

### Supplementary

**Table S1.** Comparison of cause name, ICD10 codes, cause levels and unique codes used in this study.

Cause name	ICD-10 code	Cause level	The unique code used in this study
All causes	—	—	ALL
Communicable, maternal, neonatal, and nutritional diseases	A00–B99, G00–G04, N70–N73, J00–J06, J10–J18, J20–J22, H65–H66, O00–O99, P00–P96, E00–E02, E40–E46, E50, D50–D53, D64.9, E51–64	1	A
Infectious and parasitic diseases	A00–B99, G00, G03–G04, N70–N73	2	A1
Tuberculosis	A15–A19, B90	3	A1–1
Sexually transmitted infections excluding HIV	A50–A64, N70–N73	3	A1–2
HIV/AIDS	B20–B24	3	A1–3
Diarrheal disease	A00, A01, A03, A04, A06–A09	3	A1–4
Whooping cough, poliomyelitis, diphtheria, measles, tetanus	A33–A37, A80, B05, B91	3	A1–5
Meningitis	A39, G00, G03	3	A1–6
Hepatitis B	B16–B19 (exclude B17.1, B18.2)	3	A1–7
Malaria	B50–B54	3	A1–8
Tropical disease	B55–B57, B65, B73, B74.0–B74.2	3	A1–9
Mosquito-borne viral encephalitis	A83.0	3	A1–10
Leptospirosis	A27	3	A1–11
Haemorrhagic fever	A98.5	3	A1–12
Sepsis	A40–A41	3	A1–13
Leprosy	A30	3	A1–14
Dengue	A90–A91	3	A1–15

Cause name	ICD-10 code	Cause level	The unique code used in this study
Trachoma	A71	3	A1–16
Intestinal nematode infections	B76–B81	3	A1–17
Respiratory infections	J00–J06, J10–J18, J20–J22, H65–H66	2	A2
Lower respiratory infections	J10–J18, J20–J22	3	A2–1
Upper respiratory infections	J00–J06	3	A2–2
Otitis media	H65–H66	3	A2–3
Pregnancy, childbirth and the puerperium	O00–O99	2	A3
Maternal hemorrhage	O44–O46, O67, O72	3	A3–1
Puerperal sepsis	O85–O86	3	A3–2
Oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium	O10–O16	3	A3–3
Obstructed labour	O64–O66	3	A3–4
Abortion	O00–O07	3	A3–5
Certain conditions originating in the perinatal period	P00–P96	2	A4
Low birth weight	P05–P07	3	A4–1
Birth trauma and asphyxia	P03, P10–P15, P20–P29	3	A4–2
Hemolytic disease of newborn	P55–P57	3	A4–3
Sclerema neonatorum	P83.0	3	A4–4
Nutritional deficiency	E00–E02, E40–E46, E50, D50–D53, D64.9, E51–E64	2	A5
Malnutrition	E40–E46	3	A5–1
iodine-deficiency hypothyroidism	E00–E02	3	A5–2
Vitamin A deficiency	E50	3	A5–3
Iron deficiency anaemia	D50, D64.9	3	A5–4

Cause name	ICD-10 code	Cause level	The unique code used in this study
Non-communicable diseases	C00–C97, D00–D48, D55–D89 (exclude D64.9), E03–E07, E10–E16, E20–E34, E65–E88, F01–F99, G06–G98, H00–H61, H68–H93, I00–I99, J30–J98, K00–K92, N00–N64, N75–N98, L00–L98, M00–M99, Q00–Q99	1	B
Malignant neoplasms	C00–C97	2	B1
Malignant neoplasm of lip, mouth and oropharynx	C00–C14	3	B1–1
Malignant neoplasm of oesophagus	C15	3	B1–2
Malignant neoplasm of stomach	C16	3	B1–3
Malignant neoplasm of colon and rectum	C18–C21	3	B1–4
Malignant neoplasm of liver and intrahepatic bile ducts	C22	3	B1–5
Malignant neoplasm of pancreas	C25	3	B1–6
Malignant neoplasm of lung	C33–C34	3	B1–7
Melanoma and other malignant neoplasms of skin	C43–C44	3	B1–8
Malignant neoplasm of breast	C50	3	B1–9
Malignant neoplasm of cervix uteri	C53	3	B1–10
Malignant neoplasm of corpus uteri	C54–C55	3	B1–11
Malignant neoplasm of ovary	C56	3	B1–12
Malignant neoplasm of prostate	C61	3	B1–13
Malignant neoplasm of bladder	C67	3	B1–14
Lymphoma and multiple myeloma	C81–C90, C96	3	B1–15
Leukaemia	C91–C95	3	B1–16
Other neoplasms	D00–D48	2	B2
Benign tumor	D10–D36	3	B2–1
Diabetes	E10–E14	2	B3

Cause name	ICD-10 code	Cause level	The unique code used in this study
Endocrine disorder	D55–D89 (exclude D64.9), E03–E07, E15–E16, E20–E34, E65–E88	2	B4
Diseases of the nervous system and mental disorders	F01–F99, G06–G98	2	B5
Depressive episode	F32–F33	3	B5–1
Bipolar affective disorder	F30–F31	3	B5–2
Schizophrenia	F20–F29	3	B5–3
Epilepsy	G40–G41	3	B5–4
Mental and behavioural disorders due to alcohol use	F10	3	B5–5
Alzheimer disease and dementia	F01, F03, G30–G31	3	B5–6
Parkinson disease	G20–G21	3	B5–7
Multiple sclerosis	G35	3	B5–8
Mental and behavioural disorders due to substance use	F11–F16, F18–F19	3	B5–9
Post-traumatic stress disorder	F43.1	3	B5–10
Obsessive-compulsive disorder	F42	3	B5–11
Panic disorder	F40.0, F41.0	3	B5–12
Nonorganic sleep disorders	F51	3	B5–13
Migraine	G43	3	B5–14
Mental retardation	F70–F79	3	B5–15
Sensory disease	H00–H61, H68–H93	2	B6
Glaucoma	H40	3	B6–1
Cataract	H25–H26	3	B6–2
Presbyopia	H52.4	3	B6–3
Hearing loss beginning in adulthood	H90–H91	3	B6–4
Cardiovascular disease	I00–I99**	2	B7
Acute rheumatic fever	I00–I02	3	B7–1
Rheumatic heart diseases	I01–I09	3	B7–2
Hypertensive diseases	I10–I13	3	B7–3

Cause name	ICD-10 code	Cause level	The unique code used in this study
Ischemic heart diseases	I20–I25	3	B7–4
Cerebrovascular diseases	I60–I69	3	B7–5
Inflammatory heart disease	I30–I33, I38, I40, I42	3	B7–6
Diseases of the respiratory system	J30–J98**	2	B8
Chronic obstructive pulmonary disease	J40–J44**	3	B8–1
Asthma	J45–J46	3	B8–2
Pneumoconiosis	J60–J65	3	B8–3
Diseases of the digestive system	K20–K92	2	B9
Peptic ulcer	K25–K27	3	B9–1
Cirrhosis of liver	K70, K74	3	B9–2
Appendicitis	K35–K37	3	B9–3
Ileus	K56	3	B9–4
Diseases of the genitourinary system	N00–N64, N75–N98	2	B10
Nephritis and kidney disease	N00–N19	3	B10–1
Hyperplasia of prostate	N40	3	B10–2
Diseases of the skin and subcutaneous tissue	L00–L98	2	B11
Diseases of the musculoskeletal system and connective tissue	M00–M99	2	B12
Rheumatoid arthritis	M05–M06	3	B12–1
Arthrosis	M15–M19	3	B12–2
Gout	M10	3	B12–3
Dorsalgia	M45–M48, M54 (exclude M54.2)	3	B12–4
Pregnancy, childbirth and the puerperium	Q00–Q99	2	B13
Congenital malformations of abdominal wall	Q79.2–Q79.5	3	B13–1
Anencephaly and similar malformations	Q00	3	B13–2
Congenital absence, atresia and stenosis of large intestine	Q42	3	B13–3
Cleft lip	Q36	3	B13–4

