Levels & Trends in

Child Mortality

Report 2018

Estimates developed by the UN Inter-agency Group for Child Mortality Estimation

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World Health Organization

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CHILD SURVIVAL: KEY FACTS AND FIGURES

- Over the last two decades, the world made substantial progress in reducing mortality among children and young adolescents (including children under age 5, children aged 5–9 and young adolescents aged 10–14). Still, in 2017 alone, an estimated 6.3 million children and young adolescents died, mostly from preventable causes. Children under age 5 accounted for 5.4 million of these deaths, with 2.5 million deaths occurring in the first month of life, 1.6 million at age 1–11 months, and 1.3 million at age 1–4 years. An additional 0.9 million deaths occurred among children aged 5–14.

- Globally, the majority of child and young adolescent deaths occurred during the earliest ages with 85 per cent of the 6.3 million deaths in 2017 occurring in the first five years of life. Across all regions and income groups, more than 80 per cent of the deaths of children under age 15 happened in the first five years of life regardless of the mortality level.

- Among children and young adolescents, the risk of dying was highest in the first month of life at an average rate of 18 deaths per 1,000 live births globally in 2017. In comparison, the probability of dying after the first month and before reaching age 1 was 12 per 1,000, the probability of dying after age 1 and before age 5 was 10 per 1,000, and the probability of dying after age 5 and before age 15 was 7 per 1,000.

- While the chances of survival have increased for all age groups since 2000, progress was uneven. The largest improvements in survival for children under 5 years of age occurred among children aged 1–4 years. Mortality in this age group declined by 60 per cent from 2000 to 2017. Neonatal mortality declined by 41 per cent over this same period, while mortality among children aged 1–11 months, the post-neonatal period, declined by 51 per cent. From 2000 to 2017, mortality among children aged 5–14 declined by 37 per cent.

- Children continue to face widespread regional and income disparities in their chances of survival. Sub-Saharan Africa remains the region with the highest under-five mortality rate in the world. In 2017, the region had an average under-five mortality rate of 76 deaths per 1,000 live births. This translates to 1 in 13 children dying before his or her fifth birthday – 14 times higher than the average ratio of 1 in 185 in high-income countries and 20 times higher than the ratio of 1 in 263 in the region of Australia and New Zealand, which has the lowest regional under-five mortality rate.

- In 2017 alone, some 4.4 million lives would have been saved had under-five mortality in each country been as low as in the lowest mortality country in the region. The total number of under-five deaths would have been reduced to 1 million.

- On current trends, 56 million children under 5 years of age are projected to die between 2018 and 2030, half of them newborns.

- In 2017, 118 countries already had an under-five mortality rate below the SDG target of a mortality rate at least as low as 25 deaths per 1,000 live births. Among the remaining countries, progress will need to be accelerated in about 50 countries to achieve the SDG target by 2030.

- If the 50 some countries falling behind would achieve the SDG target on child survival by 2030, 10 million lives of children under age 5 could be saved.

Global mortality rates and deaths by age

Introduction

Despite progress over the past quarter-century, millions of newborns, children and young adolescents die every year, mostly of preventable or treatable causes such as infectious diseases and injuries. These deaths reflect the limited access of children and communities to basic health interventions such as vaccination, medical treatment of infectious diseases, adequate nutrition and clean water and sanitation. Therefore, mortality rates among children and young adolescents are not only key indicators for child and young adolescent well-being, but, more broadly, for sustainable social and economic development.

While concerted efforts aimed at improving child survival have driven large reductions in mortality levels among children under 5 years of age as well as for children and young adolescents aged 5–14 in recent decades, persistent and intolerably high numbers of child and young adolescent deaths mean more work remains to be done to address the specific survival needs of children and young adolescents. The global community recognizes the crucial need to end preventable child deaths, making it an essential part of the Global Strategy for Women's, Children's, and Adolescent's Health (2016–2030)[1] and the third Sustainable Development Goal (SDG)[2] to ensure healthy lives and promote wellbeing for all people at all ages.

SDG goal 3 calls for an end to preventable deaths of newborns and children under 5 years of age and specifies that all countries should aim to reduce neonatal mortality to at least as low as 12 deaths per 1,000 live births and under-five mortality to at least as low as 25 deaths per 1,000 live births by 2030. Given the current burden of deaths, child survival remains an urgent concern. In 2017 alone, 5.4 million children died before reaching their fifth birthday – 2.5 million of those children died in the first month of life.

At a time when the knowledge and technology for life-saving interventions are available, it is unacceptable that 15,000 children died every day in 2017 mostly from preventable causes and treatable diseases.

While the mortality risk in the age group 5–14 is the lowest among all ages and represents about a fifth of the risk of children under age 5, almost one million children aged 5–14 died in 2017 alone. Moreover, although the risk of death for children aged 5–14 may be lower than for younger children, children aged 5–14 also die predominantly of avoidable causes such as infectious diseases, drowning and road injuries.[3] Given the crucial early stages of education that take place at these ages, as well as the onset of adolescence and the broader social implications that accompany that stage of life, the survival and well-being of children during this crucial period should not be ignored. Greater efforts are needed to save the lives of children aged 5–14; with public health interventions covering this age group significant progress could be made.

Achieving the ambitious child survival goals requires ensuring universal access to safe, effective, high-quality and affordable care for women, children and adolescents. It also requires an understanding of the levels and trends in child mortality as well as the underlying causes of child and young adolescent deaths. The monitoring of child and young adolescent survival requires continual improvement in the measurement of mortality, particularly in countries that lack timely and accurate mortality data. Reliable estimates of child and young adolescent mortality at the national, regional and global level are necessary for evidence-based policymaking to improve the survival chances of the world's children.

In the absence of reliable vital registration data in many countries, modelling and monitoring of child and young adolescent mortality rates remains a necessary resource for policymaking and priority setting. The United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) produces estimates of child and young adolescent mortality annually, reconciling the differences across data sources and taking into account the systematic biases associated with the various types of data on child and adolescent mortality. This report presents the UN IGME's latest estimates – up to the year 2017 – of under-five, infant, and neonatal mortality as well as mortality among children aged 5–14. It assesses progress in the reduction of child and young adolescent mortality at the country, regional and global levels, and provides an overview of the methods used to estimate the child mortality indicators mentioned above.

Levels and Trends in Child Mortality

Despite progress over the past two decades, in 2017 alone, an estimated 6.3 million children and young adolescents died, mostly from preventable causes. Newborns account for 2.5 million of these deaths, children aged 1–11 months for 1.6 million, children aged 1–4 years for 1.3 million, children aged 5–9 years for 0.6 million and young adolescents aged 10–14 years for 0.4 million (Figure 1).

Globally, the majority of child and young adolescent deaths occur at the youngest ages. Eighty-five per cent (5.4 million) of the 6.3 million deaths in 2017 occurred in the first five years of life and about half (47 per cent) of the under-five deaths in 2017 occurred in the first month of life. Across all regions and income groups, more than 80 per cent of the deaths under age 15 happened in the first five years of life regardless of the mortality level.

The risk of dying is highest in the first month of life. In 2017, neonatal mortality – the probability of dying in the first 28 days of life – was estimated at 18 deaths per 1,000 live births globally. The probability of dying after the first month and before reaching age 1 was 12 per 1,000, and the probability of dying after age 1 and before age 5 was 10 per 1,000. The under-five mortality rate, encompassing the three age groups above, was estimated at 39 deaths per 1,000 live births. For children aged 5–14, the probability of dying was estimated at 7 per 1,000 children aged 5, with the probability of dying after age 5 and before age 10 at 4 deaths per 1,000 and 3 per 1,000 for young adolescents aged 10–14 (Figure 2).

While the chances of survival have increased for all age groups since 2000, progress was uneven. The largest improvements in child survival for children under 5 years of age occurred for children aged 1–4 years – mortality in this age group dropped by 60 per cent from 2000 to 2017. Post-neonatal mortality, or mortality among children aged 1–11 months, declined by 51 per cent, neonatal mortality declined by 41 per cent and mortality among children aged 5–14 declined by 37 percent over the same period. The largest gains in the survival chances for children aged 1–4 have occurred primarily since 2000. The annual rate of reduction in mortality among children aged 1–4 more than doubled from 2.0 per cent for the period 1990 to 2000 to 5.4 per cent for 2000 to 2017. Conversely, survival for children aged 5–14 improved with an overall decline of 52 per cent in the mortality rate from 1990 to 2017, but no significant acceleration occurred after 2000 in this age group. Likewise, high-income countries are the only income group to have experienced slower decline in mortality for all age groups in the 2000 to 2017 period than 1990 to 2000, as mortality had already reached very low levels in these countries and acceleration in decline is less likely to occur at that stage (Figure 3).

Child mortality under age 5

Under-five mortality

Around the world remarkable progress in child survival has been made and millions of children have better survival chances than in 1990. The under-five mortality rate fell to 39 (37, 42)[4] deaths per 1,000 live births in 2017 from 93 (92, 95) in 1990 – a 58 per cent reduction (Table 1 and Figure 4). This is equivalent to 1 in 11 children dying before reaching age 5 in 1990, compared to 1 in 26 in 2017. In most of the SDG regions[5] the under-five mortality rate was reduced by at least half since 1990. In 74 countries, the under-five mortality rate was reduced by more than two-thirds. Among those countries, 33 low- and lower-middle-income countries achieved a two-thirds or more reduction in the under-five mortality rate since 1990. The total number of under-five deaths dropped to 5.4 (5.2, 5.8) million in 2017 from 12.6 (12.4, 12.8) million in 1990 (Table 2). On average, 15,000 children died every day in 2017, compared to 34,000 in 1990.

FIGURE 1

Child mortality declined by more than half for children under 5 years of age and children aged 5–14 years since 1990

Global mortality rates and deaths by age, 1990-2017

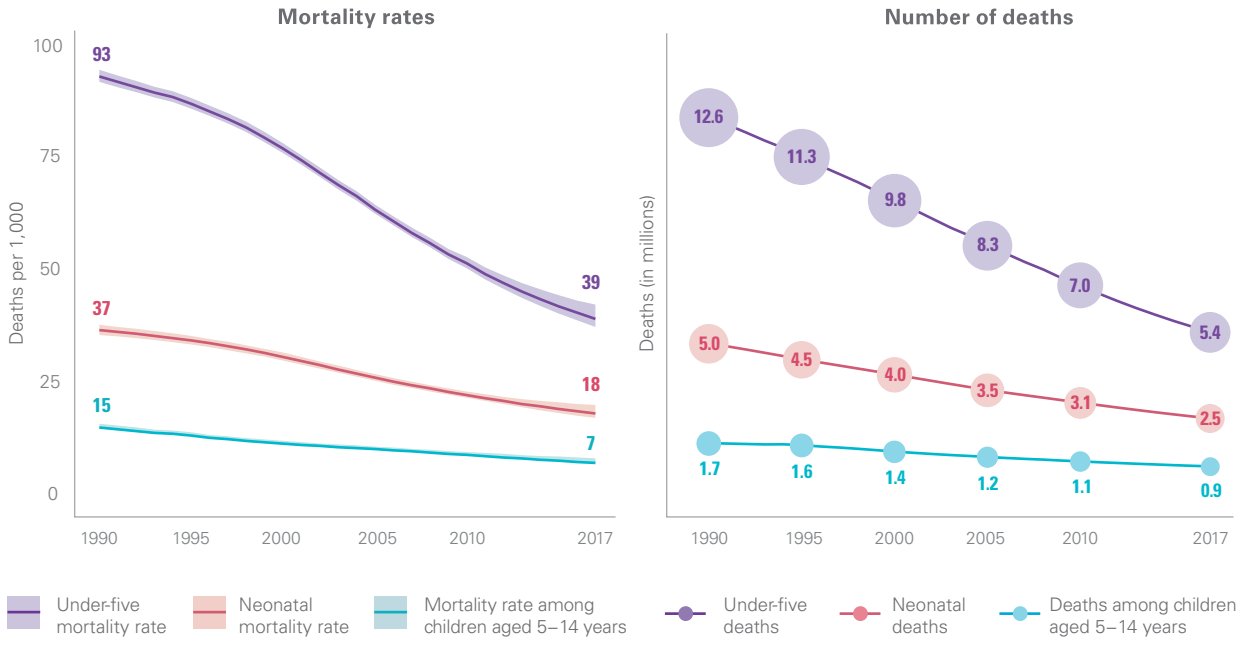


FIGURE 2

The risk of dying is highest in the first month of life

Global mortality rates and deaths by age, 2017

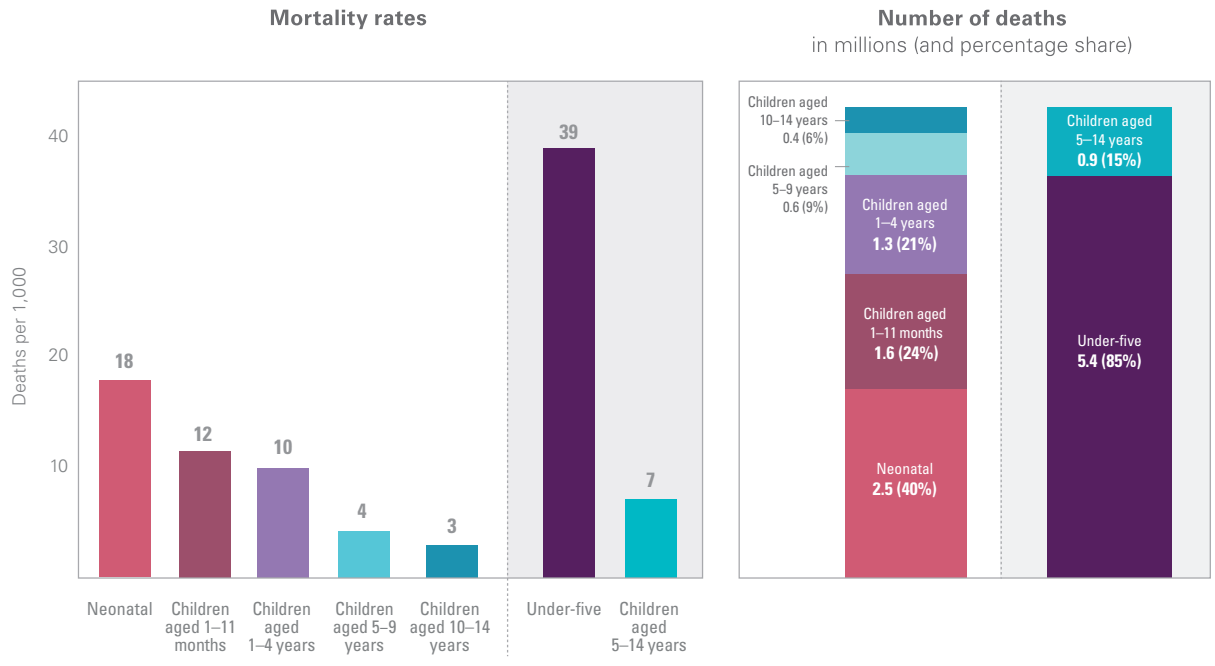


TABLE 1 **Levels and trends in the under-five mortality rate, by Sustainable Development Goal region, 1990-2017**

	Under-five mortality rate (deaths per 1,000 live births)							Decline (per cent)	Annual rate of reduction (per cent)		
Region	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2017**	**1990-2017**	**1990-2017**	**1990-2000**	**2000-2017**
Sub-Saharan Africa	182	174	156	128	102	82	76	58	3.2	1.6	4.2
Northern Africa and Western Asia	75	62	51	41	33	29	27	64	3.7	3.9	3.7
Northern Africa	84	71	60	49	39	33	31	63	3.6	3.4	3.8
Western Asia	65	54	43	34	27	24	23	65	3.9	4.2	3.7
Central and Southern Asia	124	108	91	75	60	47	43	65	3.9	3.1	4.4
Central Asia	72	73	63	47	35	26	23	68	4.2	1.4	5.8
Southern Asia	126	109	92	76	61	48	44	65	3.9	3.2	4.4
Eastern and South-Eastern Asia	57	49	40	29	22	17	16	73	4.8	3.6	5.5
Eastern Asia	51	45	34	23	15	10	9	82	6.4	3.9	7.9
South-Eastern Asia	72	59	49	40	33	28	26	64	3.8	3.9	3.7
Latin America and the Caribbean	55	43	33	26	24	18	18	68	4.2	5.1	3.7
Oceania	35	33	33	32	28	24	23	36	1.6	0.5	2.3
Australia and New Zealand	10	7	6	6	5	4	4	60	3.4	4.1	3.1
Oceania (exc. Australia and New Zealand)	74	69	66	64	58	51	48	35	1.6	1.0	2.0
Europe and Northern America	14	12	10	8	7	6	6	59	3.3	3.8	3.1
Europe	15	13	10	8	7	6	5	66	4.0	3.9	4.0
Northern America	11	9	8	8	7	7	7	41	1.9	2.8	1.4
Landlocked developing countries	168	157	139	110	85	66	61	64	3.8	1.9	4.8
Least developed countries	176	159	137	111	90	71	66	62	3.6	2.4	4.3
Small island developing States	79	70	62	56	80	45	42	46	2.3	2.4	2.2
World	**93**	**87**	**77**	**64**	**52**	**42**	**39**	**58**	**3.2**	**1.9**	**4.0**

Note: All calculations are based on unrounded numbers.

Still, children face widespread regional and income disparities in their chances of survival. Sub-Saharan Africa continues to be the region with the highest under-five mortality rate in the world – 76 deaths per 1,000 live births in 2017. This translates to 1 child in 13 dying before his or her fifth birthday – 14 times higher than the average ratio of 1 in 185 in high-income countries and 20 times higher than the ratio of 1 in 263 in the region of Australia and New Zealand. At the country level, the under-five mortality rates in 2017 ranged from 2 deaths per 1,000 live births to 127 (Map 1) – the risk of dying for a child born in the highest mortality country was about 60 times higher than in the lowest mortality country. All six countries with mortality rates above 100 deaths per 1,000 live births were in sub-Saharan Africa.

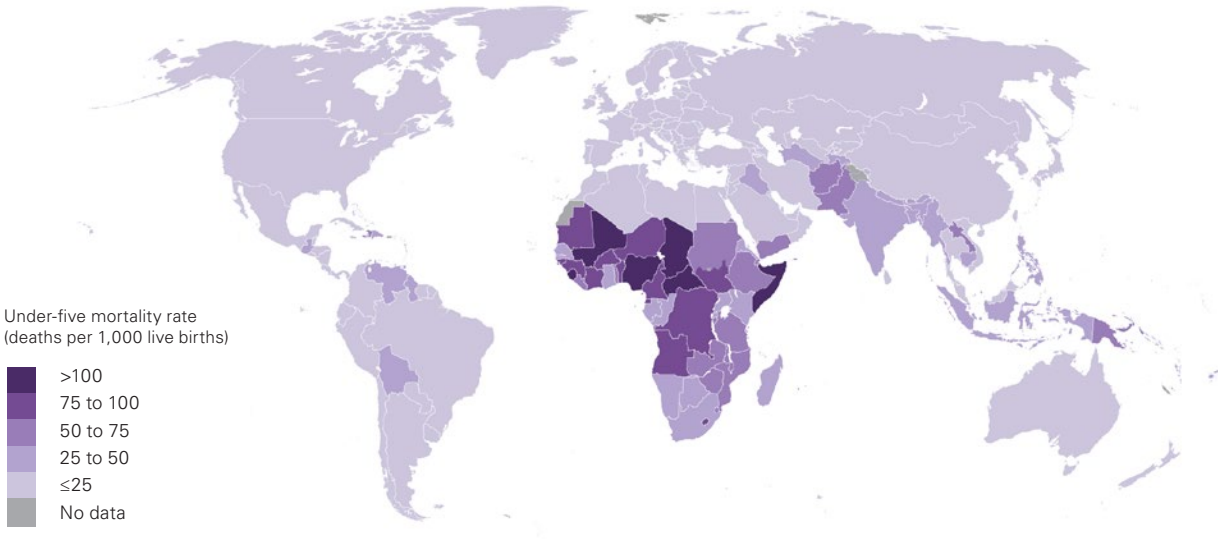
Continued preventive and curative lifesaving interventions need to be provided to children beyond the neonatal period, particularly in low-income countries, where the mortality rates for children aged 1–4 remain high. Worldwide, children aged 1–4 accounted for 25 per cent of the 5.4 million under-five deaths in 2017, children aged 1–11 months accounted for 29 per cent and neonates for 47 per cent. In high-income countries, where the average under-five mortality rate is low (5.4 deaths per 1,000 live births), children aged 1–4 years accounted for just 15 per cent of all under-five deaths in 2017. In low-income countries, with an average under-five mortality rate of 69 deaths per 1,000 live births, children aged 1–4 accounted for 29 per cent of all under-five deaths.

