Levels & Trends in
# Child Mortality

Report 2017

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

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CHILD SURVIVAL: KEY FACTS AND FIGURES

- The world has made substantial progress in reducing child mortality in the past several decades. The total number of under-five deaths dropped to 5.6 (5.4, 6.0)[1] million in 2016 from 12.6 (12.4, 12.8) million in 1990 – 15,000 every day compared with 35,000 in 1990.

- Globally, the under-five mortality rate dropped to 41 (39, 44) deaths per 1,000 live births in 2016 from 93 (92, 95) in 1990 – a 56 (53, 58) per cent decline.

- Globally, 2.6 (2.5, 2.8) million newborns died in 2016 – or 7,000 every day. Neonatal deaths accounted for 46 per cent of all under-five deaths, increasing from 41 per cent in 2000.

- The largest number of newborn deaths occurred in Southern Asia (39 per cent), followed by sub-Saharan Africa (38 per cent). Five countries accounted for half of all newborn deaths: India, Pakistan, Nigeria, the Democratic Republic of the Congo and Ethiopia.

- The neonatal mortality rate fell by 49 per cent from 37 (36, 38) deaths per 1,000 live births in 1990 to 19 (18, 20) in 2016.

- Children face the highest risk of dying in their first month of life, at a rate of 19 deaths per 1,000 live births. By comparison, the probability of dying after the first month but before reaching age 1 is 12 and after age 1 but before turning 5 is 11.

- Progress is slower in reducing neonatal mortality rates than in reducing mortality rates in children aged 1–59 months. While neonatal mortality declined by 49 per cent, the mortality in children aged 1–59 months declined by 62 per cent from 1990 to 2016.

- Disparities in child survival exist across regions and countries: in sub-Saharan Africa, approximately 1 child in 13 dies before his or her fifth birthday, while in the world's high-income countries the ratio is 1 in 189. Among newborns in sub-Saharan Africa, about 1 child in 36 dies in the first month, while in the world's high-income countries the ratio is 1 in 333.

- Many lives can be saved if the gaps across countries are closed. If all countries had reached an under-five mortality rate at or below the average rate of high-income countries – 5.3 deaths per 1,000 live births – 87 per cent of under-five deaths could have been averted, and almost 5 million children's lives could have been saved in 2016.

- If current trends continue with more than 50 countries falling short of the Sustainable Development Goal (SDG) target on child survival, some 60 million children under age 5 will die between 2017 and 2030 – and half of them will be newborns.

- If every country achieves the SDG target on child survival by 2030, an additional 10 million lives of children under age 5 will be saved throughout the period 2017–2030 – about half of them will be newborns.

- Most under-five deaths are caused by diseases that are readily preventable or treatable with proven, cost-effective interventions. Infectious diseases and neonatal complications are responsible for the vast majority of under-five deaths globally.

- The probability of dying among children aged 5–14 was 7.5 (7.2, 8.3) deaths per 1,000 children aged 5 in 2016 – substantially lower than among younger children. Still 1 (0.9, 1.1) million children aged 5–14 died in 2016. This is equivalent to 3,000 children in this age group dying every day. Among children aged 5–14, communicable diseases are a less prominent cause of death than among younger children, while other causes including injuries and non-communicable diseases become important.

Introduction

Every year, millions of children under 5 years of age die, mostly from preventable causes such as pneumonia, diarrhoea and malaria. In almost half of the cases, malnutrition plays a role, while unsafe water, sanitation and hygiene are also significant contributing factors. For this reason, child mortality is a key indicator not only for child health and well-being, but for overall progress towards the Sustainable Development Goals (SDGs).

With the end of the era of the Millennium Development Goals, the international community agreed on a new framework – the SDGs. The SDG target for child mortality represents a renewed commitment to the world's children: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 deaths per 1,000 live births and under-five mortality to at least as low as 25 deaths per 1,000 live births.

The world made substantial progress in reducing child mortality in the past few decades. Globally, the under-five mortality rate dropped from 93 deaths per 1,000 live births in 1990 to 41 in 2016. Progress in reducing child mortality has been accelerated in the 2000–2016 period compared with the 1990s – globally, the annual rate of reduction in the under-five mortality rate has increased from 1.9 per cent in 1990–2000 to 4.0 per cent in 2000–2016. The remarkable progress in improving child survival since 2000 has saved the lives of 50 million children under age 5 – children who would have died had under-five mortality remained at the same level as in 2000 in each country.

Despite the substantial progress in reducing child mortality, child survival remains an urgent concern. In 2016, 5.6 million children died before their fifth birthday – among them 2.6 million (46 per cent) died in the first month of life. It is unacceptable that 15,000 children die every day, mostly from preventable causes and treatable diseases, even though the knowledge and technologies for life-saving interventions are available.

Inequities in child mortality across and within countries remain large. At the country level, the under-five mortality rate ranged from a high of 133 deaths per 1,000 live births to a low of 2 deaths per 1,000 live births in 2016. Many countries still have very high rates – particularly in sub-Saharan Africa, home to all six countries with an under-five mortality rate above 100 deaths per 1,000 live births. Hypothetically, if all countries had reached an under-five mortality rate at or below the average rate of high-income countries – 5.3 deaths per 1,000 live births – the toll of under-five deaths in 2016 would have been 0.7 million. In other words, almost 5 million deaths (87 per cent of the total under-five deaths)

could have been prevented in 2016. Reducing inequities and reaching the most vulnerable newborns and children as well as their mothers are important priorities to achieve the SDG targets on ending preventable child deaths.

While the mortality risk for children aged 5–14 is about one fifth of the risk of dying for children under age 5, still about 1 million children aged 5–14 died in 2016. Public health interventions need to address the particular health risks for this age group, which differ from the primary risks among younger children. Special attention needs to be paid to sub-Saharan Africa where the probability that a child aged 5 dies before reaching his or her fifteenth birthday (19 deaths per 1,000 children aged 5) is 17 times higher than the average in high-income countries (1.1 deaths per 1,000 children aged 5).

Evidence-based estimation of child mortality is a cornerstone for tracking progress towards child survival goals and identifying priority areas to accelerate progress towards eliminating preventable child deaths. Reliable estimates are crucial for planning national and global health strategies, policies and interventions on child health and well-being. In the context of monitoring child survival, the United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) updates child mortality estimates annually. This report presents the group's latest estimates of under-five, infant and neonatal mortality up to the year 2016, and assesses progress at the country, regional and global levels. The report also presents, for the first time, the mortality estimates for children aged 5–14 generated by UN IGME. In addition, the report provides an overview on the estimation methods used for child mortality indicators.

Levels and Trends in Child Mortality

Mortality among children under age 5

Under-five mortality

The world has made substantial progress in child survival since 1990. The global under-five mortality rate declined by 56 per cent (53, 58), from 93 (92, 95) deaths per 1,000 live births in 1990 to 41 (39, 44) in 2016 (Table 1 and Figure 1). The majority of the regions in the world and 142 out of 195 countries at least halved their under-five mortality rate. Among all countries, more than a third (67) cut their under-five mortality by two thirds – 28 of them are low- or lower-middle-income countries, indicating that improving child survival is possible even in resource-constrained settings.

Despite substantial progress, improving child survival remains a matter of urgent concern. In 2016, an estimated 5.6 (5.4, 6.0) million children died before reaching their fifth birthday (Table 2), mostly from preventable diseases. This translates to 15,000 under-five deaths per day, an intolerably high number of largely preventable child deaths.

The burden of under-five deaths remains unevenly distributed. About 80 per cent of under-five deaths occur in two regions, sub-Saharan Africa and Southern Asia. Six countries account for half of the global under-five deaths, namely, India, Nigeria, Pakistan, the Democratic Republic of the Congo, Ethiopia and China. India and Nigeria alone account for almost a

| TABLE 1 | Levels and trends in the under-five mortality rate, by Sustainable Development Goal region, 1990-2016 |

	Under-five mortality rate (deaths per 1,000 live births)							Decline (per cent) 1990-2016	Annual rate of reduction (per cent)		
Region	1990	1995	2000	2005	2010	2015	2016		1990-2016	1990-2000	2000-2016
Northern America and Europe	14	12	10	8	7	6	6	59	3.5	3.8	3.3
Northern America	11	9	8	8	7	7	6	41	2.0	2.8	1.5
Europe	15	13	10	8	7	6	5	65	4.0	3.9	4.1
Latin America and the Caribbean	55	44	33	26	25	18	18	68	4.4	5.0	4.0
Central Asia and Southern Asia	124	108	91	75	60	48	46	63	3.8	3.1	4.3
Central Asia	73	74	64	49	37	28	26	64	3.9	1.2	5.6
Southern Asia	126	109	92	76	61	49	47	63	3.8	3.2	4.2
Eastern Asia and South-Eastern Asia	57	50	40	29	22	17	16	72	4.9	3.6	5.7
Eastern Asia	51	45	35	23	15	10	10	81	6.4	3.9	8.0
South-Eastern Asia	72	59	49	40	33	28	27	63	3.8	3.9	3.8
Western Asia and Northern Africa	75	62	51	41	33	29	28	62	3.7	3.9	3.6
Western Asia	66	54	43	34	27	25	24	63	3.8	4.2	3.6
Northern Africa	84	71	60	49	40	34	33	61	3.6	3.4	3.8
Sub-Saharan Africa	183	175	157	128	102	82	79	57	3.2	1.5	4.3
Oceania	35	33	33	31	27	24	23	35	1.6	0.6	2.3
Oceania excluding Australia and New Zealand	74	69	66	63	57	50	49	34	1.6	1.1	1.9
Australia and New Zealand	10	7	6	6	5	4	4	58	3.4	4.1	2.9
Least developed countries	176	160	139	111	89	71	68	61	3.6	2.4	4.4
Landlocked developing countries	167	158	141	111	85	66	63	62	3.7	1.7	5.0
Small island developing States	79	70	62	56	79	43	42	47	2.4	2.4	2.4
World	**93**	**87**	**78**	**64**	**52**	**42**	**41**	**56**	**3.2**	**1.9**	**4.0**

Note: All calculations are based on unrounded numbers.

Levels and trends in the number of deaths of children under age 5, by Sustainable Development Goal region, 1990-2016

Region	Under-five deaths (thousands)							Decline (per cent) 1990-2016	Share of global under-five deaths (per cent)	
	1990	1995	2000	2005	2010	2015	2016		1990	2016
Northern America and Europe	191	144	112	97	84	72	71	63	1.5	1.3
Northern America	47	40	35	35	32	28	28	41	0.4	0.5
Europe	144	104	77	62	52	44	43	70	1.1	0.8
Latin America and the Caribbean	652	513	387	293	270	194	187	71	5.2	3.3
Central Asia and Southern Asia	4,950	4,322	3,645	2,997	2,394	1,859	1,775	64	39.3	31.5
Central Asia	113	106	78	61	54	44	41	63	0.9	0.7
Southern Asia	4,836	4,217	3,566	2,936	2,339	1,815	1,734	64	38.4	30.7
Eastern Asia and South-Eastern Asia	2,312	1,688	1,203	881	675	522	495	79	18.3	8.8
Eastern Asia	1,446	1,001	646	413	286	197	180	88	11.5	3.2
South-Eastern Asia	866	687	558	468	390	326	314	64	6.9	5.6
Western Asia and Northern Africa	689	568	463	392	354	330	323	53	5.5	5.7
Western Asia	302	254	207	168	146	137	135	55	2.4	2.4
Northern Africa	388	314	256	223	208	193	188	52	3.1	3.3
Sub-Saharan Africa	3,787	4,040	4,040	3,667	3,220	2,838	2,777	27	30.1	49.2
Oceania	18	18	18	18	17	15	15	17	0.1	0.3
Oceania excluding Australia and New Zealand	15	15	16	16	15	14	13	10	0.1	0.2
Australia and New Zealand	3	2	2	2	2	2	1	50	0.0	0.0
Least developed countries	3,669	3,639	3,437	2,966	2,544	2,154	2,101	43	29.1	37.2
Landlocked developing countries	1,763	1,789	1,708	1,450	1,204	1,001	972	45	14.0	17.2
Small island developing States	94	84	74	66	96	52	51	46	0.7	0.9
World	**12,598**	**11,293**	**9,868**	**8,344**	**7,014**	**5,831**	**5,642**	**55**	**100.0**	**100.0**

Note: All calculations are based on unrounded numbers.

Under-five mortality declined in all regions between 1990 and 2016

Under-five mortality rate by Sustainable Development Goal region, 1990 and 2016
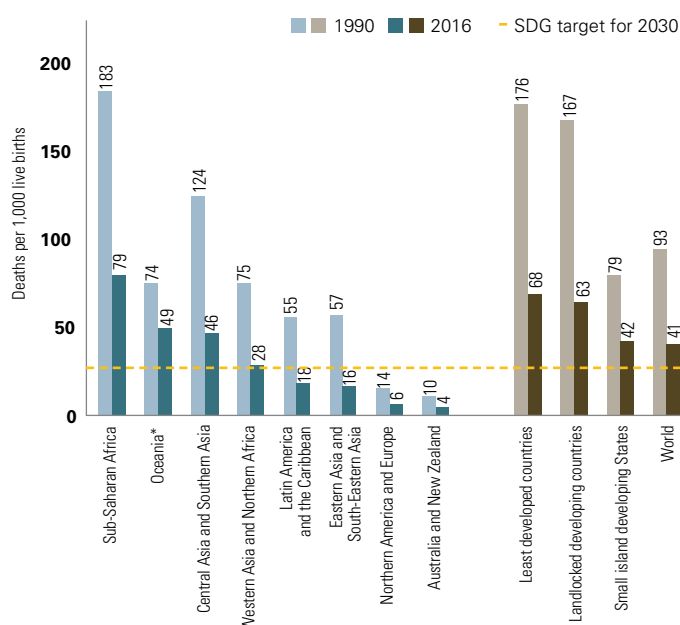
Note: Oceania* refers to Oceania excluding Australia and New Zealand.

third (32 per cent) of the global under-five deaths.

Huge disparities in under-five mortality exist across regions and countries. Sub-Saharan Africa remains the region with the highest under-five mortality rate in the world. In 2016, the region had an average under-five mortality rate of 79 deaths per 1,000 live births. This translates to 1 child in 13 dying before his or her fifth birthday – 15 times higher than the average ratio of 1 in 189 in high-income countries, or 20 times higher than the ratio of 1 in 250 in the region of Australia and New Zealand. At the country level, the under-five mortality rates in 2016 ranged from 2 deaths per 1,000 live births to 133 (Map 1). The risk of dying for a child born in the highest-mortality country is about 60 times higher than in the lowest-mortality country. All six countries with mortality rates above 100 deaths per 1,000 live births are in sub-Saharan Africa.