Cause name	ICD-10 code	Cause level	The unique code used in this study
Cleft palate	Q35, Q37	3	B13–5
Atresia of oesophagus	Q39.0–Q39.1	3	B13–6
Renal agenesis	Q60	3	B13–7
Down syndrome	Q90	3	B13–8
Congenital malformations of the circulatory system	Q20–Q28	3	B13–9
Spina bifida	Q05	3	B13–10
Diseases of oral cavity, salivary glands and jaws	K00–K14	2	B14
Dental caries	K02	3	B14–1
Periodontal diseases	K05	3	B14–2
Anodontia	—	3	B14–3
Injuries	V01–Y89	1	C
Unintentional injuries	V01–X59, Y40–Y86, Y88, Y89	2	C1
Road injuries	V01–V04, V06, V09–V80, V87, V89, V99	3	C1–1
Accidental poisoning by and exposure to noxious substances	X40–X49	3	C1–2
Falls	W00–W19	3	C1–3
Exposure to smoke, fire and flames	X00–X09	3	C1–4
Drowning	W65–W74	3	C1–5
Accidental mechanical asphyxia	W75–W77, W81–W84	3	C1–6
Electric shock	W85–W87	3	C1–7
Struck by thrown, projected or falling object(s)	W20	3	C1–8
Contact with sharp object(s)	W25–W31	3	C1–9
Exposure to forces of nature	X30–X39	3	C1–10
Intentional injuries	X60–Y09, Y35–Y36, Y87.0, Y87.1	2	C2
Intentional self-harm and sequelae	X60–X84, Y87.0	3	C2–1
Assault and sequelae	X85–Y09, Y87.1	3	C2–2
Operations of war	Y36	3	C2–3

**Table S2.** Co-linear results for economic status, education level, and health investment indicators.

Indicators	GDP per capita	Illiteracy** rate		health beds per 1,000 population	
VIF*	3.17	2.36		2.29	

Indicators	GDP per capita	illiteracy rate		health personnel per 1,000 population	
VIF	4.68	2.51		4.70	

Indicators	GDP per capita	education expenditure per capita		health beds per 1,000 population	
VIF	<b>12.36</b>	<b>42.98</b>		<b>16.34</b>	

Indicators	GDP per capita	education expenditure per capita		health personnel per 1,000 population	
VIF	6.14	<b>27.14</b>		<b>19.33</b>	

Indicators	GDP per capita	urbanization rate	illiteracy rate	health beds per 1,000 population	
VIF	<b>13.05</b>	<b>11.57</b>	2.93	2.97	

Indicators	GDP per capita	illiteracy rate		education expenditure per capita	health beds per 1,000 population
VIF	<b>24.97</b>	3.72		<b>65.86</b>	<b>25.60</b>

Indicators	GDP per capita	illiteracy rate		health personnel per 1,000 population	health beds per 1,000 population
VIF	7.73	2.92		<b>50.25</b>	<b>24.59</b>

Indicators	GDP per capita	urbanization rate	illiteracy rate	education expenditure per capita	health personnel per 1,000 population	health beds per 1,000 population
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VIF	<b>40.06</b>	<b>11.82</b>	6.85	<b>82.04</b>	<b>59.63</b>	<b>28.74</b>
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**Note:** \*, VIF = Variance Inflation Factor. A VIF value greater than 10 indicates a strong multicollinearity between indicators. \*\*, Illiteracy rate represents the illiteracy rate of population over 15 years old. The bolding indicates the VIF is higher than 10.

**Table S3.** The association between all-cause (AS)MR\* (per 100,000) for adolescents aged 10-24 years and economic status, education level, as well as health investment.

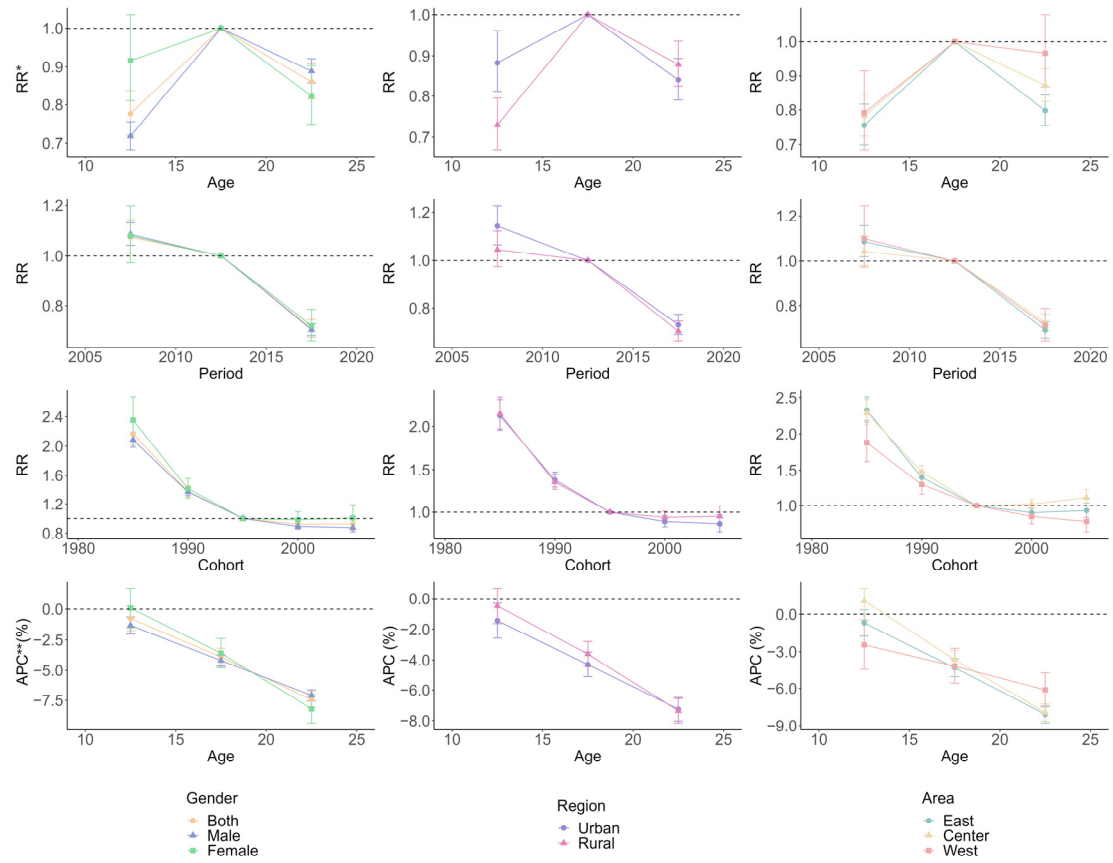
Model	GDP per capita (thousand Yuan)	urbanization rate (%)	Illiteracy rate (%)	education expenditure per capita (thousand Yuan)	health personnel per 1,000 population	health beds per 1,000 population
1	<b>-0.47</b> <b>(-0.54, -0.41)</b>					
2		<b>-1.44</b> <b>(-1.59, -1.30)</b>				
3			<b>3.27</b> <b>(2.54, 4.00)</b>			
4				<b>-10.93</b> <b>(-11.97, -9.88)</b>		
5					<b>-5.09</b> <b>(-5.62, -4.57)</b>	
6						<b>-6.77</b> <b>(-7.45, -6.08)</b>
7	<b>-0.38</b> <b>(-0.48, -0.28)</b>		<b>0.94</b> <b>(0.14, 1.74)</b>			
8	<b>-0.10</b> <b>(-0.23, 0.03)</b>					<b>-5.50</b> <b>(-7.29, -3.71)</b>
9			0.41 (-0.25, 1.07)			<b>-6.19</b> <b>(-7.34, -5.04)</b>
10	<b>-0.09</b> <b>(-0.22, 0.04)</b>		0.33 (-0.33, 1.00)			<b>-5.18</b> <b>(-7.08, -3.27)</b>
11	<b>0.35</b> <b>(0.04, 0.66)</b>	<b>-1.93</b> <b>(-4.41, 0.56)</b>	<b>-0.73</b> <b>(-1.84, 0.37)</b>	<b>-12.15</b> <b>(-22.76, -1.53)</b>	0.34 (-3.18, 3.85)	3.73 (-5.74, 13.19)

Note: \*, (AS)MR = (age-standardized) mortality rate. The bolding indicates a statistically significant association.

