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Cover Photo: Chengdu CDC staff conducting epidemiological investigations and taking pharynx test samples (photo provided by Chengdu CDC, Sichuan Province).

Preplanned Studies

Hypertension Prevalence, Awareness, Treatment, Control, and Associated Factors in the Labor Force Population — China, 2015

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Summary

What is already known about this topic?

Hypertension has become a major public health problem worldwide because of its high prevalence and various complications, and it ranks the most important risk factor for cardiovascular diseases (CVDs).

What is added by this report?

The prevalence, awareness, treatment, and control of hypertension in the labor force population in 2015 in China were 21.4%, 26.1%, 19.6%, and 6.3%, respectively. Hypertension prevalence in the labor force population remains high and the control of hypertension is still very low.

What are the implications for public health practice?

Effective public health strategies targeting the labor force population, especially older adults, males, and overweight and obese participants are needed for hypertension prevention and control.

Hypertension is a major cardiovascular risk factor and an important public health challenge worldwide. Globally, nearly 1.13 billion people have hypertension but less than 20% have their condition under control (*1*). The prevalence of hypertension among adults in China increased substantially from 18% to 23.2% between 2002 and 2012 (*2*). The awareness, treatment, and control of hypertension have been increasingly emphasized, but previous studies mainly focused on the overall population and knowledge about some specific populations such as the labor force population is limited. The labor force population was defined as 18–59 years old according to the Labor Law of the People's Republic of China. This study aimed to provide updated and reliable data on the prevalence, awareness, treatment, control and associated factors of hypertension among the labor force population in China using data from a nationally representative sample of Chinese adults.

This study used the China Chronic Disease and Nutrition Surveillance (CCDNS) in 2015, which used 298 surveillance points across 31 provincial-level administrative divisions (PLADs) and used a multi-stage stratified cluster randomized sampling method to select a representative sample of households. Local CDC invited eligible residents aged 18 years and above in the selected households to participate. Similar recruitment methods used in the CCDNS were reported elsewhere (*3*). Of the 88,250 households sampled, 123,155 subjects fulfilled criteria for being in the labor force population aged 18–59 years. We excluded 5,172 participants with missing systolic blood pressure (SBP) or diastolic blood pressure (DBP). Finally, 117,983 participants were included in the present analysis.

SBP and DBP were measured 3 times with a one-minute interval with an electronic sphygmomanometer (Omron HBP 1300) after the subjects had rested for 5 minutes in sitting position. Three readings of SBP and DBP were recorded and the average of the last two readings was used for data analysis. Information on sociodemographic characteristics (sex, age, residential area, educational level, and income), behavioral risk factors for chronic diseases (smoking, alcohol consumption, physical activity, salt intake), and body mass index (BMI) were collected through a questionnaire by face-to-face interviews with trained interviewers.

Hypertension was defined as SBP≥140 mmHg or DBP≥90 mmHg, or based on self-reported diagnosis of hypertension in hospitals at the township (community) level hospitals or above and had been taking anti-hypertensive medicine in the last 2 weeks. Awareness of hypertension was defined as a self-report of any previously diagnosed hypertension by health professionals.

Treatment of hypertension was limited to those with SBP≥140 mmHg or DBP≥90 mmHg in this surveillance and also self-reported taking a prescribed anti-hypertensive medicine over the past 2 weeks. Control of hypertension was defined as having

measured SBP<140 mmHg and DBP<90 mmHg among those with hypertension at survey.

Prevalence rates (with 95% CI*) were estimated for all and for subgroups. Sampling weights were applied to all statistical descriptions and inferences to get nationally representative estimates. The post-stratification adjustment used the 2015 Chinese population estimates from the National Bureau of Statistics. Rao-Scott chi-square tests were conducted to test for group differences in prevalence. Logistic regression models were used to examine the trends for ordered categorical variables. Multivariable logistic regression models were fit to explore the factors associated with prevalence, awareness, treatment, and control of hypertension. All statistical analyses were conducted using SAS software (version 9.4, SAS Institute Inc., Cary, USA).

Overall, 21.4% (95% CI: 20.2%–22.6%) of the study population had hypertension, including 17.2% (95% CI: 16.1%–18.3%) newly diagnosed hypertension and 4.2% (95% CI: 3.9%–4.5%) self-reported hypertension. The prevalence of hypertension was significantly higher among men than women (25.3% *vs.* 17.4%, $p<0.05$) and was higher among rural residents than urban residents (23.1% *vs.* 19.9%, $p<0.05$). Hypertension prevalence increased with age, BMI, salt intake, and alcohol consumption and decreased with education level and annual household income per capita. The awareness, treatment, and control of hypertension were 26.1%, 19.6%, and 6.3%, respectively. The awareness, treatment, and control were higher among women than men (30.2% *vs.* 23.3% for awareness, $p<0.05$; 23.6% *vs.* 16.8% for treatment, $p<0.05$; 7.7% *vs.* 5.4% for the control, $p<0.05$). It was also higher in older participants, urban residents, overweight and obese patients. (Table 1)

The treatment rate among those who were aware of their hypertension status was 75.1% (95% CI: 73.1%–77.0%). The control rate of hypertension among those receiving treatment was 32.2% (95% CI: 30.0%–34.4%). The treatment rate among those who were aware of their hypertension status increased with age ($p<0.05$) but decreased for the control among those receiving anti-hypertensive treatment. Compared with people in rural areas, hypertensive participants in urban areas tended to get more treatment among those who were aware of their hypertension status and had better control among those receiving treatment ($p<0.05$). (Table 2)

Logistic regression analysis in males and females showed that age, educational level, BMI, alcohol consumption and salt intake were associated with hypertension. Residential area and annual household income per capita were not associated with hypertension, but were associated with the awareness, treatment, and control of hypertension in both males and females. Prevalence of hypertension was higher in current smokers (25.1%) and former smokers (34.7%) than in never smokers (19.1%). However, when adjusted for other factors, current male smokers appeared to have a slightly lower hypertension rate (OR=0.90, 95% CI: 0.81–0.99) while there was no significance in females. (Table 3)

Discussion

The findings from this study showed that the burden of hypertension and lack of treatment and management in China are serious threats to public health. The labor force population bears dual responsibilities from the society and the family and is also the foundation and driving force of the sustainable development of the country. The health of the labor force is related to socioeconomic development and is also key to preventing and reducing chronic diseases of the elderly population in the future. This study showed that about one-fifth of the labor force population in China had hypertension and only one-third of them were aware of their condition. In addition, about 4 out of 5 did not receive anti-hypertensive medication, resulting in an overall control rate of less than 10%.

The prevalence of hypertension in the labor force population was higher than that in 2002, with 13.9% *vs.* 9.1% and 39.1% *vs.* 29.3% in the age groups of 18–44 years and 45–59 years, respectively. The awareness and control rates of hypertension among those receiving treatment of hypertension have improved markedly compared with the results of the 2002 China National Nutrition and Health Survey (*4*). However, awareness and control rates are much lower than those in the developed world. In European countries, less than 20% of people with hypertension were unaware of their conditions, and less than 50% of patients did not control their hypertension effectively (*5*–*6*). Moreover, the awareness, treatment, and control rates among the labor force population were worse than those in some Asian countries such as Japan and

* CI=Confidence Interval.

TABLE 1. Prevalence, awareness, treatment, and control of hypertension in the labor force population in China, 2015.