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, 2016
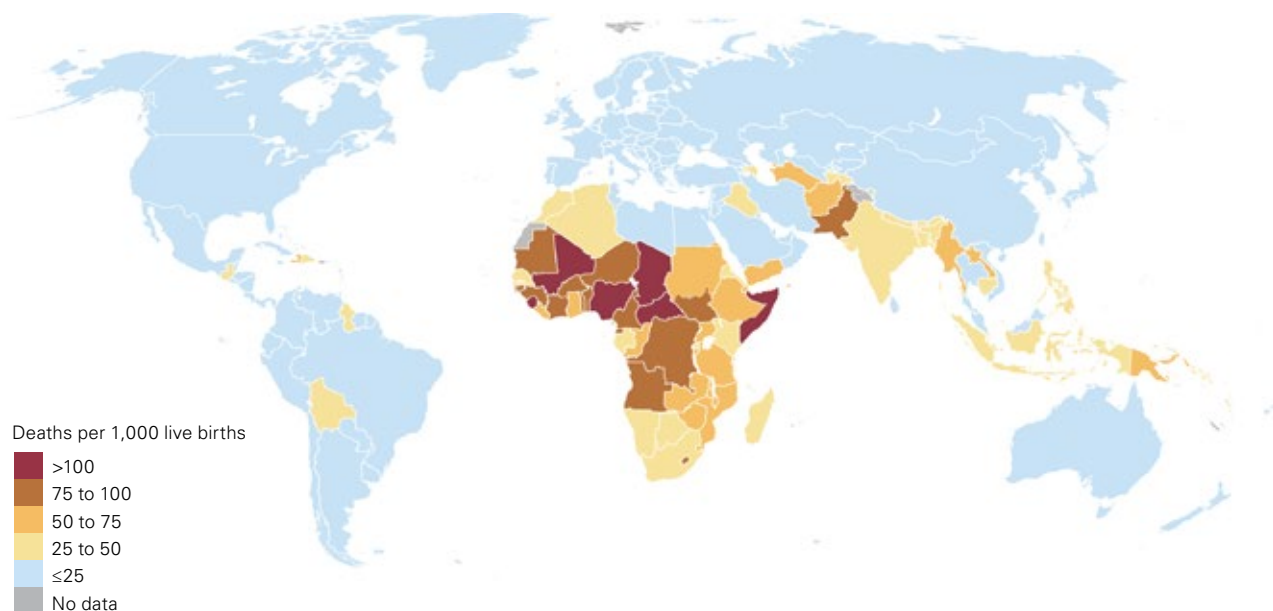
Deaths per 1,000 live births

- >100
- 75 to 100
- 50 to 75
- 25 to 50
- ≤25
- No data

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.

Children in fragile context have about twice the risk of dying under age 5 than children in non-fragile context. Among the 10 countries with the highest under-five mortality rates, 7 are classified as fragile countries.[2] Moreover, fragile states accounted for 22 per cent of the under-five deaths among low- and middle-income countries in 2016, yet they only shared about 12 per cent of the under-five population.

The number of countries with significant gender-based gaps in child mortality has fallen. 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 almost half between 1990 and 2016, from 19 to 11.

Inequity persists within countries geographically or by social-economic status. For example, in Chad, under-five mortality across regions ranged from 67 deaths per 1,000 live births to 230 based on the Demographic and Health Survey (DHS) 2014–2015.[3] In India,

under-five mortality across states varied from 13 deaths per 1,000 live births to 62 based on the Sample Vital Registration data in 2015.[4] The latest mortality estimates by wealth quintile generated by UN IGME reveal that in 99 low- and middle-income countries,[5] under-five mortality among children born in the poorest households is on average twice that of children born in the wealthiest households.[6] The burden of under-five deaths is also disproportionally concentrated among poorer households, with the two poorest quintiles accounting for about half of the under-five deaths but only for 40 per cent of the births.

Eliminating the gaps between the poorest and richest households and between countries would save millions of lives. In 2016 alone, some 2 million[7] lives would have been saved had under-five mortality in the poorest households been as low as it is in the wealthiest households. Closing the gap between countries would have produced even starker results: if all countries had reached an under-five mortality rate at or below the average rate of high-income countries – 5.3 deaths per 1,000 live births – 87 per cent of under-five deaths could have been prevented,

and the lives of almost 5 million children could have been saved in 2016.

Accelerated progress will be needed in more than a quarter of all countries, to achieve SDG targets in child survival. Among all 195 countries analysed, 116 already met the SDG target on under-five mortality and 27 countries are expected to meet the target by 2030 if current trends continue, while 52 countries need to accelerate progress. These countries can be found in most regions of the world, but the majority are in sub-Saharan Africa. If current trends continue, more than three quarters of all countries in sub-Saharan Africa will miss the under-five mortality target, and 13 countries in the region will not reach the target until after 2050.

Achieving the SDG target on time would mean averting 10 million under-five deaths compared with a business-as-usual scenario. If current trends continue, over 60 million children under 5 years of age will die between 2017 and 2030, about half of them newborns. More than half of these deaths will occur in sub-Saharan Africa and about 30 per cent in Southern Asia. Meeting the SDG target would reduce the number of under-five deaths by 10 million between 2017 and 2030. Urgent efforts are needed in the countries that are falling behind.

Neonatal mortality

The first 28 days of life – the neonatal period – are the most vulnerable time for a child's survival. Children face the highest risk of dying in their first month of life, at a global rate of 19 deaths per 1,000 live births (Table 3). By way of comparison, the probability of dying after the first month but before reaching age 1 is 12 and after age 1 but before turning 5 is 11. Globally, 2.6 (2.5, 2.8) million children died in the first month of life in 2016 (Table 4) – approximately 7,000 newborn deaths every day – most of which occurred in the first week, with about 1 million dying on the first day and close to 1 million dying within the next six days.

Neonatal mortality declined globally and in all regions but more slowly than mortality among children aged 1–59 months. The global neonatal mortality rate fell from 37 (36, 38) deaths per 1,000 live births in 1990 to 19 (18, 20) in 2016. However, the decline in the neonatal mortality rate from 1990 to 2016 was slower than the decline in mortality among children aged 1–59 months: 49 per cent, compared with 62 per cent, a pattern consistent across all SDG regions (Figure 2). The relative decline in neonatal mortality was slower in sub-Saharan Africa than in the other regions. Despite the modest decline in the neonatal mortality rate in sub-Saharan Africa of 40 per cent, the number of neonatal deaths remained almost the same from 1990 to 2016 due to an increasing number of births.

Marked disparities in neonatal mortality exist across regions and countries. Among the SDG regions, neonatal mortality was highest in sub-Saharan Africa and Southern Asia, which each reported 28 deaths per 1,000 live births (Table 3). A child 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 46 deaths per 1,000 live births in Pakistan to 1 each in Iceland and Japan (Figure 3).

FIGURE 2

Progress in reducing neonatal mortality is slower than in mortality among children aged 1–59 months

Percentage decline in neonatal mortality and in mortality among children aged 1-59 months, by Sustainable Development Goal region, 1990-2016
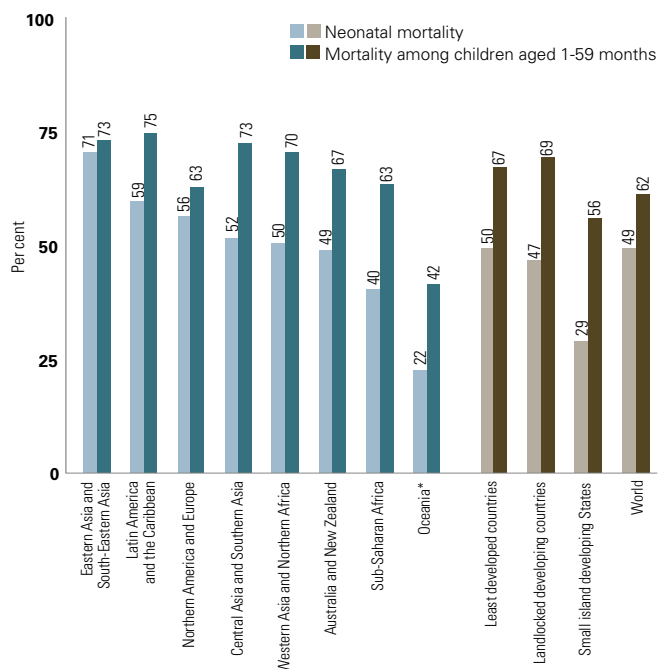
Note: Oceania* refers to Oceania excluding Australia and New Zealand. All calculations are based on unrounded numbers.

FIGURE 3

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

Neonatal mortality rates, by country and Sustainable Development Goal region, 2016
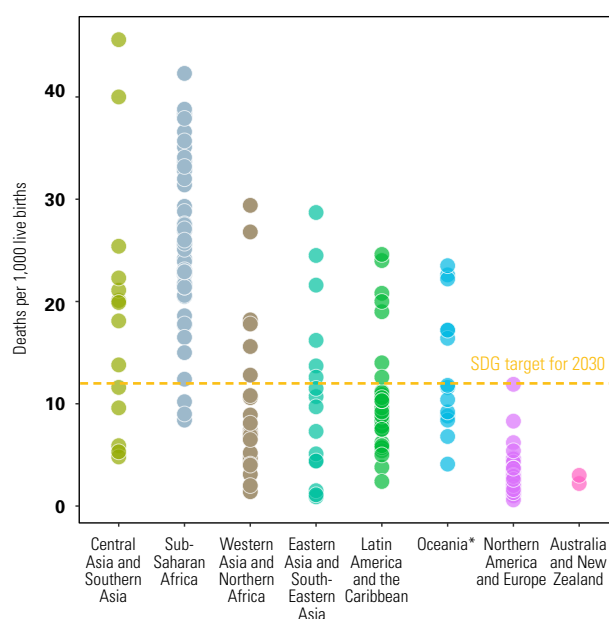
Note: Each dot represents a country. Oceania* refers to Oceania excluding Australia and New Zealand.

TABLE
3

Levels and trends in the neonatal mortality rate, by Sustainable Development Goal region, 1990-2016

Region	Neonatal mortality rate (deaths per 1,000 live births)							Decline (per cent) 1990-2016	Annual rate of reduction (per cent)		
	1990	1995	2000	2005	2010	2015	2016		1990-2016	1990-2000	2000-2016
Northern America and Europe	7	6	5	4	4	3	3	56	3.2	3.4	3.0
Northern America	6	5	5	5	4	4	4	35	1.7	2.4	1.2
Europe	8	7	6	4	3	3	3	64	4.0	3.7	4.1
Latin America and the Caribbean	23	19	16	13	11	9	9	59	3.5	3.8	3.3
Central Asia and Southern Asia	56	51	45	39	33	28	27	52	2.8	2.2	3.2
Central Asia	28	29	27	22	18	14	13	53	2.9	0.6	4.3
Southern Asia	57	52	46	39	34	29	28	52	2.8	2.2	3.1
Eastern Asia and South-Eastern Asia	28	25	20	15	11	9	8	71	4.7	3.3	5.6
Eastern Asia	28	25	19	13	8	5	5	82	6.7	3.6	8.6
South-Eastern Asia	28	24	21	18	16	14	14	51	2.8	2.8	2.8
Western Asia and Northern Africa	31	27	23	20	17	15	15	50	2.7	2.7	2.7
Western Asia	28	24	20	17	14	13	13	54	3.0	3.1	2.9
Northern Africa	33	29	26	23	20	18	17	48	2.5	2.3	2.6
Sub-Saharan Africa	46	45	41	37	32	28	28	40	2.0	1.1	2.5
Oceania	14	13	14	13	12	11	10	24	1.0	0.0	1.7
Oceania excluding Australia and New Zealand	27	26	26	25	23	21	21	22	1.0	0.5	1.3
Australia and New Zealand	5	4	4	3	3	2	2	49	2.6	2.5	2.6
Least developed countries	52	47	42	37	31	27	26	50	2.6	2.1	2.9
Landlocked developing countries	48	45	42	36	31	26	26	47	2.4	1.3	3.1
Small island developing States	27	25	24	23	22	19	19	29	1.3	1.3	1.3
World	**37**	**34**	**31**	**26**	**22**	**19**	**19**	**49**	**2.6**	**1.8**	**3.1**

Note: All calculations are based on unrounded numbers.

TABLE
4

Levels and trends in the number of neonatal deaths, by Sustainable Development Goal region, 1990-2016

Region	Number of neonatal deaths (thousands)							Decline (per cent) 1990-2016	Neonatal deaths as a share of under-five deaths (per cent)		
	1990	1995	2000	2005	2010	2015	2016		1990	2000	2016
Northern America and Europe	98	75	60	53	45	40	39	60	51	54	55
Northern America	24	21	20	20	18	16	16	34	52	55	57
Europe	74	54	41	33	27	24	23	69	51	53	54
Latin America and the Caribbean	270	227	181	141	119	101	98	64	41	47	52
Central Asia and Southern Asia	2,277	2,076	1,824	1,561	1,317	1,083	1,044	54	46	50	59
Central Asia	45	40	32	29	28	23	21	52	39	41	51
Southern Asia	2,232	2,036	1,792	1,532	1,289	1,061	1,023	54	46	50	59
Eastern Asia and South-Eastern Asia	1,112	807	600	457	341	263	250	78	48	50	51
Eastern Asia	778	526	358	242	153	100	92	88	54	55	51
South-Eastern Asia	334	282	242	215	188	163	158	53	39	43	50
Western Asia and Northern Africa	285	245	215	196	187	176	173	40	41	46	54
Western Asia	131	115	100	87	78	74	72	45	43	48	54
Northern Africa	154	130	115	109	109	103	100	35	40	45	53
Sub-Saharan Africa	1,008	1,079	1,117	1,092	1,056	1,010	1,003	1	27	28	36
Oceania	7	7	7	8	7	7	7	4	39	42	45
Oceania excluding Australia and New Zealand	6	6	6	7	6	6	6	-5	37	40	44
Australia and New Zealand	1	1	1	1	1	1	1	39	48	55	59
Least developed countries	1,138	1,120	1,088	1,008	920	845	834	27	31	32	40
Landlocked developing countries	530	536	529	493	454	411	404	24	30	31	42
Small island developing States	33	30	29	28	27	24	23	28	35	39	46
World	**5,058**	**4,517**	**4,005**	**3,507**	**3,073**	**2,681**	**2,614**	**48**	**40**	**41**	**46**

Note: All calculations are based on unrounded numbers.

