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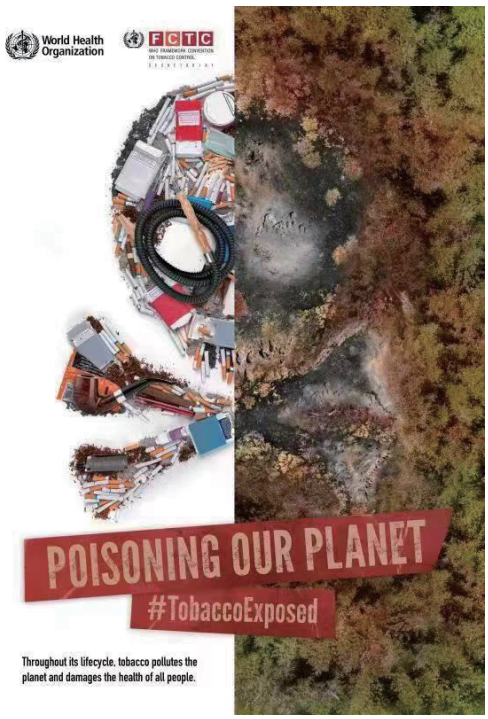

WORLD NO TOBACCO DAY ISSUE

Preplanned Studies

Commentary

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Preplanned Studies

Smoking Behavior Among Secondary School Students — China, 2021

Xinying Zeng[1]; Xinbo Di[1]; Shiwei Liu[1]; Huiyu Xie[1]; Zida Meng[1]; Lin Xiao[1,#]

Summary

What is already known about this topic?

In 2019, China CDC conducted the National Youth Tobacco Survey among secondary school students, and the prevalence rates of ever, current, and frequent smoking were 17.9%, 5.9%, and 1.8%, respectively.

What is added by this report?

The prevalence rate of cigarette use in males decreased largely from 2019 to 2021 in China, while it increased in 18 provincial-level administrative divisions (PLADs) for females. The tobacco control situation remains challenging among vocational senior high school (VSHS) students. Significant geographical disparities existed in cigarette use.

What are the implications for public health practice?

Targeted tobacco control policies aimed at VSHS students are needed, specifically those PLADs with higher smoking rates. Additionally, close attention should be paid to female smokers.

Based on the framework of the Global Youth Tobacco Survey (*1*), China CDC had conducted the China National Youth Tobacco Survey (NYTS) among junior high school (JHS) students in 2014 and among junior and senior high school (SHS) students [including vocational senior high school (VSHS) students] in 2019, respectively (*2*). Similarly, China CDC again implemented NYTS in 2021. The 2021 China NYTS was approved by the Institutional Review Board of China CDC (No. 202110). In this study, we reported smoking behavior at the national level with ever, current, and frequent cigarette smoking from the 2021 China NYTS and compared them with 2019. We also examined provincial-level disparities in cigarette smoking in 2021 and provincial-level disparities in their change between 2019 and 2021.

With a design similar to the 2014 and 2019 China NYTS (*2*), a 3-stage stratified cluster random sampling was also applied in the 2021 China NYTS covering 31 provincial-level administrative divisions (PLADs) in the mainland of China. First, 5 districts (for urban areas) and 5 counties (for rural areas) were selected in each PLAD using proportionate to population size sampling scheme (PPS). Second, 3 JHSs, 2 SHSs, and 1 VSHS within each selected district and county were selected using PPS method. Third, within selected schools, 1 class (which must include more than 40 students in each grade) was randomly selected and all of the students of the selected class were interviewed. Finally, 936 JHSs, 637 SHSs, and 254 VSHSs from 317 districts/counties participated in the survey. A total of 269,250 eligible students (136,296 JHS students, 96,852 SHS students, and 36,102 VSHS students) completed the survey, of which 138,007 were male and 131,243 were female. The overall survey response rate was 95.9%.

Throughout the investigation, we implemented strict quality control. Before the field interview, all interviewers and supervisors should be trained and tested. During the interview, the interviewers explained to the students the purpose and content of the survey, emphasizing that the survey was voluntary and anonymous, that the responses would be kept confidential, etc. Students completed the questionnaire independently without teachers present. The quality controllers checked the completeness of the finished questionnaires. After the interview, the subsequent data entry was completed by a professional company, and the entry quality (<5/10,000 error rate) was guaranteed by a sampling check. Missing data, outlier values, and logic mistakes were processed by China CDC before final utilization.

Structured paper-based questionnaires with no logical skips were used. In terms of smoking behavior, all of the participants were asked about smoking frequency, smoking amount, smoking age, etc. Ever cigarette smokers (ES) were defined as those who had smoked cigarettes in the past, even one or two puffs, and current smokers (CS) as smoking cigarettes at least 1 day during the past 30 days. Those who reported smoking cigarettes on 20 or more days in the past 30 days were frequent smokers (FS). Data were weighted

according to the complex sampling design. Prevalence estimates and their corresponding 95% confidence intervals (CI) were calculated and their difference with no overlap in CI was referred to be statistically significant between subgroups. SAS (version 9.4, SAS Institute, Inc. Cary, NC, USA) was used for all analyses.