**Table S4.** The association between all-cause (AS)MR\* (per 100,000) for adolescents aged 10 to 24 years and one-year-lagged economic status, education level, as well as health investment in different subgroups.

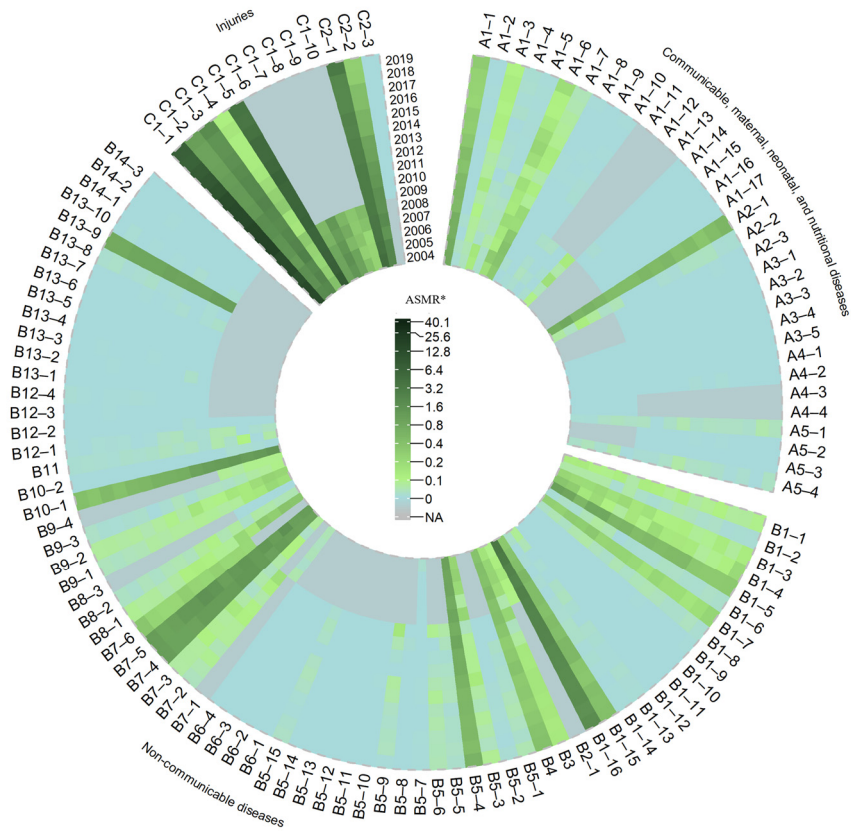
Group	GDP per capita (thousand Yuan)	Illiteracy rate (%)	health beds per 1,000 population
Country	−0.10 (−0.24, 0.04)	0.36 (−0.30, 1.03)	<b>−5.21</b> (−7.19, −3.23)
Gender			
Male	<b>−0.23</b> (−0.40, −0.07)	0.01 (−0.78, 0.80)	<b>−6.40</b> (−8.76, −4.04)
Female	0.02 (−0.11, 0.15)	<b>0.75</b> (0.13, 1.37)	<b>−3.69</b> (−5.54, −1.85)
Area			
Urban	−0.08 (−0.24, 0.08)	0.32 (−0.45, 1.08)	<b>−3.99</b> (−6.27, −1.71)
Rural	<b>−0.21</b> (−0.37, −0.04)	0.18 (−0.60, 0.97)	<b>−4.57</b> (−6.91, −2.22)
Age group			
10 to 14	−0.01 (−0.15, 0.12)	<b>−0.74</b> (−1.39, −0.10)	<b>−1.99</b> (−3.90, −0.07)
15 to 19	−0.06 (−0.23, 0.11)	<b>1.09</b> (0.27, 1.92)	<b>−3.63</b> (−6.09, −1.18)
20 to 24	−0.19 (−0.40, 0.02)	0.44 (−0.57, 1.45)	<b>−8.34</b> (−11.35, −5.34)
Cause of death			
CMNN diseases**	<b>0.05</b> (0.02, 0.07)	<b>0.28</b> (0.16, 0.40)	<b>−0.77</b> (−1.14, −0.41)
NCDs***	−0.01 (−0.05, 0.04)	<b>0.26</b> (0.05, 0.47)	<b>−0.99</b> (−1.62, −0.35)
Injuries	<b>−0.14</b> (−0.23, −0.05)	−0.21 (−0.62, 0.20)	<b>−3.48</b> (−4.70, −2.27)

Note: \*, (AS)MR = (age-standardized) mortality rate; \*\*, CMNN diseases = Communicable, maternal, neonatal, and nutritional diseases; \*\*\*, NCDs = non-communicable diseases. For different Age group, we used MR, while for other groups, we used ASMR. The bolding indicates a statistically significant association.



**Figure S1.** Age, period, and cohort trends in mortality in each subgroup, 2005–2019.

Note: \*, RR=Rate Ratio; \*\*, APC = Annual Percentage change. The error bars represent the 95% confidence interval of the estimate.



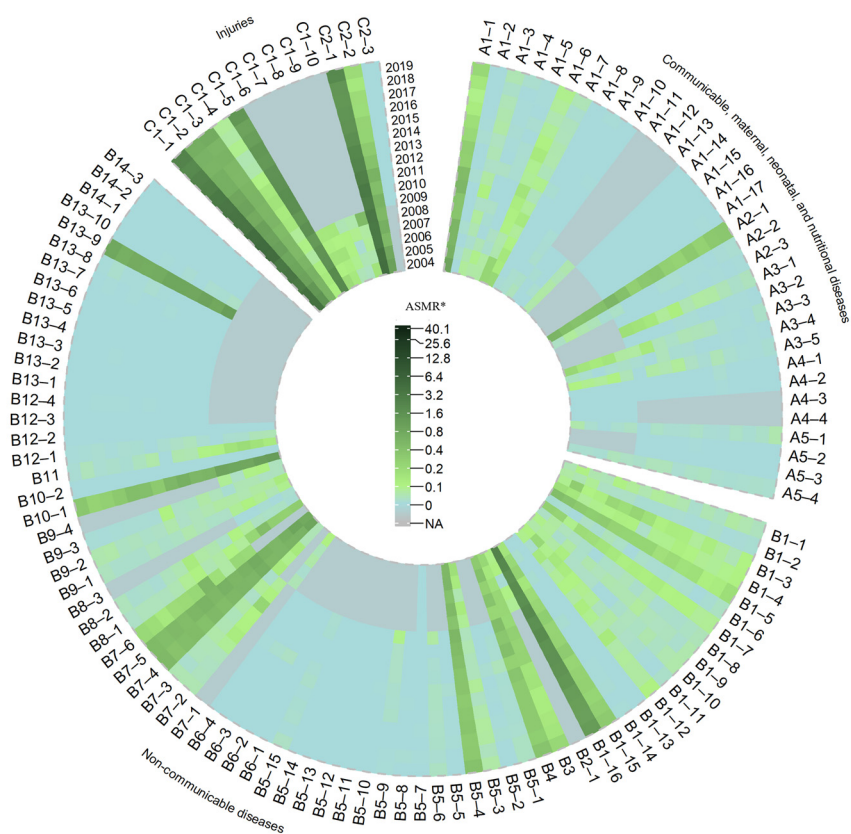
**Figure S2.** The ASMR of male adolescents aged 10 to 24 by cause of death, 2004 to 2019. Note: \*, ASMR = Age standardized mortality rate.