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 2016 – Southern Asia accounted for 39 per cent of all such deaths and sub-Saharan Africa accounted for 38 per cent (Table 4). At the country level, half of all neonatal deaths are concentrated in five countries, namely, India (24 per cent), Pakistan (10 per cent), Nigeria (9 per cent), the Democratic Republic of the Congo (4 per cent) and Ethiopia (3 per cent). India and Pakistan alone accounted for about a third of all newborn deaths.

Globally, 46 per cent of under-five deaths occur during the neonatal period. Despite falling rates of neonatal mortality, its importance in the burden of under-five deaths is increasing. Due to the slower decline of neonatal mortality relative to mortality in children aged 1–59 months, the share of neonatal deaths among under-five deaths increased from 40 per cent in 1990 to 46 per cent in 2016. This trend is expected to continue as the under-five mortality rate continues to decline (Figure 3).

Lower under-five mortality is associated with a higher concentration of under-five deaths occurring during the neonatal period. The share of neonatal deaths among under-five deaths is still relatively low in sub-Saharan Africa (36 per cent), which remains the region with the highest under-five mortality rates. In the regions Australia and New Zealand and Northern America and Europe, where under-five mortality rates are low, more than half of all under-five deaths occur during the neonatal period. The only exception is

Southern Asia, where the proportion of neonatal deaths is among the highest (59 per cent) despite a relatively high under-five mortality rate. Many countries in this region have higher-than-expected neonatal mortality rates, given the level of under-five mortality. To save newborns in these countries, it is critical to understand the causes of higher-than-expected neonatal mortality rates and the bottlenecks to prevent newborn deaths.

Many countries will lag even further behind in achieving 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 52 countries will miss the target for under-five mortality. About half of these countries would not even reach the neonatal mortality target by 2050. These 60+ countries carried about 80 per cent of the burden of neonatal deaths in 2016.

Accelerating progress to achieve the SDG target on neonatal mortality would save the lives of 5 million newborns from 2017 to 2030 in the 60+ countries that will miss the target for neonatal mortality by 2030 if current trends continue. Based on current trends, 30 million newborns would die between 2017 and 2030. Eighty per cent of these deaths would occur in Southern Asia and sub-Saharan Africa. About one in six of these deaths (5 million) could be averted if countries at risk of missing the SDG target with low rates of progress and high neonatal mortality rates accelerate progress. Many of the countries with low rates of progress are concentrated in sub-Saharan Africa and Southern Asia.

The remarkable progress in improving child survival over the past few decades, particularly in some low- and lower-middle-income countries, provides a clear message: with the right commitments, concerted efforts and political will, bold and ambitious goals are within reach. Despite the substantial progress, the unfinished business of child survival looms large. If current trends continue without acceleration, some 60 million children under 5 years of age will die from 2017 to 2030, and about half of them will be newborns.

Ending newborn and child deaths from preventable infectious diseases is critical. Despite strong advances in fighting childhood illnesses, infectious diseases – which are most often diseases of the poor and thus are a marker of equity – remain highly prevalent, particularly in sub-Saharan Africa and Southern Asia. Pneumonia, diarrhoea and malaria remain among the leading causes of death among children under age 5 – accounting for almost a third of global under-five deaths, and about 40 per cent of under-five deaths in sub-Saharan Africa.[8] The main killers of children under age 5 in 2016 included preterm birth complications (18 per cent), pneumonia (16 per cent), intrapartum-related events (12 per cent), diarrhoea (8 per cent), neonatal sepsis (7 per cent) and malaria (5 per cent) (Figure 4).

Accelerating the reduction in child mortality is possible by expanding effective preventive and curative interventions that target the main causes of child deaths and the most vulnerable newborns and children. With an increasing share of under-five deaths occurring during the neonatal period, accelerated change for child survival, health and development requires greater focus on a healthy start to life. Children that die in the first 28 days of life suffer from diseases and conditions that are associated with quality of care around the time of childbirth and are readily preventable or treatable with proven, cost-effective interventions. Further reductions in neonatal deaths in particular depend on building stronger 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 cover the antenatal period, the time around birth

FIGURE 4 Infectious diseases and neonatal complications are the leading causes of death among children under age 5

A. Global distribution of deaths among children under age 5, by cause, 2016

Deaths among children aged 1–59 months (54%)

Neonatal deaths (46%)

Pneumonia, **3%**
Preterm birth complications, **16%**
Intrapartum-related events, **11%**
Sepsis or menigitis, **7%**
Other, **3%**
Injury, **1%**
Congenital, **5%**
Tetanus, **1%**
Diarrhoea, **0.3%**

Pneumonia, **13%**
Other, **12%**
Congenital, **4%**
Intrapartum-related events, **1%**
Preterm birth complications, **2%**
Meningitis, **2%**
AIDS, **1%**
Malaria, **5%**
Injury, **6%**
Measles, **1%**
Diarrhoea, **8%**

Nearly half of all deaths in children under age 5 are attributable to undernutrition

B. Global distribution of deaths among newborns, by cause, 2016

Pneumonia **6%** Diarrhoea **1%**

Preterm birth complications **35%** | Intrapartum-related events **24%** | Sepsis or menigitis **15%** | Congenital abnormalities **11%** | Other **7%**

Tetanus **1%**
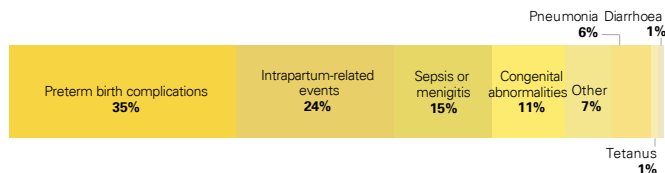
Note: Estimates are rounded and therefore may not sum up to 100%.
Source: WHO and Maternal and Child Epidemiology Estimation Group (MCEE) provisional estimates 2017

and the first week of life, as well as care for small and sick newborns.

Despite the substantial progress in reducing child deaths, children from poorer areas or households remain disproportionately vulnerable. It is critical to address these inequities to further accelerate the pace of progress to fulfil the promise to children. Without intensified efforts to reduce newborn and child mortality, particularly in the highest-mortality areas and in contexts of persistent inequities, the SDG targets will be unattainable. Countries and the international community must take immediate action to further accelerate progress to end preventable newborn and child deaths.

Mortality among children aged 5–14

Mortality among children aged 5–14 is low, but 1 million children in this age group still died in 2016. The probability of dying among children aged 5–14 was 7.5 (7.2, 8.3) deaths per 1,000 children aged 5 in 2016 – substantially lower than the probability of dying for children under age 5 (41 deaths per 1,000 live births). Still, 1 (0.9, 1.1) million children aged 5–14 died in 2016. This is equivalent to 3,000 children aged 5–14 dying every day.

The world has halved the mortality rate among children aged 5–14 since 1990. From 1990 to 2016, the mortality rate in older children declined by 51 (46, 54) per cent and the number of deaths dropped by 44 per cent from 1.7 (1.7, 1.8) million to 1 million. Most of the regions reduced the probability of dying among children aged 5–14 by at least half (Table 5 and Figure 5).

FIGURE 5 Mortality among children aged 5–14 declined in all regions between 1990 and 2016

Probability of dying among children aged 5–14 by Sustainable Development Goal region, 1990 and 2016
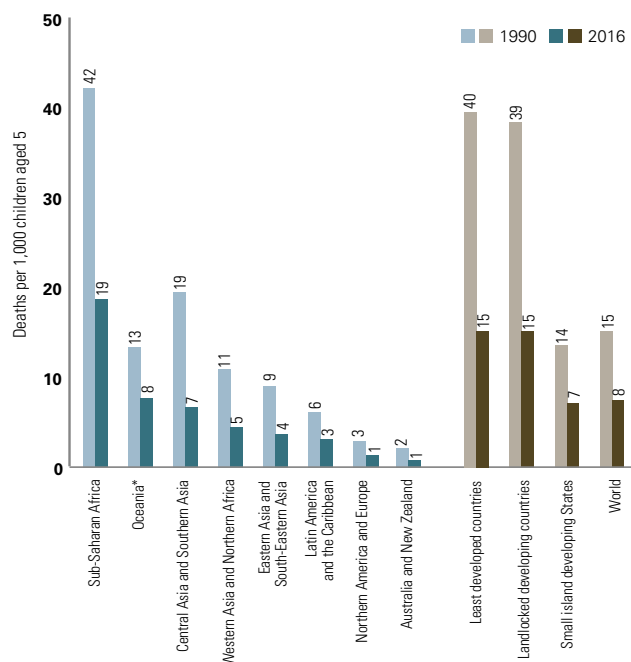
Note: Oceania* refers to Oceania excluding Australia and New Zealand.

TABLE 5 Levels and trends in mortality among children aged 5–14 (probability of dying, deaths per 1,000 children aged 5) and the number of deaths, by Sustainable Development Goal region, 1990-2016

Region	Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5)					Decline (per cent) 1990-2016	Annual rate of reduction (per cent) 1990-2016	Number of deaths among children aged 5–14 (thousands)				
	1990	2000	2010	2015	2016			1990	2000	2010	2015	2016
Northern America and Europe	3	2	2	1	1	57	3.2	42	31	18	16	15
Northern America	2	2	1	1	1	46	2.4	9	8	6	6	6
Europe	3	3	2	1	1	64	3.9	32	23	12	10	10
Latin America and the Caribbean	6	4	4	3	3	50	2.7	65	49	43	34	33
Central Asia and Southern Asia	19	13	9	7	7	66	4.1	611	470	327	258	245
Central Asia	8	5	4	3	3	56	3.2	9	7	4	4	4
Southern Asia	20	14	9	7	7	66	4.2	602	463	323	254	241
Eastern Asia and South-Eastern Asia	9	6	5	4	4	60	3.5	308	226	131	110	107
Eastern Asia	6	5	3	3	3	59	3.5	149	116	59	50	48
South-Eastern Asia	15	10	7	5	5	65	4.0	159	111	72	60	59
Western Asia and Northern Africa	11	8	5	5	5	59	3.4	83	65	47	45	43
Western Asia	9	6	4	4	4	60	3.5	34	27	21	20	18
Northern Africa	13	9	7	6	5	58	3.4	50	38	27	25	25
Sub-Saharan Africa	42	33	23	19	19	55	3.1	604	596	536	516	513
Oceania	6	5	5	4	4	38	1.9	3	3	2	2	2
Oceania excluding Australia and New Zealand	13	11	9	8	8	43	2.1	2	2	2	2	2
Australia and New Zealand	2	1	1	1	1	55	3.1	1	0	0	0	0
Least developed countries	40	28	19	16	15	61	3.7	581	512	433	393	388
Landlocked developing countries	39	28	19	16	15	60	3.6	284	264	210	195	193
Small island developing States	14	10	11	7	7	48	2.5	13	12	13	8	8
World	**15**	**12**	**9**	**8**	**8**	**51**	**2.7**	**1,716**	**1,442**	**1,105**	**981**	**959**

Note: All calculations are based on unrounded numbers.

MAP
2
Countries with the highest mortality in children aged 5–14 are concentrated in parts of sub-Saharan Africa

Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5) by country, 2016
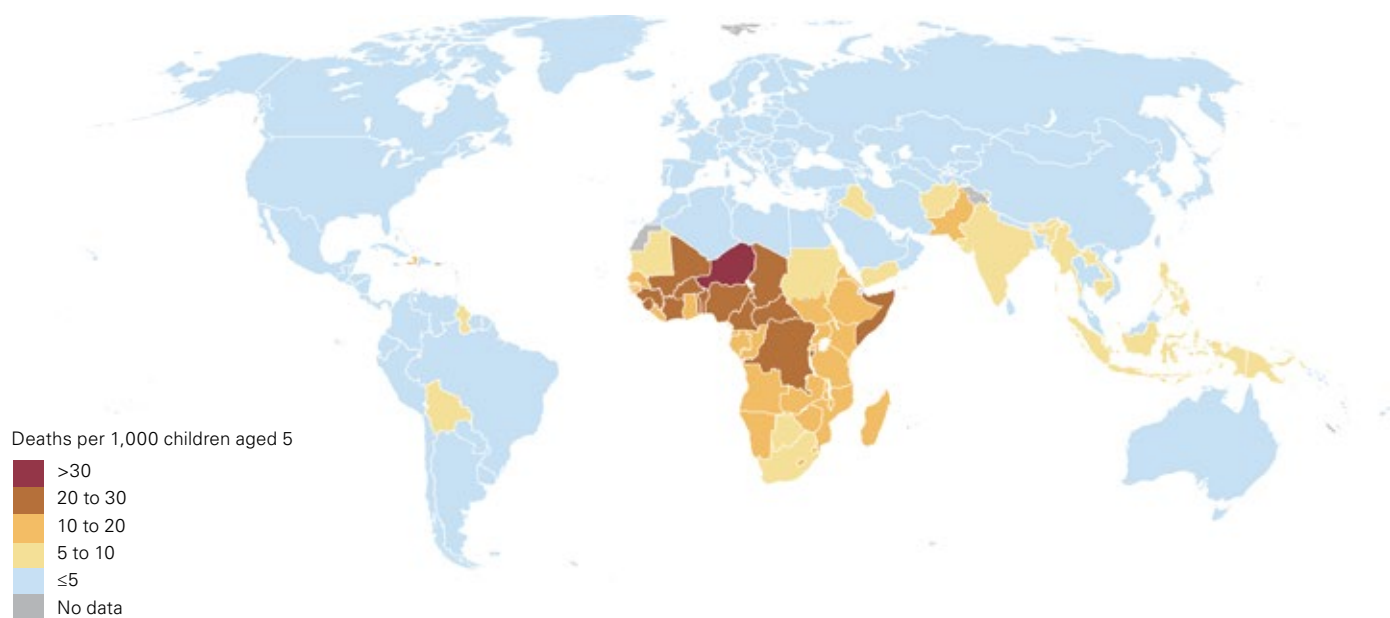
Deaths per 1,000 children aged 5

- >30
- 20 to 30
- 10 to 20
- 5 to 10
- ≤5
- No data

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.

Large disparities exist in the survival chances of children aged 5–14 across regions and countries. In sub-Saharan Africa, the probability of dying among children aged 5–14 was 19 deaths per 1,000 children aged 5, followed by Oceania – excluding Australia and New Zealand – with 8 and Southern Asia with 7. The average risk for a child in sub-Saharan Africa to die between age 5 and age 14 is 17 times higher than the average for children in high-income countries (1.1 deaths per 1,000 children aged 5) and 14 times higher than in Northern America and Europe. The highest probability of dying in this age group was found in the Niger, with 40 deaths per 1,000 children aged 5 versus 0.5 per 1,000 in both Denmark and Luxembourg. The top 26 countries with the highest mortality rates are all in sub-Saharan Africa, with 15 of them having mortality rates above 20 (Map 2). More than half (53 per cent) of deaths to children aged 5–14 occurred in

sub-Saharan Africa, followed by Southern Asia with about 25 per cent. Half (52 per cent) of all deaths between age 5–14 occurred in seven countries (India, Nigeria, the Democratic Republic of the Congo, Pakistan, Ethiopia, China and the Niger).

