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Supplementary appendix

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Supplementary appendix: Trends in cause-specific mortality among children aged 5-14 years from 2005 to 2016 in India, China, Brazil, and Mexico: nationally-representative mortality studies

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Rank	Income Category	Country	Deaths in 2017	Nationally-representative mortality system with causes (ICD-10)
1	Middle	India	151 657	Sample Registration System/Million Death Study, 2001-2013, good quality
2	Middle	Nigeria	105 285	None
3	Low	Democratic Republic of the Congo	63 343	None
4	Middle	Pakistan	49 188	None
5	Middle	China	38 596	Integrated disease surveillance points and vital registration, 2004-2016, good quality
6	Low	Ethiopia	37 749	None
7	Low	Niger	25 854	None
8	Middle	Indonesia	23 974	Sample registration system, 2014-2016, low quality
9	Low	United Republic of Tanzania	19 137	None
10	Middle	Cameroon	18 911	None
11	Low	Uganda	17 698	None
12	Middle	Cote d'Ivoire	17 571	None
13	Middle	Angola	14 092	None
14	Middle	Bangladesh	14 087	Sample registration system,
15	Low	Burkina Faso	13 741	None
16	Middle	Kenya	13 473	None
17	Middle	Philippines	13 389	Vital registration, 2006-2011 available in WHO mortality database
18	Low	Mali	12 825	None
19	Low	Mozambique	12 502	None
20	Low	Chad	11 658	None
21	Low	Somalia	10 330	None
22	Low	Afghanistan	10 072	None
23	Middle	Sudan	9438	None
24	Low	Madagascar	8859	None
25	Middle	Egypt	8798	Vital registration, 2000-2015, low quality
26	Middle	Ghana	8385	None
27	Middle	South Africa	8192	Vital registration, low quality, high misclassification for injuries and HIV
28	Low	Guinea	7844	None
29	Middle	Myanmar	7754	None
30	Middle	Brazil	7308	Vital registration, good quality
31	Low	Malawi	6967	None
32	Low	Benin	6854	None
33	Middle	Zambia	6656	None
34	Low	Burundi	6499	None
35	Low	South Sudan	6265	None
36	Low	Senegal	6197	None
37	Low	Zimbabwe	6151	None
38	Middle	Mexico	5711	Vital registration, good quality
39	Low	Yemen	5635	None
SUBTOTAL of above countries/Global total			818 645 / 928 587 (88%)	
SUBTOTAL of four countries included/ LMIC countries with accessible nationally-representative cause of death data (%)			203 272 / 233 651 (87%)	

Appendix Table 1. UN-IGME estimates for countries with highest number of deaths for children aged 5-14 years in 2017, data availability and quality of nationally-representative cause of death data. Income categories are based on the World Bank.¹ Completeness of coverage for death registration and causes of death for countries were reported by the World Health Organization and the United Nations Statistics Division.^{2,3} We considered countries with vital registration completeness or without a nationally-representative sample registration system as not having a nationally-representative mortality system. Sample registration data from Indonesia and Bangladesh were not accessible; however quality and completeness of cause of death data are low for both systems.^{4,5}

Cause of death	ICD-10 range
I. Communicable and nutritional conditions	
1. Pneumonia	H65-H68, H70-H71, J00-J22, J32, J36, J85-J86, P23, U04
2. Tuberculosis	A15-19, J65, B90
3. Diarrhoea	A00-A09
4. Vaccine Preventable Diseases	
Measles	B01, B05
Other selected vaccine preventable diseases	A33, A35, A36-A37, A80, B03, B06, B26, B91
5. Meningitis/encephalitis	A39, A81, A83-A89, G00-G09
6. Malaria	B50-B54
Other causes	
Nutritional deficiencies	D50-D53, E00-E02, E40-E46, E50-E64, X53-X54
HIV	B20-B24, C46, D84, R75
Acute bacterial sepsis and severe infections	A20-A28, A32, A38, A40-A49, A68, A70, A74-A79, B95-B96, H10, H60, I30, I32-I33, I39-I41, K02, K04-K05, K61, K65, K67, K81, L00-L04, L08, M00-M01, M60, M86, N10, N30, N34, N41, N49, N61, P36-P39, U80-U89
Other infectious and parasitic diseases	A30, A31, A50, A51-A53, A54-A64, A65-A67, A69, A71, A82, A90-A99, B00 B02 B04 B07-B09 B15-B17 B19 B25 B27-B49 B55-B58 B59, B60/B64 B65-B83, B85-B89, B92, B94, B97-B99, N70-N74, P35, Y95
Fever of unknown origin	R50
Maternal and Perinatal conditions	O00-O99, A34, F53; P00-P22, P24-P29, P50-P96
II. Non-communicable diseases	
7. Cancer	
Leukemia, lymphoma, blood cancers	C81-C96, D45-D47
Brain and CNS cancers	C69-C72, D31-D33, D42-D43
Other Cancers	C00-C45, C47-C68, C73-C80, C97, D00-D30, D34-D41, D44, D48, N60, N62-N64, N87, R59
8. Neurological	G40-G41, R56, F00-F09, F11-F39, F40-F52, F54-F99, G10-G37, G43-G44, G47-G73, G80, G90-G99, R26-R29, R40-R49, R90
Other Non-communicable diseases	
Cardiovascular	G45-G46, G81-G83, I00-I28, I31, I34-I38, I42-I84, I86-I99, R00-R01, R03, R55
Diabetes, Endocrine and immune disorders	E10-E14, D55-D63, D64, D65-D83, D86-D89, E03-E07, E15-E16, E20-E35, E65-E90, R70-R74, R76, R77, R81
Congenital	Q00-Q99
Chronic Respiratory diseases	J30-J31, J33-J35, J37-J64, J66-J84, J90-J99, R04-R06, R84, R91
Other NCDs	B18, F10, H00-H06, H11-H59, H61-H62, H69, H72-H95, I85, K00-K01, K03, K06-K14, L05, L10-L99, M02-M54, M61-M85, M87-M99, R20-R23, I85, K20-K60, K62-K63, K66, K70-K80, K82-K93, R10-R19, R63, R85, X45, Y15, Y90, Y91, N00-N08, N11-N29, N31-N33, N35-N40, N42-N48, N50-N51, N75-N86, N88-N99, R30-R39, R80, R82, R86, R87
III. Injuries	
9. Transport accidents	V01-V89, V90-V99, Y85,
10. Drowning	W65-W74
11. Suicide	X60-X84
12. Homicide	X85-Y09 , Y35-Y36, Y87
Other injuries	
Falls	W00-W19
Poisonings, fires, and venomous	X40-X44, X46-X49, X00-X09, X20-X29, W57
Other unintentional	W20-W56, W58-W59, W64, W75-W99, X10-X19, X30-X39, X50-X52, X57-X59, Y40-Y84, Y86, Y88-Y89
All other injuries	Y10-Y14, Y16-Y34, Y96-Y98
IV. Ill-defined or cause unknown	
	R02, R07-R09, R25, R51-R54, R57-R58, R60-R62, R64-R69, R78-R79, R83, R89, R92-R94, R96, R98-R99

