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Rates of progress in mortality decline, 2000-2019

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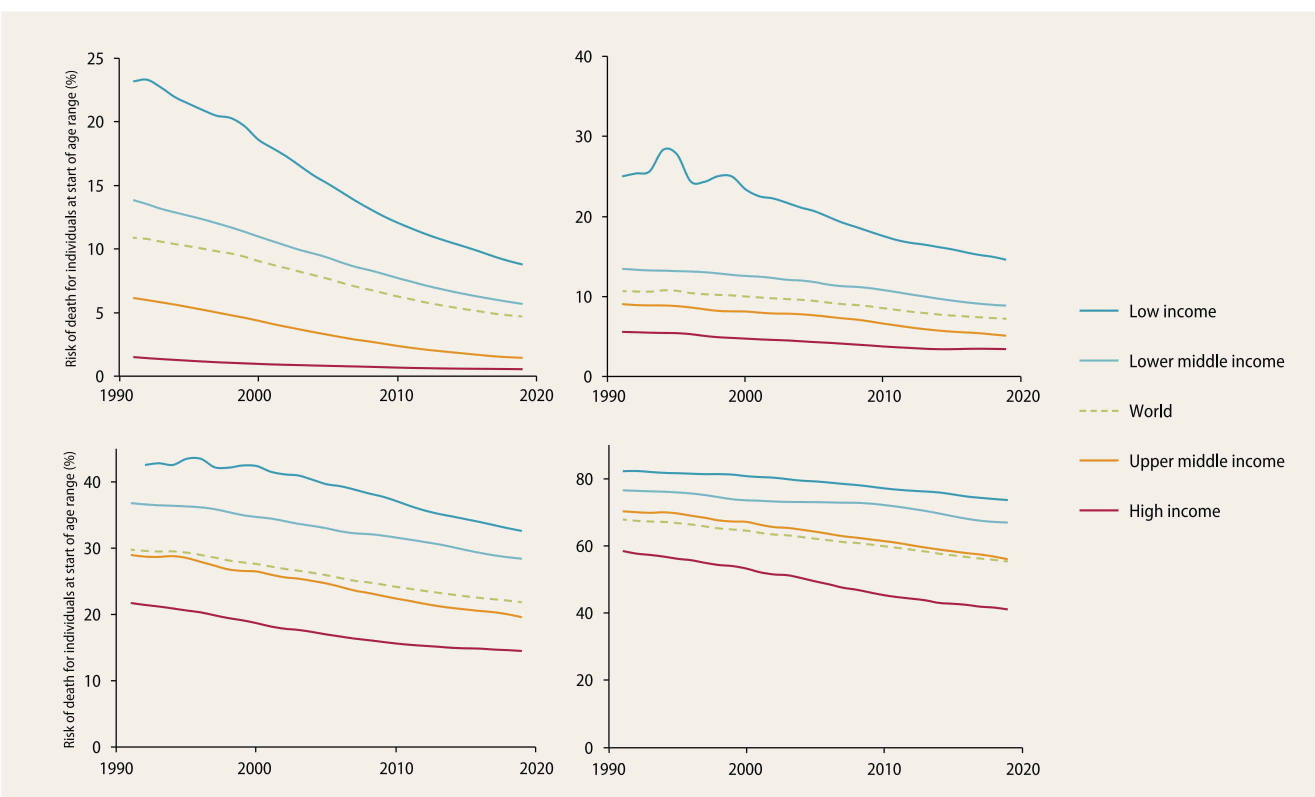
INTRODUCTION

Globally, mortality rates have been generally declining over time. The rates of decline, however, vary between ages and countries or country income levels (Norheim and others 2015). Mortality rates among children have declined remarkably since the 1990s, mostly owing to global as well as country-level efforts under the UN Millennium Development Goals (MDGs) (Cha 2017; Lozano and others 2011; Tanner and others 2016). Compared to child mortality, progress in reducing adult mortality has been much slower (Figure 5.1) (Norheim and others 2015; Wang and others 2017). The gap in mortality rates between low- and middle-income countries (LMICs) and high-income countries is converging for deaths at younger ages but diverging for older ages. In 2019, about 80 percent of deaths above 15 years globally are due to non-communicable diseases (NCDs); this proportion has been increasing over time across all ages (World Health Organization (WHO) 2020). Recognizing the increasing disease burden due to NCDs, the Sustainable Development Goals (SDGs), adopted in 2015 by the UN General Assembly, included target 3.4 to reduce mortality due to NCDs by one-third by 2030 (United Nations General Assembly 2015). However, progress has been slow and insufficient to meet the target, even prior to the COVID-19 pandemic (United Nations, Department of Economic and Social Affairs, Sustainable Development 2023).

The progress in mortality reduction not only varies by age, but also over time (NCD Countdown 2030 collaborators 2018). As shown in Figure 5.1, mortality rates decreased notably faster for ages under 70 during 1990-2010 compared to after 2010, at least in LMICs. The first section of this study seeks to examine and quantify the rates of progress in mortality reduction, by age group and country income levels, during 2010-09 and compare them to the rates during 2000-09. In the next section, we examine countries' performance in the rate of decline in mortality during 2010-19 compared to during 2000-09. The following section presents the progress by disease groups and age. Finally, the last section examines the trend in cost of saving a child vs. an adult life from 2000 to 2019.

FIGURE 5.1 Change in risk of death at start of age range, by age group and country income level, 1990-2019



Source: Original calculations for this publication

RATES OF PROGRESS OVER 2000-09 AND 2010-19

As we mentioned earlier, global progress on mortality reduction has been varying with time, country income levels, and age. Here, we use interrupted time series (ITS) analysis to examine and quantify the difference in the rates of progress in mortality reduction, by age and country income levels between 2010-19 and 2000-09. Annex 5.1 provides details of the ITS methodology. Actual mortality rates, by age, sex, and country income levels are presented in Annex Figure 5A.2.

Table 5.1 shows the results of the ITS analysis of the change in mortality rates from 2000-09 to 2010-19, by age and sex, and by country income level. Between 2000 and 2010, mortality rates declined significantly across all age groups irrespectively of country income level, except for males aged 70-84 years in lower-middle-income countries where the mortality rates increased but not significantly. Compared to ages 0-14, the mortality rate among those 50-69 years fell in low-income countries but rose substantially in middle-income countries in 2010. For almost all country income levels, the rate of decline in mortality between 2010 and 2019 was significantly slower than during 2000-09 for ages under age 70. The slowing of progress in the second decade was seen at all ages above 50, with the exception for ages 70-84 years, where the rate of decline was significantly faster during 2010-19 for males in low-income countries and males and females in middle-income countries.

TABLE 5.1 Results from interrupted time series analysis of the change in mortality rates (per 100,000 population) from 2000-10 to 2010-19, by country income, age, and sex

	Annual rate of change during 2000-09	Level change in 2010	Trend change in 2010-19 vs 2000-09	Constant	Number of observations
Under 15 years					
Low-income countries					
Males	**-66.67 (0.000)**	**30.51 (0.016)**	**32.00 (0.000)**	**1671.36 (0.000)**	20
Females	**-63.44 (0.000)**	**26.79 (0.013)**	**31.13 (0.000)**	**1514.51 (0.000)**	20
Lower-middle-income countries					
Males	**-25.81 (0.000)**	0.62 (0.897)	**7.50 (0.000)**	**827.21 (0.000)**	20
Females	**-26.90 (0.000)**	2.37 (0.676)	**8.33 (0.000)**	**812.14 (0.000)**	20
Upper-middle-income countries					
Males	**-10.54 (0.000)**	-1.10 (0.611)	**1.67 (0.001)**	**286.77 (0.000)**	20
Females	**-8.49 (0.000)**	0.19 (0.934)	**1.36 (0.010)**	**233.64 (0.000)**	20
High-income-countries					
Males	**-1.62 (0.000)**	**-1.94 (0.003)**	**0.48 (0.000)**	**70.66 (0.000)**	20
Females	**-1.19 (0.000)**	**-1.47 (0.005)**	**0.24 (0.008)**	**57.03 (0.000)**	20
15-49 years					
Low income-countries					
Males	**-18.72 (0.000)**	9.36 (0.113)	**13.09 (0.000)**	**703.94 (0.000)**	20
Females	**-18.17 (0.000)**	-11.10 (0.110)	**5.32 (0.000)**	**618.29 (0.000)**	20
Lower-middle-income countries					
Males	**-3.75 (0.000)**	-5.14 (0.055)	**-2.92 (0.000)**	**377.95 (0.000)**	20
Females	**-6.23 (0.000)**	-5.04 (0.164)	**1.49 (0.012)**	**307.49 (0.000)**	20
Upper-middle-income countries					
Males	**-5.06 (0.000)**	-6.47 (0.053)	0.12 (0.788)	**301.19 (0.000)**	20
Females	**-2.23 (0.000)**	**-6.09 (0.007)**	**-0.98 (0.002)**	**153.82 (0.000)**	20

	Annual rate of change during 2000-09	Level change in 2010	Trend change in 2010-19 vs 2000-09	Constant	Number of observations
High income-countries					
Males	**-3.82 (0.000)**	**-8.28 (0.017)**	**3.01 (0.000)**	**186.52 (0.000)**	20
Females	**-1.32 (0.000)**	**-2.77 (0.010)**	**0.96 (0.000)**	**89.38 (0.000)**	20
50-69 years					
Low income-countries					
Males	**-38.62 (0.000)**	**-54.43 (0.004)**	**8.06 (0.003)**	**2659.56 (0.000)**	20
Females	**-38.75 (0.000)**	-25.33 (0.060)	**5.82 (0.016)**	**2125.66 (0.000)**	20
Lower-middle-income countries					
Males	**-31.11 (0.000)**	14.51 (0.249)	**9.13 (0.002)**	**2204.67 (0.000)**	20
Females	**-30.21 (0.000)**	14.49 (0.122)	**21.05 (0.000)**	**1583.90 (0.000)**	20
Upper-middle-income countries					
Males	**-36.55 (0.000)**	**29.34 (0.002)**	**22.77 (0.000)**	**1768.85 (0.000)**	20
Females	**-26.82 (0.000)**	**24.03 (0.009)**	**16.68 (0.000)**	**992.49 (0.000)**	20
High income-countries					
Males	**-22.76 (0.000)**	5.59 (0.350)	**15.72 (0.000)**	**1236.70 (0.000)**	20
Females	**-10.91 (0.000)**	**7.88 (0.010)**	**9.18 (0.000)**	**641.12 (0.000)**	20
70-84 years					
Low income-countries					
Males	**-70.49 (0.000)**	**-149.27 (0.004)**	**-53.94 (0.000)**	**9818.88 (0.000)**	20
Females	**-104.62 (0.000)**	27.86 (0.138)	**41.76 (0.000)**	**7792.70 (0.000)**	20
Lower-middle-income countries					
Males	8.87 (0.106)	**-182.17 (0.000)**	**-123.27 (0.000)**	**8116.32 (0.000)**	20
Females	**-25.50 (0.000)**	**-86.54 (0.006)**	**-67.10 (0.000)**	**6147.70 (0.000)**	20
Upper-middle-income countries					
Males	**-64.09 (0.000)**	22.59 (0.380)	-13.57 (0.096)	**7137.03 (0.000)**	20
Females	**-64.32 (0.000)**	-24.61 (0.217)	**-18.41 (0.001)**	**4693.27 (0.000)**	20
High income-countries					
Males	**-93.53 (0.000)**	-24.93 (0.388)	**25.13 (0.000)**	**5457.30 (0.000)**	20
Females	**-55.57 (0.000)**	-79.32 (0.112)	17.15 (0.051)	**2917.58 (0.000)**	20

p-values are given in parenthesis.
Figures in bold indicate significance at 95 percent confidence interval.
The "annual rate of change during 2000-09" refers to the annual rate of change in mortality rates (per 100,000 population) during 2000 to 2009, "level change in 2010" refers to the change (increase or decrease) in mortality rate in 2010, and "trend change in 2010-19 vs 2000-09" refers to change in the mortality rate during 2010-19 from that during 2000-09. A positive trend change indicates a slower decline in mortality during 2010-19 compared to during 2000-09, while a negative trend change indicates a more rapid decline during 2010-19 than during 2000-09.

COUNTRIES' RATES OF PROGRESS DURING 2000-09 AND 2010-19

In this section, we examine performance, at the country level, in the rate of decline in mortality between 2000 and 2019. We used the framework of Verguet and Jamison (2014) to estimate performance in the rate of decline in under-five mortality in LMICs (Verguet and Jamison 2014). We define performance as the difference in the rate of decline in actual mortality compared to that predicted by a set of contextual factors. The analysis includes 71 LMICs that have a population of more than 7 million, which covers about 83 percent of the world population in 2019 (United Nations, Department of Economic and Social Affairs, Population Division 2022). High-income countries (HICs) were excluded, as the mathematical relationship between mortality rates and social, economic, and demographic characteristics markedly differs between HICs and LMICs. Details of the methodology used in provided in Annex 5.2.

Table 5.2 presents the top 10 and worst 10 LMICs in the performance in the rate of decline in mortality during 2010-19 and their ranking during 2000-09, by age and sex. Ranking of all 71 LMICs are provided in Annex Table 5A.2. We note that, across all ages, Haiti emerges as one of the top performers during 2010-19 but as one of the worst performers during 2000-10. This is due to the earthquake in 2010 that killed hundreds of thousands in Haiti. Similar situations of natural disasters and conflicts in Mozambique (flooding in 2000), and Afghanistan and Iraq (war during the 2000s) make them outliers in this analysis. The crisis countries are shown in the tables in italics. Excluding the crisis countries, across most, if not, all age groups, among the top performers were Rwanda and Cambodia during 2000-09, Russia during 2010-19, while among the worst was Zimbabwe during 2000-09, and Tunisia during 2010-19. In the 50-69 age group, among males, South Africa had the best performance during 2010-19, even after considering the substantial reduction in HIV infection that occurred during this period. A notable number of lower income African countries, including Tanzania and Zambia, were among the top 10 performers for mortality decline at ages 50-69 in both males and females. Among the worst performers at these ages were a number of middle-income countries in East Asia (Viet Nam and Malaysia) and Eastern Europe (Bulgaria and Uzbekistan) along with Kenya. In terms of gender differences in country performance, for both males and females, the best and worst performer countries correlate rather well for under 15 years (R2=0.94), but less at older ages (Annex Figure 5A.3).

We also examined performance transitions from 2000-09 to 2010-19. Performance transitions for the 71 LMICs and the distribution are given in Annex Table 5A.3. For ages 50-69 years, 64 out of the 71 LMICs (or 90 percent) fall in the moderate transition categories of +2.4 percent to -2.5 percent mortality decline per year. For ages under 70 years, Rwanda and Cambodia presented some of the poorest transitions of -2.5 percent to -5 percent per year.