Leading cause in 2004 (ASMR* (per 100,000))	Leading cause in 2010 (ASMR (per 100,000))	Leading cause in 2019 (ASMR (per 100,000))
Road injuries (15.40)	Road injuries (18.11)	Road injuries (7.16)
Drowning (8.39)	Drowning (6.17)	Drowning (4.07)
Intentional self-harm and sequelae (4.95)	Intentional self-harm and sequelae (2.97)	Intentional self-harm and sequelae (3.18)
Leukaemia (3.46)	Leukaemia (2.46)	Falls (1.94)
Assault and sequelae (2.35)	Falls (1.95)	Leukaemia (1.88)
Falls (2.19)	Accidental poisoning by and exposure to noxious substances (1.75)	Cerebrovascular diseases (1.18)
Accidental poisoning by and exposure to noxious substances (2.01)	Assault and sequelae (1.38)	Ischemic heart diseases (1.13)
Nephritis and kidney disease (1.49)	Cerebrovascular diseases (1.37)	Accidental poisoning by and exposure to noxious substances (1.10)
Electric shock (1.41)	Ischemic heart diseases (1.34)	Congenital malformations of the circulatory system (0.76)
Cerebrovascular diseases (1.20)	Congenital malformations of the circulatory system (1.09)	Epilepsy (0.61)
Ischemic heart diseases (1.05)	Nephritis and kidney disease (0.98)	Lower respiratory infections (0.55)
Epilepsy (1.04)	Epilepsy (0.84)	Lymphoma and multiple myeloma (0.42)
Malignant neoplasm of liver and intrahepatic bile ducts (1.04)	Malignant neoplasm of liver and intrahepatic bile ducts (0.58)	Nephritis and kidney disease (0.42)
Accidental mechanical asphyxia (0.96)	Tuberculosis (0.50)	Endocrine disorder (0.40)
Struck by thrown, projected or falling object(s) (0.93)	Lower respiratory infections (0.46)	Inflammatory heart disease (0.35)

Class

- Communicable, maternal, neonatal, and nutritional diseases
- Non-communicable diseases
- Injuries

**Figure S3.** The top 15 leading causes of death of male adolescents aged 10 to 24 in 2004, 2010 and 2019. Note: \*, ASMR = Age standardized mortality rate.

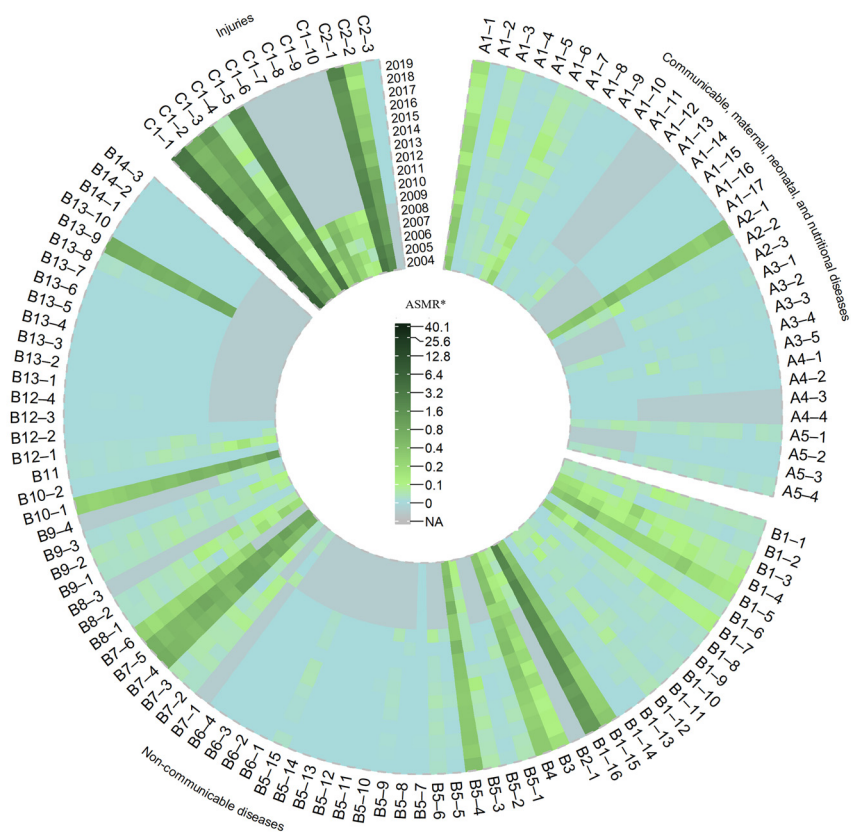


**Figure S4.** The ASMR of female adolescents aged 10 to 24 by cause of death, 2004 to 2019. Note: \*, ASMR = Age standardized mortality rate.

Leading cause in 2004 (ASMR* (per 100,000))	Leading cause in 2010 (ASMR (per 100,000))	Leading cause in 2019 (ASMR (per 100,000))
Intentional self-harm and sequelae (4.86)	Road injuries (5.18)	Road injuries (2.51)
Road injuries (4.30)	Intentional self-harm and sequelae (3.17)	Intentional self-harm and sequelae (2.09)
Leukaemia (2.53)	Leukaemia (1.65)	Drowning (1.39)
Drowning (2.13)	Drowning (1.39)	Leukaemia (1.25)
Accidental poisoning by and exposure to noxious substances (1.51)	Accidental poisoning by and exposure to noxious substances (0.97)	Congenital malformations of the circulatory system (0.80)
Nephritis and kidney disease (1.21)	Congenital malformations of the circulatory system (0.79)	Falls (0.74)
Assault and sequelae (1.04)	Cerebrovascular diseases (0.61)	Accidental poisoning by and exposure to noxious substances (0.70)
Tuberculosis (0.93)	Nephritis and kidney disease (0.55)	Ischemic heart diseases (0.51)
Ischemic heart diseases (0.87)	Ischemic heart diseases (0.55)	Cerebrovascular diseases (0.49)
Cerebrovascular diseases (0.75)	Tuberculosis (0.55)	Epilepsy (0.39)
Falls (0.59)	Falls (0.47)	Endocrine disorder (0.37)
Lower respiratory infections (0.57)	Epilepsy (0.46)	Lower respiratory infections (0.35)
Epilepsy (0.52)	Assault and sequelae (0.44)	Nephritis and kidney disease (0.35)
Malignant neoplasm of liver and intrahepatic bile ducts (0.43)	Lower respiratory infections (0.40)	Lymphoma and multiple myeloma (0.31)
Endocrine disorder (0.32)	Endocrine disorder (0.34)	Tuberculosis (0.21)

Class 
 ■ Communicable, maternal, neonatal, and nutritional diseases
 ■ Non-communicable diseases
 ■ Injuries

**Figure S5.** The top 15 leading causes of death of female adolescents aged 10 to 24 in 2004, 2010 and 2019. Note: \*, ASMR = Age standardized mortality rate.



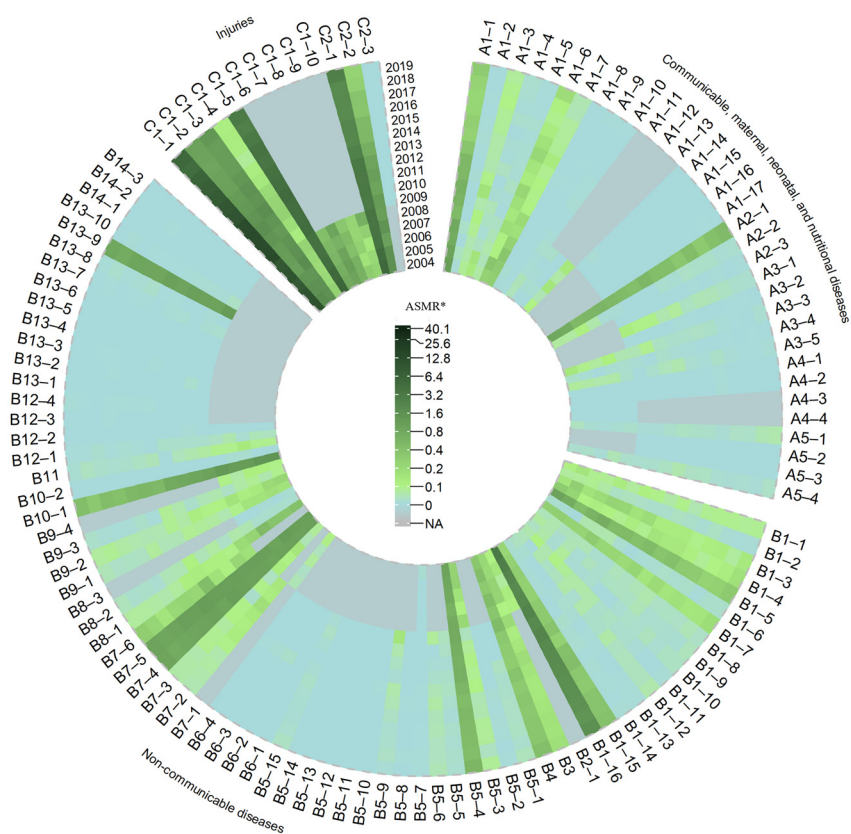
**Figure S6.** The ASMR of urban adolescents aged 10 to 24 by cause of death, 2004 to 2019. Note: \*, ASMR = Age standardized mortality rate.