With shifting demographics, the burden of child deaths is heaviest in sub-Saharan Africa. The burden of child deaths varies geographically, with most deaths taking place in just two regions. In 2017, half of the deaths among children under age 5 occurred in sub-Saharan Africa, and another 30 per cent occurred in Southern Asia.

MAP 1

Children in sub-Saharan Africa and Southern Asia face a higher risk of dying before their fifth birthday

Under-five mortality rate (deaths per 1,000 live births) by country, 2017



Note: The classification is based on unrounded numbers. This map does not reflect a position by UN IGME agencies on the legal status of any country or territory or the delimitation of any frontiers.

More than a third (38 per cent) of all under-five deaths occur in the least developed countries. Due to growing child populations and a shift of the population distribution towards high-mortality regions, the share of global under-five deaths that occur in sub-Saharan Africa increased from 30 per cent in 1990 to 50 per cent in 2017 (Table 2) and is expected to increase even further in the next few decades. By 2050, an estimated 60 per cent of under-five deaths will take place in sub-Saharan Africa.

The number of countries with gender disparities in child mortality continues to decline. On average boys are expected to have a higher probability of dying before reaching age 5 than girls. The estimated under-five mortality rate in 2017 was 41 deaths per 1,000 live births for boys and 37 for girls. In 2017, an estimated 2.9 million boys and 2.5 million girls under 5 years of age died. In some countries, the risk of dying before age 5 for girls is significantly higher than what would be expected based on global patterns. These countries are primarily located in Southern Asia and Western Asia. The number of countries showing these gender disparities fell by more than half between 1990 and 2017, from 19 to 9.

Children are dying because of who they are and the environments into which they were born – whether they be impoverished families or marginalized communities. A recent analysis showed that children in the poorest households are nearly twice as likely to die before the age of 5 as those from the richest.[6] The risk of death before age 5 for children in rural areas is 1.5 times higher than for children in urban areas,[7] and within urban areas children from poorer households tend to have higher mortality rates.[8] Children of mothers who lack any education are 2.6 times more likely to die before reaching age 5 compared to children of mothers with a secondary or higher education.[9] Poor air quality is an important risk factor for child mortality; recent research highlighted that exposure to air pollution leads to higher mortality levels among children under age 1 particularly in certain regions like sub-Saharan Africa.[10]

Eliminating disparities between countries would save millions of lives. In 2017 alone, some 4.4 million deaths could have been averted had under-five mortality in each country been as low as in the lowest mortality country in the SDG region; the total number of under-five

deaths would have been reduced to 1 million. Closing the gap between all countries would have produced even starker results: if all countries had reached an under-five mortality rate as low as the lowest country rate in the world – 2.1 deaths per 1,000 live births – 95 per cent of under-five deaths would have been averted, and the lives of over 5 million children could have been saved in 2017 alone (Figure 5).

In more than a quarter of all countries, urgent action is needed to accelerate reductions in child mortality to reach the SDG targets on child survival. Of 195 countries analyzed in this report, 118 already met the SDG target on under-five mortality, and 26 countries are expected to meet the target by 2030, if current trends continue.[11] Efforts to accelerate progress need to be scaled up in the remaining 51 countries, two-thirds of which are located in sub-Saharan Africa, in order to reach the SDG target by 2030. Among them, 30 countries will need to more than double their current rate of reduction to achieve the SDG target on time. In countries that already achieved the SDG target, efforts to reduce inequity in mortality within country should be intensified.

Accelerating progress to achieve the SDG target by 2030 in countries that are falling behind would mean averting almost 10 million under-five deaths compared with the current scenario. On current trends[11], about 56 million children under 5 years of age will die between 2018 and 2030, half of them newborns. More than half of these 56 million deaths will occur in sub-Saharan Africa and approximately 30 per cent in Southern Asia. Meeting the SDG target in the 50 some countries in which acceleration is required would reduce the number of under-five deaths by almost 10 million between 2018 and 2030. Concerted and urgent action is needed in the countries that are falling behind.

Neonatal mortality

The first month is the most crucial period for child survival. Globally, an estimated 2.5 million newborns died in the first month of life in 2017 – approximately 7,000 every day – most of whom died in the first week after birth. About 36 per cent died the same day they were born, and close to three-quarters of all newborn deaths in 2017 occurred in the first week of life.[12] The global neonatal mortality rate fell from 37 (36, 38) deaths per 1,000 live births in 1990 to 18 (17, 20) in 2017. Among the regions, the largest declines since 1990 occurred in Eastern Asia with an 84 per cent reduction followed by Europe with a 64 per cent reduction.

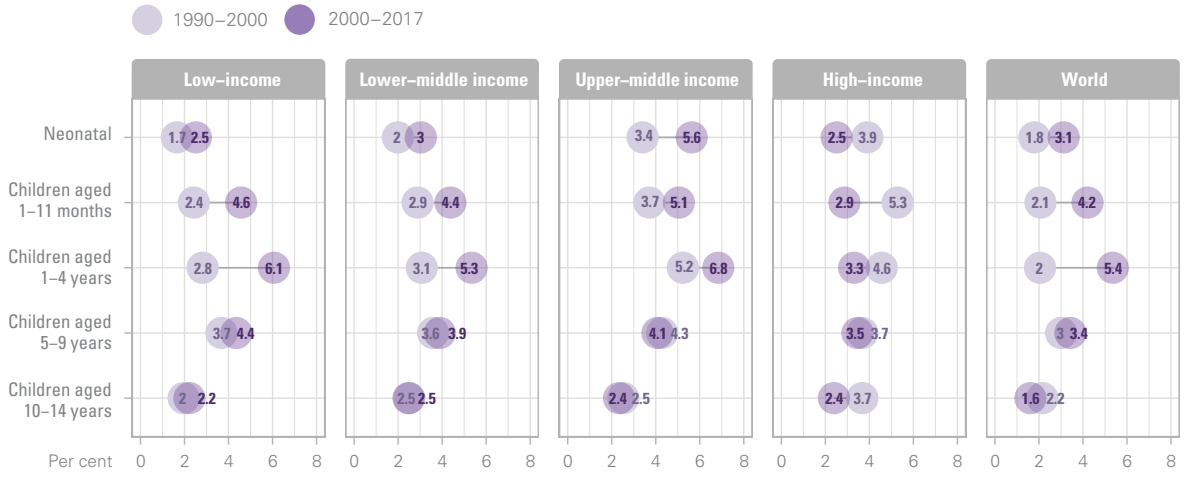
Neonatal mortality declined globally and in all regions but more slowly than mortality among children aged 1–11 months or children aged 1–4 years in most cases. Globally, the neonatal mortality rate fell by 51 per cent from 1990 to 2017 (Table 3), a smaller reduction in mortality than among children aged 1–59 months (63 per cent).

Despite declining neonatal mortality levels, marked disparities in neonatal mortality exist across regions and countries. Among the SDG regions, sub-Saharan Africa had the highest neonatal mortality rate in 2017 at 27 deaths per

FIGURE 3

Progress in reducing mortality accelerated, particularly for children aged 1–4 years

Annual rate of reduction in mortality rate by age group and income, from 1990 to 2000 and 2000 to 2017



Note: All calculations are based on unrounded numbers.

TABLE 2

Levels and trends in the number of deaths of children under age 5, by Sustainable Development Goal region, 1990-2017

	Number of under-five deaths (thousands)							Decline (per cent)	Share of global under-five deaths (per cent)		
Region	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2017**	**1990-2017**	**1990**	**2000**	**2017**
Sub-Saharan Africa	3,782	4,024	4,006	3,657	3,228	2,838	2,715	28	30.1	40.8	50.1
Northern Africa and Western Asia	689	569	463	391	351	324	308	55	5.5	4.7	5.7
Northern Africa	388	314	256	223	207	191	180	54	3.1	2.6	3.3
Western Asia	301	254	207	167	143	133	128	57	2.4	2.1	2.4
Central and Southern Asia	4,951	4,327	3,646	2,993	2,374	1,821	1,648	67	39.3	37.1	30.4
Central Asia	113	104	77	59	51	41	37	68	0.9	0.8	0.7
Southern Asia	4,838	4,223	3,570	2,934	2,323	1,780	1,612	67	38.5	36.3	29.8
Eastern and South-Eastern Asia	2,304	1,681	1,196	875	672	523	472	79	18.3	12.2	8.7
Eastern Asia	1,442	999	644	413	286	198	168	88	11.5	6.6	3.1
South-Eastern Asia	862	682	552	462	386	325	305	65	6.9	5.6	5.6
Latin America and the Caribbean	647	507	382	287	266	197	188	71	5.1	3.9	3.5
Oceania	18	18	18	18	17	15	15	18	0.1	0.2	0.3
Australia and New Zealand	3	2	2	2	2	2	1	52	0.0	0.0	0.0
Oceania (exc. Australia and New Zealand)	15	15	16	16	16	14	13	11	0.1	0.2	0.2
Europe and Northern America	191	144	112	96	85	75	71	63	1.5	1.1	1.3
Europe	144	104	76	62	53	45	42	71	1.1	0.8	0.8
Northern America	47	40	35	35	32	29	29	39	0.4	0.4	0.5
Landlocked developing countries	1,765	1,782	1,675	1,433	1,199	1,002	945	46	14.0	17.0	17.4
Least developed countries	3,658	3,616	3,398	2,952	2,554	2,170	2,067	43	29.1	34.6	38.2
Small island developing States	94	84	74	67	97	54	51	45	0.7	0.8	1.0
World	**12,582**	**11,269**	**9,823**	**8,317**	**6,992**	**5,793**	**5,417**	**57**	**100.0**	**100.0**	**100.0**

Note: All calculations are based on unrounded numbers.

1,000 live births, followed by Southern Asia with 26 deaths per 1,000 live births. A child born in sub-Saharan Africa or in Southern Asia is nine times more likely to die in the first month than a child in a high-income country. Across countries, neonatal mortality rates ranged from 1 death per 1,000 live births to 44 deaths (Map 2). The risk of dying for a newborn in the first month of life is about 50 times larger in the highest mortality country than in the lowest mortality country. The burden of neonatal deaths is also unevenly distributed across regions and countries. Two regions account for almost 80 per cent of the newborn deaths in 2017; sub-Saharan Africa accounted for 39 per cent of all such deaths and Southern Asia accounted for 38 per cent (Table 4).

The burden of newborn deaths stagnated in sub-Saharan Africa. Despite the modest 41 per cent decline in the neonatal mortality rate from 2000 to 2017 in sub-Saharan Africa, the number of neonatal deaths stagnated around 1 million deaths per year due to an increasing number of births (Table 4). In 23 countries in sub-Saharan Africa, the number of neonatal deaths did not decline from 1990 to 2017 even though the rates of neonatal mortality fell over the same period.

Demographic risk factors are associated with decreased chances of newborn survival. Children born to the youngest mothers are at the greatest risk of death in the first weeks of life – newborns whose mothers are less than 20 years old are about 1.5 times more likely to die in their first month of life compared to children of 20–29 year-old mothers.[13] Likewise, children born less than two years after their mother's previous birth are 2.7 times more likely to die within the first 28 days of life than children born four or more years after their mother's previous birth.[14]

TABLE 3 **Levels and trends in the neonatal mortality rate, by Sustainable Development Goal region, 1990-2017**

	Neonatal mortality rate (deaths per 1,000 live births)							Decline (per cent)	Annual rate of reduction (per cent)		
Region	1990	1995	2000	2005	2010	2015	2017	1990-2017	1990-2017	1990-2000	2000-2017
Sub-Saharan Africa	46	44	41	36	32	28	27	41	1.9	1.2	2.4
Northern Africa and Western Asia	31	27	23	20	17	15	14	54	2.9	2.8	2.9
Northern Africa	33	29	26	23	20	17	16	51	2.6	2.3	2.8
Western Asia	28	24	20	17	14	13	12	58	3.2	3.3	3.1
Central and Southern Asia	56	51	45	38	33	28	26	54	2.9	2.2	3.3
Central Asia	28	29	27	22	18	13	12	59	3.3	0.6	4.9
Southern Asia	57	52	46	39	34	28	26	54	2.9	2.2	3.3
Eastern and South-Eastern Asia	28	24	20	15	11	8	8	72	4.7	3.2	5.6
Eastern Asia	28	25	20	13	8	5	5	84	6.7	3.4	8.7
South-Eastern Asia	28	24	21	18	16	14	13	54	2.8	2.8	2.9
Latin America and the Caribbean	23	19	16	13	11	10	10	58	3.2	3.6	2.9
Oceania	14	13	14	13	12	11	10	24	1.0	0.0	1.6
Australia and New Zealand	5	4	4	3	3	2	2	50	2.6	2.7	2.5
Oceania (exc. Australia and New Zealand)	27	26	26	25	24	22	21	22	0.9	0.5	1.2
Europe and Northern America	7	6	5	4	4	3	3	58	3.2	3.4	3.0
Europe	8	7	6	4	4	3	3	64	3.8	3.7	3.8
Northern America	6	5	5	5	4	4	4	36	1.6	2.2	1.3
Landlocked developing countries	48	45	42	36	31	27	25	47	2.3	1.4	2.9
Least developed countries	52	47	42	37	32	28	26	50	2.5	2.2	2.7
Small island developing States	27	25	23	23	22	20	20	27	1.1	1.3	1.0
World	**37**	**34**	**31**	**26**	**22**	**19**	**18**	**51**	**2.6**	**1.8**	**3.1**

Note: All calculations are based on unrounded numbers.

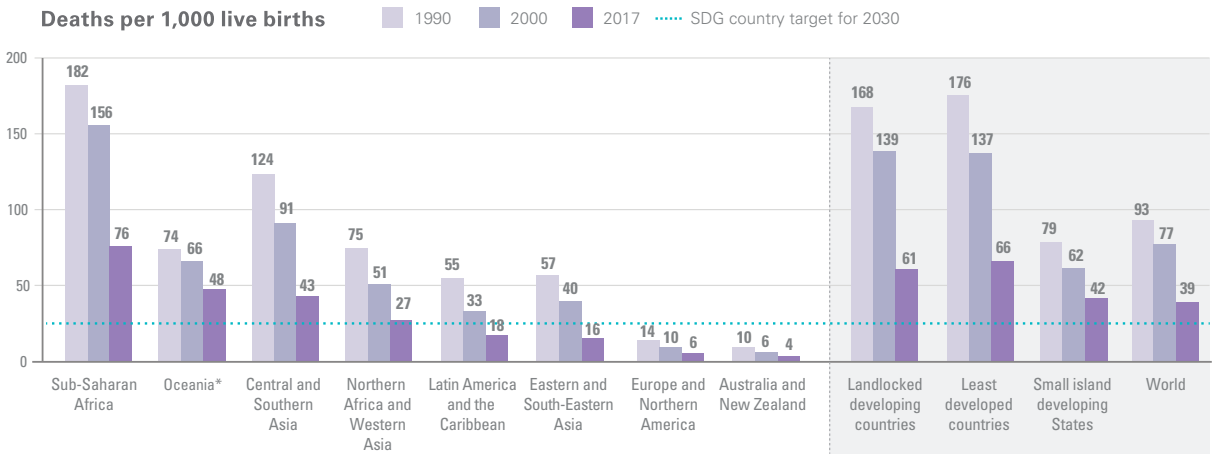
Lower under-five mortality is associated with a higher concentration of under-five deaths occurring during the neonatal period. Globally, neonatal deaths accounted for 47 per cent of all under-five deaths, up from 40 per cent in 1990. The share of neonatal deaths among under-five deaths was relatively low in sub-Saharan Africa (37 per cent), which remains the region with the highest under-five mortality rates. In the region of Europe, which had one of the lowest regional under-five mortality rates, 54 per cent of all under-five deaths occurred during the neonatal period. An exception is Southern Asia, where the proportion of neonatal deaths was among the highest (60 per cent) despite a relatively high under-five mortality rate (Table 4).

More countries will miss the SDG target on neonatal mortality than on under-five mortality, if current trends continue. On current trends, more than 60 countries will miss the target for neonatal mortality by 2030, while 51 countries will miss the target for under-five mortality. Accelerating progress in these 60 some countries to achieve the SDG target on neonatal mortality would save the lives of 5 million newborns from 2018 to 2030. Based on current trends, 28 million newborns would die between 2018 and 2030, and 80 per cent of these deaths would occur in Southern Asia and sub-Saharan Africa.

FIGURE 4

Under-five mortality declined in all regions between 1990 and 2017

Under-five mortality rate by Sustainable Development Goal region, 1990, 2000 and 2017

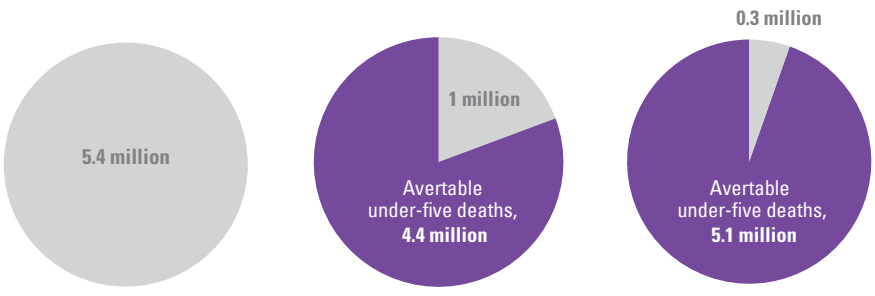


Note: Oceania* refers to Oceania excluding Australia and New Zealand. The figures are based on unrounded numbers.