Injuries become more prominent as a cause of death as children get older. Among children aged 5–9 years and younger adolescents aged 10–14 years, communicable diseases are a less prominent cause of death than among younger children, while other causes become important. For instance, injuries account for more than a quarter of the deaths among this age group, non-communicable diseases for about another quarter and infectious diseases and other communicable diseases, perinatal and nutritional causes for about half of the deaths.[9] Drowning and road injuries alone account for 10 per cent of all deaths in this age group.

In accordance with the decision by the 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.[10] UNICEF and the World Health Organization (WHO) undertook joint country consultations in 2017. The country consultation process gave each country's Ministry of Health and National Statistics Office the opportunity to review all data inputs, the estimation methodology and the draft estimates for mortality in 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 2017, 108 of 195 countries sent responses, and 72 of those provided comments or additional data. After the consultations, the UN IGME draft estimates for mortality in children under age 5 were revised for 70 countries using new data and the estimates for mortality in children under age 5–14 were revised for 75 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, 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.

In 2017, UN IGME for the first time generated 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 estimates of mortality among 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, 2016.

To increase the transparency of the estimation process, 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 national available 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 from UN IGME methods 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, both nationally and internationally. 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 representative. The preferred source of data is a civil registration system which 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, in the developing world most countries do not have well-functioning vital registration systems, and household surveys, such as the UNICEF-supported Multiple Indicator Cluster Surveys (MICS), the Demographic and Health Surveys (DHS) supported by the United States Agency for International Development (USAID), and periodic population censuses have become the primary source 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 microdata upon availability) that provide the basis of child mortality estimates for a majority of developing countries.

The first step in the process of arriving at estimates of levels and recent trends of the under-five mortality rate or infant mortality rate 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 some older census or survey 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> under "underlying data," as well as on the country-specific charts). 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 64 new surveys or censuses were added for 40 countries and data from vital registration systems or sample vital registration systems were updated for 131 countries. In total, more than 6,600 country-year data points for 400 series were added or updated. The database, as of September 2017, contains 18,000 country-year data points from more than 1,500 series across 195 countries from 1990 (or earlier, up 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 5,500 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.

Data from civil registration systems
Civil registration data are the preferred data source for child mortality estimation. The calculation of the under-five mortality rates (U5MR), infant mortality rates (IMR), neonatal mortality rates (NMR) and mortality rates among children aged 5–14 from civil registration data is derived from a standard period abridged life table. 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 5q0 (5q0=U5MR/1,000) or 1q0 (1q0=IMR/1,000) observation divided by the value of the 5q0 or 1q0 observation. The stochastic standard error of the observation is calculated using a Poisson approximation using live birth numbers from the World Population Prospects, given by sqrt(5q0/lb) (or similarly sqrt(1q0/lb), where 5q0 is the under-five mortality rate (per 1 live birth) and lb is the number of live births in the year of the observation.[11] 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 adjusted vital registration (VR) data for deficient completeness in the reporting of early infant deaths in several European countries. For more details on the past adjustment, see the Notes section.[12]

Survey data
The majority of survey data comes in one of two forms: the full birth history, whereby women of reproductive ages from 15 to 49 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, 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).

Full birth history data, collected by all DHS and, increasingly, also MICS surveys, allow the calculation of child mortality indicators for specific time periods in the past. This allows DHS and MICS to publish child mortality estimates for five 5-year periods before the survey, that is, 0 to 4, 5 to 9, 10 to 14, etc. UN IGME has re-calculated 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 are 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.[13]

In general, summary birth history data, collected by censuses and many household surveys, use the age of the woman as an indicator of exposure time and exposure time period of the children, and use models to estimate mortality indicators for periods in the past for women aged 25–29 through 45–49. This method is well known, but has several shortcomings. Starting with the 2014 round of estimation, 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. The new method has several advantages over the previous one. First, estimates based on time since first birth generally have lower sampling errors, and 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, the new method 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. Third, the method tends to show less fluctuation across time, particularly in countries with relatively low fertility and mortality. UN IGME considers the improvements in the estimates based on time since first birth worthwhile when compared with the estimates derived from the classification by age of the mother; hence, in cases where the microdata are available, UN IGME has reanalysed the data using the new method.[14]

Moreover, following advice from the Technical Advisory Group (TAG) of UN IGME, child mortality estimates from summary birth histories were not included if estimates from full birth histories in the same survey were available.[15]

Adjustment for missing mothers in high-HIV settings
In populations severely affected by HIV and 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 downward. 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 UN IGME developed a method to adjust HIV/AIDS-related mortality for each survey data observation from full birth histories during HIV and 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.[16] This method was applied to all direct estimates from full birth histories.

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 6. To reconcile these differences and take better account of the systematic biases associated with the various types of data inputs, TAG has developed a new 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, 2016. This method is described in the following section.

Estimation of under-five mortality rates
Under-five mortality rate (U5MR) estimates were produced 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 UN IGME child mortality estimates published in September 2013,[17] September 2014[18] and September 2015.[19]

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 (i.e., country-year data points). 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

FIGURE 6

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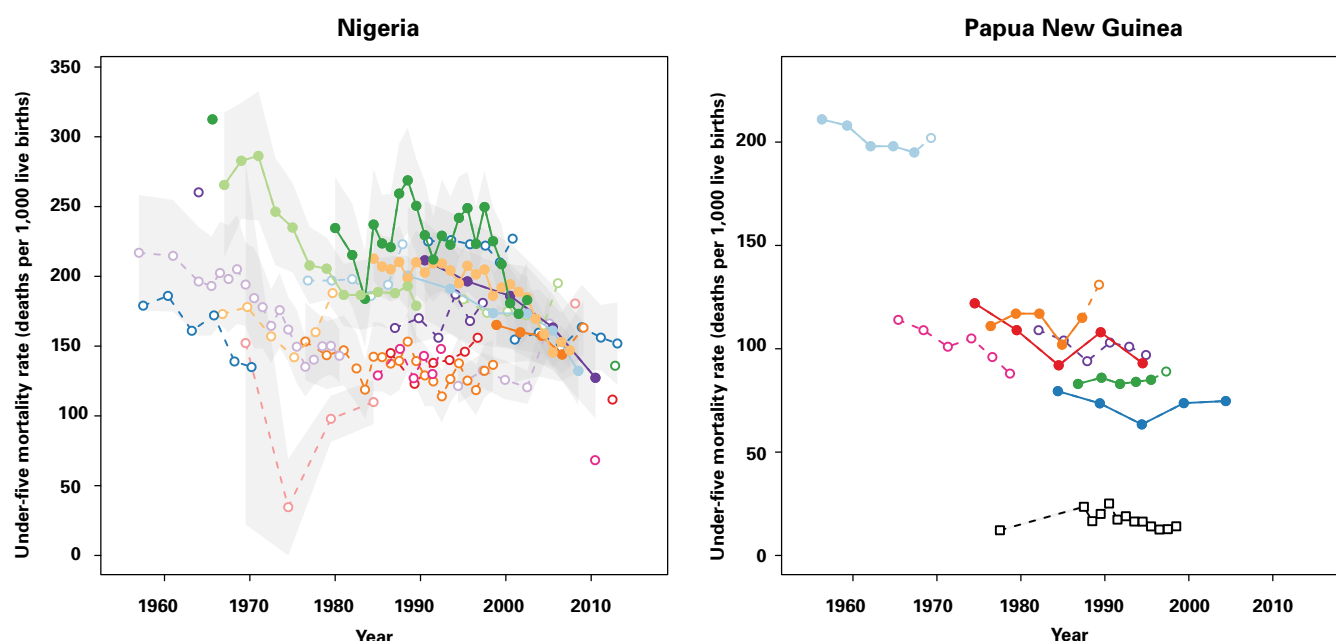
Note: All data available for the country are shown as coloured points, with observations from the same data series joined by lines, and each colour identifying different data sources. Grey bands in the left plot represent the standard errors of the observations where available or applicable. Series considered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

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 if 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 information on data quality for different source types from every country.

Figure 7 displays the plot of 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 surveys. Validation exercises show that the B3 model also performs better in short-term projections.

The B3 method was developed and implemented for UN IGME by Leontine Alkema from the University of Massachusetts, Amherst, and Jin Rou New from the National University of Singapore, with guidance and review by the TAG of UN IGME. A more complete technical description of the B3 model is available elsewhere.[20]

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 non-standard 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 to estimate IMR, but is fitted to the logit transform of r – i.e., $\log(r/1\text{-}r)$,

FIGURE 7 **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.

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.[21] 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 under-five and infant mortality driven by HIV and AIDS

To capture the extraordinarily rapid changes in child mortality driven by HIV and AIDS over the epidemic period in some countries, the regression models were fitted to data points for the U5MR from all other causes than HIV and AIDS, and then estimates of HIV and AIDS under-five mortality from the Joint United Nations Programme on HIV/AIDS (UNAIDS) 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 related to the HIV and AIDS epidemic.

3. Use UNAIDS estimates of AIDS child mortality[22] to adjust the data points from 1980 onward to exclude AIDS deaths.

4. Fit the standard B3 model to the observations to AIDS-free data points.

5. Extrapolate the model to the target year – in this case, 2016.

6. Add back estimates of deaths due to 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 AIDS deaths for children under age 1 are added to generate the final IMR estimates.

Estimates of under-five and infant mortality by sex

In 2012, UN IGME produced estimates of U5MR for males and females separately for the first time.[23] In many countries, fewer sources have provided data by sex than have provided data for both sexes combined. For this reason, rather than estimate U5MR trends by sex directly from reported mortality levels by sex, UN IGME uses the available data by sex to estimate a time trend in the sex ratio (male/female ratio) of U5MR instead. Bayesian methods for 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 new model is available elsewhere.[11]

Estimates of neonatal mortality

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 estimates by sex. It has the advantage that, compared with 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 new model is available elsewhere.[24]

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 in children aged 5–14

For the first time this year, 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 (10q5). The methods used are similar to those that are used to estimate under-five mortality rates (U5MR). In 39 countries, there were not enough data inputs to estimate the probability 10q5 from vital registration, surveys or censuses. For these cases, the probability 10q5 was modelled based on 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 (10q5) against log (U5MR), with region-specific dummies, and the coefficients of this regression were used to predict the probability 10q5 between 1990 and 2016 for countries with insufficient data

sources based on the estimates of the under-five mortality rate. 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).

In populations severely affected by HIV and 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 also more likely to die. However, 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 10q5. 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.

Estimating child mortality due to conflict and natural disasters

Estimated deaths for major crises were derived from various data sources from 1990 to the present. Estimated deaths from natural disasters were obtained from the CRED International Disaster Database,[25] with under-five proportions and for children aged 5–14 estimated as described elsewhere,[26] and conflict deaths were taken from Uppsala Conflict Data Program/ Peace Research Institute Oslo datasets as well as reports prepared by the United Nations 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 > 0.2 per 1,000 or crisis 10q5 was > 0.2 per 1,000; and (4) the number of under-five crisis deaths or among children 5–14 years old was > 10 deaths or (5) in the event that high-quality vital registration data were available and should not be smoothed by the B3 model.

These criteria resulted in 16 different crises being explicitly incorporated into the UN IGME estimates for under-five mortality and 38

different crises for mortality 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 that 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, namely, in the Syrian Arab Republic and Yemen. Based on the scarce currently available data and the difficulties to estimate a broader impact of these crises on health systems, UN IGME decided to hold the estimates constant from the start of each of these crises while increasing the uncertainty over the crisis time, 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 ones. 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 2016. 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 2017 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 about 70 countries, the latest available child mortality estimate was more than 5 years old.

Calculating number of deaths for children under age 5

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 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 twentieth birth-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 number of live births estimates in each country used to calculate the annual under-five deaths come from the World Population Prospects: the 2017 Revision.[27]

Notes

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

2. Fragile states refer to the World Bank Group 'Harmonized List of Fragile Situations FY18'. 'Fragile situations' have: either a) a harmonized average Country Policy and Institutional Assessment (CPIA) country rating of 3.2 or less, or b) the presence of a United

Nations and/or regional peacekeeping operation or c) presence of a United Nations and/or regional peace-building and political mission. The detailed classification can be found at <http://pubdocs.worldbank.org/en/189701503418416651/FY18FCSLIST-Final-July-2017.pdf >, accessed on 6 September 2017.

3. Institut National de la Statistique des Études Économiques et Démographiques - INSEED/Tchad, Ministère de la Santé Publique - MSP/Tchad, and ICF International, Enquête Démographique et de Santé et à Indicateurs Multiples au Tchad (EDS-MICS) 2014–2015, 2016, available from <http://dhsprogram.com/pubs/pdf/FR317/FR317.pdf>.

4. Office of the Registrar General & Census Commissioner, India Ministry of Home Affairs Government of India New Delhi: Sample Registration System Statistical Report 2015, India: Sample Registration System 2015, New Delhi, 2016, available from <www.censusindia.gov.in/vital_statistics/SRS_Reports_2015.html>.

5. Among the 99 countries with estimates of under-five mortality by wealth quintile.

6. This group of countries accounts for 93 per cent of the under-five deaths and 71 per cent of the under-five population lives in these countries. The average under-five mortality rate for this group of countries in 2016 was 53 deaths per 1,000 live births.

7. Among the 99 countries with estimates of under-five mortality by wealth quintile.

8. WHO and Maternal and Child Epidemiology Estimation Group (MCEE) provisional estimates 2017, forthcoming.

9. World Health Organization, Global Health Estimates 2015, WHO, 2016.

10. Economic and Social Council: Statistical Commission Report on the forty-eighth session (7–10 March 2017) E/2017/24-E/CN.3/2017/35, United Nations, New York, 2017.

11. Alkema, L., and J. R. New, 'Global Estimation of Child Mortality Using a Bayesian B-Spline Bias-Reduction Method', Annals of Applied Statistics vol. 8, no. 4, 2014, pp. 2122–2149.

12. There were concerns about the completeness 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). 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. UN IGME previously carried out an analysis of the ratio of early neonatal (under seven 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 year, this assessment was revisited using the latest data, and the clear signal of underreporting is no longer apparent across countries. Therefore, UN IGME has removed these adjustment factors in the estimates for this publication. Going forward, 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.