TABLE 5.2 Top 10 and worst 10 performance rankings among 71 LMICs in the rate of decline of mortality, by sex and age: 2000-10 and 2010-19

Country	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in		Country	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10			2010-19	2000-10
Under 15 males				**Under 15 females**			
Top 10 performance countries during 2010-19				*Top 10 performance countries during 2010-19*			
Russian Federation	46	1 (5.6)	33 (-0.4)	*Haiti*	474	1 (7.6)	71 (-10.2)
Haiti	610	2 (5.6)	71 (-8.8)	Russian Federation	37	2 (5.2)	52 (-1.8)
Azerbaijan	157	3 (5.1)	63 (-2.3)	Azerbaijan	121	3 (5.2)	64 (-2.6)
Belarus	27	4 (4.6)	16 (0.7)	Kazakhstan	74	4 (4.7)	51 (-1.8)
Kazakhstan	105	5 (4.6)	42 (-0.9)	Belarus	20	5 (4.5)	34 (-0.4)
China	71	6 (3.8)	25 (0.4)	China	61	6 (3.8)	24 (0.5)
Ukraine	55	7 (3.8)	64 (-2.4)	Ukraine	43	7 (3.8)	69 (-3.9)
Bulgaria	55	8 (3.5)	67 (-3)	Burundi	576	8 (3.4)	48 (-1.5)
Malawi	392	9 (3.2)	8 (2.1)	Malawi	337	9 (2.6)	7 (2.5)

Country	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance[*]) in	
		2010-19	2000-10
Under 15 males *(continued)*			
Worst 10 performance countries during 2010-19			
Burundi	685	10 (2.8)	50 (-1.6)
Malaysia	72	71 (-3.6)	31 (-0.3)
Viet Nam	245	70 (-3.1)	68 (-3.1)
Dominican Republic	272	69 (-2.7)	61 (-2.1)
Guinea	1054	68 (-2.2)	43 (-1)
Philippines	247	67 (-2)	51 (-1.6)
Nigeria	1377	66 (-1.8)	54 (-1.7)
Cote d'Ivoire	822	65 (-1.8)	40 (-0.9)
Benin	1005	64 (-1.7)	55 (-1.7)
Myanmar	438	63 (-1.6)	48 (-1.5)
Tunisia	152	62 (-1.6)	57 (-2)
15-49 males			
Top 10 performance countries during 2010-19			
Haiti	423	1 (7)	71 (-9.9)
Iraq	193	2 (4.6)	70 (-3.2)
South Africa	575	3 (4.5)	13 (1.2)
Tanzania	320	4 (3.6)	45 (-0.9)
Mozambique	522	5 (2.2)	62 (-2)
Zimbabwe	632	6 (2.2)	65 (-2.2)
Serbia	121	7 (2.1)	4 (1.6)
Belarus	301	8 (2.1)	27 (0.1)
Russian Federation	384	9 (2)	9 (1.4)
Sierra Leone	367	10 (1.7)	1 (2.8)
Worst 10 performance countries during 2010-19			
Afghanistan	530	71 (-3.5)	12 (1.2)
Mexico	340	70 (-2.9)	68 (-2.7)
Kenya	592	69 (-2)	60 (-1.9)
Viet Nam	314	68 (-2)	61 (-1.9)
Bulgaria	241	67 (-1.9)	41 (-0.7)
Burkina Faso	489	66 (-1.7)	40 (-0.6)
Tunisia	175	65 (-1.7)	63 (-2)
Ghana	471	64 (-1.7)	64 (-2.1)
Mali	450	63 (-1.4)	43 (-0.7)
Indonesia	253	62 (-1.3)	57 (-1.6)
50-69 males			
Top 10 performance countries during 2010-19			
Haiti	2271	1 (4)	71 (-4.9)
Iraq	1503	2 (2.7)	64 (-0.7)
South Africa	2453	3 (2.3)	43 (0.4)

Country	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance[*]) in	
		2010-19	2000-10
Under 15 females *(continued)*			
Worst 10 performance countries during 2010-19			
South Africa	271	10 (2.4)	63 (-2.6)
Malaysia	61	71 (-4.4)	31 (-0.2)
Viet Nam	144	70 (-3.4)	67 (-3.2)
Dominican Republic	227	69 (-2.9)	65 (-2.8)
Guinea	954	68 (-2.3)	36 (-0.6)
Nigeria	1351	67 (-2.1)	57 (-2)
Philippines	194	66 (-1.8)	55 (-1.9)
Tunisia	125	65 (-1.7)	59 (-2.1)
Cote d'Ivoire	659	64 (-1.7)	38 (-0.7)
Kenya	347	63 (-1.5)	23 (0.5)
Benin	889	62 (-1.5)	53 (-1.8)
15-49 females			
Top 10 performance countries during 2010-19			
Haiti	246	1 (11.4)	71
South Africa	396	2 (6.9)	19
Mozambique	311	3 (4.7)	65
Tanzania	239	4 (3.1)	29
Ukraine	85	5 (2.9)	13
Zambia	310	6 (2.7)	7
Zimbabwe	478	7 (2.6)	70
Malawi	313	8 (2.3)	36
Iran	86	9 (2.3)	51
Sierra Leone	318	10 (2.2)	2
Worst 10 performance countries during 2010-19			
Kenya	443	71 (-3.3)	53 (-1.7)
Viet Nam	112	70 (-2.3)	60 (-2.1)
Mexico	121	69 (-2.1)	57 (-1.9)
Cambodia	195	68 (-1.9)	3 (1.9)
Nigeria	723	67 (-1.8)	63 (-2.7)
Cote d'Ivoire	525	66 (-1.7)	68 (-3.6)
Mali	407	65 (-1.7)	32 (-0.3)
Benin	415	64 (-1.5)	66 (-3.2)
Bolivia	185	63 (-1.5)	31 (-0.1)
Dominican Republic	136	62 (-1.5)	18 (0.7)
50-69 females			
Top 10 performance countries during 2010-19			
Haiti	1473	1 (5.8)	71 (-6.6)
Mozambique	1803	2 (2.2)	70 (-2.5)
Jordan	608	3 (2.1)	18 (0.7)

Country	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10
50-69 males *(continued)*			
Top 10 performance countries during 2010-19 (continued)			
Tanzania	1972	4 (1.8)	66 (-0.9)
Jordan	1076	5 (1.6)	19 (0.9)
Zambia	2218	6 (1.3)	10 (1.5)
Mozambique	2626	7 (1.3)	70 (-1.7)
Bangladesh	1396	8 (1.1)	68 (-1.3)
Algeria	861	9 (1.1)	1 (3.1)
Peru	1013	10 (0.8)	23 (0.8)
Worst 10 performance countries during 2010-19			
Viet Nam	1440	71 (-2.2)	18 (0.9)
Thailand	1343	70 (-1.7)	30 (0.6)
Mexico	1423	69 (-1.5)	44 (0.4)
Bulgaria	2047	68 (-1.4)	32 (0.6)
Malaysia	1496	67 (-1.3)	47 (0.1)
Rwanda	2205	66 (-1.2)	7 (1.8)
Kenya	2733	65 (-1.2)	65 (-0.8)
Tunisia	1239	64 (-1.2)	28 (0.6)
Philippines	1536	63 (-1.2)	31 (0.6)
Uzbekistan	1956	62 (-1)	13 (1.4)
70-84 males			
Top 10 performance countries during 2010-19			
Haiti	9175	1 (1.7)	71 (-2.8)
Sri Lanka	6941	2 (1.6)	42 (-0.3)
India	6301	3 (1.4)	53 (-0.5)
Russian Federation	7560	4 (1.4)	17 (0.3)
Iraq	7497	5 (1.2)	52 (-0.4)
Iran	6150	6 (1.2)	1 (1.1)
Türkiye	5929	7 (1.1)	18 (0.3)
Algeria	5195	8 (1)	3 (0.9)
Peru	5419	9 (1)	8 (0.6)
Sudan	6889	10 (0.9)	34 (-0.2)
Worst 10 performance countries during 2010-19			
Uzbekistan	9451	71 (-0.7)	68 (-1.5)
Mexico	5519	70 (-0.6)	66 (-1.3)
Tunisia	6478	69 (-0.5)	45 (-0.3)
Nigeria	9364	68 (-0.5)	27 (0)
Senegal	8854	67 (-0.5)	44 (-0.3)
Burkina Faso	9944	66 (-0.5)	20 (0.3)
Benin	8038	65 (-0.4)	43 (-0.3)
Niger	8924	64 (-0.4)	15 (0.4)

Country	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10
50-69 females *(continued)*			
Top 10 performance countries during 2010-19 (continued)			
Zambia	1581	4 (2)	8 (1.2)
Malawi	1677	5 (1.9)	58 (-1.1)
Algeria	590	6 (1.9)	1 (2)
Bangladesh	814	7 (1.9)	26 (0.3)
Tanzania	1463	8 (1.8)	55 (-1)
Ukraine	861	9 (1.8)	50 (-0.5)
South Africa	1554	10 (1.7)	32 (0.1)
Worst 10 performance countries during 2010-19			
Viet Nam	635	71 (-2.1)	27 (0.3)
India	1291	70 (-1.8)	25 (0.3)
Bulgaria	886	69 (-1.5)	31 (0.2)
Guatemala	1069	68 (-1.4)	59 (-1.1)
Cambodia	1051	67 (-1.3)	6 (1.4)
Cote d'Ivoire	2297	66 (-1.3)	65 (-1.5)
Malaysia	841	65 (-1.1)	21 (0.5)
Uzbekistan	1172	64 (-1)	19 (0.7)
Nigeria	2289	63 (-0.9)	67 (-1.9)
Kenya	1942	62 (-0.9)	52 (-0.7)
70-84 females			
Top 10 performance countries during 2010-19			
Haiti	7390	1 (2.6)	71 (-3.7)
Iran	3905	2 (1.7)	13 (0.5)
Ukraine	4680	3 (1.7)	48 (-0.5)
Morocco	5054	4 (1.6)	50 (-0.6)
Sri Lanka	3792	5 (1.5)	4 (0.9)
Türkiye	3684	6 (1.4)	34 (-0.2)
Peru	3764	7 (1.4)	27 (-0.1)
Colombia	3135	8 (1.3)	8 (0.7)
Russian Federation	4792	9 (1.1)	22 (0)
Bulgaria	4419	10 (1.1)	2 (1)
Worst 10 performance countries during 2010-19			
Nigeria	9121	71 (-0.8)	59 (-0.9)
Uzbekistan	7356	70 (-0.8)	69 (-1.6)
Azerbaijan	6212	69 (-0.7)	47 (-0.5)
Benin	7355	68 (-0.6)	64 (-1)
Mexico	4114	67 (-0.6)	70 (-1.8)
Cameroon	7592	66 (-0.6)	55 (-0.8)
Mali	8882	65 (-0.5)	19 (0.1)
Pakistan	6660	64 (-0.5)	26 (-0.1)

Country	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10
70-84 males *(continued)*			
Worst 10 performance countries during 2010-19 (continued)			
Pakistan	8329	63 (-0.4)	60 (-0.7)
Afghanistan	8730	62 (-0.3)	21 (0.3)

Country	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10
70-84 females *(continued)*			
Worst 10 performance countries during 2010-19 (continued)			
Uganda	9373	63 (-0.5)	67 (-1.2)
Guinea	7580	62 (-0.5)	37 (-0.3)

* Performance is defined as the difference between the actual rate of decline in mortality and the rate predicted by the multilevel regression model.
Countries in italics are those that encountered major crises such as hurricanes, earthquakes, flooding, tsunami, or war during 2000, 2005, 2010, 2015, or 2019, thereby showing a pseudo good or poor in performance during 2010-2019 relative to during 2000-2010.

RATES OF PROGRESS IN CAUSE-SPECIFIC MORTALITY

Country-level monitoring of mortality rates is important for monitoring trends over time. To reduce mortality rates, monitoring of death rates should be accompanied by deaths due to each disease cause. Globally, the proportion of deaths due to communicable, maternal, perinatal, and nutritional conditions (CMPs) are declining, while that from NCDs are increasing (WHO 2020). This is particularly so in LMICs, where CMPs, as a proportion of total deaths have declined from 39 percent in 2000 to 21 percent in 2019. Meanwhile, the contribution from NCDs have increased from 55 percent to 70 percent (WHO 2020). Here, we examine and quantify the rates of progress in cause-specific mortality for selected major causes of death, by country income levels and age, from 2000 to 2019. We measure rates of progress as average annual rates of reduction (AARR) calculated using the standard WHO methodology (UNICEF 2007).

We present in Table 5.3 the country income levels and age groups with the fastest and slowest progress, in terms of AARR, for males and females. Between 2000 and 2019, among CMPs, childhood-cluster diseases (based on the definition the 2019 WHO Global Health Estimates (WHO 2020): whooping cough, diphtheria, measles, and tetanus) among children aged 0-14 years in upper-middle-income countries showed the fastest rate of decline in mortality, with an AARR of about 9 percent. The slowest rates of decline among CMPs in LMICs was observed for malaria in lower-middle-income countries (AARR=0.4 percent for males and 1.1 percent for females). Compared to CMPs, progress in NCDs are much slower: the fastest rate of decline among NCDs was observed for respiratory diseases for ages 50-69 in upper-middle-income countries, with an AARR of about 5 percent (almost half the fastest rate for CMPs). The slowest progress was in tobacco-attributable cancers and breast cancer among those aged 70 years and older in low-income countries. Within injuries, drowning at ages under 15 in upper-middle-income countries showed the fastest rate of decline, while falls at ages 70 and over in upper-middle-income countries showed an average annual increase of about 2.3 percent.

We further estimated the number of deaths due to the selected major causes of death that would have been averted in 2019, had the rate of decline for each of the selected causes of death been equal to that of HIV/AIDS for ages under 49 years and tuberculosis for ages 50 years and over. These two causes of deaths were selected based on the fact that immense attention and efforts were invested towards these diseases during the 2000s which resulted in the remarkable drop in incidence and mortality from these causes (WHO 2015a, 2015c, 2015b). If similar levels of effort were spent on all causes and thus, expecting similar rates of progress, about 13.5 million deaths would have been averted globally. Out of this, about 4.6 million (or 34 percent) would been premature mortality under 70 years. The deaths avertable by causes and age groups in Annex Table 5A.4.