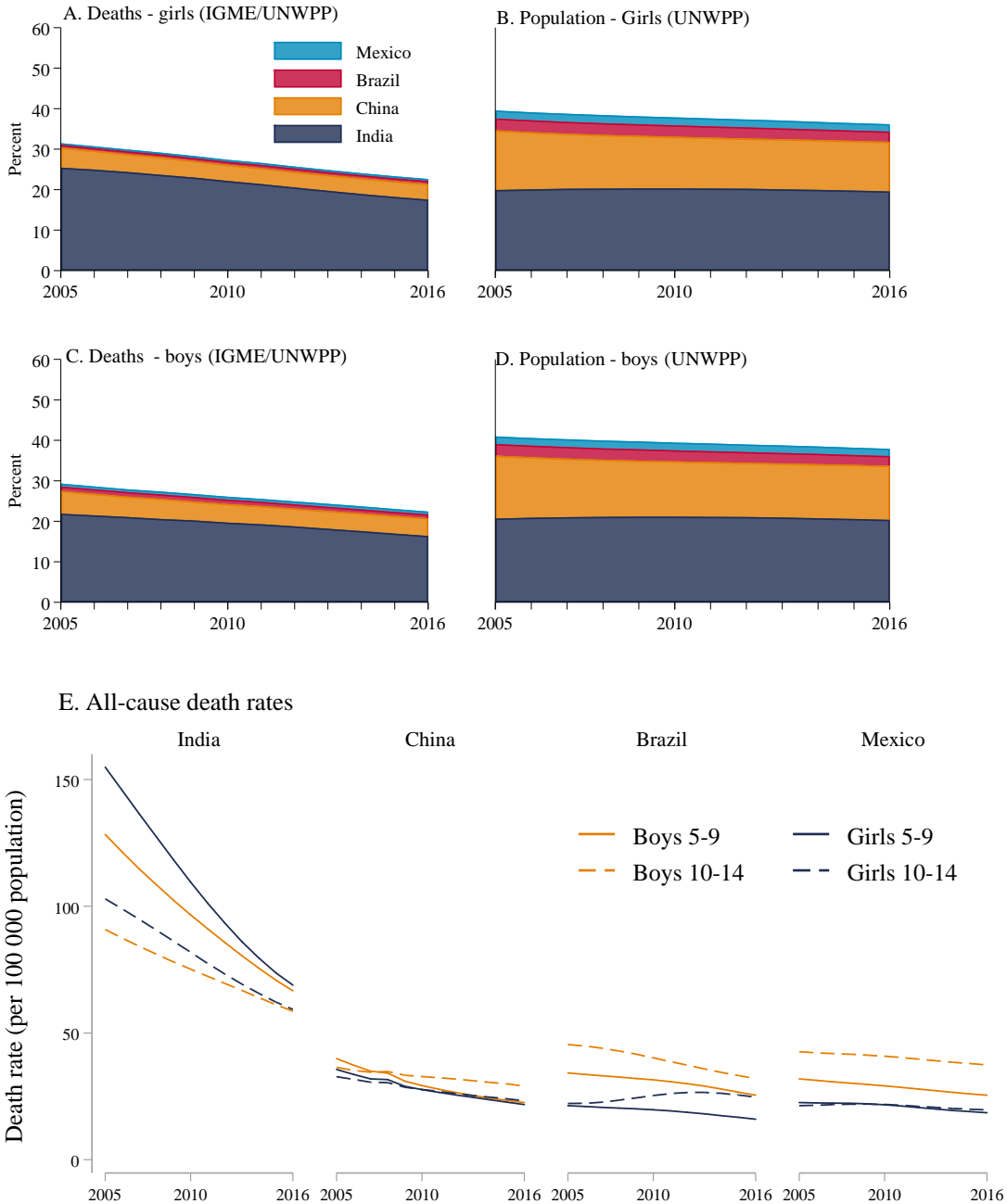
Appendix Table 2. ICD-10 Classification of deaths at ages 5-14 for India, Brazil, and Mexico. All causes were used in the analyses. Trends of numbered causes are presented in the manuscript.

Cause of death	China DSP ICD-10 range
I. Communicable and nutritional conditions	
1. Diarrhoea	A00, A01, A03, A04, A06-A09
2. Pneumonia	J00-J06, J10-J18, J20-J22, H65-H66
3. Tuberculosis	A15-A19, B90
4. Vaccine Preventable Diseases	
Measles	B05
Other selected vaccine preventable diseases	A33-A37, A80, B91
5. Meningitis/encephalitis	A39, A83.0, G00, G03
6. Malaria	B50-B54
Other causes	
Nutritional deficiencies	E00-E02, E40-E46, E50, D50-D53, D64.9, E51-E64
HIV	B20-B24
Other infectious and parasitic diseases	A02, A05, A20-A28, A30-A32, A38, A40-A79, A81, A82, A83.1-A83.9, A84-A99, B00-B04, B06-B19, B25-B49, B55-B60, B64-B89, B92-B99, G04, I30-I33, I38, I40, I42, N70-N73
Maternal and Perinatal conditions	O00-O99, P00-P96
II. Non-communicable diseases	
7. Cancer	
Leukemia, lymphoma, blood cancers	C81-C96
Other Cancers	C00-C16, C18-C22, C25, C33-C34, C43-C44, C50, C53-C56, C61, C67, D00-D48
8. Neurological	F01-F99, G06-G98
Other Non-communicable diseases	
Cardiovascular	I00-I13, I20-I28, I34-I37, I44-I51, I60-I99
Diabetes, Endocrine and immune disorders	D55-D64 (minus D64.9), D65-D89, E03-E07, E10-E14, E15-E16, E20-E34, E65-E88
Chronic Respiratory diseases	J30-J98
Congenital	Q00-Q99
Other NCDs	H00-H61, H68-H93, K00-K01, K03-K14, K20-K92, L00-L98, M00-M99, N00-N64, N75-N98
III. Injuries	
9. Transport accidents	V01-V04, V06, V09-V80, V87, V89, V99
10. Drowning	W65-W74
11. Suicide	X60-X84, Y87.0
12. Homicide	X85-Y09, Y35-Y36, Y87.1
Other injuries	
Falls	W00-W19
Poisonings and fires	X40-X49, X00-X09
Other unintentional	V05, V81-V86, V88, V90-V98, W20-W64, W75-W99, X10-X39, X50-X59, Y40-Y86, Y88, Y89
IV. Ill-defined	R0-R99

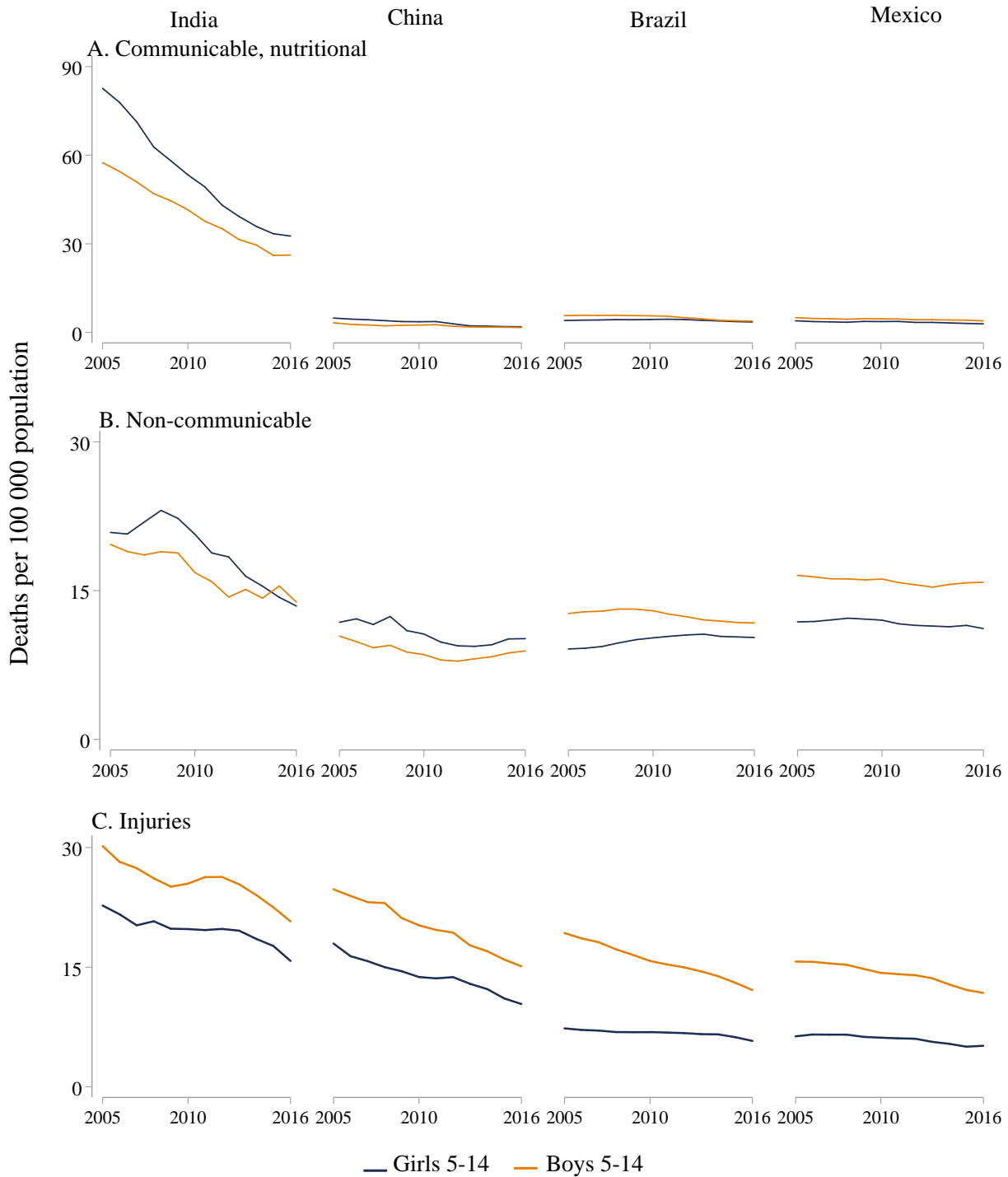
Appendix Table 3. ICD-10 Classification of deaths at ages 5-14 for aggregated data from China. Ill-defined causes were reported distinctly from 2013-2016. All causes were used in the analyses. Trends of numbered causes are presented in the manuscript.