Characteristics	Prevalence						Awareness		Treatment		Control	
	Newly diagnosed (%) (95% CI)*	*p* value†	Self-reported (%) (95% CI)	*p* value	Total (%) (95% CI)	*p* value	(%) (95% CI)	*p* value	(%) (95% CI)	*p* value	(%) (95% CI)	*p* value
Total	17.2(16.1−18.3)	−	4.2(3.9−4.5)	−	21.4(20.2−22.6)	−	26.1(24.6−27.6)	−	19.6(18.2−20.9)	−	6.3(5.6−7.0)	−
Age (years)												
18−44	12.4(11.3−13.5)	<0.05	1.5(1.3−1.7)	<0.05	13.9(12.7−15.1)	<0.05	16.0(14.4−17.7)	<0.05	10.5(9.3−11.7)	<0.05	3.7(3.0−4.3)	<0.05
45−59	28.4(27.3−29.6)		10.6(10.0−11.3)		39.1(37.9−40.2)		34.5(32.8−36.2)		27.2(25.5−28.8)		8.5(7.6−9.4)	
Sex												
Male	21.0(19.6−22.5)	<0.05	4.3(3.9−4.6)	0.4439	25.3(23.7−26.8)	<0.05	23.3(21.6−24.9)	<0.05	16.8(15.4−18.2)	<0.05	5.4(4.7−6.1)	<0.05
Female	13.3(12.4−14.2)		4.1(3.8−4.4)		17.4(16.5−18.4)		30.2(28.4−32.0)		23.6(21.9−25.3)		7.7(6.7−8.7)	
Residential area												
Urban	15.5(14.0−16.9)	<0.05	4.5(4.0−4.9)	<0.05	19.9(18.2−21.6)	<0.05	29.0(26.8−31.1)	<0.05	22.4(20.5−24.2)	<0.05	8.4(7.3−9.4)	<0.05
Rural	19.2(18.2−20.2)		3.9(3.6−4.2)		23.1(22.1−24.0)		23.2(21.7−24.7)		16.8(15.4−18.2)		4.3(3.6−4.9)	
Educational level												
Illiterate or primary school	22.5(21.2−23.9)	<0.05	5.4(4.9−6.0)	<0.05	28.0(26.7−29.3)	<0.05	26.4(24.3−28.5)	0.9494	19.4(17.3−21.5)	0.1823	5.6(4.4−6.8)	<0.05
Junior high school	18.2(17.1−19.3)		4.1(3.6−4.6)		22.3(21.1−23.5)		25.0(22.9−27.1)		18.4(16.5−20.3)		5.5(4.6−6.4)	
Senior high school	14.8(13.0−16.6)		4.4(3.8−5.0)		19.2(17.0−21.4)		28.6(26.1−31.1)		22.9(20.7−25.0)		8.3(7.0−9.6)	
College and above	9.4(8.3−10.6)		2.2(1.7−2.7)		11.7(10.4−13.0)		24.6(20.2−29.0)		19.1(15.5−22.7)		8.7(6.4−11.0)	
Annual household income per capita (￥)												
<7,500	19.4(18.1−20.7)	<0.05	4.3(3.8−4.5)	0.0892	23.6(22.3−24.9)	<0.05	24.1(22.1−26.1)	<0.05	17.7(15.9−19.4)	<0.05	4.4(3.5−5.3)	<0.05
7,500−15,000	18.9(17.8−20.1)		4.4(4.0−4.8)		23.3(22.2−24.5)		25.4(23.4−27.4)		18.9(17.1−20.6)		5.7(4.7−6.6)	
15,001−25,000	18.1(16.9−19.3)		4.2(3.7−4.6)		22.3(21.4−23.6)		26.3(24.1−28.5)		18.7(16.8−20.5)		6.1(5.2−7.1)	
>25,000	14.5(12.5−16.4)		4.7(4.0−5.4)		19.2(16.8−21.6)		31.4(28.8−34.1)		24.6(22.2−27.0)		9.0(7.6−10.4)	
Body weight status (BMI categories)												
Underweight, BMI<18.5	5.0(3.7−6.2)	<0.05	0.7(0.5−1.0)	<0.05	5.7(4.4−7.1)	<0.05	18.1(13.2−22.9)	<0.05	13.0(8.9−17.0)	<0.05	3.6(1.4−5.8)	0.5053
Normal weight, BMI: 18.5−23.9	10.8(9.9−11.7)		1.9(1.7−2.1)		12.6(11.7−13.6)		20.4(18.4−22.3)		14.8(13.2−16.4)		5.9(4.9−6.9)	
Overweight, BMI: 24−27.9	21.8(20.6−23.)		5.6(5.1−6.0)		27.4(26.1−28.6)		26.9(25.2−28.5)		20.4(18.8−21.9)		6.8(5.9−7.7)	
Obesity, BMI≥28	32.5(30.7−34.4)		10.0(9.2−10.8)		42.5(40.8−44.3)		31.0(28.7−33.3)		23.5(21.5−25.6)		6.0(4.9−7.2)	
Smoking												
Never	15.2(14.2−16.2)	<0.05	4.0(3.7−4.2)	0.1604	19.1(18.1−20.2)	<0.05	26.6(25.1−28.2)	<0.05	20.7(19.2−22.1)	<0.05	6.6(5.7−7.4)	<0.05
Former smoker	25.0(22.8−27.3)		9.7(8.4−11.0)		34.7(32.7−36.8)		36.9(32.8−41.1)		28.0(24.2−31.8)		9.6(6.6−12.7)	
Current smoker	21.1(19.5−22.8)		4.0(3.5−4.5)		25.1(23.3−26.9)		23.0(20.9−25.1)		15.9(14.2−17.6)		5.2(4.4−6.0)	

TABLE 1. (continued)

Characteristics	Prevalence						Awareness		Treatment		Control	
	Newly diagnosed (%) (95% CI)*	*p* value†	Self-reported (%) (95% CI)	*p* value	Total (%) (95% CI)	*p* value	(%) (95% CI)	*p* value	(%) (95% CI)	*p* value	(%) (95% CI)	*p* value
Excessive drinking§												
Yes	31.5(29.1−33.9)	<0.05	5.7(4.9−6.6)	<0.05	37.3(34.7−39.8)	<0.05	24.0(21.6−26.4)	0.0491	15.4(13.2−17.6)	<0.05	4.4(3.3−5.4)	<0.05
No	15.9(14.9−17.0)		4.1(3.8−4.3)		20.0(18.9−21.1)		26.4(24.9−27.9)		20.3(18.9−21.6)		6.6(5.9−7.4)	
Excessive salt intake§												
Yes	19.7(18.5−20.8)	<0.05	4.6(4.19−4.9)	<0.05	24.2(23.0−25.4)	<0.05	25.8(24.0−27.6)	0.3497	18.8(17.3−20.4)	<0.05	5.5(4.7−6.2)	<0.05
No	14.7(13.5−15.9)		3.8(3.57−4.1)		18.6(17.2−19.9)		26.7(24.9−28.5)		20.7(19.1−22.4)		7.5(6.3−8.6)	
Lack of physical activity§												
Yes	16.7(15.4−18.1)	0.2978	3.5(3.2−3.8)	<0.05	20.2(18.9−21.6)	0.0127	22.6(20.5−24.7)	0.0001	17.2(15.4−19.1)	<0.05	5.47(4.6−6.4)	0.0827
No	17.3(16.2−18.5)		4.4(4.1−4.7)		21.7(20.4−22.9)		26.9(25.4−28.5)		20.2(18.8−21.5)		6.50(5.7−7.3)	

* CI, confidence interval.

† Rao-scott chi-square tests were conducted to test for differences in prevalence for unordered categorical variables and logistic regression models were used to examine the trends for ordered categorical variables.