In 2021, the ES prevalence rate among secondary school students was 16.7%, higher for males (23.2%) than for females (9.5%), higher in rural areas (18.5%) than in urban areas (14.5%), and highest among VSHS students (28.9%), followed by SHS students (18.9%), and JHS students (12.9%). Among ES, 66.1% smoked their first cigarette at 13 years old and before, with no significant difference for males and females, in urban areas and rural areas, and highest among JHS students (81.8%), followed by SHS students (60.9%), and VSHS students (44.1%) (Table 1).

In 2021, the CS prevalence rate among secondary school students was 4.7%, higher for males (7.1%) than for females (1.9%), higher in rural areas (5.3%) than in urban areas (3.9%), and highest among VSHS students (12.1%), followed by SHS students (4.2%), and JHS students (3.3%). The proportion of FS was 1.3% which means more than a quarter of CS were FS. Similar to ES and CS, the FS prevalence rate was much higher among males (2.1%) than that among females (0.3%), lowest in JHS (0.6%), followed by SHS (1.3%), and highest in VSHS (4.1%) (Table 1).

There was a wide geographical variation in the proportion of CS among PLADs, ranging from 0.9% to 13.2%. The highest CS prevalence rates were reported for Xizang (Tibet), Yunnan, and Qinghai, while the lowest CS prevalence rates were in Shanghai, Beijing, and Jiangxi. Significant provincial disparities were also present in the percentage change of CS from 2019 to 2021. The CS prevalence rate decreased in 26 of 31 PLADs, of which Beijing, Jiangxi, and Shanghai had the largest decreases, while Shandong, Anhui, Hainan, and Xizang (Tibet) had increased. For males, the rate increased only in 3 PLADs, while it increased in 18 PLADs for females (Figure 1).

DISCUSSION

Several studies indicated that nicotine addiction beginning during adolescence could be hard to quit and increase the risk of future addiction (*3*–*4*). It is effective to prevent tobacco use initiation during adolescence in mitigating and controlling the adult tobacco epidemic. According to Wang et al., 77.9% of current smokers attempted cigarette smoking at puberty (*5*). In this survey, 66.1% of ever smokers tried their first cigarette at 13 years old and before.

The prevalence of current cigarette smoking among secondary school students was 4.7%, which can project that an estimated 3.68 million secondary school students currently smoke cigarettes in 2021 in China. Among JHS students aged 13–15 years, the prevalence rate of CS was 4.5% for males and 1.9% for females, which was much lower than the global level (7.9% for males, 3.5% for females) and also lower than that of the western pacific region (7.0% for males, 2.4% for females) (*6*).

Compared with the 2019 China NYTS, the prevalence rates of ES, CS, and FS for males in 2021 decreased by 10.8% (26.0% *vs.* 23.2%), 26.0% (9.6% *vs.* 7.1%), and 34.4% (3.2% *vs.* 2.1%) (*2*), respectively, while they were unchanged for females. These decreases in cigarette use may be partially due to the development of tobacco control interventions, such as creating smoke-free school grounds nationwide, banning smoking in school, and actively implementing health promotion and education on tobacco control (*7*–*8*). The increasing popularity of e-cigarette use might attract some young cigarette smokers to smoke e-cigarettes instead. Compared to 2019 which predated the coronavirus disease 2019 (COVID-19) pandemic, students might spend more time at home taking classes and under parental supervision in 2021, so they were likely not to smoke during the past 30 days.

Previous studies had reported that in European countries such as France and Denmark, rates of tobacco use among VSHS students were usually 1–3 times higher than those among SHS students (*9*–*10*). In this study, cigarette use was much more prevalent in VSHS students than among SHS and JHS students, with the prevalence rate of CS among VSHS students being 4 times and 3 times among JHS and SHS students and the prevalence rate of FS being 7 times and 3 times. This indicated that targeted measures of tobacco control are urgently needed to protect VSHS students from tobacco.

There were significant geographical differences in cigarette smoking across PLADs in China. The coastal and wealthier PLADs in eastern and southeastern China generally have lower CS prevalence rates than those in the southwestern and central regions, similar to the epidemiologic characteristics of tobacco use among Chinese adults. Significant provincial disparities were also present in the percentage change

TABLE 1. Smoking behavior among secondary high school students of China in 2021.