Cause of death	ICD-10
Mode of transport for road traffic injuries	
Road traffic accidents	V01-V06, V09-V80, V87, V89
Pedestrian	V01-V06, V09
Cyclist	V10-V19
Two and three-wheeled vehicles	V20-V39
Cars, vans	V40-V59
Large motor vehicles	V60-V79
Other or unknown mode of transport	V80-V89
Firearm-related injuries	
Suicide	X60-X84
Firearm-related suicide	X72-X74
Homicide	X85-Y09 , Y35-Y36, Y87.1
Firearm-related homicide	X93-X95
Unintentional firearm discharge	W32-W34

Appendix Table 4. ICD-10 Sub-category classification of deaths at ages 5-14 for Road traffic injuries and firearm-related injuries for India, Brazil, and Mexico.



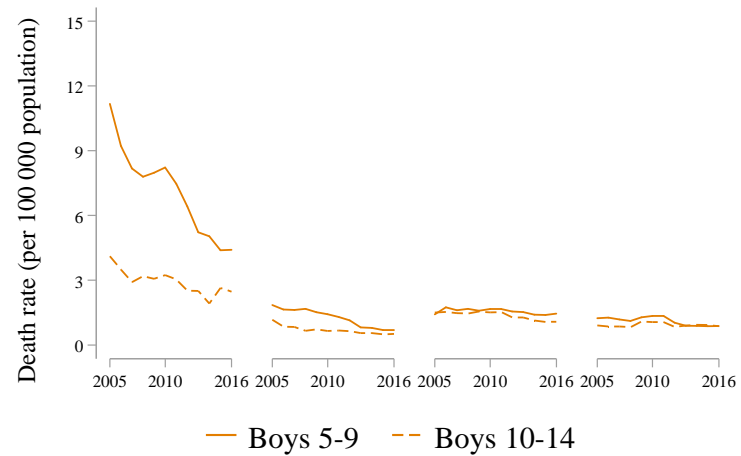
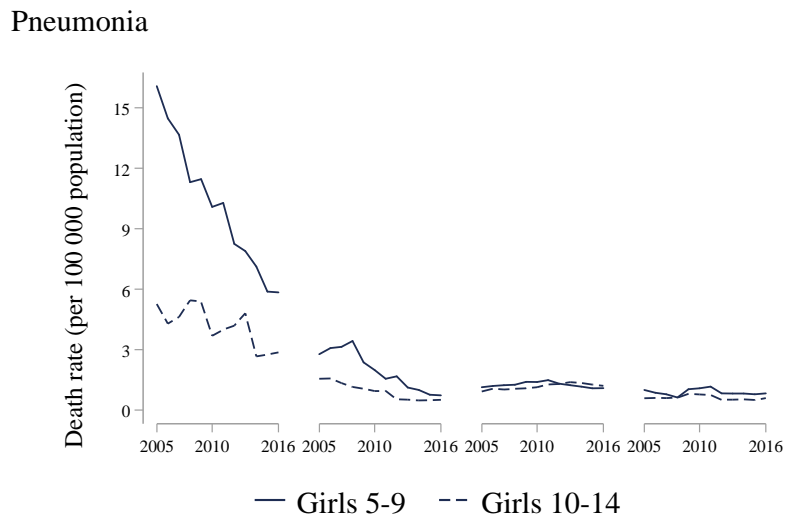
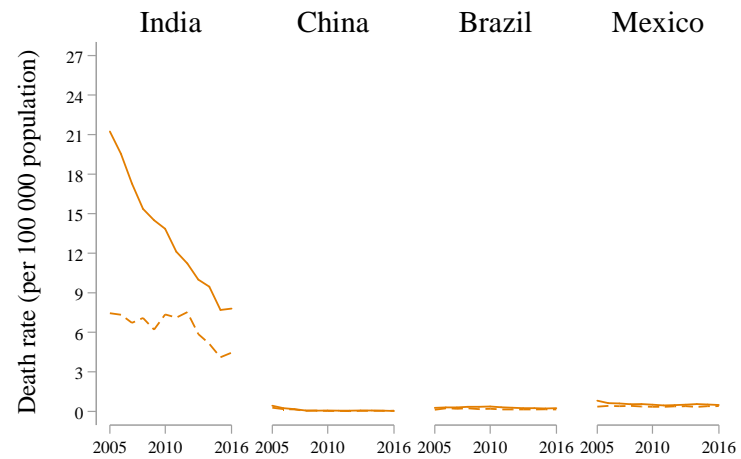
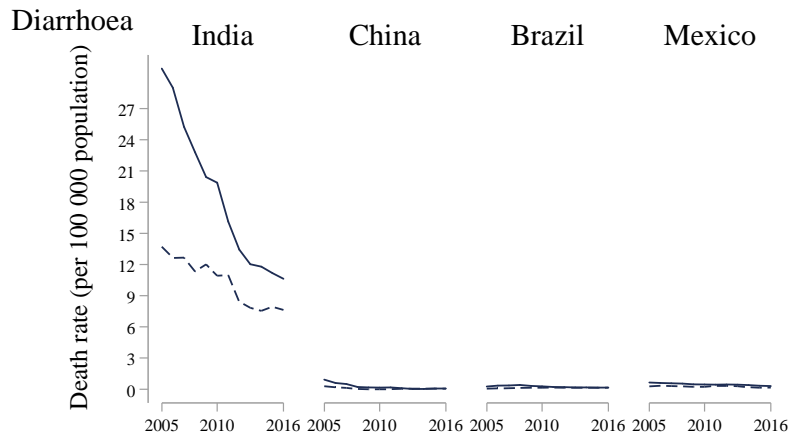
Appendix Figure 1. All-cause mortality envelopes used for study countries. A, C. Percent of global deaths and B, D. percent of global populations for girls (A-B) and boys (C-D) represented by the study countries' deaths and populations, respectively. E. The contribution of total deaths in all four countries to global deaths declined from 30% in 2005 to 23% in 2016. All cause death rates for children 5-9 and 10-14 by sex. UN-IGME estimated deaths were used to calculate death rates for 5-9 and 10-14 year olds. Sex ratios for each 5-year age group were calculated by dividing the sex-specific central mean death rates by those for both sexes retrieved directly from UNWPP. The sex ratios were applied to IGME age-specific rates to calculate sex and age-specific rates and counts. UNWPP mortality rates for girls 10-14 years in Brazil were lower for 2005-2010 than for 2010-2015 due to an increase in probability of dying reported by IBGE in their life tables for 2011, but do not reflect a significant increase in mortality trend across all the years.