TABLE 5.3 **Diseases and conditions showing country income level and age group with the fastest and slowest progress in mortality reduction, 2000-19**

		Male						**Female**					
		Fastest			*Slowest*			*Fastest*			*Slowest*		
Disease/condition category	**Diseases/conditions**	**Region**	**Age group**	**AARR %**	**Region**	**Age group**	**AARR %**	**Region**	**Age group**	**AARR %**	**Region**	**Age group**	**AARR %**
All Causes		UMICs	0-14	4.6	UMICs	70+	0.7	UMI	0-14	4.6	HICs	70+	0.9
Communicable, maternal, perinatal and nutritional conditions	Tuberculosis	UMICs	70+	6.3	LICs	70+	4.1	HICs	50-69	6.3	HICs	70+	3.3
	HIV/AIDS	HICs	15-49	8.1	UMICs	15-49	1.9	LICs	15-49	8.0	UMICs	15-49	2.4
	Diarrhoeal diseases	UMICs	0-14	6.9	HICs	0-14	4.1	UMICs	0-14	7.2	HICs	0-14	4.1
	Childhood-cluster diseases	UMICs	0-14	9.1	LICs	0-14	5.2	UMICs	0-14	9.2	HICs	0-14	5.3
	Malaria	LICs	0-14	6.3	LMICs	15-49	0.4	LICs	0-14	6.4	LMICs	15-49	1.1
	Respiratory infections	UMICs	0-14	6.5	HICs	0-14	4.5	UMICs	0-14	6.5	HICs	40-14	4.5
	Maternal conditions							LMI	15-49	5.8	HICs	15-49	0.6
	Neonatal conditions	UMICs	0-28 days	4.8	HICs	0-28 days	2.2	UMICs	0-28 days	4.8	HICs	0-28 days	2.1
Non-communicable diseases	All cancers	HICs	50-69	1.8	LICs	70+	-0.2	UMICs	50-69	1.2	LICs	70+	-0.2
	Tobacco-attributable cancers[a]	HICs	50-69	2.1	LICs	70+	-0.4	UMICs	50-69	1.3	LICs	70+	-0.7
	Infection attributable cancers[b]	UMICs	50-69	4.1	HICs	70+	0.3	UMICs	50-69	2.2	HICs	70+	0.4
	Stomach cancer	HICs	50-69	3.9	LICs	70+	0.5	UMICs	50-69	3.4	LICs	70+	0.8
	Breast cancer							HICs	50-69	1.5	LICs	70+	-1.2
	Cardiovascular diseases (not stroke)	HICs	70+	2.3	UMICs	70+	-0.2	UMICs	50-69	2.5	LICs	70+	0.2
	Stroke	HICs	50-69	3.4	LICs	70+	0.9	HICs	50-69	3.9	LICs	70+	0.7
	Respiratory diseases	UMICs	50-69	4.8	HICs	50-69	0.7	UMICs	50-69	5.3	HICs	50-69	-0.3
Injuries	Road injury	HICs	15-49	3.5	LICs	70+	-1.2	HICs	70+	3.7	LICs	70+	-1.0
	Falls	LICs	50-69	1.1	UMICs	70+	-2.3	LICs	50-69	1.3	UMICs	70+	-2.3
	Drowning	UMICs	0-14	6.2	LICs	0-14	2.7	UMICs	0-14	7.6	LICs	0-14	2.8
	Suicide	UMICs	50-69	3.7	HICs	15-49	0.5	UMICs	15-49	6.2	HICs	15-49	-0.3

AARR = Average annual rate of reduction; LICs = low-income countries; LMICs = lower-middle-income countries; UMICs = upper-middle-income countries; HICs = high-income countries; [a]Mouth and oropharynx, Oesophagus, Trachea, bronchus, lung, and Larynx cancers; [b]Liver, Cervix uteri, and Corpus uteri cancers.

COST OF SAVING A LIFE OVER TIME

In 1975, Samuel Preston, in a classic paper, showed that life expectancy is related to national income (Preston 1975). He found that life expectancy increases with national income per capita in poorer countries, but plateaus at higher income levels. He also noted an upward and lateral shift in the curve over time, indicating that for the same level of income, life expectancy increases over time (Figure 5.2). This relationship was mathematically studied by Hum and colleagues in 2012 using the Michaelis-Menten enzyme kinetics (Hum and others 2012). Treating income as the substrate that is catalyzed to increase survival, Hum and colleagues investigated the change in the level of income that is needed to achieve half of the period-specific maximum survival ("critical income"). The study found that between 1970 and 2007, the critical income fell by 50 percent for children but doubled for men aged 15-59 years. Here, we extend the 2012 analysis by Hum and colleagues to assess the trend in the critical income for ages under 15, 15-49, and 50-69 from 1990 to 2019. We redefine critical income here as the income needed to achieve 80 percent of the global maximum life expectancy. We used five-year average to calculate the average critical income at a mid-point year (starting from 1992.5 for 1990-95 and 2017 for 2015-19). The analysis includes 71 LMICs with over 7 million population in 2019 (United Nations, Department of Economic and Social Affairs, Population Division 2022). Details of the model can be found in Annex 5.3.

Table 5.4 shows the coefficients in three-age specific mixed effects models. Expectedly, the maximum survival rates for children approximates a complete survival from birth to age 15 and was unchanged between 1992 and 2017. While for ages 15-49 and 50-69, the maximum survival rates increased by 0.6 percent and 4.4 percent, respectively. This change represents the technological advances for this age-group among HICs. In terms of critical income, the pattern of progress is reversed. The critical income for child survival fell from US$1,452 to US$800 (2017 PPP), representing a decline of 46 percent. For adults aged 15-49, this remained relatively constant over the last thirty years. Regrettably, that for ages 50-69 increased by about 26 percent from US$914 to US$1,180. This signifies that the technological gains in HICs to reduce mortality at middle and older ages lacks research on improving efficiency and cost-effectiveness.

Table 5.5 ranks the top five LMICs with the lowest critical income in the three age groups. Rwanda, Madagascar, Mozambique, Niger, and the Democratic Republic of Congo are among the top five countries with the lowest critical income across all three age-groups.

FIGURE 5.2 Preston curve showing the relationship between life expectancy at birth and income (Preston 1975)

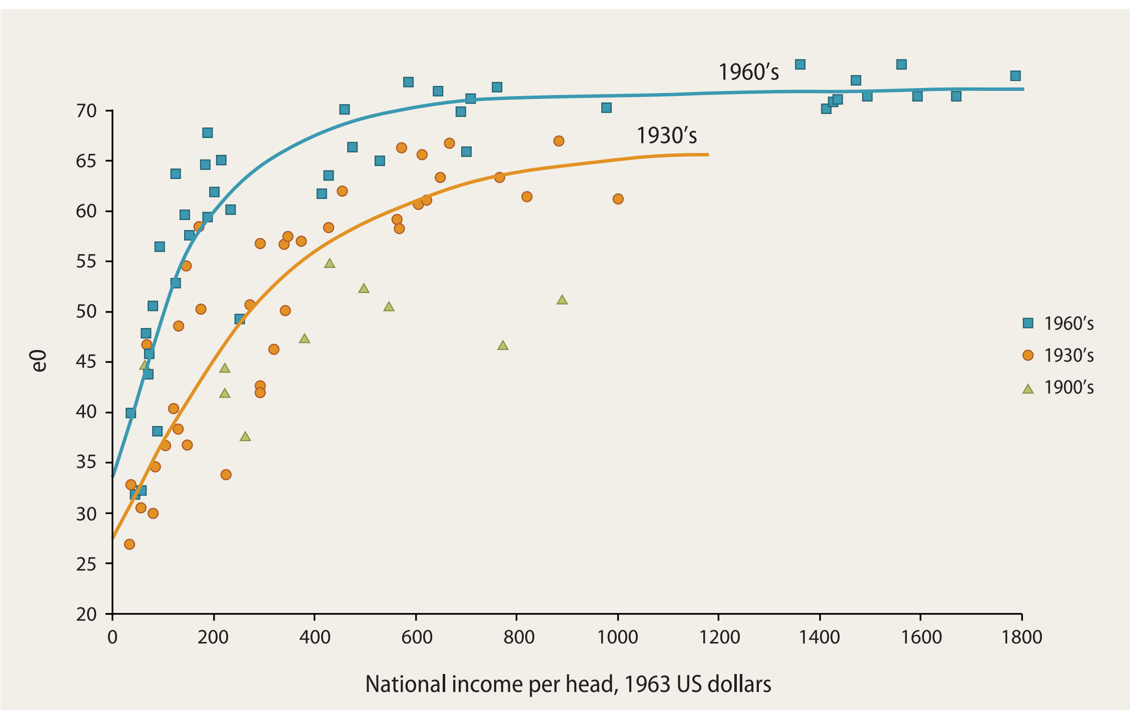


TABLE 5.4 Global maximum survival rates and critical income levels, 1990 to 2019

	Under 15 years		15-49 years		50-69 years	
Median years	**1990-95**	**2015-19**	**1990-95**	**2015-19**	**1990-95**	**2015-19**
Maximum survival rates (per 1000)	1,000.96 (2.89)	1,000.81 (0.83)	985.40 (1.68)	990.98 (1.16)	868.68 (6.78)	907.34 (5.96)
Critical income (2017 PPP)	1,452.56	800.16	400.40	412.52	914.36	1,179.56
AIC	778.16	629.19	650.38	621.15	810.04	845.44

Standard errors are given in parenthesis.

TABLE 5.5 Top five LMICs with the lowest critical income for ages under 15 years, 15-49 years, and 50-69 years

	Countries with the lowest critical income		
Rank	**Under 15 years**	**15-49 years**	**50-69 years**
1	Malawi	Niger	Niger
2	Rwanda	Congo, Dem. Rep.	Congo, Dem. Rep.
3	Madagascar	Madagascar	Madagascar
4	Mozambique	Bangladesh	Ethiopia
5	Uganda	Rwanda	Cambodia

REFERENCES

1. Cha, S. 2017. "The impact of the worldwide Millennium Development Goals campaign on maternal and under-five child mortality reduction: 'Where did the worldwide campaign work most effectively?'" *Global Health Action* 10 (1): 1267961.
2. Hum, R. J., P. Jha, A. M. McGahan, and Y. –L. Cheng. 2012. "Global divergence in critical income for adult and childhood survival: Analyses of mortality using Michaelis–Menten." *ELife* 1: e00051.
3. Lozano, R., H. Wang, K. J. Foreman, J. K. Rajaratnam, M. Naghavi, and others. 2011. "Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: An updated systematic analysis." *The Lancet* 378 (9797), 1139–165.
4. NCD Countdown 2030 collaborators. 2018. "NCD Countdown 2030: Worldwide trends in non-communicable disease mortality and progress towards Sustainable Development Goal target 3.4." *The Lancet* 392 (10152): 1072–88.
5. Norheim, O. F., P. Jha, K. Admasu, T. Godal, R. J. Hum, and others. 2015. "Avoiding 40% of the premature deaths in each country, 2010–30: Review of national mortality trends to help quantify the UN Sustainable Development Goal for health." *The Lancet* 385 (9964), 239–252.
6. Preston, S. H. 1975. "The changing relation between mortality and level of economic development." *Population Studies* 29 (2), 231–48.
7. Tanner, J., A. M. Aguilar Rivera, T. L. Candland, V. Galdo, F. E. Manang, and others. 2016. "Delivering the millennium development goals to reduce maternal and child mortality: A systematic review of impact evaluation evidence (English)." Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/920581467995896846/Delivering-the-millennium-development-goals-to-reduce-maternal-and-child-mortality-a-systematic-review-of-impact-evaluation-evidence.
8. UNICEF. 2007. "Technical Note: How to calculate average annual rate of reduction (AARR) of underweight prevalence." https://data.unicef.org/resources/technical-note-calculate-average-annual-rate-reduction-aarr-underweight-prevalence/.
9. United Nations General Assembly. "Transforming our world : the 2030 Agenda for Sustainable Development". 21 October 2015, A/RES/70/1. https://www.refworld.org/docid/57b6e3e44.html.
10. United Nations, Department of Economic and Social Affairs, Population Division. 2022. *World Population Prospects 2022*. New York: UN Department of Economic and Social Affairs, Population Division.
11. United Nations, Department of Economic and Social Affairs, Sustainable Development. 2023. *Goal 3 Ensure healthy lives and promote well being for all at all ages*. https://sdgs.un.org/goals/goal3.
12. Verguet, S., and D. T. Jamison. 2014. "Estimates of performance in the rate of decline of under-five mortality for 113 low- and middle-income countries, 1970-2010." *Health Policy and Planning* 29(2), 151–63.
13. Wang, H., A. A. Abajobir, K. H. Abate, C. Abbafati, K. M. Abbas, and others. 2017. "Global, regional, and national under-5 mortality, adult mortality, age-specific mortality, and life expectancy, 1970–2016: A systematic analysis for the Global Burden of

Disease Study 2016." *The Lancet* 390 (10100), 1084–150.

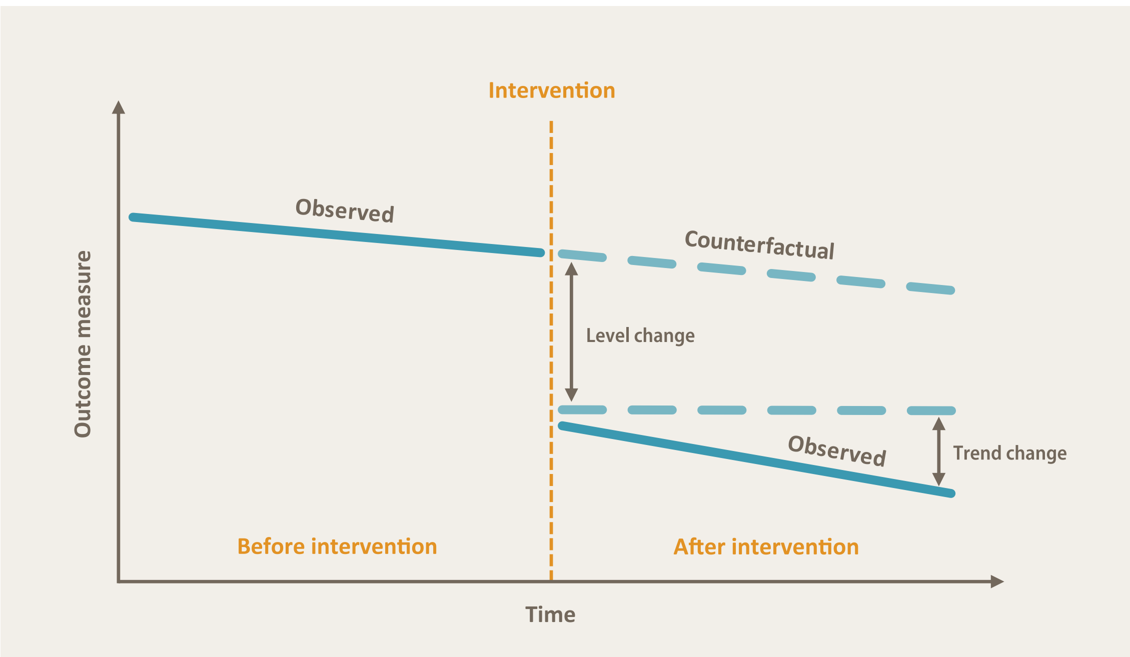
14. World Bank. 2021. World Bank Country and Lending Groups. https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.
15. World Health Organization (WHO). 2015a. Accelerating progress on HIV, tuberculosis, malaria, hepatitis and neglected tropical diseases: A new agenda for 2016-2030. World Health Organization. https://apps.who.int/iris/handle/10665/204419.
16. World Health Organization (WHO). 2015b. Global health sector response to HIV, 2000– 2015: Focus on innovations in Africa: progress report. World Health Organization. https://apps.who.int/iris/handle/10665/198065.
17. World Health Organization (WHO). 2015c. Global tuberculosis report 2015, 20th ed. World Health Organization. https://apps.who.int/iris/handle/10665/191102.
18. World Health Organization (WHO). 2020. Global Health Estimates 2020: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2019. https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death.