Region	Variable	Total		Junior high school		Senior high school		Vocational senior high school	
		Unweighted N	Weighted % (95% CI)	Unweighted N	Weighted % (95% CI)	Unweighted N	Weighted % (95% CI)	Unweighted N	Weighted % (95% CI)
Total	Both								
	Ever cigarette smokers	43,934	16.7 (15.8−17.5)	16,472	12.9 (11.9−13.8)	17,380	18.9 (17.7−20.1)	10,082	28.9 (26.4−31.3)
	Smoking first cigarette at 13 years old and before among ever smokers	22,767	66.1 (64.6−67.6)	10,301	81.8 (79.8−83.8)	8,727	60.9 (59.4−62.3)	3,739	44.1 (41.5−46.7)
	Current cigarette smokers	12,934	4.7 (4.3−5.0)	4,382	3.3 (2.9−3.7)	4,255	4.2 (3.7−4.7)	4,297	12.1 (10.5−13.6)
	Frequent cigarette smokers	3,782	1.3 (1.1−1.4)	830	0.6 (0.5−0.7)	1,386	1.3 (1.1−1.5)	1,566	4.1 (3.4−4.8)
	Males								
	Ever cigarette smokers	31,986	23.2 (22.0−24.3)	11,581	17.0 (15.7−18.3)	12,824	28.0 (26.4−29.7)	7,581	40.1 (36.8−43.4)
	Smoking first cigarette at 13 years old and before among ever smokers	16,900	66.1 (64.3−67.8)	7,410	82.8 (81.0−84.7)	6,534	60.3 (58.4−62.1)	2,956	45.2 (42.5−47.9)
	Current cigarette smokers	10,403	7.1 (6.6−7.7)	3,173	4.5 (3.9−5.1)	3,653	7.4 (6.5−8.3)	3,577	18.5 (16.2−20.9)
	Frequent cigarette smokers	33,36	2.1 (1.9−2.4)	667	1.0 (0.8−1.1)	1,250	2.4 (2.1−2.7)	1,419	7.0 (5.8−8.2)
	Females								
	Ever cigarette smokers	11,948	9.5 (8.8−10.1)	4,891	8.1 (7.4−8.8)	4,556	9.8 (8.7−10.9)	2,501	15.2 (13.8−16.5)
	Smoking first cigarette at 13 years old and before among ever smokers	5,867	66.1 (63.9−68.4)	2,891	79.3 (76.0−82.6)	2,193	62.6 (58.9−66.4)	783	40.3 (36.3−44.3)
	Current cigarette smokers	2,531	1.9 (1.7−2.1)	1,209	1.9 (1.6−2.2)	602	1.1 (0.9−1.3)	720	4.2 (3.5−4.9)
	Frequent cigarette smokers	446	0.3 (0.2−0.3)	163	0.2 (0.2−0.3)	136	0.2 (0.2−0.3)	147	0.6 (0.4−0.8)

TABLE 1. (Continued)

Region	Variable	Total		Junior high school		Senior high school		Vocational senior high school	
		Unweighted N	Weighted % (95% CI)	Unweighted N	Weighted % (95% CI)	Unweighted N	Weighted % (95% CI)	Unweighted N	Weighted % (95% CI)
Urban	Both								
	Ever cigarette smokers	20,870	14.5 (13.6−15.5)	7,361	10.4 (9.2−11.5)	8,698	17.0 (15.7−18.3)	4,811	27.5 (24.1−31.0)
	Smoking first cigarette at 13 years old and before among ever smokers	10,685	64.5 (62.2−66.8)	4,610	83.2 (81.4−85.0)	4,307	59.9 (58.1−61.6)	1,768	42.6 (38.4−46.7)
	Current cigarette smokers	5,696	3.9 (3.5−4.4)	1,693	2.3 (1.9−2.8)	1,995	3.9 (3.3−4.5)	2,008	11.5 (9.2−13.7)
	Frequent cigarette smokers	1,794	1.2 (1.0−1.3)	359	0.5 (0.4−0.6)	678	1.3 (1.0−1.5)	757	4.0 (3.0−5.1)
	Males								
	Ever cigarette smokers	14,979	20.1 (18.7−21.4)	5,159	13.8 (12.1−15.5)	6,330	24.8 (22.8−26.8)	3,490	37.6 (32.5−42.6)
	Smoking first cigarette at 13 years old and before among ever smokers	7,859	64.8 (62.3−67.3)	3,323	84.2 (82.2−86.2)	3,168	59.2 (56.9−61.4)	1,368	44.5 (40.4−48.5)
	Current cigarette smokers	4,515	6.0 (5.4−6.6)	1,208	3.1 (2.5−3.8)	1,694	6.8 (5.6−7.9)	1,613	17.0 (13.7−20.4)
	Frequent cigarette smokers	1,581	2.0 (1.7−2.3)	294	0.7 (0.5−0.9)	608	2.4 (1.9−2.8)	679	6.9 (5.0−8.8)
	Females								
	Ever cigarette smokers	5,891	8.4 (7.8−9.1)	2,202	6.5 (5.8−7.2)	2,368	9.2 (8.3−10.1)	1,321	15.4 (13.4−17.3)
	Smoking first cigarette at 13 years old and before among ever smokers	2,826	63.5 (60.3−66.7)	1,287	80.6 (76.8−84.4)	1,139	61.8 (58.2−65.4)	400	36.6 (30.8−42.5)
	Current cigarette smokers	1,181	1.7 (1.5−1.9)	485	1.4 (1.1−1.6)	301	1.1 (0.8−1.3)	395	4.8 (3.7−6.0)
	Frequent cigarette smokers	213	0.2 (0.2−0.3)	65	0.2 (0.1−0.2)	70	0.2 (0.1−0.3)	78	0.6 (0.4−0.9)

TABLE 1. (Continued)

