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Announcements

The 33rd World No-Tobacco Day — May 31, 2020

Tobacco use poses an enormous threat to public health worldwide, killing more than eight million people every year (*1*). In 1987, the World Health Assembly of the World Health Organization (WHO) designated April 7, 1988 as World No-Tobacco Day (WNTD) (*2*) to encourage all persons worldwide who smoke or chew tobacco to quit for at least 24 hours. Extensive press coverage of this event stimulated and identified a range of policy and health education activities linked to the event, and the specific theme was "Tobacco or Health: Choose Health" (*3*). The second WNTD was held on May 31, 1989 and emphasized the theme "Women and Tobacco—The Female Smoker: At Added Risk" (*4*). From then on, May 31 has been recognized as WNTD and gradually became a year-long campaign beginning on that day. This day aims to discourage tobacco users from consuming tobacco and to encourage governments, communities, groups, and individuals to become aware of the problem and take appropriate action.

The WNTD theme changes every year, and for the 33rd WNTD arriving on May 31, 2020, the theme of this year's WNTD will be "The secret's out — if your product killed 8 million people each year, you'd also target a new generation." In China, Healthy China 2030 targeted "reducing the smoking prevalence of people over 15-years-old to 20% by 2030". Protecting new generations from tobacco use is a crucial link to achieve this goal, and although much progress has already been achieved, there is much more work to be done.

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Preplanned Studies

Tobacco Use and Exposure Among Secondary School Students — China, 2019

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Summary

What is already known about this topic?

Using the framework of the global youth tobacco survey (GYTS), China CDC conducted the first round of a national tobacco survey among junior high school (JHS) students in 2014, indicating that 17.9% and 5.9% of respondents were experimental and current cigarette smokers, respectively.

What is added by this report?

China CDC implemented a second round of the survey in 2019 and included senior high school (SHS) and vocational senior high school (VSHS) students. Experimental and current cigarette use was much higher among VSHS (30.3%, 14.7%) and SHS (21.6%, 5.6%) students than in JHS students (12.9%, 3.9%). Minors being able to buy cigarettes without refusal, tobacco advertisements and promotions on movies, TV, and at retail outlets, parents smoking, and teacher smoking in school were also widely prevalent.

What are the implications for public health practice?

Despite positive changes from 2014 to 2019, the external factors compelling teenagers to smoke were extensive. The priority for tobacco control among secondary school students should be strengthening the implementation of existing laws and regulations and developing targeted policies and measures for VSHS.

Using the framework of the global youth tobacco survey (GYTS), China CDC conducted the first round of tobacco survey among junior high school (JHS) students with a nationally and provincially representative sample in 2014 (2014 youth survey). A three-stage stratified cluster random sampling design was used in the survey. The selection of survey points (districts and counties) from each provincial-level administrative division (PLAD) of the mainland of China in the first stage and JHSs from each survey

point in the second stage were implemented using a proportionate to population size sampling scheme (PPS), and students were randomly sampled in the third stage. The data was collected by students answering paper-based questionnaires, and 155,117 respondents were analyzed in total (total (*1*). To continuously provide evidence for policy-making and evaluation, China CDC implemented the second round of the epidemiological survey in 2019, in which the senior high school (SHS) and vocational senior high school (VSHS) students were included for the first time (2019 teenager survey). In this study, we report selected main findings of the 2019 teenager survey as relevant to cigarette smoking, availability, tobacco advertisements and promotion, and smoking exposure.

A method of multistage stratified cluster random sampling was also applied in the 2019 teenager survey. First, 5 districts (for urban areas) and 5 counties (for rural areas) were selected in each PLAD of the mainland of China by PPS. Second, 3 JHSs, 2 SHSs, and 1 VSHS in each participating district/county were also selected using the PPS method. Both private and public schools were included in the original sampling frame and each school must have had more than 40 students otherwise it would be excluded. Third, one class in each grade of a selected school was randomly identified and all the students in the class were investigated. The sampling was carried out by the China CDC in coordination with local health and education authorities.

Standardized paper-based questionnaires were distributed to students by trained investigators during school hours and centrally but independently completed by students with no teachers present. The quality controllers checked the completeness of all finished questionnaires. The provincial supervisors randomly selected 5% of respondents in each district or county and re-investigated using parts of the questionnaire to examine the accuracy. The subsequent data entry was completed by a professional company, and the entry quality (<5/10,000 error rate) was guaranteed by sampling checks. The data were further processed by accounting for missing data, outlier values, and logic mistakes for final utilization.

Questions included primary information (school, grade, class and individual), cigarette use, addiction, cessation, e-cigarette, secondhand smoke exposure, tobacco availability, price, tobacco advertisements and promotion, smoking cognition and attitude, and tobacco control propaganda. Experimental smokers (ES) were those who had smoked cigarettes in the past including those who may have taken only one or two puffs. Current smokers (CS) were those who had smoked a cigarette at least one day in the past 30 days.

Weighting strategies based on a complex sampling design were applied to parameter estimation (*2*). Point values and 95% confidence intervals (CI) for each parameter were calculated and reported in this study. The difference of values with no overlap in CI is identified to be statistically significant between subgroups. All analyses were done with SAS (version 9.4; SAS Institute, Inc. Cary, NC, USA).

A total of 288,192 students participated in the survey, including 147,270 JHS students, 106,432 SHS students, and 34,490 VSHS students. The overall response rate was 94.8%.

ES prevalence rate among secondary school students was 17.9%, with 12.9%, 21.6%, and 30.3% for JHS, SHS, and VSHS students, respectively, and higher rates in male students (17.9%, 33.6%, and 43.2%) than in female students (7.2%, 10.2%, and 14.0%), respectively. The overall CS prevalence rate was 5.9% and the highest was observed among VSHS students (14.7%), and then SHS (5.6%) and JHS (3.9%) students with higher rates in male students (23.3%, 10.0%, and 5.8%) than in female students (3.7%, 1.4%, and 1.8%). For both ES and CS, the prevalence rates were higher in rural areas than in urban areas for JHS and SHS mainly among male students; VSHS showed no statistical differences. Significant regional disparities were present between schools for both ES and CS. High ES and CS were mainly from PLADs of the Southwest (Tibet, Yunnan, and Guizhou), as well as Hunan and Qinghai for JHS and SHS. Comparatively, the ES and CS prevalence rates were higher in the Southwest (Yunnan and Guizhou) and the North (Heilongjiang, Inner Mongolia) for VSHS. (Table 1, Figure 1)

Overall, among students who had experienced the following scenarios in the 30 days before the date of investigation, 76.5% of CS from JHS reported that they had not been rejected for attempting to buy cigarettes as minors under the age of 18 years, which was lower than those from SHS (87.6%) and VSHS (87.6%). The proportion of CS buying cigarettes by stick was 16.2%, 8.8%, and 3.7% for JHS, SHS, and VSHS, respectively, and was much higher in rural than in urban areas. Approximately 2.8 % of VSHS students reported they had even been offered free tobacco

TABLE 1. Experimental and current cigarette use among secondary high school students in China, 2019.

Characteristic (age in median)	Total				Urban				Rural			
	Experimental smokers		Current smokers		Experimental smokers		Current smokers		Experimental smokers		Current smokers	
	N	% (95% CI)*	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Both												
Overall (15 years old)	282,421	17.9(17.1−18.8)	286,455	5.9(5.5−6.4)	150,421	15.1(14.0−16.3)	152,302	5.0(4.2−5.8)	132,000	19.7(18.5−20.9)	134,153	6.5(5.9−7.2)
Junior high school (14 years old)	144,566	12.9(12.0−13.9)	146,451	3.9(3.4−4.4)	76,178	9.0(8.1−9.9)	77,006	2.3(1.9−2.6)	68,388	15.2(13.9−16.6)	69,445	4.8(4.1−5.6)
Senior high school (16 years old)	104,342	21.6(20.4−22.8)	105,868	5.6(5.1−6.1)	56,908	17.7(16.4−19.0)	57,679	4.1(3.5−4.7)	47,434	23.9(22.3−25.6)	48,189	6.4(5.7−7.1)
Vocational senior high school (17 years old)	33,513	30.3(27.7−32.9)	34,136	14.7(12.7−16.6)	17,335	29.6(25.1−34.2)	17,617	14.5(10.8−18.1)	16,178	30.9(28.1−33.6)	16,519	14.8(12.9−16.7)
Males												
Overall (15 years old)	141,568	26.0(24.8−27.3)	143,985	9.6(8.8−10.4)	75,581	21.5(19.8−23.2)	76,724	8.0(6.7−9.3)	65,987	28.9(27.1−30.6)	67,261	10.6(9.6−11.6)
Junior high school (14 years old)	74,766	17.9(16.6−19.2)	75,897	5.8(5.0−6.5)	39,501	12.1(10.9−13.4)	40,006	3.2(2.7−3.8)	35,265	21.2(19.3−23.1)	35,891	7.2(6.1−8.4)
Senior high school (16 years old)	49,306	33.6(31.9−35.2)	50,233	10.0(9.1−10.8)	27,153	26.5(24.5−28.4)	27,636	7.1(6.1−8.1)	22,153	37.7(35.6−39.9)	22,597	11.6(10.4−12.8)
Vocational senior high school (17 years old)	17,496	43.2(39.7−46.6)	17,855	23.3(20.3−26.3)	8,927	41.5(35.4−47.5)	9,082	22.7(17.3−28.2)	8,569	44.7(41.1−48.4)	8,773	23.8(20.9−26.7)
Females												
Overall (15 years old)	140,853	9.1(8.5−9.7)	142,470	1.9(1.7−2.1)	74,840	8.1(7.5−8.7)	75,578	1.6(1.4−1.9)	66,013	9.7(8.8−10.6)	66,892	2.1(1.8−2.4)
Junior high school (14 years old)	69,800	7.2(6.5−7.9)	70,554	1.8(1.5−2.1)	36,677	5.3(4.7−5.9)	37,000	1.1(0.9−1.3)	33,123	8.3(7.3−9.4)	33,554	2.1(1.7−2.6)
Senior high school (16 years old)	55,036	10.2(9.4−11.0)	55,635	1.4(1.1−1.6)	29,755	9.3(8.4−10.1)	30,043	1.2(1.0−1.4)	25,281	10.7(9.5−12.0)	25,592	1.4(1.1−1.8)
Vocational senior high school (16 years old)	16,017	14.0(12.3−15.7)	16,281	3.7(2.9−4.4)	8,408	14.6(12.1−17.2)	8,535	4.0(2.8−5.2)	7,609	13.4(11.2−15.6)	7,746	3.4(2.5−4.2)

