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Cover Photos: China CDC professionals help fight the COVID-19 pandemic abroad. Xuejun Ma in Iran on February 29, Mengjie Han in Iraq on March 7, and Ning Xiao in Italy on March 12 (Provided by Center for Global Public Health, China CDC).

Announcements

The 25th National School Safety Day

National School Safety Day is organized by the Chinese government and celebrated annually on the last Monday in March since 1996.

Because students are in the age range that are minimally associated with mortality risks, their health has not been prioritized recently. However, approximately 1.25 million deaths among individuals aged 5 to 19 years were reported globally in 2017 (*1*). During a critical phase of life in which their chances of formative growth are greatly shaped and future patterns of lifelong wellbeing are potentially established, this group is deemed to be the cornerstone for the country's development and deserves to be closely monitored (*1*). Among primary and secondary school students aged 6 to 18 years in our country, injury was the leading cause of death, accounting for over 50% of premature death with a significant proportion being preventable. Measures such as education, environmental modification, engineering, enforcement, and evaluation should be introduced based on rational effectiveness (*2–3*). Universal health coverage, improving healthcare awareness, development of healthier lifestyles, and environmental hazard modification should be adopted to prevent non-communicable and communicable diseases (*4*).

Government support, enforcement of legislation, education generalization, multisectoral cooperation, and stakeholder engagement should be initiated to promote health and well-being among primary and secondary school students, especially for preventing injuries (*2–4*).

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Preplanned Studies

Mortality and Causes of Death in Primary and Secondary School Students — China, 2018

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Summary

What is already known about this topic?

There were approximately 1.23 million deaths reported among individuals aged 5–19 years worldwide in 2017. Limited attention has been paid to current mortality among primary and secondary school students aged 6–18 years in China.

What is added by this report?

In 2018, an estimated 28,519 deaths occurred among primary and secondary school students aged 6–18 years in China with an age-standardized mortality rate (ASMR) of 17.66 per 100,000. Substantial disparities existed among sexes, age groups, areas, and regions for different causes of death. Drowning, road traffic injuries, and leukemia were three leading causes of death.

What are the implications for public health practice?

Government support, legislation enforcement, multisectoral cooperation, and stakeholder engagement should be initiated to reduce premature deaths among primary and secondary school students in China, especially those due to injuries.

Premature death among primary and secondary school students aged 6–18 years is an important public health issue in China. In this study, we used data from China's Cause-of-Death Reporting System (CDRS) to estimate students' mortality. In 2018, it was estimated that there were 28,519 student deaths between the ages of 6–18 years, with age-standardized mortality rate (ASMR) of 17.66 per 100,000. Substantial disparities existed among different sexes, age groups, areas, and regions. Drowning, road traffic injuries, and leukemia were three leading causes of death. Multisectoral efforts should be initiated to reduce premature death among students, especially those due to injuries.

Deaths in older children (5–9 years) and younger

adolescents (10–14 years) have received little attention. The neglect of these groups are presumably associated with the fact that this is the age range during which human mortality risks reach their minimum but are not insubstantial (*1*). It was reported that there were approximately 1.23 million deaths among individuals aged 5–19 years worldwide in 2017 (*2*). Primary and secondary school students aged 6–18 years mostly consist of older children and adolescents. Estimating their mortality is of great necessity to identify health priorities for reducing premature death.

This report used deaths in 2018 as collected by CDRS. Detailed descriptions of CDRS have been reported elsewhere (*3*). After primary quality control, 512 out of 605 were identified as eligible disease surveillance points, with 1,822 thousand reported deaths, covering 272 million population. Individuals aged 6–18 years were extracted and stratified by sex, age group, occupation, area, and region. National data of total population and current students in primary and secondary schools were obtained from National Bureau of Statistics (*4*). International Classification of Disease, 10th revision (ICD-10) was used to re-classify cause-of-death.

Crude mortality rate was calculated by using deaths and the respective populations. In consideration of CDRS under-reporting, mortality rate was adjusted for under-reporting through following formula: mortality rate=crude morality rate/(1–under-reporting rate) (*5*). The Sixth National Population Census in 2010 was used for age-standardized mortality rate (ASMR) estimation (*4*). Estimated death count nationwide was generated through scaled-up aggregation data in each stratum acquired. Years of life lost (YLLs) is a measure of premature death calculated as the sum of each death multiplied by the standard life expectancy at each age (*2*). Software R (version 3.6.2, The R foundation for Statistical Computing) was applied for statistical analysis.

In 2018, a total of 45,385 deaths among individuals aged 6–18 years nationwide were estimated with 28,519 students and 16,867 non-students. The ASMR for those aged 6–18 years was 23.55 per 100,000 with students estimated at 17.66 and non-students at 54.13 per 100,000. Non-students showed higher ASMR compared with its counterpart in all age groups, especially for those aged 6–12 years (136.25 *vs*. 14.12 per 100,000). Deaths occurring in those aged 6–18 years were estimated to occupy 0.47% of total population and calculated YLLs constituted 2.19% of total YLLs in all age. (Table 1)

Male students showed higher ASMR than female students (21.50 *vs*. 13.30 per 100,000). Rural areas showed a higher value than urban areas (19.72 *vs*. 14.28 per 100,000). Western regions showed the highest ASMR (22.07 per 100,000), followed by central regions (18.23 per 100,000) and eastern regions (14.07 per 100,000). Injury (52.87%) and non-communicable diseases (NCDs) (38.71%) contributed over 90% deaths to overall mortality in students. Drowning (2.93 per 100,000, 16.59%), road traffic injuries (2.74 per 100,000, 15.51%), and leukemia (1.37 per 100,000, 7.75%) were the three leading causes of death. (Table 2)

The ASMR of students varied as age changed. The ASMR of drowning reached its peak in primary school students with downward trends in junior high school students. Following a similar trend as age increased, suicide mortality came reached its peak in secondary school students aged 15 years and older. For other conditions, a comparatively stable trend was observed in adjacent ages such as road traffic injuries, falls, poisonings, and most NCDs. Female students showed more frequent mortality fluctuations in comparison with male students, especially for malignant tumor after 13 years. (Figure 1)

DISCUSSION

This study presents an up-to-date overview of mortality among primary and secondary school students aged 6–18 years in China in 2018. Differences in ASMR was noticed among students and non-students, especially for those aged 6–12 years for primary school. The health gap was large in relation to dropout, which was presumed to be induced by socio-economic structural transformation, household unemployment and poverty, as well as stereotype conventions. For disadvantaged groups who encountered obstacles for education and suffered from inferior health conditions such as migrant, left-behind, disabled, and impoverished children, providing economic support, promoting universal health coverage, and popularizing compulsory education could be effectively reduce premature death in non-students (*6*). The results concerning the age-specific percentage of deaths and YLLs were consistent with the Global Burden of Disease 2017 (GBD2017) (*2*). Given the five times higher age-specific YLLs percentage compared to deaths, the value of health losses occurring in the youth were inferred to be considerately higher than that of the elderly, which

TABLE 1. Age-standardized mortality rate, estimated deaths in students and non-students aged 6–18 years in China, 2018.