Region	Variable	Total		Junior high school		Senior high school		Vocational senior high school	
		Unweighted N	Weighted % (95% CI)	Unweighted N	Weighted % (95% CI)	Unweighted N	Weighted % (95% CI)	Unweighted N	Weighted % (95% CI)
Rural	Both								
	Ever cigarette smokers	23,064	18.5 (17.2−19.9)	9,111	15.1 (13.6−16.5)	8,682	20.6 (18.6−22.6)	5,271	30.2 (26.8−33.5)
	Smoking first cigarette at 13 years old and before among ever smokers	12,082	67.2 (65.3−69.1)	5,691	81.0 (78.1−84.0)	4,420	61.6 (59.4−63.8)	1,971	45.4 (42.3−48.5)
	Current cigarette smokers	7,238	5.3 (4.7−5.9)	2,689	4.1 (3.5−4.8)	2,260	4.5 (3.8−5.2)	2,289	12.6 (10.4−14.7)
	Frequent cigarette smokers	1,988	1.3 (1.2−1.5)	471	0.7 (0.6−0.9)	708	1.3 (1.1−1.6)	809	4.1 (3.2−5.1)
	Males								
	Ever cigarette smokers	17,007	25.9 (24.1−27.7)	6,422	19.9 (18.0−21.8)	6,494	30.9 (28.5−33.3)	4,091	42.4 (38.5−46.3)
	Smoking first cigarette at 13 years old and before among ever smokers	9,041	66.9 (64.5−69.4)	4,087	82.0 (79.4−84.6)	3,366	61.0 (58.3−63.8)	1,588	45.8 (42.3−49.4)
	Current cigarette smokers	5,888	8.2 (7.3−9.0)	1,965	5.7 (4.8−6.7)	1,959	8.0 (6.7−9.2)	1,964	19.9 (16.7−23.0)
	Frequent cigarette smokers	1,755	2.3 (2.0−2.6)	373	1.2 (0.9−1.4)	642	2.4 (2.0−2.8)	740	7.1 (5.6−8.5)
	Females								
	Ever cigarette smokers	6,057	10.4 (9.2−11.5)	2,689	9.5 (8.3−10.6)	2,188	10.4 (8.5−12.3)	1,180	15.0 (13.1−16.9)
	Smoking first cigarette at 13 years old and before among ever smokers	3,041	68.0 (64.9−71.0)	1,604	78.7 (74.0−83.3)	1,054	63.3 (57.4−69.1)	383	44.0 (39.0−49.0)
	Current cigarette smokers	1,350	2.1 (1.7−2.4)	724	2.3 (1.8−2.8)	301	1.1 (0.8−1.4)	325	3.7 (2.8−4.6)
	Frequent cigarette smokers	233	0.3 (0.2−0.4)	98	0.3 (0.2−0.3)	66	0.2 (0.1−0.4)	69	0.5 (0.3−0.8)