§ According to the Dietary Guidelines for Chinese Residents, excessive drinking was defined as an average daily alcohol intake of at least 25 g for males and 15 g for females. Excessive salt intake was defined as an average daily intake more than 6 g. Physical activity insufficiency was defined as the length of moderate and high intensity activity less than 150 minutes per week.

TABLE 2. Treatment rate of hypertensive patients who were aware of their condition and control rate of those patients who received hypertension treatment in the labor force population in China, 2015.

Characteristics	Treatment rate of hypertensive patients who were aware of their condition (%) (95% CI)*						Control rate of those patients who received hypertension treatment (%) (95% CI)					
	Treatment by medical order	*p* value†	Treatment by symptoms	*p* value	Total	*p* value	Treatment by medical order	*p* value	Treatment by symptoms	*p* value	Total	*p* value
Total	73.7(72.2−75.8)	−	9.9(8.5−11.2)	−	75.1(73.1−77.0)	−	29.7(27.4−32.1)	−	1.5(1.0−1.9)	−	32.2(30.0−34.4)	−
Age (years)												
18−44	65.6(61.8−69.3)	<0.05	9.7(7.4−12.1)	0.8797	65.5(61.6−69.3)	<0.05	30.3(25.7−34.8)	0.7839	1.8(0.6−3.00)	0.4220	34.8(30.5−39.2)	0.2156
45−59	77.2(75.4−79.1)		9.9(8.5−11.4)		78.8(76.9−80.7)		29.5(27.3−31.7)		1.3(0.9−1.8)		31.3(29.1−33.5)	
Sex												
Male	70.8(68.4−73.3)	<0.05	9.3(7.7−10.8)	0.2457	72.3(69.7−74.9)	<0.05	29.1(26.3−32.0)	0.5366	1.4(0.7−2.1)	0.7862	31.3(29.1−34.6)	0.7261
Female	77.5(75.3−79.8)		10.6(8.6−12.6)		78.3(75.9−80.6)		30.3(27.5−33.1)		1.5(1.0−2.01)		32.5(29.8−35.3)	
Residence												
Urban	75.9(73.7−78.1)	<0.05	7.9(6.4−9.5)	<0.05	77.2(74.6−79.7)	<0.05	35.4(31.8−39.0)	<0.05	0.9(0.4−1.5)	<0.05	37.4(34.1−40.7)	<0.05
Rural	71.6(68.7−74.5)		12.3(10.3−14.3)		72.5(69.9−75.0)		22.3(19.9−24.7)		2.1(1.5−2.8)		25.3(22.8−27.8)	

TABLE 2. (continued)

Characteristics	Treatment rate of hypertensive patients who were aware of their condition (%) (95% CI)*						Control rate of those patients who received hypertension treatment (%) (95% CI)					
	Treatment by medical order	*p* value†	Treatment by symptoms	*p* value	Total	*p* value	Treatment by medical order	*p* value	Treatment by symptoms	*p* value	Total	*p* value
Educational level												
Illiterate or primary school	72.5(69.5−75.5)		12.6(10.4−14.9)		73.5(70.3−76.7)		26.2(22.0−30.3)		1.6(1.0−2.2)		28.9(24.8−33.0)	
Junior high school	72.4(69.1−75.8)	0.0543	9.8(7.4−12.2)	<0.05	73.5(70.4−76.7)	<0.05	27.6(23.9−31.3)	<0.05	1.6(0.8−2.4)	0.2149	29.8(26.0−33.6)	<0.05
Senior high	79.3(76.1−82.5)		6.7(4.9−8.5)		79.9(76.5−83.4)		34.8(30.9−38.6)		1.3(0.3−2.3)		36.2(32.4−40.0)	
College and above	74.9(67.8−82.1)		5.8(2.6−9.0)		77.7(72.4−83.1)		40.5(32.0−49.1)		0.7(0.5−1.8)		45.4(36.7−54.1)	
Annual household income per capita (￥)												
<7,500	72.9(69.0−76.8)		11.2(8.8−13.5)		73.2(69.9−76.4)		21.4(18.0−24.9)		1.9(0.8−3.0)		25.0(21.4−28.5)	
7,500−15,000	74.8(71.8−77.8)	0.0664	10.2(8.0−12.4)	<0.05	74.2(71.0−77.4)	<0.05	28.2(24.1−32.3)	<0.05	1.2(0.6−1.9)	0.8742	30.1(26.2−34.0)	<0.05
15,001−25,000	69.4(65.5−73.4)		9.6(7.0−12.2)		71.0(66.8−75.1)		30.8(26.6−35.0)		1.3(0.6−2.0)		32.5(28.2−36.8)	
>25,000	78.3(75.4−81.4)		6.8(5.1−8.4)		78.4(75.4−81.4)		33.2(28.9−37.5)		1.6(0.5−2.7)		36.6(32.5−40.6)	
Body weight status (BMI categories)												
Underweight, BMI<18.5	68.3(52.9−74.9)		13.3(6.2−20.4)		71.9(60.3−83.4)		23.5(9.7−37.4)		2.0(0.5−5.0)		27.6(13.9−41.4)	
Normal weight, BMI: 18.5−23.9	73.0(69.3−76.7)	0.3709	11.5(8.3−14.8)	0.2927	72.6(68.7−76.6)	0.1782	37.0(32.6−41.5)	<0.05	1.7(0.9−2.6)	<0.05	39.8(35.5−44.1)	<0.05
Overweight, BMI: 24−27.9	74.2(71.5−77.0)		9.2(7.5−10.9)		75.7(72.9−78.5)		30.4(27.5−33.3)		1.8(1.1−2.6)		33.6(30.5−36.6)	
Obesity, BMI≥28	74.6(71.5−77.6)		9.6(7.8−11.4)		75.9(72.9−78.9)		24.4(20.5−28.3)		0.8(0.4−1.3)		25.7(21.7−29.7)	
Smoking												
Never	76.6(74.5−78.1)		10.0(8.3−11.6)		77.7(75.7−79.7)		29.6(26.7−43.5)		1.4(0.9−1.9)		31.7(28.9−34.6)	
Former smoker	72.5(66.2−78.8)	<0.05	8.6(5.4−11.8)	0.9846	75.7(69.8−81.5)	<0.05	28.5(21.6−35.3)	0.7970	2.0(0.4−4.5)	0.7015	34.5(26.8−42.2)	0.6477
Current smoker	68.6(65.3−71.9)		10.1(8.2−12.0)		69.2(66.0−72.3)		30.3(26.9−33.8)		1.5(0.67−2.29)		32.5(29.0−36.0)	
Excessive drinking§												
Yes	65.3(60.2−70.3)	<0.05	10.7(7.6−13.8)	0.5559	64.2(59.4−69.0)	<0.05	27.7(22.1−33.3)	0.4551	0.4(0.1−0.6)	<0.05	28.3(22.7−34.0)	0.1595
No	75.3(73.4−77.1)		9.8(8.4−11.2)		76.7(74.7−78.7)		30.0(27.6−32.4)		1.6(1.1−2.1)		32.7(30.4−34.9)	
Excessive salt intake§												
Yes	71.3(69.0−73.6)	<0.05	11.5(9.5−13.4)	<0.05	72.9(70.6−75.3)	<0.05	26.2(23.7−28.7)	<0.05	1.6(1.0−2.1)	0.7235	28.9(26.3−31.6)	<0.05
No	77.4(74.7−80.2)		7.8(6.2−9.4)		77.8(74.6−80.9)		33.8(29.9−37.7)		1.4(0.7−2.1)		36.1(32.2−39.9)	
Lack of physical activity§												
Yes	72.6(68.4−76.8)	0.4445	10.3(7.5−13.2)	0.7284	76.3(72.5−80.0)	0.4937	29.6(25.7−33.5)	0.9519	1.3(0.1−2.6)	0.7903	31.7(27.8−35.6)	0.8490
No	74.3(72.4−76.2)		9.8(8.4−11.2)		74.8(72.8−76.9)		29.7(27.2−32.2)		1.5(1.0−2.0)		32.2(29.8−34.7)	

* CI, confidence interval.

