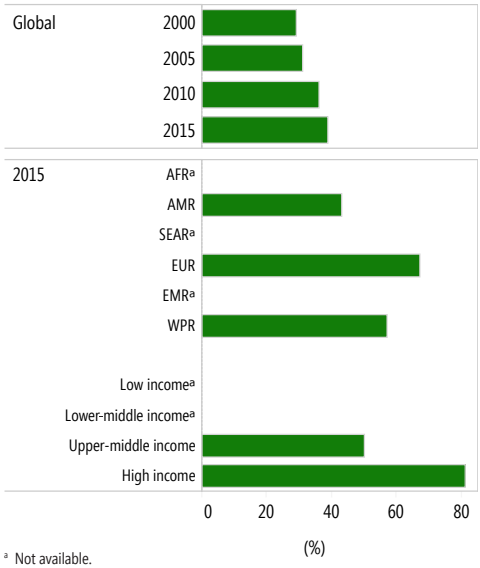
TREND
Proportion slowly increased, from 29% in 2000 to 39% in 2015.

GEOGRAPHICAL DISTRIBUTION
Among regions with available data, the proportion was lowest in the WHO Region of the Americas (43%) and highest in the European Region (67%).

NATIONAL INCOME
Data are only available for upper-middle-income (50%) and high-income countries (81%).

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



[a] Not available.

Indicator 6.a.1 Amount of water and sanitation related official development assistance (ODA) for water and sanitation related activities and programmes that is part of a government-coordinated spending plan

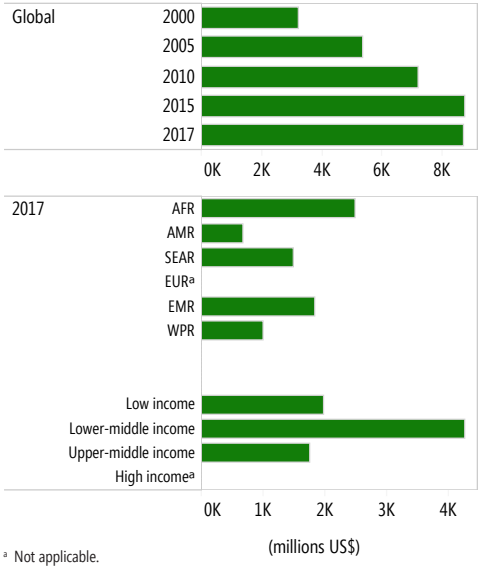
TREND
Water sector ODA increased by nearly 270% from 3.2 billion USD in 2000 to 8.7 billion USD in 2017, but dropped by 3% from 2016 to 2017.

GEOGRAPHICAL DISTRIBUTION
In 2017, the WHO African Region received the largest water sector ODA to the water sector (2.5 billion USD), nearly four times higher than that in the WHO Region of the Americas (677 million USD).

NATIONAL INCOME
Lower-middle-income countries received the largest water sector ODA to the water sector (4.3 billion USD), more than two times of that in low-income countries (2.0 billion USD) and upper-middle-income countries (1.8 billion USD).

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



[a] Not applicable.

Indicator 7.1.2 Proportion of population with primary reliance on clean fuels (%)

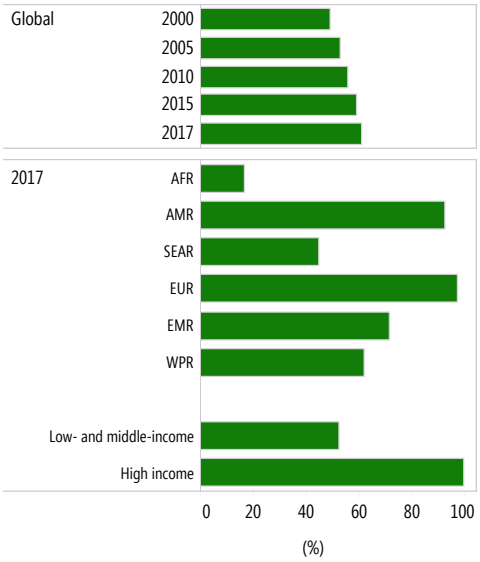
TREND
The proportion slowly increased, from 49% in 2000 to 61% in 2017.

GEOGRAPHICAL DISTRIBUTION
The proportion was highest in the WHO European Region and the Region of the Americas (>95% and 92%, respectively), and lowest in the African Region (17%).

NATIONAL INCOME
Only about half the population in LMIC have primary reliance on clean fuels, but the proportion is nearly 100% in high-income countries.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Not applicable.



Indicator 11.6.2 Annual mean concentrations of fine particulate matter (PM2.5) in urban areas (µg/m³), 2016

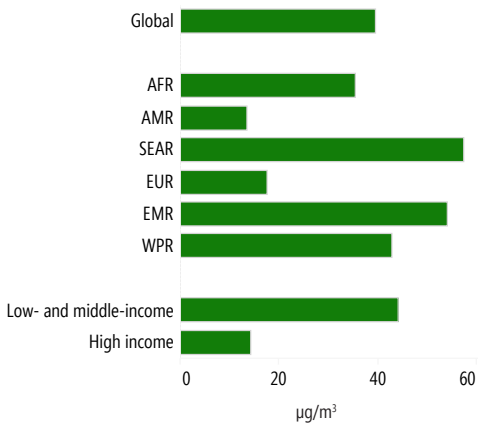
TREND
Not available.

GEOGRAPHICAL DISTRIBUTION
Particulate matter was highest in the WHO South-East Asia Region (57.3 µg/m³) and the Eastern Mediterranean Region (54.0 µg/m³), and lowest in the Region of the Americas (13.4 µg/m³).

NATIONAL INCOME
The mean level of fine particulate matter was more than 40 µg/m³ in LMIC, three times as high as that of high-income countries.

AGE DISTRIBUTION
Not applicable.

SEX DISTRIBUTION
Not applicable.



8 UNIVERSAL HEALTH COVERAGE AND HEALTH SYSTEMS

The main SDG targets relating to universal health coverage (UHC) and health systems are Targets 3.8 (UHC), 1.a (resource mobilization), 3.b (research and development, and access to essential medicines and vaccines), 3.c (health workforce), 3.d (international health regulations) and 17.19 (statistical capacity-building).

The indicators for UHC track whether people in need of health services receive them (service coverage) and whether they incur financial hardship in doing so (financial protection) *(84)*. Service coverage is tracked using 16 tracer indicators, which are compiled into an index that ranges between 0 and 100.[1] Service coverage is lowest in the WHO African Region and in lower-income countries (Fig. 8.1). In 2015, the number of people with full coverage of essential services was estimated to range from 2.3 to 3.5 billion (Fig. 8.2). This implies that at least half of the world's 7.3 billion people are not receiving the essential health services they need. Using currently available data and methods, it is not possible to disaggregate the service coverage index by sex; also, two of the included tracer conditions are female specific.

TARGET 3.b: Support the research and development of vaccines and medicines for the communicable and noncommunicable diseases that primarily affect developing countries provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all

INDICATORS

3.b.1 Proportion of the target population covered by all vaccines included in their national programme (see Section 3)

3.b.2 Total net official development assistance to medical research and basic health sectors

3.b.3 Proportion of health facilities that have a core set of relevant essential medicines available and affordable on a sustainable basis

TARGET 3.c: Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States

INDICATOR

3.c.1 Health worker density and distribution

TARGET 3.d: Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

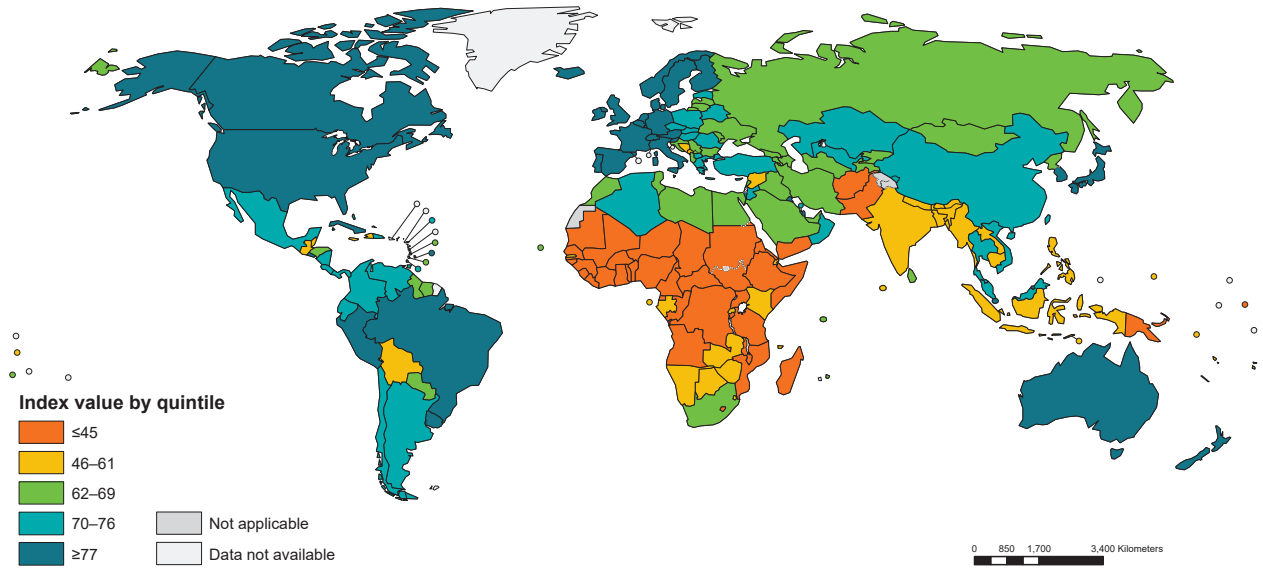
INDICATOR

3.d.1 International Health Regulations (IHR) capacity and health emergency preparedness

TARGET 17.19: By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries

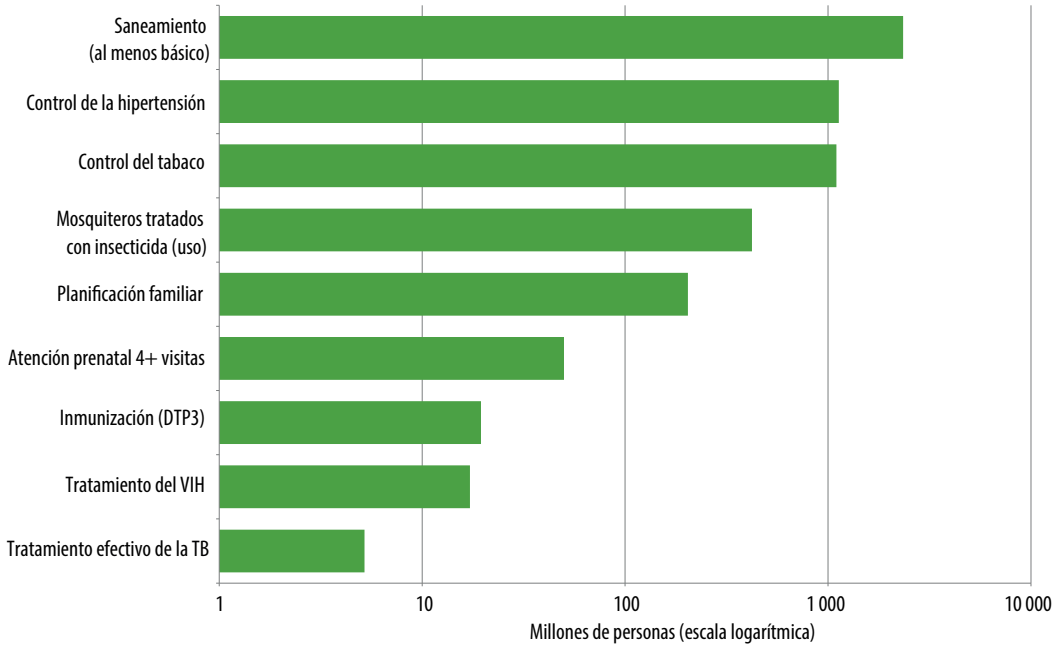
[1] Covering areas of reproductive, maternal, newborn and child health, infectious disease control, NCDs, and service capacity and access.

Fig. 8.1
UHC service coverage index by country for 2015



Source: WHO (2017) *(84)*.