FIGURE 5

Millions of child deaths could be averted if regional and country disparities in child survival were eliminated

Under-five deaths under different scenarios for 2017

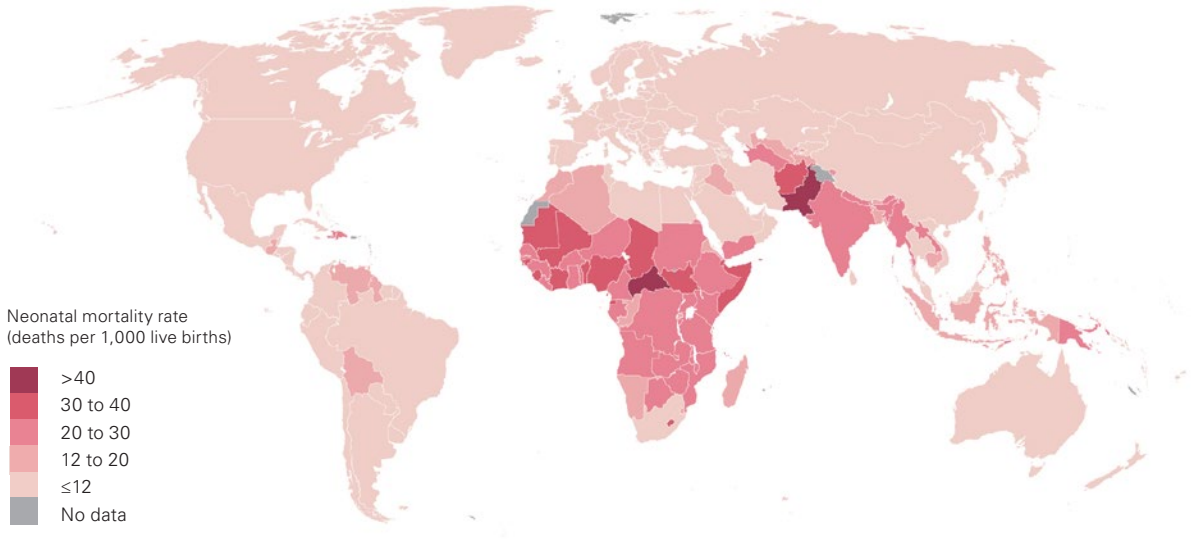


Note: Under the regional equity scenario, the number of under-five deaths was calculated by setting each country's under-five mortality rate to the lowest country mortality rate within the respective region for 2017. Under the global equity scenario, the number of under-five deaths was calculated by setting each country's under-five mortality rate to the lowest country mortality rate in the world for 2017 (2.1 deaths per 1,000 live births). Both scenarios are compared to the prevailing number of under-five deaths in 2017. The lowest mortality rate was selected from countries with more than 1,000 live births in 2017.

MAP 2

Large disparities in the level of neonatal mortality persist across regions and countries

Neonatal mortality rate (deaths per 1,000 live births) in 2017, by country



Note: The classification is based on unrounded numbers. This map does not reflect a position by UN IGME agencies on the legal status of any country or territory or the delimitation of any frontiers.

TABLE 4

Levels and trends in the number of neonatal deaths, by Sustainable Development Goal region, 1990-2017

	Number of neonatal deaths (thousands)							Decline (per cent)	Neonatal deaths as a share of under-five deaths (per cent)		
Region	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2017**	**1990-2017**	**1990**	**2000**	**2017**
Sub-Saharan Africa	997	1,066	1,100	1,084	1,056	1,015	999	0	26	27	37
Northern Africa and Western Asia	287	245	215	195	184	171	161	44	42	46	52
Northern Africa	155	130	115	109	107	100	94	39	40	45	52
Western Asia	132	114	99	86	76	71	67	49	44	48	53
Central and Southern Asia	2,276	2,082	1,828	1,554	1,310	1,071	991	56	46	50	60
Central Asia	44	40	32	28	27	20	18	59	39	42	50
Southern Asia	2,232	2,041	1,796	1,526	1,283	1,051	973	56	46	50	60
Eastern and South-Eastern Asia	1,105	805	603	450	338	259	234	79	48	50	50
Eastern Asia	772	525	364	238	153	100	84	89	54	57	50
South-Eastern Asia	333	280	239	213	185	159	150	55	39	43	49
Latin America and the Caribbean	268	228	183	142	120	106	103	62	42	48	55
Oceania	7	7	7	8	7	7	7	3	39	41	46
Australia and New Zealand	1	1	1	1	1	1	1	40	48	55	60
Oceania (exc. Australia and New Zealand)	6	6	6	7	6	6	6	-6	38	40	45
Europe and Northern America	98	75	60	53	45	41	39	61	51	54	55
Europe	73	54	41	33	28	24	22	69	51	53	54
Northern America	24	21	20	20	18	17	16	34	52	55	56
Landlocked developing countries	527	533	522	493	460	417	403	23	30	31	43
Least developed countries	1,129	1,109	1,076	1,008	930	860	838	26	31	32	41
Small island developing States	32	30	28	28	27	25	24	26	35	38	47
World	**5,038**	**4,507**	**3,997**	**3,486**	**3,061**	**2,670**	**2,533**	**50**	**40**	**41**	**47**

Note: All calculations are based on unrounded numbers.

Mortality among children aged 5–14

Mortality among children aged 5–14 is relatively low compared to mortality levels of children under age 5. The probability of dying among children aged 5–14 was 7.2 (6.9, 8.0) deaths per 1,000 children aged 5 in 2017 – roughly 18 per cent of the under-five mortality rate in 2017, even though the exposure to the risk of dying is twice as long in the age group 5–14. Still, an estimated 0.9 (0.9, 1.0) million children aged 5–14 died in 2017 – about 2,500 deaths of children aged 5–14 every day.

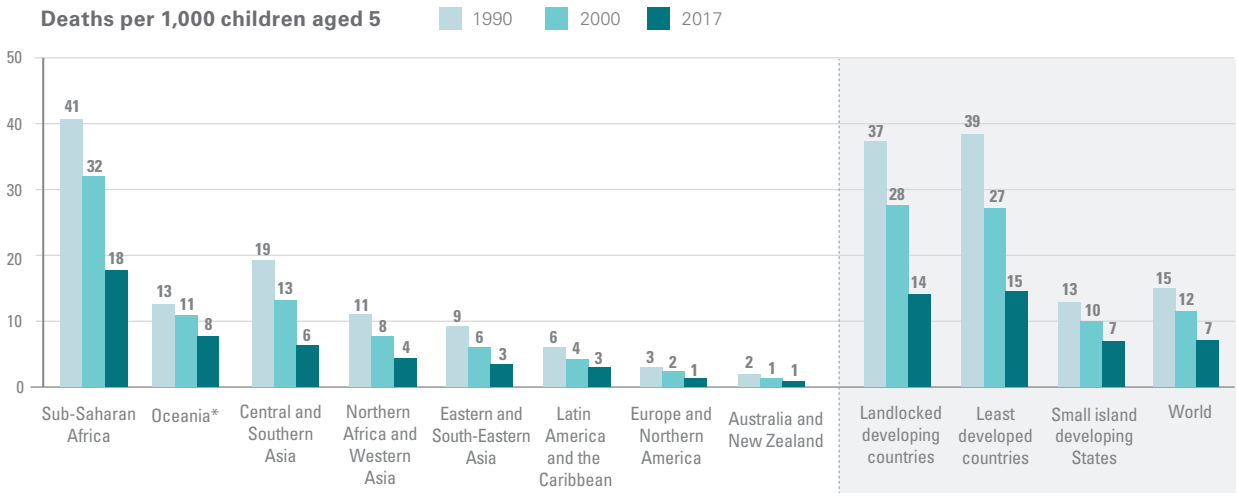
Globally, deaths among children aged 5–9 accounted for 61 per cent of all deaths of children aged 5–14, although the population aged 5–9 represented only 51 per cent of the population aged 5–14. This is because the mortality rate is generally higher among children aged 5–9 than those aged 10–14, except in low-mortality countries. In low-income countries, with an average mortality rate among children aged 5–14 of 16.5 deaths per 1,000 children aged 5, one third of deaths happened in the 10–14 age group, while in high-income countries, with an average rate of 1.1 deaths, more than half of the deaths among 5–14 year-olds occurred at the ages 10–14.

The world has halved the mortality rate among children aged 5–14 since 1990. From 1990 to 2017, the mortality rate in older children declined by 52 per cent, and the number of deaths dropped by 45 per cent from 1.7 (1.7, 1.8) million to 0.9 (0.9, 1.0) million. Most of the regions reduced the probability of dying among children aged 5–14 by at least half from 1990 to 2017 (Table 5 and Figure 6). Unlike under-five mortality, progress in reducing mortality in this age group was not significantly accelerated after the year 2000. At the global level, the average annual rate of reduction was 2.7 per cent from 1990 to 2000 and 2.8 per cent from 2000 to 2017.

FIGURE 6

Mortality among children aged 5–14 declined in all regions between 1990 and 2017

Probability of dying at age 5–14 years by Sustainable Development Goal region, 1990, 2000 and 2017



Note: Oceania* refers to Oceania excluding Australia and New Zealand. The figures are based on unrounded numbers.

TABLE 5

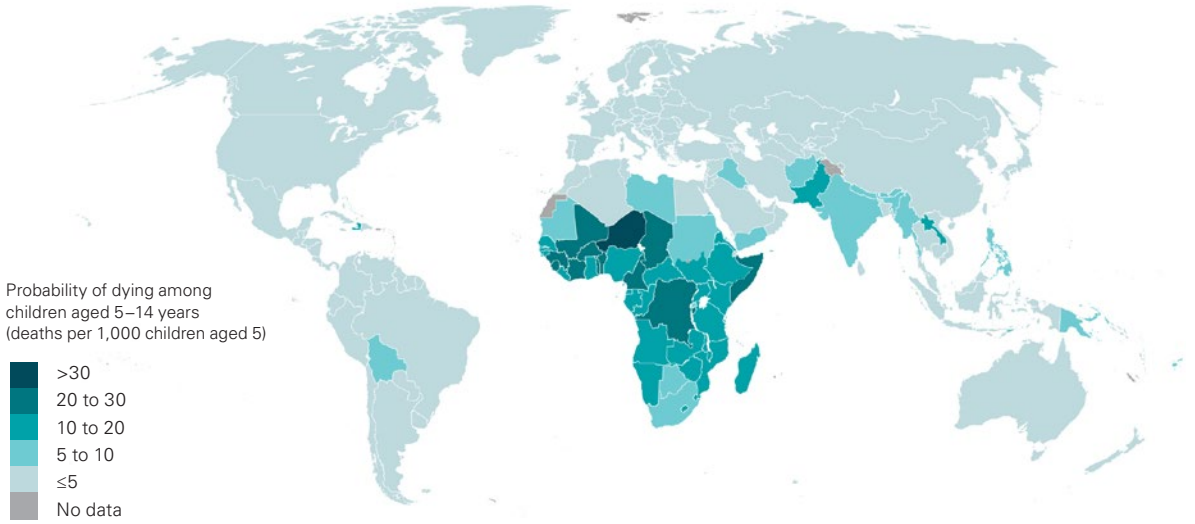
Levels and trends in mortality among children aged 5–14 (probability of dying) and the number of deaths, by Sustainable Development Goal region, 1990–2017

	Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)					Decline (per cent)	Annual rate of reduction (per cent)	Number of deaths among children aged 5–14 (thousands)				
Region	**1990**	**2000**	**2010**	**2015**	**2017**	**1990-2017**	**1990-2017**	**1990**	**2000**	**2010**	**2015**	**2017**
Sub-Saharan Africa	41	32	23	19	18	56	3.1	587	583	532	506	499
Northern Africa and Western Asia	11	8	5	5	4	60	3.4	84	67	48	46	44
Northern Africa	13	9	6	6	5	60	3.4	49	38	27	25	24
Western Asia	9	7	5	4	4	58	3.2	35	29	21	21	19
Central and Southern Asia	19	13	9	7	6	67	4.1	607	468	329	260	237
Central Asia	7	6	4	4	3	49	2.5	8	7	4	4	4
Southern Asia	20	13	9	7	6	68	4.2	599	461	324	255	233
Eastern and South-Eastern Asia	9	6	4	4	3	63	3.7	317	222	124	105	100
Eastern Asia	7	5	3	2	2	67	4.1	162	114	51	43	41
South-Eastern Asia	14	10	7	6	5	63	3.7	155	108	73	62	58
Latin America and the Caribbean	6	4	4	3	3	50	2.6	63	48	42	34	32
Oceania	6	5	4	4	4	37	1.7	3	3	2	2	2
Australia and New Zealand	2	1	1	1	1	55	3.0	1	0	0	0	0
Oceania (exc. Australia and New Zealand)	13	11	9	8	8	38	1.8	2	2	2	2	2
Europe and Northern America	3	2	2	1	1	57	3.1	42	32	18	16	16
Europe	3	3	2	1	1	64	3.7	32	23	12	10	10
Northern America	2	2	1	1	1	46	2.3	9	8	6	6	6
Landlocked developing countries	37	28	19	15	14	62	3.6	278	258	207	186	181
Least developed countries	39	27	19	16	15	62	3.6	567	501	428	386	375
Small island developing States	13	10	11	7	7	47	2.3	13	11	12	8	8
World	**15**	**12**	**9**	**8**	**7**	**52**	**2.7**	**1,702**	**1,422**	**1,095**	**969**	**929**

Note: All calculations are based on unrounded numbers.

MAP 3 **Countries with the highest mortality among children aged 5–14 are concentrated in sub-Saharan Africa**

Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5) in 2017, by country



Note: The classification is based on unrounded numbers. This map does not reflect a position by UN IGME agencies on the legal status of any country or territory or the delimitation of any frontiers.

Survival chances for children and young adolescents are not the same across regions and countries. In sub-Saharan Africa, the probability of dying among children aged 5–14 in 2017 was 18 deaths per 1,000 children aged 5, followed by Oceania – excluding Australia and New Zealand – with 8 deaths and Southern Asia with 6. More than half (54 per cent) of deaths to children aged 5–14 occurred in sub-Saharan Africa, followed by Southern Asia with about 25 per cent. The average risk of dying between the fifth and fifteenth birthdays was 15 times higher in sub-Saharan Africa than in Europe. At the country level, mortality ranged from 0.5 to 39 deaths per 1,000 children aged 5. The higher mortality countries are concentrated in sub-Saharan Africa (Map 3) and all 13 countries with a mortality rate for children aged 5–14 above 20 deaths per 1,000 children aged 5 were in sub-Saharan Africa.

Injuries become more prominent as a cause of death as children get older and mortality levels decline. Among children aged 5–9 years and young adolescents aged 10–14 years, communicable diseases are a less prominent cause of death than among children under age 5, while other causes become important. For instance, injuries account for about 30 per cent of the deaths among these age groups, non-communicable diseases for about a fifth and infectious diseases and other communicable diseases, perinatal and nutritional causes for about half of the deaths.[3] Drowning and road injuries alone account for 14 per cent of all deaths in this age group. In sub-Saharan Africa, communicable diseases and perinatal and nutritional causes still account for almost two-thirds of all deaths of children aged 5–14, while they account for less than 8 per cent in Europe and Northern America.

Conclusion

Improving the survival chances of newborns, children and young adolescents remains an urgent challenge. On current trends, 56 million children under age 5 will die from 2018 to 2030, half of them newborns. Without intensified commitment to newborn and child survival, many countries will not be able to meet the SDG goal to end preventable child deaths — if current trends were to continue, about half of the countries that would not achieve the SDG targets on child mortality by 2030 would only achieve the targets after 2050. Accelerating progress in the 50 some countries at risk of falling short of the SDG mortality target on under-five mortality could save the lives of 10 million children. However, progress should not end with achieving the SDG targets at country levels. Millions more children's lives could be saved if every country achieved the lowest mortality rate in their respective region.

Particular attention should be given to countries in sub-Saharan Africa and Southern Asia. These two regions are home to the highest-mortality countries in the world and 80 per cent of global child and young adolescent deaths. Sub-Saharan Africa remains the region with the highest mortality rate in the world; given the expected growth in the child population of this region, the number of under-five deaths in the region may increase or remain unchanged if the decline in mortality rates does not outpace the increase in births.

To achieve sustainable and equitable progress towards 2030 and beyond, disparities in child survival within countries must also be addressed. Analysis of household survey data indicates that a mother's level of education has a powerful influence on the likelihood of her child dying; children born to mothers with no education are about 2.6 times more likely to die before their fifth birthday than those born to mothers who have completed secondary education. Likewise, a rural-urban divide and disparity in household wealth contribute to inequitable child mortality outcomes within countries. Children in rural areas are about 1.5 times more likely to die before their fifth birthday than those in urban areas, while children from poorer households in low-and middle-income countries remain disproportionately vulnerable to early death – under-five mortality rates are, on average, twice as high for the poorest households compared to the richest. Concerted efforts, investments and innovative approaches are urgently needed to accelerate progress particularly in countries and communities that risk falling behind.

Ending preventable deaths of children worldwide will require targeted interventions to the age-specific causes of death among children and young adolescents. Three quarters of children and young adolescents aged 0–14 are dying from communicable, perinatal and nutritional conditions according to the latest Global Health Estimates from the World Health Organization (WHO).[3] Infectious diseases, which disproportionally effect children in poorer settings, remain highly prevalent particularly in sub-Saharan Africa. In 2016, globally the leading causes of death among children under age 5 included preterm birth complications (18 per cent), pneumonia (16 per cent), intrapartum-related events (12 per cent), congenital anomalies (9 per cent), diarrhoea (8 per cent), neonatal sepsis (7 per cent) and malaria (5 per cent)[15]; injuries play a more prominent role in the deaths of older children. Expanding prevention and treatment of these causes is critical to improving newborn, child and young adolescent survival. If interventions were scaled up and the quality of care increased, the lives of many more children could be saved.

The increasing share of under-five deaths occurring during the neonatal period, requires a greater focus on a healthy start to life. Deaths of newborns are the result of diseases and conditions that are associated with quality of care around the time of childbirth. Further reductions in neonatal

mortality will depend on strengthening health services, ensuring that every birth is attended by skilled personnel and making hospital care available in an emergency. Cost-effective interventions for newborn health should cover the antenatal period, the time around birth and the first week of life, as well as care for small and sick newborns.

Just as a scale-up in health interventions and care is essential to further combat child mortality, more investment is required to improve data collection and data quality to better monitor progress in child survival. Due to the limited availability of high-quality data in many low- and middle-income countries, the accurate measurement of levels and trends in child mortality remains a significant challenge. All children deserve to be counted, yet only around 70 per cent of the world's babies have a birth certificate[16] and most child deaths occur without registration. Improved monitoring of child mortality requires the development of complete and accurate civil registration systems in low- and middle-income countries, to gather accurate, timely, and disaggregated data that can inform evidence-based decision-making, programming and planning to the benefit of the world's children.

Country consultation

In accordance with the decision by the United Nations Statistical Commission and the United Nations Economic and Social Council resolution 2006/6, UN IGME child mortality estimates, which are used for the compilation of global indicators for SDG monitoring, are produced in consultation with countries.[17] UNICEF and WHO undertook joint country consultations in 2018. The country consultation process gave each country's Ministry of Health, National Statistics Office or relevant agency the opportunity to review all data inputs, the estimation methodology and the draft estimates for mortality among children under age 5 and mortality among children aged 5–14 for its country. The objective was to identify relevant data that were not included in the UN IGME database and to allow countries to review and provide feedback on estimates. In 2018, 113 of 195 countries sent comments or additional data. After the consultations, the UN IGME draft estimates for mortality among children under age 5 were revised for 81 countries using new data, and the estimates for mortality among children aged 5–14 were revised for 70 countries due to new data. All countries were informed about changes in their estimates.

Estimating child mortality

The United Nations Inter-agency Group for Child Mortality Estimation (UN IGME), which includes members from UNICEF, WHO, the World Bank Group and United Nations Population Division, was established in 2004 to advance the work on monitoring progress towards the achievement of child survival goals.

UN IGME's Technical Advisory Group (TAG), comprising leading academic scholars and independent experts in demography and biostatistics, provides guidance on estimation methods, technical issues and strategies for data analysis and data quality assessment.

UN IGME updates its neonatal, infant and under-five mortality estimates annually after reviewing newly available data and assessing data quality.

These estimates are widely used in UNICEF's flagship publications, the United Nations Secretary General's SDG report, and publications by other United Nations agencies, governments and donors.

Since 2017, UN IGME generates country-specific trend estimates of the mortality in children aged 5–14, that is, the probability that a child aged 5 dies before reaching his or her fifteenth birthday. These estimates are presented in this report.

In this chapter, we summarize the methods UN IGME uses to generate child mortality estimates for children under age 5 and children aged 5–14.

Overview

UN IGME follows the following broad strategy to arrive at annual estimates of child mortality:

1. Compile and assess the quality of all available nationally representative data relevant to the estimation of child mortality including data from vital registration systems, population censuses, household surveys and sample registration systems.