Leading cause in 2004 (ASMR* (per 100,000))	Leading cause in 2010 (ASMR (per 100,000))	Leading cause in 2019 (ASMR (per 100,000))
Road injuries (6.69)	Road injuries (8.90)	Road injuries (3.74)
Drowning (3.91)	Drowning (2.58)	Intentional self-harm and sequelae (2.47)
Intentional self-harm and sequelae (3.59)	Intentional self-harm and sequelae (2.49)	Drowning (2.13)
Leukaemia (2.52)	Leukaemia (1.92)	Falls (1.33)
Assault and sequelae (1.98)	Falls (1.20)	Leukaemia (1.28)
Accidental poisoning by and exposure to noxious substances (1.44)	Accidental poisoning by and exposure to noxious substances (1.14)	Congenital malformations of the circulatory system (0.73)
Nephritis and kidney disease (1.12)	Assault and sequelae (1.00)	Accidental poisoning by and exposure to noxious substances (0.72)
Falls (0.96)	Congenital malformations of the circulatory system (0.88)	Ischemic heart diseases (0.72)
Cerebrovascular diseases (0.80)	Ischemic heart diseases (0.85)	Cerebrovascular diseases (0.64)
Ischemic heart diseases (0.74)	Cerebrovascular diseases (0.82)	Epilepsy (0.42)
Electric shock (0.47)	Nephritis and kidney disease (0.59)	Lower respiratory infections (0.40)
Epilepsy (0.39)	Epilepsy (0.57)	Lymphoma and multiple myeloma (0.33)
Endocrine disorder (0.36)	Lymphoma and multiple myeloma (0.41)	Endocrine disorder (0.32)
Tuberculosis (0.35)	Endocrine disorder (0.40)	Nephritis and kidney disease (0.28)
Malignant neoplasm of liver and intrahepatic bile ducts (0.31)	Lower respiratory infections (0.36)	Inflammatory heart disease (0.27)

Class

- Communicable, maternal, neonatal, and nutritional diseases
- Non-communicable diseases
- Injuries

**Figure S7.** The top 15 leading causes of death of urban adolescents aged 10 to 24 in 2004, 2010 and 2019. Note: \*, ASMR = Age standardized mortality rate.

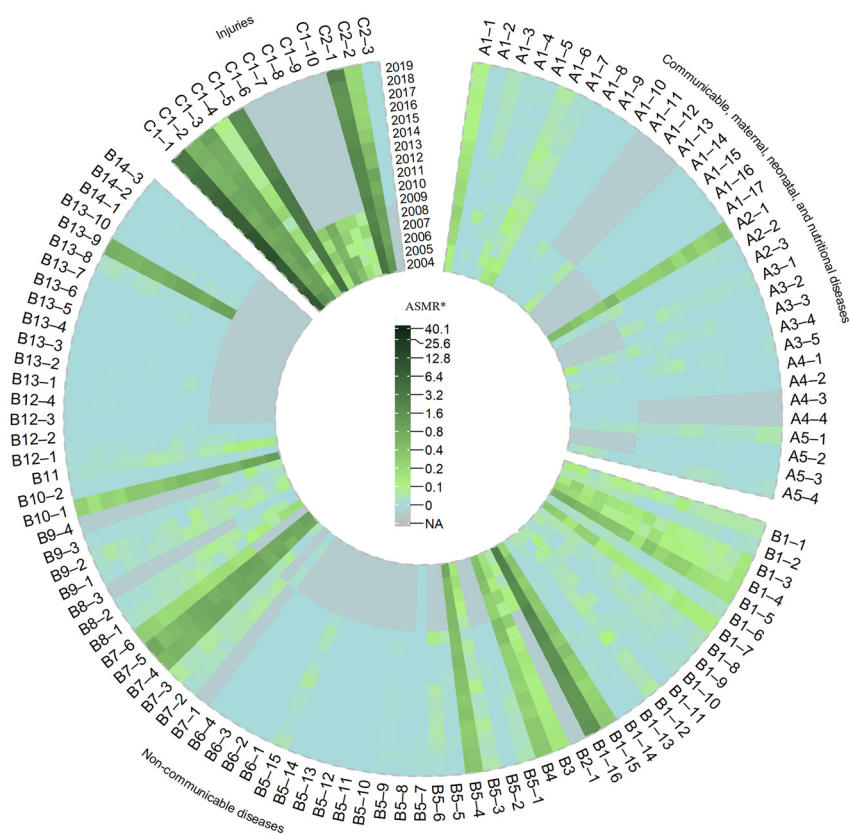


**Figure S8.** The ASMR of rural adolescents aged 10 to 24 by cause of death, 2004 to 2019. Note: \*, ASMR = Age standardized mortality rate.

Leading cause in 2004 (ASMR* (per 100,000))	Leading cause in 2010 (ASMR* (per 100,000))	Leading cause in 2019 (ASMR* (per 100,000))
Road injuries (11.56)	Road injuries (13.25)	Road injuries (5.57)
Drowning (6.02)	Drowning (4.60)	Drowning (3.12)
Intentional self-harm and sequelae (5.55)	Intentional self-harm and sequelae (3.34)	Intentional self-harm and sequelae (2.76)
Leukaemia (3.24)	Leukaemia (2.14)	Leukaemia (1.73)
Accidental poisoning by and exposure to noxious substances (1.92)	Accidental poisoning by and exposure to noxious substances (1.49)	Falls (1.39)
Falls (1.62)	Falls (1.27)	Accidental poisoning by and exposure to noxious substances (1.00)
Assault and sequelae (1.59)	Cerebrovascular diseases (1.09)	Cerebrovascular diseases (0.96)
Nephritis and kidney disease (1.46)	Ischemic heart diseases (1.01)	Ischemic heart diseases (0.90)
Tuberculosis (1.11)	Congenital malformations of the circulatory system (0.98)	Congenital malformations of the circulatory system (0.80)
Ischemic heart diseases (1.07)	Assault and sequelae (0.91)	Epilepsy (0.56)
Cerebrovascular diseases (1.07)	Nephritis and kidney disease (0.86)	Lower respiratory infections (0.48)
Epilepsy (0.97)	Epilepsy (0.71)	Nephritis and kidney disease (0.44)
Malignant neoplasm of liver and intrahepatic bile ducts (0.96)	Tuberculosis (0.65)	Endocrine disorder (0.41)
Electric shock (0.93)	Malignant neoplasm of liver and intrahepatic bile ducts (0.49)	Lymphoma and multiple myeloma (0.39)
Lower respiratory infections (0.81)	Lower respiratory infections (0.47)	Malignant neoplasm of liver and intrahepatic bile ducts (0.32)

Class
 ■ Communicable, maternal, neonatal, and nutritional diseases
 ■ Non-communicable diseases
 ■ Injuries

**Figure S9.** The top 15 leading causes of death of rural adolescents aged 10 to 24 in 2004, 2010 and 2019. Note: \*, ASMR = Age standardized mortality rate.