*Abbreviation: CI=confidence intervals.

products by the tobacco industry, which was higher than in JHS and SHS students (2.0%) and higher in male students than in female students. Approximately 48.9% and 46.7% of respondents from JHS and VSHS, respectively, reported they had seen advertisements and promotions at retail outlets, which was higher than those from SHS (42.0%). Nearly a quarter of respondents had seen tobacco advertisements and promotions on the internet with the highest being VSHS students (27.7%), and the differences between genders and between urban-rural areas only appeared in JHS students. The proportions of respondents having seen smoking scenes on movies, TV, or videos were 69.5%, 72.9%, and 77.4% among students from JHS, SHS, and VSHS, respectively (Table 2). In addition, over half of the students reported that at least one of their parents is a smoker, and this was higher in rural areas than in urban areas for JHS and SHS. About half of SHS and VSHS students and 42.6% of JHS students had seen a teacher smoke in school. The proportions were higher in male students than in female students, and higher in rural areas than in urban areas. (Table 2)

DISCUSSION

The health hazards due to starting to smoke at an early stage of life is higher than starting later in life (*3*). Most adult smokers smoked their first cigarette before 18 years of age, which makes it hard to quit once they get addicted and thereby leads to an increase in lifetime smoking (*4*–*5*). Developing continued monitoring of tobacco use and strengthening tobacco control in children and adolescents would be greatly beneficial to reducing the number of smokers.

Compared with the 2014 youth survey, the prevalence rates of ES and CS among JHS students in 2019 decreased by 27.9% (17.9% *vs.* 12.9%) and 33.9% (5.9% *vs.* 3.9%), respectively. Globally, the prevalence rate of CS among JHS students in China is lower than in 45 GYTS countries (6.8% in median), and close to Mongolia (3.9%) and Bahamas (3.8%) (*6*).

The reported rate of having seen smoking scenes on movies, TV, or videos has decreased by 14.1% (80.9% *vs.* 69.5%) from 2014 to 2019. Other indicators related to cigarette availability and advertisements on the internet have declined but no statistical significance was observed besides the reported rate of having seen marketing activities at retail outlets having increased by 17.8% (41.5% *vs.* 48.9%).

These declines may be partially explained by the great tobacco control efforts in China to protect

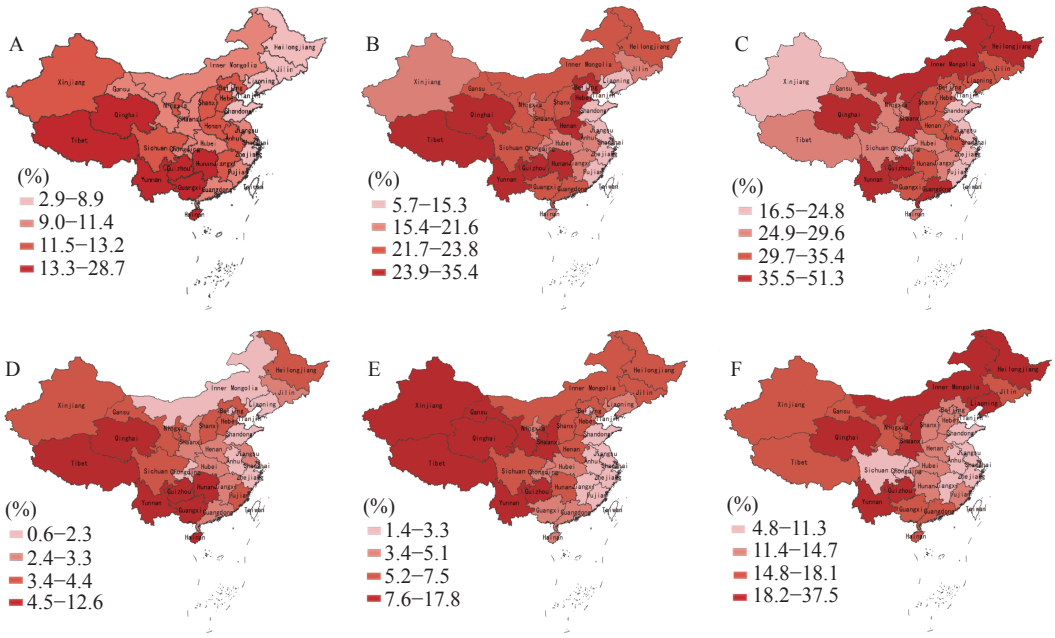

FIGURE 1. Regional disparities in the proportion of experimental smoker and current smoker among secondary school students in China, 2019. (A) Proportion of experimental smoker (junior high school students); (B) Proportion of experimental smoker (senior high school students); (C) Proportion of experimental smoker (vocational senior high school students); (D) Proportion of current smoker (junior high school students); (E) Proportion of current smoker (senior high school students); (F) Proportion of current smoker (vocational senior high school students).

TABLE 2. Cigarette availability, advertisements and promotion, and smoking exposure among secondary high school students in China, 2019.

Region	Variable	Total		Junior high school		Senior high school		Vocational senior high school	
		N	% (95% CI)	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Total	Both								
	Buying cigarettes as a minor without rejection*	9,108	83.3(82.0−84.6)	3,128	76.5(74.1−79.0)	3,152	87.6(86.0−89.2)	2,828	87.6(85.6−89.5)
	Buying cigarettes individually by stick†	11,087	9.2(7.3−11.1)	3,176	16.2(12.1−20.3)	4,243	8.8(6.7−10.8)	3,668	3.7(2.5−4.9)
	Tobacco advertisements and promotions at retail outlets§	69,554	46.4(45.3−47.5)	31,917	48.9(47.5−50.2)	26,415	42.0(40.3−43.6)	11,222	46.7(44.8−48.7)
	Tobacco advertisements and promotions on the internet¶	230,192	23.4(22.8−23.9)	111,308	23.2(22.6−23.9)	88,872	21.4(20.6−22.1)	30,012	27.7(26.5−28.9)
	Tobacco advertisements and promotions on movies, TV, or videos**	228,262	71.7(71.0−72.3)	116,417	69.5(68.8−70.2)	83,699	72.9(71.9−73.9)	28,146	77.4(75.8−78.9)
	Free tobacco products provided by tobacco industry††	287,881	2.1(2.0−2.3)	147,106	2.0(1.8−2.2)	106,328	2.1(1.9−2.2)	34,447	2.8(2.4−3.1)
	Parents smoke§§	288,126	54.2(53.2−55.1)	147,235	52.8(51.6−53.9)	106,409	54.4(53.2−55.6)	34,482	59.2(57.6−60.8)
	Teacher smokes in school¶¶	288,118	46.9(45.3−48.5)	147,224	42.6(40.9−44.2)	106,411	54.0(51.8−56.3)	34,483	49.6(46.1−53.1)
	Males								
	Buying cigarettes as a minor without rejection*	7,658	83.0(81.6−84.4)	2,472	75.4(72.8−78.0)	2,718	87.3(85.6−88.9)	2,468	87.3(85.1−89.5)
	Buying cigarettes individually by stick†	9,462	9.0(7.2−10.9)	2,513	16.6(12.6−20.6)	3,718	9.1(6.9−11.2)	3,231	3.5(2.4−4.6)
	Tobacco advertisements and promotions at retail outlets§	39,289	45.2(44.1−46.4)	17,832	49.1(47.6−50.5)	14,554	38.8(37.2−40.4)	6,903	45.2(42.6−47.7)
	Tobacco advertisements and promotions on the internet¶	115,891	24.2(23.5−24.8)	57,588	24.0(23.3−24.8)	42,465	22.0(21.2−22.7)	15,838	28.2(26.4−30.0)
	Tobacco advertisements and promotions on movies, TV, or videos**	115,694	76.8(76.2−77.4)	60,825	74.1(73.3−74.9)	40,190	79.0(78.1−79.9)	14,679	83.0(81.5−84.4)
	Free tobacco products provided by tobacco industry††	145,064	2.7(2.5−2.9)	76,393	2.5(2.2−2.7)	50,570	2.7(2.4−2.9)	18,101	3.8(3.2−4.3)
	Parents smoke§§	145,206	53.9(53.0−54.9)	76,470	52.7(51.5−53.8)	50,610	53.8(52.4−55.1)	18,126	58.7(56.8−60.6)
	Teacher smokes in school¶¶	145,199	51.1(49.5−52.7)	76,461	45.9(44.1−47.6)	50,613	59.5(57.2−61.9)	18,125	55.7(51.9−59.5)
	Females								
	Buying cigarettes as a minor without rejection*	1,450	85.2(82.3−88.1)	656	81.1(76.6−85.7)	434	89.6(85.1−94.1)	360	89.8(84.6−95.1)
	Buying cigarettes individually by stick†	1,625	10.3(7.1−13.4)	663	14.6(9.1−20.1)	525	6.4(3.6−9.2)	437	6.0(1.9−10.2)
	Tobacco advertisements and promotions at retail outlets§	30,265	48.0(46.5−49.5)	14,085	48.6(46.8−50.4)	11,861	46.2(43.7−48.6)	4,319	49.7(46.5−52.8)
	Tobacco advertisements and promotions on the internet¶	114,301	22.5(21.9−23.1)	53,720	22.3(21.6−23.0)	46,407	20.8(19.8−21.7)	14,174	27.0(25.5−28.6)
	Tobacco advertisements and promotions on movies, TV, or videos**	112,568	65.9(65.1−66.7)	55,592	64.2(63.4−65.1)	43,509	66.9(65.6−68.2)	13,467	70.3(68.4−72.2)
	Free tobacco products provided by tobacco industry††	142,817	1.5(1.3−1.6)	70,713	1.5(1.3−1.6)	55,758	1.4(1.3−1.6)	16,346	1.5(1.2−1.8)
	Parents smoke§§	142,920	54.5(53.4−55.5)	70,765	52.9(51.6−54.2)	55,799	55.0(53.8−56.3)	16,356	59.9(57.9−61.9)
	Teacher smokes in school¶¶	142,919	42.2(40.6−43.9)	70,763	38.7(37.1−40.4)	55,798	48.7(46.4−51.0)	16,358	41.8(37.9−45.6)