ANNEX 5.1

Interrupted time-series (ITS) analysis methodology

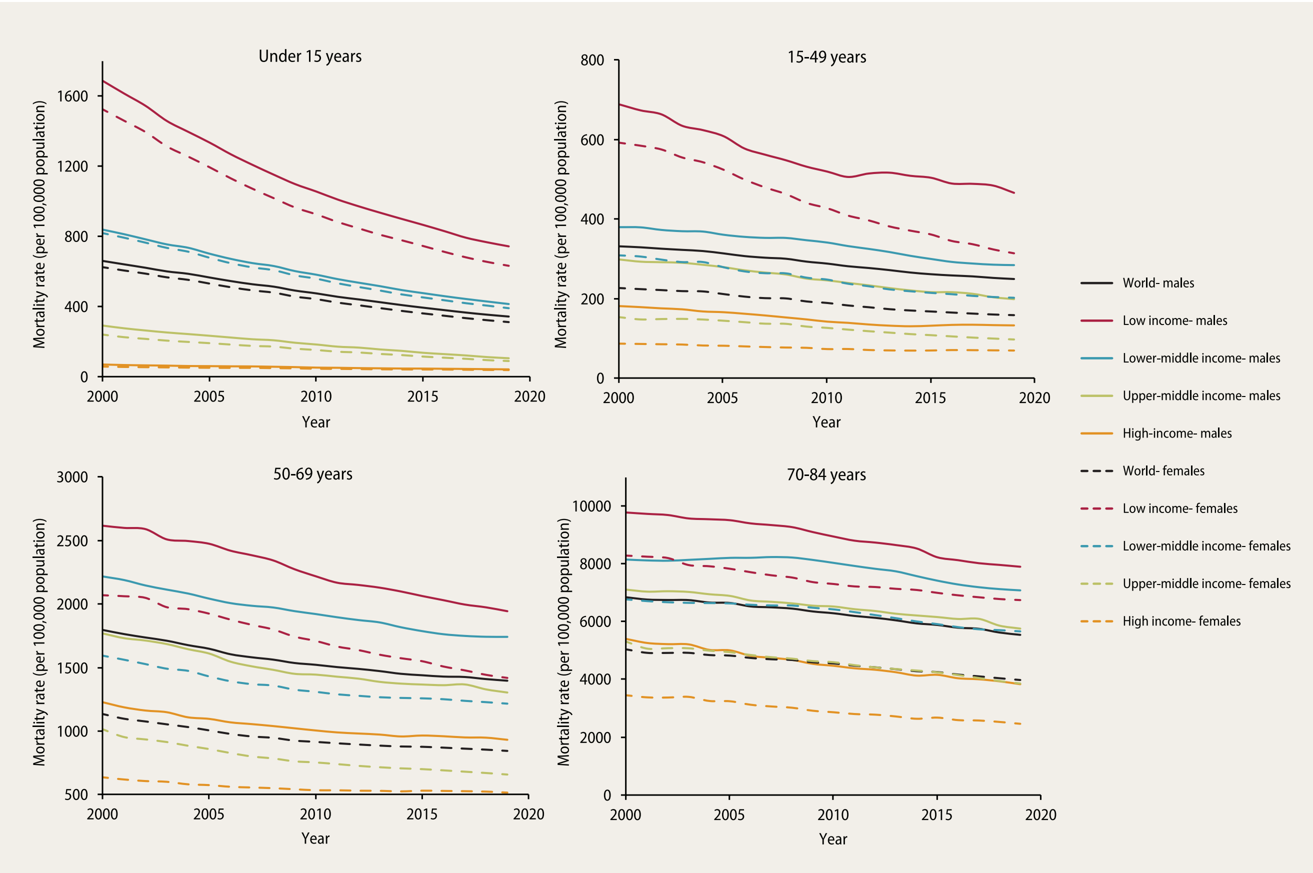
An ITS analysis provides a robust quasi-experimental design that can be used to evaluate changes in an outcome of interest after a particular time-point (Bernal and others 2017; Kontopantelis and others 2015). In an ITS analysis, a continuous series of observations on an outcome of interest for a population over time is used to establish a trend using a regression model; this trend is then interrupted (usually by an intervention) at a known time-point (Bernal and others 2017; Kontopantelis and others 2015). The difference in the trend before and after the time-point quantifies the effect of the intervention. Figure 5A.1 provides a schematic representation of an ITS analysis.

FIGURE 5A.1 Schematic representation of an interrupted time series analysis



For our current analysis, in the absence of intervention, we define the interruption point as 2010 to examine if there are notable difference in the rate of mortality decline in the second decade of 2000 compared to the first, using the logic that trends which had been established from 2000-2009 should accelerate after 2010 if more attention was given to health and action on health during the second.

FIGURE 5A.2 Mortality rate, global and by country income level, by age and sex, between 2000 and 2019



ANNEX 5.2

Methods used to estimate country performance during 2000 to 2019

We examine country performance in the rate of decline in mortality for ages under 15, 15-49, 50-69, and 70-84 years between 2000 and 2019. We used the framework of Verguet and Jamison (2014) to estimate performance in the rate of decline in under-five mortality in LMICs (Verguet & Jamison, 2014). We define performance as the difference in the rate of decline in actual mortality compared to that predicted a model using a set of contextual factors. We include 71 LMICs (based on the World Bank 2020 country classification (World Bank 2021)) that have a population of over 7 million, which covers about 83 percent of the world population in 2019. For population and actual mortality, we used data from the World Population Prospects (WPP) 2022 (United Nations, Department of

Economic and Social Affairs, Population Division 2022). For predicted mortality, we used a hierarchical linear model comprised of the contextual variables: time (year), income (gross domestic product per capita (GDPPC)), female education level (mean years of schooling by age 25), geography (percent population living within 100km off the coast), urbanization, electricity access, malaria incidence, and HIV prevalence. We allow for between-country variability by using a random-intercept term at the country level, and between-country variability in their uptake of knowledge and technologies (or "technical progress") using a country-specific slope on time (Jamison and others 2016). To examine the potential impact of public health provision on technical progress, we include in the model the percentage of births attended by skilled birth attendant and coverage of three doses of diphtheria, tetanus, and pertussis (DTP3) immunization among one-year-olds in 2000 as indicators of early adopters of mortality reduction technologies. Thus, the model can be mathematically written as:

$$\ln m_{it} = \gamma_{00} + \gamma_{10}\text{Time} + \beta_2 \ln(\text{GDPPC}) + \beta_3\text{FeEd} + \beta_4\text{Coast} + \beta_5\text{Urban} + \beta_6\text{Electricity} + \beta_7\text{Malaria} + \beta_8\text{HIV} + \beta_9\text{Skillbirth-2000} + \beta_{10}\text{DTP3-2000} + \mu_{0i} + \mu_{1i}\text{Time} + \varepsilon_{it}$$

where, γ are the country-invariant intercept and slope (time) components, μ are the country-specific terms, and ε_{it} is a random i.i.d. normally distributed disturbance (for details, see Jamison, Murphy, and Sandbu 2016 on the use of hierarchical model to account for technical progress to predict mortality).

Using the performances estimated over five years, we calculate 10-year performance as the average of two consecutive 5-year performance. Finally, we calculate the change in performance in the rate of decline in mortality in the second decade of 2000 relative to the first decade as the difference between the two consecutive 10-year performance.

Annex table 5A.1 shows the coefficients in the hierarchical model used to predict the mortality rates for ages under 15, 15-49, 50-69, and 70-84 years, disaggregated by sex.

Table 5A.1 Results of the hierarchical model predicting levels of mortality, by age and sex

Coefficient	Under 15 years				15-49 years				50-69 years				70-84 years			
	Males		Females		Males		Females		Males		Females		Males		Females	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Constant intercept (γ_{00})	9.510	0.361	9.588	0.387	7.608	0.357	7.636	0.337	8.847	0.206	8.840	0.207	9.200	0.143	9.336	0.158
Time (number of years since 1990, γ_{10})	-0.038	0.003	-0.037	0.003	-0.019	0.003	-0.019	0.002	-0.012	0.001	-0.014	0.001	-0.006	0.001	-0.008	0.001
ln(GDPPC)	-0.121	0.049	-0.132	**0.052**	**-0.117**	**0.048**	**-0.104**	**0.047**	**-0.117**	**0.027**	**-0.125**	**0.029**	0.024	0.019	0.013	0.021
FeEd	0.005	0.013	0.000	0.014	0.010	0.013	0.004	0.013	**0.021**	**0.008**	0.008	0.008	0.005	0.005	-0.002	0.006
Coast	**-0.004**	**0.001**	**-0.003**	**0.001**	**-0.004**	**0.001**	-0.002	0.001	**-0.003**	0.001	-0.002	0.001	-0.002	0.001	-0.001	0.001
Urban	0.000	0.003	0.001	0.003	0.002	0.003	0.001	0.002	0.001	0.002	0.000	0.002	-0.002	0.001	**-0.003**	**0.001**
Electricity	-0.001	0.001	-0.002	0.001	0.000	0.001	**-0.004**	**0.001**	**0.001**	**0.001**	0.000	0.001	0.000	0.000	0.000	0.000
Malaria	**0.000**	**0.000**	**0.000**	**0.000**	0.000	0.000	**0.000**	**0.000**	**0.000**	**0.000**	0.000	0.000	**0.000**	**0.000**	0.000	0.000
HIV	0.057	**0.012**	**0.056**	**0.012**	**0.059**	**0.012**	**0.088**	**0.010**	**0.030**	**0.007**	**0.048**	**0.006**	0.003	0.005	0.007	0.005
Skillbirth-2000	-0.011	0.003	-0.012	0.003	-0.001	0.003	-0.003	0.002	-0.001	0.002	-0.003	0.001	0.000	0.001	-0.001	0.001
DTP3-2000	**-0.013**	**0.003**	**-0.014**	**0.003**	-0.006	0.003	**-0.009**	**0.002**	-0.002	0.002	**-0.003**	**0.002**	-0.002	0.001	**-0.004**	**0.001**
Variance of country-specific intercept (μ_{0i})	0.111	0.023	0.128	0.027	0.121	0.024	0.052	0.014	0.045	0.009	0.028	0.006	0.022	0.004	0.026	0.005
Variance of country-specific slope (μ_{1i})	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AIC	-248.81		-191.82		-247.21		-196.43		-643.37		-588.00		-917.17		-853.47	

Values in bold indicate significance at 95% confidence interval.
Dependent variable is logged mortality rate.

TABLE 5A.2 **Performance rankings of 71 LMICs in the rate of decline of mortality, by age and sex: 2000-10 and 2010-19**

Country (ordered based on ranking during 2010-19)	Under 15 years					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in		Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10		2010-19	2000-10
Russian Federation	46	1 (5.6)	33 (-0.4)	37	2 (5.2)	52 (-1.8)
Haiti	610	2 (5.6)	71 (-8.8)	474	1 (7.6)	71 (-10.2)
Azerbaijan	157	3 (5.1)	63 (-2.3)	121	3 (5.2)	64 (-2.6)
Belarus	27	4 (4.6)	16 (0.7)	20	5 (4.5)	34 (-0.4)
Kazakhstan	105	5 (4.6)	42 (-0.9)	74	4 (4.7)	51 (-1.8)
China	71	6 (3.8)	25 (0.4)	61	6 (3.8)	24 (0.5)
Ukraine	55	7 (3.8)	64 (-2.4)	43	7 (3.8)	69 (-3.9)
Bulgaria	55	8 (3.5)	67 (-3)	52	17 (1.4)	62 (-2.6)
Malawi	392	9 (3.2)	8 (2.1)	337	9 (2.6)	7 (2.5)
Burundi	685	10 (2.8)	50 (-1.6)	576	8 (3.4)	48 (-1.5)
South Africa	319	11 (2)	65 (-2.7)	271	10 (2.4)	63 (-2.6)
Uzbekistan	154	12 (2)	27 (0.2)	114	14 (1.8)	25 (0.5)
Türkiye	77	13 (1.9)	2 (3.7)	66	11 (2.1)	2 (3.8)
India	255	14 (1.5)	20 (0.6)	266	13 (1.8)	22 (0.6)
Rwanda	398	15 (1.5)	1 (4.9)	345	18 (1)	1 (5.2)
Uganda	443	16 (1.4)	7 (2.2)	386	26 (0.5)	8 (2.3)
Morocco	167	17 (1.3)	29 (0.1)	134	15 (1.5)	29 (0.1)
Iran	122	18 (1.3)	62 (-2.2)	108	16 (1.5)	61 (-2.6)
Sri Lanka	61	19 (1.3)	41 (-0.9)	51	19 (1)	41 (-0.9)
Senegal	416	20 (1.2)	11 (1.4)	329	12 (2)	9 (1.9)
Thailand	78	21 (1.1)	34 (-0.4)	61	22 (0.9)	35 (-0.5)
Iraq	246	22 (1)	53 (-1.7)	197	30 (0.4)	46 (-1.4)
Egypt	167	23 (1)	37 (-0.6)	143	20 (0.9)	32 (-0.3)
Argentina	87	24 (0.8)	38 (-0.7)	74	23 (0.7)	40 (-0.8)
Ecuador	123	25 (0.8)	46 (-1.5)	97	24 (0.6)	50 (-1.7)
Jordan	131	26 (0.7)	58 (-2)	106	25 (0.6)	54 (-1.8)
Zimbabwe	516	27 (0.6)	70 (-4.4)	444	32 (0.3)	70 (-4.5)
Sierra Leone	1023	28 (0.5)	26 (0.3)	928	21 (0.9)	26 (0.4)
Mozambique	744	29 (0.3)	30 (0.1)	642	28 (0.4)	27 (0.3)
Indonesia	206	30 (0.3)	36 (-0.5)	173	27 (0.5)	33 (-0.4)
Tanzania	492	31 (0.3)	24 (0.5)	439	43 (-0.1)	18 (0.9)
Bangladesh	247	32 (0.3)	10 (1.6)	217	35 (0.1)	10 (1.6)
Niger	854	33 (0.2)	4 (3)	794	29 (0.4)	5 (3.2)
Cameroon	783	34 (0.2)	59 (-2.1)	656	31 (0.3)	56 (-2)
Guatemala	212	35 (0.1)	21 (0.6)	173	40 (-0.1)	20 (0.8)
Mexico	117	36 (0.1)	15 (0.8)	95	33 (0.1)	19 (0.8)
Peru	128	37 (0.1)	14 (0.8)	103	36 (0.1)	17 (0.9)
Brazil	128	38 (-0.1)	3 (3.2)	100	44 (-0.3)	4 (3.3)
Cambodia	287	39 (-0.1)	5 (2.7)	210	39 (0)	3 (3.6)