Age (Years)	Education level*	Age-standardized mortality rate (per 100,000)			Total population (10,000)			Estimated deaths			Age-specific deaths/All-age deaths (%)	Age-specific YLLs/All-age YLLs (%)
		Total	Students	Non-students	Total	Students	Non-students	Total	Students	Non-students		
6–12	Primary school	19.61	14.12	136.25	10,568.86	10,093.70	475.16	20,730	14,256	6,474	0.21	1.02
13–15	Junior high school	27.03	22.46	55.51	4,386.04	3,780.05	605.99	11,855	8,491	3,364	0.12	0.54
16–18	Senior high school	28.88	25.78	32.35	4,314.39	2,279.49	2,034.91	12,458	5,876	6,583	0.14	0.63
	Total	23.55	17.66	54.13	19,269.30	16,153.24	3,116.06	45,385	28,519	16,867	0.47	2.19

Abreviation: YLLs=Years of life lost.
* Education level for school students aged 6–18 years only.

TABLE 2. The age-standardized mortality rate (per 100,000) of primary and secondary school students aged 6–18 years in China, 2018.

Item	Sex			Urban			Rural			Eastern			Central			Western		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
All-cause	17.66	21.50	13.30	14.28	16.91	11.34	19.72	24.27	14.51	14.07	16.76	11.00	18.23	22.62	13.16	22.07	27.07	16.59
Injury	9.33	12.14	6.15	7.29	9.30	5.04	10.58	13.86	6.83	6.60	8.61	4.30	9.72	12.85	6.11	12.75	16.43	8.71
Drowning	2.93	4.34	1.33	1.92	2.93	0.78	3.55	5.20	1.67	1.86	2.76	0.82	3.20	4.56	1.63	4.16	6.37	1.73
Road traffic injuries	2.74	3.46	1.93	2.19	2.60	1.74	3.07	3.98	2.04	2.03	2.48	1.52	2.93	3.80	1.94	3.53	4.49	2.47
Suicide	1.10	1.31	0.86	1.11	1.24	0.96	1.09	1.35	0.79	0.86	1.23	0.43	1.05	1.21	0.86	1.49	1.54	1.44
Falls	0.91	1.10	0.69	0.83	1.07	0.56	0.95	1.12	0.76	0.62	0.73	0.50	1.08	1.43	0.67	1.13	1.28	0.96
Poisoning	0.50	0.53	0.47	0.30	0.29	0.30	0.62	0.68	0.56	0.37	0.36	0.37	0.43	0.48	0.37	0.76	0.82	0.70
Other injuries	1.15	1.40	0.88	0.95	1.18	0.69	1.28	1.53	0.99	0.87	1.05	0.67	1.03	1.36	0.65	1.68	1.94	1.40
Non-communicable diseases	6.83	7.79	5.75	5.72	6.28	5.09	7.52	8.70	6.16	6.21	6.91	5.42	7.01	8.12	5.72	7.53	8.70	6.24
Leukemia	1.37	1.61	1.11	1.17	1.31	1.00	1.50	1.78	1.17	1.39	1.60	1.14	1.47	1.73	1.16	1.25	1.48	1.01
Cardiovascular diseases	1.05	1.24	0.83	0.94	1.00	0.88	1.11	1.38	0.81	1.01	1.24	0.74	1.03	1.10	0.95	1.13	1.38	0.85
Congenital abnormality	0.82	0.90	0.74	0.81	0.77	0.86	0.83	0.98	0.66	0.57	0.63	0.50	1.03	1.19	0.84	0.97	0.98	0.96
Nervous systems diseases	0.76	0.87	0.63	0.48	0.59	0.36	0.93	1.04	0.79	0.62	0.73	0.50	0.77	0.93	0.58	0.94	1.02	0.85
Respiratory diseases	0.50	0.50	0.50	0.33	0.36	0.29	0.61	0.59	0.64	0.39	0.43	0.35	0.42	0.35	0.49	0.74	0.76	0.72
Immune system diseases	0.26	0.25	0.27	0.19	0.15	0.24	0.30	0.30	0.29	0.25	0.15	0.35	0.28	0.30	0.26	0.25	0.32	0.18
Digestive system diseases	0.17	0.15	0.19	0.10	0.09	0.10	0.22	0.19	0.25	0.13	0.08	0.19	0.10	0.15	0.04	0.30	0.26	0.35
Other malignant tumor	1.90	2.27	1.48	1.71	2.01	1.37	2.02	2.43	1.55	1.86	2.04	1.66	1.92	2.36	1.40	1.94	2.52	1.31
Communicable diseases	0.31	0.32	0.30	0.20	0.21	0.19	0.38	0.39	0.37	0.22	0.20	0.24	0.29	0.35	0.22	0.47	0.48	0.46
Infectious & parasitic diseases	0.31	0.32	0.30	0.20	0.21	0.19	0.38	0.39	0.37	0.22	0.20	0.24	0.29	0.35	0.22	0.47	0.48	0.46
Others	1.18	1.24	1.11	1.07	1.12	1.02	1.24	1.32	1.16	1.04	1.05	1.04	1.22	1.30	1.12	1.33	1.46	1.18

reminds of the urgent need to prevent premature death in order to minimize social labor force damage.

Obvious mortality disparities in population distribution and geographical patterns could be found among primary and secondary school students aged 6–18 years. Sex differences could be primarily driven