TABLE 2. (Continued)

Region	Variable	Total		Junior high school		Senior high school		Vocational senior high school	
		N	% (95% CI)	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Urban	Both								
	Buying cigarettes as a minor without rejection*	4,234	84.1(82.2−86.0)	1,203	75.9(72.6−79.2)	1,639	87.1(84.6−89.5)	1,392	86.8(84.0−89.6)
	Buying cigarettes individually by stick†	5,125	4.6(3.1−6.2)	1,214	10.7(7.4−13.9)	2,135	5.4(3.6−7.2)	1,776	2.0(0.7−3.3)
	Tobacco advertisements and promotions at retail outlets§	34,756	46.8(45.3−48.2)	15,534	49.4(47.8−51.0)	13,521	41.2(39.5−42.9)	5,701	48.0(44.9−51.2)
	Tobacco advertisements and promotions on the internet¶	124,054	22.7(22.0−23.4)	59,358	21.8(21.1−22.5)	49,053	20.3(19.5−21.2)	15,643	28.4(26.4−30.3)
	Tobacco advertisements and promotions on movies, TV, or videos**	120,185	69.5(68.5−70.4)	60,168	66.5(65.4−67.5)	45,489	70.3(69.3−71.4)	14,528	76.6(74.0−79.2)
	Free tobacco products provided by tobacco industry††	152,885	2.1(2.0−2.2)	77,228	1.9(1.8−2.1)	57,886	2.1(1.9−2.3)	17,771	2.7(2.1−3.3)
	Parents smoke§§	153,028	52.1(50.7−53.5)	77,304	49.8(48.2−51.4)	57,928	52.3(50.5−54.1)	17,796	58.8(56.7−60.9)
	Teacher smokes in school¶¶	153,025	37.7(35.4−40.0)	77,299	32.7(30.3−35.1)	57,931	45.4(42.1−48.7)	17,795	40.5(35.7−45.3)
	Males								
	Buying cigarettes as a minor without rejection*	3,455	84.0(81.7−86.3)	913	74.8(70.8−78.9)	1,360	86.5(84.2−88.9)	1,182	86.8(83.4−90.1)
	Buying cigarettes individually by stick†	4,252	4.6(3.0−6.2)	919	11.8(8.4−15.3)	1,811	5.6(3.6−7.5)	1,522	1.9(0.5−3.3)
	Tobacco advertisements and promotions at retail outlets§	19,376	46.0(44.2−47.9)	8,592	48.9(47.0−50.8)	7,388	38.5(36.3−40.8)	3,396	48.3(44.0−52.6)
	Tobacco advertisements and promotions on the internet¶	62,298	24.0(23.0−25.0)	30,669	22.6(21.7−23.5)	23,535	21.3(20.4−22.2)	8,094	30.5(27.4−33.6)
	Tobacco advertisements and promotions on movies, TV, or videos**	61,055	75.2(74.2−76.2)	31,608	71.4(70.3−72.6)	22,000	77.1(76.0−78.2)	7,447	82.8(80.5−85.2)
	Free tobacco products provided by tobacco industry††	77,155	2.7(2.5−2.9)	40,179	2.4(2.1−2.6)	27,775	2.9(2.5−3.3)	9,201	3.6(2.6−4.6)
	Parents smoke§§	77,244	52.0(50.5−53.5)	40,227	49.9(48.1−51.8)	27,801	51.4(49.6−53.3)	9,216	58.7(55.7−61.6)
	Teacher smokes in school¶¶	77,241	41.7(39.2−44.2)	40,224	35.6(33.1−38.2)	27,802	50.3(46.6−53.9)	9,215	47.3(41.4−53.2)
	Females								
	Buying cigarettes as a minor without rejection*	779	84.7(81.2−88.2)	290	79.5(74.9−84.1)	279	89.7(82.6−96.8)	210	87.2(78.5−95.9)
	Buying cigarettes individually by stick†	873	4.8(2.8−6.8)	295	6.9(3.3−10.5)	324	4.7(1.8−7.5)	254	2.9(0.1−5.7)
	Tobacco advertisements and promotions at retail outlets§	15,380	47.9(46.3−49.4)	6,942	50.1(48.3−51.8)	6,133	44.5(42.6−46.5)	2,305	47.4(43.8−51.1)
	Tobacco advertisements and promotions on the internet¶	61,756	21.3(20.4−22.1)	28,689	20.8(20.0−21.7)	25,518	19.4(18.3−20.5)	7,549	25.5(23.2−27.9)
	Tobacco advertisements and promotions on movies, TV, or videos**	59,130	62.9(61.9−64.0)	28,560	60.6(59.4−61.8)	23,489	63.6(62.3−64.9)	7,081	68.7(66.1−71.3)
	Free tobacco products provided by tobacco industry††	75,730	1.4(1.2−1.6)	37,049	1.4(1.2−1.6)	30,111	1.3(1.1−1.5)	8,570	1.5(1.0−2.0)
	Parents smoke§§	75,784	52.3(50.8−53.7)	37,077	49.7(48.2−51.2)	30,127	53.1(51.1−55.2)	8,580	58.9(56.4−61.5)
	Teacher smokes in school¶¶	75,784	33.2(30.9−35.4)	37,075	29.3(26.9−31.8)	30,129	40.7(37.5−43.9)	8,580	31.8(27.8−35.7)

TABLE 2. (Continued)