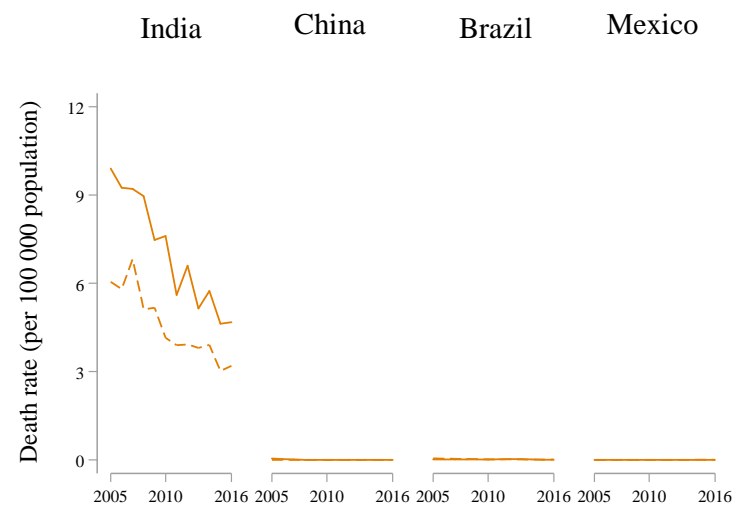
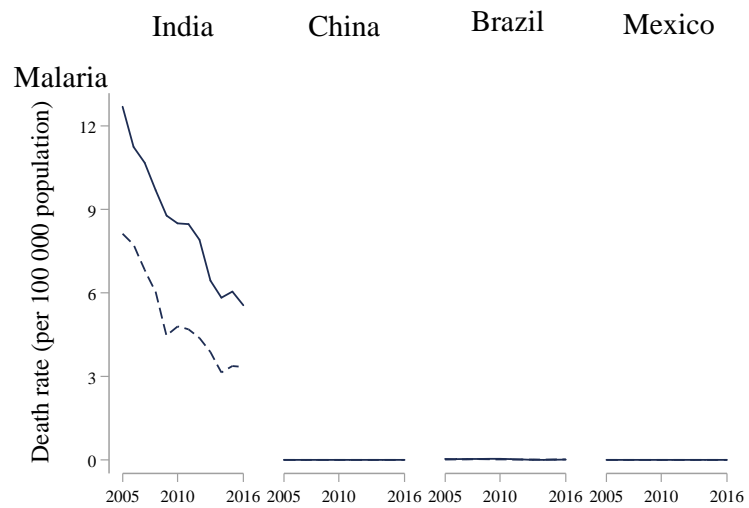
Appendix Figure 2. Declines in major COD groups for children 5-14, 2005-16

Cause of death	India		China		Brazil		Mexico	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Communicable, nutritional	8.7 (8.2, 9.1)	7.4 (6.9, 7.8)	8.9 (7.3, 10.6)	5.2 (3.7, 6.7)	1.1 (-0.1, 2.3)	4.0 (2.7, 5.3)	2.1 (1.3, 3.0)	1.8 (1.3, 2.2)
Diarrhoea	8.6 (7.5, 9.6)	7.5 (6.5, 8.6)	19.0 (11.7, 25.7)	14.8 (7.4, 21.6)	3.5 (0.4, 6.5)	2.7 (0.1, 5.1)	5.5 (3.7, 7.3)	1.9 (0.6, 3.3)
Pneumonia	7.9 (6.7, 9.0)	6.7 (5.3, 8.1)	13.0 (11.0, 15.1)	8.2 (7.0, 9.4)	-1.1 (-2.5, 0.3)	2.2 (1.0, 3.4)	1.0 (-1.9, 3.9)	2.0 (0.1, 3.8)
Tuberculosis	15.2 (12.4, 17.9)	1.7 (-1.3, 4.6)	26.7 (19.5, 33.2)	22.5 (17.6, 27.2)	3.6 (1.8, 5.4)	5.9 (4.0, 7.8)	0.9 (-2.3, 4.1)	4.0 (1.0, 6.9)
Meningitis/encephalitis	7.0 (3.2, 10.6)	9.5 (8.1, 11.0)	11.9 (6.4, 17.0)	5.4 (2.4, 8.2)	3.6 (2.1, 5.1)	5.1 (2.6, 7.5)	3.1 (1.2, 5.0)	3.2 (2.1, 4.3)
Malaria	7.6 (6.6, 8.6)	6.9 (5.6, 8.2)			11.6 (4.2, 18.5)	12.5 (7.2, 17.5)		
Vaccine-preventable	18.8 (13.7, 23.6)	13.5 (10.8, 16.1)	15.7 (4.5, 25.6)	13.4 (3.5, 22.3)	-2.0 (-4.6, 0.5)	1.4 (-2.0, 4.7)	12.9 (9.7, 16.0)	9.8 (7.4, 12.1)
Other communicable, nutritional	7.0 (5.6, 8.3)	6.9 (5.7, 8.1)	-12.4 (-23.3, -2.4)	-8.9 (-16.2, -2.1)	1.5 (0.3, 2.6)	5.2 (4.0, 6.3)	0.6 (-0.2, 1.3)	0.6 (-0.1, 1.4)
Non-communicable	4.4 (2.9, 5.9)	3.3 (2.4, 4.2)	2.3 (1.1, 3.4)	1.6 (0.4, 2.8)	-1.3 (-1.8, -0.7)	1.0 (0.6, 1.4)	0.7 (0.3, 1.0)	0.5 (0.3, 0.7)
Cancer	4.4 (2.5, 6.2)	1.9 (-0.4, 4.2)	1.1 (-1.2, 3.2)	1.5 (-1.0, 4.0)	-1.0 (-1.4, -0.5)	1.5 (1.1, 1.8)	0.4 (0.1, 0.8)	0.6 (0.0, 1.2)
Neurological	2.4 (1.0, 3.9)	1.6 (-0.2, 3.3)	-0.2 (-1.7, 1.3)	-1.1 (-2.2, 0.0)	-4.0 (-4.6, -3.4)	-1.5 (-2.6, -0.4)	1.3 (0.8, 1.8)	0.5 (0.1, 0.9)
Cardiovascular	6.4 (3.3, 9.4)	3.7 (-1.6, 8.8)	-5.8 (-9.0, -2.8)	-3.5 (-4.9, -2.0)	0.9 (0.2, 1.6)	2.8 (1.8, 3.7)	-3.7 (-4.8, -2.5)	-1.8 (-2.6, -1.0)
Other non-communicable	4.7 (2.4, 6.9)	4.2 (3.0, 5.4)	5.4 (4.8, 6.1)	4.3 (3.4, 5.2)	-0.9 (-1.8, 0.0)	1.3 (0.9, 1.6)	1.5 (1.1, 1.9)	1.0 (0.4, 1.6)
Injuries	2.3 (1.6, 3.1)	2.4 (1.6, 3.3)	4.2 (3.6, 4.8)	4.4 (4.0, 4.8)	1.6 (1.1, 2.1)	3.9 (3.6, 4.2)	2.4 (1.7, 3.1)	2.6 (2.1, 3.0)
Transport accidents	-0.6 (-3.3, 2.0)	-0.6 (-1.7, 0.4)	2.3 (1.3, 3.3)	1.9 (1.0, 2.8)	2.3 (1.6, 3.0)	5.4 (5.0, 5.9)	3.8 (2.6, 4.9)	4.0 (3.4, 4.6)
Drowning	1.4 (0.5, 2.4)	1.3 (-0.4, 3.0)	7.5 (6.8, 8.2)	7.0 (6.2, 7.7)	4.3 (3.4, 5.1)	5.7 (5.4, 5.9)	4.7 (3.7, 5.8)	2.5 (1.2, 3.9)
Falls	1.3 (-1.5, 4.1)	2.2 (-1.6, 5.8)	4.3 (1.9, 6.7)	3.9 (1.9, 5.8)	6.3 (4.6, 7.9)	6.9 (6.1, 7.7)	3.3 (1.1, 5.4)	2.5 (0.0, 4.9)
Suicide	-0.5 (-3.5, 2.4)	0.0 (-1.6, 1.5)	7.8 (5.8, 9.8)	5.8 (3.9, 7.7)	-2.8 (-4.3, -1.3)	-1.3 (-2.4, -0.1)	-5.9 (-7.0, -4.9)	-2.8 (-3.6, -2.0)
Homicide	-1.0 (-4.2, 2.0)	10.7 (6.7, 14.6)	9.1 (7.4, 10.7)	11.5 (9.2, 13.6)	-2.5 (-3.4, -1.5)	-0.4 (-0.9, 0.1)	-0.5 (-2.3, 1.2)	-1.6 (-4.9, 1.6)
Other injuries	4.9 (4.3, 5.5)	5.1 (4.2, 6.0)	-5.8 (-9.7, -2.0)	-8.7 (-12.9, -4.8)	1.4 (-0.2, 2.9)	3.6 (2.9, 4.3)	3.5 (1.9, 5.0)	3.8 (3.3, 4.3)