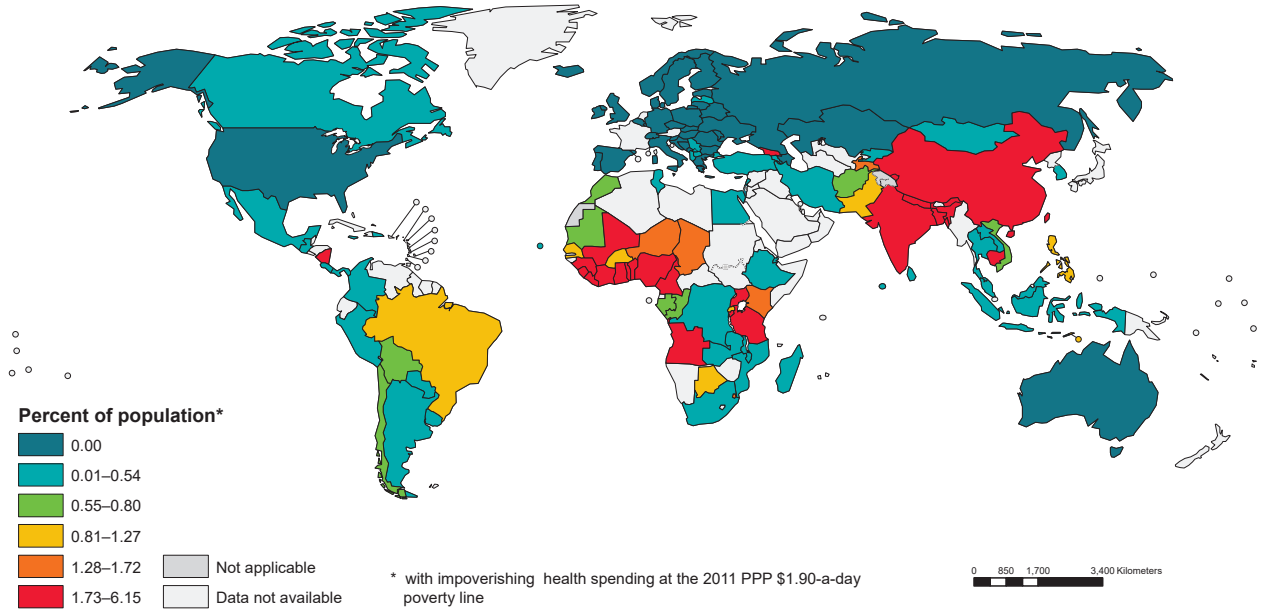
Fig. 8.2
Number of people in need of but not receiving a selected essential health service



DTP3: third dose of diphtheria-tetanus-pertussis containing vaccine; HIV: human immunodeficiency virus; TB: tuberculosis.
[a] 2016 estimates: TB effective treatment, HIV treatment, Immunization (DTP3), Family planning, Insecticide-treated nets (use); 2015 estimates: Tobacco control, Hypertension control, Sanitation (at least basic); 2013 estimates: Antenatal care 4+ visits.

Source: WHO (2017) *(84)*.

Fig. 8.3
Proportion of population falling below the 2011 PPP US$ 1.90-a-day poverty line as a result of paying for health care, latest year



Source: WHO (2017) *(84)*.

Regarding financial protection, in 2010, an estimated 808 million people (11.7% of the world's population) spent at least 10% of their household budget paying out of their own pocket for health services; for 179 million people these payments exceeded a quarter of their household budget *(84)*. An estimated 97 million people (1.4% of the world's population) fell below the poverty line as a result of out-of-pocket health care spending in 2010[1] (Fig. 8.3). The proportion of the population that suffers catastrophic health expenditures (>10% or >25% of total household expenditures or income) is higher in middle-income countries than in low- or high-income countries. However, at all income levels people can suffer catastrophic health expenditures, even in high-income countries and in countries where most of the out-of-pocket health spending is on medicines. Further work is needed to investigate differences in financial protection between men and women.

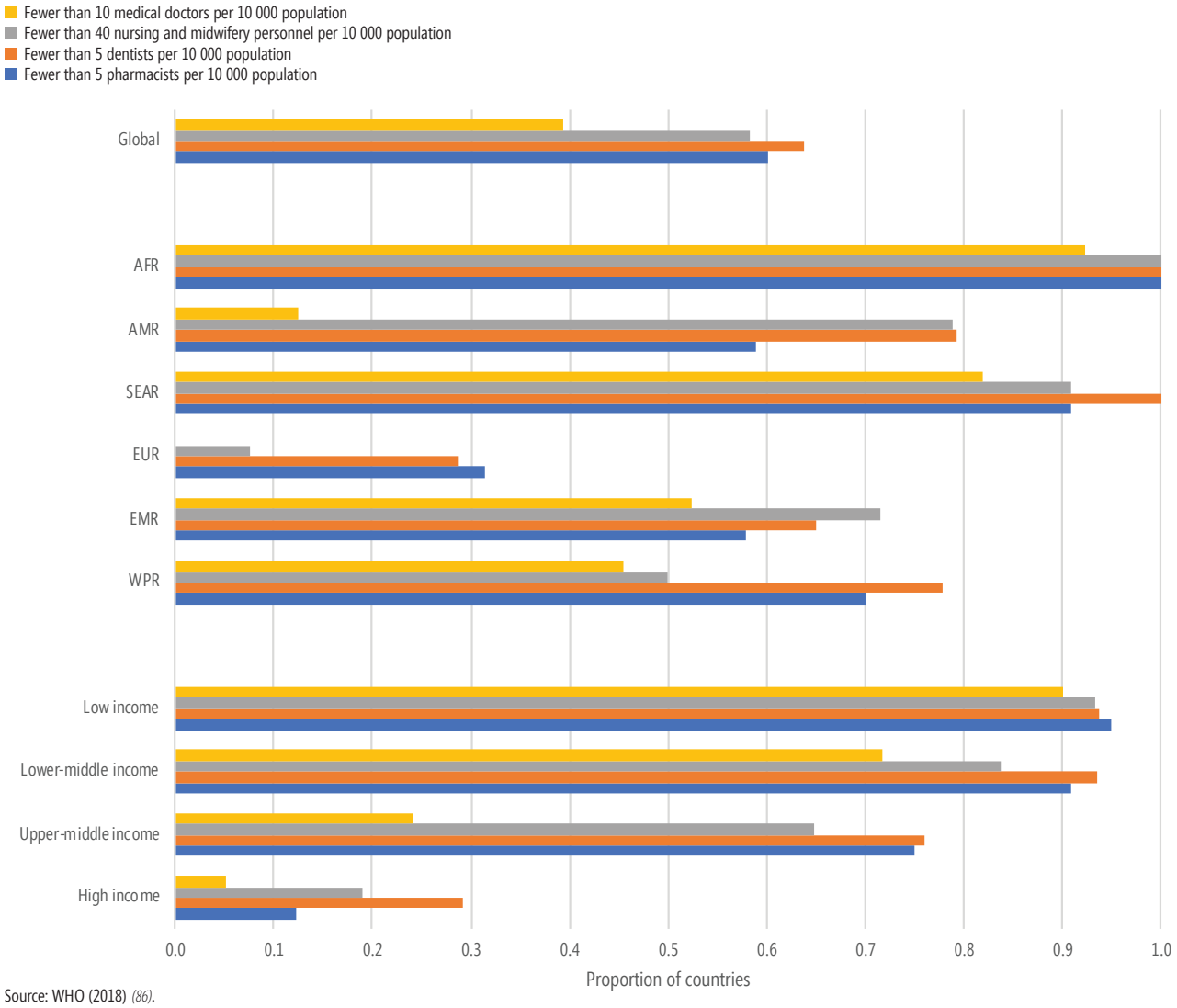
Globally in 2016, the mean proportion of total government expenditure from domestic sources devoted to health was 10.6%, varying from less than 2% in some countries to over 20% in others. The proportion was lowest in low-income countries (around 6.6%) and highest in high-income countries (above 14%). External funding (aid) represents less than 1% of global health expenditure, and is a small and declining proportion of health spending in middle-income countries, but it is increasing in low-income countries *(85)*.

A qualified health workforce that is available, equitably distributed and accessible by the population is essential for a well-functioning health system. In general, the number of health workers available for the size of population increases with country income. Data for 2013–2018 show that almost 40% of all countries have fewer than 10 medical doctors per 10 000 people: 90% of low-income countries suffer from such shortages, whereas only 5% of high-income countries do *(86)*. The average global density of medical doctors in 2017 was 15 per 10 000 people. Up to 93% of low-income countries have fewer than 40 nursing and midwifery personnel per 10 000 people, whereas only 19% of high-income countries do. In terms of dentists and pharmacists, 64% and 60% of countries have fewer than five of these health workers, respectively, per 10 000 people (Fig. 8.4).

WHO's study of the cost of health SDGs in low- and lower-middle income countries found that about one third of the additional investment required to achieve the health SDGs is for the cost of health workers' employment, not including the necessary education and training *(87)*. The WHO Global Strategy on Human Resources for Health: Workforce 2030 (GSHRH) estimates a global shortfall of almost 18 million health workers by 2030, primarily in low-income and lower-middle-income countries. The health and social sector, with its 234 million workers, is one of the biggest and fastest growing employers in the world, particularly of women *(88)*. Women represent the majority of workers in the health and social sector at around 70%, and contribute US$ 3 trillion annually to global health, nearly half in the form of unpaid care work *(88–90)*. More recent analysis shows that 67% of the health workforce is female, although the percentage varies among regions. However, fewer women are employed in high-skill health occupations; also, women are more likely to have part-time jobs and may earn less *(91)*. Gender inequities in the health workforce are the result of

[1] At the international US$ 1.90-a-day poverty line measured in terms of 2011 purchasing power parity (PPP). For each country, this poverty line is converted to local currency units of the relevant year using PPP conversion factors and consumer index prices, to take into account inflation or deflation since 2011.

Fig. 8.4
Proportion of countries with insufficient health care professionals, 2013–2018



Source: WHO (2018) *(86)*.

gender norms affecting occupational entry, gender-based discrimination in earnings, barriers to access to full-time employment, and constraints to accessing professional development and leadership roles. Power and pay gaps between men and women in the health sector need to be urgently closed, by pursuing deliberate strategies to level the playing field for women *(92)*.

Health system functioning also relies on access to affordable essential medicines of assured quality that are available at all times in adequate amounts and in the appropriate dosage forms. Indicator 3.b.3 (Proportion of health facilities that have a core set of relevant essential medicines available and affordable on a sustainable basis) makes it possible to assess both the availability and affordability of medicines by combining them into a single indicator, while allowing a separate analysis to identify the main driver of poor performance. The index is computed based on 32 tracer essential medicines for the treatment, prevention and management of acute and chronic diseases, communicable diseases and NCDs in a primary health care setting. Preliminary analysis from 16 countries (eight from the WHO African Region, seven from the Region of the Americas and one from the European Region) found that only 15.5% of surveyed facilities provided available and affordable (i.e. accessible) medicines in 2016, with accessibility being higher in public sector facilities than in private sector facilities (24.5% and 9.2%, respectively). The analysis also found that the issue lies with the price of the tracer medicines; that is, if the selected tracer essential medicines were provided at affordable prices, overall access to medicines across 16 analysed countries would be 20.5%, with accessibility in public sector facilities reaching 30% and in private sector facilities 15.4%.

Research and development into new or improved health products and processes (e.g. medicines, vaccines and diagnostics) is critical for improving health outcomes. However, allocation of funds for research and development is often poorly aligned with global public health needs. The latest available data from OECD indicate that only 18 of 139 countries (13%) that received ODA for medical research and basic health sectors met their target for the percentage of such ODA allocated to medical research *(93)*.

All countries need to have a strong capacity for early warning, risk reduction and management of national and global health risks, including disease outbreaks, natural disasters, and deliberate or accidental events. Under the International Health Regulations (IHR) (2005) *(94)*, all States Parties are required to have or to develop minimum core public health capacities for surveillance, response and reporting of an event that may constitute a public health emergency of international concern. The IHR monitoring and evaluation framework includes annual self-assessment reporting by State Parties, and voluntary joint external evaluations. Preliminary analysis of the 2018 reports from 181 States Parties show that States Parties are generally reporting better performance in the detection capacities (e.g. surveillance and laboratory, with the average scores of around 70% globally), than in response capacities (such as emergency preparedness and response, with a global average score of 59%). Gaps in capacities at the points of entry (ports, airports and ground crossings) and for chemical safety and radiation emergencies are reported, with the global average scores of about 50%.

It is estimated that only half of the 194 Member States register at least 80% of the deaths in their population of those aged 15 years and over, with associated information on cause of death. In addition, data-quality problems (e.g. the high proportion of deaths being assigned a "garbage code") mean that it is difficult to obtain precise and meaningful information on causes of death, which in turn further limits the use of cause-of-death information to inform public health actions. The latest assessment suggests that less than one third of countries have high-quality data on cause of death.[1] Further research is needed to investigate sex differences in the completeness of death registration and possible biases in reporting causes of death. Monitoring of 11 health-related SDG indicators relies on good-quality cause-of-death data from countries; hence, investments in death registration systems need to be improved.

[1] Unpublished, updated assessment from WHO (2018) *(2)*.

Indicator 3.8.1 UHC service coverage index, 2015

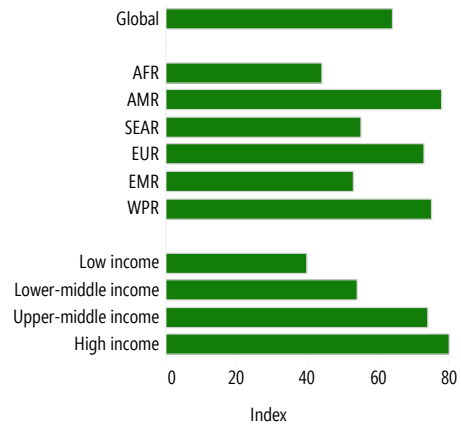
TREND
Not available.

GEOGRAPHICAL DISTRIBUTION
Values of the service coverage index varied widely across countries and across regions, with the WHO Region of the Americas having the highest score in 2015 (78 out of a maximum score of 100), followed by the Western Pacific Region (75) and the European Region (73).