Region	Variable	Total		Junior high school		Senior high school		Vocational senior high school	
		N	% (95% CI)	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Rural	Both								
	Buying cigarettes as a minor without rejection*	4,874	82.9(81.2−84.6)	1,925	76.7(73.7−79.7)	1,513	87.8(85.7−89.8)	1,436	88.3(85.6−90.9)
	Buying cigarettes individually by stick†	5,962	11.5(8.9−14.1)	1,962	17.8(12.6−23.0)	2,108	10.1(7.4−12.7)	1,892	5.2(3.5−7.0)
	Tobacco advertisements and promotions at retail outlets§	34,798	46.2(44.6−47.7)	16,383	48.6(46.8−50.4)	12,894	42.3(40.1−44.6)	5,521	45.5(43.3−47.8)
	Tobacco advertisements and promotions on the internet¶	106,138	23.8(23.0−24.6)	51,950	24.1(23.1−25.0)	39,819	22.0(20.9−23.1)	14,369	27.0(25.7−28.4)
	Tobacco advertisements and promotions on movies, TV, or videos**	108,077	73.0(72.2−73.8)	56,249	71.2(70.3−72.1)	38,210	74.4(73.0−75.8)	13,618	78.1(76.3−79.9)
	Free tobacco products provided by tobacco industry††	134,996	2.1(2.0−2.3)	69,878	2.0(1.8−2.3)	48,442	2.0(1.8−2.3)	16,676	2.8(2.4−3.3)
	Parents smoke§§	135,098	55.4(54.2−56.7)	69,931	54.5(52.9−56.0)	48,481	55.6(54.1−57.2)	16,686	59.6(57.3−61.9)
	Teacher smokes in school¶¶	135,093	52.6(50.7−54.5)	69,925	48.2(46.1−50.2)	48,480	59.0(56.2−61.8)	16,688	57.9(53.9−61.9)
	Males								
	Buying cigarettes as a minor without rejection*	4,203	82.5(80.7−84.2)	1,559	75.6(72.5−78.7)	1,358	87.6(85.4−89.7)	1,286	87.8(85.0−90.7)
	Buying cigarettes individually by stick†	5,210	11.2(8.7−13.8)	1,594	17.9(12.9−22.8)	1,907	10.3(7.5−13.1)	1,709	4.9(3.4−6.4)
	Tobacco advertisements and promotions at retail outlets§	19,913	44.8(43.3−46.4)	9,240	49.1(47.3−51.0)	7,166	38.9(36.8−41.0)	3,507	42.3(39.8−44.7)
	Tobacco advertisements and promotions on the internet¶	53,593	24.3(23.4−25.2)	26,919	24.9(23.8−25.9)	18,930	22.4(21.3−23.4)	7,744	25.9(24.4−27.5)
	Tobacco advertisements and promotions on movies, TV, or videos**	54,639	77.8(77.0−78.6)	29,217	75.6(74.5−76.7)	18,190	80.1(78.9−81.2)	7,232	83.1(81.4−84.7)
	Free tobacco products provided by tobacco industry††	67,909	2.7(2.4−3.0)	36,214	2.5(2.2−2.9)	22,795	2.6(2.2−2.9)	8,900	3.9(3.2−4.6)
	Parents smoke§§	67,962	55.1(53.9−56.3)	36,243	54.3(52.8−55.7)	22,809	55.2(53.4−57.0)	8,910	58.7(56.2−61.2)
	Teacher smokes in school¶¶	67,958	56.9(55.1−58.7)	36,237	51.7(49.6−53.9)	22,811	64.9(62.1−67.7)	8,910	63.4(59.5−67.3)
	Females								
	Buying cigarettes as a minor without rejection*	671	85.5(81.5−89.5)	366	81.8(75.8−87.7)	155	89.6(83.7−95.4)	150	92.2(86.7−97.6)
	Buying cigarettes individually by stick†	752	13.3(8.5−18.1)	368	17.5(9.9−25.0)	201	7.5(3.3−11.6)	183	9.0(1.3−16.7)
	Tobacco advertisements and promotions at retail outlets§	14,885	48.1(45.9−50.2)	7,143	47.8(45.3−50.3)	5,728	47.0(43.4−50.5)	2,014	51.8(46.8−56.8)
	Tobacco advertisements and promotions on the internet¶	52,545	23.3(22.4−24.2)	25,031	23.2(22.1−24.2)	20,889	21.6(20.3−23.0)	6,625	28.4(26.4−30.4)
	Tobacco advertisements and promotions on movies, TV, or videos**	53,438	67.7(66.6−68.7)	27,032	66.2(65.1−67.3)	20,020	68.8(67.0−70.6)	6,386	71.8(69.0−74.5)
	Free tobacco products provided by tobacco industry††	67,087	1.5(1.4−1.6)	33,664	1.5(1.3−1.6)	25,647	1.5(1.3−1.8)	7,776	1.5(1.1−1.9)
	Parents smoke§§	67,136	55.8(54.4−57.3)	33,688	54.7(52.9−56.5)	25,672	56.1(54.5−57.7)	7,776	60.8(57.8−63.8)
	Teacher smokes in school¶¶	67,135	47.8(45.7−49.9)	33,688	44.1(42.0−46.2)	25,669	53.3(50.3−56.3)	7,778	50.9(45.7−56.1)

* In the past 30 days before the date of investigation, current smokers had not experienced being refused due to age when buying cigarettes;
† In the past 30 days before the date of investigation, the current smokers had bought cigarettes individually by stick for themselves;
§ In the past 30 days before the date of investigation, students had seen tobacco advertisements and promotions at retail outlets;
¶ In the past 30 days before the date of investigation, the students had seen tobacco advertisements or video on the internet;
** In the past 30 days before the date of investigation, the students had seen smoking scenes on movies, TV, or videos;
†† The students have been offered free tobacco products by the tobacco industry;
§§ At least one of parents is smoker;
¶¶ The students had seen a teacher smoke in school during school hours.
Abbreviation: CI=confidence intervals.

children and adolescents in recent years using measures such as strengthening health education, banning tobacco advertisements, and prohibiting tobacco use inside secondary and primary schools (*7*–*9*). The improvement of social civilization and environmental hygiene may also possibly contribute to the reduction of tobacco use. In addition, the popularity of e-cigarettes might potentially make some cigarette smokers smoke e-cigarettes instead, which will be further analyzed in future research.

Despite positive changes in the past five years, the external factors compelling teenagers to smoke were extensive. First, although laws exist to prohibit selling tobacco product to minors in China, 76.5%, 87.6%, and 87.6% of CS from JHS, SHS, and VSHS, respectively, reported that they had not been rejected for being under 18 years old when buying cigarettes, indicating that relevant laws have not been well implemented. Second, the presence of buying cigarettes individually and getting free tobacco products from the tobacco industry indicated tobacco companies prefer to use a variety of strategies for promoting its products. Third, plenty of research revealed that tobacco advertisements and promotions are causally associated with the initiation and progression of tobacco use among children and adolescents (*10*). However, 48.9%, 42.0%, and 46.7% of respondents from JHS, SHS, and VSHS, respectively, reported they had seen tobacco advertisements and promotions at retail outlets, and nearly a quarter of respondents had seen them on the internet, which indicates that tobacco retail outlets and the internet should be the focus of regulations. Finally, our study showed that smoking scenes in movies, TV, or videos are widely prevalent.

Parents and teachers play an important role in the development of smoking habits for children and adolescents (*4*). Unfortunately, despite a slight decline, approximately half of the students in this study reported that at least one parent smokes and that teachers smoked in school. According to the "Opinions on further strengthening school smoking control" jointly launched by the Ministry of Education and the Ministry of Health in 2010, teachers are not allowed to smoke in school, especially in front of students. (*7*) The present study reflects a big gap in actual implementation.

In this study, we investigated SHS and VSHS students for the first time. The proportion of ES and CS among SHS and VSHS students is 1.9 and 2.21 folds of JHS, and it is 2.35 and 3.77 folds of JHS for VSHS. This disparity is more prominent in male students and urban areas. These results suggest that targeted measures of tobacco control are urgently needed in senior high schools, especially to protect VSHS students.

A potential limitation is the self-reported design based on a paper-based questionnaire, which may probably cause mistakes in the process of data collection or potentially due to underreporting. However, the large sample size can make up for this disadvantage and this design can well maintain comparability with previous and other studies. Standardized and electronic survey systems, platform-based data management, and environmental nicotine detection should be considered for future surveys. In addition, the classification of urban-rural areas is roughly based on the naming of an area as "district (Qu)" and "county (Xian)" and is consistent with most studies in China.

In conclusion, there is a large decline in the ES and CS prevalence rates among JHS students from 2014–2019 in China. However, the tobacco control situation remains challenging with big regional disparities in the proportion of ES and CS, relatively easy access to cigarettes, high exposure to advertisements and promotions from tobacco industry, and inefficient policy implementation. Cigarette smoking in SHS, especially VSHS, is widely prevalent, suggesting the urgent need for targeted tobacco control measures.

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Preplanned Studies

Cigarette Package Warnings for Adult Smoking Cessation — China, 2018

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Summary

What is already known about this topic?

After the framework convention on tobacco control (FCTC) came into force, the health warnings on cigarette packaging in the mainland of China had been changed in three rounds. But the warning label is still only pure text and without descriptions of specific health consequences caused by tobacco use.

What is added by this report?

Although there were two rounds of changes from 2010 to 2018, current health warning labels did not work in increasing Chinese smokers' smoking cessation intention compared with the previous one. Large pictorial warning labels were more effective than the current health warning label in stimulating Chinese smoker's willingness to quit.

What are the implications for public health practice?

Pictorial health warnings could play a great role in promoting the realization of the tobacco control goals of Healthy China 2030. Pictorial health warnings should be printed on cigarette packs in the mainland of China as soon as possible.