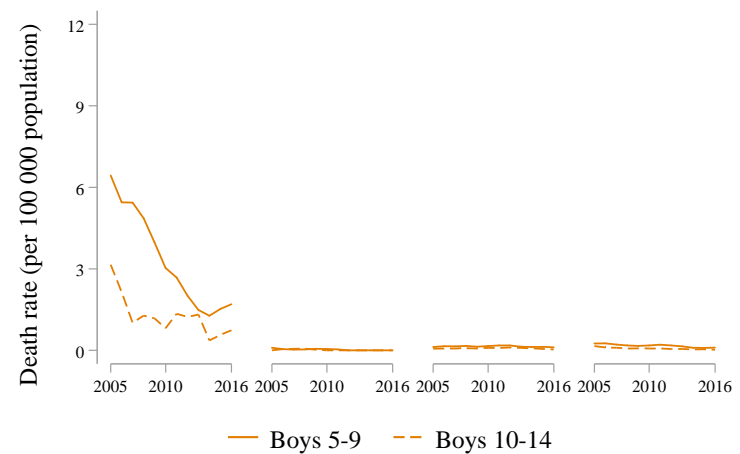
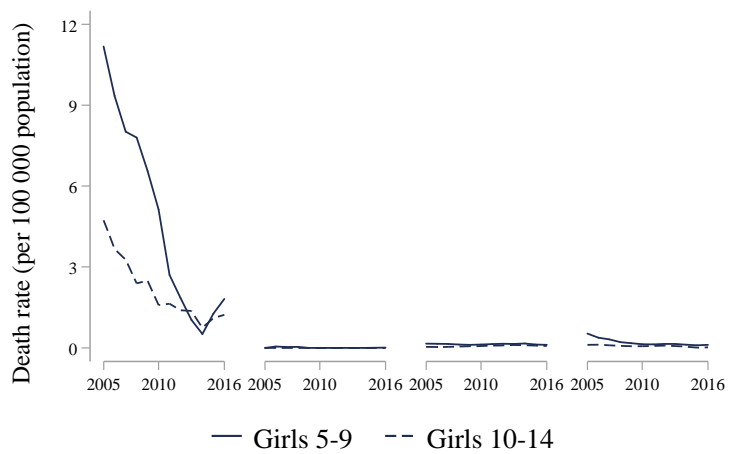
Appendix Table 5. Average annual rates of reduction and 95% confidence intervals for cause-specific mortality trends from 2005-2016 for children aged 5-14 years in India, China, Brazil, and Mexico.



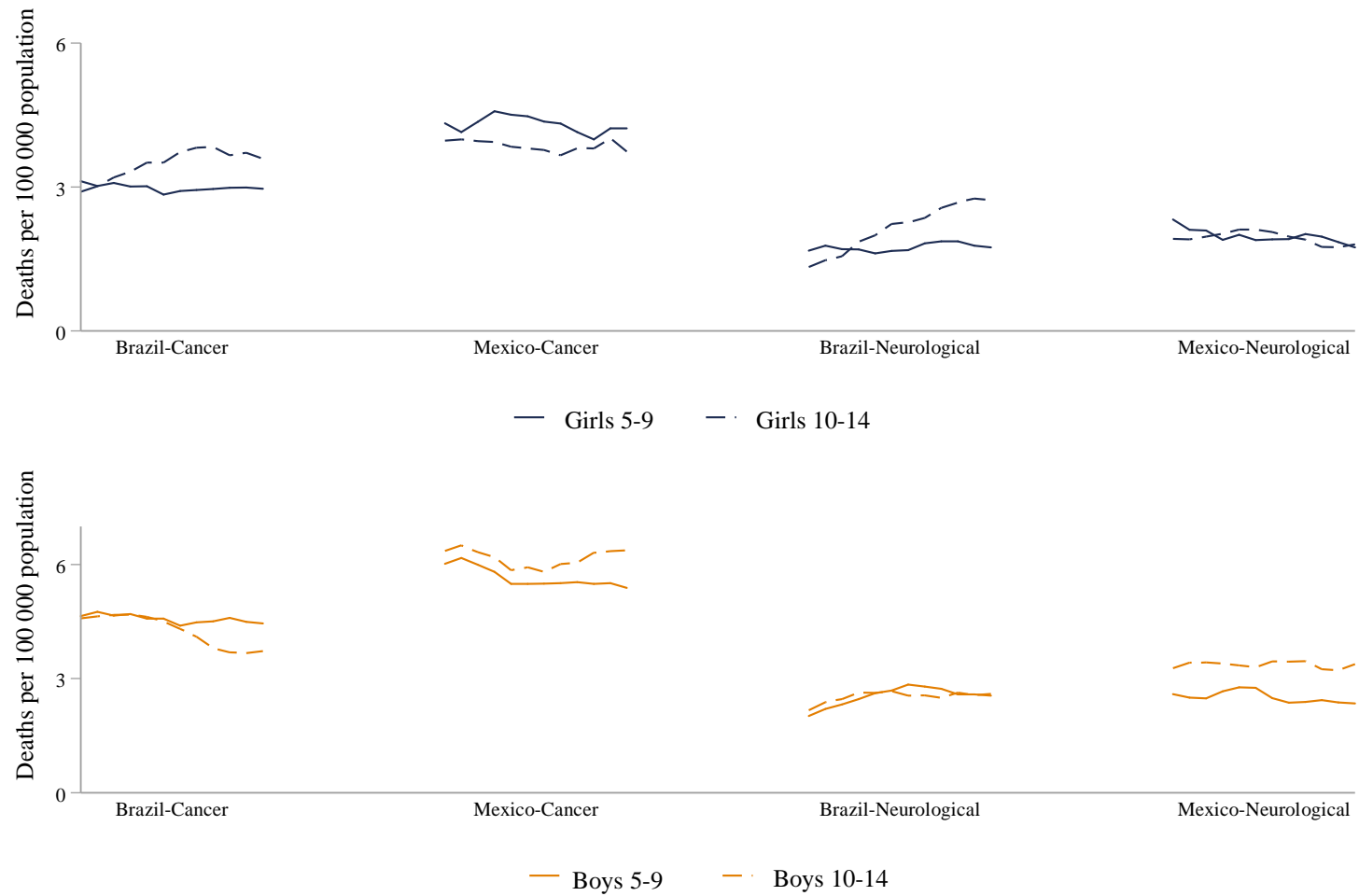
Appendix Figure 3. Changes in rates for diarrhoea and pneumonia by age group and sex, 2005-2016