NATIONAL INCOME
Low-income countries had the lowest score (40) and high-income countries had the highest score (80).

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



Indicators 3.8.2 Population with household expenditures on health exceeding 10% and 25% of total household expenditure or income

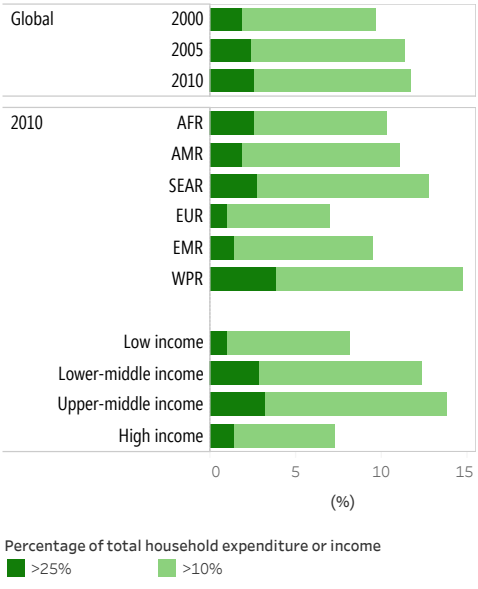
TREND
The proportion of the world's population who spent a considerable share of their household budget paying out of their own pocket for health services increased in the decade from 2000 (at least a 10% share: from 9.7% to 11.7%; at least a 25% share: from 1.9% to 2.6%).

GEOGRAPHICAL DISTRIBUTION
Out-of-pocket health payments are a source of financial hardship everywhere for all countries across all regions. The WHO South-East Asia Region and Western Pacific Region are the regions with the highest proportion of their population spending at both thresholds, whereas the WHO European Region and Eastern Mediterranean Region are the regions with the lowest incidence. However, in-depth country-specific analyses are needed to understand what is behind these aggregate numbers for relevant evidence-based policy analysis.

NATIONAL INCOME
At all national income levels people can suffer financial hardship. Middle-income countries have the highest proportion of the population spending a large share of the household budget on health out-of-pocket; low-income and high-income countries have smaller shares. In low-income countries, financial barriers to access might be preventing people from spending anything on health. In high income countries, out-of-pocket spending on medicines can be a major source of financial hardship.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



Indicator 3.b.2 Total net ODA to medical research and basic health sectors per capita (US$), by recipient country, 2017

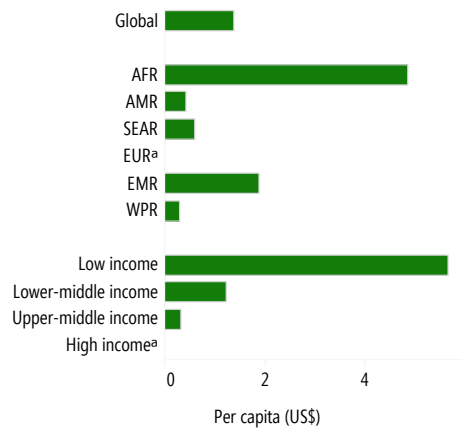
TREND (not shown here)
The global absolute amount of total net ODA increased from 2.1 billion constant 2016 US$ in 2010 to 9.4 billion constant 2016 US$ in 2016.

GEOGRAPHICAL DISTRIBUTION
Net ODA per capita in 2017 was greatest in the WHO African Region.

NATIONAL INCOME
Net ODA per capita in 2017 was greatest in low-income countries.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



[a] Not applicable.
Source: OECD.Stat *(95)*.

Indicator 3.c.1 Density of medical doctors and midwifery personnel (per 10 000 population), 2017

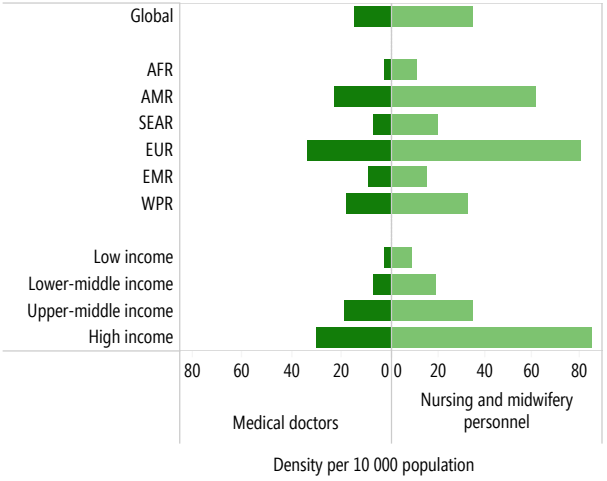
TREND
Not available.

GEOGRAPHICAL DISTRIBUTION
The lowest health worker densities are seen in the WHO African Region and the highest in the European Region.

NATIONAL INCOME
The lowest health worker densities are seen in low-income countries and the highest in high-income countries.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Among the health workforce, 67% is female, although the percentage varies among regions. In most countries, male workers make up most of the workforce of physicians, dentists and pharmacists, with female workers making the most of nursing and midwifery personnel *(86)*.



Indicator 3.d.1 Average of 13 International Health Regulations core capacity scores, 2018

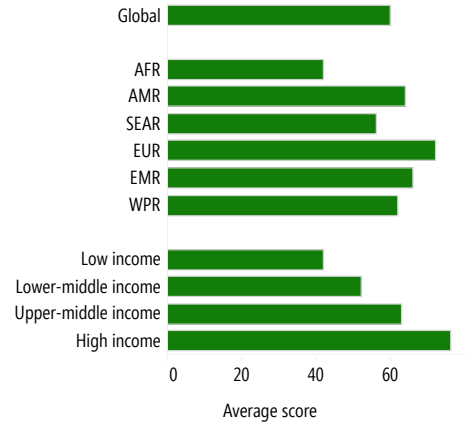
TREND
Not available. As a new tool and questionnaire were used in the 2018 annual self-assessment reporting of States Parties, the results are not directly comparable with the reports of previous years.

GEOGRAPHICAL DISTRIBUTION
The average capacity is lowest in WHO Africa Region (42%), and highest in the WHO European Region (74%).

NATIONAL INCOME
The average capacity increases with national income.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



Indicator 1.a.2 Domestic general government health expenditure (GGHE-D) as percentage of general government expenditure (GGE) (%)

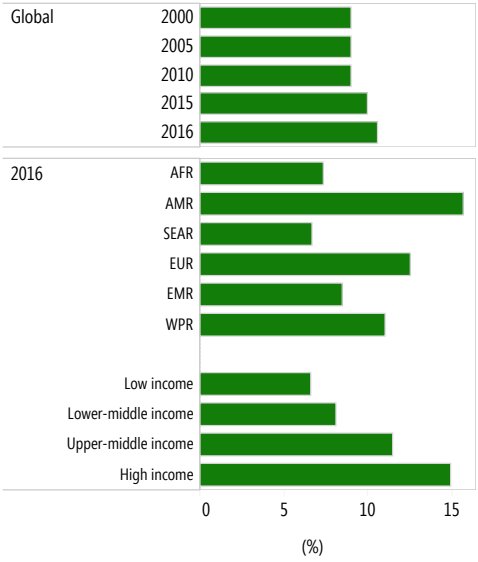
TREND
Globally, the average national percentage of total government expenditure devoted to health increased slightly from around 9% in 2000 to 10.6% in 2016.

GEOGRAPHICAL DISTRIBUTION
The average national percentage of total government expenditure from domestic sources allocated to health ranged from 7% in the WHO African Region and South-East Asia Region, to over 15% in the Region of the Americas in 2016.

NATIONAL INCOME
The level of government spending on health from domestic sources within the total expenditure for public sector operations in a country increased with country income.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



Indicator 17.19.2 Completeness of cause-of-death data (%), 2017

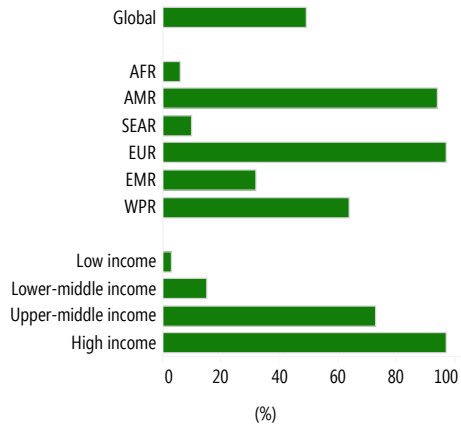
TREND
Not available.

GEOGRAPHICAL DISTRIBUTION
The WHO European Region and Region of the Americas had the most complete cause-of-death registration data in 2017, covering 97% and 94% of deaths, respectively. The WHO African Region and South-East Asia Region had very low completeness (6% and 10%, respectively).

NATIONAL INCOME
Completeness of cause-of-death registration data increased with income group.

AGE DISTRIBUTION
Not available.

SEX DISTRIBUTION
Not available.



9 SUMMARY OF FINDINGS

Global trends

Life expectancy

Between 2000 and 2016, global life expectancy at birth increased by 5.5 years, from 66.5 to 72.0 years; healthy life expectancy (HALE) also increased over that period, from 58.5 in 2000 to 63.3 in 2016. In 2016, a person aged 60 years could expect to live another 20.5 years, while HALE was 15.8; thus, in a person aged 60 years, the equivalent number of years of full health lost due to living in an unhealthy state is almost a quarter of the remaining life expectancy (i.e. 4.7 years or 23%).

Health-related SDG indicators

Recent years have seen improvements in 24 (56%) of the 43 health-related SDG indicators tracked in this report.[1] However, at a global level, progress has stalled or trends are in the wrong direction for five of those 43 indicators: road traffic mortality, children overweight, malaria incidence, alcohol consumption and water sector ODA. Trends have not yet been reported in 14 of the 43 indicators (33%). Nine of the health-related SDG indicators have explicit targets

Table 9.1
Trends in health-related SDG indicators

Programme area
- Reproductive, maternal and child health
- Infectious and noncommunicable diseases
- Injuries, violence and environmental risks
- Health systems and financing

SDG indicators with explicit targets for 2030

Progress stalled or trend in wrong direction	
3.6.1	Road traffic mortality
Progress made but too slow to meet target	
3.1.1	Maternal mortality
3.4.1	NCD mortality
3.4.2	Suicide mortality
6.1.1	Safe drinking-water coverage
6.2.1	Safe sanitation coverage
7.1.2	Clean energy coverage
Progress fast enough to attain target	
3.2.1	Under-5 mortality
3.2.2	Neonatal mortality

[1] Four of the health-related SDG indicators in the official list of SDG indicators *(7)* have more than one component (Indicators 2.2.2, 3.8.2, 3.b.1, 3.c.1). Where this is the case, each component is treated as a separate indicator in *World health statistics 2019*. The 43 indicators tracked have 36 unique indicator numbers in the official list of SDG indicators.

Table 9.1, continued

SDG indicators with no explicit targets for 2030

Progress stalled or trend in wrong direction	
2.2.2	Children overweight
3.3.3	Malaria incidence
3.5.2	Alcohol consumption
6.a.1	Water sector ODA
Progress made	
3.1.2	Skilled birth attendance
3.7.1	Met need for family planning
3.7.2	Adolescent birth rate
2.2.1	Stunting in children
3.b.1	DTP3 coverage
	MCV2 coverage
	PCV3 coverage
3.3.1	New HIV infections
3.3.2	Tuberculosis incidence
3.3.4	Hepatitis B prevalence
3.3.5	Need for NTD interventions
3.a.1	Tobacco use in persons ≥15 years
16.1.1	Homicide
3.9.3	Poisoning mortality
3.b.2	ODA medical research & basic health sectors
1.a.2	Domestic government health expenditure

Trend not yet reported	
2.2.2	Wasting in children
3.9.1	Air pollution mortality
3.9.2	Unsafe water and sanitation mortality
5.2.1	Intimate partner violence
11.6.2	Fine particulate matter in urban areas
3.8.1	UHC service coverage index
3.c.1	Medical doctor density
	Nurse/midwife density
	Dentist density
	Pharmacist density
3.d.1	International Health Regulations capacity
3.8.2	Household health expenditures >10%
	Household health expenditures >25%
17.9.2	Completeness of cause-of-death data

for 2030, but only two of those indicators are on track to meet 2030 targets: those for under-5 mortality rate and neonatal mortality rate. However, it is estimated that on current trends 51 countries will miss the target for under-5 mortality, and more than 60 countries will miss the target for neonatal mortality in 2030.

Underlying data for tracking the health-related SDGs

Monitoring of the health-related SDGs is based on statistics of two types:

- **primary data** – data compiled by international agencies from routine reporting by countries or publicly available sources such as DHS. Statistics are presented as they are reported or with modest adjustment; and
- **comparable estimates** – country data are adjusted or modelled to allow comparisons between countries or over time. Comparable estimates are produced for countries with underlying primary data and, in some cases, also for those without.