† Rao-Scott chi-square tests were conducted to test for differences in prevalence for unordered categorical variables and logistic regression models were used to examine the trends for ordered categorical variables.

§ According to the Dietary Guidelines for Chinese Residents, excessive drinking was defined as an average daily alcohol intake of at least 25 g for males and 15 g for females. Excessive salt intake was defined as an average daily intake more than 6 g. Physical activity insufficiency was defined as the length of moderate and high intensity activity less than 150 minutes per week.

TABLE 3. Associations between factors and hypertension awareness, treatment, and control among male and female labor force populations in China, 2015.

Characteristics	Having hypertension		Awareness		Treatment		Control	
	OR(95% CI)*	*p* value	OR(95% CI)	*p* value	OR(95% CI)	*p* value	OR(95% CI)	*p* value
Male								
Age (years) (ref: 18−44)								
45−59	2.70(2.47−2.95)	<0.05	2.75(2.34−3.23)	<0.05	3.42(2.85−4.10)	<0.05	2.79(2.03−3.82)	<0.05
Residential area (ref: Urban)								
Rural	0.95(0.85−1.05)	0.3037	0.77(0.65−0.91)	<0.05	0.75(0.64−0.88)	<0.05	0.61(0.47−0.79)	<0.05
Educational level (ref: Illiterate or primary school)								
Junior high school	1.01(0.91−1.13)	0.7974	1.18(0.99−1.41)	0.0660	1.27(1.01−1.59)	<0.05	1.25(0.90−1.74)	0.1755
Senior high	0.87(0.75−1.01)	0.0693	1.24(0.97−1.58)	0.0851	1.49(1.17−1.91)	<0.05	1.32(0.88−1.96)	0.1780
College and above	0.77(0.65−0.91)	<0.05	1.47(0.99−2.18)	0.0558	1.70(1.11−2.59)	<0.05	2.09(1.24−3.53)	<0.05
Annual household income per capita (￥) (ref: <7,500)								
7,500−15,000	0.94(0.84−1.05)	0.2424	0.99(0.84−1.18)	0.9149	0.91(0.75−1.10)	0.3031	0.94(0.63−1.41)	0.7776
15,001−25,000	0.98(0.86−1.11)	0.7285	1.06(0.84−1.35)	0.6034	0.91(0.73−1.13)	0.3836	1.05(0.70−1.58)	0.8121
>25,000	0.87(0.72−1.04)	0.1172	1.37(1.10−1.71)	<0.05	1.33(1.03−1.72)	<0.05	1.65(1.09−2.49)	<0.05
Body weight status (BMI categories) (ref: BMI: 18.5−23.9)								
Underweight, BMI<18.5	0.46(0.35−0.62)	<0.05	0.69(0.46−1.03)	0.0663	0.75(0.47−1.19)	0.2242	1.79(0.68−4.68)	0.2371
Overweight, BMI:24−27.9	2.17(1.99−2.36)	<0.05	0.99(0.68−1.47)	0.9901	1.08(0.68−1.70)	0.7501	1.89(0.77−4.63)	0.1670
Obesity, BMI≥28	5.04(4.49−5.66)	<0.05	1.39(0.90−2.14)	0.1344	1.42(0.88−1.26)	0.1523	1.44(0.57−3.68)	0.4442
Smoking (ref: Never smoking)								
Former smoker	1.22(1.03−1.44)	<0.05	2.15(1.74−2.65)	<0.05	1.87(1.47−2.36)	<0.05	2.33(1.46−3.72)	<0.05
Current smoker	0.90(0.81−0.99)	<0.05	1.25(1.07−1.45)	<0.05	1.05(0.88−1.26)	0.5890	1.25(0.94−1.65)	0.1216
Excessive drinking (ref: No)†								
Yes	1.82(1.69−1.97)	<0.05	0.96(0.84−1.10)	0.5768	0.84(0.70−1.01)	0.0562	0.75(0.55−1.04)	0.0798
Excessive salt intake (ref: No)†								
Yes	1.14(1.04−1.26)	<0.05	1.00(0.86−1.17)	0.9694	0.97(0.84−1.12)	0.6867	0.96(0.72−1.28)	0.7798
Lack of physical activity (ref: No)†								
Yes	1.01(0.90−1.14)	0.8403	0.79(0.66−0.93)	<0.05	0.78(0.65−0.94)	<0.05	0.75(0.56−1.01)	0.0542
Female								
Age (years) (ref: 18−44)								
45−59	4.46(4.05−4.91)	<0.05	2.69(2.30−3.16)	<0.05	3.12(2.61−3.73)	<0.05	2.31(1.61−3.32)	<0.05
Residential area (ref: Urban)								
Rural	0.99(0.89−1.10)	0.8977	0.90(0.77−1.06)	0.2255	0.86(0.72−1.04)	0.1193	0.60(0.44−0.82)	<0.05
Educational level (ref: Illiterate or primary school)								
Junior high school	0.74(0.66−0.83)	<0.05	1.01(0.85−1.20)	0.9065	1.08(0.89−1.31)	0.4492	1.08(0.75−1.55)	0.6982
Senior high	0.63(0.55−0.72)	<0.05	1.09(0.85−1.39)	0.4931	1.12(0.85−1.46)	0.4247	1.32(0.87−1.99)	0.1920
College and above	0.41(0.32−0.52)	<0.05	0.68(0.42−1.11)	0.1200	0.77(0.46−1.29)	0.3196	1.27(0.60−2.69)	0.5258

TABLE 3. (continued)

Characteristics	Having hypertension		Awareness		Treatment		Control	
	OR(95% CI)*	*p* value	OR(95% CI)	*p* value	OR(95% CI)	*p* value	OR(95% CI)	*p* value
Annual household income per capita (￥) (ref: <7,500)								
7,500−15,000	1.06(0.94−1.20)	0.3589	1.07(0.89−1.28)	0.5054	1.12(0.92−1.38)	0.2576	1.45(0.98−2.12)	0.0604
15,001−25,000	0.91(0.81−1.03)	0.1450	1.12(0.94−1.32)	0.1982	1.08(0.91−1.29)	0.3746	1.34(0.97−1.86)	0.0775
>25,000	0.93(0.79−1.08)	0.3315	1.30(1.07−1.58)	<0.05	1.37(1.11−1.70)	<0.05	1.63(1.18−2.27)	<0.05
Body weight status (BMI categories) (ref: BMI: 18.5−23.9)								
Underweight, BMI<18.5	0.63(0.48−0.84)	<0.05	2.20(1.34−3.63)	<0.05	2.08(1.16−3.74)	<0.05	1.83(0.62−5.37)	0.2745
Overweight, BMI:24−27.9	2.36(2.18−2.56)	<0.05	2.68(1.64−4.35)	<0.05	2.52(1.42−4.47)	<0.05	1.53(0.53−4.38)	0.4325
Obesity, BMI ≥28	5.09(4.54−5.71)	<0.05	3.86(2.34−6.38)	<0.05	3.76(2.07−6.83)	<0.05	1.95(0.62−6.14)	0.2566
Smoking (ref: Never smoking)								
Former smoker	0.92(0.54−1.55)	0.7418	1.41(0.65−3.04)	0.3870	1.39(0.61−3.16)	0.4392	1.45(0.65−3.22)	0.3630
Current smoker	0.86(0.69−1.08)	0.1823	1.17(0.82−1.67)	0.3946	1.36(0.92−2.00)	0.1206	2.21(1.41−3.48)	<0.05
Excessive drinking (ref: No)†								
Yes	0.92(0.68−1.25)	0.5872	0.48(0.34−0.67)	<0.05	0.38(0.26−0.56)	<0.05	0.16(0.06−0.42)	<0.05
Excessive salt intake (ref: No)†								
Yes	1.17(1.06−1.29)	<0.05	0.87(0.75−1.01)	0.0603	0.85(0.71−1.01)	0.0628	0.66(0.52−0.84)	<0.05
Lack of physical activity (ref: No)†								
Yes	0.99(0.88−1.13)	0.9741	0.95(0.78−1.17)	0.6450	1.04(0.86−1.27)	0.6775	1.23(0.85−1.78)	0.2807

* CI, confidence interval.