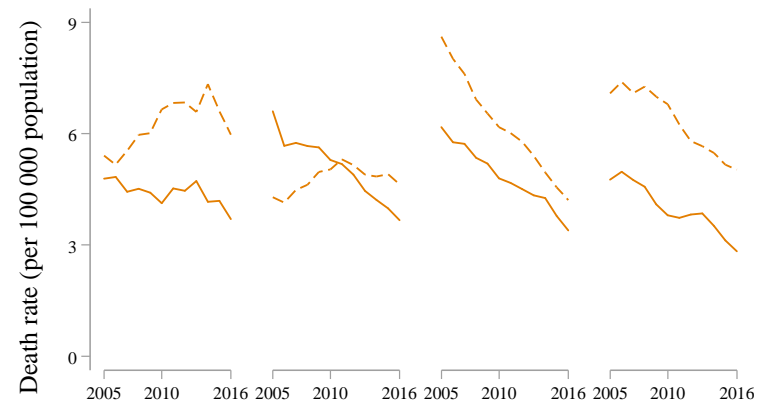
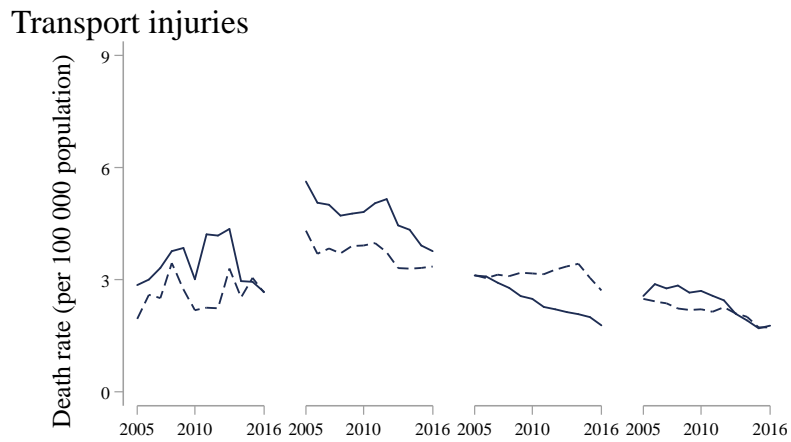
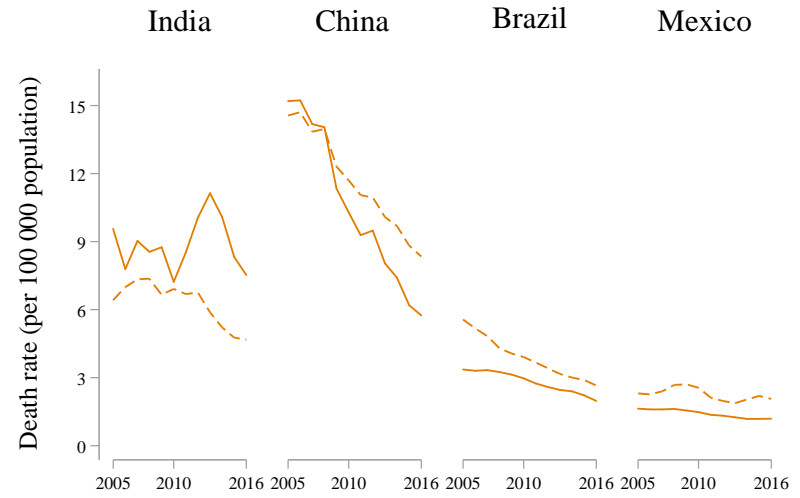
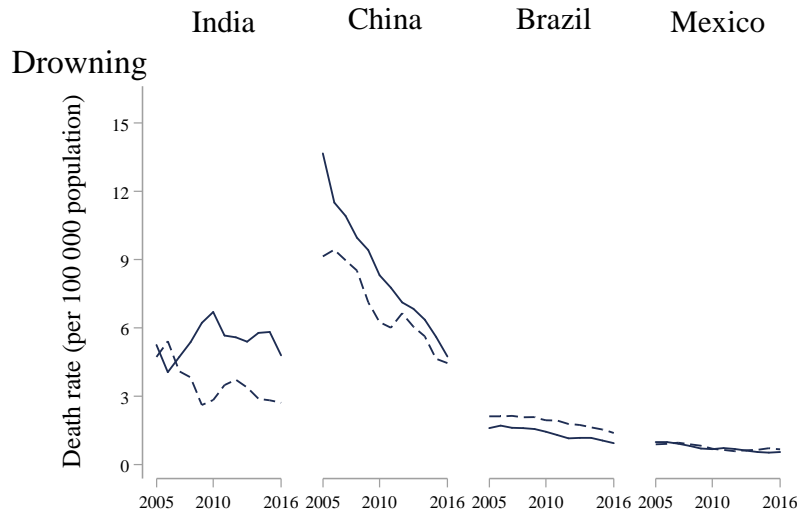
Vaccine-preventable



Appendix Figure 4. Changes in rates for malaria and vaccine preventable diseases by age group and sex, 2005-2016



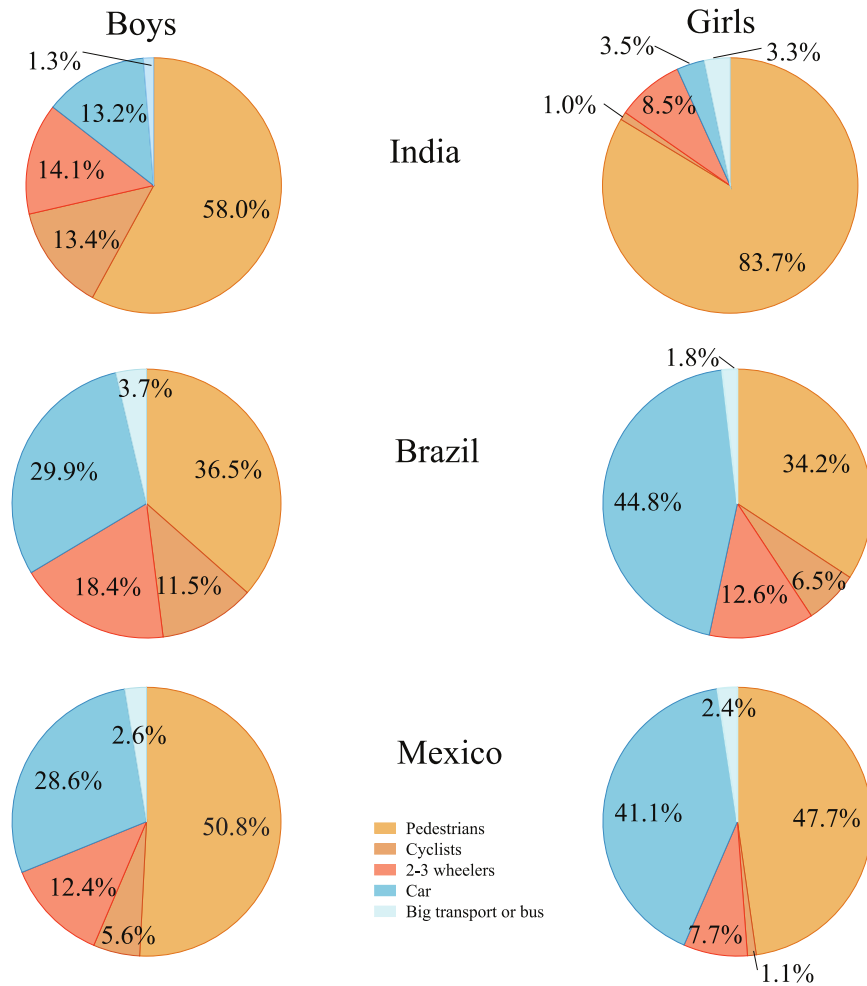
Appendix Figure 5. Changes in rates for cancer and neurological diseases by age group and sex, 2005-2016