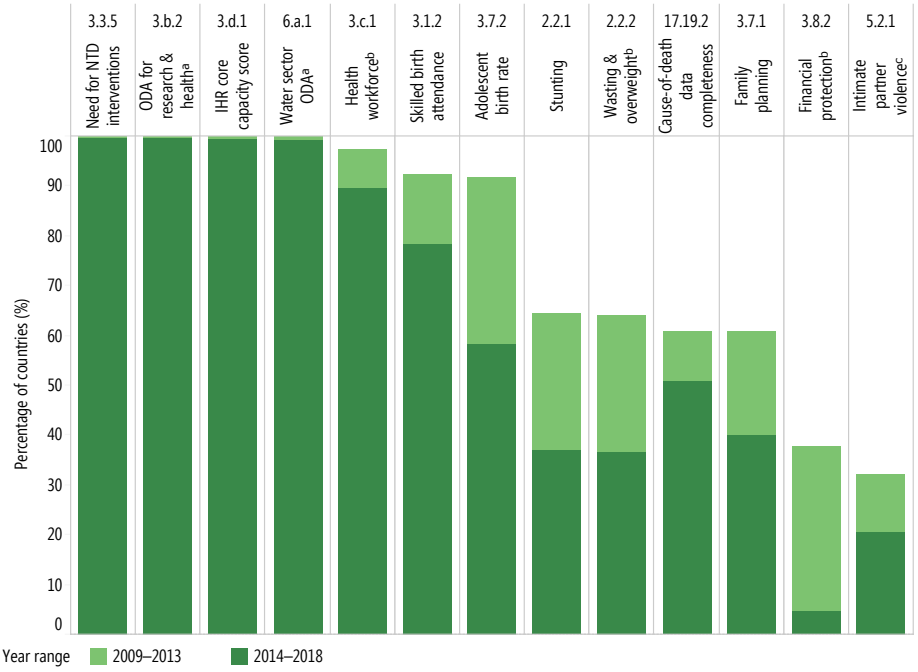
Sections 2–8 of this report presented SDG indicator values with respect to trends over time, geographical comparisons and sex disaggregation. Another aspect that needs to be considered is the availability and timeliness of the data underlying each SDG indicator value. Health-related SDG indicators have varying definitions and methodologies; thus, what is considered as underlying data can vary by indicator. Some complex indicators use multiple parameters from multiple data sources from different years. In such cases, the most important parameter (or parameters) was selected as the defining criteria of underlying data. The quality of underlying data may also vary. This assessment is based on the underlying data used as inputs for the SDG indicator, regardless of any adjustments made to the data in the estimation process. The "latest available year of underlying data" refers to the most recent year of the reference period for the available input data that were used to generate an estimate.

For 18 SDG indicators that are reported as primary data, the proportion of countries with available primary data within the past 10 years ranged from 32% for intimate partner violence, to 100% for four indicators (Fig. 9.1). The proportion of countries with available recent primary data, that is, within the past 5 years, ranged from 5% to 100%.

For 25 SDG indicators that are reported as comparable estimates, the availability of underlying data also varies across indicators (Fig. 9.2). Indicators that were adopted for global monitoring before the SDG era – for example, under-5 mortality, TB incidence, and vaccination coverage – tend to have relatively high availability of underlying data, even though such data may not be recent for all countries. In contrast, availability of underlying data tends to be lower for new global indicators such as cause-specific mortality rates, and population using safely managed drinking-water and safely managed sanitation services. The average lag between the year of the estimate and the latest available year of underlying data ranged from 0 for HIV, TB, malaria incidence and immunizations, to 5 years for hepatitis B prevalence. The year of estimates ranges from 2015 for maternal mortality to 2017 for HIV, TB and malaria incidence, vaccination coverage and clean energy coverage.

Of the 43 health and health-related SDG indicators reported in *World health statistics 2019*, sex disaggregation would potentially be informative for 28 indicators (Table 9.2). Sex disaggregation is not possible for the 10 indicators

Fig. 9.1
The availability of underlying data for SDG indicators reported as primary data

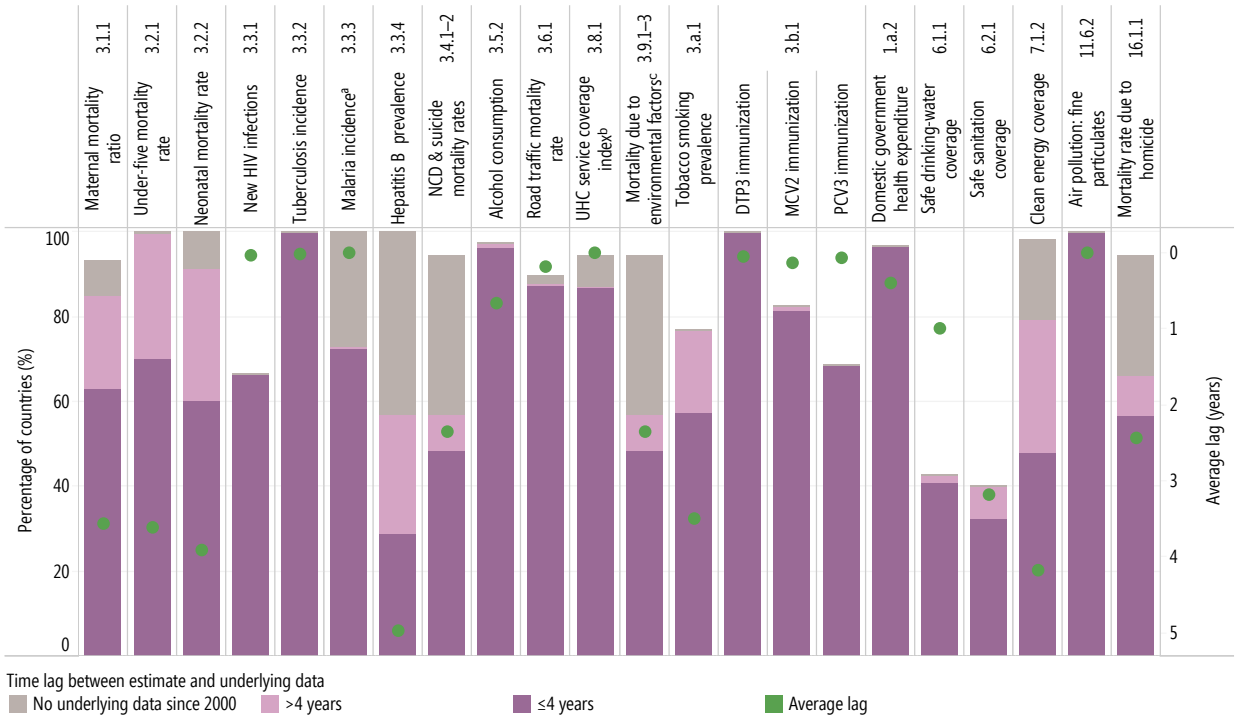


[a] Denominator for 3.b.2 and 6.a.1 reflects the list of official development assistance (ODA) recipients 2014–2017 maintained by the Development Assistance Committee of the Organisation for Economic Co-operation and Development.

[b] Indicator 3.8.2 considers two thresholds (10% and 25% of total household expenditure); availability is the same for both. Indicator 3.c.1, health workforce, includes four components (density of medical doctors, nursing and midwifery personnel, dentists and pharmacists); availability is shown for density of nursing and midwifery personnel. Indicator 2.2.2 includes two components (proportion of children wasted and proportion of children overweight); availability is shown for children wasted.

[c] Includes surveys for women aged 15–49 only.

Fig. 9.2
The availability of underlying data for SDG indicators reported as comparable estimates



[a] Denominator for indicator 3.3.3 is the number of endemic countries in 2000 (107 countries).

[b] For indicator 3.8.1, grey bar indicates "low" data availability and purple bar indicates "medium" and "high" data availability *(84)*.

[c] Includes mortality attributed to household and ambient air pollution, unsafe WASH services and unintentional poisoning.

Table 9.2
Availability of sex-disaggregated values of SDG indicators at global or regional levels

Programme area:
Reproductive, maternal and child health · Infectious and noncommunicable diseases · Injuries, violence and environmental risks · Health systems and financing

Sex-disaggregated values reported	
3.2.1	Under-5 mortality
3.3.1	New HIV infections
3.3.2	Tuberculosis incidence
3.4.1	NCD mortality
3.a.1	Tobacco use in persons ≥15 years
3.5.2	Alcohol consumption
3.4.2	Suicide mortality
16.1.1	Homicide
3.9.3	Poisoning mortality
3.9.1	Air pollution mortality
3.9.2	Unsafe water and sanitation mortality

Sex-disaggregated values not currently reported	
3.2.2	Neonatal mortality
2.2.1	Stunting in children
2.2.2	Wasting in children
2.2.2	Overweight children
3.b.1	DTP3 immunization coverage
	MCV2 immunization coverage
	PCV3 immunization coverage
3.3.3	Malaria incidence
3.3.4	Hepatitis B prevalence
3.3.5	Need for NTD interventions
3.6.1	Road traffic mortality
3.8.1	UHC service coverage index
3.c.1	Medical doctor density
	Nurse/midwife density
	Dentist density
	Pharmacist density
17.9.2	Cause-of-death data completeness

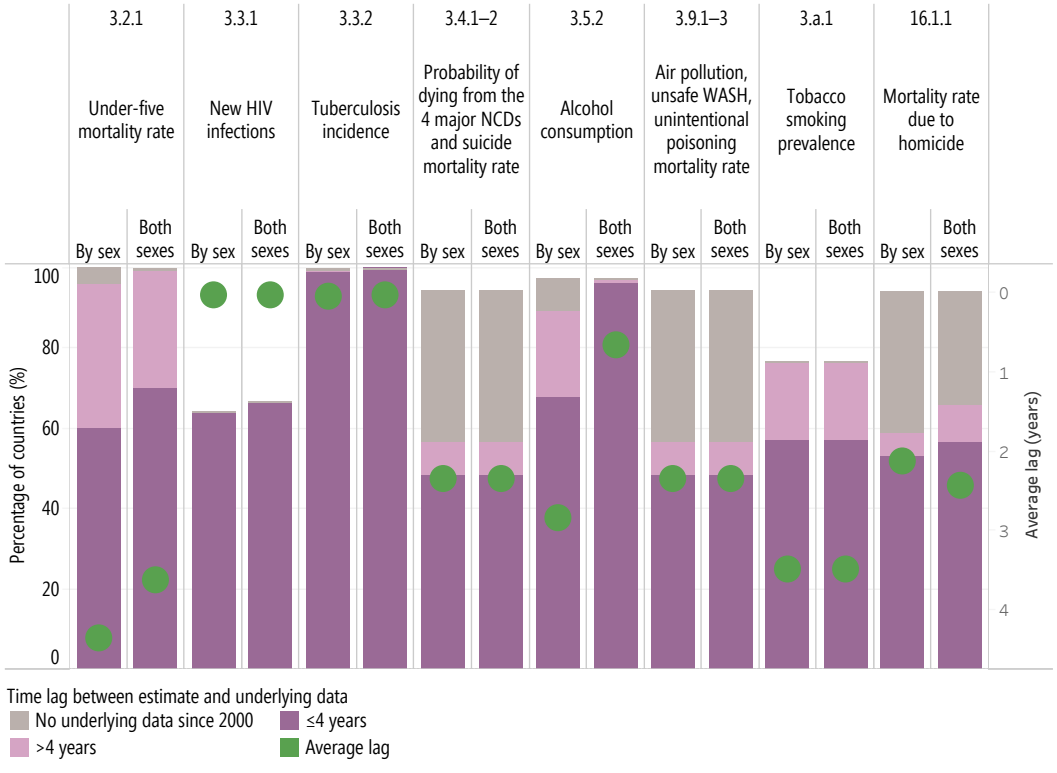
Data collected at household or higher level	
6.1.1	Safe drinking-water coverage
6.2.1	Safe sanitation coverage
6.a.1	Water sector ODA
7.1.2	Clean energy coverage
11.6.2	Fine particulate matter in urban areas
3.8.2	Household health expenditure >10%
	Household health expenditure >25%
1.a.2	Domestic government health expenditure
3.b.2	ODA medical research & basic health sectors
3.d.1	International Health Regulations capacity

Female specific	
3.7.1	Met need for family planning
3.7.2	Adolescent birth rate
3.1.1	Maternal mortality
3.1.2	Skilled attendance at birth
5.1.2	Intimate partner violence

for which data are collected at household, subnational or national level, or for the five female-specific indicators. For the 28 SDG indicators for which sex-disaggregated data could be informative, such data at global and regional levels are available for only 11 indicators (though data may be available at country level).

The availability of underlying data for sex-disaggregated estimates for the 11 indicators is shown in Fig. 9.3. When the main data sources for sex-specific and both-sexes estimates are the same, such as cause-of-death registration data for cause-specific mortality, the availability of recent, sex-specific underlying data is similar to that of both-sexes

Fig. 9.3
The availability of underlying data for SDG indicators reported as comparable estimates by sex



underlying data. When data sources are different, such as the case for alcohol consumption where underlying data for both-sexes estimates come mainly from administrative sources while underlying data for sex-specific estimates (that is, sex ratio of alcohol consumption) come mainly from surveys, the availability of recent, sex-specific underlying data may be lower than that of both-sexes underlying data.