13. Pedersen, J., and J. Liu, 'Child Mortality Estimation: Appropriate time periods for child mortality estimates from full birth histories', Plos Medicine, vol. 9, no. 8, 2012.

14. Verhulst, A., 'Child Mortality Estimation: An assessment of summary birth history methods using microsimulation', Demographic Research, vol. 34, article 39, available from <www.demographic-research.org/volumes/vol34/39/34-39.pdf>.

15. Silva, R., 'Child Mortality Estimation: Consistency of under-five mortality rate estimates using full birth histories and summary birth histories', PLoS Medicine, vol. 9, no. 8, 2012.

16. Walker, N., K. Hill, and F. M. Zhao, 'Child Mortality Estimation: Methods used to adjust for bias due to AIDS in estimating trends in under-five mortality', PLoS Medicine, vol. 9, no. 8, 2012.

17. United Nations Inter-agency Group for Child Mortality Estimation (UN IGME), 'Levels & Trends in Child Mortality. Report 2013', United Nations Children's Fund, New York, 2013, available from <www.childmortality.org>.

18. United Nations Inter-agency Group for Child Mortality Estimation (UN IGME), 'Levels & Trends in Child Mortality. Report 2014', United Nations Children's Fund, New York, 2014, available from<www.childmortality.org>.

19. United Nations Inter-agency Group for Child Mortality Estimation (UN IGME), 'Levels & Trends in Child Mortality. Report 2015', United Nations Children's Fund, New York, 2015, available from <www.childmortality.org>.

20. Alkema, L., and J. R. New, 'Global Estimation of Child Mortality Using a Bayesian B-Spline Bias-Reduction Method', Annals of Applied Statistics, vol. 8, 2014, pp. 2122–2149.

21. Guillot, M., et al., 'Child Mortality Estimation: A global overview of infant and child mortality age patterns in light of new empirical data', PLoS Medicine, vol. 9, no. 8, 2012.

22. UNAIDS 2017 estimates, July 2017.

23. Sawyer, C.C., 'Child Mortality Estimation: Estimating sex differences in childhood mortality since the 1970s', PLoS Medicine, vol. 9, no. 8, 2012.

24. Alexander, M., and L. Alkema, 'Global Estimation of Neonatal Mortality Using a Bayesian Hierarchical Splines Regression Model', 2016, available at <https://arxiv.org/abs/1612.03561>.

25. CRED, 'EM-DAT: The CRED International Disaster Database', Université Catholique de Louvain, Belgium, available from <www.emdat.be/>.

26. World Health Organization, 'WHO Methods and Data Sources for Global Causes of Death 2000–2015', Global Health Estimates Technical Paper WHO/HIS/IER/GHE/2016.3, WHO, Geneva, 2016, available from <www.who.int/healthinfo/global_burden_disease/GlobalCOD_method_2000_2015.pdf>.

27. United Nations Department of Economic and Social Affairs Population Division, 'World Population Prospects: The 2017 revision', United Nations, New York, 2017.

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

Country	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			2016			Annual rate of reduction (ARR) (per cent) 1990-2016			1990			2016		
	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	177	162	194	70	57	85	3.6	2.8	4.5	108	99	118	80	64	96
Albania	40	35	45	14	7	25	4.2	1.8	6.6	3	3	4	0	0	1
Algeria	49	46	52	25	23	27	2.6	2.1	2.9	41	38	44	24	22	26
Andorra	9	5	15	3	2	5	4.5	1.3	7.6	0	0	0	0	0	0
Angola	221	198	249	83	41	147	3.8	1.5	6.5	136	121	152	96	48	170
Antigua and Barbuda	26	19	36	9	6	11	4.3	2.6	6.1	0	0	0	0	0	0
Argentina	29	28	29	11	11	12	3.7	3.5	3.9	20	20	21	8	8	9
Armenia	50	45	55	13	10	18	5.0	3.9	6.1	4	3	4	1	0	1
Australia	9	9	9	4	4	4	3.5	3.3	3.7	2	2	2	1	1	1
Austria	10	9	10	4	3	4	3.8	3.5	4.3	1	1	1	0	0	0
Azerbaijan	95	86	104	31	19	52	4.3	2.2	6.3	19	17	21	5	3	9
Bahamas	24	22	25	11	9	13	3.1	2.3	3.9	0	0	0	0	0	0
Bahrain	23	22	24	8	7	9	4.3	3.7	4.8	0	0	0	0	0	0
Bangladesh	144	140	148	34	31	38	5.5	5.1	5.9	532	517	548	106	96	117
Barbados	18	17	19	12	10	16	1.4	0.5	2.3	0	0	0	0	0	0
Belarus	15	15	16	4	4	4	5.2	5.0	5.5	2	2	2	0	0	0
Belgium	10	10	10	4	4	4	3.6	3.2	4.0	1	1	1	1	0	1
Belize	39	35	44	15	14	16	3.7	3.1	4.3	0	0	0	0	0	0
Benin	178	167	191	98	74	132	2.3	1.2	3.4	39	37	42	38	29	52
Bhutan	128	114	146	32	23	45	5.3	3.9	6.7	3	2	3	0	0	1
Bolivia (Plurinational State of)	124	117	131	37	26	52	4.7	3.4	6.0	29	28	31	9	7	13
Bosnia and Herzegovina	18	18	19	6	6	7	4.3	3.8	4.6	1	1	1	0	0	0
Botswana	54	47	62	41	18	77	1.1	-1.5	4.3	2	2	3	2	1	4
Brazil	64	60	69	15	13	18	5.6	4.8	6.3	240	224	256	45	37	54
Brunei Darussalam	13	13	14	10	9	11	1.1	0.6	1.7	0	0	0	0	0	0
Bulgaria	18	18	19	8	7	8	3.4	3.1	3.7	2	2	2	1	0	1
Burkina Faso	199	186	212	85	66	109	3.3	2.3	4.3	79	74	84	60	46	77
Burundi	170	155	187	72	57	91	3.3	2.3	4.3	45	40	49	31	24	39
Cabo Verde	63	60	65	21	18	25	4.1	3.5	4.7	1	1	1	0	0	0
Cambodia	116	108	125	31	19	49	5.1	3.3	7.0	44	41	47	11	7	18
Cameroon	143	133	154	80	62	103	2.3	1.3	3.2	72	67	77	66	52	86
Canada	8	8	8	5	4	6	2.0	1.4	2.5	3	3	3	2	2	2
Central African Republic	174	157	193	124	80	192	1.3	-0.5	3.0	20	18	23	20	13	31
Chad	211	196	226	127	105	150	1.9	1.3	2.7	60	56	64	77	64	91
Chile	19	19	20	8	8	9	3.2	2.9	3.5	6	5	6	2	2	2
China	54	50	59	10	9	11	6.5	5.9	7.1	1,402	1,292	1,525	168	147	194
Colombia	35	33	38	15	12	20	3.2	2.3	4.2	32	30	34	11	9	15
Comoros	126	112	140	73	39	144	2.1	-0.6	4.5	2	2	2	2	1	4
Congo	91	80	103	54	38	74	2.0	0.7	3.4	8	7	9	9	7	13
Cook Islands	24	22	27	8	5	12	4.4	2.7	6.2	0	0	0	0	0	0
Costa Rica	17	16	17	9	7	10	2.5	1.8	3.2	1	1	1	1	1	1
Côte d'Ivoire	151	141	162	92	69	122	1.9	0.8	3.0	77	72	82	78	58	103
Croatia	13	13	13	5	4	5	3.9	3.5	4.2	1	1	1	0	0	0
Cuba	13	13	14	6	5	6	3.4	3.2	3.6	2	2	2	1	1	1
Cyprus	11	11	12	3	2	3	5.6	4.7	6.5	0	0	0	0	0	0
Czechia	12	12	12	3	3	4	5.1	4.8	5.3	2	2	2	0	0	0
Democratic People's Republic of Korea	43	34	56	20	16	26	3.0	–	–	18	14	23	7	5	9
Democratic Republic of the Congo	184	167	203	94	67	129	2.6	1.3	3.9	280	254	308	304	218	416
Denmark	9	9	9	4	4	5	2.8	2.2	3.3	1	1	1	0	0	0
Djibouti	118	101	136	64	43	95	2.3	0.7	3.9	3	2	3	1	1	2
Dominica	17	16	19	34	27	43	-2.6	-3.6	-1.7	0	0	0	0	0	0
Dominican Republic	60	56	64	31	23	41	2.6	1.5	3.6	13	12	14	7	5	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) 1990		2016		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]	
	Male	Female	Male	Female	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016
Afghanistan	183	172	74	66	120	53	74	60	75	40	48	46	21	10	7	10
Albania	44	36	15	12	35	12	3	0	13	6	1	0	6	2	0	0
Algeria	53	45	27	24	41	22	34	20	23	16	19	15	9	4	7	3
Andorra	9	8	3	3	7	2	0	0	4	1	0	0	2	1	0	0
Angola	231	211	88	76	131	55	82	65	54	29	35	35	46	15	17	13
Antigua and Barbuda	29	23	9	8	25	5	0	0	17	4	0	0	5	2	0	0
Argentina	32	26	12	10	26	10	18	7	15	6	11	5	3	2	2	2
Armenia	54	45	15	12	42	12	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	103	86	34	28	75	27	15	5	32	18	7	3	5	3	1	0
Bahamas	25	22	11	10	20	9	0	0	14	6	0	0	4	3	0	0
Bahrain	24	22	8	7	20	7	0	0	15	3	0	0	4	2	0	0
Bangladesh	147	140	37	32	100	28	368	87	64	20	241	62	25	5	75	16
Barbados	20	16	13	11	16	11	0	0	12	8	0	0	3	2	0	0
Belarus	17	13	4	3	12	3	2	0	9	2	1	0	4	2	1	0
Belgium	11	9	4	4	8	3	1	0	5	2	1	0	2	1	0	0
Belize	43	35	16	13	32	13	0	0	20	10	0	0	5	3	0	0
Benin	185	171	102	93	107	63	24	25	46	31	11	13	46	22	7	7
Bhutan	134	121	36	29	90	27	2	0	43	18	1	0	18	7	0	0
Bolivia (Plurinational State of)	130	117	40	33	85	30	20	7	42	19	10	5	14	6	2	1
Bosnia and Herzegovina	20	16	7	5	16	5	1	0	11	5	1	0	3	1	0	0
Botswana	58	50	44	37	42	33	2	2	26	26	1	1	10	8	0	0
Brazil	69	59	16	14	53	14	198	40	26	8	96	23	5	3	17	8
Brunei Darussalam	14	12	11	9	10	9	0	0	6	4	0	0	4	2	0	0
Bulgaria	21	16	8	7	15	7	2	0	8	4	1	0	4	2	0	0
Burkina Faso	206	191	89	80	99	53	40	38	46	26	19	19	41	26	11	14
Burundi	180	160	77	66	103	48	27	21	41	24	11	11	57	20	9	6
Cabo Verde	67	58	23	19	48	18	1	0	20	10	0	0	6	2	0	0
Cambodia	124	108	34	27	85	26	32	10	40	16	15	6	36	5	9	2
Cameroon	151	135	85	74	89	53	45	44	42	24	22	20	37	30	13	19
Canada	9	7	5	5	7	4	3	2	4	3	2	1	2	1	1	0
Central African Republic	181	166	130	117	114	89	14	14	52	42	6	7	36	22	3	3
Chad	219	202	133	121	111	75	33	46	52	35	16	22	55	26	10	11
Chile	21	17	9	8	16	7	5	2	9	5	2	1	3	2	1	0
China	56	52	11	9	42	9	1,090	144	30	5	759	86	7	3	138	45
Colombia	39	31	17	14	29	13	26	10	18	9	16	6	5	3	4	2
Comoros	133	118	78	68	88	55	2	1	51	33	1	1	17	6	0	0
Congo	96	85	58	49	59	39	5	7	28	21	3	4	37	11	3	2
Cook Islands	27	22	9	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	139	101	82	104	66	54	57	50	37	26	32	31	28	11	18
Croatia	14	11	5	4	11	4	1	0	8	3	0	0	3	1	0	0
Cuba	15	12	6	5	11	4	2	1	7	2	1	0	4	2	1	0
Cyprus	12	10	3	2	10	2	0	0	6	1	0	0	2	1	0	0
Czechia	14	10	4	3	10	3	1	0	7	2	1	0	2	1	0	0
Democratic People's Republic of Korea	47	39	22	18	33	15	14	5	21	11	9	4	8	4	3	1
Democratic Republic of the Congo	192	175	101	87	118	72	184	235	41	29	67	96	44	28	44	64
Denmark	10	8	5	4	7	4	0	0	4	3	0	0	2	1	0	0
Djibouti	126	109	70	58	91	54	2	1	49	33	1	1	17	2	0	0
Dominica	18	16	36	31	14	31	0	0	11	24	0	0	3	2	0	0
Dominican Republic	64	55	34	28	46	26	10	5	25	21	5	4	8	3	1	1