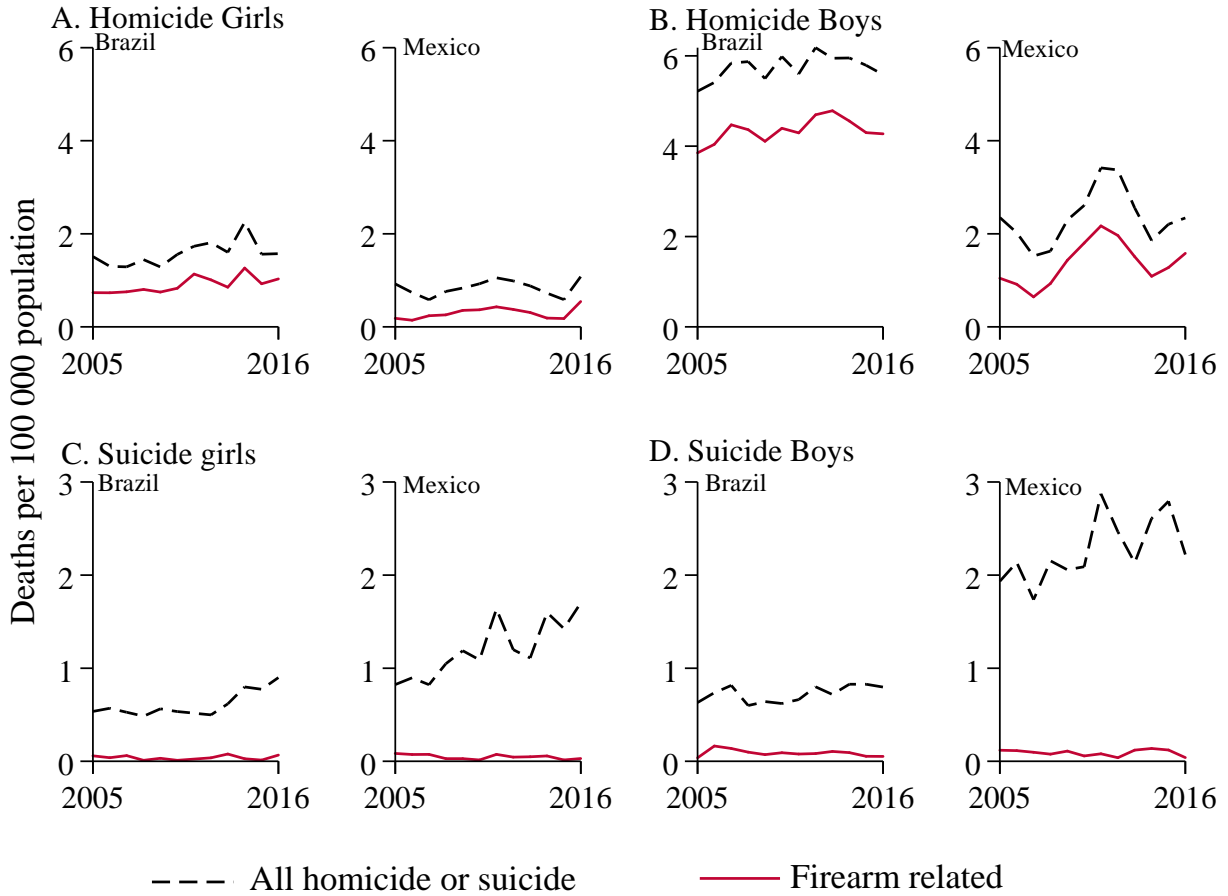
— Girls 5-9 -- Girls 10-14

— Boys 5-9 -- Boys 10-14

Appendix Figure 6. Changes in rates for drowning and transport accidents by age group and sex, 2005-2016



Appendix Figure 7. Mode of transport among road injury deaths (V01-V89) in the last three years of the study period. Vulnerable road users are pedestrians, cyclists, and occupants of two-three wheeled motor vehicles. Unspecified mode of transport were excluded and assumed to not differ from the distribution when mode of transport was specified. These were much higher in Brazil (boys 23.2%, girls 18.7%) and Mexico (boys 40.4%, girls 43.9%), than in India (boys 12.8%, girls 1.7%). For China, only pedestrian and car related accidents were reported among road traffic accidents from 2013-2016. Pedestrians accounted for 57% of boys and 59% of girls among these deaths. Cars accounted for 11% of road traffic injury deaths for boy and girls in China.



Appendix Figure 8. Crude age-specific death rates per 100 000 population for firearm-related homicide (A-B) and suicide (C-D) deaths for girls (A, C) and boys (B, D) 10-14 aged years in Brazil and Mexico, 2005-16.

Homicide rates increased annually an average of 0.7% (0.3%-1.1%) for boys in Brazil. In Mexico, homicide death rates peaked in 2012, but then decreased to rates 2.5 times lower than for Brazil. Suicide death rates were also increasing twice as fast annually in Mexico (girls 5.9%, 7.0%-4.9%; boys 2.8%, 3.6%-2.0%) than in Brazil (girls 2.8%, 1.2%- 4.4%; boys 1.4%, 0.03%-2.73%). Suicide rates were two times higher for boys than for girls in Mexico. The mode of suicide was mostly hanging for both countries. Deaths due to unintentional firearm discharge accounted for 3% and 12% of firearm deaths in Brazil and Mexico, respectively.

Sex, Cause and Death rate per 100 000 population (2005)	% of all cause deaths		Sex, Cause and Death rate per 100 000 population (2016)	% of all cause deaths	
Girls					
1. Diarrhoea	22.3	17.3	1. Diarrhoea	9.1	14.3
2. Pneumonia	10.7	8.3	2. Malaria	4.5	6.9
3. Malaria	10.4	8.1	3. Pneumonia	4.4	6.8
4. Vaccine-preventable*	8.0	6.2	4. Drowning*	3.8	5.9
5. Meningitis or encephalitis	7.6	5.9	5. Meningitis or encephalitis	3.3	5.2
All other defined causes		52.0	All other defined causes		57.5
Ill-defined	2.8	2.2	Ill-defined	2.3	3.5
All causes	129.0		All causes	64.1	
Boys					
1. Diarrhoea	14.4	13.2	1. Diarrhoea	6.1	9.8
2. Drowning	8.0	7.3	2. Drowning	6.1	9.7
3. Malaria	8.0	7.3	3. Transport accidents†	4.8	7.7
4. Pneumonia	7.7	7.0	4. Malaria	3.9	6.3
5. Meningitis or encephalitis†	6.7	6.1	5. Pneumonia	3.4	5.5
All other defined causes		57.0	All other defined causes		58.0
Ill-defined	2.3	2.1	Ill-defined	1.9	3.0
All causes	109.7		All causes	62.6	

Appendix Table 6. Changes in rank of COD for children 5-14 in India, 2005 to 2016

*For girls aged 5-14 years in India, vaccine-preventable deaths were the fourth leading cause of death in 2005 but changed to tenth leading cause in 2016. Drowning changed from the seventh leading cause in 2005 to fourth leading cause in 2016.

† For boys aged 5-14 years in India, transport accidents changed from sixth leading cause of death in 2005 to the third leading cause of death in 2016. Meningitis or encephalitis declined from fifth leading cause of death in 2005 to eighth leading cause of death in 2016

Sex, Cause and Death rate per 100 000 population (2005)	% of all cause deaths	
Girls		
1. Drowning	8.6	24.5
2. Transport accidents	5.0	14.4
3. Cancer	3.9	11.6
4. Pneumonia*	2.2	6.1
5. Suicide*	1.3	4.3
All other defined causes	39.1	
Ill-defined		
All causes	34.2	
Boys		
1. Drowning	14.9	39.1
2. Transport accidents	5.4	14.0
3. Cancer	4.0	10.6
4. Falls	1.7	4.5
5. Neurological	1.7	4.3
All other defined causes	27.5	
Ill-defined		
All causes	38.2	

Sex, Cause and Death rate per 100 000 population (2016)	% of all cause deaths	
Girls		
1. Cancer	4.3	19.0
2. Transport accidents	3.6	15.8
3. Drowning	3.5	15.3
4. Neurological*	1.7	7.6
5. Falls	0.9	3.8
All other defined causes	37.1	
Ill-defined	0.3	1.4
All causes	22.5	
Boys		
1. Drowning	7.0	27.2
2. Transport accidents	4.1	16.1
3. Cancer	3.6	14.0
4. Neurological	1.8	6.8
5. Falls	1.1	4.3
All other defined causes	30.4	
Ill-defined	0.3	1.1
All causes	25.8	

Appendix Table 7. Changes in rank of COD for children 5-14 in China, 2005 to 2016.