† According to the Dietary Guidelines for Chinese Residents, excessive drinking was defined as an average daily alcohol intake of at least 25 g for males and 15 g for females. Excessive salt intake was defined as an average daily intake more than 6 g. Physical activity insufficiency was defined as the length of moderate and high intensity activity less than 150 minutes per week.

Republic of Korea (*7*–*8*). These disparities are partly due to barriers in the health care system such as lack of access to care, low patient health literacy, and costly medications in different development levels.

Among hypertensive patients, only 20% of the hypertensive population were self-reported and 17.2% were newly diagnosed with hypertension indicating that hypertension remained largely undetected partly because many patients experienced almost no symptoms and were unaware of their condition. This is especially true in rural areas where blood pressure measurements during the first visit and routine blood pressure screening among communities is underutilized. The multivariable logistic regression models showed that although the prevalence between urban and rural areas had no significance, labor force population in rural areas had lower odds for awareness, treatment, and control rates. Moreover, rural residents had higher control rates among treated hypertensive participants by symptoms but lower control rates among treated hypertensive participants by medical order compared with counterparts in urban areas. This could be explained by the difference in the socioeconomic conditions and the access and quality of health services.

Age is one of the factors that affects the prevalence, awareness, treatment, and control of hypertension. The odds for hypertension were higher in older adults than that in younger adults especially in females, but younger adults had lower odds in the awareness, treatment, and control of hypertension both in males and females. The results indicate that younger adults are more likely to neglect their own health and have more adverse life habits, which may cause hypertension-related complications and increase the probability of mortality (*9*). Hypertensive patients aged 35 years and above were included in the National Basic Public Health Service Project, which were provided with free management services by the local primary health care workers, while the younger hypertensive

patients lack standardized management and have poor compliance. So popularizing the importance of self-management of hypertension is vitally important to initiating a healthy lifestyle and promote self-examination of hypertension to prevent hypertension from an early age.

Gender differences were also revealed in the prevalence, awareness, treatment, and control of hypertension. Women had a lower prevalence but were more likely to be aware of hypertension, take hypertension treatment, and control their condition when compared to men. Studies have shown that men usually face higher social pressure and have more opportunities to be exposed to risk factors of chronic diseases such as smoke and alcohol. Women have more contact with the health care system and are more likely to seek medical attention if they have an episode of illness.

This study found that income inequality was associated with the awareness, treatment, and control of hypertension. Those with lower annual household income tended to have lower rates of awareness, treatment, and control, which was consistent with findings in some other middle-income countries (*10*). Psychosocial mechanisms suggest that people with more economic resources may be less likely to feel frustrated or inferior when comparing to those with fewer economic resources (*11*). They also have more financial resources to cover related medical costs and can get more social support after being diagnosed with hypertension.

This study found an inverse association between smoke and hypertension in males and there was no association between smoke and hypertension in females. This is probably due to reverse causation and the fact that men with hypertension are more likely to be advised by their doctors to quit smoking. Additionally, we found that former male smokers were more aware of their hypertension and had better control than never-smokers. This could be explained by people knowing that they were hypertensive were more likely to quit smoking and paid more attention to their health status (*12*). This pattern was also found in a study from Canada (*13*). Other behavioral risk factors such as alcohol consumption, excessive salt intake and lack of physical activity were also related with hypertension. Having a healthy lifestyle is important for preventing hypertension.

This study was subject to a few limitations. First, this was a cross-sectional study, which cannot test causality or rule out reverse causation, particularly for smoking. Second, the awareness and treatment status of hypertension were self-reported, which may incur errors and recall bias.

In conclusion, hypertension prevalence in the labor force population was high in China. Although the rate of awareness, treatment, and control of hypertension has increased markedly, challenges still exist in how to identify hypertensive individuals who are unaware of their hypertension and how to provide primary care. Effective public health strategies targeting at the labor force population, such as older adults, males, overweight and obese participants, are needed for hypertension prevention and management.

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Preplanned Studies

Unintentional Injury Mortality Among Children Under Five Years — China, 2006–2017

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Summary

What is already known about this topic?

Unintentional injuries among children aged under five years is still a serious public health problem in China. Epidemiological characteristics of under-five unintentional injury are reported in single provinces and cities for China but not nationally based on the Disease Surveillance Points (DSPs) dataset.

What is added by this report?

Unintentional injury mortality rates for under-five decreased substantially between 2006 and 2017 in China, with the decrease occurring primarily for males and rural children. Children living in rural areas and males had higher unintentional injury mortality rates than children in urban areas and females. The major fatal types of under-five unintentional injury were drowning and road injury.

What are the implications for public health practice?

Further interventions need to be taken in accordance with the main types of unintentional injuries, especially effective prevention strategies used in other countries or recommended by the World Health Organization (WHO). Even with equal access to injury prevention and control services for different sexes, policy efforts should focus on higher-risk populations, especially children aged under five years who are males or reside in rural areas.

Unintentional injury is a serious public health problem for Chinese children under age five, and no reports examine the latest trends of unintentional injury mortality for children under age five in China at a national level. Using China's Disease Surveillance Points (DSPs) data, percent change in mortality between 2006 and 2017 was estimated based on the mortality rate ratio, which was obtained via negative binomial regression. This study reported that unintentional injury mortality rates for children under age five decreased substantially between 2006 and 2017 in China, with the decrease occurring primarily for males and for children residing in rural areas, and that the major types of fatal unintentional injury were drowning and road injury. In the future, further unintentional injury interventions should be taken based on the major types of unintentional injury and populations that are at higher risk. Effective prevention strategies used in other countries or recommended by the World Health Organization (WHO) should be considered for implementation in China.

Unintentional injury was the third leading cause of under-five mortality in China and the first leading cause of death for children aged between one to five years in China in 2015 (*1*). To date, no the national level studies examine unintentional injury mortality by sex, by geographic area (rural or urban), and by type nor the latest trends for children under age five in China.

Limited published evidence reported under-five unintentional injury mortality trends in China were from single provincial-level administrative divisions (PLADs) or for single types, such as one conducted in Sichuan Province (*2*) and another for unintentional suffocation (*3*).

Using China's DSPs dataset, the report examine the changes of under-five unintentional injury mortality by location (urban/rural), sex, and type from 2006 to 2017 to analyze the epidemiological characteristics of unintentional injuries for children under-five in China, which may help policy-makers make well-informed decisions to promote the prevention and control of unintentional injuries.

Mortality data were extracted from the DSPs data set, and the methods have been described elsewhere (*3*). The causes of death are determined by trained coders from local hospitals and China CDC based on the 10th edition of the International Classification of Diseases (ICD-10) (*4*). ICD-10 codes of unintentional injuries in DSP system is "V01-X59".