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

Country	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			2016			Annual rate of reduction (ARR) (per cent) 1990-2016			1990			2016		
	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
Ecuador	57	51	63	21	13	35	3.8	1.9	5.7	17	16	19	7	4	11
Egypt	86	82	90	23	18	29	5.1	4.1	6.0	165	157	172	57	45	74
El Salvador	60	55	65	15	10	22	5.3	3.8	6.8	10	9	11	2	1	3
Equatorial Guinea	191	165	221	91	61	132	2.8	1.3	4.5	3	3	4	4	2	5
Eritrea	151	138	166	45	29	70	4.7	2.9	6.5	19	17	21	7	5	11
Estonia	18	17	18	3	3	3	7.0	6.3	7.5	0	0	0	0	0	0
Ethiopia	203	189	218	58	47	73	4.8	3.9	5.7	441	411	473	187	149	233
Fiji	28	24	34	22	18	26	1.0	0.0	1.9	1	1	1	0	0	0
Finland	7	7	7	2	2	3	4.1	3.8	4.6	0	0	0	0	0	0
France	9	9	9	4	4	4	3.2	2.9	3.6	7	7	7	3	3	3
Gabon	92	80	107	47	32	68	2.6	1.1	4.2	3	3	4	3	2	4
Gambia	168	150	188	65	41	103	3.6	1.9	5.4	7	6	8	5	3	8
Georgia	47	42	53	11	10	12	5.7	5.0	6.3	4	4	5	1	1	1
Germany	9	8	9	4	4	4	3.1	2.9	3.3	7	7	7	3	3	3
Ghana	127	120	134	59	45	77	3.0	1.9	4.0	70	66	74	51	39	66
Greece	11	10	11	4	3	4	3.9	3.3	4.6	1	1	1	0	0	0
Grenada	22	21	24	16	14	19	1.3	0.6	2.0	0	0	0	0	0	0
Guatemala	82	77	87	29	24	35	4.1	3.3	4.8	29	27	31	12	10	15
Guinea	235	220	251	89	72	111	3.7	2.9	4.6	63	59	67	39	31	48
Guinea-Bissau	219	196	244	88	61	123	3.5	2.2	5.0	10	9	11	6	4	8
Guyana	60	55	66	32	22	48	2.4	0.8	3.9	1	1	1	1	0	1
Haiti	145	136	155	67	52	88	3.0	1.9	3.9	38	35	40	17	14	23
Honduras	58	54	63	19	14	25	4.4	3.2	5.5	11	10	12	4	3	5
Hungary	17	17	18	5	4	6	4.6	4.0	5.3	2	2	2	0	0	1
Iceland	6	6	7	2	2	3	4.3	3.2	5.3	0	0	0	0	0	0
India	126	122	130	43	39	47	4.1	3.7	4.6	3,396	3,287	3,511	1,081	975	1,188
Indonesia	84	81	88	26	21	33	4.5	3.6	5.4	395	378	413	131	104	165
Iran (Islamic Republic of)	57	52	61	15	11	21	5.1	3.7	6.4	107	98	115	20	15	29
Iraq	54	50	59	31	23	42	2.1	1.0	3.3	35	32	38	38	28	51
Ireland	9	9	10	4	3	4	3.6	3.0	4.2	0	0	1	0	0	0
Israel	12	11	12	4	3	4	4.5	4.1	4.9	1	1	1	1	1	1
Italy	10	10	10	3	3	4	4.1	3.8	4.4	5	5	6	2	2	2
Jamaica	30	26	36	15	10	25	2.6	0.8	4.4	2	2	2	1	0	1
Japan	6	6	6	3	3	3	3.3	3.2	3.5	8	8	9	3	3	3
Jordan	37	34	39	18	13	24	2.8	1.5	4.1	4	4	5	4	3	6
Kazakhstan	52	48	57	11	11	12	5.9	5.5	6.3	20	19	22	4	4	5
Kenya	98	92	104	49	41	60	2.7	1.9	3.4	95	90	101	74	61	90
Kiribati	96	83	111	54	35	84	2.2	0.4	4.0	0	0	0	0	0	0
Kuwait	18	17	18	8	8	9	2.8	2.5	3.2	1	1	1	1	0	1
Kyrgyzstan	65	58	73	21	20	22	4.4	3.9	4.8	9	8	10	3	3	3
Lao People's Democratic Republic	162	146	178	64	46	88	3.6	2.3	4.9	28	26	31	10	7	14
Latvia	17	16	18	5	4	5	5.0	4.5	5.5	1	1	1	0	0	0
Lebanon	33	29	37	8	4	14	5.4	3.2	7.8	2	2	2	1	0	1
Lesotho	91	83	100	94	72	121	-0.1	-1.1	1.0	5	5	6	6	4	7
Liberia	258	237	280	67	51	93	5.2	4.0	6.3	25	23	27	10	8	14
Libya	42	36	49	13	9	19	4.5	3.0	6.1	5	5	6	2	1	2
Lithuania	15	14	16	5	5	6	4.0	3.5	4.4	1	1	1	0	0	0
Luxembourg	9	8	10	2	2	3	5.0	4.0	6.0	0	0	0	0	0	0
Madagascar	160	149	171	46	32	66	4.7	3.4	6.2	78	73	83	37	26	53
Malawi	232	220	246	55	43	71	5.5	4.6	6.5	98	93	104	36	28	46
Malaysia	17	16	17	8	8	9	2.7	2.5	2.9	8	8	9	4	4	5
Maldives	94	86	103	9	7	11	9.2	8.3	10.2	1	1	1	0	0	0

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		2016		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]	
	Male	Female	Male	Female	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016
Ecuador	62	51	23	18	44	18	13	6	24	11	8	4	8	3	2	1
Egypt	86	86	24	22	63	19	120	49	33	13	64	32	11	5	16	9
El Salvador	64	55	17	13	46	13	8	2	23	8	4	1	7	4	1	0
Equatorial Guinea	200	180	97	84	129	66	2	3	51	32	1	1	40	17	0	0
Eritrea	162	139	49	39	93	33	12	5	34	18	4	3	48	13	4	2
Estonia	20	15	3	3	14	2	0	0	10	1	0	0	5	1	0	0
Ethiopia	215	191	64	53	121	41	268	132	60	28	137	90	81	17	117	48
Fiji	31	26	24	20	24	19	1	0	13	9	0	0	10	4	0	0
Finland	7	6	3	2	6	2	0	0	4	1	0	0	2	1	0	0
France	10	8	4	4	7	3	6	2	4	2	3	2	2	1	2	1
Gabon	99	86	52	43	60	34	2	2	32	22	1	1	22	16	1	1
Gambia	175	160	70	61	82	42	3	3	50	28	2	2	35	13	1	1
Georgia	53	42	12	9	40	10	4	1	25	7	2	0	7	3	1	0
Germany	10	7	4	4	7	3	6	2	3	2	3	2	2	1	2	1
Ghana	135	119	64	53	80	41	44	36	42	27	24	24	29	13	12	9
Greece	11	10	4	4	9	3	1	0	7	2	1	0	2	1	0	0
Grenada	24	21	17	15	18	14	0	0	12	8	0	0	4	3	0	0
Guatemala	87	76	31	26	60	24	21	10	29	14	10	6	12	4	3	1
Guinea	243	227	94	84	139	58	38	26	63	25	18	11	52	22	9	8
Guinea-Bissau	234	203	96	80	130	58	6	4	64	38	3	3	34	18	1	1
Guyana	67	53	37	28	46	27	1	0	31	20	1	0	11	6	0	0
Haiti	153	136	73	61	100	51	26	13	39	25	10	6	31	15	6	4
Honduras	63	53	21	17	45	16	9	3	22	10	4	2	9	4	1	1
Hungary	19	15	6	5	15	4	2	0	11	3	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	42	44	88	35	2,385	867	57	25	1,570	640	21	6	449	160
Indonesia	91	78	29	23	62	22	288	110	30	14	142	68	15	5	69	25
Iran (Islamic Republic of)	57	56	16	15	44	13	82	17	25	10	47	13	9	3	15	3
Iraq	58	50	34	28	42	26	28	32	26	18	18	22	8	6	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	7	2	4	1	2	1	1	0
Jamaica	34	26	17	13	25	13	2	1	20	11	1	1	5	3	0	0
Japan	7	6	3	3	5	2	6	2	3	1	3	1	2	1	3	1
Jordan	38	35	19	17	30	15	4	4	20	11	3	3	5	4	1	1
Kazakhstan	59	45	13	10	44	10	17	4	22	6	8	2	6	3	2	1
Kenya	103	92	53	45	63	36	62	53	28	23	28	34	18	11	13	14
Kiribati	102	89	59	49	69	42	0	0	35	23	0	0	17	9	0	0
Kuwait	19	16	9	8	15	7	1	0	10	4	0	0	4	2	0	0
Kyrgyzstan	71	59	24	19	54	19	7	3	24	12	3	2	9	3	1	0
Lao People's Democratic Republic	172	151	70	58	111	49	20	8	54	29	10	5	27	10	3	2
Latvia	19	15	5	4	13	4	0	0	8	2	0	0	6	2	0	0
Lebanon	34	31	8	8	27	7	2	1	21	5	1	0	7	1	0	0
Lesotho	98	84	101	86	73	72	4	4	40	39	2	2	14	14	1	1
Liberia	270	245	72	62	172	51	16	8	58	23	5	4	34	17	2	2
Libya	46	38	14	12	36	11	5	1	21	7	3	1	9	5	1	1
Lithuania	17	13	6	5	12	4	1	0	8	3	0	0	4	2	0	0
Luxembourg	10	8	3	2	7	2	0	0	4	2	0	0	2	1	0	0
Madagascar	167	152	51	42	97	34	49	28	40	19	20	15	44	13	15	9
Malawi	242	222	60	50	137	39	59	25	51	23	23	15	42	14	11	7
Malaysia	18	15	9	8	14	7	7	4	8	4	4	2	5	3	2	1
Maldives	100	88	9	8	68	7	1	0	42	5	0	0	13	3	0	0

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

| Country | 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 | | | 2016 | | | Annual rate of reduction (ARR) (per cent) 1990-2016 | | | 1990 | | | 2016 | | |
	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
Mali	254	238	271	111	69	176	3.2	1.4	5.0	101	95	108	82	51	131
Malta	11	10	12	7	6	8	1.9	1.2	2.7	0	0	0	0	0	0
Marshall Islands	51	43	60	35	25	51	1.4	-0.2	2.9	0	0	0	0	0	0
Mauritania	117	105	129	81	45	147	1.4	-0.9	3.7	9	8	10	12	6	21
Mauritius	23	22	24	14	12	15	2.0	1.5	2.4	1	0	1	0	0	0
Mexico	46	42	50	15	14	15	4.4	4.0	4.7	110	102	120	34	32	36
Micronesia (Federated States of)	55	44	69	33	15	76	1.9	-1.1	4.9	0	0	0	0	0	0
Monaco	8	7	9	3	3	4	3.1	2.1	4.2	0	0	0	0	0	0
Mongolia	109	100	118	18	12	26	6.9	5.5	8.5	8	7	8	1	1	2
Montenegro	17	16	18	4	3	5	5.7	5.0	6.3	0	0	0	0	0	0
Morocco	80	75	85	27	20	37	4.1	2.9	5.4	58	54	62	19	14	26
Mozambique	248	229	268	71	53	97	4.8	3.6	5.9	149	138	161	78	58	106
Myanmar	116	106	126	51	39	64	3.2	2.2	4.2	128	118	140	48	37	60
Namibia	71	65	78	45	31	66	1.8	0.3	3.2	4	3	4	3	2	5
Nauru	58	36	95	35	21	56	2.0	-0.8	4.9	0	0	0	0	0	0
Nepal	141	132	150	35	29	42	5.4	4.6	6.1	99	93	105	20	16	24
Netherlands	8	8	9	4	4	4	3.0	2.8	3.2	2	2	2	1	1	1
New Zealand	11	11	12	5	5	6	2.8	2.3	3.3	1	1	1	0	0	0
Nicaragua	68	63	73	20	13	31	4.7	2.9	6.5	10	9	11	2	2	4
Niger	329	308	350	91	65	129	4.9	3.6	6.2	137	129	146	86	62	121
Nigeria	213	199	227	104	77	140	2.7	1.6	3.9	862	807	918	733	544	980
Niue	14	10	20	22	10	51	-1.8	-5.3	1.6	0	0	0	0	0	0
Norway	9	8	9	3	2	3	4.6	4.1	5.1	0	0	1	0	0	0
Oman	39	34	45	11	10	11	5.0	4.4	5.5	3	2	3	1	1	1
Pakistan	139	134	144	79	61	102	2.2	1.2	3.2	584	563	605	424	329	550
Palau	36	31	42	16	9	31	3.2	0.5	5.7	0	0	0	0	0	0
Panama	31	27	35	16	10	27	2.4	0.4	4.5	2	2	2	1	1	2
Papua New Guinea	88	80	97	54	32	94	1.9	-0.3	3.8	13	12	14	12	7	21
Paraguay	47	42	52	20	12	32	3.3	1.4	5.2	6	6	7	3	2	4
Peru	80	76	85	15	12	20	6.4	5.3	7.4	52	50	55	9	7	12
Philippines	58	54	62	27	20	37	2.9	1.8	4.1	116	109	124	64	48	87
Poland	17	17	18	5	5	5	5.0	4.9	5.2	10	10	10	2	2	2
Portugal	15	14	15	4	3	4	5.5	4.8	6.3	2	2	2	0	0	0
Qatar	21	19	22	9	8	9	3.4	3.0	3.9	0	0	0	0	0	0
Republic of Korea	16	15	17	3	3	4	5.9	5.6	6.2	10	10	11	2	1	2
Republic of Moldova	33	28	38	16	11	23	2.8	1.2	4.3	3	2	3	1	0	1
Romania	31	31	32	9	8	10	4.8	4.4	5.2	10	10	11	2	2	2
Russian Federation	22	21	22	8	6	9	4.0	3.2	4.8	45	45	46	14	12	17
Rwanda	151	142	160	39	25	60	5.2	3.5	7.0	48	45	51	14	9	22
Saint Kitts and Nevis	32	29	35	9	6	14	4.7	3.2	6.2	0	0	0	0	0	0
Saint Lucia	21	20	23	13	11	16	1.8	1.0	2.7	0	0	0	0	0	0
Saint Vincent and the Grenadines	24	23	26	17	14	20	1.5	0.7	2.3	0	0	0	0	0	0
Samoa	31	27	35	17	12	24	2.2	0.9	3.8	0	0	0	0	0	0
San Marino	11	9	14	3	1	6	5.2	2.2	8.2	0	0	0	0	0	0
Sao Tome and Principe	105	92	119	34	23	50	4.4	2.8	6.0	0	0	1	0	0	0
Saudi Arabia	45	36	55	13	7	25	4.8	2.0	7.2	25	21	31	8	5	16
Senegal	140	134	148	47	37	60	4.2	3.3	5.1	44	42	46	25	20	32
Serbia	28	28	29	6	5	7	6.1	5.6	6.5	4	4	4	1	0	1
Seychelles	17	15	18	14	11	18	0.6	-0.4	1.6	0	0	0	0	0	0
Sierra Leone	262	239	286	114	88	141	3.2	2.4	4.2	50	45	54	29	23	36
Singapore	8	7	8	3	3	3	3.9	3.5	4.3	0	0	0	0	0	0
Slovakia	15	15	15	6	6	6	3.5	3.3	3.7	1	1	1	0	0	0