Plenty of evidence shows well-designed health warnings and messages are part of a range of effective measures to communicate health risks and increase the motivation of tobacco users to quit and decrease their tobacco consumption (*1*–*4*). Thus, Article 11 of the World Health Organization's (WHO) Framework Convention on Tobacco Control (FCTC) pointed out the requirement of packaging and labelling of tobacco products (*5*). After the FCTC came into force, health warnings on cigarette packaging in China had been changed in three rounds. In January 2009 (*6*), plain text health warnings were required to account for 30% of the front, back, and bottom area of the cigarette packaging, including two general warnings. The warning information on the back of the cigarette pack was required to be in English. In April 2012 (*7*), the text warning on the back of the cigarette pack was adjusted from English to Chinese; the font size was doubled (the height of text was required to be not less than 4 mm), but the overall size of the warning did not change. In October 2016 (*8*), a new version of the text health warning took effect, requiring the area of the warning to reach 35% of the cigarette pack. The font requirement was changed to 4.5 mm and three new text warnings were added. This study examined the effects of current health warning labels on smoking cessation intention and explored the different influence between the current health warning label and pictorial health warning labels.

Data used in this paper were from the Global Adult Tobacco Survey (GATS) China Project, which used a global standardized methodology and was conducted in 2018 (*9*). A multi-stage, geographically clustered sample design was used to produce nationally representative data. In total, 200 monitoring counties/districts were sampled coming from 31 provincial-level administrative divisions (PLADs) of the mainland of of China. Nationally, a total of 24,370 households were sampled and one individual was randomly selected from each participating household to complete the survey. The household survey method was adopted, and the investigator used the digital tablet to collect data through in-person inquiry. The subjects of this survey were the Chinese residents aged 15 and above who used the household as their primary residence in the previous month before the survey and excluded those who lived collectively in places like student dormitories, nursing homes, military camps, prisons, or hospitals.

All of the participants were asked "In the last 30 days, did you notice any health warnings on cigarette packages?", and smokers were asked "In the last 30 days, have warning labels on cigarette packages led you to think about quitting?". Then the digital tablet will randomly present five imitated pictorial health warnings and ask smokers "If you see such a health warning on a cigarette package, would you consider stopping smoking?" In addition, all of the participants were asked "Do you support printing such a pictorial

1. Smoking and secondhand smoke cause lung cancer
2. Smoking causes chronic obstructive pulmonary disease
3. Smoking causes the yellowing of teeth, bad breath, and periodontal disease
4. Smoking causes erectile dysfunction
5. Smoking causes peripheral vascular disease

FIGURE 1. Five imitated pictorial health warning labels randomly selected by digital tablet.

warning on cigarette packages?" As showed in Figure 1, pictorial health warning 1 was "Smoking and secondhand smoke cause lung cancer" and used pictures of lungs of non-smokers and smokers for comparison. Pictorial health warning 2 was "Smoking causes chronic obstructive pulmonary disease (COPD)" with a picture of an actual patient with COPD caused by smoking. Pictorial health warning 3 was "Smoking causes the yellowing of teeth, bad breath, and periodontal disease" using a picture of diseased teeth and gum. Pictorial health warning 4 was "Smoking causes erectile dysfunction" using curved cigarettes to symbolize the symptom. Pictorial health warning 5 was "Smoking causes peripheral vascular diseases" using a picture of a diseased foot from a patient.

Due to the complex survey sample design for the surveys, each responding unit was assigned a unique survey weight that was used to produce estimates of population parameters, and 2018 population data were used for post-stratification, which was provided by National Statistics Bureau of China. All computations were performed using the SAS software (version 9.4, SAS Institute Inc., Cary, USA) complex survey data analysis procedure. Percentage or proportion was used for descriptive statistics. The difference of values with no overlap in confidence interval(CI) was identified to be statistically significant between subgroups.

Out of a total of 24,370 selected households, 3,193 empty households were eliminated and 21,177 remained. Out of these, 19,640 households completed the survey and a total of 19,376 people completed the final individual survey. The overall response rate was 91.5%. The 19,376 people surveyed represented a total of 1,156,987,000 men and women aged 15 and over in the mainland of China. There were 9,109 men and 10,267 women in the sample, representing 50.6% of men and 49.4% of women in the target population, respectively. In terms of age distribution, there were 930, 5,128, 8,652, and 4,666 respondents in the 15–24, 25–44, 45–64, and ≥65 years old groups, respectively.

The results showed that within the 30 days prior to the survey, 88.2% of smokers had seen the health warnings on the cigarette package, within whom 36.3% said that they would consider quitting smoking because they saw the current health warnings on the cigarette package. In addition, the proportion of non-smokers who saw the health warning on the cigarette packaging was 53.4%. The percentage of people who saw the health warnings on cigarette packaging was highest among young people (15–24 years old), both among smokers (98.1%) and non-smokers (64.5%).

The results showed that 56.1% of smokers said they would consider quitting smoking after seeing such pictorial health warnings, which was much higher than seeing the current health warnings on the cigarette package. For each age group, the proportion of smokers considering quitting after seeing the pictorial health warning labels were higher than those who saw current health warning labels. This was also true for smokers with different education levels, and smokers living in urban and rural areas (Table 1).

In addition, the proportions of smokers who considered quitting smoking after seeing pictorial health warnings varied based on which image they saw. The proportion of smokers who intended to quit smoking after seeing the pictorial warning of "Smoking causes chronic obstructive pulmonary disease" was the highest among the 5 pictorial health warning labels (61.9%); while "Smoking causes erectile dysfunction" had the lowest rate (49.3%). Between them were

TABLE 1. Percentage of adults aged 15 years or older who noticed health warnings on cigarette packages and considered quitting because of the different health warnings.

Demographic characteristics	Non-smokers who noticed health warnings on cigarette package [percentage (95%CI)]	Current smokers* [percentage (95%CI)]		
		Noticed health warnings on cigarette package	Thought about quitting because of warning labels	Thought about quitting because of pictorial health warnings
Overall	53.4(50.9−55.9)	88.2(86.2−90.0)	36.3(33.5−39.2)	56.1(52.5−59.6)
Gender				
Male	59.2(55.8−62.6)	88.9(86.9−90.7)	36.2(33.4−39.1)	56.2(52.6−59.8)
Female	50.3(47.7−52.9)	70.7(61.9−78.1)	38.4(27.7−50.4)	52.9(41.3−64.1)
Age (years)				
15–24	64.5(59.5−69.2)	98.1(93.6−99.5)	30.3(22.2−39.9)	59.3(48.4−69.3)
25–44	64.0(60.2−67.6)	91.4(88.3−93.8)	40.1(36.2−44.1)	60.1(55.2−64.9)
45–64	46.8(44.0−49.7)	86.6(84.2−88.8)	35.8(32.6−39.1)	54.8(50.9−58.6)
≥65	28.7(26.3−31.2)	74.8(70.6−78.6)	29.3(24.6−34.6)	45.1(39.2−51.2)
Residence				
Urban	56.3(53.5−59.0)	92.2(90.5−93.7)	32.6(29.4−36.0)	52.9(48.3−57.5)
Rural	48.8(44.4−53.1)	83.0(79.1−86.4)	41.5(37.1−46.1)	61.4(56.5−66.1)
Education level				
Primary school or less	32.4(29.7−35.3)	75.1(71.6−78.4)	33.7(29.5−38.3)	51.3(46.5−56.1)
Attended secondary school	62.0(58.0−65.9)	91.0(87.9−93.3)	38.5(34.4−42.9)	58.7(54.2−63.0)
High school graduate	64.0(60.1−67.8)	92.8(90.0−94.9)	38.5(33.4−43.7)	56.7(50.3−63.0)
College graduate or above	57.2(53.5−60.9)	94.2(89.7−96.8)	36.1(30.1−42.5)	55.4(48.2−62.3)

Abbreviation: CI=confidence interval.
*Includes daily and occasional (less than daily) smokers.

"Smoking and second-hand smoke cause lung cancer", "Smoking causes peripheral vascular diseases", and "Smoking causes the yellowing of teeth, bad breath, and periodontal disease", which had a rate of 58.2%, 55.8%, and 54.9%, respectively. Compared with the other 4 pictorial health warnings, fewer smokers wanted to quit after seeing the "Smoking causes erectile dysfunction", which used a symbolic image rather than graphic depictions of the syndrome.

The results also showed that 69.6% of the subjects supported the printing of pictorial health warnings on cigarette packaging including 65.2% of smokers and 71.1% of non-smokers.

DISCUSSION

Although there were two rounds of changes from 2010 to 2018 (Figure 2), only 36.3% of smokers who had seen the health warnings on the cigarette packages in the past 30 days said they would consider quitting because of the current health warnings on the cigarette packages, which has not changed in comparison with the number in 2010 (36.4%) (*10*). This indicates that current health warning labels on the cigarette packages are not enough to encourage smokers to quit and did not work in increasing Chinese smokers' smoking cessation intention compared with the previous one.

In contrast, 56.1% of smokers said they would consider quitting smoking after seeing pictorial health warnings, which was much higher than seeing the current health warnings on the cigarette package. For each age group, the proportion of smokers considering quitting after seeing the pictorial health warning labels were higher than those who saw current health warning labels. This indicates that pictorial health warnings are more effective than current pure text health warnings for increasing the willingness of smokers to quit smoking. This is consistent with the results of studies in multiple countries (*11–15*).

Many studies discovered symbolic warnings and images depicting the social and emotional impact of warnings might be less effective than graphic images (*16*). In our study, the rate of smokers considering quitting smoking after seeing the warning "Smoke leading to erectile dysfunction" was lower than others. This also suggests pictorial warnings featuring "graphic" depictions of disease were significantly more effective than symbolic images.