Country (ordered based on ranking during 2010-19)	Under 15 years *(continued)*					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in		Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10		2010-19	2000-10
Nepal	269	40 (-0.2)	6 (2.5)	220	38 (0)	6 (3.1)
Afghanistan	594	41 (-0.3)	32 (-0.3)	526	47 (-0.4)	39 (-0.7)
Mali	1006	42 (-0.3)	44 (-1.1)	924	45 (-0.3)	42 (-1)
Sudan	662	43 (-0.4)	47 (-1.5)	525	42 (-0.1)	47 (-1.4)
Pakistan	599	44 (-0.4)	52 (-1.6)	504	41 (-0.1)	43 (-1)
Laos	421	45 (-0.5)	35 (-0.4)	331	49 (-0.5)	30 (-0.1)
Tajikistan	306	46 (-0.5)	17 (0.7)	235	48 (-0.5)	16 (0.9)
Algeria	211	47 (-0.5)	69 (-3.5)	189	50 (-0.5)	68 (-3.8)
Serbia	49	48 (-0.5)	9 (2)	39	57 (-1.1)	11 (1.4)
Madagascar	582	49 (-0.5)	18 (0.7)	466	34 (0.1)	12 (1.4)
Chad	1440	50 (-0.5)	66 (-2.8)	1300	46 (-0.3)	66 (-2.8)
Honduras	153	51 (-0.6)	12 (1.4)	125	51 (-0.5)	13 (1.3)
Kenya	384	52 (-0.7)	22 (0.5)	347	63 (-1.5)	23 (0.5)
Ethiopia	603	53 (-0.8)	23 (0.5)	446	37 (0)	14 (1.3)
Burkina Faso	913	54 (-0.9)	39 (-0.8)	821	52 (-0.7)	37 (-0.7)
Colombia	124	55 (-1)	28 (0.2)	98	56 (-1.1)	28 (0.1)
Bolivia	341	56 (-1.1)	19 (0.7)	294	53 (-0.7)	21 (0.7)
Zambia	647	57 (-1.1)	13 (0.9)	539	59 (-1.1)	15 (1)
Congo, Dem. Rep.	1023	58 (-1.2)	45 (-1.2)	869	55 (-1)	45 (-1.3)
Papua New Guinea	420	59 (-1.2)	49 (-1.5)	365	58 (-1.1)	49 (-1.5)
Togo	711	60 (-1.3)	56 (-1.7)	672	61 (-1.3)	60 (-2.4)
Ghana	555	61 (-1.4)	60 (-2.1)	449	54 (-0.9)	58 (-2)
Tunisia	152	62 (-1.6)	57 (-2)	125	65 (-1.7)	59 (-2.1)
Myanmar	438	63 (-1.6)	48 (-1.5)	325	60 (-1.2)	44 (-1.3)
Benin	1005	64 (-1.7)	55 (-1.7)	889	62 (-1.5)	53 (-1.8)
Cote d'Ivoire	822	65 (-1.8)	40 (-0.9)	659	64 (-1.7)	38 (-0.7)
Nigeria	1377	66 (-1.8)	54 (-1.7)	1351	67 (-2.1)	57 (-2)
Philippines	247	67 (-2)	51 (-1.6)	194	66 (-1.8)	55 (-1.9)
Guinea	1054	68 (-2.2)	43 (-1)	954	68 (-2.3)	36 (-0.6)
Dominican Republic	272	69 (-2.7)	61 (-2.1)	227	69 (-2.9)	65 (-2.8)
Viet Nam	245	70 (-3.1)	68 (-3.1)	144	70 (-3.4)	67 (-3.2)
Malaysia	72	71 (-3.6)	31 (-0.3)	61	71 (-4.4)	31 (-0.2)

Country (ordered based on ranking during 2010-19)	15-49 years					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in		Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10		2010-19	2000-10
Haiti	423	1 (7)	71 (-9.9)	246	1 (11.4)	71 (-13.3)
Iraq	193	2 (4.6)	70 (-3.2)	132	12 (2.1)	62 (-2.6)
South Africa	575	3 (4.5)	13 (1.2)	396	2 (6.9)	19 (0.6)

Country (ordered based on ranking during 2010-19)	15-49 years *(continued)*					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance[a]) in		Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance[a]) in	
		2010-19	2000-10		2010-19	2000-10
Tanzania	320	4 (3.6)	45 (-0.9)	239	4 (3.1)	29 (0)
Mozambique	522	5 (2.2)	62 (-2)	311	3 (4.7)	65 (-2.8)
Zimbabwe	632	6 (2.2)	65 (-2.2)	478	7 (2.6)	70 (-4.6)
Serbia	121	7 (2.1)	4 (1.6)	66	11 (2.1)	5 (1.8)
Belarus	301	8 (2.1)	27 (0.1)	84	14 (1.9)	24 (0.2)
Russian Federation	384	9 (2)	9 (1.4)	104	13 (2)	6 (1.6)
Sierra Leone	367	10 (1.7)	1 (2.8)	318	10 (2.2)	2 (2)
Uganda	438	11 (1.7)	8 (1.4)	315	16 (1.6)	21 (0.4)
Tajikistan	186	12 (1.6)	37 (-0.4)	123	28 (0.6)	35 (-0.4)
Sri Lanka	198	13 (1.5)	14 (1.1)	89	41 (-0.2)	38 (-0.6)
Morocco	137	14 (1.5)	5 (1.6)	103	15 (1.6)	15 (0.9)
Laos	255	15 (1.5)	16 (0.8)	183	29 (0.5)	10 (1.2)
Jordan	105	16 (1.4)	33 (-0.3)	76	23 (1)	30 (-0.1)
Ukraine	315	17 (1.3)	11 (1.2)	85	5 (2.9)	13 (1.1)
Guatemala	304	18 (1.3)	34 (-0.3)	138	53 (-0.9)	27 (0)
Brazil	234	19 (1.2)	25 (0.3)	101	21 (1.1)	17 (0.7)
Zambia	488	20 (1.2)	10 (1.3)	310	6 (2.7)	7 (1.5)
Kazakhstan	337	21 (1.1)	18 (0.7)	134	27 (0.7)	42 (-0.9)
Türkiye	107	22 (1.1)	26 (0.2)	52	22 (1)	22 (0.3)
Iran	190	23 (1)	47 (-1.1)	86	9 (2.3)	51 (-1.4)
Egypt	161	24 (0.8)	39 (-0.6)	87	20 (1.1)	16 (0.8)
Algeria	128	25 (0.8)	7 (1.5)	93	18 (1.2)	14 (1)
Rwanda	358	26 (0.7)	2 (2.7)	250	31 (0.2)	1 (3.8)
Ecuador	236	27 (0.5)	58 (-1.7)	105	36 (0)	49 (-1.4)
Thailand	284	28 (0.4)	35 (-0.3)	105	25 (0.9)	33 (-0.4)
India	245	29 (0.4)	56 (-1.5)	163	50 (-0.6)	28 (0)
Malaysia	153	30 (0.4)	24 (0.3)	71	32 (0.2)	11 (1.1)
Nepal	242	31 (0.4)	23 (0.4)	177	40 (-0.2)	26 (0.1)
Azerbaijan	225	32 (0.3)	51 (-1.4)	113	44 (-0.4)	61 (-2.4)
Bangladesh	179	33 (0.3)	67 (-2.5)	135	39 (-0.2)	43 (-0.9)
Burundi	530	34 (0.2)	6 (1.6)	395	19 (1.2)	45 (-1)
Sudan	400	35 (0.2)	21 (0.5)	255	33 (0)	34 (-0.4)
Colombia	255	36 (0.1)	3 (2.3)	101	61 (-1.4)	23 (0.3)
Cameroon	470	37 (-0.1)	44 (-0.8)	394	43 (-0.4)	55 (-1.9)
Ethiopia	428	38 (-0.2)	32 (-0.1)	258	26 (0.9)	9 (1.3)
Argentina	156	39 (-0.2)	28 (0)	80	24 (1)	25 (0.1)
Niger	335	40 (-0.2)	20 (0.5)	314	35 (0)	20 (0.5)
Papua New Guinea	383	41 (-0.4)	50 (-1.4)	237	34 (0)	56 (-1.9)
Madagascar	413	42 (-0.4)	29 (-0.1)	277	30 (0.4)	8 (1.4)
Peru	214	43 (-0.4)	49 (-1.3)	112	38 (-0.1)	44 (-0.9)

Country (ordered based on ranking during 2010-19)	15-49 years *(continued)*					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in		Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10		2010-19	2000-10
Pakistan	250	44 (-0.4)	66 (-2.4)	163	49 (-0.6)	4 (1.8)
China	144	45 (-0.4)	53 (-1.4)	80	42 (-0.2)	40 (-0.7)
Senegal	282	46 (-0.5)	17 (0.7)	180	17 (1.4)	12 (1.1)
Malawi	553	47 (-0.5)	19 (0.5)	313	8 (2.3)	36 (-0.5)
Cambodia	323	48 (-0.6)	15 (0.8)	195	68 (-1.9)	3 (1.9)
Myanmar	400	49 (-0.7)	59 (-1.8)	215	37 (-0.1)	54 (-1.8)
Guinea	476	50 (-0.8)	48 (-1.3)	424	59 (-1.4)	37 (-0.6)
Congo, Dem. Rep.	536	51 (-0.9)	38 (-0.5)	405	46 (-0.5)	52 (-1.7)
Uzbekistan	222	52 (-0.9)	31 (-0.1)	130	48 (-0.5)	41 (-0.8)
Nigeria	720	53 (-1)	52 (-1.4)	723	67 (-1.8)	63 (-2.7)
Honduras	188	54 (-1)	30 (-0.1)	124	51 (-0.6)	46 (-1.1)
Dominican Republic	279	55 (-1)	22 (0.4)	136	62 (-1.5)	18 (0.7)
Chad	776	56 (-1)	69 (-3.1)	643	47 (-0.5)	67 (-3.3)
Cote d'Ivoire	542	57 (-1)	55 (-1.5)	525	66 (-1.7)	68 (-3.6)
Togo	456	58 (-1)	46 (-1.1)	470	58 (-1.4)	69 (-3.6)
Philippines	178	59 (-1)	42 (-0.7)	132	54 (-1)	47 (-1.3)
Bolivia	304	60 (-1)	36 (-0.4)	185	63 (-1.5)	31 (-0.1)
Benin	493	61 (-1.2)	54 (-1.4)	415	64 (-1.5)	66 (-3.2)
Indonesia	253	62 (-1.3)	57 (-1.6)	199	52 (-0.7)	58 (-1.9)
Mali	450	63 (-1.4)	43 (-0.7)	407	65 (-1.7)	32 (-0.3)
Ghana	471	64 (-1.7)	64 (-2.1)	342	56 (-1.2)	64 (-2.7)
Tunisia	175	65 (-1.7)	63 (-2)	82	55 (-1)	59 (-2)
Burkina Faso	489	66 (-1.7)	40 (-0.6)	385	60 (-1.4)	48 (-1.3)
Bulgaria	241	67 (-1.9)	41 (-0.7)	109	57 (-1.4)	50 (-1.4)
Viet Nam	314	68 (-2)	61 (-1.9)	112	70 (-2.3)	60 (-2.1)
Kenya	592	69 (-2)	60 (-1.9)	443	71 (-3.3)	53 (-1.7)
Mexico	340	70 (-2.9)	68 (-2.7)	121	69 (-2.1)	57 (-1.9)
Afghanistan	530	71 (-3.5)	12 (1.2)	256	45 (-0.5)	39 (-0.6)

Country (ordered based on ranking during 2010-19)	50-69 years					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in		Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10		2010-19	2000-10
Haiti	2271	1 (4)	71 (-4.9)	1473	1 (5.8)	71 (-6.6)
Iraq	1503	2 (2.7)	64 (-0.7)	1043	13 (1.3)	63 (-1.4)
South Africa	2453	3 (2.3)	43 (0.4)	1554	10 (1.7)	32 (0.1)
Tanzania	1972	4 (1.8)	66 (-0.9)	1463	8 (1.8)	55 (-1)
Jordan	1076	5 (1.6)	19 (0.9)	608	3 (2.1)	18 (0.7)
Zambia	2218	6 (1.3)	10 (1.5)	1581	4 (2)	8 (1.2)
Mozambique	2626	7 (1.3)	70 (-1.7)	1803	2 (2.2)	70 (-2.5)

Country (ordered based on ranking during 2010-19)	50-69 years *(continued)*					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in 2010-19	Performance ranking (performance*) in 2000-10	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in 2010-19	Performance ranking (performance*) in 2000-10
Bangladesh	1396	8 (1.1)	68 (-1.3)	814	7 (1.9)	26 (0.3)
Algeria	861	9 (1.1)	1 (3.1)	590	6 (1.9)	1 (2)
Peru	1013	10 (0.8)	23 (0.8)	690	15 (0.9)	46 (-0.4)
Russian Federation	2437	11 (0.8)	8 (1.5)	962	28 (0.2)	20 (0.6)
Azerbaijan	1478	12 (0.8)	2 (2.8)	815	27 (0.2)	5 (1.6)
Türkiye	1222	13 (0.8)	9 (1.5)	550	20 (0.6)	13 (1)
Afghanistan	2120	14 (0.7)	25 (0.7)	1479	23 (0.4)	48 (-0.5)
Iran	1092	15 (0.6)	3 (2.4)	633	12 (1.3)	3 (1.7)
Sierra Leone	2122	16 (0.5)	16 (1.1)	1708	16 (0.8)	34 (0)
Laos	1829	17 (0.4)	15 (1.1)	1251	30 (0)	22 (0.5)
Zimbabwe	3044	18 (0.4)	33 (0.6)	2194	14 (1)	64 (-1.5)
Belarus	2545	19 (0.2)	38 (0.5)	855	29 (0)	40 (-0.1)
Ethiopia	1757	20 (0.2)	49 (0)	1222	19 (0.7)	16 (0.7)
Ukraine	2416	21 (0.2)	20 (0.9)	861	9 (1.8)	50 (-0.5)
Sri Lanka	1590	22 (0.2)	45 (0.3)	687	55 (-0.8)	24 (0.4)
Burundi	2043	23 (0.2)	12 (1.4)	1615	21 (0.6)	38 (-0.1)
Ecuador	957	24 (0.1)	21 (0.8)	669	38 (-0.2)	43 (-0.3)
Tajikistan	1625	25 (0.1)	14 (1.3)	1067	43 (-0.3)	2 (1.7)
Cameroon	2209	26 (0.1)	59 (-0.4)	1862	41 (-0.3)	62 (-1.4)
Papua New Guinea	2338	27 (0.1)	40 (0.4)	1349	17 (0.8)	53 (-0.7)
Morocco	1402	28 (0)	5 (1.9)	830	11 (1.5)	15 (0.8)
India	1685	29 (0)	29 (0.6)	1291	70 (-1.8)	25 (0.3)
Uganda	2535	30 (0)	22 (0.8)	1811	24 (0.4)	35 (0)
Brazil	1338	31 (0)	42 (0.4)	686	22 (0.6)	17 (0.7)
Kazakhstan	2308	32 (-0.1)	11 (1.4)	1099	35 (-0.2)	41 (-0.3)
Serbia	1735	33 (-0.1)	24 (0.7)	836	26 (0.2)	23 (0.4)
Senegal	1748	34 (-0.1)	26 (0.6)	1077	18 (0.7)	12 (1)
Egypt	2031	35 (-0.2)	67 (-0.9)	1247	56 (-0.8)	54 (-0.9)
Guinea	1919	36 (-0.2)	58 (-0.4)	1667	54 (-0.7)	42 (-0.3)
Nepal	1902	37 (-0.2)	39 (0.5)	1331	44 (-0.5)	44 (-0.3)
Congo, Dem. Rep.	2026	38 (-0.2)	48 (0)	1604	42 (-0.3)	60 (-1.3)
Mali	2160	39 (-0.2)	52 (-0.2)	1717	46 (-0.5)	45 (-0.3)
Nigeria	2462	40 (-0.3)	62 (-0.6)	2289	63 (-0.9)	67 (-1.9)
Malawi	2821	41 (-0.3)	57 (-0.4)	1677	5 (1.9)	58 (-1.1)
Chad	2516	42 (-0.3)	69 (-1.5)	2047	33 (-0.1)	66 (-1.9)
Argentina	1403	43 (-0.3)	27 (0.6)	716	25 (0.4)	57 (-1)
Cambodia	1376	44 (-0.4)	4 (2.3)	1051	67 (-1.3)	6 (1.4)
Sudan	1781	45 (-0.4)	41 (0.4)	1251	60 (-0.9)	28 (0.2)
Bolivia	2118	46 (-0.5)	55 (-0.3)	1306	51 (-0.7)	39 (-0.1)
Cote d'Ivoire	2525	47 (-0.5)	61 (-0.6)	2297	66 (-1.3)	65 (-1.5)