Country variation in data availability is shown in Fig. 9.4. For 40% of countries, recent primary or underlying data are available for three quarters or more of all indicators included here. However, for about one third of countries, over half of the indicators have no recent primary or underlying data. One in seven indicator country values included in Annex 2 have had no underlying data since 2000. Low-income and lower-middle-income countries in particular lack primary or underlying data.

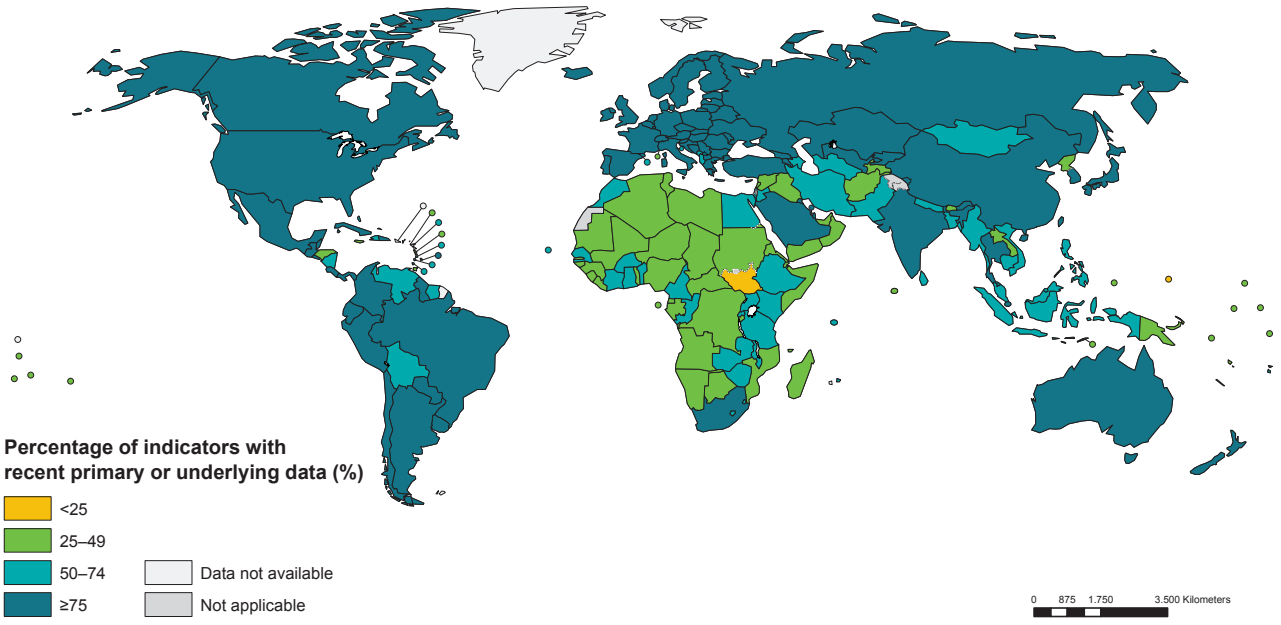
The results presented above illustrate the need for improved data availability for global health monitoring. Greater investment is needed to improve country health information systems as part of the national statistical system to generate better data, both to inform national decision-making and to reduce reliance on statistical modelling for global monitoring.

The "availability of data" reported here refers to data available to and used by international agencies responsible for global monitoring of the SDGs. More data may be available at country level,[1] but did not reach or was not compiled by the relevant international agencies in time to produce this report, or were not included because of issues with comparability. Better systems are needed to improve data flow, to enable international agencies to capture primary data that are available at country level, and for countries to give feedback to international agencies on the use of both primary data and methodologies to generate comparable estimates.

WHO is committed to promoting the use of sex-disaggregated data and to undertaking gender analysis, in line with the commitment made in its Thirteenth General Programme of Work *(96)* and the World Health Assembly Resolution 60.25 *(97)*. It will support Member States in improving the collection, analysis and use of quantitative data on health, disaggregated by sex, age and other relevant social stratifications. It will also promote quantitative and qualitative research to analyse the complex effects of social and cultural factors on health, and the reduction of gender biases in health information and research.

[1] A report on the availability of data at country level for health-related SDG indicators is being prepared and scheduled for release later in 2019.

Fig. 9.4
Availability of recent primary or underlying data to inform global SDG monitoring[a]



[a] Sex disaggregation is included in the count of indicators. Indicator 3.8.1 (UHC service coverage index) is not included as the availability is assessed differently (see Fig. 9.2).

Differences between countries

Life expectancy

Mortality rates are higher in low-income countries and the WHO African Region. As a consequence, life expectancy in low-income countries (62.7 years) is 18.1 years lower than in high-income countries (80.8 years). The 10 conditions contributing most to the reduced life expectancy in low-income countries are lower respiratory infections (life expectancy reduced by 2.09 years), diarrhoeal diseases (1.97 years), stroke (1.45 years), HIV/AIDS (1.45 years), TB (1.35 years), ischaemic heart disease (1.35 years), malaria (0.96 years), road injury (0.75 years), birth asphyxia and birth trauma (0.63 years), and protein-energy malnutrition (0.62 years).

SDG indicators of health status

The disparities in life expectancy between countries are reflected in many of the health-related SDG indicators. In low-income countries, more than a third of children are stunted (short for their age), reflecting long-term nutritional deprivation, and more than one child out of 14 born will die before his or her fifth birthday. Adolescent birth rates are eight times higher in low-income countries than in high-income countries. In low-income countries, one woman out of 41 dies from maternal causes. The burden of infectious diseases, including HIV, TB, malaria, hepatitis B and neglected tropical diseases (NTDs) is higher in low-income countries than in high-income countries. Mortality rates attributed to unsafe water, unsafe sanitation and lack of hygiene are also highest in low-income countries, as are mortality rates for

Table 9.3
Latest values of selected WHS 2019 indicators by sex, WHO region and World Bank income group and globally[a]

SDG indicator (by topic area)	Year	Global			WHO region						World Bank income group				2030 numeric target
		Male	Female	Both sexes	AFR	AMR	SEAR	EUR	EMR	WPR	LI	LMI	UMI	HI	
Reproductive and maternal health															
3.1.1 Maternal mortality ratio (per 100 000 live births)	2015	-	216	-	542	52	164	16	166	41	495	253	55	17	<70
3.1.2 Proportion of births attended by skilled health personnel (%)	2013–2018	-	81	-	59	95	81	99	79	97	60	76	99	99	-
3.7.1 Family planning satisfied with modern methods[b] (%)	2019	-	76	-	56	83	71	77	61	87	58	65	78	82	-
3.7.2 Adolescent birth rate (per 1000 women aged 15–19 years)	2015–2020	-	44	-	99	49	33	17	45	14	97	46	29	12	-
Child health															
3.2.1 Under-five mortality rate (per 1000 live births)	2017	41	37	39	74	14	36	9	50	13	69	49	14	5	25
3.2.2 Neonatal mortality rate (per 1000 live births)	2017	-	-	18	27	8	21	5	27	6	48	49	26	7	12
2.2.1 Prevalence of stunting in children under 5[c] (%)	2018	-	-	21.9	33.1	6.5	31.9	-	24.7	6.4	34.2	31.1	6.3	-	-
2.2.2 Prevalence of wasting in children under 5[c] (%)	2018	-	-	7.3	7.0	0.8	15.0	-	7.8	2.2	7.4	11.6	1.8	-	-
2.2.2 Prevalence of overweight in children under 5[c] (%)	2018	-	-	5.9	3.5	7.2	3.8	-	5.7	6.0	3.1	3.9	7.4	-	-
3.b.1 DTP3 immunization coverage among 1-year-olds (%)	2017	-	-	85	72	91	88	94	81	97	78	82	94	95	-
3.b.1 MCV2 immunization coverage by the nationally recommended age (%)	2017	-	-	67	25	74	77	90	67	94	29	63	88	91	-
3.b.1 PCV3 immunization coverage among 1-year olds (%)	2017	-	-	44	68	82	12	70	52	16	68	32	33	85	-
Infectious diseases															
3.3.1 New HIV infections (per 1000 uninfected population)	2017	0.26	0.24	0.25	1.22	0.16	0.08	0.18	0.06	0.06	0.66	0.23	0.24	0.07	-
3.3.2 Tuberculosis incidence (per 100 000 population)	2017	168	99	134	237	28	226	30	113	95	244	223	58	11	-
3.3.3 Malaria incidence (per 1000 population at risk)	2017	-	-	59.1	219.4	7.3	7.0	0.0	14.8	2.5	189.3	42.8	2.5	-	-
3.3.4 Hepatitis B surface antigen prevalence among children under 5 years (%)	2017	-	-	0.80	2.34	0.07	0.26	0.21	0.69	0.38	2.31	0.72	0.30	0.16	-
3.3.5 Reported number of people requiring interventions against NTDs (millions)	2017	-	-	1582.9	594.1	75.5	733.3	5.5	75.4	98.4	398.4	1068.6	114.7	0.5	-
Noncommunicable diseases															
3.4.1 Probability of dying from CVD, cancer, diabetes, CRD between age 30 and exact age 70 (%)	2016	21.6	15.0	18.3	20.6	15.1	23.1	16.7	22.0	16.2	21.3	23.3	17.7	12.0	Reduce 1/3
3.4.2 Suicide mortality rate (per 100 000 population)	2016	13.5	7.7	10.6	7.4	9.8	13.2	15.4	3.9	10.2	6.8	10.6	10.0	14.3	Reduce 1/3
3.5.2 Total alcohol per capita (≥15 years of age) consumption (litres of pure alcohol)	2016	10.1	2.7	6.4	6.3	8.0	4.5	9.8	0.6	7.3	3.8	4.7	7.0	9.8	-
3.a.1 Prevalence of tobacco smoking among persons aged 15 years and older[d] (%)	2016	33.7	6.2	19.9	9.8	16.9	16.9	29.4	18.1	24.5	11.4	17.2	23.1	24.1	-
Injuries and violence															
3.6.1 Road traffic mortality rate (per 100 000 population)	2016	-	-	18.2	26.6	15.6	20.7	9.3	18.0	16.9	27.5	19.2		8.3	Half by 2020
16.1.1 Mortality rate due to homicide (per 100 000 population)	2016	10.1	2.6	6.4	10.4	17.9	4.1	3.3	6.7	1.9	8.7	5.9	7.9	2.9	-
Environmental risks															
3.9.1 Mortality rate attributed to household and ambient air pollution[d] (per 100 000 population)	2016	128.5	101.1	114.1	180.9	29.7	165.8	36.3	125.0	102.8		131.7		17.8	-
3.9.2 Mortality rate attributed to exposure to unsafe WASH services (per 100 000 population)	2016	11.4	12.1	11.7	45.8	1.1	15.4	0.3	10.6	1.0	42.4	18.6	1.1	0.3	-
3.9.3 Mortality rate from unintentional poisoning (per 100 000 population)	2016	1.6	1.2	1.4	2.7	0.6	1.8	0.7	1.5	1.1	2.8	1.8	1.1	0.5	-
6.1.1 Proportion of population using safely managed drinking-water services (%)	2015	-	-	71	26	82	-	91	56	-	23	59	92	98	Universal
6.2.1 Proportion of population using safely managed sanitation services (%)	2015	-	-	39	-	43	-	67	-	57	-	-	50	81	Universal
6.a.1 WASH-related ODA[e] (constant 2016 US$ millions)	2017	-	-	8698.25	2483.89	676.69	1484.41	-	1836.26	1011.10	1983.59	4262.35	1750.49	-	-
7.1.2 Proportion of population with primary reliance on clean fuels (%)	2017	-	-	61	17	92	45	>95	72	62		54		100	Universal
11.6.2 Annual mean concentrations of fine particulate matter (PM2.5) in urban areas (μg/m^3)	2016	-	-	39.6	35.5	13.4	57.3	17.6	54.0	42.9		44.0		14.4	-
UHC and health systems															
3.8.1 UHC service coverage index	2015	-	-	64	44	78	55	73	53	75	40	54	74	80	-
3.8.2 Catastrophic out-of-pocket health spending >10%[f]	2010	-	-	11.7	10.3	11.1	12.8	7.0	9.5	14.8	8.1	12.4	13.8	7.2	-
3.8.2 Catastrophic out-of-pocket health spending >25%[f]	2010	-	-	2.6	2.6	1.9	2.8	1.0	1.4	3.9	1.1	2.8	3.2	1.4	-
1.a.2 Domestic general government health expenditure as percentage of GGE (%)	2016	-	-	10.6	7.3	15.6	6.7	12.5	8.5	11.0	6.6	8.1	11.5	14.9	-
3.c.1 Density of medical doctors (per 10 000 population)	2017	-	-	15.1	2.8	23.3	7.4	33.8	9.9	18.0	3.1	7.5	19.4	30.4	-
3.c.1 Density of nursing and midwifery personnel (per 10 000 population)	2017	-	-	34.8	10.9	61.9	19.9	80.6	15.2	32.6	8.5	18.9	35	85.6	-
3.d.1 Average of 13 International Health Regulations core capacity scores	2018	-	-	60	42	65	56	74	66	64	42	52	64	77	-
3.b.2 Total net ODA to medical research and basic health sectors per capita[g] (US$)	2017	-	-	1.39	4.83	0.42	0.60	-	1.89	0.30	5.64	1.23	0.33	-	-
17.19.2 Completeness of cause-of-death data (%)	2017	-	-	49	6	94	10	97	32	64	3	15	73	97	-

Darker shading represents high values for mortality, incidence, prevalence, risk factor and catastrophic out-of-pocket health spending indicators; and lower values for coverage, ODA, health workforce and health expenditure indicators.