FIGURE 2. Evolution history of health warnings on cigarette package in China.

Studies have shown that health warnings for cigarette packaging is an explicit, low-cost effective way to promote the awareness of the harms induced by tobacco use to smokers and non-smokers. Health warnings are effective tools for increasing the awareness of smoking hazards, reducing tobacco consumption, and reducing smoking rates (*1–4*). The results of this study showed that the public had a relatively high exposure rate to health warnings on cigarette packages. Even among non-smokers, the exposure rate was still as high as 53.4%. For young people aged 15–24, both smokers and non-smokers had a higher exposure rate.

Healthy China 2030 set the goal of "reducing the smoking prevalence of people over 15-year-old to 20% by 2030". To achieve this, encouraging smokers to quit is crucial, but the number of new smokers also needs to be reduced. Pictorial health warnings have strong effects in both aspects, and the public's support for the adoption of pictorial health warnings was high. Furthermore, 91 countries (52% of the world's population) have adopted comprehensive graphic pack warning requirements (*17*). Therefore, pictorial health warnings have a great role in promoting the realization of tobacco control goals of Healthy China 2030, and China should print pictorial health warnings on cigarette packs as soon as possible.

This study is subject to a few limitations. In the survey, smokers were asked if he or she noticed health warning on cigarette package in the last 30 days; and if the warning labels led him or her think about quitting, which might have led to recall bias. However, the same questions were used in the 2010 GATS survey and 2018 GATS survey, so the proportions of the smokers considering quitting because of warning labels are comparable. In addition, the survey was conducted based on households where all of the people in a participating household were registered and one individual was randomly selected from the household to complete the survey. Because of population shifts, more young people have moved to larger cities and fewer young people were interviewed in the survey, especially in rural areas. To account for this, weighting and post-stratification adjustment were used in this study.

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Preplanned Studies

Adult Secondhand Smoke Exposure — Shanghai Municipality, 2018

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Summary

What is already known on this topic?

The average secondhand smoke exposure rate was 68.1% in China in 2018. The World Health Organization suggests that legislation must be used to achieve a 100% smoke-free environment and protect nonsmokers from secondhand smoke.

What is added by this report?

This study showed that the implementation of the *Amendment Regulations on Smoking Control in Public Places of Shanghai* had a significant effect on reducing the exposure rate of secondhand smoke. The rate in 2018 was 46.7%, which was significantly lower than that (58.5%) before implementation in 2016.

What are the implications for public health practice?

Considering the high exposure and the harm of secondhand smoke in China, it is necessary to promote smoke-free legislation and enforce tobacco control measures.

Secondhand smoke (SHS) poses serious harms to human health. Currently, there are 316 million smokers in China, and about 740 million non-smokers are exposed to SHS (*1*). The number of deaths caused by SHS is more than 100,000 every year (*2*). *The Regulation on Smoking Control in Public Places of Shanghai* was implemented on March 1, 2010. To further strengthening the tobacco control, *Amendment of the Regulation on Smoking Control of Shanghai* was formally implemented on March 1, 2017, restricting smoking in all indoor public places. It is of great significance to understand the level and status of SHS exposure for the formulation of tobacco control policies and intervention strategies (*3*).

The data of this study was from the Shanghai Adult Tobacco Survey in 2018, which was conducted among the population aged 15 years and older. Multi-stage, geographically clustered sampling was used and covered 100 monitor points from 16 districts. A total of 3,250 families were sampled, and one individual was randomly selected from each family to complete the survey. The Global Adult Tobacco Survey (GATS) standard questionnaire was used and face-to-face survey was conducted, 3,112 individuals completed the survey (95.8%), and this study analyzes SHS exposure data. SHS exposure of non-smokers refers to exposure to tobacco smoke at least 1 day per week; SHS exposure at home and in public places refers to the proportion of participants, including smokers and non-smokers, who saw someone smoking, smelled smoke, or saw cigarette butts when visiting specific places in the past 30 days (*1–3*). The data was weighted according to the sampling method and analyzed using SAS software (version 9.3; SAS Institute, Inc. Cary, NC, USA) complex survey design.

The survey included 1,465 males and 1,647 females, and after weighted adjustment, male respondents accounted for 51.6% and female respondents 48.4%. For different age groups, the proportion of participants aged 25 to 44 years was the highest (41.4%), followed by those aged 45 to 64 years (32.3%), and the proportions of different genders and age groups in this study were similar to that of Shanghai overall (*4*), which indicated good representativeness of the sample data. In terms of education levels, participants with college degree or above accounted for the highest proportion at 40.8%. The highest proportion in terms of occupation was enterprise, business, and service personnel at 44.7%.

According to the survey, the SHS exposure rate of non-smokers among the age of 15 years and above in Shanghai was 46.7% (95% CI: 40.4%–53.0%) in 2018 and was higher in males (52.6%) than in females (42.8%). However, the proportion of women exposed daily was higher than men (p<0.001). Among different occupational groups, the exposure rate in enterprises, businesses, and service personnel was the highest (51.2%), followed by farmers (51.0%), and the unemployed (50.9%), all of which were above 50%;

while medical personnel (38%) and teachers (16.2%) had a relatively lower exposure (p=0.026). The proportion of SHS exposure at home in the last 30 days was 23.5%, higher in males than in females (p<0.001); however, in the subgroup of non-smokers, the rate was a little higher in females than in males. Based on different age groups, the group aged 15–24 years had the highest exposure rate at 25.6%, followed by the group aged over 65 years at 21.2% (p<0.001). The differences were also significant among different educational levels with education level being inversely related to exposure rate from 24.5% to 8.8% (p<0.001) (Table 1).

The proportion of SHS exposure in major public places were, from highest to lowest, 28.1% for restaurants, 17.3% for indoor workplaces, 12.1% for universities, 10.0% for government buildings, 7.7% for primary and secondary schools, 4.2% for medical

TABLE 1. Estimation of exposure of second-hand smoke overall and at home.

Demographic characteristics	Overall of non-smokers* (Rate [%] [95% CI])		Home† (Rate [%] [95% CI])	
	One day or above/per week	Nearly everyday	Overall	Non-smokers
Gender				
Male	52.6(44.8−60.4)	12.2(7.6−16.8)	28.4(23.6−33.3)	14.1(9.7, 18.6)
Female	42.8(36.7−48.8)	15.1(11.7−18.6)	18.2(13.9−22.4)	17.8(13.6, 22.0)
χ^2	13.869	20.583	32.488	3.782
p value	<0.0001	<0.0001	<0.0001	0.052
Age group				
15–24 years	48.0(35.6−60.4)	13.5(5.6−21.5)	31.9(20.4−43.4)	25.6(15.4, 35.7)
25–44 years	48.5(42.1−55.0)	12.9(8.8−17.0)	17.5(13.4−21.6)	12.6(8.5, 16.6)
45–64 years	46.3(38.1−54.4)	15.7(11.4−20.0)	25.6(19.8−31.5)	14.9(9.8, 20.1)
≥65 years	40.8(34.4−47.2)	14.1(10.1−18.0)	28.3(23.5−33.2)	21.2(16.4, 26.0)
χ^2	3.123	0.541	18.864	18.315
p value	0.373	0.910	<0.0001	<0.0001
Educational level§				
Primary school and below	42.1(35.0−49.3)	19.7(14.1−25.3)	34.3(27.0−41.7)	24.5(18.6, 30.5)
Junior high school	53.2(45.7−60.7)	19.2(14.6−23.8)	29.5(24.1−34.8)	20.5(15.4, 25.5)
Senior high school	47.4(37.3−57.5)	16.8(10.8−22.9)	24.8(19.1−30.5)	15.2(9.5, 20.8)
College and above	43.8(36.6−51.1)	8.4(4.5−12.3)	12.6(9.5−15.7)	8.8(5.5, 12.0)
χ^2	7.393	18.290	117.126	50.076
p value	0.060	<0.0001	<0.0001	<0.0001
Occupation				
Farmer	51.0(34.5−67.6)	20.1(7.2−32.9)	36.7(22.9−50.5)	25.7(12.0, 39.5)
Government/public institution personnel	49.5(36.2−62.8)	13.7(4.7−22.7)	18.2(7.3−29.1)	17.2(5.1, 29.3)
Enterprise, commercial, service personnel	51.2(43.2−59.2)	12.4(7.6−17.2)	22.7(17.7−27.6)	13.1(9.1, 17.2)
Teacher	16.2(3.2−29.2)	−	5.6(0.0−14.1)	6.1(0.0, 15.5)
Medical worker	38.0(19.5−56.5)	12.3(0.0−26.2)	13.2(2.2−24.3)	14.3(0.6, 27.9)
Unemployed	50.9(34.5−67.3)	24.9(11.2−38.7)	28.9(16.1−41.8)	25.5(12.9, 38.1)
Others	42.3(34.5−50.1)	14.8(10.2−19.5)	24.3(19.4−29.2)	18.4(13.0, 23.7)
χ^2	14.332	7.227¶	14.425	11.739
p value	0.026	0.204	0.025	0.068
Total	46.7(40.4−53.0)	14.0(10.4−17.6)	23.5(19.2−27.7)	16.3(12.4, 20.3)

* Refers to the frequency of non-smokers' exposure to secondhand smoke per week.
† People who report that someone smokes in their home on a daily/weekly/monthly basis.
§ The educational level of respondents over 25 years old was only reported.
¶ The category that does not show results is eliminated, when doing Chi-square test.