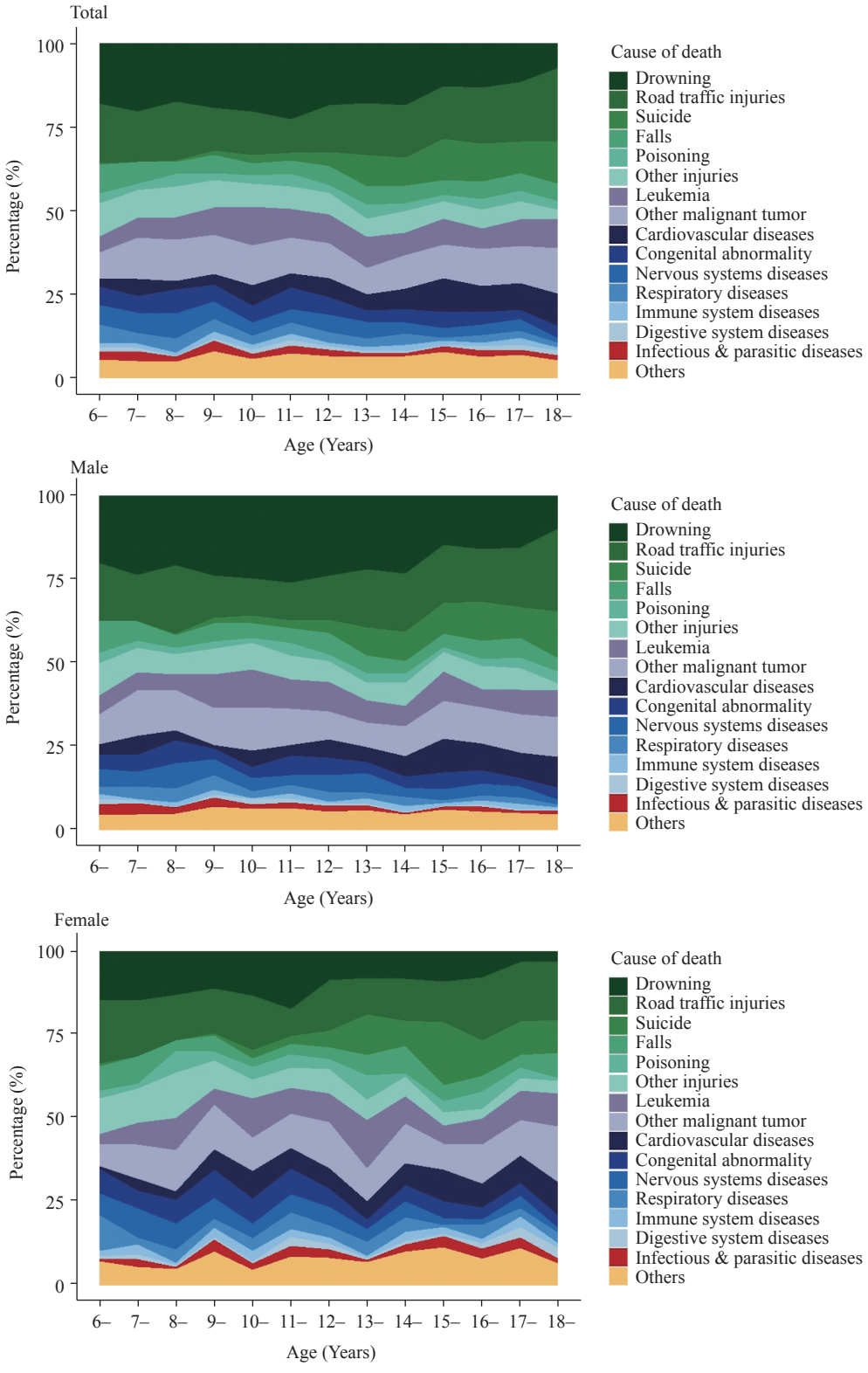

FIGURE 1. Sex and age differences in mortality in primary and secondary school students aged 6–18 years in China by cause-of-death, 2018.

by variations in exposure prevalence to cause-specific risk factors, particularly for injury (*6*). It was reported that intrinsic characteristics with aggressive and adventurous spirits in boys made them inclined to actively encounter hazards, and in the absence of cognition and self-control, they tended to experience more injuries than female students (*7*). Suicide was a typical condition that increased considerately with age, which brings attention to issues of mental health in senior high school students (*6*). A higher ASMR in remote areas was consistent with previous studies (*8*). Reasons could be partially attributed to economic involvement, healthcare coverage, infrastructure assurance, effective guardian supervision, and education popularization in developed areas and regions. For example, students in developed areas were inclined to receive multi-source health protection and security training, including courses taught by professionals from health, transportation, and fire-fighting departments (*8*).

Injury was the leading cause of death among students. Premature death as a result of unintentional injuries were discussed at length in most studies, with the majority deemed preventable (*6*). A "5E comprehensive strategy", which covers education, environmental modification, engineering, enforcement, and evaluation, was introduced for injury control and prevention worldwide to effectively reduce injury incidence and mortality (*6*). NCDs also accounted for a large proportion of student mortality, most of which might be explained by biological factors, inferior living environments, and unhealthy lifestyle; for instance, leukemia was regarded as being related to indoor environment pollution caused by household decorations (*7*). Although premature death caused by communicable diseases seemed to not be so substantial, guardians should still take precautions as existing risk factors continued to rise and potential new risk factors emerge. Planned immunizations would be an effective approaches in preventing many communicable diseases (*9*).

During past years, several programs for protecting and promoting children's health have been launched and yielded profound benefits. Related clauses were embodied in legislations and regulations, like "The Law of Education", "The Law of Protection of Juveniles", "The Law of Road Traffic Safety", "China Children's Development Outlines". With multi-sectional cooperation at its burgeoning phase, measures such as health literature advocacy, regular lifestyle development, and mental health establishment were provided for students in some regions (*6*). Nevertheless, enforcement was a demanding bottleneck. Due to the complexity of multi-sector enabler management, such as health, education, security, transportation, and urban construction, no specific department or agency was assigned to centralize and coordinate the efforts of societal partners to work together (*10*). Therefore, the government should maintain a leading role to present strategies that aim to eliminate modifiable risk factors for early intervention, such as providing financial and technical support, implementing enforcement for legislation and promoting community engagement, especially to narrow the gaps between developed and remote areas and considerable differences between subgroups at different ages. These initiatives could, in return, inform individual-level change, decrease the demand on tertiary services, and operate effectively to reduce premature death among students (*9*).

The findings of this study were subject to some limitations. Ascertainment bias in cause-of-death diagnosis remained the greatest concern, which required correction for redistribution algorithms for implausible diagnostic codes (*2*).

Understanding mortality in primary and secondary school students remained as an essential concern in effectively reducing premature death. This study helped to identify heterogeneity in mortality patterns and is of great value for tailoring priorities to promote students' health in China.

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Preplanned Studies

Characteristics of Injury Diagnosis among Primary and Secondary School Students — China, 2018

Pengpeng Ye[1]; Yuliang Er[1]; Yuan Wang[1]; Leilei Duan[1,#]

Summary

What is already known about this topic?

Child injury is a serious public health problem in China. The epidemiological characteristics injuries related to primary and secondary school students were usually reported from school-based population surveys conducted in developed regions of China. Medical and health institution-based data were rarely adopted to explore the typical patterns of injury occurrence among primary and secondary school students in China.

What is added by this report?

This study found that among primary and secondary school students with injury diagnosis in the National Injury Surveillance System (NISS), the high-risk group of primary and secondary school students with injury diagnosis was male students. The frequent incidence season was spring and early summer. Noon was the peak incidence time. Falling was the most common cause of injury among students, but other frequent causes of injury differs in students with different education levels. Home and school were the most common places where injury occurs. Students were more likely to suffer injury when they were engaged in leisure and sport activities. Limbs and the head were easily injured with contusions/bruises.

What are the implications for public health practice?