2. Assess data quality, recalculate data inputs and make adjustments if needed by applying standard methods.

3. Fit a statistical model to these data to generate a smooth trend curve that averages over possibly disparate estimates from the different data sources for a country.

4. Extrapolate the model to a target year, in this case 2017.

To increase the transparency of the estimation process, the UN IGME has developed a child mortality web portal, CME Info (www.childmortality.org). It includes all available data and shows estimates for each country as well as which data are currently officially used by UN IGME. Once the new estimates are finalized, CME Info will be updated to reflect all available data and the new estimates.

UN IGME estimates are based on nationally representative data from censuses, surveys or vital registration systems. UN IGME does not use any covariates to derive its estimates. It only applies a curve fitting method to good quality empirical data to derive trend estimates after data quality assessment. Countries often use a single source for their official estimates or apply different methods than UN IGME to derive official estimates. The differences between UN IGME estimates and national official estimates are usually not large if the empirical data are of good quality. UN IGME aims to minimize the errors for each estimate, harmonize trends over time, and produce up-to-date and properly assessed estimates of child mortality. In the absence of error-free data, there will always be uncertainty around data and estimates. To allow for added comparability, UN IGME generates such estimates with uncertainty bounds. Applying a consistent methodology also allows for comparisons between countries, despite the varied number and types of data sources. UN IGME applies a common methodology across countries and uses original empirical data from each country but does not report figures produced by individual countries using other methods, which would not be comparable to other country estimates.

Data Sources

Nationally representative estimates of under-five mortality can be derived from several different sources, including civil registration and sample surveys. Demographic surveillance sites and hospital data are excluded as they are rarely nationally representative. The preferred source of data is a civil registration system that records births and deaths on a continuous basis. If registration is complete and the system functions efficiently, the resulting estimates will be accurate and timely. However, many low- and middle-income countries do not have well-functioning vital registration (VR) systems, and household surveys, such as the UNICEF-supported Multiple Indicator Cluster Surveys (MICS), the USAID-supported Demographic and Health Surveys (DHS) and periodic population censuses have become the primary sources of data on mortality among children under age 5 and among children aged 5–14. These surveys ask women about the survival of their children, and it is these reports (or micro data upon availability) that provide the basis of child mortality estimates for a majority of low- and middle-income countries.

The first step in the process of arriving at estimates of levels and recent trends of child mortality is to compile all newly available data and add the data to the CME database. Newly available data will include newly released vital statistics from a civil registration system, results from recent censuses and household surveys and, occasionally, results from older censuses or surveys not previously available.

The full set of empirical data used in this analysis is publicly available from the UN IGME web portal, CME Info (www.childmortality.org).
In this round of estimation, a substantial amount of newly available data has been added to the underlying database for under-five, infant and neonatal mortality. Data from 59 new surveys or censuses were added for 44 countries and data from vital registration systems or sample vital registration systems were updated for 134 countries. In total, more than 6,700 country-year data points from 500 series were added or updated. The database, as of August 2018, contains over 18,000 country-year data points from more than 1,500 series across 195 countries from 1990 (or earlier, back to 1940) to 2017.
The increased empirical data have substantially changed the estimates generated by UN IGME for some countries from previous editions partly because the fitted trend line is based on the entire time series of data available for each country. The estimates presented in this report may differ from and are not necessarily comparable with previous sets of UN IGME estimates or the most recent underlying country data. For mortality among children aged 5–14 years, data were calculated from censuses and surveys, or vital registration records of population and deaths in the age group. The database for mortality among children aged 5–14 contains more than 5,600 data points.

Whatever the method used to derive the estimates, data quality is critical. UN IGME assesses data quality and does not include data sources with substantial non-sampling errors or omissions as underlying empirical data in its statistical model to derive UN IGME estimates.

Civil registration data

Data from civil registration systems are the preferred data source for child mortality estimation. The calculation of under-five mortality rates (U5MR), infant mortality rates (IMR) and mortality rates among children aged 5–14 years are derived from a standard period abridged life table using the age-specific deaths and mid-year population counts from civil registration data. The neonatal mortality rate (NMR) is calculated with the number of deaths of infants under one month of age and the number of live births in a given year. For civil registration data (with available data on the number of deaths and mid-year populations), initially annual observations were constructed for all observation years in a country. For country-years in which the coefficient of variation exceeded 10 per cent, deaths and mid-year populations were pooled over longer periods, starting from more recent years and combining those with adjacent previous years, to reduce spurious fluctuations in countries where small numbers of births and deaths were observed.

The coefficient of variation is defined to be the stochastic standard error of the ${}_5q_0$ (${}_5q_0$=U5MR/1,000) or ${}_1q_0$ (${}_1q_0$ =IMR/1,000) observation divided by the value of the ${}_5q_0$ or ${}_1q_0$ observation. The stochastic standard error of the observation is calculated using a Poisson approximation using live birth numbers, given by sqrt(${}_5q_0$/lb) (or sqrt(${}_1q_0$/lb), where ${}_5q_0$ is the under-five mortality rate (per 1 live birth) and lb is the number of live births in the year of the observation.[18] After this recalculation of the civil registration data, the standard errors are set to a minimum of 2.5 per cent for input into the model. A similar approach was used for neonatal mortality and mortality among children aged 5–14. In previous revisions, UN IGME had adjusted vital registration data for incompleteness in the reporting of early infant deaths in several European countries. For more details on the past adjustment see Notes.[19]

Survey data

The majority of survey data comes in one of two forms: the full birth history (FBH), whereby women are asked for the date of birth of each of their children, whether the child is still alive, and if not, the age at death; and the summary birth history (SBH), whereby women are asked only about the number of their children ever born and the number that have died (or equivalently the number still alive).

FBH data, collected by all Demographic and Health Surveys (DHS) and increasingly also Multiple Indicator Cluster Surveys (MICS), allow the calculation of child mortality indicators for specific time periods in the past. This allows DHS and MICS to publish under-five child mortality estimates for five 5-year periods before the survey, that is, 0 to 4, 5 to 9, 10 to 14, etc.[20-22] The UN IGME has recalculated estimates for calendar year periods, using single calendar years for periods shortly before the survey, and then gradually increasing the number of years for periods further in the past, whenever microdata from the survey is available. The cut-off points for a given survey for shifting from estimates for single calendar years to two years, or two years to three, etc., are based on the coefficients of variation (a measure of sampling uncertainty) of the estimates.[23]

Mortality estimates of children aged 5–14 can also be derived from the full birth history module, but the probability of dying in children aged 5 to 14 ($_{10}q_5$) is estimated for three 4-year reference periods prior to the survey (0–3 years prior to the survey, 4–7 years, and 8–11 years) to insure greater robustness of the estimates.

In general, SBH data, collected by censuses and many household surveys, use the age of the woman as an indicator of the age of her children and their exposure time to the risk of dying, and employ models to estimate mortality indicators for periods in the past for women ages 25 to 29 through ages 45 to 49. This method is well known but has several shortcomings. Starting with the 2014 round of estimation, the UN IGME changed the method of estimation for summary birth histories to one based on classification of women by the time that has passed since their first birth. This method has several benefits over the previous one. First, it generally has lower sampling errors. Second, it avoids the problematic assumption that the estimates derived for each age group adequately represent the mortality of the whole population. As a result, it has less susceptibility to the selection effect of young women who give birth early, since all women who give birth necessarily must have a first birth and therefore are not selected for. Third, the method tends to show less fluctuation across time, particularly in countries with relatively low fertility and mortality. The UN IGME considers the improvements in the estimates based on time since first birth worthwhile when compared to the estimates derived from the classification by age of mother, hence in cases where the microdata are available, the UN IGME has reanalysed the data using the new method.

Moreover, following advice from the TAG of the UN IGME, child mortality estimates from SBH were not included if estimates from FBH in the same survey were available.[24] SBH data are not used to derive neonatal mortality or mortality among children aged 5–14.

Adjustment for missing mothers in high-HIV settings

In populations severely affected by HIV/AIDS, HIV-positive (HIV+) children will be more likely to die than other children and will also be less likely to be reported since their mothers will have been more likely to die also. Child mortality estimates will thus be biased downwards. The magnitude of the bias will depend on the extent to which the elevated under-five mortality of HIV+ children is not reported because of the deaths of their mothers. The TAG of the UN IGME developed a method to adjust HIV/AIDS-related mortality for each survey data observation from FBH during HIV/AIDS epidemics (1980-present) by adopting a set of simplified but reasonable assumptions about the distribution of births to HIV+ women, primarily relating to the duration of their infection, vertical transmission rates, and survival times of both mothers and children from the time of the birth.[25] This method was applied to all direct estimates from full birth histories. No adjustment was included for HIV-related biases in the age group 5–14, since no method currently exists to estimate the magnitude of this bias in the probability $_{10}q_5$.

Systematic and random measurement error

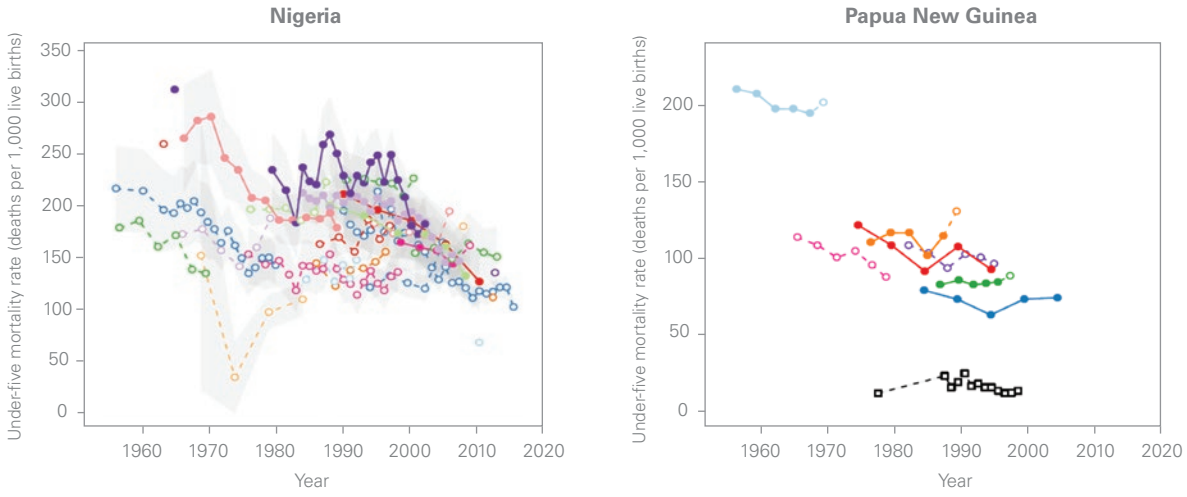
Data from these different sources require different calculation methods and may suffer from different errors, for example random errors in sample surveys or systematic errors due to misreporting. Thus, different surveys often yield widely different estimates of U5MR for a given time period as illustrated in Figure 7. In order to reconcile these differences and take better account of the systematic biases associated with the various types of data inputs, the TAG has developed an estimation method to fit a smoothed trend curve to a set of observations and to extrapolate that trend to a defined time point, in this case 2017. This method is described in the following section.

Estimation of under-five mortality rates

Estimation and projection of under-five mortality rates (U5MR) was undertaken using the Bayesian B-splines bias-adjusted model, referred to as the B3 model. This model was developed, validated, and used to produce previous rounds of the UN IGME child mortality estimates published in October 2017.[26]

In the B3 model, log(U5MR) is estimated with a flexible splines regression model. The spline regression model is fitted to all U5MR observations in the country. An observed value for U5MR is considered to be the true value for U5MR multiplied by an error factor, i.e. observed U5MR = true U5MR * error, or on the log-scale, log(observed U5MR) = log(true U5MR) + log(error), where error refers to the relative difference between an observation and the truth. While estimating the true U5MR, properties of the errors that provide information about the quality of the observation, or in other words, the extent of error that we expect, are taken into account. These properties include: the standard error of the observation, its source type (e.g. DHS versus census) and whether the observation is part of a data series from a specific survey (and how far the data series is from other series with overlapping observation periods). These properties are summarized in the so-called data model. When estimating the U5MR, the data model adjusts for the errors in the observations, including the average systematic biases associated with different types of data sources, using

FIGURE 7 **Empirical under-five mortality data in Nigeria and Papua New Guinea**



Note: All data available for the country are shown as coloured points, with observations from the same data series joined by lines, and each colour identifying different data sources. Grey bands in the left plot represent the standard errors of the observations where available or applicable. Series considered but not included in the statistical model due to substantial non-sampling errors or omission appear with dashed lines.

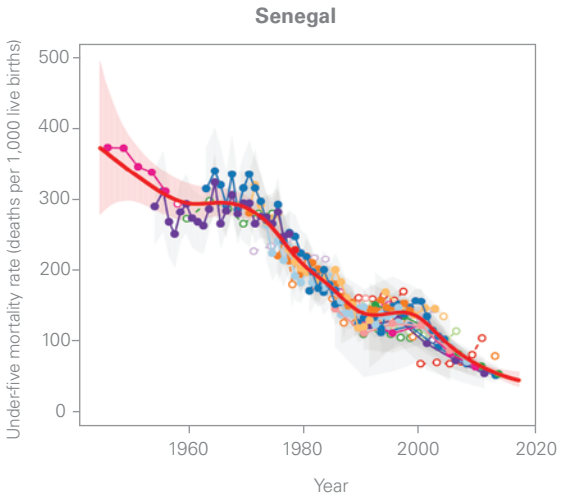
information on data quality for different source types from all countries.

Figure 8 displays the U5MR over time for Senegal, used here for illustrative purposes.

Compared with the previously applied Loess estimation approach, the B3 model better accounts for data errors, including biases and sampling and non-sampling errors in the data. It can better capture short-term fluctuations in the under-five mortality rate and its annual rate of reduction, and thus is better able to account for evidence of acceleration in the decline of under-five mortality from new data. Validation exercises show that the B3 model also performs better in short-term projections.

The B3 method was developed and implemented for the UN IGME by Leontine Alkema and Jin Rou New from the National University of Singapore with guidance and review by the TAG of the UN IGME. A more complete technical description of the B3 model is available elsewhere.[17]

FIGURE 8 **Empirical under-five mortality data and estimates from the B3 model for Senegal**



Note: The B3 estimates are in red. Ninety per cent uncertainty intervals for the U5MR are given by the pink bands. All data available for the country are shown as coloured points, with observations from the same data series joined by lines. Solid points and lines represent data series/observations that were included for curve-fitting. Grey bands in the left plot represent the standard errors of the observations where available or applicable.

Estimation of infant mortality rates

In general, the B3 model described above is applied to the U5MR for all countries (except for the Democratic People's Republic of Korea, where a nonstandard method was employed). For countries with high-quality VR data (covering a sufficient period of time and deemed to have high levels of completeness and coverage), the B3 model is also used, but is fitted to the logit transform of r, i.e. log(r/1-r), where r is the ratio of the IMR to the median B3 estimates of U5MR in the corresponding country-year. This is to restrict the IMR to be lower than the U5MR. For the remaining countries, the IMR is derived from the U5MR, through the use of model life tables that contain known regularities in age patterns of child mortality.[27] The advantage of this approach is that it avoids potential problems with the under-reporting of neonatal deaths in some countries and ensures that the internal relationships of the three indicators are consistent with established norms. For Sahelian countries (Burkina Faso, Chad, the Gambia, Mali, Mauritania, the Niger and Senegal), the relationship from model life tables does not apply between infant and child mortality, thus a logit transform of the ratio of IMR/U5MR is used to estimate IMR from U5MR using data from full birth histories and a multilevel regression with country-specific intercept.

Adjustment for rapidly changing child mortality driven by HIV/AIDS

To capture the extraordinarily rapid changes in child mortality driven by HIV/AIDS over the epidemic period in some countries, the regression models were fitted to data points for the U5MR from all causes other than HIV/AIDS, and then UNAIDS estimates of HIV/AIDS under-five mortality were added to estimates from the regression model. This method was used for 17 countries where the HIV prevalence rate exceeded 5 per cent at any point in time since 1980. Steps were as follows:

1. Compile and assess the quality of all newly available nationally representative data relevant to the estimation of child mortality.

2. Adjust survey data to account for possible biases in data collection and in HIV/AIDS epidemic.

3. Use UNAIDS estimates of HIV/AIDS child mortality[28] to adjust the data points from 1980 onwards to exclude HIV/AIDS deaths.

4. Fit the standard statistical model to the observations to HIV-free data points.

5. Extrapolate the model to the target year, in this case 2017.

6. Add back estimates of deaths due to HIV/AIDS (from UNAIDS).

7. For the epidemic period, a non-AIDS curve of IMR is derived from U5MR using model life tables and then the UNAIDS estimates of HIV/AIDS deaths for children under age 1 are added to generate the final IMR estimates.

Estimation of under-five and infant mortality rates by sex

In 2012, the UN IGME produced estimates of U5MR for males and females separately for the first time.[29] In many countries, fewer sources have provided data by sex than for both sexes combined. For this reason, the UN IGME, rather than estimate U5MR trends by sex directly from reported mortality levels by sex, uses the available data by sex to estimate a time trend in the sex ratio (male/female ratio) of U5MR instead. Bayesian methods for the UN IGME estimation of sex ratios with a focus on the estimation and identification of countries with outlying levels or trends were used. A more complete technical description of the model is available elsewhere.[30]

Estimation of neonatal mortality rates

The neonatal mortality rate (NMR) is defined as the probability of dying before 28 days per 1,000 live births. In 2015, the UN IGME method for estimating NMR was updated. The new Bayesian methodology is similar to that used to estimate U5MR and derive estimates by sex. It has the advantage that, compared to the previous model, it can capture data-driven trends in NMR within countries and over time for all countries. A more complete technical description of the model is available elsewhere.[31]

For neonatal mortality in HIV-affected and crisis-affected populations, the ratio is estimated initially for non-AIDS and non-crisis mortality. After estimation, crisis neonatal deaths are added back on to the neonatal deaths to compute the total estimated neonatal mortality rate. No AIDS deaths are added back to the NMR, thereby assuming that HIV/AIDS-related deaths only affect child mortality after the first month of life.

Estimation of mortality rates among children aged 5–14

UN IGME produces country specific trend estimates of the mortality in children aged 5–14 – that is, the probability that a child aged 5 dies before reaching his or her fifteenth birthday ($_{10}q_5$). The methods used are similar to those that are used to estimate under-five mortality rates (U5MR). The B3 statistical model developed for under-five mortality was used to obtain a smooth trend curve in $_{10}q_5$ as well. In 35 countries, there were not enough data inputs to estimate the probability $_{10}q_5$ from vital registration, surveys or censuses. For these cases, the probability $_{10}q_5$ was modelled based on the estimates of the under-five mortality rate, and an expected relation between mortality in the age groups 0–4 and 5–14, as observed in countries with sufficient data series. A linear regression was used to regress log ($_{10}q_5$) against log(U5MR), with region-specific dummies, and the coefficients of this regression were used to predict the probability $_{10}q_5$ between 1990 and 2017 for countries with insufficient data sources. The advantage of this approach is that no model life tables are used (since such life tables are based on the historical experience of countries with high quality vital registration data and do not always adequately reflect age patterns of mortality in low- and middle- income countries).

No adjustment was included for HIV-related biases in the age group 5–14, since no method currently exists to estimate the magnitude of this bias in the probability $_{10}q_5$. This bias should be less severe when estimating mortality in the age group 5–14, as compared with the under-five mortality rate, because in the absence of treatment, the majority of children infected through their mothers, will die before reaching age 5.