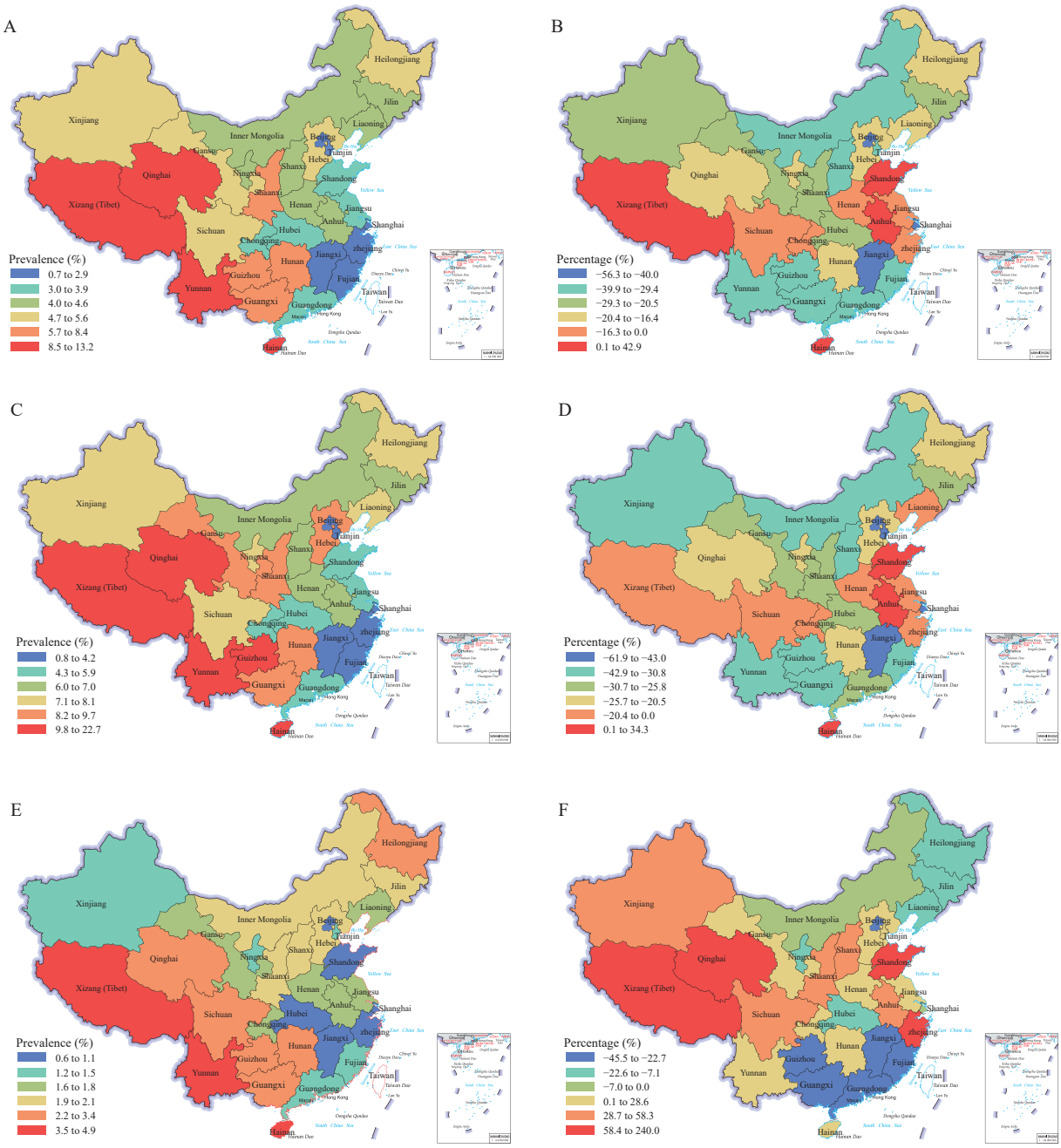

FIGURE 1. Provincial disparities in the prevalence of current cigarette smoking in 2021 and its percentage change by sex from 2019 to 2021. (A) Prevalence of current smoking for both; (B) Percentage change in prevalence of current smoking for both; (C) Prevalence of current smoking for males; (D) Percentage change in prevalence of current smoking for males; (E) Prevalence of current smoking for females; (F) Percentage change in prevalence of current smoking for females.

of CS from 2019 to 2021. Notably, the PLADs with low levels of CS prevalence, such as Shanghai, Beijing, and Jiangxi, had greater reductions, while those PLADs with high levels, such as Xizang (Tibet), Hainan, and Qinghai, decreased slowly or even increased. This suggested that developing area-tailored and enforced interventions and measures were urgent for PLADs with high prevalence of smoking on the basis of national policies and strategies. In this study, the CS prevalence rate of males in all PLADs decreased significantly, except for Shandong, Hainan, and Anhui, while it was far less decreased among females and even increased in 18 PLADs. Given the rising trend of tobacco use among females, more attention should be paid to female smokers.

This study was subject to some limitations. The data

was collected by self-reporting which was subject to recall and reporting bias, which may lead to underreporting. In addition, the classification of urban-rural areas is based only on the name of the area with "district or QU" and "county, XIAN, MENG, or QI", but it is consistent with most studies in China.

In conclusion, the prevalence rates of ES, CS, and FS for males decreased from 2019 to 2021 in China, while CS of females increased in 18 PLADs. Tobacco control remains challenging for VSHS. Significant regional disparities in the prevalence of cigarette use and its percentage change suggested that tailored tobacco control measures were needed for PLADs with higher smoking rates.

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[#] Corresponding author: Lin Xiao, xiaolin@chinacdc.cn.

[1] Tobacco Control Office, Chinese Center for Disease Control and Prevention, Beijing, China.

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Preplanned Studies

Tobacco Use and Cessation Among College Students — China, 2021

Huiyu Xie[1]; Xinbo Di[1]; Shiwei Liu[1]; Xinying Zeng[1]; Zida Meng[1]; Lin Xiao[1,#]

Summary

What is already known about this topic?

Previous studies about tobacco use among college students in China were conducted at the school level or city level, with fewer than 5,000 students participating.

What is added by this report?

In 2021, China CDC conducted a national tobacco survey targeting students enrolled in the public higher education system. Overall, 124,119 students from 220 colleges and universities in 31 provincial-level administrative divisions participated in this survey. Current cigarette smoking, current daily smoking, willingness to quit, and smoking cessation among college students were explored.

What are the implications for public health practice?

The current daily cigarette smoking rate of college students was significantly higher than senior high school students, especially for higher vocational colleges students. Tobacco control interventions, such as a smoke-free school policy and smoking cessation services, need to be reinforced on college campuses.

Cigarette smoking is one of the leading causes of preventable morbidity and mortality globally (*1*). The report of 2018 China-Global Adult Tobacco Survey (GATS) showed that the average age to initiating daily smoking for daily smokers was 21.1 years old (*2*), around the average age of a university student. However, previous GATS investigations excluded those who lived in collective housing, such as student dormitories, and previous studies among college students were mostly conducted at the school or city level (*3*–*4*). To fill this gap and provide evidence for policymaking, China CDC conducted the first round of a national tobacco survey in 2021. By using a multi-stage stratified cluster for a random sampling designed survey, China CDC aimed to achieve a nationally representative sample, targeting all college students enrolled in the public higher education system. Using a modified electronic questionnaire based on the GATS questionnaire, 124,119 college students from 220 colleges were asked about cigarette smoking prevalence, intention to quit, smoking cessation rate, etc.