Medical and health institution-based data could be an additional data source for student-related injury research. Typical patterns could be summarized to provide data-driven basis for the improved formulation of injury prevention and control strategies and measures towards students. The characteristics of injury events differs in students with different education levels and requires more specific attentions towards students when conducting relevant programs in school and school-related places.

Child injury has become a public health issue attracting widespread concern in the world (*1*). In China, injury is also an important threat to children's health and safety, particularly for those in schools (*2*). This study uses data from the National Injury Surveillance System (NISS) in China to depict the characteristics of primary and secondary school students with injury diagnosis in 2018 in order to provide evidence for better formulation of relevant strategies and measures towards primary and secondary school student-related injury prevention and control.

In the world, more than 95% of child injury deaths occur in low- and middle-income countries every year (*1*). In developed countries, the absolute number of child injury mortality is relatively low, but injury is still the main cause of death among children, accounting for about 40% of child deaths (*2*). In China, about 42 million primary and secondary school students suffer from various injuries every year, of which about 400,000 are disabled (*3*).

At present, the epidemiological characteristics of primary and secondary school student-related injury were usually reported from school-based population surveys conducted in developed regions of China, such as Beijing, Shanghai, Guangdong Province, and Zhejiang Province (*4*–*5*). However, data derived from medical and health institutions are rarely adopted to explore typical patterns of injuries among primary and secondary school students in China.

The NISS was established and operated by the National Center for Chronic and Noncommunicable Disease Control and Prevention of the Chinese Center for Disease Control and Prevention (NCNCD, China CDC) in 2006. Currently, it covers 84 counties and districts in 31 provincial level administrative divisions (PLADs), including 252 medical and health institutions (*6*). This study used NISS 2018 data to descriptively analyze the characteristics of injury event and injury-induced clinical outcome of primary and secondary school students.

All data in this study were from NISS in 2018. The working mechanism, data collection process, quality control, and report card data domains and other detailed information of NISS can be found in published articles (*6*–*7*). In this study, patients who

met all following criteria will be considered as primary and secondary school students and included in the final analysis: 1) aged between 6 and 18 years old (*8*); 2) education level was self-reported or reported by other guardians as primary school, junior high school, or senior high school (equivalent to high school); 3) the occupation was self-reported or reported by other guardians as student. Software Stata (version 15.1; College Station, TX, USA), was adopted to perform the analysis in this study.

In 2018, there were 147,018 cases in line with the definition of primary and secondary school students in the NISS, accounting for 10.61% of all injury cases including 100,104 male students and 46,914 female students, and 72,616, 34,202, and 40,200 cases for primary, junior, and senior high school students, respectively. There were more male students than females in each education level.

Among cases with different levels of education, injuries mainly occurred in the year from March to June and in a day at noon. As for injury cause, the top three causes in primary school students were fall (52.21%), animal injury (14.06%), and blunt injury (11.09%). In junior high school students, the three causes were fall (52.42%), blunt injury (12.36%), and animal injury (10.16%). In senior high school students, these causes were fall (45.46%), blunt injury (14.25%), and road traffic injury (12.06%). As for location of injury, the top three locations in primary school students were home (33.28%), school and school-related public places (28.96%), and roads/streets (17.27%). In junior high school students, the top three locations were school and school-related public places (35.99%), home (23.85%), and road/street (19.46%), respectively. In senior high school students, these locations were schools and school-related public places (34.71%), roads/streets (22.00%), and homes (20.91%). (Table 1)

TABLE 1. The characteristics of injury diagnosis among primary and secondary school students in China, 2018

	Primary school N (%)	Junior high school N (%)	Senior high school N (%)	Total N (%)
Sex				
Male	48,074 (66.20)	24,259 (70.93)	27,771 (69.08)	100,104 (68.09)
Female	24,542 (33.80)	9,943 (29.07)	12,429 (30.92)	46,914 (31.91)
Causes				
Road traffic injury	6,066 (8.35)	3,305 (9.66)	4,850 (12.06)	14,221 (9.67)
Fall	37,911 (52.21)	17,930 (52.42)	18,276 (45.46)	74,117 (50.41)
Blunt object injury	8,051 (11.09)	4,227 (12.36)	5,727 (14.25)	18,005 (12.25)
Firearm	52 (0.07)	32 (0.09)	20 (0.05)	104 (0.07)
Sharp object injury	5,336 (7.35)	2,784 (8.14)	4,055 (10.09)	12,175 (8.28)
Burn	1,197 (1.65)	306 (0.89)	463 (1.15)	1,966 (1.34)
Suffocation	226 (0.31)	88 (0.26)	83 (0.21)	397 (0.27)
Drowning	44 (0.06)	14 (0.04)	14 (0.03)	72 (0.05)
Poisoning	223 (0.31)	242 (0.71)	675 (1.68)	1,140 (0.78)
Animal injury	10,210 (14.06)	3,476 (10.16)	3,766 (9.37)	17,452 (11.87)
Sexual assault	4 (0.01)	1 (<0.001)	1 (<0.001)	1 (<0.001)
Others	2,215 (3.05)	1,321 (3.86)	1,726 (4.29)	5,262 (3.58)
Unknown	1,081 (1.49)	476 (1.39)	544 (1.35)	2,101 (1.43)
Places				
Home	24,167 (33.28)	8,156 (23.85)	8,407 (20.91)	40,730 (27.70)
Public residential institution	9,367 (12.90)	3,524 (10.30)	3,831 (9.53)	16,722 (11.37)
School and school-related area	21,032 (28.96)	12,311 (35.99)	13,955 (34.71)	47,298 (32.17)
Sports and athletics area	2,635 (3.63)	2,369 (6.93)	3,241 (8.06)	8,245 (5.61)
Road	12,542 (17.27)	6,654 (19.46)	8,844 (22.00)	28,040 (19.07)
Commercial and serve area	1,027 (1.41)	370 (1.08)	916 (2.28)	2,313 (1.57)
Industrial and construction area	179 (0.25)	90 (0.26)	216 (0.54)	485 (0.33)

TABLE 1. (Continued)