[a] Excludes SDG 5.2.1 and density of dentists and pharmacists in SDG 3.c.1 which have low coverage or are not available across most regions.
[b] Women of reproductive age.
[c] High income figure has low coverage, interpret with caution.
[d] Age-standardized.
[e] Amount that is part of a government-coordinated spending plan, refers to water sector only.
[f] Population with household expenditures on health greater than 10% or 25% of total household expenditure or income.
[g] Recipient countries.

road traffic injuries and unintentional poisoning. Although NCDs are often associated with a more prosperous lifestyle, the probability of dying prematurely from CVD, cancer, diabetes and chronic respiratory disease is highest in low-income and lower-middle-income countries.

There are some exceptions to poor health being primarily associated with low-income countries, and in locations where geography also has an influence. Highest wasting rates are observed in the WHO South-East Asia Region (15%) and Eastern Mediterranean Region (7.8%). Mortality rates from homicide are highest in the WHO Region of the Americas. Suicide mortality rates are highest in the WHO European Region, and lowest in the Eastern Mediterranean Region.

SDG indicators of health service coverage and financing

Populations in low-income countries generally have poorer coverage of essential health services and values of the UHC service coverage index are lower. The proportion of women who had their family planning needs met with a modern contraceptive method, and the skilled birth attendance rate were lowest in low-income and lower -middle-income countries, where 95% of maternal deaths occur. Immunization coverage rates are also generally lower in low-income countries. Health workforce densities are lower in low-income countries, and domestic government health expenditure as a proportion of total general government expenditures is lower (despite lower absolute levels of general government expenditure and greater health needs). The proportion of the population that suffer catastrophic health expenditures (>10% or >25% of total household expenditures or income) is higher in middle-income countries than in low- or high-income countries. However, at all income levels people can suffer catastrophic health expenditures, even in high-income countries and in countries where most of the out-of-pocket health spending is due to medicines.

SDG indicators of exposure to risk factors

Populations in lower-income countries are less likely to use safely managed drinking-water, and clean fuels and technology; also, they have greater exposure to fine particulate matter in cities. In contrast, tobacco use and alcohol consumption are the highest in high-income countries, although the health impact of alcohol is greater among disadvantaged populations for the same levels of alcohol consumption.

Differences between men and women

Life expectancy

Globally, women have a longer life expectancy than men: 74.2 versus 69.8 years at birth, and 21.9 versus 19.0 years at age 60 years. HALE is also greater in women than men at birth (64.8 versus 62.0 years) and at age 60 years (16.8 versus 14.8 years). However, the number of equivalent years of full health lost through living in unhealthy states is also greater in women than men (9.5 versus 7.8 years). Globally, the sex ratio at birth has ranged between 105–110 males to every 100 females; however, because mortality rates are higher in men, the number of men for every 100 women decreases to 100 in the age group 50–54 years and to 95 by the age group 60–64 years, falling sharply thereafter.

Some of the differences in mortality rates and life expectancy are due to biological sex differences between men and women. For example, X-linked immune regulators may enhance immune responses in female children, resulting in reduced mortality among girls aged under 5 years. Others are linked to gender differences; that is, the socially constructed roles, norms, behaviours, activities and attributes that a given society considers appropriate for men, women boys and girls. For example, child marriage increases the risks related to early pregnancy among girls whereas higher rates of male employment in the transport industry expose men to higher risks of death on the roads. The exact contributions that biological differences and gender roles make to health status are often difficult to separate because they do not operate independently.

Men's reduced life expectancy compared with that of women is not due to a single or a small number of causes. Of the 40 leading causes of death, 33 causes contribute more to reduced life expectancy in men than in women. The main causes of death that contribute to a lower life expectancy for men than for women are ischaemic heart disease (0.84 years), road injuries (0.47), lung cancer (0.40), chronic obstructive pulmonary disease (0.36), stroke (0.32), cirrhosis of the liver (0.27), TB (0.23), prostate cancer (0.22) and interpersonal violence (0.21). Breast cancer (0.30 years), maternal conditions (0.23) and cervical cancer (0.15) are the causes of death that have the most effect on female rather than male global life expectancy.

SDG indicators of health status

The differences between men and women in health status are reflected in the majority of health-related SDG indicators, where sex disaggregation has been possible. In 2017, male children were 11% more likely to die than female children before the age of 5 years, compared with only 6% in 2000, indicating that the decline in under-5 mortality rate since 2000 has been faster in females than in males. Given that boys generally have a higher under-5 mortality rate than girls for biological reasons, the similarity of the under-5 mortality rate between boys and girls in the WHO South-East Asia Region is indicative of high rates of avoidable mortality among female children. Although global estimates are not available, household surveys indicate that rates of stunting and wasting are generally higher in boys than girls. Similarly, the proportion of boys overweight is higher than girls.

Globally in 2017, the incidence rate of new HIV infections was 1.09 times higher in men than in women. In the WHO African Region, the incidence rate was 1.28 times higher in women than in men; however, in all other WHO regions, the incidence rates were higher in men than women. The incidence rate of TB was 1.7 higher in men than in women globally in 2017. In 2016, the probability of a man aged 30 years dying from an NCD before 70 years of age was 1.44 times higher than for a woman aged 30 years. Globally in 2016, suicide mortality rates were 1.75 times higher in men than in women.

Deaths rates from road injury are more than twice as high in men as in women from age 15 years, and mortality rates due to homicide are four times higher in men than in women. One in five of all homicides is committed by an intimate partner or family member, with women making up most of the victims *(75)*. Beyond mortality, violence against women is not only widespread, but carries a high burden of morbidity and ill health. Worldwide in 2013, it was estimated that 35% of women and girls aged 15–49 years reported physical or sexual intimate partner violence or non-partner sexual violence in their lifetime. Women and girls may also experience harmful practices, such as female genital mutilation (FGM) and early and forced marriage. As of 2017, at least 200 million girls and women had undergone FGM in the 30 countries where the practice is concentrated *(78)*. Globally, 21% of women aged between 20 and 24 years reported that they were married or in an informal union before age 18 years *(77)*. Also, it is estimated that in 2015–2020 more than one in 25 adolescent girls aged 15–19 years will give birth *(1)*.

Mortality rates attributed to household and ambient air pollution are 1.27 times higher in men than in women. In contrast, the global mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene is 1.06 higher in women than in men, although there is much regional variation.

SDG indicators of health service coverage

Access to many services for prevention or treatment of infectious diseases and NCDs is not part of the SDG monitoring framework, except as part of the UHC service coverage index, which cannot be sex-disaggregated using currently available data and methodologies. Nevertheless, some relevant observations have been made through other global health reports. Household surveys suggest that vaccination rates are similar in boys and girls. The risk of not using a condom during sex with a non-regular partner appears to be higher in women than in men. However, in countries with generalized HIV epidemics, men are less likely than women to take an HIV test and less likely to access antiretroviral therapy; also, men are more likely than women to die of an AIDS-related illness *(51)*. Similarly, male TB patients appear to be less likely to seek care than female TB patients *(52–55, 98)*, as reflected in lower rates of case notification compared with the estimated total of cases. Death rates for some NCDs may also be influenced by access to diagnosis and treatment; for example, cervical cancer mortality rates are higher in low-income countries that have poorer access to health services.

SDG indicators of exposure to risk factors

Age-standardized prevalence of tobacco smoking was five times higher in men than in women in 2016, with the largest M/F ratio observed in the WHO Eastern Mediterranean Region. Globally, per capita alcohol consumption was almost 4 times higher in men than in women in 2016.

10 HIGHLIGHTS AND WAYS FORWARD

What has improved

- Global life expectancy increased by 5.5 years to 72.0 years between 2000 and 2016, and healthy life expectancy increased by 4.8 years to 63.3 years.
- Of 29 health-related SDG indicators for which global trends are reported, 24 have shown improvements in recent years. More births are attended by skilled health personnel, and women are less likely to die in childbirth. Global targets to reduce neonatal deaths and deaths in children aged under 5 years are on track, and childhood stunting is in decline. Nonetheless, it is estimated that 303 000 maternal deaths occurred globally in 2015 and that 5.4 million children aged under 5 years died in 2017.
- Vaccination coverage rates have increased while incidence rates for several infectious diseases, prevalence of tobacco smoking, exposure to environmental risks and premature NCD mortality have decreased.

What has not improved

- Progress has stalled or trends are in the wrong direction for five of the 29 health-related SDG indicators for which trends are reported: the proportion of children aged under 5 years overweight, malaria incidence, harmful use of alcohol, deaths from road traffic injuries, and water-sector official development assistance.

Disparities in health outcomes

- Life expectancy at birth in low-income countries is 18.1 years lower than in high-income countries. Much of this difference is attributable to easily preventable and treatable conditions.
- In low-income countries, one in 41 women die from maternal causes. Such deaths rarely occur in upper-middle and high-income countries. Maternal deaths contribute more to differences in life expectancy between men and women than any other single cause.
- In low-income countries, more than a third of children are stunted (short for their age), reflecting long-term nutritional deprivation, and one child out of every 14 born will die before his or her fifth birthday.
- In 2016, life expectancy in men was 4.4 years lower than for women, with higher death rates for multiple causes, especially cardiovascular diseases, road injuries, lung cancer, chronic obstructive pulmonary disease and stroke. Men are generally exposed to increased occupational risks, and have higher prevalence of tobacco use and higher per capita consumption of alcohol. In

many settings, men use health services less than women, even after taking into account reproductive-related consultations. The health gap between men and women is widest in high-income countries.

Data availability

The *World health statistics 2019* report reviews, for the first time, the availability of country data for global SDG reporting. This review suggests that major improvements are needed to country data systems:

- one in seven indicator country values included in this report have had no underlying data since 2000; low-income and lower-middle-income countries in particular lack underlying data;
- for about one third of countries, over half of the indicators have no recent primary or underlying data;
- 11 health-related SDG indicators require cause-of-death data, yet only around half of countries are able to register more than 80% of adult deaths, and less than one third of countries have good-quality data on cause of death; and
- sex disaggregation is currently available for less than half (11/28) of relevant SDG indicators at global level where it would be of interest.

Ways forward

Some key actions are suggested based on the findings of this report; these actions are outlined below.

1. Improve access to health services

For many conditions, particularly in low-income countries, premature deaths can be averted by improving access to and use of preventive and curative health services. Efforts in support of UHC must focus on reaching those whom services are not reaching, such as marginalized, stigmatized and geographically isolated people of all ages and genders. This may require a strengthened health workforce and increased provision of health facilities, equipment, medicines and vaccines. It will also require removing barriers to accessing services including economic barriers (as a consequence of out-of-pocket expenses and insufficient public financing) and cultural barriers (where the workforce providing services does not have the necessary cultural sensitivity). In some circumstances it will be necessary to address societal barriers to accessing care and this may require actions that lie beyond the traditional remit of ministries of health. Nonetheless, the health sector can play a key role in raising awareness and catalysing the development of multisectoral policies and programmes to reduce barriers to access. In some countries, health and social systems are strained by natural disasters or conflict, and the populations affected can account for a large proportion of unmet SDG need. Stronger and more resilient national health systems need to be backed by the regional and global alert and response mechanisms that will mitigate the impact of health emergencies.

2. Address risks to health

The health of populations can also be improved by reducing exposure to risk factors such as unsafe water and sanitation, air pollution, violence, unsafe roads, tobacco use and alcohol consumption. The health sector also has a key role to play in raising awareness and catalysing the development of multisectoral policies and programmes to reduce exposure to these risk factors.

3. Make health systems responsive to sex and gender

Health planning needs to allow for the different needs of men and women, regarding exposure to risk factors, barriers to access and use of services and health outcomes. In many circumstances, men experience poorer health outcomes than women do. Although some of these poorer health outcomes may have a biological basis, they may be amplified by gender roles. Gender analysis and health policies should consider women, men and gender-diverse population groups, to ensure equitable health outcomes. It is also necessary to formulate gender-responsive human-resource policies and regulations, ensure equal pay for work of equal value, and address barriers faced by women in progressing to leadership roles.

4. Invest in data systems for health, including disaggregated data

Progress in achieving the SDG goals is inhibited by incomplete or outdated information on several health-related indicators. The countries lacking underlying data are often those with limited resources and the greatest health need. Collecting, analysing and utilizing data of good quality is an important step to progressing health care, allowing better allocation of resources and timely interventions, and reducing costs while also improving the health care received. By ensuring that data can be disaggregated by sex, place of residence and other dimensions, there is potential to act to reduce inequality. Routine information systems, health facility or household surveys, and civil registration and vital statistics systems must be designed to provide relevant, timely and accurate data.