For the first stage, all colleges in the mainland of China were divided into nine strata by region (east, middle, and west) and school attributes [Colleges Directly Under the Central Ministries and Commissions or Colleges Co-sponsored by Province and Ministry (CCMC/CCPM), Provincial Colleges (PC), and Higher Vocational Colleges (HVC)]. The number of sampling schools in each stratum and the survey schools were selected using a proportionate student size. For stage two, under an estimated ratio of 1∶2 of students in the arts∶sciences and each class having no less than 40 students, 3 classes (one for arts and two for science) were randomly sampled for each grade within the selected schools. All the students in the selected class would be sampled. Post hoc stratification adjusted the proportion of school attributes and gender. In this survey, an electronic survey system was used for data collection. Under the coordination of the local education departments, trained investigators came to the selected classes, asked the college students to fill out and submit the questionnaire independently through the WeChat mini-program. The data were further checked by provincial quality controllers and would be reinvestigated if a large proportion of duplicate reports existed.

Parts of the GATS questionnaires were tailored for college students. Questions included basic information (school, grade, major, gender, race, etc.), cigarette and e-cigarette use, smoking cessation, secondhand smoke exposure, price, tobacco control propaganda, smoking cognition, and attitudes. By asking the participants, "Do you currently smoke tobacco on a daily basis, less than daily, or not at all?", current smokers (CS) were defined as those who answered "daily" and "less than daily", and current daily smokers (CDS) were defined as those who answered "daily". For current non-

smokers, "In the past, have you smoked tobacco on a daily basis, less than daily, or not at all?" was asked. The smoking cessation was defined as those who answered "daily" and "less than daily." Willingness to quit referred to the intention of current smokers to quit smoking within the next month, within the next or after 12 months.

A total of 220 colleges in 31 provincial-level administrative divisions (PLADs) were covered in this survey, with 124,119 participants completing the individual questionnaires. The overall response rate was 95.9%. The data were processed by checking logic issues, missing values, and outliers for final analysis. Prevalence rates and chi-square test for differences were calculated and reported in this study. Statistical analysis was performed using SAS 9.4 software (SAS Institute Inc., Cary, NC, USA).

CS prevalence rate among college students was 7.8%, with 3.0%, 5.0%, and 11.6% for CCMC/CCPM, PC, and HVC students, respectively, and higher rates in males (4.9%, 9.8%, and 21.2%) than in females (1.0%, 0.9%, and 1.4%) (p<0.05). The overall prevalence of CDS was 4.7%, with the highest among HVC (7.1%), and then PC (2.9%) and CCMC/CCPM (1.6%), with higher in males (9.2%) than in females (0.5%) (p<0.05). The prevalence of CS and CDS among students increased with the grade level, with first year (3.6%, 1.9%), second year (4.6%, 2.7%), third year (5.5%, 3.3%), and fourth year (5.6%, 3.5%) in CCMC/CCPM and PC, and with first year (11.0%, 6.3%), second year (11.2%, 6.8%), and third year (12.6%, 8.2%) in HVC (p<0.05). Significant regional disparities existed between schools for CS rates. The highest CS rate was observed in the western region (10.0%), then the middle (7.2%), and the eastern region (7.0%) (p<0.05). In the western region (6.1%), the CDS rate was also observed higher than that in the eastern (4.3%) and middle region (4.2%) (p<0.05) (Table 1). For CS and CDS, the average number of cigarettes smoked was 7.3 [95% confidence intervals (CI): 7.0–7.5] and 10.2 (95% CI: 9.9–10.6) sticks/day, respectively.

TABLE 1. Current cigarette uses among college students in China, 2021.

Region	Characteristics	Total				Males				Females			
		Current smokers		Current daily smokers		Current smokers		Current daily smokers		Current smokers		Current daily smokers	
		N	%	N	%	N	%	N	%	N	%	N	%
Total	Overall	9,642	7.8	5,830	4.7	8,964	15.0	5,518	9.2	678	1.1	312	0.5
	School type												
	CCMC/CCPM	150	3.0	79	1.6	129	4.9	70	2.7	21	1.0	9	0.4
	PC	3,362	5.0	1,995	2.9	3,065	9.8	1,868	6.0	297	0.9	127	0.4
	HVC	6,130	11.6	3,756	7.1	5,770	21.2	3,580	13.2	360	1.4	176	0.7
East	Overall	3,789	7.0	2,325	4.3	3,439	13.4	2,158	8.4	350	1.3	167	0.6
	School type												
	CCMC/CCPM	82	2.5	44	1.4	69	3.8	38	2.1	13	1.0	6	0.5
	PC	1,306	4.2	755	2.4	1,124	8.5	679	5.1	182	1.2	76	0.5
	HVC	2,401	11.3	1,526	7.2	2,246	19.8	1,441	12.7	155	1.6	85	0.9
Middle	Overall	2,618	7.2	1,537	4.2	2,446	13.5	1,458	8.1	172	1.0	79	0.5
	School type												
	CCMC/CCPM	25	3.0	13	1.6	24	5.4	12	2.7	1	0.3	1	0.3
	PC	842	4.4	503	2.6	792	8.1	479	4.9	50	0.6	24	0.3
	HVC	1,751	10.1	1,021	5.9	1,630	19.7	967	11.7	121	1.4	54	0.6
West	Overall	3,235	10.0	1,968	6.1	3,079	19.4	1,902	12.0	156	1.0	66	0.4
	School type												
	CCMC/CCPM	43	5.0	22	2.5	36	9.6	20	5.3	7	1.6	2	0.5
	PC	1,214	6.8	737	4.1	1,149	14.0	710	8.7	65	0.8	27	0.3
	HVC	1,978	14.0	1,209	8.5	1,894	25.0	1,172	15.4	84	1.3	37	0.6

Abbreviations: CCMC/CCPM=Colleges Directly Under the Central Ministries and Commissions or Colleges Co-sponsored by Province and Ministry; PC=Provincial Colleges; HVC=Higher Vocational Colleges.