Sex, type of geographic residence (urban or rural), and specific types of unintentional injury were considered in data analysis. Under-five mortality rates from 2006–2017 were calculated as number of deaths

divided by the corresponding population. Unintentional injury was divided into six groups according to the types: 1) road injury (V01-V98), 2) drowning (W65-W74), 3) falling (W00-W19), 4) poisoning (X40-X49), 5) fire (X00-X09), and 6) other unintentional injuries (W20-W64, W75-W99, X10-X39, X50-X59).

Percent change in mortality between 2006 and 2017 was estimated based on mortality rate ratio, which was calculated as (mortality rate ratio – 1) ×100%*. Using standard errors of regression coefficients, 95% confidence intervals (95% CI†) of mortality rate ratio and percent change in mortality between 2006 and 2017 were calculated furtherly. Stata 16 software (StataCorp LLC. Texas, USA) was used for data analysis. $p<0.05$ was considered statistically significant.

For children under-five years, unintentional injury mortality showed a fluctuating downward trend from 2006 to 2017. Under-five unintentional injury mortality rates showed a general increasing trend from 2006 to 2008, rising from 25.27 to 34.70 per 100,000 population. Between 2008 and 2017, the mortality rates continuously decreased to 17.55 per 100,000 population in 2017.

Males and rural children aged under five years of age had higher unintentional injury mortality rates than females and urban children across the study time period. Sex subgroups followed a similar changing pattern in the unintentional injury mortality rate from 2006 to 2017. However, under-five unintentional injury mortality rates in rural areas fluctuated greatly from 2006 to 2017, with one peak in 2008 (35.78 per 100,000 population) and another peak in 2011 (35.07 per 100,000 population). The under-five unintentional injury mortality in rural areas rose by 18.63% between 2006 and 2008 and then decreased by 45.08% between 2008 and 2017. The under-five unintentional injury mortality in urban areas had a little fluctuation with one peak in 2011 (19.57 per 100,000 population) and rose by 28.49% between 2006 and 2011 before decreasing by 32.04% between 2011 and 2017. The mortality rate in urban areas did not change significantly over time for urban children [–13%, 95% CI (–25%, 1%)], but decreased substantially for males [–34%, 95% CI (–40%, –29%)], females [–26%, 95% CI (–33%, –18%)], and rural children [–35%, 95% CI (–40%, –30%)] between 2006 and 2017. (Table 1)

As shown in Figure 1, road injury is the most common type of unintentional injuries for children aged under five years, accounting for 57.44% of fatal unintentional injuries among that age group between 2006 and 2017. In addition, drowning caused 35.53% of unintentional injury mortality. Drowning mortality decreased 49.95% between 2006 and 2017 from 10.43 to 5.22 per 100,000 persons for children aged under five years. However, road injury mortality for children under five decreased only by 7.56%, from 4.63 to 4.28 per 100,000 persons between 2006 and 2017.

Discussion

This study reports three major findings: 1) unintentional injury mortality rates for children under five years old decreased substantially between 2006 and 2017 in China, with the decrease occurring primarily

TABLE 1. Change in unintentional injury mortality for children aged under five years in China, 2006–2017.

Sex/Geographic residence	Mortality rate (per 100,000 persons)												Percent change in rate(%)* (95% CI)	Pseudo r-Squared
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
Total	25.27	26.60	34.70	33.01	31.47	30.31	27.89	23.73	23.70	19.92	19.96	17.55	−30 (−35, −25)†	0.37
Sex														
Male	30.37	30.60	40.79	37.63	38.36	36.59	31.74	27.00	26.81	23.20	22.51	19.84	−34 (−40, −29)†	0.36
Female	19.94	22.27	28.13	28.02	24.03	23.47	23.33	19.82	19.94	15.98	16.90	14.80	−26 (−33, −18)†	0.34
Geographic residence														
Urban	15.23	16.80	17.93	17.03	19.00	19.57	14.94	18.45	17.94	15.11	15.32	13.30	−13 (−25, 1)	0.26
Rural	30.16	31.39	35.78	33.16	29.76	35.07	34.24	26.18	26.37	22.22	22.20	19.65	−35 (−40, −30)†	0.35

Abreviation: CI=Confidence Interval.
* Percent change in rate was calculated as (mortality in 2017 / mortality in 2006 − 1) × 100%.
† $p<0.05$.

* Mortality rate ratio is denoted as "eb" and obtained via negative binomial regression; e approximately equals 2.7183 and b signifies the regression coefficient.
† CI=Confidence Interval.

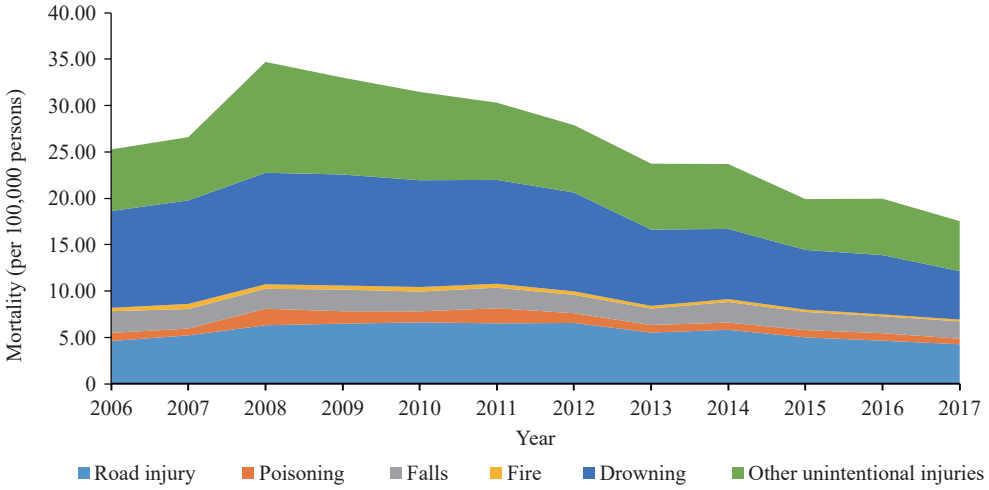

FIGURE 1. Unintentional injury mortality among children under five years by specific types in China, 2006–2017.

for males and for rural children; 2) children living in rural areas and males had higher unintentional injury mortality rates than children in urban areas and females; and 3) the major types for fatal unintentional injury were drowning and road injury.

The change patterns revealed by this study in China are similar to those reported by previous studies based on the World Health Organization (WHO) mortality dataset (*5*). It also is consistent with the trends reported for Sichuan Province based on the National Health Statistics Survey (NHSS) data (*2*). The downward unintentional injury mortality trends may benefit from public health policies and attempts to reduce unintentional injuries in China such as the Ministry of Health (now the National Health Commission) in China incorporating injury control into the scope of disease control in 2002, the establishment of the National Injury Surveillance System (NISS) in 2006, and the issuing of a series of technical guidelines for injury intervention in 2011.

The overall unintentional injury mortality from the DSP dataset (ranging from 25.27 to 17.55 per 100,000 persons from 2006 to 2017) is lower than the estimate from the Global Burden of Disease (GBD) 2017 update over the same time period (from 67.57 to 31.06) (*6*). The difference may be interpreted as the result of using different data sources and adjustment methods. For instance, the GBD study group adopts multiple data sources for China and then adjusts by reallocating inferior codes that reflect inaccurate or ambiguous data (*7*).