	Primary school N (%)	Junior high school N (%)	Senior high school N (%)	Total N (%)
Farm/farmland	193 (0.27)	122 (0.36)	106 (0.26)	421 (0.29)
Others	100 (0.14)	32 (0.09)	56 (0.14)	188 (0.13)
Unknown	1,374 (1.89)	574 (1.68)	628 (1.56)	2,576 (1.75)
Activities				
Paid work	276 (0.38)	183 (0.54)	395 (0.98)	854 (0.58)
Housework	1,408 (1.94)	977 (2.86)	1,547 (3.85)	3,932 (2.67)
Education	4,011 (5.52)	2,374 (6.94)	2,453 (6.10)	8,838 (6.01)
Sports activities	8,477 (11.67)	6,440 (18.83)	7,618 (18.95)	22,535 (15.33)
Leisure activities	36,128 (49.75)	13,527 (39.55)	14,793 (36.8)	64,448 (43.84)
Life activity	8,007 (11.03)	3,429 (10.03)	4,125 (10.26)	15,561 (10.58)
Driving/riding vehicles	4,324 (5.95)	2,900 (8.48)	4,467 (11.11)	11,691 (7.95)
Walking	7,170 (9.87)	3,126 (9.14)	3,308 (8.23)	13,604 (9.25)
Others	746 (1.03)	304 (0.89)	425 (1.06)	1,475 (1.00)
Unknown	2,069 (2.85)	942 (2.75)	1,069 (2.66)	4,080 (2.78)
Intent				
Unintentional	70,270 (96.77)	32,206 (94.16)	37,021 (92.09)	139,497 (94.88)
Self-harm/suicide	56 (0.08)	111 (0.32)	242 (0.60)	409 (0.28)
Intentional (Violence/Assault)	1,546 (2.13)	1,570 (4.59)	2,576 (6.41)	5,692 (3.87)
Others	660 (0.91)	284 (0.83)	308 (0.77)	1,252 (0.85)
Unknown	84 (0.12)	31 (0.09)	53 (0.13)	168 (0.11)
Severity				
Minor	62,004 (0.85)	28,187 (0.82)	33,412 (0.83)	123,603 (0.84)
Moderate	10,057 (0.14)	5,722 (0.17)	6,392 (0.16)	22,171 (0.15)
Severe	555 (0.01)	293 (0.01)	396 (0.01)	1,244 (0.01)
Nature				
Fractures	6,016 (8.28)	3,926 (11.48)	2,992 (7.44)	12,934 (8.80)
Sprain/pull	7,710 (10.62)	5,346 (15.63)	6,882 (17.12)	19,938 (13.56)
Sharp injury, bites and open	21,353 (29.41)	7,830 (22.89)	9,849 (24.5)	39,032 (26.55)
Injuries				
Contusions/bruises	31,882 (43.9)	14,789 (43.24)	17,090 (42.51)	63,761 (43.37)
Burn	1,227 (1.69)	353 (1.03)	503 (1.25)	2,083 (1.42)
Concussion/Cerebral contusion	1,673 (2.30)	684 (2.00)	904 (2.25)	3,261 (2.22)
Organ system injury	728 (1.00)	373 (1.09)	818 (2.03)	1,919 (1.31)
Others	1,441 (1.98)	655 (1.92)	901 (2.24)	2,997 (2.04)
Unknown	586 (0.81)	246 (0.72)	261 (0.65)	1,093 (0.74)
Body part injured				
Head	24,372 (33.56)	7,956 (23.26)	9,319 (23.18)	41,647 (28.33)
Upper limbs	21,172 (29.16)	11,171 (32.66)	11,555 (28.74)	43,898 (29.86)
lower limbs	18,332 (25.25)	10,460 (30.58)	12,925 (32.15)	41,717 (28.38)
Trunk	4,040 (5.56)	2,029 (5.93)	2,464 (6.13)	8,533 (5.80)
Multiple parts	2,460 (3.39)	1,596 (4.67)	2,405 (5.98)	6,461 (4.39)
Whole body	431 (0.59)	339 (0.99)	693 (1.72)	1,463 (1.00)
Others	1,395 (1.92)	471 (1.38)	610 (1.52)	2,476 (1.68)
Unknown	414 (0.57)	180 (0.53)	229 (0.57)	823 (0.56)

TABLE 1. (Continued)

	Primary school N (%)	Junior high school N (%)	Senior high school N (%)	Total N (%)
Disposition				
Discharged after treatment	67,240 (92.6)	30,987 (90.60)	36,168 (89.97)	134,395 (91.41)
Observed	1,082 (1.49)	575 (1.68)	969 (2.41)	2,626 (1.79)
Admitted	529 (0.73)	300 (0.88)	225 (0.56)	1,054 (0.72)
Transferred	3,400 (4.68)	2,163 (6.32)	2,608 (6.49)	8,171 (5.56)
Dead	10 (0.01)	11 (0.03)	23 (0.06)	44 (0.03)
Others	355 (0.49)	166 (0.49)	207 (0.51)	728 (0.50)
Total	72,616 (100.00)	34,202 (100.00)	40,200 (100.00)	147,018 (100.00)

As for activity at the time of injury, the top three activities in primary school students were leisure activities (49.75%), sports activities (11.67%), and life activities (11.03%). In junior high school students, the top three activities were leisure activities (39.55%), sports activities (18.83%), and life activities (10.03%). The three activities in senior high school students when injuries occurred were leisure activities (36.80%), sports activities (18.95%), and driving/riding vehicles (11.11%). More than 90% of the cases with different education levels were unintentional injuries. For intentional injury, the proportion of self-harm/suicide was highest in senior high school students (0.60%), followed by junior high school students (0.32%), and primary school students (0.08%). The proportion of other intentional injuries in senior high school students was 6.41%, which is more than that in junior high school students (4.59%), and primary school students (2.13%).

The characteristics of clinical outcomes in cases with different levels of education are very similar. More than 80% of injury cases were mild at each education level. The major body part injured is limbs and head. The most common nature of injury is contusions/bruises. More than 90% of injury cases can be discharged after medical treatment. There were only 44 injury-related deaths among primary and secondary school students in NISS, but the proportion of death in senior high school students was more than twice as high as that in junior high school and primary school students.

DISCUSSION

According to the findings from NISS 2018, the high-risk group of primary and secondary school students with injury diagnosis is male students. The frequent incidence season is spring and early summer. Noon is the peak incidence time. Fall is the most common cause of injury among students, but other frequent causes of injury differ in students with different education levels. Home and school are the most common places where injuries occurs. Students are more likely to suffer injuries when they are engaged in leisure and sport activities. Limbs and head are easily injured with contusions and bruises.

These findings are similar to previous research results. Therefore, male students could be prioritized as a target population in school-based injury prevention and control programs. Leisure and sports activities in school carried out in spring and summer should be taken into great consideration when implementing injury prevention programs. The potential risk of injury-related risk factors in school and school-related places should be regularly checked and reduced to improve the safety of students' daily life.

As for students at lower education levels, they are prone to suffer animal injury likely due to strong curiosity but less protective awareness and ability when they come into contact or play with animals. Therefore, it is important to help them establish a good awareness of preventing animal injury, for instance, dog or cat scratches and bites. Learning how to identify the living habits and behavioral characteristics of common animals, such as dogs, cats, etc., is essential for avoiding unintentional behaviors that could cause animal attacks and for understanding protective measures when an animal attacks (*9*).

As for students at higher education levels, the publicity and education of road traffic safety should be encouraged to be implemented in school and school-related places, which could provide more opportunities for students to strengthen their awareness of road traffic safety responsibilities. The target population of road traffic safety education could be expanded from students to their teachers, families, and other guardians. The proper behavioral norms of adults complying with road traffic regulations could promote

students to form better road traffic behaviors (*10*).