REFERENCES

1. World population prospects: the 2017 revision. Geneva: United Nations, Department of Economic and Social Affairs, Population Division; 2017 (https://population.un.org/wpp/, accessed 31 March 2019).
2. Global health estimates 2016 (deaths by cause, age, sex, by country and by region, 2000–2016; and life expectancy, 2000–2016). Geneva: World Health Organization; 2018.
3. Mielke MM, Ferretti MT, Iulita MF, Hayden K, Khachaturian AS. Sex and gender in Alzheimer's disease – does it matter? Alzheimer's & Dementia. 2018;14(9):1101 (https://www.ncbi.nlm.nih.gov/pubmed/30196887, accessed 26 March 2019).
4. Beltran-Sanchez H, Preston SH, Canudas-Romo V. An integrated approach to cause-of-death analysis: cause-deleted life tables and decompositions of life expectancy. Demogr Res. 2008;19:1323 (https://www.ncbi.nlm.nih.gov/pubmed/20165568, accessed 31 April 2019).
5. Rosano GM, Panina G. Oestrogens and the heart. Therapie. 1999;54(3):381–5 (https://www.ncbi.nlm.nih.gov/pubmed/10500455, accessed 26 March 2019).
6. Nhamoyebonde S, Leslie A. Biological differences between the sexes and susceptibility to tuberculosis. J Infect Dis. 2014;209(suppl 3):S100–S6 (https://dx.doi.org/10.1093/infdis/jiu147, accessed 17 March 2019).
7. Hawkes S, Buse K. Gender and global health: evidence, policy, and inconvenient truths. Lancet. 2013;381(9879):1783–7 (https://doi.org/10.1016/S0140-6736(13)60253-6, accessed 14 May 2019).
8. O'Donnell O, Van Doorslaer E, Wagstaff A, Lindelow M. Analyzing health equity using household survey data: a guide to techniques and their implementation. The World Bank; 2007 (https://elibrary.worldbank.org/doi/abs/10.1596/978-0-8213-6933-3, accessed 22 April 2019).
9. Zimicki S. The relationship between fertility and maternal mortality. In: Parnell A (ed), Contraceptive use and controlled fertility: health issues for women and children (background papers). Washington DC: National Research Council (US), National Academies Press (US); 1989 (https://www.ncbi.nlm.nih.gov/books/NBK235085/, accessed 17 March 2019).
10. Trends in maternal mortality: 1990 to 2015: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2015 (https://apps.who.int/iris/bitstream/handle/10665/194254/9789241565141_eng.pdf, accessed 31 April 2019).
11. Ganchimeg T, Ota E, Morisaki N, Laopaiboon M, Lumbiganon P, Zhang J et al. Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. BJOG. 2014;121:40–8 (https://dx.doi.org/10.1111/1471-0528.12630, accessed 17 March 2019).
12. New country classifications by income level: 2018–2019 [website]. World Bank; 2018 (https://blogs.worldbank.org/opendata/new-country-classifications-income-level-2018-2019, accessed 22 April 2019).
13. Early and unintended pregnancy and the education sector: evidence review and recommendations. Paris: UNESCO; 2007 (https://unesdoc.unesco.org/ark:/48223/pf0000251509, accessed 17 March 2019).
14. Motherhood in childhood. Facing the challenge of adolescent pregnancy. New York: United Nations Population Fund; 2013 (https://www.unfpa.org/sites/default/files/pub-pdf/EN-SWOP2013.pdf, accessed 17 March 2019).
15. Bergman A-S, Axberg U, Hanson E. When a parent dies – a systematic review of the effects of support programs for parentally bereaved children and their caregivers. BMC Palliat Care. 2017;16(1) (https://dx.doi.org/10.1186/s12904-017-0223-y, accessed 17 March 2019).
16. Zhou H, Zhang L, Ye F, Wang H-j, Huntington D, Huang Y et al. The effect of maternal death on the health of the husband and children in a rural area of China: a prospective cohort study. PLOS ONE. 2016;11(6):e0157122 (https://dx.doi.org/10.1371/journal.pone.0157122, accessed 17 March 2019).
17. Finlay JE, Moucheraud C, Goshev S, Levira F, Mrema S, Canning D et al. The effects of maternal mortality on infant and child survival in rural Tanzania: a cohort study. Matern Child Health J 2015;19(11):2393–402 (https://dx.doi.org/10.1007/s10995-015-1758-2, accessed 17 March 2019).
18. Moucheraud C, Worku A, Molla M, Finlay JE, Leaning J, Yamin AE. Consequences of maternal mortality on infant and child survival: a 25-year longitudinal analysis in Butajira Ethiopia (1987–2011). Reprod Health. 2015;12(S1) (https://dx.doi.org/10.1186/1742-4755-12-s1-s4, accessed 17 March 2019).
19. Ronsmans C, Chowdhury ME, Dasgupta SK, Ahmed A, Koblinsky M. Effect of parent's death on child survival in rural Bangladesh: a cohort study. Lancet. 2010;375(9730):2024–31 (https://dx.doi.org/10.1016/s0140-6736(10)60704-0, accessed 17 March 2019).
20. Kes A, Ogwang S, Pande RP, Douglas Z, Karuga R, Odhiambo FO et al. The economic burden of maternal mortality on households: evidence from three sub-counties in rural western Kenya. Reprod Health. 2015;12(S1) (https://dx.doi.org/10.1186/1742-4755-12-s1-s3, accessed 17 March 2019).
21. Wang H, Ye F, Wang Y, Huntington D. Economic impact of maternal death on households in rural China: a prospective cohort study. PLoS ONE. 2013;8(10):e76624 (https://dx.doi.org/10.1371/journal.pone.0076624, accessed 17 March 2019).
22. Ye F, Wang H, Huntington D, Zhou H, Li Y, You F et al. The immediate economic impact of maternal deaths on rural Chinese households. PLoS ONE. 2012;7(6):e38467 (https://dx.doi.org/10.1371/journal.pone.0038467, accessed 17 March 2019).
23. WHO, MCEE. MCEE-WHO estimates for child causes of death 2000–2017. Geneva: World Health Organization Department of Evidence, Information and Research, and Maternal Child Epidemiology Estimation (MCEE); 2018 (https://www.who.int/healthinfo/global_burden_disease/estimates/en/index2.html, accessed 22 April 2019).
24. Waldron I. Sex differences in human mortality: the role of genetic factors. Soc Sci Med. 1983;17(6):321–33 (https://dx.doi.org/10.1016/0277-9536(83)90234-4, accessed 17 March 2019).
25. Waldron I. Sex differences in infant and early childhood mortality: major causes of death and possible biological causes, Too young to die: genes or gender? New York: United Nations Department of Economic and Social Affairs, Population Division; 1998:64–83.
26. Wamani H, Åstrøm AN, Peterson S, Tumwine JK, Tylleskär T. Boys are more stunted than girls in sub-Saharan Africa: a meta-analysis of 16 demographic and health surveys. BMC Pediatr. 2007;7(1) (https://dx.doi.org/10.1186/1471-2431-7-17, accessed 17 March 2019).
27. Calu Costa J, Wehrmeister FC, Barros AJD, Victora CG. Gender bias in careseeking practices in 57 low- and middle-income countries. J Glob Health. 2017;7(1) (https://dx.doi.org/10.7189/jogh.07.010418, accessed 17 March 2019).
28. Common childhood infections and gender inequalities: a systematic review. Maternal, newborn and child health working paper. New York: United Nations Children's Fund; 2015 (https://www.unicef.org/health/files/Systematic_review_of_childhood_infections_and_gender_FINAL.pdf, accessed 17 March 2019).
29. Khera R, Jain S, Lodha R, Ramakrishnan S. Gender bias in child care and child health: global patterns. Arch Dis Child. 2013;99(4):369–74 (https://dx.doi.org/10.1136/archdischild-2013-303889, accessed 17 March 2019).
30. WHO. Global Health Observatory (GHO) data: Health equity assessment toolkit. Geneva: World Health Organization (https://www.who.int/gho/health_equity/assessment_toolkit/en/, accessed 22 April 2019).
31. Alkema L, Chao F, You D, Pedersen J, Sawyer CC. National, regional, and global sex ratios of infant, child, and under-5 mortality and identification of countries with outlying ratios: a systematic assessment. Lancet Glob Health. 2014;2(9):e521–e30 (https://dx.doi.org/10.1016/s2214-109x(14)70280-3, accessed 17 March 2019).
32. Costa JC, da Silva ICM, Victora CG. Gender bias in under-five mortality in low/middle-income countries. BMJ Glob Health. 2017;2(2):e000350 (https://dx.doi.org/10.1136/bmjgh-2017-000350, accessed 17 March 2019).
33. Iqbal N, Gkiouleka A, Milner A, Montag D, Gallo V. Girls' hidden penalty: analysis of gender inequality in child mortality with data from 195 countries. BMJ Glob Health. 2018;3(5):e001028 (https://dx.doi.org/10.1136/bmjgh-2018-001028, accessed 17 March 2019).

34. Pradhan E, Pearson E, Puri M, Maharjan M, Maharjan DC, Shah I. Determinants of imbalanced sex ratio at birth in Nepal: evidence from secondary analysis of a large hospital-based study and nationally-representative survey data. BMJ Open. 2019;9(1):e023021 (https://dx.doi.org/10.1136/bmjopen-2018-023021, accessed 17 March 2019).

35. Preventing gender-biased sex selection: an interagency statement OHCHR, UNFPA, UNICEF, UN Women and WHO. Geneva: World Health Organization; 2011 (https://apps.who.int/iris/bitstream/handle/10665/44577/9789241501460_eng.pdf, accessed 24 April 2019).

36. Miles to go closing gaps breaking barriers righting injustices: global AIDS update. Geneva: Joint United Nations Programme on HIV/AIDS; 2018 (https://www.unaids.org/en/resources/documents/2018/global-aids-update, accessed 17 March 2019).

37. DeBeck K, Cheng T, Montaner JS, Beyrer C, Elliott R, Sherman S et al. HIV and the criminalisation of drug use among people who inject drugs: a systematic review. Lancet HIV. 2017;4(8):e357–e74 (https://dx.doi.org/10.1016/s2352-3018(17)30073-5, accessed 17 March 2019).

38. Decker MR, Pearson E, Illangasekare SL, Clark E, Sherman SG. Violence against women in sex work and HIV risk implications differ qualitatively by perpetrator. BMC Pub Health. 2013;13(1) (https://dx.doi.org/10.1186/1471-2458-13-876, accessed 17 March 2019).

39. Deering KN, Amin A, Shoveller J, Nesbitt A, Garcia-Moreno C, Duff P et al. A systematic review of the correlates of violence against sex workers. Am J Public Health. 2014;104(5):e42–e54 (https://dx.doi.org/10.2105/ajph.2014.301909, accessed 17 March 2019).

40. Hladik W, Barker J, Ssenkusu JM, Opio A, Tappero JW, Hakim A et al. HIV infection among men who have sex with men in Kampala, Uganda – a respondent driven sampling survey. PLoS ONE. 2012;7(5):e38143 (https://dx.doi.org/10.1371/journal.pone.0038143, accessed 17 March 2019).

41. Schwartz SR, Nowak RG, Orazulike I, Keshinro B, Ake J, Kennedy S et al. The immediate effect of the Same-Sex Marriage Prohibition Act on stigma, discrimination, and engagement on HIV prevention and treatment services in men who have sex with men in Nigeria: analysis of prospective data from the TRUST cohort. Lancet HIV. 2015;2(7):e299–e306 (https://dx.doi.org/10.1016/s2352-3018(15)00078-8, accessed 17 March 2019).

42. Decker MR, Crago A-L, Chu SKH, Sherman SG, Seshu MS, Buthelezi K et al. Human rights violations against sex workers: burden and effect on HIV. Lancet. 2015;385(9963):186–99 (https://www.ncbi.nlm.nih.gov/pubmed/25059943, accessed 17 March 2019).

43. Dunkle KL, Decker MR. Gender-based violence and HIV: reviewing the evidence for links and causal pathways in the general population and high-risk groups. Am J Reprod Immunol. 2012;69:20–6 (https://dx.doi.org/10.1111/aji.12039, accessed 17 March 2019).

44. Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntryre JA, Harlow SD. Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. Soc Sci Med. 2004;59(8):1581–92 (https://dx.doi.org/10.1016/j.socscimed.2004.02.003, accessed 17 March 2019).

45. Garcia-Moreno C, Watts C. Violence against women: its importance for HIV/AIDS. AIDS. 2000;14:S253. (https://www.ncbi.nlm.nih.gov/pubmed/11086869, accessed 17 March 2019).

46. Jewkes R. Gender inequities must be addressed in HIV prevention. Science. 2010;329(5988):145–7 (https://dx.doi.org/10.1126/science.1193794, accessed 17 March 2019).

47. Maman S, Campbell J, Sweat MD, Gielen AC. The intersections of HIV and violence: directions for future research and interventions. Soc Sci Med. 2000;50(4):459–78 (https://dx.doi.org/10.1016/s0277-9536(99)00270-1, accessed 17 March 2019).

48. Dlamini-Simelane TTT, Moyer E. 'Lost to follow up': rethinking delayed and interrupted HIV treatment among married Swazi women. Health Policy Plan. 2017;(32.2):248–56 (https://dx.doi.org/10.1093/heapol/czw117, accessed 17 March 2019).

49. Gamarel KE, Nelson KM, Stephenson R, Santiago Rivera OJ, Chiaramonte D, Miller RL. Anticipated HIV stigma and delays in regular HIV testing behaviors among sexually-active young gay, bisexual, and other men who have sex with men and transgender women. AIDS and Behavior. 2017;22(2):522–30 (https://dx.doi.org/10.1007/s10461-017-2005-1, accessed 17 March 2019).