Country (ordered based on ranking during 2010-19)	50-69 years *(continued)*					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in		Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10		2010-19	2000-10
Honduras	1643	48 (-0.5)	35 (0.5)	969	40 (-0.2)	29 (0.2)
Togo	2140	49 (-0.5)	56 (-0.4)	1788	45 (-0.5)	68 (-1.9)
Guatemala	1467	50 (-0.6)	46 (0.2)	1069	68 (-1.4)	59 (-1.1)
Madagascar	1714	51 (-0.6)	17 (1.1)	1274	31 (-0.1)	10 (1.1)
Indonesia	1802	52 (-0.6)	34 (0.6)	1183	32 (-0.1)	51 (-0.6)
Colombia	953	53 (-0.6)	6 (1.9)	593	49 (-0.6)	4 (1.6)
Benin	1903	54 (-0.6)	60 (-0.4)	1587	47 (-0.6)	69 (-1.9)
Dominican Republic	1416	55 (-0.6)	50 (0)	816	61 (-0.9)	9 (1.1)
Pakistan	1866	56 (-0.7)	63 (-0.7)	1237	59 (-0.9)	30 (0.2)
Burkina Faso	2184	57 (-0.7)	53 (-0.2)	1609	52 (-0.7)	56 (-1)
Niger	1873	58 (-0.7)	37 (0.5)	1451	34 (-0.1)	37 (-0.1)
China	1129	59 (-0.9)	36 (0.5)	557	48 (-0.6)	14 (1)
Myanmar	2149	60 (-0.9)	51 (-0.2)	1349	57 (-0.8)	61 (-1.3)
Ghana	1849	61 (-1)	54 (-0.2)	1401	53 (-0.7)	47 (-0.4)
Uzbekistan	1956	62 (-1)	13 (1.4)	1172	64 (-1)	19 (0.7)
Philippines	1536	63 (-1.2)	31 (0.6)	1042	58 (-0.8)	49 (-0.5)
Tunisia	1239	64 (-1.2)	28 (0.6)	590	36 (-0.2)	33 (0.1)
Kenya	2733	65 (-1.2)	65 (-0.8)	1942	62 (-0.9)	52 (-0.7)
Rwanda	2205	66 (-1.2)	7 (1.8)	1551	39 (-0.2)	7 (1.2)
Malaysia	1496	67 (-1.3)	47 (0.1)	841	65 (-1.1)	21 (0.5)
Bulgaria	2047	68 (-1.4)	32 (0.6)	886	69 (-1.5)	31 (0.2)
Mexico	1423	69 (-1.5)	44 (0.4)	886	50 (-0.6)	36 (0)
Thailand	1343	70 (-1.7)	30 (0.6)	596	37 (-0.2)	11 (1.1)
Viet Nam	1440	71 (-2.2)	18 (0.9)	635	71 (-2.1)	27 (0.3)

Country (ordered based on ranking during 2010-19)	70-84 years					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in		Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10		2010-19	2000-10
Haiti	9175	1 (1.7)	71 (-2.8)	7390	1 (2.6)	71 (-3.7)
Sri Lanka	6941	2 (1.6)	42 (-0.3)	3792	5 (1.5)	4 (0.9)
India	6301	3 (1.4)	53 (-0.5)	5458	21 (0.6)	38 (-0.4)
Russian Federation	7560	4 (1.4)	17 (0.3)	4792	9 (1.1)	22 (0)
Iraq	7497	5 (1.2)	52 (-0.4)	6176	23 (0.6)	53 (-0.7)
Iran	6150	6 (1.2)	1 (1.1)	3905	2 (1.7)	13 (0.5)
Türkiye	5929	7 (1.1)	18 (0.3)	3684	6 (1.4)	34 (-0.2)
Algeria	5195	8 (1)	3 (0.9)	4537	13 (0.9)	24 (0)
Peru	5419	9 (1)	8 (0.6)	3764	7 (1.4)	27 (-0.1)
Sudan	6889	10 (0.9)	34 (-0.2)	5809	12 (1)	60 (-0.9)
Colombia	4649	11 (0.9)	11 (0.6)	3135	8 (1.3)	8 (0.7)

Country (ordered based on ranking during 2010-19)	70-84 years *(continued)*					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in 2010-19	Performance ranking (performance*) in 2000-10	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in 2010-19	Performance ranking (performance*) in 2000-10
Morocco	6895	12 (0.8)	57 (-0.6)	5054	4 (1.6)	50 (-0.6)
Ecuador	4340	13 (0.6)	14 (0.4)	3149	27 (0.4)	20 (0.1)
Bulgaria	6815	14 (0.5)	12 (0.5)	4419	10 (1.1)	2 (1)
China	5556	15 (0.5)	23 (0.2)	3601	17 (0.7)	9 (0.7)
Ethiopia	7449	16 (0.5)	6 (0.7)	6100	16 (0.8)	1 (1.5)
Malaysia	5877	17 (0.5)	10 (0.6)	4581	28 (0.4)	11 (0.5)
Laos	8399	18 (0.4)	39 (-0.3)	6984	39 (0)	33 (-0.2)
Zimbabwe	8061	19 (0.4)	28 (0)	6106	14 (0.9)	40 (-0.4)
Tajikistan	8373	20 (0.4)	65 (-1.2)	6866	37 (0)	49 (-0.6)
Dominican Republic	5481	21 (0.3)	61 (-0.7)	3841	50 (-0.2)	7 (0.7)
Burundi	8116	22 (0.3)	2 (1)	7176	29 (0.4)	14 (0.5)
Honduras	7239	23 (0.3)	22 (0.2)	5214	25 (0.5)	23 (0)
Egypt	8712	24 (0.3)	67 (-1.4)	6846	59 (-0.5)	63 (-1)
Serbia	7387	25 (0.3)	37 (-0.2)	4778	18 (0.7)	46 (-0.5)
Belarus	9247	26 (0.3)	69 (-1.7)	4933	24 (0.6)	68 (-1.2)
Bangladesh	6926	27 (0.2)	70 (-2.2)	5012	11 (1)	62 (-1)
Brazil	5931	28 (0.2)	16 (0.4)	4111	32 (0.2)	18 (0.2)
Thailand	4113	29 (0.1)	4 (0.9)	2602	15 (0.8)	5 (0.9)
Tanzania	7678	30 (0.1)	30 (-0.1)	5560	19 (0.7)	21 (0.1)
South Africa	6871	31 (0.1)	50 (-0.4)	4961	33 (0.2)	44 (-0.5)
Argentina	6105	32 (0.1)	25 (0)	3585	30 (0.2)	45 (-0.5)
Rwanda	8410	33 (0)	9 (0.6)	7071	26 (0.4)	6 (0.8)
Jordan	6432	34 (0)	19 (0.3)	4391	22 (0.6)	12 (0.5)
Cambodia	6636	35 (0)	5 (0.8)	5628	55 (-0.3)	3 (0.9)
Ukraine	8323	36 (0)	35 (-0.2)	4680	3 (1.7)	48 (-0.5)
Kenya	6980	37 (0)	33 (-0.2)	5818	60 (-0.5)	29 (-0.1)
Bolivia	9084	38 (0)	54 (-0.5)	7063	44 (-0.1)	41 (-0.4)
Malawi	8664	39 (0)	31 (-0.1)	5616	20 (0.7)	17 (0.3)
Myanmar	8898	40 (0)	38 (-0.3)	7072	36 (0)	57 (-0.8)
Madagascar	7396	41 (0)	48 (-0.4)	6311	41 (-0.1)	31 (-0.2)
Azerbaijan	8282	42 (-0.1)	47 (-0.4)	6212	69 (-0.7)	47 (-0.5)
Nepal	8060	43 (-0.1)	51 (-0.4)	6770	49 (-0.2)	42 (-0.4)
Togo	9527	44 (-0.1)	46 (-0.4)	9072	35 (0.1)	65 (-1.2)
Congo, Dem. Rep.	8110	45 (-0.1)	24 (0)	7248	54 (-0.3)	51 (-0.7)
Viet Nam	6640	46 (-0.1)	58 (-0.6)	3867	56 (-0.3)	52 (-0.7)
Sierra Leone	9466	47 (-0.2)	26 (0)	8389	43 (-0.1)	30 (-0.2)
Chad	9794	48 (-0.2)	59 (-0.7)	8742	38 (0)	58 (-0.8)
Guinea	8213	49 (-0.2)	62 (-0.7)	7580	62 (-0.5)	37 (-0.3)
Guatemala	5312	50 (-0.2)	7 (0.6)	4238	47 (-0.1)	43 (-0.5)
Papua New Guinea	9407	51 (-0.2)	55 (-0.5)	7004	42 (-0.1)	61 (-0.9)

Country (ordered based on ranking during 2010-19)	70-84 years *(continued)*					
	Males			Females		
	Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in		Mortality rate in 2019 (per 100,000 population)	Performance ranking (performance*) in	
		2010-19	2000-10		2010-19	2000-10
Cameroon	7953	52 (-0.2)	49 (-0.4)	7592	66 (-0.6)	55 (-0.8)
Philippines	7483	53 (-0.2)	32 (-0.1)	6167	48 (-0.2)	39 (-0.4)
Zambia	9090	54 (-0.2)	29 (-0.1)	7412	46 (-0.1)	25 (0)
Kazakhstan	9169	55 (-0.2)	13 (0.5)	6547	40 (0)	56 (-0.8)
Mozambique	10186	56 (-0.2)	56 (-0.6)	8465	31 (0.2)	54 (-0.8)
Cote d'Ivoire	8452	57 (-0.2)	41 (-0.3)	6860	45 (-0.1)	36 (-0.3)
Mali	9678	58 (-0.3)	36 (-0.2)	8882	65 (-0.5)	19 (0.1)
Uganda	10496	59 (-0.3)	63 (-0.7)	9373	63 (-0.5)	67 (-1.2)
Ghana	7825	60 (-0.3)	64 (-0.8)	7010	61 (-0.5)	66 (-1.2)
Indonesia	8283	61 (-0.3)	40 (-0.3)	6260	53 (-0.3)	35 (-0.3)
Afghanistan	8730	62 (-0.3)	21 (0.3)	7194	52 (-0.3)	28 (-0.1)
Pakistan	8329	63 (-0.4)	60 (-0.7)	6660	64 (-0.5)	26 (-0.1)
Niger	8924	64 (-0.4)	15 (0.4)	8051	51 (-0.2)	15 (0.4)
Benin	8038	65 (-0.4)	43 (-0.3)	7355	68 (-0.6)	64 (-1)
Burkina Faso	9944	66 (-0.5)	20 (0.3)	8720	58 (-0.5)	32 (-0.2)
Senegal	8854	67 (-0.5)	44 (-0.3)	6985	34 (0.1)	16 (0.4)
Nigeria	9364	68 (-0.5)	27 (0)	9121	71 (-0.8)	59 (-0.9)
Tunisia	6478	69 (-0.5)	45 (-0.3)	3817	57 (-0.4)	10 (0.6)
Mexico	5519	70 (-0.6)	66 (-1.3)	4114	67 (-0.6)	70 (-1.8)
Uzbekistan	9451	71 (-0.7)	68 (-1.5)	7356	70 (-0.8)	69 (-1.6)

FIGURE 5A.3 Correlation between performance in mortality decline during 2010-19 among males and females