In addition, in the perspective of tertiary prevention, it is also strongly suggested that self-rescue skill training could be provided for students to learn some simple but effective first-aid techniques, such as wound cleaning, bandaging to stop bleeding, etc. Timely and proper first-aid treatments could help students improve their self-rescue ability and reduce the severity of injury.

There are also some limitations in this study. First, the age range of primary and secondary school students are defined by researchers according to the requirement of laws and common sense, which arbitrarily excluded the possibility of people being a student under the age of 6 or over 18 years old in this study. Second, the data of this study from the NISS are not a representative sample of a certain population, and the findings could not fully reflect the actual situation of injuries among primary and secondary school students in China. Third, given the self-reported information of injuries or information reported by students' guardians, recall bias or mistakes could occur in the data collection of demographic characteristics and injury events. Fourth, given the lack of unified guidelines for the diagnosis and treatment of injuries, the reliability of injury-related clinical outcomes could be affected by the experience and perception of medical staff and health care providers in different medical and health institutions.

This is the first study reporting the typical patterns of injuries among primary and secondary school students based on NISS. The findings of this study could be a good supplement for existing student-related injury studies and provide additional data for improving corresponding prevention and control strategies and measures.

The data utilization of National Injury Surveillance System had been reviewed and approved by the Ethical Review Committee of the National Center for Chronic and Noncommunicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention. The ethical application grant number is 201502.

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Commentary

The Safety of Drinking Water in China: Current Status and Future Prospects

Xiaoming Shi[1,#]

Editorial The idea for a world day for water was proposed in 1992, the year that the United Nations Conference on Environment and Development in Rio de Janeiro took place. That same year, the United Nations General Assembly adopted a resolution by which March 22 of each year was declared World Day for Water, to be observed starting in 1993. Since then, March 22 became an international day that focuses on the importance of freshwater. The theme of World Water Day 2020 is about water and climate change and how the two are inextricably linked.

Climate change will have a direct impact on precipitation, evaporation, and other hydrological factors and will change the global hydrological cycle, thus leading to the spatial and temporal redistribution of water resources, causing a series of water safety issues. With rapid socioeconomic development and urbanization over the past 40 years, China's water environment situation has become increasingly complex, and the health impact of water safety has become one of the import public health issues. Access to safe drinking water is an important basis for population health.

The Chinese Government issued the Action Plan for Prevention and Control of Water Pollution (the State Council, 2015) to strengthen the prevention and control of water pollution and ensure drinking water safety. The Outline of the "Healthy China 2030" Initiative addressed the importance of enhancing health risk assessment systems in environmental health issue.

On the World Water Day 2020, *China CDC Weekly* launch the commentary, summarizing the status of the hydrological environment and the actions taking place to protect drinking water in China and discusses the prospects on challenges of climate change and drinking water safety that China may face in the future.

Water safety refers to the ability of a state or a region to obtain needed water resources and water resource products and the ability to maintain sustainable ecological practices to protect the environment. The current state of water safety in China could be characterized by challenges in water scarcity, uneven distribution of water resources both spatially and temporally, and poor water quality (*1*).

Therefore, China will experience severe water stress based on shortages in the availability of water and the quality of water in the near future. Besides taking measures to reduce global warming and fighting against water pollution, China should address the issues of drinking water scarcity and safety, conduct health risk evaluation and management, improve the environmental health surveillance, establish health risk assessment systems, and focus on major public health issues that emphasizes the crucial transition from data monitoring to health risk assessment.

In this paper, the status of the water environment and the actions taking place on drinking water in China are summarized. Finally, the prospects on challenges of climate change and drinking water safety we may face in the future are discussed.

CURRENT STATUS OF THE WATER ENVIRONMENT

The total volume of freshwater resources in China is 2.8 trillion cubic meters, accounting for 6 percent of global water resources and ranking fourth in the world behind Brazil, Russia, and Canada. However, China's water resources are estimated to be only 2,000 cubic meters per capita, a quarter of the world's average level. China, with a large area, varied topography, and an uneven distribution of water resources, has been listed as one of the 13 countries with a water shortage by the United Nations (*2*).

Pollution also exacerbates water scarcity in China. Discharge of industrial wastewater, domestic sewage, agricultural hazardous pesticides and manure has

polluted the surface water and ground water. According to the 2018 "China's Water Resource Bulletin" (Ministry of Water Resources 2018) (*3*), only 81.6% of the rivers, 25.0% of lakes, 87.3% of reservoirs, and 23.9% of shallow groundwater met the criteria for drinking water supply sources. In 2018, the Ministry of Water Resources evaluated 1,045 centralized drinking water sources from 31 provincial-level administrative divisions (PLADs) and found that the percentage of water sources for qualified centralized water supply was 83.5%. Even southern China, with relatively well-stocked water resources, also faced scarcity issues for providing safe and clean drinking water (*3*). In addition, given the rapidly developing economy, more and more newly-emerging contaminants are attracting widespread public attention. The effects of perfluorinated compounds (PFCs), pharmaceutical and personal care products (PPCPs) on drinking water quality also cannot be ignored.

Due to the increasing population and accelerated urbanization, the demand for safe drinking water is also rising. In 2018, water consumption was 225 L/day in urban areas and 89 L/day in rural areas compared with an average water consumption per capita (>350 L/day) for Japan and the USA (*1*). Currently 59.6% of China's population lives in cities and the demand for drinking water is expected to increase significantly as urbanization progresses (*4*). The population of China is predicted to arrive at the peak in 2030, and alarmingly, the annual per capita water resources will drop to 1,760 m^3, only 4% higher than the water stress threshold (1,700 m^3/year) (*1*).

Safe drinking water is closely related to public health. Currently, 5.5% of reservoir water sources and 16.1% of the lake water sources in China are not compliant with regulations (*5*). Water purification technology is relatively out of date. Many companies still use the conventional water treatment processes and some even have no water treatment measures. There is also secondary pollution risk because of aging water supply networks. Byproducts of disinfection affect water quality, and drinking water quality compliance rates must continue to be improved (*6*).

Global climate change is inextricably linked to water as it increases the variability of hydrological cycle, induces extreme weather events, affects water quality, and threatens sustainable development and biodiversity worldwide (*7*). Under the changing climate, extreme weather events are making water scarcer, more unpredictable, and more polluted. Action plans to tackle climate change need to be integrated with different disciplines and coordinated across different sectors. They must have one thing in common: safe and sustainable water management.

HEALTH RISKS OF WATER POLLUTION

Surveillance data from the National Health Commission of China show that the reported number of incident cases of national notifiable infectious diseases in 2018 was 7.8 million, including 18.9% water-borne diseases (*4*). Fluorosis due to drinking water and arsenic poisoning still threaten Chinese residents' health. According to 2018 China's Health Statistics Yearbook, there were 77,292 villages with fluorosis due to drinking water nationwide, which represents 2.1% of all villages in China. Although the number of drinking water arsenic poisoning patients has declined since 2011, China still had 2,667 villages with drinking water arsenic poisonings by the end of 2018, with an exposed population of 1.6 million (*4*).