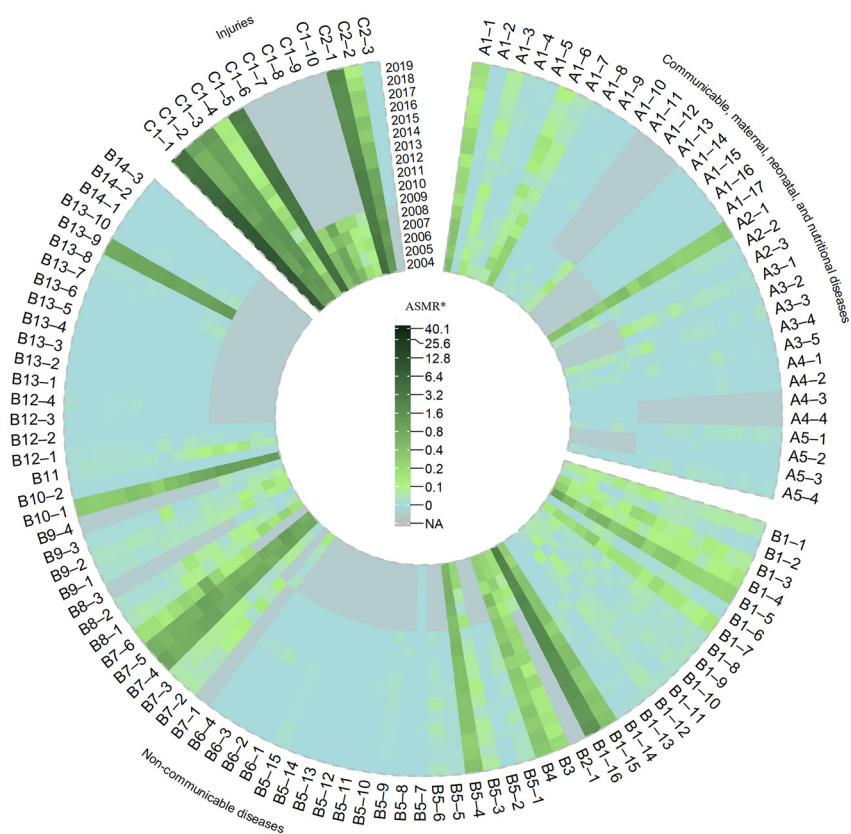
**Figure S10.** The ASMR of eastern adolescents aged 10 to 24 by cause of death, 2004 to 2019. Note: \*, ASMR = Age standardized mortality rate.

Leading cause in 2004 (ASMR* (per 100,000))	Leading cause in 2010 (ASMR (per 100,000))	Leading cause in 2019 (ASMR (per 100,000))
Road injuries (9.58)	Road injuries (11.18)	Road injuries (3.63)
Drowning (4.38)	Drowning (3.26)	Intentional self-harm and sequelae (2.54)
Intentional self-harm and sequelae (3.77)	Intentional self-harm and sequelae (2.21)	Drowning (1.99)
Leukaemia (2.95)	Leukaemia (1.99)	Leukaemia (1.57)
Accidental poisoning by and exposure to noxious substances (1.70)	Cerebrovascular diseases (1.04)	Falls (1.03)
Assault and sequelae (1.46)	Congenital malformations of the circulatory system (0.95)	Cerebrovascular diseases (0.76)
Falls (1.27)	Falls (0.83)	Congenital malformations of the circulatory system (0.66)
Nephritis and kidney disease (1.21)	Ischemic heart diseases (0.78)	Accidental poisoning by and exposure to noxious substances (0.59)
Cerebrovascular diseases (1.02)	Accidental poisoning by and exposure to noxious substances (0.72)	Ischemic heart diseases (0.51)
Epilepsy (0.83)	Assault and sequelae (0.67)	Lower respiratory infections (0.38)
Ischemic heart diseases (0.82)	Nephritis and kidney disease (0.46)	Epilepsy (0.37)
Electric shock (0.80)	Epilepsy (0.40)	Endocrine disorder (0.35)
Malignant neoplasm of liver and intrahepatic bile ducts (0.58)	Endocrine disorder (0.40)	Lymphoma and multiple myeloma (0.31)
Lower respiratory infections (0.46)	Lymphoma and multiple myeloma (0.35)	Inflammatory heart disease (0.28)
Endocrine disorder (0.41)	Malignant neoplasm of liver and intrahepatic bile ducts (0.33)	Nephritis and kidney disease (0.26)

Class

- Communicable, maternal, neonatal, and nutritional diseases
- Non-communicable diseases
- Injuries

**Figure S11.** The top 15 leading causes of death of eastern adolescents aged 10 to 24 in 2004, 2010 and 2019. Note: \*, ASMR = Age standardized mortality rate.



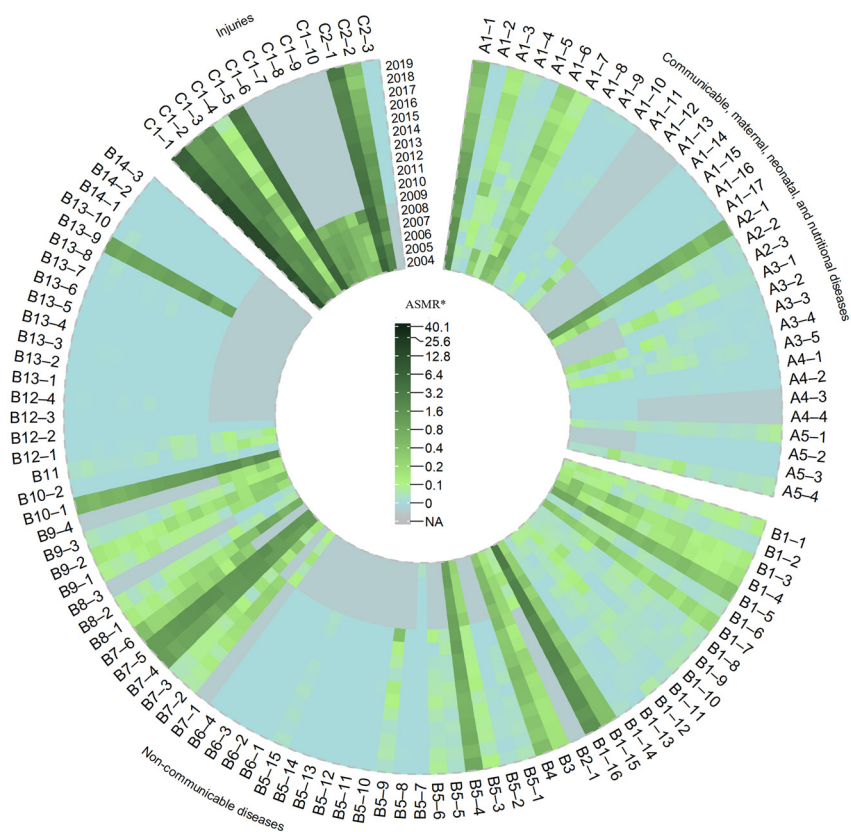
**Figure S12.** The ASMR of central adolescents aged 10 to 24 by cause of death, 2004 to 2019. Note: \*, ASMR = Age standardized mortality rate.

Leading cause in 2004 (ASMR* (per 100,000))	Leading cause in 2010 (ASMR* (per 100,000))	Leading cause in 2019 (ASMR* (per 100,000))
Road injuries (8.80)	Road injuries (10.10)	Road injuries (4.41)
Drowning (5.27)	Drowning (4.26)	Drowning (2.96)
Intentional self-harm and sequelae (4.92)	Intentional self-harm and sequelae (2.80)	Intentional self-harm and sequelae (2.25)
Leukaemia (2.84)	Leukaemia (2.11)	Leukaemia (1.56)
Assault and sequelae (1.29)	Falls (1.47)	Falls (1.30)
Accidental poisoning by and exposure to noxious substances (1.28)	Accidental poisoning by and exposure to noxious substances (1.23)	Ischemic heart diseases (0.94)
Falls (1.25)	Congenital malformations of the circulatory system (1.12)	Accidental poisoning by and exposure to noxious substances (0.93)
Nephritis and kidney disease (1.24)	Assault and sequelae (0.82)	Congenital malformations of the circulatory system (0.75)
Malignant neoplasm of liver and intrahepatic bile ducts (0.89)	Ischemic heart diseases (0.76)	Cerebrovascular diseases (0.65)
Ischemic heart diseases (0.82)	Nephritis and kidney disease (0.75)	Epilepsy (0.40)
Electric shock (0.79)	Cerebrovascular diseases (0.56)	Lymphoma and multiple myeloma (0.39)
Cerebrovascular diseases (0.66)	Epilepsy (0.55)	Lower respiratory infections (0.35)
Epilepsy (0.57)	Lower respiratory infections (0.45)	Endocrine disorder (0.34)
Struck by thrown, projected or falling object(s) (0.47)	Lymphoma and multiple myeloma (0.39)	Nephritis and kidney disease (0.33)
Tuberculosis (0.47)	Malignant neoplasm of liver and intrahepatic bile ducts (0.37)	Malignant neoplasm of liver and intrahepatic bile ducts (0.24)

Class

- Communicable, maternal, neonatal, and nutritional diseases
- Non-communicable diseases
- Injuries

**Figure S13.** The top 15 leading causes of death of central adolescents aged 10 to 24 in 2004, 2010 and 2019. Note: \*, ASMR = Age standardized mortality rate.