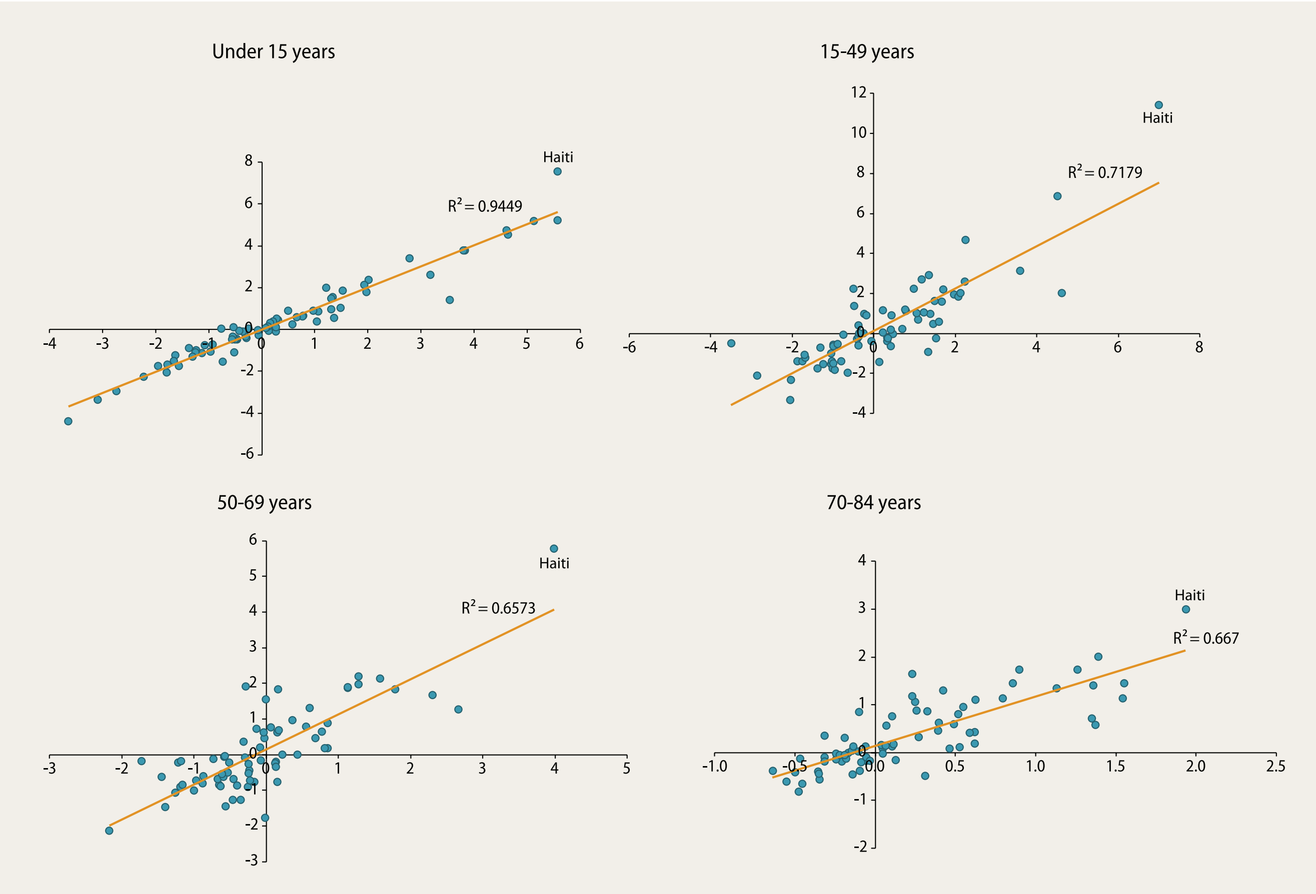


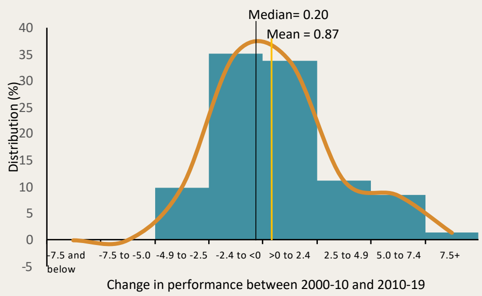
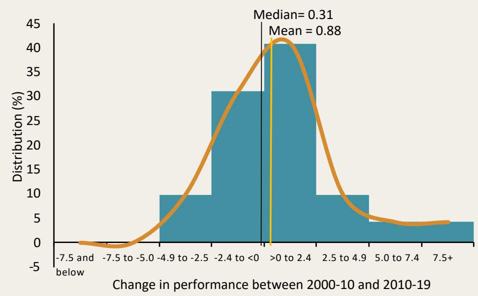
TABLE 5A.3 Change in performance in the annual rate of decline in mortality under 15 years, 15-49 years, 50-69 years, and 70-84 years, by sex from 2000-10 decade to 2010-2019 decade

a. Under 15 years

Change in performance in annual rate of decline of mortality under 15 years (% per year)	Males (change in performance per year)	Females (change in performance per year)
7.5 and above (best transition)	***Haiti** (14.4)*	***Haiti** (17.7)* Azerbaijan (7.8) Ukraine (7.7)
5.0 to 7.4	Azerbaijan (7.4) Bulgaria (6.5) Ukraine (6.2) Russian Federation (5.9) Kazakhstan (5.5) Zimbabwe (5.0)	Russian Federation (7.0) Kazakhstan (6.5) South Africa (5.0)
2.5 to 4.9	South Africa (4.7) Burundi (4.4) Belarus (3.9) Iran (3.5) China (3.4) Algeria (3.0) ***Iraq** (2.7)* Jordan (2.7)	Belarus (4.9) Burundi (4.8) Zimbabwe (4.8) Iran (4.0) Bulgaria (4.0) Algeria (3.3) China (3.3) Chad (2.5)

a. Under 15 years *(continued)*

Change in performance in annual rate of decline of mortality under 15 years (% per year)	Males (change in performance per year)	Females (change in performance per year)
>0 to 2.4	Chad (2.3) Cameroon (2.3) Ecuador (2.2) Sri Lanka (2.2) Uzbekistan (1.7) Egypt (1.6) Thailand (1.5) Argentina (1.4) Pakistan (1.2) Morocco (1.2) Sudan (1.1) Malawi (1.1) India (0.9) Indonesia (0.8) Mali (0.8) Ghana (0.7) Togo (0.4) Tunisia (0.4) Papua New Guinea (0.3) Sierra Leone (0.2) ***Mozambique*** *(0.2)* Benin (0.1) Viet Nam (0.0) ***Afghanistan*** *(0.0)*	Jordan (2.4) Cameroon (2.3) Ecuador (2.3) Sri Lanka (1.8) ***Iraq*** *(1.7)* Morocco (1.5) Argentina (1.5) Thailand (1.3) Uzbekistan (1.3) Sudan (1.3) India (1.2) Ghana (1.2) Egypt (1.2) Togo (1.1) Pakistan (0.9) Indonesia (0.9) Mali (0.6) Sierra Leone (0.4) Tunisia (0.4) Papua New Guinea (0.4) Congo, Dem. Rep. (0.3) ***Afghanistan*** *(0.3)* Benin (0.3) ***Mozambique*** *(0.2)* Philippines (0.2) Malawi (0.1) Senegal (0.1) Myanmar (0.1)
-2.4 to <0	Laos (0.0) Congo, Dem. Rep. (-0.1) Nigeria (-0.1) Myanmar (-0.1) Burkina Faso (-0.2) Tanzania (-0.2) Senegal (-0.2) Philippines (-0.4) Guatemala (-0.4) Dominican Republic (-0.6) Mexico (-0.7) Peru (-0.8) Uganda (-0.8) Cote d'Ivoire (-0.9) Colombia (-1.1) Tajikistan (-1.2) Madagascar (-1.2) Kenya (-1.2) Ethiopia (-1.2) Guinea (-1.3) Bangladesh (-1.3) Türkiye (-1.8) Bolivia (-1.8) Honduras (-1.9) Zambia (-2.0)	Nigeria (0.0) Burkina Faso (0.0) Viet Nam (-0.2) Dominican Republic (-0.2) Laos (-0.4) Mexico (-0.7) Peru (-0.8) Guatemala (-0.8) Tanzania (-1.0) Cote d'Ivoire (-1.0) Colombia (-1.2) Ethiopia (-1.3) Madagascar (-1.3) Tajikistan (-1.4) Bolivia (-1.4) Bangladesh (-1.5) Guinea (-1.6) Türkiye (-1.7) Uganda (-1.8) Honduras (-1.8) Kenya (-2.1) Zambia (-2.2)
-4.9 to -2.5	Serbia (-2.5) Nepal (-2.7) Niger (-2.8) Cambodia (-2.8) Brazil (-3.3) Rwanda (-3.4) Malaysia (-3.4)	Serbia (-2.6) Niger (-2.8) Nepal (-3.1) Brazil (-3.5) Cambodia (-3.6) Malaysia (-4.2) Rwanda (-4.2)

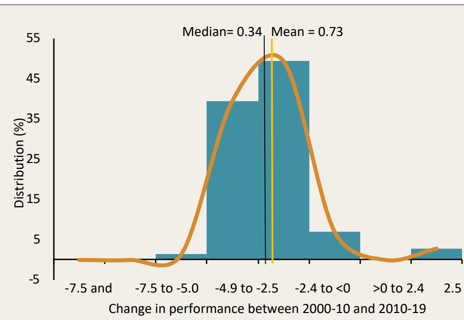
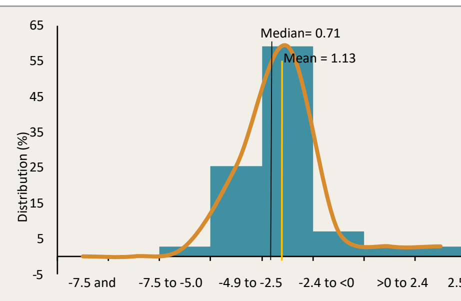
Change in performance in annual rate of decline of mortality under 15 years (% per year)	Males (change in performance per year)	Females (change in performance per year)
-7.4 to -5.0		
-7.5 and below (worst transition)		
Distribution (%)	 	

Countries in italics are those that encountered major crises such as hurricanes, earthquakes, flooding, tsunami, or war during 2000, 2005, 2010, 2015, or 2019, thereby showing a pseudo good or poor in performance during 2010-2019 relative to during 2000-2010.

b. 15-49 years

Change in performance in annual rate of decline of mortality between 15 and 49 years (% per year)	Males (change in performance per year)	Females (change in performance per year)
7.5 and above (best transition)	***Haiti*** *(16.9)* ***Iraq*** *(7.8)*	***Haiti*** *(24.7)* ***Mozambique*** *(7.5)*
5.0 to 7.4		Zimbabwe (7.2) South Africa (6.3)
2.5 to 4.9	Tanzania (4.5) Zimbabwe (4.4) ***Mozambique*** *(4.2)* South Africa (3.3) Bangladesh (2.8)	***Iraq*** *(4.7)* Iran (3.7) Tanzania (3.2) Malawi (2.8) Chad (2.7)
>0 to 2.4	Ecuador (2.2) Iran (2.1) Chad (2.1) Pakistan (2.0) Tajikistan (2.0) Belarus (2.0) India (1.9) Azerbaijan (1.7) Jordan (1.6) Guatemala (1.6) Egypt (1.4) Myanmar (1.0) Papua New Guinea (1.0) China (1.0) Peru (0.9) Brazil (0.9) Türkiye (0.8) Cameroon (0.8) Thailand (0.8) Laos (0.7) Russian Federation (0.6) Sri Lanka (0.5) Cote d'Ivoire (0.5) Serbia (0.5) Guinea (0.5) Nigeria (0.4) Kazakhstan (0.4)	Togo (2.3) Burundi (2.2) Azerbaijan (2.1) Papua New Guinea (2) Ukraine (1.9) Cote d'Ivoire (1.8) Myanmar (1.8) Belarus (1.7) Benin (1.6) Kazakhstan (1.6) Ghana (1.5) Cameroon (1.5) Ecuador (1.4) Thailand (1.4) Zambia (1.3) Indonesia (1.2) Uganda (1.2) Congo, Dem. Rep. (1.2) Jordan (1.1) Tajikistan (1.1) Tunisia (1.0) Nigeria (0.9) Argentina (0.8) Peru (0.8) Morocco (0.8) Türkiye (0.7) Bangladesh (0.7)

b. 15-49 years *(continued)*

Change in performance in annual rate of decline of mortality between 15 and 49 years (% per year)	Males (change in performance per year)	Females (change in performance per year)
>0 to 2.4 *(continued)*	Ghana (0.4) Tunisia (0.3) Uganda (0.3) Indonesia (0.3) Benin (0.2) Ukraine (0.1) Togo (0.1) Malaysia (0.1)	Sudan (0.5) China (0.5) Honduras (0.5) Sri Lanka (0.4) Russian Federation (0.4) Senegal (0.3) Egypt (0.3) Brazil (0.3) Philippines (0.3) Serbia (0.3) Uzbekistan (0.2) Algeria (0.2) Sierra Leone (0.2) ***Afghanistan*** *(0.1)* Bulgaria (0.1)
-2.4 to <0	Ethiopia (0.0) Nepal (0.0) Viet Nam (-0.1) Kenya (-0.1) Morocco (-0.1) Zambia (-0.2) Mexico (-0.2) Argentina (-0.2) Sudan (-0.2) Madagascar (-0.3) Philippines (-0.4) Congo, Dem. Rep. (-0.4) Mali (-0.7) Bolivia (-0.7) Algeria (-0.7) Niger (-0.7) Uzbekistan (-0.8) Honduras (-0.9) Malawi (-1.0) Sierra Leone (-1.1) Burkina Faso (-1.1) Senegal (-1.2) Bulgaria (-1.2) Burundi (-1.3) Dominican Republic (-1.4) Cambodia (-1.5) Rwanda (-2.0) Colombia (-2.2)	Burkina Faso (-0.1) Mexico (-0.2) Viet Nam (-0.2) Nepal (-0.3) Ethiopia (-0.4) Niger (-0.5) India (-0.6) Laos (-0.7) Guinea (-0.8) Malaysia (-0.9) Guatemala (-0.9) Madagascar (-1.0) Bolivia (-1.4) Mali (-1.5) Kenya (-1.6) Colombia (-1.7) Dominican Republic (-2.2) Pakistan (-2.4)
-4.9 to -2.5	***Afghanistan*** *(-4.7)*	Rwanda (-3.6) Cambodia (-3.9)
-7.4 to -5.0		
-7.5 and below (worst transition)		
Distribution (%)		

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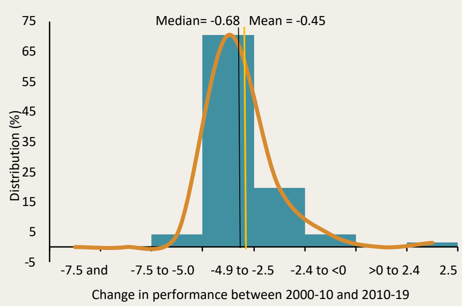
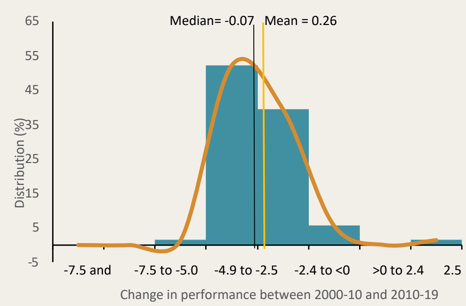
c. 50-69 years