Villages with high-relative prevalence of cancer in the Huai River Basin are a major health issue, drawing huge public and media concern in recent years. Among the 14 counties in key areas of the basin, cancer deaths were found to be at low or normal historical levels in 1970s according to total cancer mortality and its changes over the last 30 years. However, presently, cancer mortality is high. For example, Yingdong District in Anhui Province, Shenqiu County in Henan Province, and cities in Hubei Province experienced significant increases in cancer mortality over the past 30 years with rates as high as 9.27, 7.14, and 2.71 times the national average, respectively (*8*). In 2013, a book named Atlas of the Huai River Basin Water Environment and Digestive Cancer Mortality (*9*) was published. A review of variation in trends in the causes of death in the Huai River Basin over the past 30 years showed that the areas having the most polluted water for the longest time were precisely the areas with the highest increase in digestive-system cancer deaths. The increase of mortality was several times than that of the national average increase for the respective cancers. Spatial analysis shows a high level of correlation between the seriously polluted areas and areas with high mortality from cancer (*9*).

ON-GOING ACTIONS ON DRINKING WATER SAFETY

In recent decades, climate change has had a

profound impact on the global natural ecosystem and human society and brought human health risks on water shortages and pollutions. It is necessary to pay more attention to water safety problems. Faced with this challenge, some critical actions have been taken in China.

Treatment of Water Pollution and Protection of Sources of Water

The State Council promulgated and implemented the Action Plan for Water Pollution Prevention and Control ("Water" in Article 10) in 2015 (*10*), which clarified that the local governments are the main body and responsible for the improvement of water pollution. The Ministry of Ecological Environment, in conjunction with other ministries, guided the local governments to implement the "Water" in Article 10. Until 2017, prefectural cities, provincial capitals, and municipalities directly under central government control have completed goals to ensure no large floating objects appeared on river surfaces, no garbage appeared on the river banks, and no illegal sewage was discharge. In addition, the percentage of black and odorous water is to be reduced to less than 10% of all water resources by the end of 2020.

For the protection of sources of drinking water, laws and regulations have been basically established including the Water Law, "Water" in Article 10, the Regulations on the Prevention and Control of Pollution in Drinking-Water Source Protection Areas, Regulations on the Urban Water Supply, Measures for Supervision and Administration of Drinking Water Hygiene, and the Standards for Drinking Water Quality. The protection of drinking water sources is mainly subject to compulsory management by all-levels of government. All provinces, cities, and counties have implemented water protection measures based on their actual conditions and level of pollution.

Surveillance of Water Quantity and Quality

The Ministry of Ecological Environment and the Ministry of Water Resources are responsible for monitoring the quantity and quality of water in the environment including surface water and groundwater, production of domestic water, and emergency incidents, and seawater and freshwater resources. The extensive surveillance of the quantity and quality of water provides data and information for environmental management and also provides a basis for quality assessments of river and marine water.

The National Health Commission is responsible for monitoring drinking water quality. At the end of 2018, China's monitoring of drinking water quality in urban and rural areas had basically covered all prefectures, counties, and 90% of towns and townships, and aims to cover all townships and towns by 2020. In addition, the quality of drinking water in urban and rural areas has been significantly improved in recent years, especially in rural areas (*11*). In 2018, the National Health Commission, in collaboration with other ministries, launched a revision of the standards for drinking water quality, which is expected to be released and implemented in 2020.

Centralized Water Supply and Rural Drinking Water Safety Projects

Currently, centralized water supplies have basically covered all urban areas and most rural villages and townships in China providing continuous and qualified domestic water for urban residents (*12*). For remote rural areas, where residents usually live separately, China launched a project to consolidate and improve the safety of drinking water in rural areas, giving priority to solving the problem of drinking water safety for the poor. In this rural drinking water safety project, a total of 14.3 billion CNY had been invested by the central government, and a total of 100.2 billion CNY had been invested in all localities, which helped to improve the safety of drinking water for 136 million people. The main goal of this project is to comprehensively solve the problem of drinking water safety for the poor by 2020. Besides, centralized drinking water supply and disinfection of drinking water has been promoted in rural areas with better economic conditions, but the coverage rate of the centralized water supply is still lower than that in cities (*11*).

Surveillance of Water-borne Infectious Diseases

The morbidity and other related statistical data of urban and rural water-borne diseases were collected for health surveillance through the information system for infectious diseases and all-cause disease surveillance. In the national notifiable infectious diseases, for example, cholera, typhoid and paratyphoid, bacterial and amoebic dysentery, viral hepatitis (A and E), and other infectious diarrheal diseases could be spread by water. Effective surveillance could provide a scientific basis for

formulating strategies for the prevention and control of water-borne infectious diseases

Health Risk Assessment and Management of Drinking Water

As human health and the safety of drinking water are severely threatened, China has established national monitoring systems of environmental health and risk assessment since 2016. The current risk assessment system for human health has been transformed from single element assessment focus to a multi-elemental, multi-approach, and multi-disciplinary assessment. In 2018, the National Health Commission started a new round of revisions for drinking water standards, which introduced the environmental health risk assessment to set the limit value of the standard. In 2019, the National Institute of Environmental Health of China CDC, launched the pilot project on environmental health risk assessment under the leadership of the National Health Commission. The aims and goals of this pilot work were to understand the present situation of environmental health risk assessment and to build an environmental health risk assessment system in China, which would demonstrate and apply relevant technologies including methods and products in pilot provinces and cities. In 2020, we will conduct a drinking water-related health risk assessment in the pilot areas using monitoring data and a developed risk-assessment package. The findings of this pilot project will greatly enhance China's drinking-water health risk assessment technology. In doing so, corresponding measures may be taken for integrated water treatment and pollution control.

SUGGESTIONS ON THE NEXT STEPS FOR DRINKING WATER SAFETY

Water Safety Measures under Climate Change

With an increasing impact of human activities on climate change, measures should be taken to slow down climate change and improve the ability of human beings to cope with water safety problems. The fundamental way to mitigate climate change is to conserve available energy, develop alternative energy, and reduce greenhouse gas emissions. According to the current challenges of water shortages and uneven distribution of water resources in China, opening new water sources, reducing resource expenditure, and improving utilization rates of water resources is necessary. In addition, it is necessary to monitor the hydrology and water quality of rivers and lakes in real time. We need to enhance the development and utilization of water resources through further research of the environment, function, and structure, the interactions among the components of the aquatic ecosystem, and the implementation of the real-time early warning and prediction systems for water safety.