Among students who were currently cigarette smokers, 67.5% reported that they were willing to quit smoking, with 31.2% planning to quit in the next month. The proportion willing to quit smoking next month was higher among males (31.5%) than females (27.2%), and higher in the western region (34.4%) than in the middle (31.0%) and eastern region (28.5%) (p<0.05). It was higher in HVC (33.9%) than those in PC (26.4%) and CCMC/CCPM (16.9%) (p<0.05). Smoking cessation rate among college students in China was 26.0%, with female students (49.0%) higher than male students (23.2%) (p<0.05); it was significantly higher in the western region (27.2%) than in the eastern (25.6%) and middle region (25.2%) (p<0.05). The highest proportion of smoking cessation was reported in CCMC/CCPM (32.1%), followed by PC (30.3%) and HVC (23.5%) (p<0.05) (Table 2).

DISCUSSION

In this survey, CS and CDS rates among college students were 7.8% and 4.7%, respectively. Males, HVC students, and western region students had higher CS and CDS rates. CS and CDS rates among western region male students in HVC were 25.0% and 15.4%, respectively. College is a crucial stage of developing behavior and lifestyle, and it is also a stage in which smoking behaviors increased significantly. Several studies have shown that tobacco use is becoming prevalent among college students (*5*). This was in line with this study that the CDS rate among college students was double that of senior high school students (2.1%) surveyed in 2019 (p<0.05) (*6*). This may be partially due to the existence of some restrictions on smoking for youth under the age of 18. To protect the health of college students and to achieve a future

TABLE 2. Smoking cessation and current smokers' willingness to quit smoking next month in China, 2021.

Region	Characteristics	Total				Males				Females			
		Planned to quit smoke next month*		Smoking cessation		Planned to quit smoke next month*		Smoking cessation		Planned to quit smoke next month*		Smoking cessation	
		N	%	N	%	N	%	N	%	N	%	N	%
Total	Overall	3,008	31.2	3,389	26.0	2,820	31.5	2,736	23.2	188	27.2	653	49.0
	School type												
	CCMC/CCPM	26	16.9	69	32.1	26	20.2	48	27.1	0	0.0	21	50.0
	PC	898	26.4	1,441	30.3	838	27.2	1,186	27.9	60	19.9	255	46.2
	HVC	2,084	33.9	1,879	23.5	1,956	33.8	1,502	20.7	128	35.3	377	51.2
East	Overall	1,083	28.5	1,298	25.6	1,005	29.2	1,011	22.5	78	21.9	287	45.0
	School type												
	CCMC/CCPM	13	15.4	43	35.0	13	18.8	30	30.3	0	0.0	13	50.0
	PC	333	25.1	555	30.2	298	26.4	427	27.5	35	18.8	128	41.3
	HVC	737	30.6	700	22.6	694	30.8	554	19.8	43	27.7	146	48.5
Middle	Overall	812	31.0	885	25.2	759	31.1	727	22.7	53	30.0	158	47.9
	School type												
	CCMC/CCPM	4	15.9	14	37.2	4	16.7	9	27.3	0	0.0	5	83.3
	PC	206	24.2	360	30.2	196	24.6	316	28.5	10	19.6	44	46.8
	HVC	602	34.2	511	22.6	559	34.2	402	19.8	43	34.7	109	47.4
West	Overall	1,113	34.4	1,206	27.2	1,056	34.3	998	24.4	57	36.2	208	57.1
	School type												
	CCMC/CCPM	9	20.3	12	22.1	9	25.0	9	20.0	0	0.0	3	30.0
	PC	359	29.4	526	30.6	344	29.8	443	27.8	15	23.1	83	56.1
	HVC	745	37.5	668	25.3	703	36.9	546	22.4	42	50.0	122	59.2

Abbreviations: CCMC/CCPM=Colleges Directly Under the Central Ministries and Commissions or Colleges Co-sponsored by Province and Ministry; PC=Provincial Colleges; HVC=Higher Vocational Colleges.
* Current smokers who planned to or were thinking about quitting in the next month.

reduction in tobacco use across the whole population, some targeted tobacco control interventions are needed. The smoke-free school policy can be applied on college campuses, for example, prominently displayed "smoke-free campus" or "no-smoking" signs at school entrances, no tobacco advertising or tobacco sales in schools, and strictly enforcing smoke-free regulations (*7*). In addition, tobacco-related topics can be required incorporated into the curriculum to increase students' recognition of tobacco hazards (*8*).

The 2018 report of China-GATS showed that, among people aged 15–24 years, the proportion of current smokers who intended to quit in the next month and the smoking cessation rate were 9.3% and 8.1%, respectively (*2*), significantly lower than that in college students (31.2%, 26.0%) (p<0.05). This difference may be due to the higher education levels of college students and their higher levels of awareness of tobacco hazards. Several longitudinal studies indicated that tobacco control policies and professional smoking cessation services significantly reduced smoking behaviors (*9*). Therefore, actively providing professional smoking cessation services within the student health center and encouraging students and school staff to participate in school-based tobacco control and cessation programs would be effective (*10*).