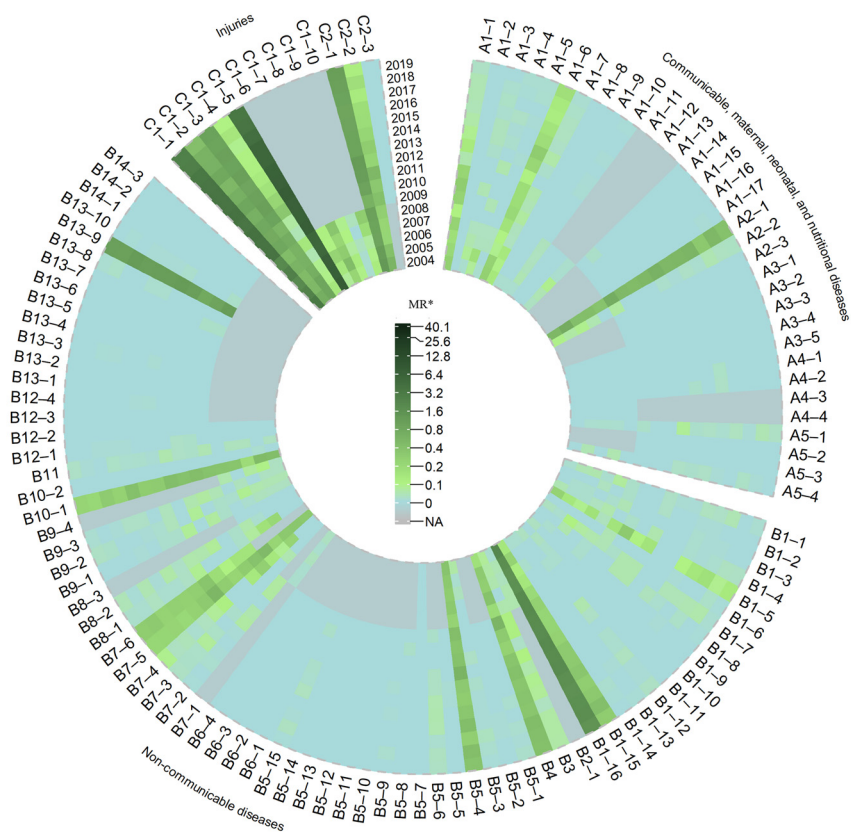
**Figure S14.** The ASMR of western adolescents aged 10 to 24 by cause of death, 2004 to 2019. Note: \*, ASMR = Age standardized mortality rate.

Leading cause in 2004 (ASMR* (per 100,000))	Leading cause in 2010 (ASMR (per 100,000))	Leading cause in 2019 (ASMR (per 100,000))
Road injuries (11.86)	Road injuries (15.04)	Road injuries (7.32)
Drowning (6.64)	Intentional self-harm and sequelae (4.46)	Drowning (3.61)
Intentional self-harm and sequelae (6.30)	Drowning (4.36)	Intentional self-harm and sequelae (3.30)
Leukaemia (3.28)	Accidental poisoning by and exposure to noxious substances (2.39)	Falls (1.89)
Assault and sequelae (2.52)	Leukaemia (2.14)	Leukaemia (1.67)
Accidental poisoning by and exposure to noxious substances (2.46)	Cerebrovascular diseases (1.50)	Accidental poisoning by and exposure to noxious substances (1.28)
Tuberculosis (2.23)	Falls (1.46)	Cerebrovascular diseases (1.21)
Falls (1.78)	Ischemic heart diseases (1.43)	Ischemic heart diseases (1.14)
Nephritis and kidney disease (1.67)	Assault and sequelae (1.41)	Congenital malformations of the circulatory system (0.96)
Accidental mechanical asphyxia (1.33)	Tuberculosis (1.29)	Epilepsy (0.80)
Cerebrovascular diseases (1.33)	Nephritis and kidney disease (1.18)	Lower respiratory infections (0.66)
Ischemic heart diseases (1.31)	Epilepsy (1.13)	Nephritis and kidney disease (0.61)
Lower respiratory infections (1.16)	Congenital malformations of the circulatory system (0.74)	Tuberculosis (0.56)
Epilepsy (1.01)	Lower respiratory infections (0.63)	Endocrine disorder (0.46)
Electric shock (0.77)	Malignant neoplasm of liver and intrahepatic bile ducts (0.58)	Lymphoma and multiple myeloma (0.42)

Class

- Communicable, maternal, neonatal, and nutritional diseases
- Non-communicable diseases
- Injuries

**Figure S15.** The top 15 leading causes of death of western adolescents aged 10 to 24 in 2004, 2010 and 2019. Note: \*, ASMR = Age standardized mortality rate.



**Figure S16.** The ASMR of adolescents aged 10 to 14 by cause of death, 2004 to 2019.

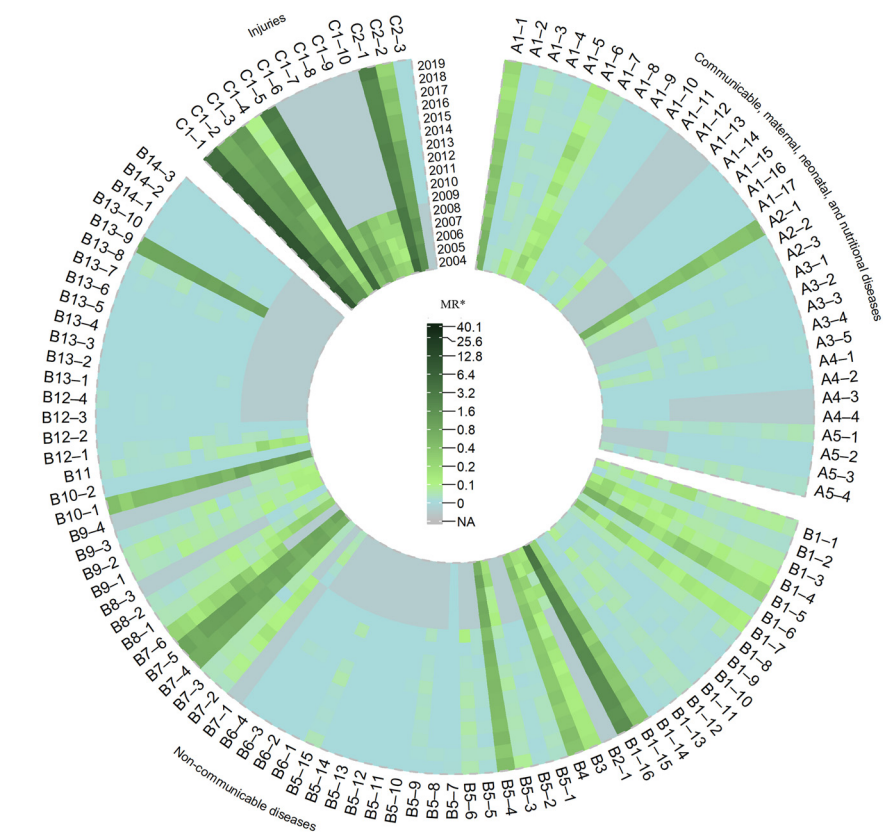
Note: \*, MR = Mortality rate.