50. Merten S, Ntalasha H, Musheke M. Non-uptake of HIV testing in children at risk in two urban and rural settings in Zambia: a mixed-methods study. PLOS ONE. 2016;11(6):e0155510 (https://dx.doi.org/10.1371/journal.pone.0155510, accessed 17 March 2019).

51. Blind spot: addressing a blind spot in the response to HIV. Geneva: Joint United Nations Programme on HIV/AIDS; 2017 (https://www.unaids.org/en/resources/documents/2017/blind_spot, accessed 17 March 2019).

52. Amere GA, Nayak P, Salindri AD, Narayan KMV, Magee MJ. Contribution of smoking to tuberculosis incidence and mortality in high-tuberculosis-burden countries. Am J Epidemiol. 2018;187(9):1846–55 (https://dx.doi.org/10.1093/aje/kwy081, accessed 17 March 2019).

53. Narasimhan P, Wood J, MacIntyre CR, Mathai D. Risk factors for tuberculosis. J Pulm Med. 2013;2013:1–11 (https://dx.doi.org/10.1155/2013/828939, accessed 17 March 2019).

54. Global tuberculosis report 2018. Geneva: World Health Organization; 2018 (http://apps.who.int/iris/bitstream/handle/10665/274453/9789241565646-eng.pdf?ua=1, accessed 31 August 2019).

55. Dodd PJ, Looker C, Plumb ID, Bond V, Schaap A, Shanaube K et al. Age- and sex-specific social contact patterns and incidence of mycobacterium tuberculosis infection. Am J Epidemiol. 2015;183:156–66 (https://dx.doi.org/10.1093/aje/kwv160, accessed 17 March 2019).

56. Carnevale P, Frézil JL, Bosseno MF, Le Pont F, Lancien J. Etude de l'agressivité D'Anopheles gamiae A en fonction de l'âge et du sexe dessujets humains. Bull World Health Organ. 1978;56(1):147–54 (https://www.ncbi.nlm.nih.gov/pubmed/307444, accessed 17 March 2019).

57. Golenda CF, Gambel JM, Solberg VB, Wirtz RA, Burge R. Gender-related efficacy difference to an extended duration formulation of topical N,N-diethyl-m-toluamide (DEET). Am J Trop Med Hyg. 1999;60(4):654–7 (https://dx.doi.org/10.4269/ajtmh.1999.60.654, accessed 17 March 2019).

58. Brabin BJ. An analysis of malaria in pregnancy in Africa. Bull World Health Organ. 1983;61(6):1005–16 (https://www.ncbi.nlm.nih.gov/pubmed/6370484, accessed 17 March 2019).

59. Pryce J, Richardson M, Lengeler C. Insecticide-treated nets for preventing malaria. Cochrane Database Syst Rev. 2018;11 (https://dx.doi.org/10.1002/14651858.cd000363.pub3, accessed 17 March 2019).

60. Bhatt S, Weiss DJ, Cameron E, Bisanzio D, Mappin B, Dalrymple U et al. The effect of malaria control on Plasmodium falciparum in Africa between 2000 and 2015. Nature. 2015;526(7572):207–11 (https://dx.doi.org/10.1038/nature15535, accessed 17 March 2019).

61. The DHS Program malaria indicator surveys (MIS) [website]. United States Agency for International Development (USAID) (https://dhsprogram.com/What-We-Do/Survey-Types/MIS.cfm, accessed 22 April 2019).

62. Noor AM, Kirui VC, Brooker SJ, Snow RW. The use of insecticide treated nets by age: implications for universal coverage in Africa. BMC Pub Health. 2009;9(1) (https://dx.doi.org/10.1186/1471-2458-9-369, accessed 17 March 2019).

63. Coalson JE, Cohee LM, Buchwald AG, Nyambalo A, Kubale J, Seydel KB et al. Simulation models predict that school-age children are responsible for most human-to-mosquito Plasmodium falciparum transmission in southern Malawi. Malaria Journal. 2018;17(1)(https://dx.doi.org/10.1186/s12936-018-2295-4, accessed 17 March 2019).

64. Liu WC, Liu QY. Molecular mechanisms of gender disparity in hepatitis B virus-associated hepatocellular carcinoma. World J Gastroenterol. 2014;20(20):6252 (https://dx.doi.org/10.3748/wjg.v20.i20.6252, accessed 17 March 2019).

65. Rilkoff H, Tukahebwa EM, Fleming FM, Leslie J, Cole DC. Exploring gender dimensions of treatment programmes for neglected tropical diseases in Uganda. PLoS Negl Trop Dis. 2013;7(7):e2312 (https://dx.doi.org/10.1371/journal.pntd.0002312, accessed 17 March 2019).

66. Vouking MZ, Tamo VC, Tadenfok CN. Contribution and performance of female community-directed distributors in the treatment of onchocerciasis with ivermectin in Sub-Saharan Africa: a systematic review. Pan African Medical Journal. 2015;20(1) (https://www.panafrican-med-journal.com/content/article/20/188/full/#.WMFM2LhBq70, accessed 17 March 2019).

67. Wolff S, Puts DA. Sex differences: summarizing more than a century of scientific research. Arch Sex Behav. 2009;38(6):1070–2 (https://dx.doi.org/10.1007/s10508-009-9538-y, accessed 17 March 2019).

68. Denny L, de Sanjose S, Mutebi M, Anderson BO, Kim J, Jeronimo J et al. Interventions to close the divide for women with breast and cervical cancer between low-income and middle-income countries and high-income countries. Lancet. 2017;389(10071):861–70 (https://www.ncbi.nlm.nih.gov/pubmed/27814963, accessed 22 April 2019).

69. Hitchman SC, Fong GT. Gender empowerment and female-to-male smoking prevalence ratios. Bull World Health Organ. 2011;89(3):195–202 (https://dx.doi.org/10.2471/blt.10.079905, accessed 17 March 2019).

70. Pompili M, Serafini G, Innamorati M, Dominici G, Ferracuti S, Kotzalidis GD et al. Suicidal behavior and alcohol abuse. Int J Environ Res Public Health. 2010;7(4):1392–431 (https://dx.doi.org/10.3390/ijerph7041392, accessed 17 March 2019).

71. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1.9 million participants. Lancet Glob Health. 2018;6(10):e1077–e86 (https://dx.doi.org/10.1016/s2214-109x(18)30357-7, accessed 17 March 2019).

72. Physical activity [website]. Geneva: World Health Organization; 2018 (https://www.who.int/news-room/fact-sheets/detail/physical-activity, accessed 17 March 2019).

73. NCD Risk Factor Collaboration. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. Lancet. 2017;390(10113):2627–42 (https://www.ncbi.nlm.nih.gov/pubmed/29029897, accessed 22 April 2019).

74. Mehta LS, Beckie TM, DeVon HA, Grines CL, Krumholz HM, Johnson MN et al. Acute myocardial infarction in women: a scientific statement from the American Heart Association. Circulation. 2016;133(9):916–47 (https://www.ncbi.nlm.nih.gov/pubmed/26811316, accessed 22 April 2019).

75. Global study on homicide: gender-related killing of women and girls. Vienna: United Nations Office on Drugs and Crime; 2018 (https://www.unodc.org/documents/data-and-analysis/GSH2018/GSH18_Gender-related_killing_of_women_and_girls.pdf, accessed 17 March 2019).

76. Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence. Geneva: World Health Organization; 2013 (https://apps.who.int/iris/bitstream/handle/10665/85239/9789241564625_eng.pdf, accessed 17 March 2019).

77. Child marriage: latest trends and future prospects. New York: United Nations Children's Fund; 2018 (https://data.unicef.org/wp-content/uploads/2018/07/Child-Marriage-Data-Brief.pdf, accessed 5 April 2019).

78. Female genital mutilation (UNICEF Data) [website]. New York: United Nations Children's Fund (UNICEF); 2018 (https://data.unicef.org/topic/child-protection/female-genital-mutilation/, accessed 5 April 2019).

79. Inspire: seven strategies for ending violence against children. Geneva: World Health Organization; 2016 (https://apps.who.int/iris/bitstream/handle/10665/207717/9789241565356-eng.pdf?sequence=1, accessed 17 March 2019).

80. Gender, climate change and health. Geneva: World Health Organization; 2014 (http://apps.who.int//iris/bitstream/10665/144781/1/9789241508186_eng.pdf?ua=1, accessed 5 April 2019).

81. Chemicals and gender. United Nations Development Programme; 2011 (https://www.undp.org/content/undp/en/home/librarypage/environment-energy/chemicals_management/chemicals-and-gender.html, accessed 17 March 2019).

82. Burning opportunity: clean household energy for health, sustainable development, and wellbeing of women and children. Geneva: World Health Organization; 2016 (http://www.who.int/iris/bitstream/10665/204717/1/9789241565233_eng.pdf?ua=1, accessed 17 March 2019).

83. WHO/UNICEF Joint Water Supply, Sanitation Monitoring Programme. Progress on drinking water and sanitation: 2014 Update. Geneva: World Health Organization; 2014. (http://apps.who.int/iris/bitstream/10665/112727/1/9789241507240_eng.pdf?ua=1, accessed 31 March 2019)

84. WHO, World Bank. Tracking universal health coverage: 2017 global monitoring report. Geneva: World Health Organization and the International Bank for Reconstruction and Development / The World Bank; 2017 (https://apps.who.int/iris/bitstream/handle/10665/259817/9789241513555-eng.pdf, accessed 22 April 2019).

85. Public spending on health: a closer look at global trends (WHO/HIS/HGF/HFWorkingPaper/18.3). Geneva: World Health Organization; 2018 (https://apps.who.int/iris/bitstream/handle/10665/276728/WHO-HIS-HGF-HF-WorkingPaper-18.3-eng.pdf?ua=1, accessed 22 March 2019).

86. Health workforce: data and statistics. Geneva: World Health Organization; 2018 (https://www.who.int/hrh/statistics/en/, accessed 22 March 2019).

87. Stenberg K, Hanssen O, Edejer TT-T, Bertram M, Brindley C, Meshreky A et al. Financing transformative health systems towards achievement of the health sustainable development goals: a model for projected resource needs in 67 low-income and middle-income countries. Lancet Global Health. 2017;5(9):e875–e87 (https://dx.doi.org/10.1016/s2214-109x(17)30263-2, accessed 22 March 2019).

88. International Labour Organization. Report for discussion at the tripartite meeting on improving employment and working conditions in health services. 2017 (https://www.ilo.org/sector/activities/sectoral-meetings/WCMS_548288/lang--en/index.htm, accessed 22 March 2019).

89. Langer A, Meleis A, Knaul FM, Atun R, Aran M, Arreola-Ornelas H et al. Women and health: the key for sustainable development. Lancet. 2015;386(9999):1165–210 (https://www.ncbi.nlm.nih.gov/pubmed/26051370, accessed 22 March 2019).

90. Magar V, Gerecke M, Dhillon I, Campbell J. Women's contributions to sustainable development through work in health: using a gender lens to advance a transformative 2030 agenda. Health employment and economic growth: an evidence base. Geneva: World Health Organization; 2017 (https://www.who.int/hrh/resources/health_employment-and-economic-growth/en/, accessed 20 February 2019).

91. Boniol M, McIsaac M, Xu L, Wuliji T, Diallo K. Gender equity in the health workforce: analysis of 104 countries. Geneva: World Health Organization; 2019 (https://www.who.int/iris/handle/10665/311314, accessed 22 April 2019).

92. Ghebreyesus TA, Fisseha S. How gender parity improves global health. 2019 (https://www.project-syndicate.org/commentary/gender-parity-improves-global-health-by-tedros-adhanom-ghebreyesus-and-senait-fisseha-2019-03, accessed 22 March 2019).

93. Global Observatory on Health R&D [website]. Geneva: World Health Organization (https://www.who.int/research-observatory/en/, accessed 22 March 2019).

94. International health regulations (2005). Geneva: World Health Organization; 2016 (http://apps.who.int/iris/bitstream/10665/246107/1/9789241580496-eng.pdf?ua=1, accessed 22 March 2019).

95. OECD.Stat [online database]. Paris: Organisation for Economic Co-operation and Development (https://stats.oecd.org/, accessed 19 January 2019).

96. WHO Thirteenth general programme of work, 2019–2023. Geneva: World Health Organization; 2018 (https://apps.who.int/gb/ebwha/pdf_files/WHA71/A71_4-en.pdf?ua=1, accessed 24 April 2019).

97. Strategy for integrating gender analysis and actions into the work of WHO. Geneva: World Health Organization; 2007 (https://apps.who.int/iris/bitstream/handle/10665/69857/WHO_FCH_GWH_08.1_eng.pdf?sequence=1, accessed 24 April 2019).

98. Horton KC, MacPherson P, Houben RMGJ, White RG, Corbett EL. Sex differences in tuberculosis burden and notifications in low- and middle-income countries: a systematic review and meta-analysis. PLOS Med. 2016;13(9):e1002119 (https://www.ncbi.nlm.nih.gov/pubmed/27598345, accessed 14 May 2019).