Estimation of child mortality due to conflict and natural disasters

Estimated deaths for major crises were derived from various data sources from 1990 to present. Natural disasters were obtained from the CRED International Disaster Database,[32] with under-five proportions and for children aged 5–14 estimated as described elsewhere,[33] and conflict deaths were obtained from Uppsala Conflict Data Program/Peace Research Institute Oslo datasets as well as reports prepared by the UN and other organizations. Estimated child deaths due to major crises were included if they met the following criteria: (1) the crisis was isolated to a few years; (2) under-five crisis deaths or crisis deaths among children aged 5–14 were >10 per cent of non-crisis deaths in the age group; (3) crisis U5MR or crisis $_{10}q_5$ was > 0.2 deaths per 1,000; (4) the number of crisis deaths among children under 5 or among children aged 5–14 years old was > 10 deaths, or (5) high quality vital registration data were available and should not be smoothed by the B3 model.

These criteria resulted in 18 different crises being explicitly incorporated into the UN IGME estimates for under-five mortality and 38 different crises being incorporated into the mortality estimates among children aged 5–14. Because the background mortality rates were relatively low in the age group 5–14, crisis deaths represented a larger share of deaths, and thus more crises met these criteria than for under-five mortality. Crisis deaths were included in the estimates by first excluding data points from crisis years, fitting the B3 model to the remaining data, and then adding the crisis-specific mortality rate to the fitted B3 curve. Crisis death estimates are uncertain but presently no uncertainty around crisis deaths is included in the uncertainty intervals of the estimates. Instead, we assume the relative uncertainty in the adjusted estimates is equal to the relative uncertainty in the non-adjusted estimates; this assumption will be revisited in the near future.

UN IGME has assessed recent humanitarian crises and based on the scarcity of currently available data and the difficulties of estimating the broader impact of these crises on health systems, UN IGME decided to hold the estimates constant from the start of the crisis while increasing the uncertainty over the crisis time for three countries: South Sudan, the Syrian Arab Republic, and Yemen. Where applicable direct crisis deaths have been added to the constant trend estimate. UN IGME will review new data, if available, in the next estimation round and revise estimates accordingly.

Estimation of uncertainty intervals

Given the inherent uncertainty in child mortality estimates, 90 per cent uncertainty intervals (UIs) are used by UN IGME instead of the more conventional 95 per cent intervals. While reporting intervals that are based on higher levels of uncertainty (i.e., 95 per cent instead of 90 per cent) would have the advantage that the chance of not having included the true value in the interval is smaller, the disadvantage of choosing higher uncertainty levels is that intervals lose their utility to present meaningful summaries of a range of likely outcomes if the indicator of interest is highly uncertain. Given this trade-off and the substantial uncertainty associated with child mortality estimates, UN IGME chose to report 90 per cent UIs, or, in other words, intervals for which there is a 90 per cent chance that they contain the true value, to encourage wider use and interpretation of the UIs.

Extrapolation to common reference year

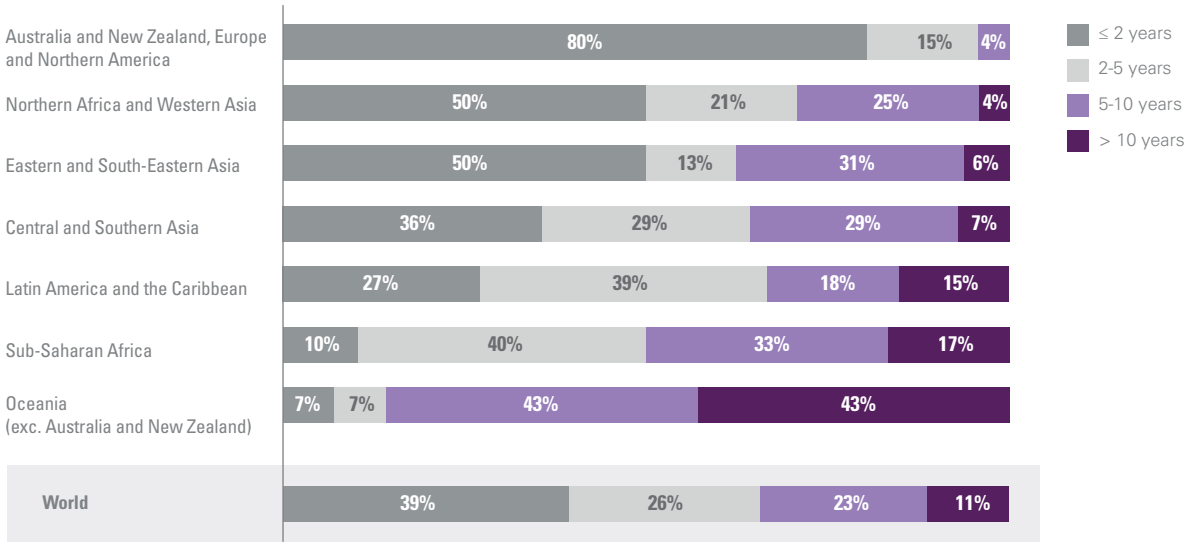
If the underlying empirical data refer to an earlier reference period than the end year of the period the estimates are reported, UN IGME extrapolates the estimates to the common end year, in this round to 2017. UN IGME does not use any covariates to derive the estimates, but uses the past trend in a country and the global trend to extrapolate to the target year. The average extrapolation period in the 2018 round of estimation was 4.5 years for under-five mortality, with half of the countries having data points within the past 3.5 years. For more than a third of all countries, the latest available child mortality estimate was more than 5 years old (Figure 9).

Calculating number of deaths

Under-five, infant, and neonatal deaths

A birth-week cohort method is used to calculate the absolute number of deaths among neonates, infants, and children under age 5. First, each annual birth cohort is divided into 52 equal birth-week cohorts. Then each birth-week cohort is exposed throughout the first five years of life to the appropriate calendar year- and

FIGURE 9 **Proportion of countries by region and extrapolation period from most recent under-five mortality data**



age-specific mortality rates depending on cohort age. For example, the twentieth birth-week cohort of the year 2000 will be exposed to the infant mortality rates in both 2000 and 2001. All deaths from birth-week cohorts occurring as a result of exposure to the mortality rate for a given calendar year are allocated to that year and are summed by age group at death to get the total number of deaths for a given year and age group. Continuing with the above example, deaths from the twentieth birth-week cohort of the year 2000 would contribute to infant deaths in year 2000 and 2001. Any deaths occurring among the twentiethbirth-week cohort of year 2000 after the twentieth week in 2001 would contribute to under-five deaths for year 2001 and so forth. Under-five deaths in each calendar year are calculated by summing up all the deaths under age 5 across all age group cohorts in that year. The annual estimate of the number of live births in each country from the World Population Prospects: the 2017 revision[34] is used to calculate the number of deaths.

Deaths among children aged 5–14

The absolute number of deaths among children aged 5–14 in a given year and country is calculated using the central death rates for age groups 5–9 and 10–14 years, $M_{5\text{-}9}$ and $M_{10\text{-}14}$, computed from the estimated ${}_5q_5$ and ${}_5q_{10}$ using a standard period abridged life table. The central deaths rates are then multiplied by the country population estimates for the respective age groups from the World Population Prospects: the 2017 revision[34] to calculate the number of deaths.

Notes

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4. Values in parentheses indicate 90 per cent uncertainty intervals for the estimates.

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19. There were concerns about incompleteness of early infant mortality data from civil registration. A European report on perinatal indicators, for example, noted a wide variation in how European countries define infant mortality, due to differences in birth and death registration practices (that is, differences in the cut-off points for acceptable weight or estimated gestation period to be registered as a birth and subsequent death).[35,36] This discrepancy can lead to under-reporting of infant deaths by some countries, particularly when compared with countries that use a broader definition for live birth.[37,38] The UN IGME previously carried out an analysis of the ratio of early neonatal (under 7 days) deaths to total neonatal deaths, which showed that several countries, many in Eastern Europe, had significantly lower values than what would be expected, suggesting an undercounting of early infant deaths. The results of this analysis were used as an upwards adjustment of 10 per cent or 20 per cent to under-five mortality rates across all years for several countries in previous UN IGME reports. This assessment was revisited in the 2017 estimation round using the latest data, and the clear signal of underreporting was no longer apparent across countries. Therefore, the UN IGME has removed these adjustment factors in the estimates for this publication. Going forward, the UN IGME will assemble finer age-specific child mortality data and attempt to determine the current level of underreporting bias in different countries, and how that bias has changed over time. This analysis could lead to a different adjustment approach in future estimates.

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Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births)									Number of under-five deaths with 90 per cent uncertainty interval (thousands)[a]					
	1990			2017			Annual rate of reduction (ARR) (per cent) 1990-2017			1990			2017		
Country	U5MR	Lower bound	Upper bound	U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound
Afghanistan	175	160	192	68	52	85	3.5	2.6	4.5	107	98	116	77	59	96
Albania	40	36	45	9	8	9	5.6	5.1	6.1	3	3	4	0	0	0
Algeria	50	46	53	24	23	25	2.7	2.4	3.0	41	38	44	22	21	23
Andorra	9	5	14	3	2	5	3.5	0.9	6.1	0	0	0	0	0	0
Angola	224	199	251	81	39	146	3.8	1.6	6.5	137	122	154	96	47	172
Antigua and Barbuda	26	19	37	7	6	10	4.7	3.0	6.3	0	0	0	0	0	0
Argentina	29	28	29	10	10	11	3.8	3.5	4.1	20	20	21	8	7	8
Armenia	50	45	55	13	10	17	5.1	4.0	6.1	4	3	4	0	0	1
Australia	9	9	9	4	3	4	3.6	3.3	3.8	2	2	2	1	1	1
Austria	10	9	10	4	3	4	3.6	3.3	3.9	1	1	1	0	0	0
Azerbaijan	95	86	105	23	16	33	5.3	3.9	6.7	19	18	21	4	3	6
Bahamas	24	22	25	7	6	9	4.4	3.5	5.3	0	0	0	0	0	0
Bahrain	23	22	24	7	6	9	4.3	3.6	4.9	0	0	0	0	0	0
Bangladesh	144	140	148	32	29	36	5.5	5.1	5.9	532	517	548	100	90	110
Barbados	18	17	19	12	10	16	1.4	0.3	2.4	0	0	0	0	0	0
Belarus	15	15	16	4	4	4	5.2	5.0	5.4	2	2	2	0	0	0
Belgium	10	10	10	4	3	4	3.6	3.3	4.0	1	1	1	0	0	1
Belize	39	34	44	14	13	16	3.7	3.0	4.3	0	0	0	0	0	0
Benin	178	167	190	98	74	138	2.2	1.0	3.2	39	36	42	39	29	55
Bhutan	128	113	147	31	21	44	5.3	3.8	6.8	3	2	3	0	0	1
Bolivia (Plurinational State of)	124	117	131	35	23	51	4.7	3.3	6.2	29	28	31	9	6	13
Bosnia and Herzegovina	18	18	19	6	5	7	4.3	3.8	4.8	1	1	1	0	0	0
Botswana	51	45	59	38	17	73	1.2	-1.4	4.2	2	2	3	2	1	4
Brazil	63	59	68	15	13	17	5.4	4.9	5.8	235	220	252	43	39	48
Brunei Darussalam	13	13	14	11	9	12	0.9	0.3	1.5	0	0	0	0	0	0
Bulgaria	18	18	19	8	7	8	3.3	3.1	3.6	2	2	2	0	0	1
Burkina Faso	200	188	213	81	61	107	3.3	2.3	4.4	80	75	85	58	44	77
Burundi	175	158	191	61	42	87	3.9	2.5	5.3	46	42	50	27	19	38
Cabo Verde	63	61	65	17	15	20	4.7	4.3	5.2	1	1	1	0	0	0
Cambodia	116	108	125	29	17	50	5.1	3.1	7.1	44	41	47	11	6	18
Cameroon	139	130	149	84	62	112	1.9	0.8	3.0	70	65	75	71	52	94
Canada	8	8	8	5	5	6	1.8	1.5	2.0	3	3	3	2	2	2
Central African Republic	176	158	195	122	77	194	1.4	-0.4	3.1	21	19	23	20	13	32
Chad	213	198	229	123	100	150	2.0	1.3	2.8	60	56	65	76	61	92
Chile	19	19	20	7	7	8	3.5	3.0	4.0	6	5	6	2	2	2
China	54	50	59	9	8	11	6.5	5.9	7.1	1,398	1,291	1,526	156	136	179
Colombia	35	33	38	15	11	20	3.2	2.2	4.3	32	30	34	11	8	14
Comoros	125	111	139	69	36	138	2.2	-0.5	4.6	2	2	2	2	1	4
Congo	90	79	102	48	31	73	2.4	0.7	4.0	8	7	9	8	5	13
Cook Islands	25	22	28	8	5	12	4.4	2.6	6.2	0	0	0	0	0	0
Costa Rica	17	16	17	9	7	12	2.3	1.4	3.2	1	1	1	1	0	1
Côte d'Ivoire	152	142	162	89	70	113	2.0	1.1	2.9	77	72	83	77	60	97
Croatia	13	13	13	5	4	5	3.8	3.3	4.1	1	1	1	0	0	0

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

	Sex-specific under-five mortality rate (deaths per 1,000 live births)				Infant mortality rate (deaths per 1,000 live births)		Number of infant deaths (thousands)[a]		Neonatal mortality rate (deaths per 1,000 live births)		Number of neonatal deaths (thousands)[a]		Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)		Number of deaths among children aged 5–14 (thousands)[a]	
	1990		2017													
Country	Male	Female	Male	Female	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017
Afghanistan	180	170	72	64	119	52	73	59	74	39	47	45	21	10	8	10
Albania	44	36	10	8	35	8	3	0	13	6	1	0	5	2	0	0
Algeria	54	45	26	23	42	21	35	19	24	15	20	14	9	4	7	3
Andorra	9	8	4	3	8	3	0	0	4	1	0	0	2	1	0	0
Angola	235	212	87	75	132	54	83	65	54	29	35	36	44	16	16	14
Antigua and Barbuda	29	23	8	7	24	5	0	0	14	4	0	0	4	2	0	0
Argentina	32	26	11	9	25	9	18	7	15	6	11	4	3	2	2	1
Armenia	54	45	14	11	42	11	3	0	23	7	2	0	4	2	0	0
Australia	10	8	4	3	8	3	2	1	5	2	1	1	2	1	0	0
Austria	11	8	4	3	8	3	1	0	5	2	0	0	2	1	0	0
Azerbaijan	101	89	25	21	76	21	16	3	31	12	6	2	5	3	1	0
Bahamas	25	22	8	7	20	6	0	0	14	4	0	0	4	3	0	0
Bahrain	24	22	8	7	20	6	0	0	15	3	0	0	4	2	0	0
Bangladesh	147	140	35	30	100	27	368	82	64	18	240	56	25	5	74	14
Barbados	20	16	14	11	16	12	0	0	12	8	0	0	3	2	0	0
Belarus	17	13	4	3	12	3	2	0	8	2	1	0	4	1	1	0
Belgium	11	9	4	3	8	3	1	0	5	2	1	0	2	1	0	0
Belize	42	35	16	13	31	12	0	0	19	9	0	0	5	3	0	0
Benin	185	170	104	93	107	64	24	26	46	33	11	13	44	22	6	7
Bhutan	133	123	34	28	90	26	2	0	43	17	1	0	19	7	0	0
Bolivia (Plurinational State of)	130	117	38	31	85	28	20	7	42	19	10	5	13	6	2	1
Bosnia and Herzegovina	20	16	6	5	16	5	1	0	11	4	1	0	3	1	0	0
Botswana	56	47	41	34	40	31	2	2	26	25	1	1	16	6	1	0
Brazil	69	57	17	13	53	13	195	39	25	9	94	25	5	2	16	7
Brunei Darussalam	15	12	11	10	10	9	0	0	6	5	0	0	4	2	0	0
Bulgaria	21	16	8	7	15	6	2	0	8	4	1	0	4	2	0	0
Burkina Faso	207	192	85	77	99	51	40	37	46	25	19	19	40	25	11	14
Burundi	182	167	66	56	105	43	28	19	40	22	11	10	55	22	9	6
Cabo Verde	67	58	19	16	48	15	1	0	21	10	0	0	6	2	0	0
Cambodia	124	108	33	26	85	25	32	9	40	15	15	5	35	5	9	2
Cameroon	146	131	90	78	86	55	44	47	40	26	21	22	35	28	12	19
Canada	9	7	6	5	7	5	3	2	4	4	2	1	2	1	1	0
Central African Republic	183	168	128	115	115	88	14	14	52	42	6	7	31	16	2	2
Chad	222	203	130	116	112	73	33	46	52	35	16	22	54	26	10	12
Chile	21	17	8	7	16	6	5	1	9	5	2	1	3	2	1	0
China	56	52	10	9	42	8	1,087	133	30	5	753	78	7	2	152	39
Colombia	39	31	16	13	29	13	26	9	18	8	16	6	5	3	4	2
Comoros	132	117	74	63	88	52	2	1	50	32	1	1	17	7	0	0
Congo	95	84	52	43	59	35	5	6	28	19	3	3	36	11	2	2
Cook Islands	27	22	8	7	21	7	0	0	13	4	0	0	5	2	0	0
Costa Rica	19	15	10	8	14	8	1	1	9	6	1	0	3	2	0	0
Côte d'Ivoire	163	140	97	80	104	64	54	56	48	34	26	30	30	27	10	18
Croatia	14	11	5	4	11	4	1	0	8	3	0	0	3	1	0	0