Leading cause in 2004 (MR* (per 100,000))	Leading cause in 2010 (MR (per 100,000))	Leading cause in 2019 (MR (per 100,000))
Drowning (8.16)	Drowning (6.79)	Drowning (3.52)
Road injuries (3.18)	Road injuries (4.00)	Road injuries (2.73)
Leukaemia (2.27)	Leukaemia (1.96)	Leukaemia (1.53)
Intentional self-harm and sequelae (1.33)	Intentional self-harm and sequelae (0.97)	Intentional self-harm and sequelae (1.11)
Falls (0.82)	Congenital malformations of the circulatory system (0.94)	Congenital malformations of the circulatory system (1.08)
Accidental poisoning by and exposure to noxious substances (0.68)	Accidental poisoning by and exposure to noxious substances (0.74)	Falls (0.99)
Assault and sequelae (0.59)	Falls (0.56)	Accidental poisoning by and exposure to noxious substances (0.41)
Lower respiratory infections (0.51)	Lower respiratory infections (0.49)	Endocrine disorder (0.40)
Nephritis and kidney disease (0.44)	Nephritis and kidney disease (0.43)	Lower respiratory infections (0.39)
Epilepsy (0.37)	Epilepsy (0.36)	Epilepsy (0.37)
Cerebrovascular diseases (0.33)	Assault and sequelae (0.34)	Lymphoma and multiple myeloma (0.30)
Meningitis (0.26)	Malignant neoplasm of liver and intrahepatic bile ducts (0.31)	Inflammatory heart disease (0.29)
Tuberculosis (0.26)	Endocrine disorder (0.31)	Nephritis and kidney disease (0.24)
Malignant neoplasm of liver and intrahepatic bile ducts (0.25)	Cerebrovascular diseases (0.29)	Cerebrovascular diseases (0.21)
Electric shock (0.23)	Tuberculosis (0.29)	Meningitis (0.17)

Class

- Communicable, maternal, neonatal, and nutritional diseases
- Non-communicable diseases
- Injuries

**Figure S17.** The top 15 leading causes of death of adolescents aged 10 to 14 in 2004, 2010 and 2019. Note: \*, MR = Mortality rate.



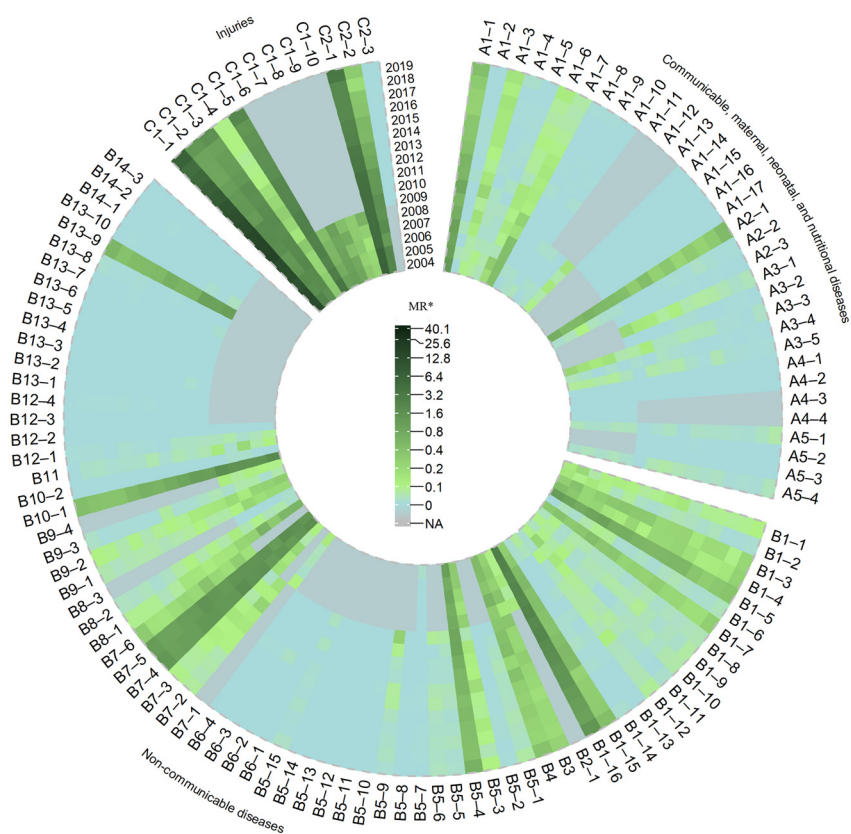
**Figure S18.** The ASMR of adolescents aged 15 to 19 by cause of death, 2004 to 2019.

Note: \*, MR = Mortality rate.

Leading cause in 2004 (MR* (per 100,000))	Leading cause in 2010 (MR (per 100,000))	Leading cause in 2019 (MR (per 100,000))
Road injuries (9.78)	Road injuries (10.70)	Road injuries (4.74)
Intentional self-harm and sequelae (5.44)	Drowning (3.26)	Drowning (3.11)
Drowning (5.35)	Intentional self-harm and sequelae (2.62)	Intentional self-harm and sequelae (2.93)
Leukaemia (3.73)	Leukaemia (2.13)	Leukaemia (1.81)
Assault and sequelae (1.71)	Accidental poisoning by and exposure to noxious substances (1.13)	Falls (1.34)
Accidental poisoning by and exposure to noxious substances (1.61)	Falls (1.05)	Cerebrovascular diseases (0.90)
Falls (1.54)	Cerebrovascular diseases (0.93)	Congenital malformations of the circulatory system (0.82)
Nephritis and kidney disease (1.10)	Congenital malformations of the circulatory system (0.93)	Accidental poisoning by and exposure to noxious substances (0.72)
Cerebrovascular diseases (0.93)	Ischemic heart diseases (0.88)	Ischemic heart diseases (0.72)
Electric shock (0.76)	Assault and sequelae (0.86)	Lower respiratory infections (0.48)
Tuberculosis (0.70)	Epilepsy (0.63)	Epilepsy (0.46)
Epilepsy (0.68)	Nephritis and kidney disease (0.51)	Nephritis and kidney disease (0.43)
Ischemic heart diseases (0.64)	Lower respiratory infections (0.41)	Endocrine disorder (0.37)
Lower respiratory infections (0.64)	Lymphoma and multiple myeloma (0.39)	Lymphoma and multiple myeloma (0.36)
Malignant neoplasm of liver and intrahepatic bile ducts (0.58)	Tuberculosis (0.34)	Inflammatory heart disease (0.24)

Class
 ■ Communicable, maternal, neonatal, and nutritional diseases
 ■ Non-communicable diseases
 ■ Injuries

**Figure S19.** The top 15 leading causes of death of adolescents aged 15 to 19 in 2004, 2010 and 2019. Note: \*, MR = Mortality rate.



**Figure S20.** The ASMR of adolescents aged 20 to 24 by cause of death, 2004 to 2019.

Note: \*, MR = Mortality rate.

Leading cause in 2004 (MR* (per 100,000))	Leading cause in 2010 (MR (per 100,000))	Leading cause in 2019 (MR (per 100,000))
Road injuries (14.12)	Road injuries (17.47)	Road injuries (6.45)
Intentional self-harm and sequelae (6.58)	Intentional self-harm and sequelae (4.66)	Intentional self-harm and sequelae (3.36)
Drowning (3.69)	Drowning (2.72)	Drowning (2.17)
Leukaemia (2.87)	Leukaemia (2.09)	Falls (1.62)
Accidental poisoning by and exposure to noxious substances (2.52)	Accidental poisoning by and exposure to noxious substances (1.94)	Leukaemia (1.44)
Assault and sequelae (2.36)	Falls (1.79)	Ischemic heart diseases (1.37)
Nephritis and kidney disease (2.09)	Ischemic heart diseases (1.51)	Accidental poisoning by and exposure to noxious substances (1.35)
Ischemic heart diseases (1.77)	Cerebrovascular diseases (1.48)	Cerebrovascular diseases (1.19)
Falls (1.65)	Assault and sequelae (1.34)	Epilepsy (0.63)
Cerebrovascular diseases (1.41)	Nephritis and kidney disease (1.18)	Congenital malformations of the circulatory system (0.57)
Tuberculosis (1.33)	Congenital malformations of the circulatory system (0.95)	Lower respiratory infections (0.48)
Malignant neoplasm of liver and intrahepatic bile ducts (1.17)	Epilepsy (0.87)	Nephritis and kidney disease (0.43)
Electric shock (1.13)	Tuberculosis (0.80)	Lymphoma and multiple myeloma (0.42)
Epilepsy (1.12)	Malignant neoplasm of liver and intrahepatic bile ducts (0.68)	Tuberculosis (0.41)
Accidental mechanical asphyxia (1.01)	Lower respiratory infections (0.41)	Endocrine disorder (0.38)

Class
 ■ Communicable, maternal, neonatal, and nutritional diseases
 ■ Non-communicable diseases
 ■ Injuries

**Figure S21.** The top 15 leading causes of death of adolescents aged 20 to 24 in 2004, 2010 and 2019. Note: \*, MR = Mortality rate