TABLE 2. Estimation of exposure to second-hand smoke in various indoor public places*.

Demographic characteristics	Rate (%) (95% CI)						
	Workplace	Government buildings	Healthcare facilities	Restaurants	Public transport	Universities	Primary and secondary schools†
Gender							
Male	22.4(16.2−28.5)	10.9(5.2−16.6)	3.3(2.1−4.6)	32.7(27.1−38.2)	2.7(1.1−4.3)	17.1(5.4−28.7)	10.1(4.3−15.9)
Female	11.5(8.3−14.8)	8.9(3.0−14.8)	5.0(3.0−6.9)	22.6(17.3−27.8)	0.8(0.3−1.4)	6.1(0.0−14.3)	5.2(1.8−8.5)
χ^2	24.067	0.345	2.272	10.997	8.387	2.285	4.214
p value	<.0001	0.557	0.132	0.0009	0.004	0.131	0.040
Age group							
15–24 years	16.5(6.1−27.0)	−	4.5(0.0−13.4)	32.1(19.2−45.1)	1.6(0.0−3.9)	15.7(0.0−31.6)	13.8(0.0−28.0)
25–44 years	14.9(10.6−19.3)	12.5(6.0−19.1)	2.7(0.7−4.6)	27.5(21.5−33.5)	2.5(0.7−4.3)	10.1(1.5−18.6)	5.5(1.7−9.2)
45–64 years	25.5(18.3−32.8)	5.6(0.0−11.3)	4.4(2.6−6.2)	26.2(20.6−31.8)	1.1(0.4−1.9)	7.8(0.0−19.8)	7.0(2.2−11.8)
≥65 years	33.8(11.2−56.4)	7.4(0.0−16.3)	6.4(3.8−9.0)	29.6(22.9−36.3)	1.3(0.4−2.2)	16.8(0.6−33.0)	12.4(2.8−22.0)
χ^2	9.510	3.788	3.003	1.360	2.874	1.315	5.207
p value	0.023	0.151	0.391	0.715	0.411	0.726	0.157
Educational level§							
Primary schools and below	38.7(23.4−54.1)	1.8(0.0−5.6)	6.7(3.7−9.7)	27.9(15.7−40.1)	5.0(0.0−10.8)	−	3.2(0.0−7.9)
Junior high school	29.8(20.6−39)	8.8(0.0−18.3)	4.8(2.4−7.2)	34.7(26.8−42.6)	0.9(0.0−1.7)	16.2(0.0−39.8)	10.0(2.5−17.6)
Senior high school	20.5(12.2−28.9)	8.0(0.0−20.0)	3.0(1.3−4.7)	25.3(18.5−32.1)	1.0(0.2−1.7)	4.5(0.0−11.7)	6.3(0.3−12.2)
College and above	12.7(8.6−16.7)	11.9(6.1−17.8)	3.6(1.3−5.8)	25.4(19.6−31.2)	2.2(0.4−3.9)	10.6(1.6−19.6)	5.1(1.2−9.0)
χ^2	35.508	1.327	4.517	6.173	7.577	1.901	3.162
p value	<0.0001	0.723	0.211	0.104	0.056	0.387	0.367
Occupation							
Farmer	50.7(23.2−78.2)	5.1(0.0−15.0)	8.4(3.6−13.2)	29.4(8.2−50.6)	7.4(0.0−17.8)	−	20.6(0.0−47.5)
Government/public institution personnel	8.3(2.6−14.0)	15.2(4.4−25.9)	3.9(0.0−9.6)	21.9(10.7−33.1)	3.3(0.0−9.8)	7.9(0.0−23.8)	8.0(0.0−23.4)
Enterprise, commercial, service personnel	20.1(14.7−25.5)	8.6(3.5−13.8)	2.4(0.8−4.1)	29.2(22.8−35.5)	1.7(0.4−3.0)	12.2(0.0−25.6)	5.2(1.4−9.0)
Teacher	0.7(0.0−2.3)	25(0.0−72.6)	13.5(0.0−39.5)	27.2(0.0−57.8)	−	−	−
Medical worker	−	−	4.5(0.0−13.5)	18.0(1.9−34.0)	−	−	−
Unemployed	39.7(0.0−100.0)	24.6(0.0−69.7)	0.3(0.0−0.9)	28.8(9.7−48.0)	−	−	16.3(0.0−38.2)
Others	14.8(8.4−21.3)	7.5(0.4−14.6)	5.0(3.1−6.9)	28.6(23.2−34.1)	1.4(0.3−2.5)	14.2(2.5−25.9)	10.5(3.1−17.9)
χ^2	23.246	4.951	8.620	2.569	4.736	0.226	4.030
p value	0.0003	0.422	0.196	0.861	0.192	0.893	0.402
Total	17.3(13.1−21.9)	10.0(5.4−14.7)	4.2(3.0−5.4)	28.1(23.5−32.6)	1.8(0.9−2.6)	12.1(4.4−19.8)	7.7(3.8−11.6)

Note: Unweighted sample size less than 25, no results are shown. The category that does not show results is eliminated, when doing Chi-square test,

* People who have been to this kind of place in the past 30 days.

† Including primary school, middle school, high school, technical secondary school, vocational high school, etc.

§ The educational level of respondents over 25 years old was only reported.

Abbreviation: CI=confidence intervals.

institutions, and 1.8% for public transports. The proportions of SHS exposure of females in indoor workplaces, restaurants, public transport, and primary and secondary schools were lower than that of men (p<0.01). Different age groups, educational levels, and occupations were contributing factors that influenced the proportion of SHS exposure of indoor workplaces (Table 2).

DISCUSSION

This study indicated that the SHS exposure rate of non-smokers in Shanghai was 46.7% in 2018, which was significantly lower than that of 2016 (58.5%) (*5*) and also lower than the national average rate (68.1%) in 2018 (*6*). The highest rate of SHS exposure were among enterprises, businesses, and service workers and may be attributed to more opportunities for exposure due to the nature of their jobs, having more social activities and having been to more places in the last 30 days (in China, sharing cigarettes with others is often considered as a means of building social connections).

Although in Shanghai the current smoking rate in females was much lower than in males (0.8% *vs.* 19.9% in 2018), the rate of daily SHS exposure among non-smoking females was higher than that in males, which may be attributed to females potentially spending more time indoors where some people may smoke illegally or that women may be more sensitive to smoking behavior and tend to report it. When comparing the proportions of SHS exposure at home based on different characteristics, the exposure proportions were found to be highest in the group aged 15–24 years, or those with lower educational levels being accompanied by higher exposure proportions, which suggests that teenagers and young adults and the group with lower education were key groups affected by SHS.

The World Health Organization (WHO) suggests that achieving a completely smoke-free environment using legislation is the most effective measure to protect non-smokers from SHS (*7*) and can also encourage smokers to quit smoking (*8*). *The Amendment Regulations on Smoking Control in Public Places of Shanghai* had been formally implemented on March 1, 2017 and restricted smoking in all indoor places. In 2018, the law enforcement departments of tobacco control from all levels have made 235,483 inspections, and the number of cases resulting in fines increased by about 20% compared with 2017 and 40% compared with 2016. From 2016 to 2018, the incidence of smoking in the workplace also dropped significantly after the legislation, which was 34.4%, 16.3%, and 15.4%, respectively. The proportion of dissuading or enforcing laws against smoking increased year from 2016 to 2018, and were 40.8%, 46.6%, and 49.3%, respectively. The results of tobacco control has been improved remarkably (*9*). Similar to Beijing (*10*), SHS exposure in Shanghai is much lower than other domestic city without legislation (*11*–*12*).