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births)									Number of under-five deaths with 90 per cent uncertainty interval (thousands)[a]					
	1990			2017			Annual rate of reduction (ARR) (per cent) 1990-2017			1990			2017		
Country	U5MR	Lower bound	Upper bound	U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound
Cuba	**13**	13	14	**5**	5	6	**3.3**	3.1	3.6	**2**	2	2	**1**	1	1
Cyprus	**11**	11	12	**3**	2	3	**5.2**	4.5	6.0	**0**	0	0	**0**	0	0
Czechia	**12**	12	12	**3**	3	4	**4.8**	4.6	5.1	**2**	2	2	**0**	0	0
Democratic People's Republic of Korea	**43**	34	56	**19**	15	24	**3.1**	3.1	3.1	**18**	14	23	**7**	5	9
Democratic Republic of the Congo	**186**	169	205	**91**	64	130	**2.6**	1.3	4.1	**284**	258	312	**300**	210	426
Denmark	**9**	9	9	**4**	4	5	**2.7**	2.2	3.2	**1**	1	1	**0**	0	0
Djibouti	**119**	102	137	**62**	39	95	**2.4**	0.7	4.2	**3**	2	3	**1**	1	2
Dominica	**17**	16	19	**34**	27	42	**-2.5**	-3.4	-1.6	**0**	0	0	**0**	0	0
Dominican Republic	**60**	57	64	**30**	22	41	**2.6**	1.4	3.7	**13**	12	14	**6**	5	9
Ecuador	**54**	49	60	**15**	14	15	**4.9**	4.5	5.3	**16**	15	18	**5**	5	5
Egypt	**86**	82	90	**22**	17	29	**5.0**	4.0	6.1	**164**	157	172	**55**	42	73
El Salvador	**60**	55	65	**15**	10	22	**5.2**	3.7	6.7	**10**	9	11	**2**	1	3
Equatorial Guinea	**179**	159	199	**90**	56	138	**2.6**	0.9	4.3	**3**	3	3	**4**	2	6
Eritrea	**151**	137	165	**43**	27	70	**4.6**	2.9	6.4	**19**	17	21	**7**	4	11
Estonia	**18**	17	18	**3**	2	3	**7.0**	6.2	7.6	**0**	0	0	**0**	0	0
Eswatini	**69**	59	79	**54**	35	83	**0.9**	-0.8	2.5	**2**	2	3	**2**	1	3
Ethiopia	**202**	188	217	**59**	48	71	**4.6**	3.9	5.3	**439**	409	470	**189**	155	229
Fiji	**29**	25	35	**25**	24	27	**0.5**	-0.2	1.2	**1**	1	1	**0**	0	0
Finland	**7**	7	7	**2**	2	3	**4.0**	3.7	4.4	**0**	0	0	**0**	0	0
France	**9**	9	9	**4**	4	5	**2.8**	2.6	3.0	**7**	7	7	**3**	3	3
Gabon	**92**	80	107	**48**	31	72	**2.4**	0.8	4.1	**3**	3	4	**3**	2	4
Gambia	**170**	152	191	**64**	39	104	**3.6**	1.8	5.5	**7**	6	8	**5**	3	8
Georgia	**48**	43	53	**11**	10	13	**5.5**	4.8	6.1	**4**	4	5	**1**	1	1
Germany	**9**	8	9	**4**	4	4	**3.1**	2.8	3.3	**7**	7	7	**3**	3	3
Ghana	**127**	120	134	**49**	39	61	**3.5**	2.7	4.3	**70**	66	74	**43**	34	53
Greece	**10**	10	11	**5**	5	6	**2.5**	1.9	3.0	**1**	1	1	**0**	0	1
Grenada	**23**	22	25	**17**	14	20	**1.2**	0.5	2.0	**0**	0	0	**0**	0	0
Guatemala	**81**	77	87	**28**	22	35	**4.0**	3.2	4.9	**29**	27	31	**12**	9	14
Guinea	**235**	219	251	**86**	68	111	**3.7**	2.8	4.6	**63**	59	67	**38**	30	49
Guinea-Bissau	**224**	200	250	**84**	57	121	**3.6**	2.2	5.1	**10**	9	11	**6**	4	8
Guyana	**61**	55	67	**31**	21	48	**2.4**	0.8	4.0	**1**	1	1	**0**	0	1
Haiti	**145**	135	155	**72**	59	90	**2.6**	1.8	3.3	**38**	35	40	**19**	15	23
Honduras	**58**	54	63	**18**	13	26	**4.3**	3.0	5.5	**11**	10	12	**4**	3	5
Hungary	**17**	17	18	**5**	4	5	**5.0**	4.5	5.4	**2**	2	2	**0**	0	0
Iceland	**6**	6	7	**2**	2	3	**4.1**	3.0	5.1	**0**	0	0	**0**	0	0
India	**126**	122	130	**39**	35	44	**4.3**	3.9	4.7	**3399**	3,287	3,516	**989**	884	1,092
Indonesia	**84**	80	88	**25**	20	33	**4.4**	3.5	5.4	**393**	376	412	**125**	96	163
Iran (Islamic Republic of)	**56**	52	61	**15**	10	23	**4.9**	3.3	6.5	**105**	97	114	**20**	13	30
Iraq	**54**	49	59	**30**	22	42	**2.1**	0.9	3.3	**35**	32	38	**37**	27	52
Ireland	**9**	9	10	**4**	3	4	**3.6**	2.8	4.3	**0**	0	1	**0**	0	0
Israel	**12**	11	12	**4**	3	4	**4.3**	4.0	4.7	**1**	1	1	**1**	1	1
Italy	**10**	10	10	**3**	3	4	**3.9**	3.6	4.2	**5**	5	6	**2**	2	2
Jamaica	**31**	26	36	**15**	9	25	**2.6**	0.7	4.5	**2**	2	2	**1**	0	1

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

	Sex-specific under-five mortality rate (deaths per 1,000 live births)				Infant mortality rate (deaths per 1,000 live births)		Number of infant deaths (thousands)[a]		Neonatal mortality rate (deaths per 1,000 live births)		Number of neonatal deaths (thousands)[a]		Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)		Number of deaths among children aged 5–14 (thousands)[a]	
	1990		2017													
Country	Male	Female	Male	Female	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017
Cuba	15	11	6	5	11	4	2	1	7	2	1	0	4	2	1	0
Cyprus	12	10	3	3	10	2	0	0	5	2	0	0	2	1	0	0
Czechia	14	11	4	3	10	3	1	0	7	2	1	0	2	1	0	0
Democratic People's Republic of Korea	48	40	21	17	33	14	14	5	22	10	9	4	8	4	3	1
Democratic Republic of the Congo	195	178	98	84	120	70	186	233	42	29	67	98	43	27	43	63
Denmark	10	8	5	4	7	4	0	0	4	3	0	0	2	1	0	0
Djibouti	126	111	67	56	92	52	2	1	50	32	1	1	16	2	0	0
Dominica	19	16	37	31	14	32	0	0	11	27	0	0	3	5	0	0
Dominican Republic	65	56	33	27	46	25	10	5	24	20	5	4	8	3	1	1
Ecuador	59	49	16	13	42	13	13	4	23	8	7	2	8	3	2	1
Egypt	86	86	23	21	63	19	120	47	33	12	64	29	11	4	16	9
El Salvador	64	55	16	13	46	13	8	1	23	7	4	1	7	4	1	0
Equatorial Guinea	188	169	96	83	121	65	2	3	48	31	1	1	36	17	0	1
Eritrea	162	139	48	38	93	32	12	5	34	18	4	3	47	12	4	2
Estonia	20	15	3	3	14	2	0	0	10	1	0	0	5	1	0	0
Eswatini	74	63	58	49	52	41	2	2	22	17	1	1	18	11	0	0
Ethiopia	215	189	65	52	120	41	267	133	60	29	137	95	79	14	114	38
Fiji	31	27	28	23	24	21	1	0	12	11	0	0	10	5	0	0
Finland	7	6	3	2	6	2	0	0	4	2	0	0	2	1	0	0
France	10	8	5	4	7	4	6	3	4	2	3	2	2	1	1	1
Gabon	99	86	53	44	60	35	2	2	31	22	1	1	21	15	1	1
Gambia	179	161	68	59	82	41	3	3	50	28	2	2	34	13	1	1
Georgia	53	42	12	10	41	10	4	1	25	7	2	0	7	3	1	0
Germany	10	7	4	3	7	3	6	2	3	2	3	2	2	1	2	1
Ghana	134	119	54	44	79	36	44	31	42	24	24	21	28	12	12	8
Greece	11	10	6	5	9	4	1	0	7	3	1	0	2	1	1	0
Grenada	25	21	18	15	18	15	0	0	12	11	0	0	4	3	0	0
Guatemala	87	76	30	25	60	23	21	10	29	13	10	5	12	4	3	2
Guinea	243	226	91	81	139	56	38	25	62	24	18	11	48	23	8	8
Guinea-Bissau	235	212	90	78	132	56	6	4	64	37	3	2	34	17	1	1
Guyana	67	54	35	27	47	26	1	0	31	19	1	0	6	5	0	0
Haiti	153	136	77	66	100	54	26	14	39	28	10	7	30	14	6	3
Honduras	63	53	20	16	45	16	9	3	22	10	4	2	8	5	1	1
Hungary	19	15	5	4	15	4	2	0	11	2	1	0	3	1	0	0
Iceland	7	6	2	2	5	2	0	0	3	1	0	0	2	1	0	0
India	122	130	39	40	89	32	2,387	802	57	24	1,572	605	21	6	448	152
Indonesia	90	77	28	22	62	21	287	105	30	12	141	61	15	5	67	24
Iran (Islamic Republic of)	56	56	16	14	44	13	81	17	26	9	48	12	8	3	14	3
Iraq	58	50	33	27	42	25	28	31	26	17	17	21	8	5	4	5
Ireland	10	8	4	3	8	3	0	0	5	2	0	0	2	1	0	0
Israel	12	11	4	3	10	3	1	0	6	2	1	0	2	1	0	0
Italy	11	9	4	3	8	3	5	1	6	2	4	1	2	1	1	0
Jamaica	34	27	17	13	26	13	2	1	20	11	1	1	5	3	0	0

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births)									Number of under-five deaths with 90 per cent uncertainty interval (thousands)[a]					
	1990			2017			Annual rate of reduction (ARR) (per cent) 1990-2017			1990			2017		
Country	U5MR	Lower bound	Upper bound	U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound
Japan	**6**	6	6	**3**	2	3	**3.3**	3.1	3.5	**8**	8	9	**3**	3	3
Jordan	**36**	34	39	**17**	12	24	**2.8**	1.5	4.2	**4**	4	5	**4**	3	6
Kazakhstan	**53**	48	58	**10**	10	10	**6.1**	5.8	6.5	**20**	19	22	**4**	4	4
Kenya	**104**	98	111	**46**	36	58	**3.0**	2.1	4.0	**101**	95	107	**69**	54	88
Kiribati	**96**	82	112	**55**	34	86	**2.1**	0.3	4.0	**0**	0	0	**0**	0	0
Kuwait	**18**	17	18	**8**	7	9	**2.9**	2.4	3.4	**1**	1	1	**1**	0	1
Kyrgyzstan	**66**	58	73	**20**	19	22	**4.4**	3.9	4.9	**9**	8	10	**3**	3	3
Lao People's Democratic Republic	**154**	142	169	**63**	45	89	**3.3**	2.0	4.7	**27**	25	29	**10**	7	14
Latvia	**17**	16	18	**4**	4	5	**5.2**	4.4	5.9	**1**	1	1	**0**	0	0
Lebanon	**32**	29	36	**8**	4	14	**5.3**	3.1	7.8	**2**	2	2	**1**	0	1
Lesotho	**89**	80	98	**86**	64	115	**0.1**	-1.0	1.3	**5**	5	6	**5**	4	7
Liberia	**261**	240	284	**75**	55	103	**4.6**	3.4	5.8	**25**	23	27	**12**	9	16
Libya	**42**	36	49	**12**	8	18	**4.5**	2.9	6.1	**5**	5	6	**2**	1	2
Lithuania	**15**	15	16	**4**	4	5	**4.7**	4.2	5.2	**1**	1	1	**0**	0	0
Luxembourg	**9**	8	9	**3**	2	3	**4.5**	3.6	5.5	**0**	0	0	**0**	0	0
Madagascar	**160**	149	172	**44**	30	65	**4.8**	3.3	6.3	**78**	73	84	**36**	24	53
Malawi	**235**	222	248	**55**	42	72	**5.3**	4.4	6.4	**99**	94	105	**37**	28	47
Malaysia	**17**	16	17	**8**	8	8	**2.8**	2.6	3.0	**8**	8	9	**4**	4	4
Maldives	**94**	85	103	**8**	6	10	**9.2**	8.1	10.2	**1**	1	1	**0**	0	0
Mali	**254**	237	272	**106**	64	174	**3.2**	1.4	5.1	**101**	94	108	**80**	49	132
Malta	**11**	11	12	**6**	5	8	**2.1**	1.3	2.9	**0**	0	0	**0**	0	0
Marshall Islands	**49**	42	57	**34**	23	50	**1.3**	-0.2	2.9	**0**	0	0	**0**	0	0
Mauritania	**118**	106	130	**79**	43	144	**1.5**	-0.8	3.7	**9**	8	10	**11**	6	21
Mauritius	**23**	22	24	**13**	11	16	**2.1**	1.3	2.8	**1**	0	1	**0**	0	0
Mexico	**45**	42	49	**13**	13	14	**4.5**	4.2	4.8	**110**	101	119	**31**	30	32
Micronesia (Federated States of)	**55**	44	69	**32**	14	76	**2.0**	-1.0	5.0	**0**	0	0	**0**	0	0
Monaco	**8**	7	9	**3**	3	5	**3.2**	2.0	4.3	**0**	0	0	**0**	0	0
Mongolia	**108**	99	117	**17**	11	26	**6.8**	5.3	8.4	**8**	7	8	**1**	1	2
Montenegro	**17**	16	17	**4**	3	4	**5.8**	5.0	6.4	**0**	0	0	**0**	0	0
Morocco	**80**	74	85	**23**	19	29	**4.5**	3.7	5.4	**58**	54	62	**16**	13	20
Mozambique	**240**	221	260	**72**	52	99	**4.4**	3.3	5.6	**144**	133	155	**81**	58	111
Myanmar	**116**	106	127	**49**	36	64	**3.2**	2.2	4.4	**128**	118	141	**46**	34	60
Namibia	**73**	67	80	**44**	30	66	**1.8**	0.3	3.3	**4**	3	4	**3**	2	5
Nauru	**60**	36	100	**33**	19	56	**2.2**	-0.8	5.2	**0**	0	0	**0**	0	0
Nepal	**140**	132	149	**34**	28	42	**5.3**	4.5	6.1	**99**	93	105	**19**	16	24
Netherlands	**8**	8	9	**4**	4	4	**2.8**	2.6	3.0	**2**	2	2	**1**	1	1
New Zealand	**11**	11	12	**5**	4	6	**2.8**	2.2	3.4	**1**	1	1	**0**	0	0
Nicaragua	**67**	62	72	**17**	11	28	**5.0**	3.2	6.9	**10**	9	11	**2**	1	3
Niger	**327**	307	348	**85**	67	107	**5.0**	4.1	5.9	**136**	128	145	**82**	65	104
Nigeria	**212**	198	226	**100**	72	138	**2.8**	1.6	4.0	**857**	803	913	**714**	515	984
Niue	**14**	10	20	**22**	9	51	**-1.6**	-5.1	1.8	**0**	0	0	**0**	0	0
Norway	**9**	8	9	**3**	2	3	**4.5**	3.9	5.1	**0**	0	1	**0**	0	0
Oman	**39**	35	45	**11**	11	12	**4.6**	4.1	5.1	**3**	2	3	**1**	1	1

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

	Sex-specific under-five mortality rate (deaths per 1,000 live births)				Infant mortality rate (deaths per 1,000 live births)		Number of infant deaths (thousands)[a]		Neonatal mortality rate (deaths per 1,000 live births)		Number of neonatal deaths (thousands)[a]		Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)		Number of deaths among children aged 5–14 (thousands)[a]	
	1990		2017													
Country	Male	Female	Male	Female	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017
Japan	7	6	3	2	5	2	6	2	3	1	3	1	2	1	3	1
Jordan	38	35	18	16	30	15	4	4	20	10	3	3	5	4	1	1
Kazakhstan	58	47	11	9	45	9	17	3	22	5	9	2	6	3	2	1
Kenya	109	98	50	42	66	34	64	51	30	21	29	32	18	10	13	13
Kiribati	102	89	59	50	69	43	0	0	36	23	0	0	15	9	0	0
Kuwait	19	16	9	8	15	7	1	0	10	4	0	0	4	2	0	0
Kyrgyzstan	72	60	22	18	55	18	7	3	24	11	3	2	6	3	1	0
Lao People's Democratic Republic	163	145	69	58	106	49	19	8	48	28	9	5	34	14	4	2
Latvia	19	15	5	4	13	4	0	0	8	2	0	0	6	1	0	0
Lebanon	34	31	8	7	27	7	2	1	21	5	1	0	7	1	0	0
Lesotho	96	81	93	79	71	67	4	4	39	38	2	2	14	13	1	1
Liberia	274	247	80	69	174	56	16	9	58	25	6	4	33	17	2	2
Libya	45	38	14	11	36	11	5	1	21	7	3	1	8	5	1	1
Lithuania	17	13	5	4	12	3	1	0	8	2	0	0	4	2	0	0
Luxembourg	10	8	3	2	7	2	0	0	4	2	0	0	2	1	0	0
Madagascar	168	152	48	40	98	33	49	27	40	18	21	16	42	13	14	9
Malawi	245	223	60	50	138	39	60	26	50	23	22	15	41	13	11	7
Malaysia	18	15	9	7	14	7	7	4	8	4	4	2	5	3	2	1
Maldives	100	88	9	7	68	7	1	0	43	5	0	0	10	3	0	0
Mali	263	245	111	101	130	66	53	50	73	35	30	28	46	23	11	13
Malta	12	10	7	6	10	6	0	0	8	4	0	0	2	1	0	0
Marshall Islands	54	44	40	32	39	28	0	0	20	16	0	0	9	6	0	0
Mauritania	125	110	85	73	72	53	6	8	46	34	4	5	22	10	1	1
Mauritius	26	20	14	12	20	12	0	0	15	8	0	0	4	2	0	0
Mexico	49	42	15	12	36	12	88	27	22	8	54	17	5	3	11	6
Micronesia (Federated States of)	60	50	35	29	43	27	0	0	26	17	0	0	10	6	0	0
Monaco	9	7	4	3	6	3	0	0	4	2	0	0	2	1	0	0
Mongolia	122	93	20	14	77	15	5	1	30	9	2	1	8	4	0	0
Montenegro	18	16	4	3	15	3	0	0	11	2	0	0	2	1	0	0
Morocco	84	75	26	21	63	20	46	14	36	14	26	10	11	3	7	2
Mozambique	249	230	77	68	159	53	96	60	58	27	36	31	67	15	28	13
Myanmar	123	108	53	44	82	39	90	36	48	24	53	23	18	8	19	8
Namibia	78	68	48	40	49	32	3	2	28	18	1	1	16	12	1	1
Nauru	64	55	36	30	46	27	0	0	30	21	0	0	10	6	0	0
Nepal	141	140	36	31	98	28	69	16	59	21	43	12	28	5	14	3
Netherlands	9	7	4	4	7	3	1	1	5	2	1	0	2	1	0	0
New Zealand	13	10	6	5	9	4	1	0	4	3	0	0	3	1	0	0
Nicaragua	72	61	19	15	51	15	8	2	23	7	3	1	8	4	1	0
Niger	329	324	88	81	132	48	57	49	54	26	24	27	69	39	17	26
Nigeria	222	201	106	94	126	65	514	466	50	33	212	241	42	20	115	105
Niue	15	12	24	19	12	18	0	0	7	11	0	0	3	4	0	0
Norway	10	8	3	2	7	2	0	0	4	2	0	0	2	1	0	0
Oman	43	36	12	10	32	10	2	1	17	5	1	0	6	2	0	0