Across the study time period, under-five males were at higher risk of fatal unintentional injuries compared to females, which is corroborated by similar relationships found in other countries such as India (*8*). This difference may be caused mainly by differences in biological temperament, cognitive strategies, exposure opportunity, and gender socialization. More dangerous and impulsive activities and consequent increased environmental exposure or lower parental restraint have been suggested as explanations for the increased mortality due to injuries among males. Compared to 2006, however, the gap of unintentional injury mortality rate in gender in 2017 is decreasing, revealing that having equal access to injury prevention and control services for different sexes in China might affect the mortality outcomes.

Compared to urban areas, children aged under five years in rural areas were at a higher risk of fatal unintentional injuries. The result is consistent with other studies observed in single PLADs in China, such as Chongqing Municipality (*9*). This may be caused by the inadequate adult supervision, low safety awareness, and less knowledge among rural adult caretakers of children and relatively weak prehospital aid and hospital treatment for the injured children (*8*). However, due to the rapid urbanization and infrastructural development of China and the enhanced safety awareness and injury knowledge among caregivers, the unintentional injury mortality for children under five years old in rural areas decreased substantially.

Across the study time period, drowning and road injury were the two leading fatal unintentional injury types in China. Deaths due to drowning were the most common in rural parts of low- and middle-income countries where exposure is greater to open natural bodies of water (unintentional falls occur most often in

natural bodies of water). Furthermore, reliable adult supervision is relatively rare in China and most natural bodies of water are not surrounded by physical barriers. Young children are at higher risk owing to lack of ability to identify and avoid water danger. But with urbanization, industrialization, and a series of effective interventions, the drowning mortality decreased substantially in China (*10*). Road injuries among children under five years old are also notable in China as the high risk of road injuries for children under five years old may be related to several factors including young children lacking the ability to identify and avoid road traffic danger when playing outside, young children have difficulty being seen in traffic due to their short stature, and the caregiver's perception of risk plays an important role in protecting young children from the risks of traffic injury. In response to rapid urbanization in China, the Chinese government implemented several effective interventions and regulations to prevent road injuries, which decreased associated mortality to an extent.

This study is subject to at least one limitation. Web-based reporting systems for the DSPs had been set up in 2008, which may have caused some fluctuations in unintentional injuries mortality rates because changing reporting methods created potential bias in unintentional injuries death reporting compared with prior years.

The findings have policy implications. First, the study reports a general decreasing trend in unintentional injury mortality among children aged under five years in China from 2006 to 2017. Although a series of measures to prevent unintentional injuries in China have been taken, having a population of 1.4 billion people require further unintentional injury interventions to be taken based on the major types of unintentional injury. Second, male children and children residing in rural areas were at higher risk of fatal unintentional injuries. Even having equal access to injury prevention and control services for different sexes, policy efforts might focus on those higher at-risk populations. In the future, effective prevention strategies used in other countries or recommended by the WHO might be introduced to China and culturally tailored for dissemination including removing or covering water hazards, strengthening traffic safety education of caregivers, and requiring using child restraints properly.

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Healthy China

Healthy Environment Promotion Campaign in Healthy China Initiative

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Summary

On July 15, 2019, the State Council of China issued new guidelines for the implementation of the country's Healthy China Initiative (2019–2030) and for the promotion of population health across the nation. This article interprets Healthy Environment Promotion Campaign (HEPC) in the Healthy China Initiative from four main aspects—background, major indices, strategies, and features. Two outcome indices and four advocacy indices are proposed by the HEPC, and the strategies are mainly embodied at three levels: individual/family, society and government. The strategies have the following features: 1) the strategies are developed on the basis of scientific evidence; 2) the strategies advocate that citizens must be responsible for their own health; 3) the administrative impetus provided by the Chinese government to integrate health into all policies is an important driver for developing and implementing the HEPC; and 4) HEPC is not an isolated campaign, so it is necessary to coordinate all 15 campaigns in order to proactively and properly implement HEPC.

Introduction

On July 15, 2019, the State Council of China issued a new guideline to implement the country's Healthy China Initiative (2019–2030) and promote population health across the nation. With a focus on disease prevention and health promotion, the guideline has proposed 15 special campaigns to reduce risk factors, protect residents' health through the course of their entire lives, and prevent and control major diseases. An action plan for 2019–2030 (*1*) has also been made public, specifying the objectives and tasks of each campaign as well as the responsibilities of different sectors and stakeholders in the campaigns. The Healthy Environment Promotion Campaign (HEPC), one of the fifteen special campaigns, focuses on major environmental factors affecting health.

Background of HEPC

Presently, China's environmental pollution problem is increasingly prominent due to the combined effects of rapid economic development, globalization, population growth, urbanization, and changing consumption behaviors. More than 1.7 million people aged 65 years and older in China in 2010 were estimated to have premature mortality related to $PM_{2.5}$ exposure (*2*). Water, sanitation, and hygiene (diarrhea only) accounts for 2.5 disability-adjusted life years (DALYs) /1,000 capita/year, and the disease burden caused by environmental pollution accounts for about 21% of the total disease burden in China as estimated by the World Health Organization (WHO) (*3*). In addition, environmental factors can affect accidental and non-accidental injuries such as traffic accidents, drowning, and poisoning, which accounted for 7.0% of total deaths and 10.0% of all-cause DALYs in China (*4*) in 2017.

To deal with the severe environmental pollution problem, the National People's Congress revised and published a series of laws and regulations such as *Environmental Protection Law of the People's Republic of China and Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution* in 2014 and 2015, respectively. In 2013, 2015, and 2016, the State Council issued action plans for the prevention and control of air pollution, water pollution, and soil pollution, respectively. In 2016, the Chinese government held a national health conference and subsequently announced the Outline of the Healthy China 2030 Plan, in which building a healthy environment is one of the five key strategies. The National Health Commission (NHC), the Ministry of Ecology and Environment (MEE), and other relevant government departments have conducted in-depth

studies on the relationship between the environment and human health. The monitoring networks on air pollution, drinking water, and rural environmental health have also been established in all provincial-level administrative divisions (PLADs) to improve the capability of monitoring, detecting, preventing, and controlling environment-related diseases in China (*5*).

Although the government has played a leading role, the health of the society is inseparable from the combined efforts of all communities and members. Chinese citizens, who play a key role in HEPC, lack the necessary personal health protection awareness and knowledge (the residents' environmental health literacy rate was as low as 12.8% in 2018 as shown in Table 1), which makes it more difficult to solve environmental problems effectively. Thus, HEPC emphasizes not only the actions of the government but also the efforts of individuals, families, and the society overall.

Major Indices of HEPC

Two outcome indices are proposed by HEPC, as listed in Table 1.

In recent years, centralized water supplies have been fully achieved in Chinese cities, standard compliance of drinking water quality in urban and rural areas has reached about 80% and 70%, respectively, and the morbidity and mortality of water-borne diseases have been greatly reduced. However, nearly one third of China's water sources is of poor quality and cannot be used as drinking water, and water treatment facilities and processes are outdated. Therefore, ensuring drinking water safety, which is one of the 2030 United Nations Sustainable Development Goals (SDGs), is also one of the most important goals of HEPC.

Residents' environmental health literacy rate, which is the percentage of residents with environmental literacy (ability to read and understand environmental health information), is set to reach more than 15% by 2022 and 25% by 2030 given the baseline rate of 12.5% in 2018. Environmental health literacy is mainly related to residents' unhealthy lifestyle and is recognized as one of the most basic, cost-effective measures to create a healthy environment and improve residents' overall health level.

Four advocacy indices are also proposed by HEPC including garbage classification, prevention and control of indoor air pollution, emergency response training, and improvement in the knowledge and capability of self-health protection. All the advocacy indices emphasize changing attitudes into action. Take garbage classification as an example: according to the *2019 Survey Report on Environmental Behaviors Among Chinese* (*6*) issued by the Ministry of Ecology and Environment of China, more than 90% of the respondents realized that garbage classification is important, but only about 30% of them thought that they had done it well, which indicates a major difference between perceptions and actions among Chinese residents.