Supporting Scientific Research on Water and Climate Change

Climate change will have a direct impact on precipitation, evaporation, surface runoff, and soil moisture and will affect the status of the global hydrological cycle causing spatial and temporal redistribution of water resources. Further research on the impact of climate change on water, such as studying the formation mechanisms of extreme weather events on flooding, could provide a scientific basis for the rational utilization of water resources and sustainable development of the economy and society. Epidemiological studies to understand the relationship between water pollution and health and new technology and other innovations for improving the water supply and water treatment are especially needed to address the water safety issue under the changing climate.

Formulating Laws and Regulations on Environmental Health Risk Assessment and Management

The lack of a structured scientific designs, macro-level policies, and coordinated mechanisms to respond to environmental health problems at the national level must be addressed and strengthened. Although there has been successive promulgation of a series of laws and regulations dealing with prophylaxis and control of environmental pollution, we lack effective approaches to tackle health problems. There are several prominent problems in the field of environmental health. First, the construction of environmental health monitoring and scientific management is lacking and the monitoring methods are not uniform. Second, there is a shortage of strategies for addressing emergency health issues in environmental pollution. Lastly, the environmental health information disclosure system is very new and lacks an extensive public participation mechanism. In addition, China's environmental health

field does not sufficiently emphasize long-term, continuous, and systematic research-based data collection plans.

Enhancing National Drinking Water Monitoring and Establishing Relevant Health risk Assessment Systems

Departments related to drinking-water safety should strengthen infrastructure construction and drinking water treatment technology, gradually improve the monitoring network for drinking water and the ability to respond to emergency situations of drinking water pollution. Regulation of drinking water hygiene and health risk assessments and drinking water safety should be also strengthened (*12*). In particular, safe management of urban centralized water supplies and engineering quality control should be prioritized. Rural drinking water monitoring work should also be implemented. We should advance implementation strategies prioritizing health prevention and protection and focus on improving waterways with high fluoride, high arsenic, and high iodine.

The comprehensive environmental health monitoring and health risk assessment should be performed in representative cities, provinces, regions, and countrywide. It is essential to construct basic environmental and health interdisciplinary datasets, select nationally representative environmental and health monitoring sites, collect environmental and health data, and establish a comprehensive environmental and health monitoring data center. Data analysis and forecasting/warning software platforms should be utilized to augment related research in environmental health risk assessment and early warning mechanisms of drinking water quality with a focus toward human health. Finally, nationwide environmental health risk assessment systems should be built in China through pilot work conducted in representative areas.

Coordination of Environmental and Health Departments at National and Local Levels

Multi-sectoral coordination mechanisms of environmental health institutions should be established and improved, especially for water safety-related ministries. Furthermore, it is their responsibility to allocate responsibility, obligations, and working procedures to improve the quality of drinking water and responding to emergency situations. This should be done for all levels of water agencies based on their function, work base, and technical advantages. The Ministry of Ecological Environment, Ministry of Water Resources, Ministry of Housing and Urban-Rural Development, and the National Health Commission collaborate to enhance the safety of drinking water and are responsible for organizing and coordinating the management of drinking water nationally. They develop laws and regulations on sanitary standard for drinking water, quality monitoring, information management, risk assessment, and tackling environmental pollution.

Establishing an Emergency Water Supply System

The urban emergency water supply system plays an irreplaceable role in dealing with water emergency issues, such as severe water shortage and major water pollution. Therefore, the emergency water supply system should be incorporated into urban infrastructure construction and the planning of water resource development on the basis of local water resources and water safety status.

Expanding Awareness Through Publicity, Information Exchange, and Health risk Communication

The potential of environmental health promotion and education should also be considered to increase public awareness of environmental health and drinking water safety. Other suggestions include conducting national surveys on knowledge, attitudes, and practices (KAP), compiling scientific health hazard materials from experts regarding pollutants, raising public awareness of health protection, and establishing environment and health interfaces. This will lead public efforts toward the understanding of environmental indicators and scientific regulations and standards. It is also essential to establish a public environmental health information exchange platform for risk communication to address environmental health issues of great social concern, thereby enhancing the evaluation of environmental health risks and reducing public panic.

On World Water Day 2020, we should call for the following: First, we cannot afford to wait, and climate policy makers must put water at the heart of action plans. Second, water can help fight against climate change through sustainable, affordable, and scalable water and sanitation solutions. Finally, everyone can

play a role in taking surprisingly easy steps to address climate change in our daily lives.

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Notifiable Infectious Diseases Reports

Reported Cases and Deaths of National Notifiable Infectious Diseases — China, February, 2020

Diseases	Cases	Deaths
Plague	0	0
Cholera	0	0
SARS-CoV	0	0
Acquired immune deficiency syndrome	2,133	971
Hepatitis	63,330	50
Hepatitis A	1,295	0
Hepatitis B	51,506	37
Hepatitis C	9,068	12
Hepatitis D	12	0
Hepatitis E	1,045	1
Other hepatitis	404	0
Poliomyelitis	0	0
Human infection with H5N1 virus	0	0
Measles	66	0
Epidemic hemorrhagic fever	374	1
Rabies	12	13
Japanese encephalitis	0	0
Dengue	17	0
Anthrax	6	0
Dysentery	1,912	0
Tuberculosis	44,933	96
Typhoid fever and paratyphoid fever	364	1
Meningococcal meningitis	3	0
Pertussis	738	0
Diphtheria	0	0
Neonatal tetanus	3	0
Scarlet fever	580	0
Brucellosis	933	0
Gonorrhea	3,524	0
Syphilis	21,448	9
Leptospirosis	2	0
Schistosomiasis	2	1
Malaria	126	2
Human infection with H7N9 virus	0	0
COVID-19*	68,033	2,611
Influenza	59,154	22
Mumps	8,018	1

Continued

Diseases	Cases	Deaths
Rubella	306	0
Acute hemorrhagic conjunctivitis	1,672	2
Leprosy	21	0
Typhus	41	0
Kala azar	13	0
Echinococcosis	91	0
Filariasis	0	0
Infectious diarrhea[†]	45,510	1
Hand, foot and mouth disease	3,263	0
Total	**326,628**	**3,781**

* The data were from the website of the National Health Commission of the People's Republic of China.
[†] Infectious diarrhea excludes cholera, dysentery, typhoid fever and paratyphoid.
The number of cases and cause-specific deaths refer to data recorded in National Notifiable Disease Reporting System in China, which includes both clinically-diagnosed cases and laboratory-confirmed cases. Only reported cases of the 31 provincial-level administrative divisions in Mainland China are included in the table, whereas data of Hong Kong Special Administrative Region, Macau Special Administrative Region, and Taiwan are not included. Monthly statistics are calculated without annual verification, which were usually conducted in February of the next year for de-duplication and verification of reported cases in annual statistics. Therefore, 12-month cases could not be added together directly to calculate the cumulative cases because the individual information might be verified via National Notifiable Disease Reporting System according to information verification or field investigations by local CDCs.

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