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births)									Number of under-five deaths with 90 per cent uncertainty interval (thousands)[a]					
	1990			2017			Annual rate of reduction (ARR) (per cent) 1990-2017			1990			2017		
Country	U5MR	Lower bound	Upper bound	U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound
Pakistan	**139**	134	144	**75**	56	100	**2.3**	1.2	3.4	**585**	564	607	**404**	304	538
Palau	**36**	31	42	**15**	8	29	**3.2**	0.7	5.7	**0**	0	0	**0**	0	0
Panama	**31**	27	34	**16**	9	28	**2.4**	0.3	4.5	**2**	2	2	**1**	1	2
Papua New Guinea	**88**	79	97	**53**	31	94	**1.8**	-0.3	3.8	**13**	12	14	**12**	7	21
Paraguay	**46**	41	51	**21**	12	39	**2.9**	0.6	5.1	**6**	6	7	**3**	2	5
Peru	**81**	77	85	**15**	12	20	**6.2**	5.2	7.2	**53**	50	55	**9**	7	12
Philippines	**58**	54	62	**28**	23	35	**2.7**	1.8	3.5	**115**	108	123	**67**	54	84
Poland	**17**	17	18	**5**	5	5	**4.8**	4.7	5.0	**10**	10	10	**2**	2	2
Portugal	**15**	14	15	**4**	3	4	**5.1**	4.7	5.5	**2**	2	2	**0**	0	0
Qatar	**21**	19	22	**8**	7	8	**3.7**	3.3	4.2	**0**	0	0	**0**	0	0
Republic of Korea	**16**	15	16	**3**	3	4	**5.7**	5.4	6.0	**10**	10	11	**1**	1	2
Republic of Moldova	**33**	29	39	**16**	12	21	**2.8**	1.6	4.1	**3**	2	3	**1**	0	1
Romania	**31**	30	32	**8**	7	9	**5.1**	4.8	5.5	**10**	10	11	**1**	1	2
Russian Federation	**22**	21	22	**8**	7	8	**3.9**	3.6	4.2	**45**	45	46	**14**	13	15
Rwanda	**151**	142	161	**38**	24	62	**5.1**	3.3	6.9	**48**	45	51	**14**	9	23
Saint Kitts and Nevis	**32**	29	35	**14**	10	19	**3.1**	1.9	4.3	**0**	0	0	**0**	0	0
Saint Lucia	**22**	21	24	**17**	13	21	**1.1**	0.1	2.1	**0**	0	0	**0**	0	0
Saint Vincent and the Grenadines	**24**	23	26	**16**	13	20	**1.5**	0.6	2.4	**0**	0	0	**0**	0	0
Samoa	**31**	27	35	**17**	11	24	**2.3**	0.8	3.9	**0**	0	0	**0**	0	0
San Marino	**11**	8	14	**2**	1	5	**5.9**	2.4	9.1	**0**	0	0	**0**	0	0
Sao Tome and Principe	**109**	96	123	**32**	21	49	**4.5**	2.9	6.1	**0**	0	1	**0**	0	0
Saudi Arabia	**44**	37	53	**7**	6	10	**6.6**	5.5	7.7	**25**	21	30	**5**	4	6
Senegal	**139**	133	147	**45**	36	58	**4.2**	3.2	5.0	**44**	42	46	**25**	20	31
Serbia	**28**	27	29	**6**	5	6	**5.9**	5.5	6.3	**4**	4	4	**1**	0	1
Seychelles	**17**	15	18	**14**	11	18	**0.6**	-0.3	1.5	**0**	0	0	**0**	0	0
Sierra Leone	**262**	241	283	**111**	92	131	**3.2**	2.5	3.9	**50**	46	54	**28**	24	34
Singapore	**8**	7	8	**3**	2	3	**3.7**	3.1	4.3	**0**	0	0	**0**	0	0
Slovakia	**15**	15	15	**6**	5	6	**3.6**	3.3	3.8	**1**	1	1	**0**	0	0
Slovenia	**10**	10	11	**2**	2	2	**5.9**	5.3	6.4	**0**	0	0	**0**	0	0
Solomon Islands	**38**	33	44	**21**	15	29	**2.3**	1.0	3.7	**0**	0	1	**0**	0	0
Somalia	**180**	150	219	**127**	69	239	**1.3**	-0.8	3.3	**61**	51	74	**78**	42	146
South Africa	**61**	53	69	**37**	31	45	**1.8**	1.0	2.7	**67**	58	75	**43**	36	52
South Sudan	**254**	210	298	**96**	43	182	**3.6**	1.0	6.8	**66**	55	77	**42**	19	79
Spain	**9**	9	9	**3**	3	3	**4.0**	3.6	4.5	**4**	4	4	**1**	1	1
Sri Lanka	**21**	21	22	**9**	8	10	**3.3**	2.7	3.8	**8**	7	8	**3**	2	3
State of Palestine	**45**	41	48	**21**	16	28	**2.8**	1.6	3.9	**4**	4	4	**3**	2	4
Sudan	**132**	122	142	**63**	50	81	**2.7**	1.8	3.6	**106**	99	115	**82**	64	104
Suriname	**48**	40	57	**20**	10	42	**3.3**	0.5	6.0	**1**	0	1	**0**	0	0
Sweden	**7**	7	7	**3**	3	3	**3.4**	3.0	3.6	**1**	1	1	**0**	0	0
Switzerland	**8**	8	8	**4**	4	5	**2.5**	2.1	2.8	**1**	1	1	**0**	0	0
Syrian Arab Republic	**37**	34	41	**17**	13	24	**2.9**	1.5	4.0	**17**	15	18	**7**	5	10
Tajikistan	**105**	96	115	**34**	25	46	**4.2**	3.0	5.4	**22**	20	24	**8**	6	11
Thailand	**37**	35	39	**10**	8	12	**5.0**	4.1	5.7	**40**	38	43	**7**	6	9

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

Country	Sex-specific under-five mortality rate (deaths per 1,000 live births)				Infant mortality rate (deaths per 1,000 live births)		Number of infant deaths (thousands)[a]		Neonatal mortality rate (deaths per 1,000 live births)		Number of neonatal deaths (thousands)[a]		Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)		Number of deaths among children aged 5–14 (thousands)[a]	
	1990		2017													
	Male	Female	Male	Female	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017
Pakistan	141	137	78	71	106	61	451	330	64	44	276	241	14	11	39	49
Palau	40	32	17	14	31	13	0	0	19	8	0	0	7	3	0	0
Panama	34	27	18	14	26	14	2	1	17	9	1	1	6	3	0	0
Papua New Guinea	93	82	58	49	64	42	9	9	31	24	5	5	14	9	2	2
Paraguay	49	42	23	19	36	18	5	3	22	11	3	2	7	3	1	0
Peru	85	76	16	13	57	12	37	7	28	7	19	4	11	3	6	2
Philippines	63	52	31	25	41	22	82	53	19	14	40	33	14	6	23	13
Poland	19	15	5	4	15	4	9	1	11	3	6	1	3	1	2	0
Portugal	16	13	4	3	12	3	1	0	7	2	1	0	4	1	1	0
Qatar	23	19	8	7	18	7	0	0	11	4	0	0	4	2	0	0
Republic of Korea	17	14	4	3	13	3	9	1	7	2	5	1	5	1	4	0
Republic of Moldova	37	30	17	14	28	13	2	1	19	12	2	0	5	2	0	0
Romania	34	28	9	7	24	7	8	1	15	4	5	1	5	2	2	0
Russian Federation	25	18	8	7	19	7	38	12	11	3	22	6	5	2	12	4
Rwanda	159	143	41	34	93	29	29	11	40	16	13	6	66	10	15	3
Saint Kitts and Nevis	35	28	15	13	26	12	0	0	20	9	0	0	5	3	0	0
Saint Lucia	25	20	18	15	19	15	0	0	13	12	0	0	4	2	0	0
Saint Vincent and the Grenadines	27	22	18	15	20	15	0	0	12	10	0	0	4	4	0	0
Samoa	33	28	18	15	25	14	0	0	16	9	0	0	6	4	0	0
San Marino	12	10	2	2	10	2	0	0	5	1	0	0	2	1	0	0
Sao Tome and Principe	115	102	36	29	69	25	0	0	27	14	0	0	20	8	0	0
Saudi Arabia	47	42	8	7	36	6	20	4	22	4	13	2	7	2	3	1
Senegal	146	132	49	41	71	33	23	18	40	21	13	11	36	14	8	6
Serbia	30	26	6	5	24	5	3	0	17	4	2	0	3	1	0	0
Seychelles	18	15	15	13	14	12	0	0	11	9	0	0	4	2	0	0
Sierra Leone	273	250	116	104	155	82	30	21	53	34	10	9	51	21	6	4
Singapore	8	7	3	3	6	2	0	0	4	1	0	0	2	1	0	0
Slovakia	17	13	6	5	13	5	1	0	9	3	1	0	3	1	0	0
Slovenia	12	9	2	2	9	2	0	0	6	1	0	0	2	1	0	0
Solomon Islands	42	35	23	19	31	18	0	0	15	9	0	0	7	4	0	0
Somalia	188	172	133	121	108	80	37	50	45	39	16	24	36	24	7	10
South Africa	67	55	41	33	47	29	51	34	21	11	23	13	9	8	9	8
South Sudan	261	246	101	92	150	63	39	27	66	40	18	18	50	19	8	6
Spain	10	8	3	3	8	3	3	1	5	2	2	1	2	1	1	0
Sri Lanka	23	19	10	8	18	8	6	2	13	6	5	2	6	2	2	1
State of Palestine	47	42	23	19	36	18	3	3	22	11	2	2	7	3	0	0
Sudan	139	124	68	58	82	44	68	57	43	30	36	39	29	9	18	9
Suriname	52	43	22	17	41	18	0	0	23	10	0	0	7	3	0	0
Sweden	8	6	3	3	6	2	1	0	4	2	0	0	1	1	0	0
Switzerland	9	7	5	4	7	4	1	0	4	3	0	0	2	1	0	0
Syrian Arab Republic	40	34	19	16	31	14	14	6	17	9	8	3	9	4	3	2
Tajikistan	112	97	37	30	83	29	17	7	32	15	7	4	12	4	2	1
Thailand	41	33	11	9	30	8	33	6	20	5	22	4	9	5	10	4

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births)									Number of under-five deaths with 90 per cent uncertainty interval (thousands)[a]					
	1990			2017			Annual rate of reduction (ARR) (per cent) 1990-2017			1990			2017		
Country	U5MR	Lower bound	Upper bound	U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound
The former Yugoslav Republic of Macedonia	37	36	38	14	12	16	3.6	3.1	4.2	1	1	1	0	0	0
Timor-Leste	174	157	192	48	30	74	4.8	3.1	6.5	5	5	6	2	1	3
Togo	146	135	157	73	57	93	2.6	1.7	3.5	23	21	24	19	15	24
Tonga	22	19	27	16	10	26	1.2	-0.8	3.1	0	0	0	0	0	0
Trinidad and Tobago	33	28	38	26	15	48	0.8	-1.6	3.1	1	1	1	0	0	1
Tunisia	56	50	64	13	9	19	5.4	3.9	6.9	12	11	14	3	2	4
Turkey	74	70	79	12	10	13	6.9	6.3	7.4	104	97	111	15	13	17
Turkmenistan	84	73	97	47	20	101	2.1	-0.7	5.3	11	9	12	7	3	14
Tuvalu	57	48	68	25	14	44	3.1	0.9	5.2	0	0	0	0	0	0
Uganda	181	171	192	49	40	60	4.8	4.1	5.6	148	140	157	85	70	104
Ukraine	19	17	22	9	8	10	2.9	2.4	3.5	13	12	15	4	4	4
United Arab Emirates	17	14	20	9	8	10	2.2	1.5	2.9	1	1	1	1	1	1
United Kingdom	9	9	10	4	4	5	2.9	2.6	3.0	7	7	7	3	3	4
United Republic of Tanzania	166	156	175	54	43	69	4.1	3.2	5.0	178	168	188	114	91	145
United States	11	11	11	7	6	7	2.0	1.8	2.1	44	43	45	27	26	28
Uruguay	23	23	24	8	8	9	3.8	3.6	4.1	1	1	1	0	0	0
Uzbekistan	72	64	81	23	18	27	4.3	3.7	4.9	51	45	56	15	12	18
Vanuatu	36	30	43	27	17	42	1.0	-0.8	2.8	0	0	0	0	0	0
Venezuela (Bolivarian Republic of)[b]	30	29	31	31	29	33	-0.2	-0.4	0.1	17	16	17	18	18	20
Viet Nam	52	48	56	21	17	26	3.3	2.5	4.1	100	92	109	33	27	41
Yemen	126	118	134	55	38	79	3.0	1.7	4.5	76	72	81	48	33	69
Zambia	185	174	197	60	43	83	4.2	3.0	5.4	64	60	68	38	27	52
Zimbabwe	78	71	84	50	36	68	1.6	0.5	2.9	29	27	32	27	19	36

Estimates of mortality among children under age 5 and children aged 5–14 by Sustainable Development Goal region[c]

Sub-Saharan Africa	182	179	186	76	70	86	3.2	2.8	3.6	3,782	3,710	3,865	2,715	2,500	3,081
Northern Africa and Western Asia	75	73	77	27	25	31	3.7	3.3	4.1	689	674	705	308	279	349
Northern Africa	84	81	87	31	27	37	3.6	3.1	4.2	388	376	400	180	157	209
Western Asia	65	63	68	23	20	28	3.9	3.2	4.5	301	292	312	128	110	155
Central and Southern Asia	124	121	127	43	39	47	3.9	3.5	4.3	4,951	4,834	5,071	1,648	1,504	1,821
Central Asia	72	68	77	23	20	29	4.2	3.4	4.7	113	106	120	37	31	45
Southern Asia	126	123	129	44	40	48	3.9	3.5	4.3	4,838	4,722	4,958	1,612	1,466	1,783
Eastern and South-Eastern Asia	57	54	60	16	14	17	4.8	4.4	5.2	2,304	2,195	2,436	472	434	526
Eastern Asia	51	47	55	9	8	10	6.4	5.8	7.0	1,442	1,335	1,570	168	148	191
South-Eastern Asia	72	70	74	26	23	30	3.8	3.2	4.2	862	839	887	305	271	352
Latin America and the Caribbean	55	53	57	18	17	19	4.2	4.0	4.4	647	628	666	188	181	199
Oceania	35	33	38	23	15	37	1.6	-0.2	3.1	18	17	19	15	10	24
Australia and New Zealand	10	9	10	4	4	4	3.4	3.2	3.6	3	3	3	1	1	2
Oceania (exc. Australia and New Zealand)	74	68	80	48	30	80	1.6	-0.3	3.3	15	14	16	13	8	22
Europe and Northern America	14	14	14	6	6	6	3.3	3.2	3.4	191	189	193	71	69	72
Europe	15	15	16	5	5	6	4.0	3.8	4.1	144	142	146	42	41	43
Northern America	11	11	11	7	6	7	1.9	1.8	2.1	47	46	48	29	28	30
Landlocked developing countries	168	164	172	61	57	68	3.8	3.4	4.0	1,765	1,728	1,807	945	884	1,048
Least developing countries	176	173	179	66	63	74	3.6	3.2	3.8	3,658	3,603	3,721	2,067	1,951	2,296
Small island developing States	79	76	82	42	37	52	2.3	1.6	2.8	94	91	97	51	45	63
World	93	92	95	39	37	42	3.2	2.9	3.4	12,582	12,410	12,782	5,417	5,174	5,846

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

Country	Sex-specific under-five mortality rate (deaths per 1,000 live births) 1990 Male	1990 Female	2017 Male	2017 Female	Infant mortality rate (deaths per 1,000 live births) 1990	2017	Number of infant deaths (thousands)[a] 1990	2017	Neonatal mortality rate (deaths per 1,000 live births) 1990	2017	Number of neonatal deaths (thousands)[a] 1990	2017	Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5) 1990	2017	Number of deaths among children aged 5–14 (thousands)[a] 1990	2017
The former Yugoslav Republic of Macedonia	39	35	15	13	33	12	1	0	17	11	1	0	3	1	0	0
Timor-Leste	180	166	52	44	131	41	4	2	55	21	2	1	26	8	0	0
Togo	155	137	79	67	90	49	14	13	43	25	7	7	38	21	4	5
Tonga	20	25	14	18	19	14	0	0	10	7	0	0	5	3	0	0
Trinidad and Tobago	36	30	29	24	29	23	1	0	21	17	1	0	4	2	0	0
Tunisia	60	53	14	12	44	11	9	2	27	8	6	2	7	3	1	1
Turkey	76	72	12	11	55	10	77	13	34	6	47	8	10	2	12	3
Turkmenistan	94	75	53	41	68	41	9	6	28	21	4	3	7	4	1	0
Tuvalu	61	53	27	22	44	21	0	0	30	16	0	0	10	5	0	0
Uganda	193	169	54	44	107	35	90	62	40	20	35	36	32	14	17	18
Ukraine	22	17	10	8	17	8	11	4	12	5	8	2	5	2	3	1
United Arab Emirates	19	15	10	8	14	8	1	1	8	5	0	0	5	1	0	0
United Kingdom	10	8	5	4	8	4	6	3	5	3	3	2	2	1	1	1
United Republic of Tanzania	172	159	58	50	100	38	110	82	38	21	43	46	30	12	22	19
United States	13	10	7	6	9	6	37	23	6	4	23	15	2	1	9	6
Uruguay	26	20	9	7	20	7	1	0	12	5	1	0	3	2	0	0
Uzbekistan	80	63	26	19	59	20	42	13	31	12	22	8	6	3	3	2
Vanuatu	39	33	29	25	29	23	0	0	16	12	0	0	7	5	0	0
Venezuela (Bolivarian Republic of)[b]	33	27	34	27	25	26	14	15	13	20	7	12	5	3	2	2
Viet Nam	59	44	24	17	37	17	72	26	24	11	46	17	12	3	20	4
Yemen	131	120	59	51	89	43	55	38	44	27	28	24	21	8	8	6
Zambia	194	176	65	55	111	42	39	26	37	22	14	14	29	14	7	7
Zimbabwe	84	71	55	45	51	37	19	19	26	22	10	12	13	14	4	6

Estimates of mortality among children under age 5 and children aged 5–14 by Sustainable Development Goal region[c] (continued)

Sub-Saharan Africa	191	173	81	70	109	52	2,296	1,876	46	27	997	999	41	18	587	499
Northern Africa and Western Asia	78	71	29	25	55	22	512	246	31	14	287	161	11	4	84	44
Northern Africa	87	81	34	29	61	25	282	141	33	16	155	94	13	5	49	24
Western Asia	69	62	25	21	50	19	230	105	28	12	132	67	9	4	35	19
Central and Southern Asia	122	126	43	43	88	35	3,531	1,341	56	26	2,276	991	19	6	607	237
Central Asia	80	65	26	20	59	21	92	32	28	12	44	18	7	3	8	4
Southern Asia	124	128	44	43	89	36	3,438	1,309	57	26	2,232	973	20	6	599	233
Eastern and South-Eastern Asia	60	54	17	14	44	13	1,747	391	28	8	1,105	234	9	3	317	100
Eastern Asia	53	48	10	8	40	8	1,121	142	28	5	772	84	7	2	162	41
South-Eastern Asia	78	66	29	23	52	21	626	249	28	13	333	150	14	5	155	58
Latin America and the Caribbean	59	50	20	16	44	15	513	159	23	10	268	103	6	3	63	32
Oceania	38	32	25	21	27	18	14	12	14	10	7	7	6	4	3	2
Australia and New Zealand	11	8	4	4	8	3	2	1	5	2	1	1	2	1	1	0
Oceania (exc. Australia and New Zealand)	79	69	52	44	55	38	11	11	27	21	6	6	13	8	2	2
Europe and Northern America	16	12	6	5	12	5	159	60	7	3	98	39	3	1	42	16
Europe	17	13	6	5	13	5	120	35	8	3	73	22	3	1	32	10
Northern America	12	10	7	6	9	6	40	25	6	4	24	16	2	1	9	6
Landlocked developing countries	176	159	65	56	101	42	1,083	658	48	25	527	403	37	14	278	181
Least developed countries	183	168	71	61	109	47	2,298	1,479	52	26	1,129	838	39	15	567	375
Small island developing States	84	74	46	39	56	33	67	40	27	20	32	24	13	7	13	8
World	**96**	**91**	**41**	**37**	**65**	**29**	**8,772**	**4,084**	**37**	**18**	**5,038**	**2,533**	**15**	**7**	**1,702**	**929**

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

Estimates of mortality among children under age 5 and children aged 5–14 by UNICEF region[c]

Region	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births)									Number of under-five deaths with 90 per cent uncertainty interval (thousands)					
	1990			2017			Annual rate of reduction (ARR)(per cent) 1990–2017			1990			2017		
	U5MR	Lower bound	Upper bound	U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound
Sub-Saharan Africa	**180**	177	184	**76**	70	86	**3.2**	2.8	3.5	**3,889**	3,816	3,972	**2,797**	2,581	3,163
West and Central Africa	**199**	193	205	**91**	80	108	**2.9**	2.2	3.4	**2,040**	1,979	2,106	**1,718**	1,506	2,037
Eastern and Southern Africa	**164**	160	168	**59**	55	67	**3.8**	3.3	4.1	**1,848**	1,806	1,896	**1,078**	997	1,227
Middle East and North Africa	**65**	64	67	**23**	21	27	**3.9**	3.3	4.3	**557**	543	572	**226**	202	260
South Asia	**129**	126	133	**45**	41	50	**3.9**	3.5	4.3	**4,733**	4,617	4,852	**1,592**	1,447	1,763
East Asia and Pacific	**57**	54	60	**16**	15	18	**4.7**	4.3	5.1	**2,322**	2,213	2,454	**487**	449	542
Latin America and Caribbean	**55**	53	57	**18**	17	19	**4.2**	4.0	4.4	**647**	628	666	**188**	181	199
North America	**11**	11	11	**7**	6	7	**1.9**	1.8	2.1	**47**	46	48	**29**	28	30
Europe and Central Asia	**31**	30	32	**9**	9	10	**4.6**	4.2	4.8	**388**	378	398	**98**	93	107
Eastern Europe and Central Asia	**47**	45	48	**13**	12	15	**4.7**	4.3	5.0	**330**	321	341	**79**	74	88
Western Europe	**11**	10	11	**4**	4	4	**3.7**	3.6	3.7	**58**	57	58	**19**	19	20
World	**93**	**92**	**95**	**39**	**37**	**42**	**3.2**	**2.9**	**3.4**	**12,582**	**12,410**	**12,782**	**5,417**	**5,174**	**5,846**