Both the current state and progress of outcome and advocacy indices will be taken as the basis for monitoring and evaluation. The national committee for HEPC shall take the lead to carry out the overall monitoring and evaluation work at the national level, and all PLADs in China shall formulate their own plans for monitoring and evaluation at a local level.

HEPC Strategies

HEPC strategies are mainly embodied at three levels: individual/family, society, and government. There are seven strategies at the individual and family level: improve environmental health literacy, enhance clean environments, adopt a simple and healthy lifestyle, reduce indoor air pollution, increase awareness of outdoor health protections, avoid traffic accidents, and avoid drowning accidents.

There are six strategies at the societal level: create healthy and comfortable community environments, increase consciousness of environmental protection for enterprises, reduce damage caused by over-consumption, clean central air conditioning, reduce accidental injury in public buildings, and disseminate environmental health knowledge including regularly conducting emergency response training for natural

TABLE 1. Major outcome indices proposed by Healthy Environment Promotion Campaign.

Indices	Target date	
	2022	2030
1. Standards compliance of drinking water quality	Significantly improved	Continuously improved
2. Residents' environmental health literacy rate	≥15% Baseline rate:12.5% (2018)	≥25%

disasters and emergencies such as fires and earthquakes in schools, hospitals, and other densely populated places.

The HEPC has developed seven strategies for departments in the government, and each strategy is led by one or several departments as shown in Table 2.

Features of the Strategies

The strategies of HEPC have the following features:

Firstly, the strategies of HEPC are developed on the basis of scientific evidence. As 80% of global diseases are related to drinking water pollution and ambient particulate matter pollution is one of the four leading risk factors contributing to deaths and DALYs (*7*), the HEPC's strategies mainly focus on controlling health hazards associated with water and air quality, which is also in line with priorities of developed countries. For example, environmental quality was identified as an important factor and the Air Quality Index (AQI) was set as one of the 26 leading health indicators (*8*) in *Healthy People 2020,* which is the fourth ten-year plan on national health issued by the US Department of Health and Human Services (HHS). *Healthy People 2020* emphasizes six aspects—outdoor air quality, surface and ground water quality, toxic substances and hazardous wastes, home and communities, infrastructure and surveillance, and global environmental health.

Secondly, as the role of health services in the Healthy China 2030 blueprint is in the transition from basic disease treatment to prevention and health promotion, the strategies of HEPC advocate that citizens must be responsible for their own health. In the First World Health Promotion Conference held in Ottawa, Canada in 1986, five areas of action for health promotion were proposed, one of which was the development of personal skills. In addition, the New Health Development Strategy formulated by the Japanese government in 2007 was focused on improving health literacy among their residents. The US government has also expected to reduce fiscal expenditure by improving national health literacy (*9*). Thus, China's strategy is consistent with international practices.

Thirdly, the HEPC strategy is in line with the concept of Health in All Policies (HiAPs) proposed by the WHO. HiAPs is a strategy that introduces goals that can be shared across all government departments, improves health outcomes among the population, and closes the health gap among different socio-demographic groups. For example, an increase in the density of footpaths and construction of bicycle lanes in cities has reduced the morbidity of hypertension, diabetes, and ischemic heart disease in the US (*10*). In China, as far as 2007, the *National Action Plan on Environment and Health* was jointly formulated and published by 18 ministries and commissions of the central government, and a leading group of national environment and health work, as well as a multi-sectoral cooperation mechanism in which each department promotes environmental health collaboratively, was established. HEPC is a continuation and development of the *National Action Plan on Environment and Health* with greater emphasis on individual and family responsibilities. The administrative impetus provided by the Chinese government to integrate health into all policies serves as a powerful driving force for HEPC.

Finally, HEPC is an independent but not isolated campaign as women, children, primary and secondary school students, and the elderly are more affected by environmental factors, which are also an important cause of the four chronic noncommunicable diseases,

TABLE 2. Healthy Environment Promotion Campaign strategies for the government.

Strategies	Leading Department
1. Formulate construction norms and evaluation indicators for healthy communities, workplaces (enterprises), and schools.	National Health Commission (NHC)
2. Establish environmental and health investigations, monitoring and risk assessment systems, and strengthen the construction of injury monitoring networks.	National Health Commission (NHC)
3. Prevent and control environmental pollution. Improve citizens' environmental and health literacy.	Ministry of Ecology and Environment (MEE)
4. Improve drinking water engineering facilities, urban public safety infrastructure, solid waste recycling facilities, and public fire-fighting facilities and improve emergency response capability.	8 Departments include: National Development and Reform Commission (NDRC), MEE, et.al.
5. Conduct life protection projects for traffic safety to reduce traffic injury accidents.	Ministry of Transport (MOT)
6. Create safety assessments and supervision of consumer products to improve the product injury monitoring and reporting system.	State Administration for Market Regulation (SAMR)
7. Research the health effects of compound pollution and health protection.	National Health Commission (NHC)

examples including cardiovascular and cerebrovascular diseases, cancers, chronic respiratory diseases, and diabetes, targeted by the *Healthy China Initiative (2019–2030)*, so it is necessary to coordinate all the 15 campaigns in order to proactively and properly implement HEPC.

Conclusion

The Chinese government has recently developed the Outline of the Healthy China 2030 Plan, in which building a healthy environment is one of the five key strategies. The Healthy Environment Promotion Campaign of Healthy China Initiative (2019–2030) is a continuation and development of the *National Action Plan on Environment and Health* with greater emphasis on individual and family responsibilities. The administrative impetus provided by the Chinese government to integrate health into all policies is an important driver for developing and implementing HEPC. A healthier China can be foreseen.

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Notifiable Infectious Diseases Reports

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

Diseases	Cases	Deaths
Plague	0	1
Cholera	0	0
SARS-CoV	0	0
Acquired immune deficiency syndrome	2,759	952
Hepatitis	112,087	100
Hepatitis A	1,251	1
Hepatitis B	91,026	80
Hepatitis C	17,287	17
Hepatitis D	19	0
Hepatitis E	1,626	1
Other hepatitis	878	1
Poliomyelitis	0	0
Human infection with H5N1 virus	0	0
Measles	205	0
Hemorrhagic fever with renal syndrome	684	3
Rabies	19	19
Japanese encephalitis	3	1
Dengue	71	0
Anthrax	10	0
Dysentery	3,309	3
Tuberculosis	67,682	142
Typhoid fever and paratyphoid fever	513	0
Meningococcal meningitis	17	2
Pertussis	1,141	0
Diphtheria	0	0
Neonatal tetanus	5	0
Scarlet fever	6,352	1
Brucellosis	2,445	1
Gonorrhea	8,254	4
Syphilis	39,671	25
Leptospirosis	6	0
Schistosomiasis	4	0
Malaria	348	2
Human infection with H7N9 virus	0	0
COVID-19	11,791	259
Influenza	986,543	108
Mumps	17,159	4

Continued

Diseases	Cases	Deaths
Rubella	1,199	0
Acute hemorrhagic conjunctivitis	2,139	0
Leprosy	26	0
Typhus	59	0
Kala azar	15	0
Echinococcosis	286	0
Filariasis	0	0
Infectious diarrhea*	121,473	1
Hand, foot and mouth disease	28,355	1
Total	**1,414,630**	**1,629**

* Infectious diarrhea excludes cholera, dysentery, typhoid fever and paratyphoid fever.

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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