*For girls aged 5-14 years in China, pneumonia was the fourth leading cause of death in 2005 but changed to seventh leading cause in 2016. Suicide changed from the fifth leading cause in 2005 to eighth leading cause in 2016. Neurological causes increased from sixth leading cause in 2005 to fourth leading cause in 2016

Sex, Cause and Death rate per 100 000 population (2005)	% of all cause deaths			Sex, Cause and Death rate per 100 000 population (2016)	% of all cause deaths	
Girls				Girls		
1. Transport accidents	3.1	14.3	→	1. Cancer	3.3	16.0
2. Cancer	3.0	13.8	→	2. Transport accidents	2.2	11.0
3. Neurological	1.5	6.9		3. Neurological	2.2	11.0
4. Drowning*	1.4	6.4		4. Homicide*	1.1	5.7
5. Cardiovascular*	1.2	5.3		5. Pneumonia	1.1	5.6
All other defined causes		45.5		All other defined causes		45.4
Ill-defined	1.7	7.6		Ill-defined	1.1	5.3
All causes	21.7			All causes	20.3	
Boys				Boys		
1. Transport accidents	7.4	18.6	→	1. Cancer	4.1	14.1
2. Cancer	4.6	11.6	→	2. Transport accidents	3.8	13.2
3. Drowning	4.5	11.2	→	3. Homicide	3.1	11.2
4. Homicide	3.0	7.5	→	4. Neurological	2.6	8.9
5. Neurological	2.1	5.3	→	5. Drowning	2.3	8.1
All other defined causes		39.2		All other defined causes		39.7
Ill-defined	2.7	6.7		Ill-defined	1.4	4.7
All causes	39.8			All causes	28.7	

Appendix Table 8. Changes in rank of COD for children 5-14 in Brazil, 2005 to 2016

*For girls aged 5-14 years in Brazil, drowning was the fourth leading cause of death in 2005 but changed to seventh leading cause in 2016. Cardiovascular diseases changed from the fifth leading cause in 2005 to sixth leading cause in 2016. Homicide was seventh leading cause in 2005 and fourth leading cause in 2016.

Sex, Cause and Death rate per 100 000 population (2005)	% of all cause deaths	
Girls		
1. Cancer	4.1	18.9
2. Transport accidents	2.5	11.5
3. Neurological	2.1	9.7
4. Pneumonia*	0.8	3.6
5. Cardiovascular	0.8	3.5
All other defined causes		52.1
Ill-defined	0.2	0.7
All causes	21.9	
Boys		
1. Cancer	6.2	16.6
2. Transport accidents	5.9	15.9
3. Neurological	2.9	7.9
4. Drowning	2.0	5.3
5. Homicide†	1.5	4.1
All other defined causes		49.1
Ill-defined	0.4	1.1
All causes	37.2	

Sex, Cause and Death rate per 100 000 population (2016)	% of all cause deaths	
Girls		
1. Cancer	4.0	20.8
2. Neurological	1.8	9.3
3. Transport accidents	1.7	9.1
4. Cardiovascular	1.1	5.9
5. Suicide	0.8	4.1
All other defined causes		50.0
Ill-defined	0.1	0.7
All causes	19.1	
Boys		
1. Cancer	5.9	18.7
2. Transport accidents	3.9	12.5
3. Neurological	2.9	9.1
4. Drowning	1.6	5.2
5. Cardiovascular†	1.6	5.0
All other defined causes		48.8
Ill-defined	0.2	0.7
All causes	31.4	

Appendix Table 9. Changes in rank of COD for children 5-14 in Mexico, 2005 to 2016

*For girls aged 5-14 years in Mexico, pneumonia was the fourth leading cause of death in 2005 but changed to sixth leading cause in 2016.

† For boys aged 5-14 years in Mexico, Cardiovascular diseases replaced homicide deaths as the fifth leading cause of death in 2016. Homicide was the sixth leading cause of death for boys in 2016.

Cause of death	Estimated deaths in four study countries, 2016	SDG Ref. No.	Disease Control Priorities Interventions
Drowning	22 110		Parental or other adult supervision; Swimming lessons
Diarrhoea	19 320	3.3, 3.9	Rotavirus vaccination; Early use of oral rehydration solutions Appropriate use of antibiotics for bloody diarrhoea and dysentery Nutritional interventions for persistent diarrhoea; Rapid restoration of nutritional status
Road traffic injuries	17 550	3.6	Separating different types of road users (e.g. motor vehicles from pedestrians) Increasing visibility of pedestrians and cyclists; Reducing average speeds through traffic calming measures; Setting and enforcing blood alcohol concentration limits Setting and enforcing use of seat belts for all motor vehicle occupants
Cancer	14 980	3.4	Twinning programs between hospitals in LMIC and established cancer treatment centers Treatment of early-stage childhood cancers (e.g. Burkitt and Hodgkin lymphoma, acute lymphoblastic leukemia) with curative intent in pediatric cancer units or hospitals
Pneumonia	11 360	3.3	Community-level pneumococcal vaccination; Pneumococcal vaccine every five years for those with underlying lung disease; Community-administered oral antibiotics for treatment
Suicide	4780	3.4	Restricting availability of toxic pesticides and other commonly used methods; organizing community-based safe storage activities for pesticides, other poisons, and medications Reducing the availability and excessive use of alcohol and illicit drugs; Decriminalization of suicide to destigmatize reporting; Working with national and local media organizations to limit inappropriate reporting of suicides; Reducing the stigma associated with suicide and mental disorders to encourage help-seeking behavior; Brief interventions for people who have attempted suicide; Improving medical management of poisoning associated with high case-fatality
Epilepsy	4500	3.4	Managing epilepsy patients, including acute stabilization and long-term management with generic anti-epileptics
Tuberculosis (TB)	4100	3.3	Routine contact tracing to identify individuals exposed to TB and linking them to care; Referring cases of TB treatment failure for drug susceptibility testing; enrolling those with MDR-TB for treatment per WHO guidelines; Using rapid molecular diagnostics (UltraXpert), including assessment of rifampicin resistance, to diagnose TB; Initiating first-line treatment per current WHO guidelines for drug-susceptible TB; referral for confirmation, further assessment of drug resistance, and treatment of drug-resistant TB Screening for latent TB infection following a new diagnosis of HIV, followed by yearly screening among PLHIV at high risk of TB exposure; initiation of isoniazid preventive therapy among all individuals who screen positive but do not have evidence of active TB Systematic identification of individuals with TB symptoms among high-risk groups and linkage to care (“active case finding”) Specialized TB services, including management of MDR- and XDR-TB treatment failure and surgery for TB
Homicide	2530	16.1	Interventions for problem drinkers; Parent training for high-risk families, including nurse home visitation for child maltreatment; Gun control
All causes	213 270		

Appendix Table 10. Effective interventions for common avoidable causes of death of children aged 5-14 years in India, China, Brazil, and Mexico. Interventions were compiled from the Disease Control Priorities volumes.⁶

Appendix references

1. The World Bank. World Bank Country Classification by income. 2018. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>; (accessed December 27, 2018)
2. World Health Organization. SDG Target 17.19|Death registration. 2018. <http://apps.who.int/gho/data/node.sdg.17-19-data?lang=en> (accessed December 27, 2018)
3. United Nations Statistics Division. 2017. Coverage of Birth and Death Registration. <https://unstats.un.org/unsd/demographic-social/crvs/> (accessed December 27, 2018)
4. Usman Y, Iriawan RW, Rosita T, et al. Indonesia's Sample Registration System in 2018: A work in progress. *Journal of Population and Social Studies* 2019;27:39-52.
5. Managment Information System and Directorate General of Health Services. Report of the Comprehensive Assessment & Strategic Action Plan on Civil Registration & Vital Statistics System in Bangladesh. Dhaka: MOHFW; 2013.
6. Jamison DT, Nugent R, Gelband H, Horton S, Jha P, Laxminarayan R, eds. *Disease control priorities*, 3rd edn. Washington, DC: World Bank, 2015.