Estimates of mortality among children under age 5 and children aged 5–14 by World Health Organization region[c]

Region	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births)									Number of under-five deaths with 90 per cent uncertainty interval (thousands)					
	1990			2017			Annual rate of reduction (ARR)(per cent) 1990–2017			1990			2017		
	U5MR	Lower bound	Upper bound	U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound
Africa	**178**	174	181	**74**	68	84	**3.3**	2.8	3.6	**3,761**	3,688	3,842	**2,658**	2,442	3,014
Americas	**43**	42	44	**14**	14	15	**4.1**	3.9	4.2	**694**	675	714	**217**	210	228
Eastern Mediterranean	**102**	100	105	**50**	43	60	**2.7**	2.0	3.2	**1,371**	1,342	1,404	**841**	734	1,007
Europe	**31**	30	32	**9**	8	10	**4.6**	4.3	4.8	**389**	379	399	**99**	93	108
South-East Asia	**119**	116	122	**36**	33	39	**4.4**	4.1	4.7	**4,626**	4,512	4,747	**1,298**	1,190	1,410
Western Pacific	**52**	49	56	**13**	12	14	**5.2**	4.8	5.6	**1,737**	1,630	1,866	**301**	276	335
World	**93**	**92**	**95**	**39**	**37**	**42**	**3.2**	**2.9**	**3.4**	**12,582**	**12,410**	**12,782**	**5,417**	**5,174**	**5,846**

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

Estimates of mortality among children under age 5 and children aged 5–14 by UNICEF region[c] (continued)

	Sex-specific under-five mortality rate (deaths per 1,000 live births)				Infant mortality rate (deaths per 1,000 live births)		Number of infant deaths (thousands)		Neonatal mortality rate (deaths per 1,000 live births)		Number of neonatal deaths (thousands)		Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)		Number of deaths among children aged 5–14 (thousands)	
	1990		2017													
Region	**Male**	**Female**	**Male**	**Female**	**1990**	**2017**	**1990**	**2017**	**1990**	**2017**	**1990**	**2017**	**1990**	**2017**	**1990**	**2017**
Sub-Saharan Africa	189	171	81	70	108	52	2,364	1,933	46	27	1,033	1,038	40	18	604	508
West and Central Africa	208	189	97	85	116	61	1,210	1,166	49	30	524	586	41	22	286	317
Eastern and Southern Africa	173	155	64	54	101	42	1,155	767	43	24	509	453	40	13	319	191
Middle East and North Africa	68	63	25	21	50	19	426	188	28	13	241	124	9	4	66	34
South Asia	127	132	45	45	92	36	3,357	1,292	59	27	2,184	961	21	7	585	229
East Asia and Pacific	60	53	17	14	43	13	1,761	403	27	8	1,112	241	9	3	319	102
Latin America and Caribbean	59	50	20	16	44	15	513	159	23	10	268	103	6	3	63	32
North America	12	10	7	6	9	6	40	25	6	4	24	16	2	1	9	6
Europe and Central Asia	34	28	10	8	25	8	312	85	14	5	175	51	4	2	55	18
Eastern Europe and Central Asia	50	43	15	12	38	11	264	69	21	7	145	39	6	2	42	13
Western Europe	12	9	4	4	9	3	48	16	6	2	30	11	2	1	13	4
World	**96**	**91**	**41**	**37**	**65**	**29**	**8,772**	**4,084**	**37**	**18**	**5,038**	**2,533**	**15**	**7**	**1,702**	**929**

Estimates of mortality among children under age 5 and children aged 5–14 by World Health Organization region[c] (continued)

	Sex-specific under-five mortality rate (deaths per 1,000 live births)				Infant mortality rate (deaths per 1,000 live births)		Number of infant deaths (thousands)		Neonatal mortality rate (deaths per 1,000 live births)		Number of neonatal deaths (thousands)		Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)		Number of deaths among children aged 5–14 (thousands)	
	1990		2017													
Region	**Male**	**Female**	**Male**	**Female**	**1990**	**2017**	**1990**	**2017**	**1990**	**2017**	**1990**	**2017**	**1990**	**2017**	**1990**	**2017**
Africa	186	168	79	68	106	51	2,292	1,844	45	27	999	988	39	17	586	491
Americas	47	39	16	13	34	12	552	184	18	8	293	119	5	3	72	38
Eastern Mediterranean	105	99	53	47	75	39	1,018	663	43	27	595	458	13	8	131	110
Europe	33	28	10	8	25	8	313	85	14	5	176	51	4	2	55	18
South-East Asia	117	120	36	36	84	29	3,261	1,057	53	21	2,088	767	20	6	638	207
Western Pacific	54	49	14	12	40	10	1,333	249	27	6	885	149	8	3	220	65
World	**96**	**91**	**41**	**37**	**65**	**29**	**8,772**	**4,084**	**37**	**18**	**5,038**	**2,533**	**15**	**7**	**1,702**	**929**

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

Estimates of mortality among children under age 5 and children aged 5–14 by World Bank region[c]

Region	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births)									Number of under-five deaths with 90 per cent uncertainty interval (thousands)					
	1990			2017			Annual rate of reduction (ARR)(per cent) 1990–2017			1990			2017		
	U5MR	Lower bound	Upper bound	U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound
East Asia and Pacific	**57**	54	60	**16**	15	18	**4.7**	4.3	5.1	**2,322**	2,213	2,454	**487**	449	542
Europe and Central Asia	**31**	30	32	**9**	9	10	**4.6**	4.2	4.8	**388**	378	398	**98**	93	107
Latin America and Caribbean	**55**	53	57	**18**	17	19	**4.2**	4.0	4.4	**647**	628	666	**188**	181	199
Middle East and North Africa	**65**	64	67	**23**	21	27	**3.9**	3.3	4.3	**559**	546	575	**227**	203	261
North America	**11**	11	11	**7**	6	7	**1.9**	1.8	2.1	**47**	46	48	**29**	28	30
South Asia	**129**	126	133	**45**	41	50	**3.9**	3.5	4.3	**4,733**	4,617	4,852	**1,592**	1,447	1,763
Sub-Saharan Africa	**181**	177	184	**76**	70	86	**3.2**	2.8	3.5	**3,886**	3,814	3,969	**2,795**	2,579	3,161
Low income	**180**	176	183	**69**	65	78	**3.5**	3.1	3.8	**2,674**	2,626	2,731	**1,709**	1,600	1,912
Lower middle income	**122**	119	124	**49**	45	54	**3.4**	3.0	3.7	**7,250**	7,120	7,390	**3,138**	2,892	3,485
Upper middle income	**52**	50	55	**14**	13	15	**4.9**	4.6	5.2	**2,468**	2,360	2,599	**497**	472	531
High income	**13**	13	14	**5**	5	6	**3.4**	3.2	3.5	**189**	185	194	**74**	72	76
World	**93**	**92**	**95**	**39**	**37**	**42**	**3.2**	**2.9**	**3.4**	**12,582**	**12,410**	**12,782**	**5,417**	**5,174**	**5,846**

Estimates of mortality among children under age 5 and children aged 5–14 by United Nations Population Division region[c]

Region	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births)									Number of under-five deaths with 90 per cent uncertainty interval (thousands)					
	1990			2017			Annual rate of reduction (ARR)(per cent) 1990–2017			1990			2017		
	U5MR	Lower bound	Upper bound	U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound	Under-five deaths	Lower bound	Upper bound
More developed regions	**13**	13	13	**6**	5	6	**3.2**	3.2	3.4	**202**	200	205	**75**	73	76
Less developed regions	**103**	102	105	**43**	41	46	**3.3**	3.0	3.4	**12,380**	12,208	12,580	**5,342**	5,098	5,772
Least developed countries	**176**	173	179	**66**	63	74	**3.6**	3.2	3.8	**3,658**	3,603	3,721	**2,067**	1,951	2,296
Excluding least developed countries	**88**	86	89	**35**	32	39	**3.4**	3.0	3.7	**8,722**	8,557	8,911	**3,275**	3,034	3,612
Excluding China	**116**	115	118	**48**	46	52	**3.3**	3.0	3.5	**10,981**	10,844	11,141	**5,187**	4,944	5,615
Sub-Saharan Africa	**182**	179	186	**76**	70	86	**3.2**	2.8	3.6	**3,782**	3,710	3,865	**2,715**	2,500	3,081
Africa	**165**	162	168	**70**	65	79	**3.2**	2.7	3.5	**4,170**	4,096	4,254	**2,895**	2,680	3,263
Asia	**89**	87	91	**30**	28	33	**4.0**	3.7	4.3	**7,556**	7,399	7,732	**2,249**	2,102	2,436
Europe	**15**	15	16	**5**	5	6	**4.0**	3.8	4.1	**144**	142	146	**42**	41	43
Latin America and the Caribbean	**55**	53	57	**18**	17	19	**4.2**	4.0	4.4	**647**	628	666	**188**	181	199
Northern America	**11**	11	11	**7**	6	7	**1.9**	1.8	2.1	**47**	46	48	**29**	28	30
Oceania	**35**	33	38	**23**	15	37	**1.6**	-0.2	3.1	**18**	17	19	**15**	10	24
World	**93**	**92**	**95**	**39**	**37**	**42**	**3.2**	**2.9**	**3.4**	**12,582**	**12,410**	**12,782**	**5,417**	**5,174**	**5,846**

Definitions

Under-five mortality rate: Probability of dying between birth and exactly 5 years of age, expressed per 1,000 live births.
Infant mortality rate: Probability of dying between birth and exactly one year of age, expressed per 1,000 live births.
Neonatal mortality rate: Probability of dying in the first 28 days of life, expressed per 1,000 live births.
Probability of dying among children aged 5–14: Probability of dying at age 5–14 years expressed per 1,000 children aged 5.

Note: Upper and lower bounds refer to the 90 per cent uncertainty intervals for the estimates. The estimates generated by the United Nations Inter-agency Group for Child Mortality Estimation are not necessarily the official statistics of United Nations Member States, which may use alternative rigorous methods.

a. Numbers of deaths are rounded to thousands. A zero indicates that the number of deaths is below 500. Unrounded numbers of deaths are available for download on childmortality.org.

b. The most recent official neonatal, infant and under-five mortality rates reported by the Instituto Nacional de Estadística and Ministerio del Poder Popular para la Salud are 10, 15 and 17 deaths per 1,000 live births, respectively, for 2017.

c. The sum of the number of deaths by region may differ from the world total because of rounding.

Country, regional and global estimates of mortality among children under age 5 and children aged 5–14

Estimates of mortality among children under age 5 and children aged 5–14 by World Bank region[c] (continued)

	Sex-specific under-five mortality rate (deaths per 1,000 live births)				Infant mortality rate (deaths per 1,000 live births)		Number of infant deaths (thousands)		Neonatal mortality rate (deaths per 1,000 live births)		Number of neonatal deaths (thousands)		Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)		Number of deaths among children aged 5–14 (thousands)	
	1990		2017													
Region	Male	Female	Male	Female	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017
East Asia and Pacific	60	53	17	14	43	13	1,761	403	27	8	1,112	241	9	3	319	102
Europe and Central Asia	34	28	10	8	25	8	312	85	14	5	175	51	4	2	55	18
Latin America and Caribbean	59	50	20	16	44	15	513	159	23	10	268	103	6	3	63	32
Middle East and North Africa	68	63	25	21	50	19	428	190	28	13	243	125	9	4	67	34
North America	12	10	7	6	9	6	40	25	6	4	24	16	2	1	9	6
South Asia	127	132	45	45	92	36	3,357	1,292	59	27	2,184	961	21	7	585	229
Sub-Saharan Africa	190	171	81	70	108	52	2,362	1,932	46	27	1,032	1,038	40	18	604	508
Low income	187	171	74	64	108	49	1,642	1,215	48	26	748	671	42	17	429	327
Lower middle income	123	120	50	46	84	37	5,034	2,388	49	24	2,971	1,566	20	8	954	487
Upper middle income	55	49	15	13	41	12	1,938	419	26	7	1,221	255	7	3	281	100
High income	15	12	6	5	11	5	158	63	7	3	96	41	3	1	37	15
World	**96**	**91**	**41**	**37**	**65**	**29**	**8,772**	**4,084**	**37**	**18**	**5,038**	**2,533**	**15**	**7**	**1,702**	**929**

Estimates of mortality among children under age 5 and children aged 5–14 by United Nations Population Division region[c] (continued)

	Sex-specific under-five mortality rate (deaths per 1,000 live births)				Infant mortality rate (deaths per 1,000 live births)		Number of infant deaths (thousands)		Neonatal mortality rate (deaths per 1,000 live births)		Number of neonatal deaths (thousands)		Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)		Number of deaths among children aged 5–14 (thousands)	
	1990		2017													
Region	Male	Female	Male	Female	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017	1990	2017
More developed regions	15	12	6	5	11	5	168	63	7	3	102	40	3	1	45	17
Less developed regions	106	100	45	41	71	32	8,604	4,021	40	20	4,935	2,493	17	8	1,657	912
Least developed countries	183	168	71	61	109	47	2,298	1,479	52	26	1,129	838	39	15	567	375
Excluding least developed countries	89	86	36	33	63	27	6,307	2,542	38	18	3,806	1,655	13	6	1,090	537
Excluding China	119	113	50	45	79	36	7,517	3,889	43	22	4,182	2,415	20	9	1,505	873
Sub-Saharan Africa	191	173	81	70	109	52	2,296	1,876	46	27	997	999	41	18	587	499
Africa	173	157	75	65	100	48	2,579	2,017	44	26	1,151	1,093	35	16	636	523
Asia	90	88	31	29	65	25	5,508	1,837	41	17	3,513	1,292	14	5	958	356
Europe	17	13	6	5	13	5	120	35	8	3	73	22	3	1	32	10
Latin America and the Caribbean	59	50	20	16	44	15	513	159	23	10	268	103	6	3	63	32
Northern America	12	10	7	6	9	6	40	25	6	4	24	16	2	1	9	6
Oceania	38	32	25	21	27	18	14	12	14	10	7	7	6	4	3	2
World	**96**	**91**	**41**	**37**	**65**	**29**	**8,772**	**4,084**	**37**	**18**	**5,038**	**2,533**	**15**	**7**	**1,702**	**929**

Regional Classifications

The regional classifications that are referred to in the report and for which aggregate data are provided in the statistical table are Sustainable Development Goal regions (see below). Aggregates presented for member organizations of the United Nations Inter-agency Group for Child Mortality Estimation may differ and regional classifications with the same name from different member organizations (e.g., "Sub-Saharan Africa") may include different countries.

Whether a country belongs to the group of Least developed countries (LDC), Landlocked developing countries (LLDC) and/or Small island developing States (SIDS) is indicated in the brackets after the country name.

Sub-Saharan Africa

Angola (LDC), Benin (LDC), Botswana (LLDC), Burkina Faso (LDC, LLDC), Burundi (LDC, LLDC), Cabo Verde (SIDS), Cameroon, Central African Republic (LDC, LLDC), Chad (LDC, LLDC), Comoros (LDC, SIDS), Congo, Côte d'Ivoire, Democratic Republic of the Congo (LDC), Djibouti (LDC), Equatorial Guinea (LDC), Eritrea (LDC), Eswatini (LLDC), Ethiopia (LDC, LLDC), Gabon, Gambia (LDC), Ghana, Guinea (LDC), Guinea-Bissau (LDC, SIDS), Kenya, Lesotho (LDC, LLDC), Liberia (LDC), Madagascar (LDC), Malawi (LDC, LLDC), Mali (LDC, LLDC), Mauritania (LDC), Mauritius (SIDS), Mozambique (LDC), Namibia, Niger (LDC, LLDC), Nigeria, Rwanda (LDC, LLDC), Sao Tome and Principe (SIDS), Senegal (LDC), Seychelles (SIDS), Sierra Leone (LDC), Somalia (LDC), South Africa, South Sudan (LDC, LLDC), Togo (LDC), Uganda (LDC, LLDC), United Republic of Tanzania (LDC), Zambia (LDC, LLDC), Zimbabwe (LLDC)

Northern Africa and Western Asia

Northern Africa

Algeria, Egypt, Libya, Morocco, Sudan (LDC), Tunisia

Western Asia

Armenia (LLDC), Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, Turkey, United Arab Emirates, Yemen (LDC)

Central and Southern Asia

Central Asia

Kazakhstan (LLDC), Kyrgyzstan (LLDC), Tajikistan (LLDC), Turkmenistan (LLDC), Uzbekistan (LLDC)

Southern Asia

Afghanistan (LDC, LLDC), Bangladesh (LDC), Bhutan (LLDC), India, Iran (Islamic Republic of), Maldives (SIDS), Nepal (LDC, LLDC), Pakistan, Sri Lanka

Eastern and South-Eastern Asia

Eastern Asia

China, Democratic People's Republic of Korea, Japan, Mongolia (LLDC), Republic of Korea

South-Eastern Asia

Brunei Darussalam, Cambodia (LDC), Indonesia, Lao People's Democratic Republic (LDC, LLDC), Malaysia, Myanmar (LDC), Philippines, Singapore (SIDS), Thailand, Timor-Leste (LDC, SIDS), Viet Nam

Latin America and the Caribbean

Antigua and Barbuda (SIDS), Argentina, Bahamas (SIDS), Barbados (SIDS), Belize (SIDS), Bolivia (Plurinational State of) (LLDC), Brazil, Chile, Colombia, Costa Rica, Cuba (SIDS), Dominica (SIDS), Dominican Republic (SIDS), Ecuador, El Salvador, Grenada (SIDS), Guatemala, Guyana (SIDS), Haiti (LDC, SIDS), Honduras, Jamaica (SIDS), Mexico, Nicaragua, Panama, Paraguay (LLDC), Peru, Saint Kitts and Nevis (SIDS), Saint Lucia (SIDS), Saint Vincent and the Grenadines (SIDS), Suriname (SIDS), Trinidad and Tobago (SIDS), Uruguay, Venezuela (Bolivarian Republic of)

Oceania

Australia and New Zealand

Australia, New Zealand

Oceania (excluding Australia and New Zealand)

Cook Islands (SIDS), Fiji (SIDS), Kiribati (LDC, SIDS), Marshall Islands (SIDS), Micronesia (Federated States of) (SIDS), Nauru (SIDS), Niue (SIDS), Palau (SIDS), Papua New Guinea (SIDS), Samoa (SIDS), Solomon Islands (LDC, SIDS), Tonga (SIDS), Tuvalu (LDC, SIDS), Vanuatu (LDC, SIDS)

Europe and Northern America

Northern America

Canada, United States of America

Europe

Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova (LLDC), Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia (LLDC), Ukraine, United Kingdom of Great Britain and Northern Ireland

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The UN IGME's independent Technical Advisory Group, comprising leading academic scholars and independent experts in demography and biostatistics, provides technical guidance on estimation methods, technical issues and strategies for data analysis and data quality assessment.

The UN IGME updates its child mortality estimates annually after reviewing newly available data and assessing data quality. This report contains the latest UN IGME estimates of child mortality at the country, regional and global levels. Country-specific estimates and the data used to derive them are available at <www.childmortality.org>.

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