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		2016													
	Male	Female	Male	Female	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016
Mali	263	245	115	105	130	68	53	51	73	36	30	27	47	24	12	13
Malta	12	10	7	6	10	6	0	0	8	5	0	0	2	1	0	0
Marshall Islands	55	46	39	31	40	29	0	0	20	16	0	0	9	6	0	0
Mauritania	125	108	88	74	71	54	6	8	45	34	4	5	22	9	1	1
Mauritius	26	20	15	12	20	12	0	0	15	8	0	0	4	2	0	0
Mexico	49	42	16	13	37	13	88	29	22	8	54	18	6	3	12	6
Micronesia (Federated States of)	59	50	37	30	43	28	0	0	25	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	124	93	21	14	77	15	5	1	30	10	2	1	19	4	1	0
Montenegro	18	16	4	4	15	4	0	0	11	2	0	0	2	1	0	0
Morocco	84	75	30	24	63	23	46	16	36	18	26	13	10	3	7	2
Mozambique	257	238	76	67	165	53	99	59	61	27	38	30	68	15	28	13
Myanmar	123	108	55	46	82	40	90	38	48	25	53	23	20	8	20	8
Namibia	76	66	49	41	48	32	3	2	26	18	1	1	17	11	1	1
Nauru	61	51	38	31	45	29	0	0	29	22	0	0	11	6	0	0
Nepal	141	141	37	32	98	28	69	16	59	21	42	12	29	5	15	3
Netherlands	9	7	4	3	7	3	1	1	5	3	1	0	2	1	0	0
New Zealand	13	10	6	5	9	5	1	0	4	3	0	0	3	1	0	0
Nicaragua	73	62	22	17	51	17	8	2	24	9	4	1	8	4	1	0
Niger	333	325	95	87	133	51	57	50	55	26	24	26	71	40	18	26
Nigeria	223	202	110	98	126	67	516	476	52	34	218	247	42	21	117	107
Niue	15	12	25	20	12	19	0	0	7	12	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	9	2	1	17	5	1	0	6	2	0	0
Pakistan	141	136	82	75	106	64	450	346	64	46	278	248	14	11	39	48
Palau	40	32	18	14	31	14	0	0	19	8	0	0	7	3	0	0
Panama	34	28	18	15	26	14	2	1	18	10	1	1	6	3	0	0
Papua New Guinea	94	82	59	50	64	42	9	9	31	24	5	5	15	9	2	2
Paraguay	50	43	22	18	37	17	5	2	22	11	3	2	7	4	1	0
Peru	84	76	17	14	57	12	37	7	28	8	18	5	11	4	6	2
Philippines	64	52	30	24	41	22	82	51	20	13	40	30	14	7	23	14
Poland	20	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	9	8	18	7	0	0	11	4	0	0	4	2	0	0
Republic of Korea	17	14	4	3	14	3	9	1	8	2	5	1	5	1	4	0
Republic of Moldova	37	29	18	14	27	14	2	1	19	12	2	0	5	2	0	0
Romania	35	28	10	8	25	8	8	1	15	4	5	1	5	2	2	0
Russian Federation	25	18	9	7	18	7	38	12	11	3	22	6	5	2	11	4
Rwanda	159	142	42	35	93	29	29	11	41	17	13	6	67	12	16	4
Saint Kitts and Nevis	35	28	10	8	26	8	0	0	19	6	0	0	5	2	0	0
Saint Lucia	24	19	15	12	18	12	0	0	13	9	0	0	4	2	0	0
Saint Vincent and the Grenadines	27	22	18	15	20	15	0	0	13	10	0	0	4	4	0	0
Samoa	34	28	19	16	26	15	0	0	16	9	0	0	6	4	0	0
San Marino	12	10	3	3	10	3	0	0	7	1	0	0	2	1	0	0
Sao Tome and Principe	111	98	37	30	67	26	0	0	26	15	0	0	20	9	0	0
Saudi Arabia	47	42	14	12	36	11	21	7	22	7	13	4	7	2	3	1
Senegal	147	134	51	43	72	34	23	18	40	21	13	11	37	16	9	7
Serbia	30	26	6	5	24	5	3	0	17	4	2	0	3	1	0	0
Seychelles	18	15	16	13	14	12	0	0	12	9	0	0	5	4	0	0
Sierra Leone	274	250	120	106	156	83	30	21	54	33	11	9	55	21	7	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

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

Country	Under-five mortality rate (U5MR) with 90 per cent uncertainty interval (deaths per 1,000 live births) 1990 U5MR	Lower bound	Upper bound	2016 U5MR	Lower bound	Upper bound	Annual rate of reduction (ARR) (per cent) 1990-2016 ARR	Lower bound	Upper bound	Number of under-five deaths with 90 per cent uncertainty interval (thousands)[a] 1990 Under-five deaths	Lower bound	Upper bound	2016 Under-five deaths	Lower bound	Upper bound
Slovenia	10	10	11	2	2	3	5.8	5.3	6.3	0	0	0	0	0	0
Solomon Islands	38	33	44	26	20	34	1.5	0.3	2.7	0	0	1	0	0	1
Somalia	181	151	221	133	73	243	1.2	-0.9	3.2	61	51	74	79	44	144
South Africa	57	51	65	43	37	50	1.1	0.4	1.9	63	56	71	51	43	59
South Sudan	256	213	301	91	56	144	4.0	2.0	6.0	67	56	78	38	24	61
Spain	9	9	9	3	3	4	3.9	3.4	4.4	4	4	4	1	1	2
Sri Lanka	21	21	21	9	8	11	3.1	2.6	3.6	8	7	8	3	3	3
State of Palestine	45	41	48	19	14	28	3.2	1.8	4.5	4	4	4	3	2	4
Sudan	131	122	142	65	53	80	2.7	1.9	3.6	106	99	115	83	67	102
Suriname	46	38	57	20	10	41	3.2	0.5	6.1	1	0	1	0	0	0
Swaziland	66	58	75	70	48	102	-0.3	-1.7	1.2	2	2	3	3	2	4
Sweden	7	7	7	3	3	3	3.4	3.1	3.6	1	1	1	0	0	0
Switzerland	8	8	8	4	4	4	2.7	2.4	3.0	1	1	1	0	0	0
Syrian Arab Republic	37	34	40	18	14	25	2.9	1.4	3.9	16	15	18	7	6	10
Tajikistan	107	96	120	43	26	74	3.5	1.4	5.4	22	20	25	11	7	18
Thailand	38	35	40	12	7	20	4.3	2.4	6.3	41	39	44	9	5	15
The former Yugoslav Republic of Macedonia	37	36	38	12	9	19	4.3	2.5	5.5	1	1	1	0	0	0
Timor-Leste	175	159	193	50	33	75	4.8	3.2	6.4	5	5	6	2	1	3
Togo	145	134	156	76	61	94	2.5	1.7	3.3	22	21	24	19	15	24
Tonga	22	18	26	16	11	26	1.1	-0.8	3.0	0	0	0	0	0	0
Trinidad and Tobago	30	25	36	19	9	43	1.8	-1.5	4.6	1	1	1	0	0	1
Tunisia	57	50	65	14	10	19	5.5	4.1	7.0	12	11	14	3	2	4
Turkey	74	70	79	13	12	13	6.8	6.5	7.1	104	97	111	16	16	17
Turkmenistan	86	75	100	51	22	109	2.0	-0.9	5.2	11	10	13	7	3	15
Tuvalu	57	48	68	25	15	43	3.1	0.9	5.3	0	0	0	0	0	0
Uganda	175	165	186	53	45	62	4.6	4.0	5.3	143	135	152	90	76	106
Ukraine	19	18	22	9	9	10	2.9	2.5	3.5	13	12	15	4	4	5
United Arab Emirates	17	14	19	8	7	8	3.0	2.2	3.7	1	1	1	1	1	1
United Kingdom	9	9	10	4	4	5	3.0	2.7	3.2	7	7	7	3	3	4
United Republic of Tanzania	179	169	189	57	46	71	4.4	3.6	5.2	192	181	203	117	96	146
United States	11	11	11	7	6	7	2.1	1.9	2.4	44	43	45	26	24	28
Uruguay	23	23	24	9	9	10	3.6	3.3	3.9	1	1	1	0	0	0
Uzbekistan	72	63	83	24	20	29	4.2	3.7	4.7	51	44	58	16	13	19
Vanuatu	36	30	42	28	18	42	1.0	-0.8	2.7	0	0	0	0	0	0
Venezuela (Bolivarian Republic of)	30	29	31	16	15	18	2.3	1.8	2.8	17	16	17	10	9	11
Viet Nam	51	47	56	22	19	26	3.3	2.6	3.9	99	91	108	34	29	41
Yemen	126	118	134	55	40	76	3.2	1.9	4.4	76	72	81	48	34	66
Zambia	182	171	194	63	46	85	4.1	2.9	5.3	63	59	67	39	28	52
Zimbabwe	75	69	82	56	44	72	1.1	0.2	2.1	28	26	30	30	23	38

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

Country	1990 U5MR	Lower bound	Upper bound	2016 U5MR	Lower bound	Upper bound	ARR	Lower bound	Upper bound	1990 Under-five deaths	Lower bound	Upper bound	2016 Under-five deaths	Lower bound	Upper bound
Northern America and Europe	14	14	14	6	6	6	3.5	3.2	3.6	191	189	193	71	68	74
Northern America	11	11	11	6	6	7	2.0	1.9	2.3	47	46	48	28	26	30
Europe	15	15	16	5	5	6	4.0	3.8	4.3	144	142	146	43	40	46
Latin America and the Caribbean	55	54	57	18	17	19	4.4	4.1	4.7	652	633	672	187	178	202
Central Asia and Southern Asia	124	121	127	46	42	51	3.8	3.4	4.1	4,950	4,837	5,072	1,775	1,630	1,945
Central Asia	73	68	78	26	22	34	3.9	2.9	4.6	113	106	121	41	35	54
Southern Asia	126	123	129	47	43	52	3.8	3.4	4.1	4,836	4,724	4,958	1,734	1,586	1,902
Eastern Asia and South-Eastern Asia	57	55	60	16	15	18	4.9	4.4	5.2	2,312	2,200	2,439	495	455	548
Eastern Asia	51	47	55	10	8	11	6.4	5.8	7.0	1,446	1,336	1,570	180	159	206
South-Eastern Asia	72	70	75	27	24	31	3.8	3.3	4.3	866	842	891	314	281	360
Western Asia and Northern Africa	75	73	77	28	26	32	3.7	3.3	4.0	689	674	706	323	297	361
Western Asia	66	63	68	24	21	29	3.8	3.2	4.4	302	292	313	135	118	161
Northern Africa	84	81	87	33	29	37	3.6	3.1	4.1	388	376	400	188	167	215
Sub-Saharan Africa	183	179	187	79	73	89	3.2	2.8	3.5	3,787	3,714	3,869	2,777	2,570	3,113
Oceania	35	33	38	23	16	37	1.6	-0.2	3.1	18	17	19	15	10	24
Oceania excluding Australia and New Zealand	74	68	81	49	31	80	1.6	-0.3	3.3	15	14	16	13	9	22
Australia and New Zealand	10	9	10	4	4	4	3.4	3.2	3.6	3	3	3	1	1	2
Least developing countries	176	173	179	68	65	75	3.6	3.3	3.9	3,669	3,615	3,731	2,101	1,990	2,310
Landlocked developing countries	167	164	171	63	59	70	3.7	3.4	4.0	1,763	1,725	1,805	972	913	1,070
Small island developing States	79	76	82	42	37	51	2.4	1.7	2.9	94	91	97	51	45	62
World	93	92	95	41	39	44	3.2	2.9	3.4	12,598	12,426	12,801	5,642	5,409	6,043

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	2016 Male	2016 Female	Infant mortality rate (deaths per 1,000 live births) 1990	2016	Number of infant deaths (thousands)[a] 1990	2016	Neonatal mortality rate (deaths per 1,000 live births) 1990	2016	Number of neonatal deaths (thousands)[a] 1990	2016	Probability of dying among children aged 5–14 (deaths per 1,000 children aged 5) 1990	2016	Number of deaths among children aged 5–14 (thousands)[a] 1990	2016
Slovenia	12	9	3	2	9	2	0	0	6	1	0	0	2	1	0	0
Solomon Islands	41	35	28	23	31	22	0	0	15	10	0	0	7	5	0	0
Somalia	189	173	139	126	109	83	37	50	45	39	16	24	38	24	8	10
South Africa	63	52	48	39	45	34	49	40	20	12	22	15	11	5	10	6
South Sudan	266	246	96	85	152	59	39	26	67	38	18	17	54	17	9	6
Spain	10	8	4	3	7	3	3	1	5	2	2	1	2	1	1	0
Sri Lanka	23	19	10	9	18	8	6	3	13	5	5	2	6	2	2	1
State of Palestine	47	42	21	18	36	17	3	3	22	11	2	2	7	3	0	0
Sudan	139	123	70	60	82	45	68	58	43	29	36	38	30	9	18	10
Suriname	51	41	22	18	40	18	0	0	22	11	0	0	7	3	0	0
Swaziland	71	60	76	65	50	52	2	2	22	21	1	1	19	11	0	0
Sweden	8	6	3	3	6	2	1	0	4	2	0	0	1	1	0	0
Switzerland	9	7	4	4	7	4	1	0	4	3	0	0	2	1	0	0
Syrian Arab Republic	40	34	19	16	30	14	13	6	17	9	7	4	7	3	3	2
Tajikistan	116	98	48	38	84	37	18	9	32	20	7	5	18	3	2	1
Thailand	43	33	14	11	31	11	33	8	21	7	23	5	8	3	10	3
The former Yugoslav Republic of Macedonia	39	35	13	11	34	11	1	0	17	8	1	0	3	1	0	0
Timor-Leste	182	167	54	46	132	42	4	2	57	22	2	1	30	8	1	0
Togo	154	135	82	70	89	51	14	13	43	26	7	7	39	23	4	5
Tonga	20	24	15	18	19	14	0	0	10	7	0	0	5	3	0	0
Trinidad and Tobago	33	27	20	17	26	17	1	0	20	13	0	0	4	3	0	0
Tunisia	60	53	15	12	44	12	9	2	27	8	6	2	7	3	2	1
Turkey	77	71	13	12	56	11	77	14	33	7	46	8	9	2	12	3
Turkmenistan	100	72	60	42	70	43	9	6	29	22	4	3	7	4	1	0
Tuvalu	61	53	28	23	44	21	0	0	30	17	0	0	10	5	0	0
Uganda	187	163	58	48	104	38	88	65	39	21	34	37	33	16	17	20
Ukraine	22	17	10	8	17	8	11	4	12	5	8	3	5	2	3	1
United Arab Emirates	19	15	9	7	14	7	1	1	8	4	0	0	6	1	0	0
United Kingdom	10	8	5	4	8	4	6	3	5	3	4	2	2	1	1	1
United Republic of Tanzania	185	172	60	53	108	40	118	84	41	22	47	46	31	12	23	20
United States	13	10	7	6	9	6	37	23	6	4	23	15	2	1	9	5
Uruguay	26	21	10	8	21	8	1	0	12	5	1	0	3	2	0	0
Uzbekistan	80	64	27	21	59	21	42	14	31	14	22	9	6	3	3	2
Vanuatu	38	33	30	25	29	23	0	0	15	12	0	0	7	5	0	0
Venezuela (Bolivarian Republic of)	33	27	18	15	25	14	14	8	13	10	7	6	5	3	2	2
Viet Nam	58	43	25	18	37	17	71	27	23	12	46	18	13	3	22	4
Yemen	131	120	59	51	88	43	55	37	44	27	28	23	21	6	8	4
Zambia	191	173	68	58	110	44	39	27	37	23	14	15	30	14	7	7
Zimbabwe	81	69	62	51	50	40	19	21	24	23	9	12	13	15	4	6