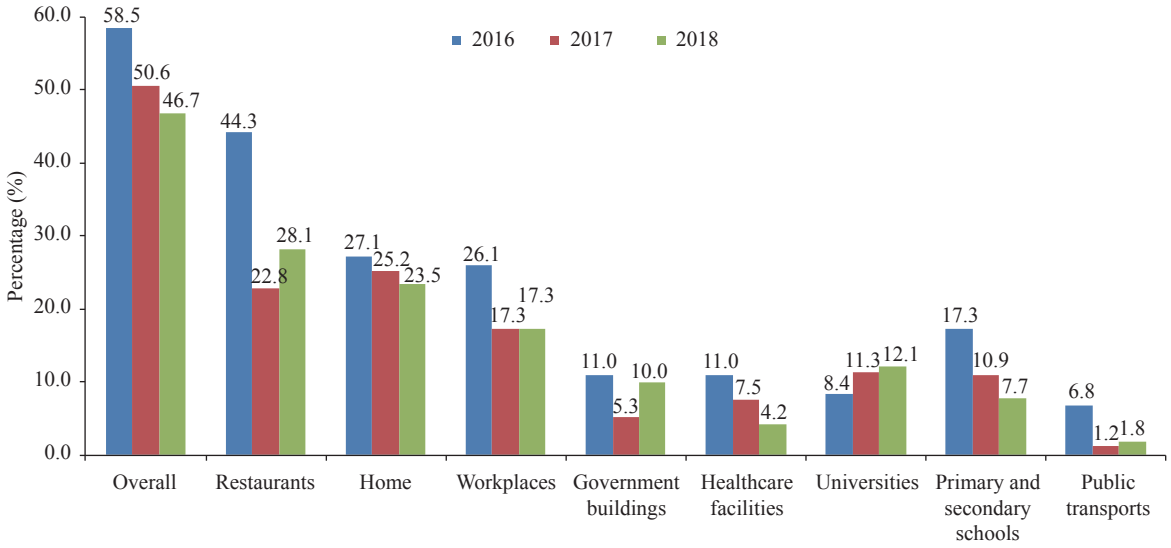

FIGURE 1. Exposure to secondhand smoke inside various public places and overall, GATS Shanghai 2016–2018. Note: The studies used multi-stage, geographically clustered sampling and Global Adult Tobacco Survey (GATS) standard questionnaire, and the data was weighted according to the sampling method, which could represent Shanghai.

Comparing the exposure of SHS before and after the implementation of the regulations (the year of 2007) in various places from 2016 to 2018 (Figure 1), it was found that the exposure dropped significantly after the implementation of the regulations (2017 and 2018) in public transports, medical institutions, indoor workplaces, restaurants, and primary and secondary schools. However, compared with that of 2017, the proportions of those who were exposed to tobacco smoke in the last 30 days in restaurants, government buildings, and universities resurged to a higher level, which was most likely due to weak enforcement of the regulations.

After one year's implementation of *the Amendment Regulation on Smoking Control in Public Places of Shanghai*, the proportion of those who were exposed to tobacco smoke in last 30 days dropped overall and in most indoor places, but some indoor places, such as restaurants, which indicated that regulations enforcement and tobacco control guidance and training needed to be strengthened in addition to public self-discipline and heteronomy in tobacco control.

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Commentary

The Importance of Reducing Smoking in China: To Achieve Healthy China 2030 While Reducing the Severity of the COVID-19 Pandemic

Geoffrey T. Fong[1,#]; Yuan Jiang[2]

The coronavirus disease 2019 (COVID-19) pandemic is the most devastating threat to global health since the 1918 influenza pandemic. As of May 22, 2020, there have been 5.1 million cases confirmed, with over 333,000 deaths. And we are just at the beginning of a long struggle.

There is a connection between COVID-19 — the greatest infectious disease outbreak in a century — and the greatest chronic disease threat in the world today — tobacco smoking. Smoking has been identified by the World Health Organization (WHO) as the "single greatest preventable cause of death in the world" (*1*). Tobacco smoking kills 7.1 million people a year (*2*), with an additional 1.2 million dying from secondhand smoke (*2*).

What's the connection? High-risk groups for COVID-19 include those with chronic obstructive pulmonary disease (COPD), cardiovascular disease, and diabetes (*3*). The importance of protecting those with such chronic diseases as a means for containing the COVID-19 pandemic has been articulated in the *China CDC Weekly* (*4*). But in addition to containing the pandemic, *there are significant opportunities for preventing and limiting the severity of COVID-19 through reducing smoking*.

Smoking is a significant risk factor for these and other conditions associated with high risk of COVID-19 (*5*), and has been identified by many health authorities, including the WHO (*6*), as a specific risk factor for COVID-19.

A recent multinational study of 8,190 COVID-19 patients found that current smokers were more likely to die (9.4%) compared to former smokers and non-smokers (5.6%) (*7*). A recent meta-analysis of 19 peer-reviewed papers found that smoking was a significant risk factor for progression of COVID-19: smokers had 1.91 times the odds of greater severity than never smokers (*8*). Thus, smoking cessation is recommended to reduce risk of COVID-19 and to lessen its severity by the WHO (*6*), the UK National Institute for Health Care Excellence (NICE) (*9*), the Canadian Lung Association (*10*), and health professionals (*11*).

Smoking in China

About 300 million Chinese people smoke — including over 50% of men (*12*). We know that one-half of all regular smokers die of a smoking-related disease (*13*). Putting these two statistics together leads to the astonishing fact that more than one of out every four men alive today in China will die of smoking. Further, each of these smokers who die will lose over a decade of life (*13*). The toll of smoking in China is already extraordinary — greater than even that of its status as the world's largest country in population — and it is increasing. The Global Burden of Disease (GBD) Study estimated that in 2017, smoking killed about 2.3 million smokers in China, with an additional 400,000 non-smokers dying of secondhand smoke (*14*).

China's high smoking rate and the connection between smoking and COVID-19 threatens to reduce the impact of the impressive efforts that China has expended to combat the pandemic through extreme limitations on population movement, extensive testing, and bolstering its healthcare capacity and supplies. It is therefore even more important than ever to encourage smokers in China to quit through strong tobacco control policies.

China is one of 181 countries that have ratified the global tobacco control treaty — the WHO Framework Convention on Tobacco Control (FCTC). The FCTC obligates China and the other Parties to implement and enforce strong tobacco control policies such as large graphic health warnings on cigarette packages, laws that prohibit smoking in all key public places such as trains and buses, shopping malls, restaurants, bars, and workplaces, bans on advertising, promotion, and sponsorship, higher taxes on cigarettes, and support for cessation. These FCTC policies correspond to the WHO's MPOWER package of tobacco control

measures, which focus on policies that are aimed at reducing the demand for tobacco products (*15*).

The Importance of Reducing Smoking Rates to Achieve the Goal of Healthy China 2030

The goal of Healthy China 2030 is to reduce deaths from noncommunicable diseases by 30% by 2030. But this cannot be achieved without great reductions in smoking. Estimates are that it would be necessary to reduce smoking prevalence from 27.7% in 2015 and 26.6% in 2018 to 20% by 2030.

China has taken the critically important step of incorporating tobacco control into the Healthy China 2030 Plan. But it is necessary to strengthen and accelerate implementation of these important tobacco control policies of the FCTC.

The International Tobacco Control Policy Evaluation Project: Evaluating Tobacco Control Measures in China

The International Tobacco Control Policy Evaluation Project (the ITC Project) is the largest tobacco research program in the world (www.itcproject.org). Since 2002, the ITC Project, based at the University of Waterloo in Canada, has conducted very large cohort surveys of smokers and users of other tobacco and nicotine products (such as e-cigarettes) in 29 countries, covering over 50% of the world's population and over 70% of the world's tobacco users.

One main objective of our research is to evaluate the impact of FCTC policies. We found, for example, that when Ireland became the first country in the world to implement a comprehensive smoke-free law, smoking in restaurants decreased from 84% to 2% in a single year (*16*). When Malaysia introduced large pictorial warnings, smokers who reported putting out a cigarette because of the warnings increased from 21% to 55% (*17*).

In 2005, the ITC Project created a partnership with the Tobacco Control Office at the China CDC. This partnership led to a 10-year ITC China Project. We conducted a large-scale ITC China cohort survey in major cities (e.g., Beijing, Shanghai, Guangzhou, Kunming, Shenyang) and in rural areas (e.g., Xining, Changxi, Yichun), with 5 data collection waves (2006, 2007–2008, 2009, 2011–2012, 2013–2015), which allowed us to examine trends over time in smoking and to measure the extent to which China's tobacco control efforts have had an impact on smokers.

Although our evaluation studies have shown that China has seen some progress in local smoke-free laws, taxation, and in restrictions on tobacco advertising, promotion, and sponsorship, we have also found that there is a need for stronger tobacco control laws in China (*18–19*).

We found that even Chinese smokers themselves would be supportive of stronger tobacco control laws. About 3 out of 4 smokers and non-smokers agreed that the government should do more to control smoking, and over 90% of smokers said that a ban on smoking in restaurants and other indoor places would be "good" or "very good." (*18*)

In 2017, we published a study in *Lancet Public Health* that examined the impact of strong tobacco control policies in 126 countries, finding that countries that implemented a greater number of policies such as higher taxes, complete smoke-free, graphic warnings, bans on tobacco advertising, and strong support for cessation experienced much greater decreases in smoking rates (*20*). In fact, if all of these policies were fully implemented in China, we predict that smoking prevalence would decrease from 27% to 18%, meeting the target for the necessary reductions in smoking for Healthy China 2030. Such a reduction would not only be monumental for China in achieving its goal for Healthy China 2030, it would also contribute to containing and preventing COVID-19.

As the COVID-19 pandemic continues to occupy the attention of China and the world, it is also important to note that since smoking is a very strong and indisputable cause of COPD, as well as cardiovascular diseases and other conditions that are also high-risk for COVID-19, interventions to reduce smoking, such as strengthening tobacco control policies (e.g., graphic warnings, higher cigarette taxes), would not only be beneficial in and of itself to take huge steps forward in meeting the goals of Healthy China 2030, but would *also* serve to reduce the severity of COVID-19.

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