Change in performance in annual rate of decline of mortality between 50 and 69 years (% per year)	Males (change in performance per year)	Females (change in performance per year)
7.5 and above (best transition)	***Haiti*** *(8.9)*	***Haiti*** *(12.4)*
5.0 to 7.4		
2.5 to 4.9	***Iraq*** *(3.4)* ***Mozambique*** *(2.9)* Tanzania (2.7)	***Mozambique*** *(4.7)* Malawi (3) Tanzania (2.8) ***Iraq*** *(2.7)*
>0 to 2.4	Bangladesh (2.4) South Africa (1.9) Chad (1.2) Egypt (0.8) Jordan (0.7) Cameroon (0.5) Nigeria (0.3) Ethiopia (0.2) Guinea (0.2) Malawi (0.1) Peru (0.1) Cote d'Ivoire (0.1) Pakistan (0.0) ***Afghanistan*** *(0.0)*	Zimbabwe (2.4) Ukraine (2.4) Chad (1.8) South Africa (1.6) Bangladesh (1.5) Papua New Guinea (1.4) Jordan (1.4) Togo (1.4) Benin (1.4) Argentina (1.4) Peru (1.3) Cameroon (1.1) Congo, Dem. Rep. (1.0) Nigeria (1.0) ***Afghanistan*** *(0.9)* Morocco (0.8) Sierra Leone (0.8) Zambia (0.7) Burundi (0.7) Uganda (0.5) Indonesia (0.5) Myanmar (0.5) Burkina Faso (0.3) Cote d'Ivoire (0.2) Egypt (0.2) Belarus (0.1) Ecuador (0.1) Kazakhstan (0.1) Niger (0.0)
-2.4 to <0	Mali (0.0) Bolivia (-0.1) Sri Lanka (-0.1) Togo (-0.2) Benin (-0.2) Zambia (-0.2) Zimbabwe (-0.2) Congo, Dem. Rep. (-0.3) Belarus (-0.3) Papua New Guinea (-0.4) Kenya (-0.4) Brazil (-0.4) Burkina Faso (-0.5) Sierra Leone (-0.5) Dominican Republic (-0.6) India (-0.6) Ecuador (-0.6) Russian Federation (-0.7) Laos (-0.7) Myanmar (-0.7) Nepal (-0.7) Türkiye (-0.7) Guatemala (-0.7) Ghana (-0.7)	Ethiopia (-0.1) Algeria (-0.1) Brazil (-0.1) Nepal (-0.1) Serbia (-0.2) Mali (-0.2) Kenya (-0.2) Tunisia (-0.3) Ghana (-0.3) Senegal (-0.3) Philippines (-0.3) Türkiye (-0.4) Guatemala (-0.4) Russian Federation (-0.4) Iran (-0.4) Honduras (-0.4) Guinea (-0.5) Laos (-0.5) Bolivia (-0.6) Mexico (-0.6) Pakistan (-1.0) Sudan (-1.1) Sri Lanka (-1.1) Madagascar (-1.1)

c. 50-69 years *(continued)*

Change in performance in annual rate of decline of mortality between 50 and 69 years (% per year)	Males (change in performance per year)	Females (change in performance per year)
-2.4 to <0 *(continued)*	Ukraine (-0.7) Senegal (-0.8) Uganda (-0.8) Serbia (-0.8) Sudan (-0.8) Argentina (-0.9) Honduras (-1.1) Indonesia (-1.1) Tajikistan (-1.2) Niger (-1.3) Burundi (-1.3) Malaysia (-1.3) China (-1.4) Kazakhstan (-1.5) Madagascar (-1.6) Philippines (-1.7) Tunisia (-1.8) Mexico (-1.8) Iran (-1.8) Morocco (-1.9) Bulgaria (-2.0) Azerbaijan (-2.0) Algeria (-2.0) Thailand (-2.3) Uzbekistan (-2.4) Colombia (-2.5)	Thailand (-1.3) Azerbaijan (-1.4) Rwanda (-1.5) China (-1.6) Malaysia (-1.6) Bulgaria (-1.7) Uzbekistan (-1.7) Dominican Republic (-2) Tajikistan (-2.1) India (-2.1) Colombia (-2.2) Viet Nam (-2.4)
-4.9 to -2.5	Cambodia (-2.7) Rwanda (-3.0) Viet Nam (-3.1)	Cambodia (-2.7)
-7.4 to -5.0		
-7.5 and below (worst transition)		
Distribution (%)		

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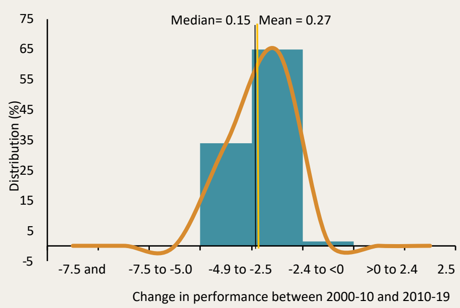
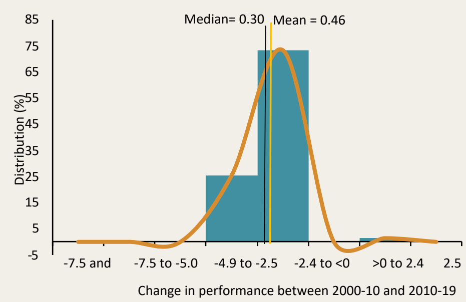
d. 70-84 years

Change in performance in annual rate of decline of mortality between 70 and 84 years (% per year)	Males (change in performance per year)	Females (change in performance per year)
7.5 and above (best transition)		
5.0 to 7.4		***Haiti*** *(6.3)*
2.5 to 4.9	***Haiti*** *(4.5)*	
>0 to 2.4	Bangladesh (2.4) Belarus (1.9)	Morocco (2.3) Ukraine (2.2)

d. 70-84 years *(continued)*

Change in performance in annual rate of decline of mortality between 70 and 84 years (% per year)	**Males (change in performance per year)**	**Females (change in performance per year)**
>0 to 2.4 *(continued)*	Sri Lanka (1.9) India (1.9) Egypt (1.7) ***Iraq*** *(1.7)* Tajikistan (1.6) Morocco (1.4) Sudan (1.1) Russian Federation (1.1) Dominican Republic (1) Türkiye (0.8) Uzbekistan (0.8) Laos (0.7) Mexico (0.6) South Africa (0.5) Serbia (0.5) Ghana (0.5) Guinea (0.5) Viet Nam (0.5) Chad (0.5) Bolivia (0.5) Zimbabwe (0.5) Uganda (0.4) Nepal (0.4) Papua New Guinea (0.4) Peru (0.4) Madagascar (0.4) ***Mozambique*** *(0.4)* Pakistan (0.3) China (0.3) Colombia (0.3) Azerbaijan (0.3) Togo (0.3) Myanmar (0.2) Ukraine (0.2) Cameroon (0.2) Tanzania (0.2) Kenya (0.2) Ecuador (0.1) Honduras (0.1) Iran (0.1) Algeria (0.1) Malawi (0.1) Cote d'Ivoire (0.1) Argentina (0.0) Indonesia (0.0)	Bangladesh (2) Sudan (1.9) Belarus (1.8) Türkiye (1.6) Peru (1.4) Zimbabwe (1.3) ***Iraq*** *(1.3)* Togo (1.3) Serbia (1.2) Mexico (1.2) Iran (1.2) Russian Federation (1.0) India (1.0) ***Mozambique*** *(1.0)* Algeria (0.9) Papua New Guinea (0.8) Chad (0.8) Myanmar (0.8) Uzbekistan (0.8) Kazakhstan (0.7) Argentina (0.7) Ghana (0.7) Uganda (0.7) South Africa (0.7) Tanzania (0.6) Tajikistan (0.6) Colombia (0.6) Sri Lanka (0.6) Egypt (0.5) Honduras (0.5) Viet Nam (0.4) Benin (0.4) Congo, Dem. Rep. (0.4) Malawi (0.4) Ecuador (0.3) Bolivia (0.3) Guatemala (0.3) Nepal (0.3) Philippines (0.2) Laos (0.2) Cote d'Ivoire (0.2) Cameroon (0.2) Madagascar (0.1) Sierra Leone (0.1) China (0.1) Bulgaria (0.1) Jordan (0.1) Nigeria (0.0) Indonesia (0.0) Brazil (0.0)
-2.4 to <0	Bulgaria (0.0) Mali (0.0) Benin (-0.1) Philippines (-0.1) Malaysia (-0.1) Zambia (-0.1) Congo, Dem. Rep. (-0.1) Senegal (-0.2) Tunisia (-0.2) Sierra Leone (-0.2) Brazil (-0.2) Jordan (-0.2)	Thailand (-0.1) Guinea (-0.1) Burundi (-0.1) Zambia (-0.1) Malaysia (-0.1) ***Afghanistan*** *(-0.1)* Azerbaijan (-0.2) Burkina Faso (-0.2) Senegal (-0.3) Kenya (-0.3) Rwanda (-0.3) Pakistan (-0.4)

d. 70-84 years *(continued)*

Change in performance in annual rate of decline of mortality between 70 and 84 years (% per year)	Males (change in performance per year)	Females (change in performance per year)
-2.4 to <0 *(continued)*	Ethiopia (-0.3) Nigeria (-0.5) ***Afghanistan** (-0.6)* Rwanda (-0.6) Burundi (-0.7) Burkina Faso (-0.7) Kazakhstan (-0.8) Niger (-0.8) Guatemala (-0.8) Cambodia (-0.8) Thailand (-0.8)	Niger (-0.6) Mali (-0.6) Ethiopia (-0.7) Dominican Republic (-0.9) Tunisia (-1.0) Cambodia (-1.2)
-4.9 to -2.5		
-7.4 to -5.0		
-7.5 and below (worst transition)		
Distribution (%)		

Countries in italics are those that encountered major crises such as hurricanes, earthquakes, flooding, tsunami, or war during 2000, 2005, 2010, 2015, or 2019, thereby showing a pseudo good or poor in performance during 2010-2019 relative to during 2000-2010.

ANNEX 5.3

Model using to estimate critical income

We used the methods of Hum and others (2012) for estimating critical income. We used country specific population by age groups (both sexes), and country specific deaths by age-groups, from World Population Prospects 2022 (United Nations, Department of Economic and Social Affairs, Population Division 2022), to derive a survival rate for children aged 0 to 14, adults 15 to 49, and seniors 50 to 69. For this analysis, we included only countries with a population of over 7 million (which covers 99.9 percent of the world population in 2019). We also calculated an average midpoint year (1992.5 and 2017, used a five- and four-year average). GDP per capita (PPP, constant $2017) was sourced from the World Bank (World Bank 2023). The five- and four-year averages were used to limit the influence of sudden, dramatic, changes in health or economic development in that country.

We adapted the Michaelis-Menten model for age-specific global critical income estimates (k_{inc}), and maximal survival rates, such that:

$$child\ survival = \frac{child\ survival_{,max} * GDP}{GDP + k_{child,inc}}$$

$$adult\ survival = \frac{adult\ survival_{max} * GDP}{GDP + k_{adult,inc}}$$

$$senior\ survival = \frac{senior\ survival_{max} * GDP}{GDP + k_{senior,inc}}$$

We used a mixed effect model to calculate the global, as well as country-level, critical incomes for all countries in the analysis. We also calculated the income required to achieve 80 percent of the maximal health in high income countries—which is mathematically, four times the critical income. Using the country-level critical incomes derived from the mixed-effects model, we ranked the top countries with the lowest critical income values for each age-grouping.

TABLE 5A.4 Deaths avertable globally in 2019 from specific causes of deaths and age groups if rate of decline was same as that from HIV/AIDS (ages 0-14, 15-49) and tuberculosis (ages 50-69, 70+)

			Male			Female		
Cause of Death (CoD)	Target Age group	Reference CoD + Age group	Reference AARR (%)	Actual AARR (%)	Deaths avertable	Reference AARR (%)	Actual AARR (%)	Deaths avertable
Malaria	15-49 years	Malaria, 0-14 years*	4.2	-0.3	17,995	4.4	0.4	10,144
Tobacco attributable cancers	50-69 years	Tuberculosis, 50-69 years	4.8	1.3	472,818	4.6	0.6	186,517
	70+ years	Tuberculosis, 70+ years	5.2	0.6	493,762	4.6	0.1	246,112
Infection attributable cancers	50-69 years	Tuberculosis, 50-69 years	4.8	2.7	70,734	4.6	1.3	127,536
	70+ years	Tuberculosis, 70+ years	5.2	1.6	67,814	4.6	1.1	99,394
Stomach cancer	50-69 years	Tuberculosis, 50-69 years	4.8	2.5	90,323	4.6	2.6	36,181
	70+ years	Tuberculosis, 70+ years	5.2	1.9	119,737	4.6	2.4	56,648
Breast cancer	50-69 years	Tuberculosis, 50-69 years				4.6	0.5	154,974
	70+ years	Tuberculosis, 70+ years				4.6	0.3	122,670
CVD (not Stroke)	50-69 years	Tuberculosis, 50-69 years	4.8	1.4	1,053,736	4.6	1.6	535,396
	70+ years	Tuberculosis, 70+ years	5.2	0.7	1,994,677	4.6	1.0	2,051,883
Stroke	50-69 years	Tuberculosis, 50-69 years	4.8	2.0	462,694	4.6	2.5	261,105
	70+ years	Tuberculosis, 70+ years	5.2	1.6	940,435	4.6	2.0	883,607
Respiratory diseases (COPD, Asthma, other)	50-69 years	Tuberculosis, 50-69 years	4.8	2.8	208,510	4.6	2.6	129,185
	70+ years	Tuberculosis, 70+ years	5.2	2.0	761,899	4.6	1.9	581,277
Road Injury	15-49 years	HIV/AIDS, 15-49 years	4.1	1.2	235,125	5.4	2.1	58,207
	50-69 years	Tuberculosis, 50-69 years	4.8	0.3	142,057	4.6	0.7	49,126
	70+ years	Tuberculosis, 70+ years	5.2	0.6	58,194	4.6	0.8	28,550
Falls	50-69 years	Tuberculosis, 50-69 years	4.8	0.4	58,962	4.6	0.6	28,721
	70+ years	Tuberculosis, 70+ years	5.2	-1.0	124,481	4.6	-0.8	145,487
Drowning	0-14 years	HIV/AIDS, 0-14 years	6.2	4.4	16,255	6.1	4.9	7,687
Suicide	15-49 years	HIV/AIDS, 15-49 years	4.1	2.0	99,838	5.4	3.6	39,369
	50-69 years	Tuberculosis, 50-69 years	4.8	2.4	50,435	4.6	2.1	22,584
	70+ years	Tuberculosis, 70+ years	5.2	1.9	32,751	4.6	2.5	13,146
Deaths avertable in 2019, 0-69 years					2,979,482			1,646,732
Deaths avertable in 2019, 70+ years					4,593,750			4,228,774
Total deaths avertable in 2019					7,573,232			5,875,506

*The reference group of malaria at ages 0-14 years was used for malaria deaths at ages 15-49 years, based on relevancy.

ANNEX REFERENCES

1. Bernal, J. L., S. Cummins, and A. Gasparrini. 2017. "Interrupted time series regression for the evaluation of public health interventions: A tutorial." *International Journal of Epidemiology* 46 (1), 348–55.
2. Hum, R. J., P. Jha, A. M. McGahan, and Y. –L. Cheng. 2012. "Global divergence in critical income for adult and childhood survival: Analyses of mortality using Michaelis–Menten." *ELife* 1: e00051.
3. Jamison, D. T., S. M. Murphy, and M. E. Sandbu. 2016. "Why has under-5 mortality decreased at such different rates in different countries?" *Journal of Health Economics* 48, 16–25.
4. Kontopantelis, E., T. Doran, D. A. Springate, I. Buchan, and D. Reeves. 2015. "Regression based quasi-experimental approach when randomisation is not an option: Interrupted time series analysis." *BMJ* 350, h2750.
5. United Nations, Department of Economic and Social Affairs, Population Division. 2022. *World Population Prospects 2022*. New York: UN Department of Economic and Social Affairs, Population Division.
6. Verguet, S., and D. T. Jamison. 2014. "Estimates of performance in the rate of decline of under-five mortality for 113 low- and middle-income countries, 1970-2010." *Health Policy and Plan-*

ning 29(2), 151–163.

7. World Bank. 2021. "World Bank Country and Lending Groups." Washington, D.C., The World Bank Group. https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.
8. World Bank. 2023. "World Development Indicators." Washington, D.C., The World Bank Group https://databank.worldbank.org/source/world-development-indicators.