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

Region	1990 Male	1990 Female	2016 Male	2016 Female	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016
Northern America and Europe	16	12	6	5	12	5	159	60	7	3	98	39	3	1	42	15
Northern America	12	10	7	6	9	6	40	24	6	4	24	16	2	1	9	6
Europe	17	13	6	5	13	5	120	36	8	3	74	23	3	1	32	10
Latin America and the Caribbean	60	51	19	16	44	15	517	159	23	9	270	98	6	3	65	33
Central Asia and Southern Asia	122	126	46	46	88	37	3,530	1,433	56	27	2,277	1,044	19	7	611	245
Central Asia	81	64	30	23	60	23	93	36	28	13	45	21	8	3	9	4
Southern Asia	124	128	47	47	89	38	3,437	1,397	57	28	2,232	1,023	20	7	602	241
Eastern Asia and South-Eastern Asia	60	54	18	15	44	14	1,753	410	28	8	1,112	250	9	4	308	107
Eastern Asia	53	49	10	9	40	8	1,124	153	28	5	778	92	6	3	149	48
South-Eastern Asia	79	66	30	24	53	22	629	257	28	14	334	158	15	5	159	59
Western Asia and Northern Africa	78	71	31	26	55	23	513	258	31	15	285	173	11	5	83	43
Western Asia	69	62	26	22	50	20	230	111	28	13	131	72	9	4	34	18
Northern Africa	87	81	35	30	61	26	282	147	33	17	154	100	13	5	50	25
Sub-Saharan Africa	192	173	84	73	109	54	2,301	1,910	46	28	1,008	1,003	42	19	604	513
Oceania	38	32	25	21	27	18	14	12	14	10	7	7	6	4	3	2
Oceania excluding Australia and New Zealand	79	69	53	44	55	38	11	11	27	21	6	6	13	8	2	2
Australia and New Zealand	11	8	4	4	8	3	2	1	5	2	1	1	2	1	1	0
Least developed countries	183	168	73	63	109	48	2,306	1,498	52	26	1,138	834	40	15	581	388
Landlocked developing countries	176	159	68	59	101	43	1,083	674	48	26	530	404	39	15	284	193
Small island developing States	84	73	46	38	56	32	67	39	27	19	33	23	14	7	13	8
World	96	91	43	39	65	31	8,787	4,242	37	19	5,058	2,614	15	8	1,716	959

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[b]

| 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 | | | 2016 | | | Annual rate of reduction (ARR) (per cent) 1990–2016 | | | 1990 | | | 2016 | | |
	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	181	177	185	78	73	88	3.2	2.8	3.5	3,893	3,820	3,977	2,860	2,655	3,198
West and Central Africa	199	193	205	95	83	110	2.9	2.3	3.3	2,042	1,981	2,109	1,756	1,547	2,042
Eastern and Southern Africa	164	160	169	61	57	69	3.8	3.3	4.1	1,851	1,807	1,900	1,104	1,026	1,241
Middle East and North Africa	66	64	67	24	22	27	3.9	3.3	4.2	558	544	573	237	216	270
South Asia	129	126	133	48	44	53	3.8	3.4	4.2	4,730	4,618	4,851	1,713	1,566	1,881
East Asia and Pacific	57	54	60	16	15	18	4.8	4.4	5.2	2,329	2,218	2,457	510	471	564
Latin America and Caribbean	55	54	57	18	17	19	4.4	4.1	4.7	652	633	672	187	178	202
North America	11	11	11	6	6	7	2.0	1.9	2.3	47	46	48	28	26	30
Europe and Central Asia	31	30	32	10	9	11	4.5	4.0	4.7	388	379	400	107	100	120
Eastern Europe and Central Asia	47	45	48	14	13	17	4.5	4.0	4.8	331	321	342	88	81	101
Western Europe	11	10	11	4	4	4	3.8	3.8	3.9	58	57	58	19	19	20
World	93	92	95	41	39	44	3.2	2.9	3.4	12,598	12,426	12,801	5,642	5,409	6,043

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

| 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 | | | 2016 | | | Annual rate of reduction (ARR) (per cent) 1990–2016 | | | 1990 | | | 2016 | | |
	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	182	77	71	86	3.2	2.8	3.5	3,764	3,692	3,844	2,720	2,512	3,043
Americas	44	42	45	14	14	15	4.3	4.0	4.5	699	681	719	215	205	230
Eastern Mediterranean	102	100	105	52	46	61	2.6	2.0	3.1	1,374	1,345	1,407	877	776	1,032
Europe	31	30	32	10	9	11	4.5	4.0	4.8	390	380	401	108	100	121
South-East Asia	119	116	122	39	36	42	4.3	4.0	4.6	4,626	4,513	4,746	1,407	1,297	1,521
Western Pacific	52	49	56	13	12	15	5.4	4.8	5.8	1,742	1,632	1,867	313	285	351
World	93	92	95	41	39	44	3.2	2.9	3.4	12,598	12,426	12,801	5,642	5,409	6,043

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[b] (continued)

| Region | 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 | | 2016 | | | | | | | | | | | | | |
	Male	Female	Male	Female	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016
Sub-Saharan Africa	190	171	84	73	108	53	2,369	1,968	46	28	1,044	1,041	42	18	621	522
West and Central Africa	208	189	101	89	116	63	1,211	1,184	49	31	531	589	42	23	293	321
Eastern and Southern Africa	173	155	66	56	101	43	1,158	784	44	25	513	452	41	14	328	201
Middle East and North Africa	68	63	26	22	50	20	427	198	28	14	239	135	10	4	67	33
South Asia	127	132	48	48	92	39	3,355	1,380	59	28	2,185	1,010	21	7	587	238
East Asia and Pacific	60	54	18	15	43	14	1,766	422	28	8	1,119	257	9	4	311	109
Latin America and Caribbean	60	51	19	16	44	15	517	159	23	9	270	98	6	3	65	33
North America	12	10	7	6	9	6	40	24	6	4	24	16	2	1	9	6
Europe and Central Asia	34	28	11	9	25	8	312	92	14	5	174	57	4	2	55	18
Eastern Europe and Central Asia	51	42	16	13	38	13	264	76	21	7	144	45	6	2	42	13
Western Europe	12	9	4	4	9	3	48	16	6	2	30	12	2	1	13	4
World	96	91	43	39	65	31	8,787	4,242	37	19	5,058	2,614	15	8	1,716	959

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

| Region | 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 | | 2016 | | | | | | | | | | | | | |
	Male	Female	Male	Female	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016
Africa	186	168	82	71	107	52	2,296	1,879	46	27	1,010	993	41	18	602	505
Americas	47	40	16	13	35	12	556	183	18	8	295	114	5	3	75	38
Eastern Mediterranean	105	100	55	49	76	41	1,019	690	43	28	597	475	13	8	131	108
Europe	34	28	11	9	25	8	313	93	14	5	175	57	4	2	55	18
South-East Asia	117	120	39	39	84	32	3,261	1,136	53	23	2,088	817	20	6	643	217
Western Pacific	55	49	14	12	40	11	1,337	260	27	7	891	156	8	3	209	72
World	96	91	43	39	65	31	8,787	4,242	37	19	5,058	2,614	15	8	1,716	959

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[b]

| 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 | | | 2016 | | | Annual rate of reduction (ARR) (per cent) 1990–2016 | | | 1990 | | | 2016 | | |
	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
Low income	188	185	192	73	68	81	3.6	3.2	3.9	2,571	2,522	2,628	1,671	1,565	1,852
Middle income	91	89	93	38	36	41	3.4	3.0	3.6	9,861	9,693	10,050	3,903	3,673	4,237
Lower middle income	121	118	123	51	47	56	3.3	3.0	3.6	7,400	7,271	7,539	3,386	3,154	3,711
Upper middle income	52	49	54	14	13	15	5.0	4.7	5.3	2,462	2,351	2,589	518	493	557
Low and middle income	102	101	104	44	42	48	3.2	2.9	3.4	12,432	12,259	12,635	5,575	5,341	5,975
East Asia and Pacific	60	57	63	17	16	19	4.8	4.4	5.2	2,307	2,196	2,435	504	465	558
Europe and Central Asia	47	45	48	14	13	17	4.5	4.0	4.8	331	321	342	88	81	101
Latin America and the Caribbean	57	55	58	18	17	19	4.4	4.1	4.7	644	625	664	184	175	199
Middle East and North Africa	69	67	71	26	23	29	3.8	3.3	4.2	529	516	543	227	206	259
South Asia	129	126	133	48	44	53	3.8	3.4	4.2	4,730	4,618	4,851	1,713	1,566	1,881
Sub-Saharan Africa	181	177	185	78	73	88	3.2	2.8	3.5	3,891	3,817	3,974	2,859	2,654	3,196
High income	13	12	13	5	5	6	3.3	2.8	3.6	166	161	172	67	63	75
World	93	92	95	41	39	44	3.2	2.9	3.4	12,598	12,426	12,801	5,642	5,409	6,043

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

| 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 | | | 2016 | | | Annual rate of reduction (ARR) (per cent) 1990–2016 | | | 1990 | | | 2016 | | |
	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	3.4	3.2	3.6	202	200	205	75	72	78
Less developed regions	103	102	105	45	43	48	3.2	3.0	3.4	12,396	12,224	12,599	5,567	5,334	5,968
Least developed countries	176	173	179	68	65	75	3.6	3.3	3.9	3,669	3,615	3,731	2,101	1,990	2,310
Excluding least developed countries	88	86	89	37	34	40	3.3	3.0	3.6	8,727	8,560	8,915	3,466	3,235	3,780
Excluding China	116	115	118	50	48	54	3.3	3.0	3.4	10,995	10,859	11,149	5,399	5,165	5,797
Sub-Saharan Africa	183	179	187	79	73	89	3.2	2.8	3.5	3,787	3,714	3,869	2,777	2,570	3,113
Africa	165	162	169	72	67	81	3.2	2.7	3.4	4,175	4,100	4,258	2,965	2,760	3,307
Asia	89	88	91	32	30	35	3.9	3.6	4.2	7,563	7,405	7,742	2,404	2,259	2,590
Europe	15	15	16	5	5	6	4.0	3.8	4.3	144	142	146	43	40	46
Latin America and the Caribbean	55	54	57	18	17	19	4.4	4.1	4.7	652	633	672	187	178	202
Northern America	11	11	11	6	6	7	2.0	1.9	2.3	47	46	48	28	26	30
Oceania	35	33	38	23	16	37	1.6	-0.2	3.1	18	17	19	15	10	24
World	93	92	95	41	39	44	3.2	2.9	3.4	12,598	12,426	12,801	5,642	5,409	6,043

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 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[b] (continued)

| Region | 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 | | 2016 | | | | | | | | | | | | | |
	Male	Female	Male	Female	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016
Low income	196	180	78	68	112	51	1,565	1,176	50	27	713	632	46	18	427	332
Middle income	93	89	39	36	65	29	7,084	3,009	39	19	4,261	1,944	14	6	1,253	613
Lower middle income	122	119	53	49	84	38	5,148	2,570	48	25	3,038	1,679	20	8	984	510
Upper middle income	55	49	15	13	41	12	1,936	439	26	7	1,223	265	7	3	269	103
Low and middle income	105	99	46	42	71	33	8,649	4,185	40	20	4,973	2,576	17	8	1,681	945
East Asia and Pacific	63	56	19	16	46	14	1,749	417	29	9	1,109	254	10	4	303	108
Europe and Central Asia	51	42	16	13	38	13	264	76	21	7	144	45	6	2	42	13
Latin America and the Caribbean	61	52	19	16	45	15	510	156	23	9	266	96	6	3	64	32
Middle East and North Africa	71	67	28	24	53	22	403	190	29	15	225	129	10	4	63	32
South Asia	127	132	48	48	92	39	3,355	1,380	59	28	2,185	1,010	21	7	587	238
Sub-Saharan Africa	190	171	84	73	108	53	2,367	1,967	46	28	1,043	1,040	42	18	621	522
High income	14	11	6	5	10	5	138	57	6	3	84	38	3	1	35	14
World	96	91	43	39	65	31	8,787	4,242	37	19	5,058	2,614	15	8	1,716	959

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

| Region | 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 | | 2016 | | | | | | | | | | | | | |
	Male	Female	Male	Female	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016	1990	2016
More developed regions	15	12	6	5	11	5	168	64	7	3	103	41	3	1	45	17
Less developed regions	106	101	47	42	71	33	8,619	4,179	40	20	4,955	2,573	17	8	1,670	942
Least developed countries	183	168	73	63	109	48	2,306	1,498	52	26	1,138	834	40	15	581	388
Excluding least developed countries	89	86	38	35	63	28	6,313	2,681	38	18	3,817	1,738	13	6	1,089	554
Excluding China	119	113	52	47	79	37	7,529	4,035	43	23	4,196	2,487	20	9	1,533	897
Sub-Saharan Africa	192	173	84	73	109	54	2,301	1,910	46	28	1,008	1,003	42	19	604	513
Africa	173	157	77	67	101	50	2,584	2,057	44	26	1,162	1,103	36	17	653	538
Asia	90	88	33	31	65	26	5,513	1,954	41	18	3,520	1,367	14	5	952	370
Europe	17	13	6	5	13	5	120	36	8	3	74	23	3	1	32	10
Latin America and the Caribbean	60	51	19	16	44	15	517	159	23	9	270	98	6	3	65	33
Northern America	12	10	7	6	9	6	40	24	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	43	39	65	31	8,787	4,242	37	19	5,058	2,614	15	8	1,716	959

Regional Classifications

The regional classifications referred to in the report are Sustainable Development Goal regions (see below). Aggregates presented in the statistical table for member organizations of the United Nations Inter-agency Group for Child Mortality 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), 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), Swaziland (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

The United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) was formed in 2004 to share data on child mortality, harmonize estimates within the UN system, improve methods for child mortality estimation, report on progress towards child survival goals and enhance country capacity to produce timely and properly assessed estimates of child mortality. The UN IGME includes the United Nations Children's Fund, the World Health Organization, the World Bank Group and the United Nations Population Division of the Department of Economic and Social Affairs as full members.

UN IGME's independent Technical Advisory Group, comprising eminent 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.

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>.