A potential limitation is that the self-reported questionnaires may cause observer bias, which might underreport the prevalence rates. Underreporting surveys could be conducted in the future to explore whether potential observer bias exist.

In conclusion, the prevalence of current daily cigarette smoking among college students was much higher than that of senior high school students, and the rate in HVC was significantly high. College students were more willing to quit smoking and had higher smoking cessation rate, thus, the tobacco control interventions, such as smoke-free school policy and smoking cessation services, need to be reinforced on college campuses.

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[#] Corresponding author: Lin Xiao, xiaolin@chinacdc.cn.

[1] Tobacco Control Office, Chinese Center for Disease Control and Prevention, Beijing, China.

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Preplanned Studies

Local Brand Smoking Among Adult Smokers: Findings from the Wave 5 International Tobacco Control China Survey — China, 2015

Peter Hao[1,#]; Steve Shaowei Xu[2]; Haiyen Sung[3,4]; Tingting Yao[3,4]; Yuan Jiang[5]; Anne C.K. Quah[2]; Geoffrey T. Fong[2,6]

Summary

What is already known about this topic?

Branding of cigarettes may play a role in shaping the smoking behaviors of Chinese smokers, and local brand (LB) cigarettes may reflect this influence because of greater tax and non-tax incentives compared to non-LB. Some of these brands are regional flagships that market to smokers using local landmarks or icons.

What is added by this report?

LB brands were significantly more likely to be the usual brand of smokers residing in provincial-level administrative divisions (PLADs) that produced their own LB cigarettes [adjusted odds ratio (AOR): 30.95; 95% confidence interval (CI): 26.36–36.49] compared to those residing in PLADs that had non-local ventures with non-LB cigarettes. Further, smokers residing in urban areas were found to be less likely to smoke LB cigarettes (AOR: 0.79; 95% CI: 0.67–0.93) compared to those in rural areas.

What are the implications for public health practice?

These findings suggest that LB smoking may be a result of industry-driven incentives to boost LB sales, fueled by such as supply-side strategies to boost LB sales or targeted cultural/social marketing that appeals to certain demographic groups. Although addressing these incentives to support LBs would be challenging given the nature of China's tobacco industry, doing so would have potential to reduce cigarette smoking and ultimately the health burden of smoking in China.

Nearly one-third of all smokers in the world or over 300 million smokers reside in China, consuming an estimated 2.3 trillion cigarettes every year (*1*). According to the China Global Adult Tobacco Survey (GATS) in 2018, the prevalence of current smoking among Chinese aged 15 or older was 2.1% in women and 50.5% in men (*2*). The high prevalence of smoking in Chinese men might be due to the persistent normalization of smoking within Chinese culture, where cigarettes were commonly used as a form of sharing or gift-giving for interpersonal relationships and magnanimity during festivals and weddings, and as business favors (*3*).

Branding of cigarettes may play a unique role in affecting the smoking behaviors of Chinese smokers due to the abundance of Chinese cigarette brands and their varieties. This was largely due to a brand consolidation strategy by the China National Tobacco Corporation (CNTC), which has a monopoly over China's cigarette market, accounting for 98% of domestic sales (*4*). From 1990 to 2013, the CNTC reduced the 2,000 cigarette brands to 90 brands (*4*). The CNTC includes several major local/regional subsidiaries that manufacture flagship cigarette brands. These local brands (LB) often are packaged and advertised through the use of symbols and pictures that represent regions and local landmarks. Smokers may use cigarette brands as symbols of their home regions, suggesting that they prefer their home region's cigarettes over others (*5*). An example of this local branding can be seen in Figure 1, where the CNTC local subsidiary, China Tobacco Hubei Industrial Co. Ltd, uses the Yellow Crane Tower (Huanghelou) as its brand name, with its photo on the packaging, thus linking its brand to this famous landmark, which has been the object of several famous poems (*6*).

Cigarette brands have often been linked to symbols of China — both national and local, and the presence of these symbols on the packs of many cigarette brands, such as the image of the Forbidden City on packs of Chunghwa cigarettes (whose brand name is literally the name of the country), has been cited by China as a reason for not implementing graphic warnings as recommended by Article 11 of the World Health Organizaiton (WHO) Framework Convention on Tobacco Control (FCTC) — that graphic images of disease would not be appropriate when appearing next to these national symbols.

FIGURE 1. Cultural landmarks and the eponymous cigarette brands.
Left to right: Yellow Crane Tower Cigarettes, Yellow Crane Tower (Wuhan, China).
Source: cig88.com, tripadvisor.com, accessed March 18, 2019 (*7–8*).

Thus, LBs may affect smokers because of the positive branding strategies that reflect their local origins. But in addition, under the China tobacco taxation system where most tobacco taxes are collected at the producer and wholesale levels and shared with local governments, there is an incentive that the CNTC pushes for the production and sale of local brands locally so that tobacco producing provincial-level administrative divisions (PLADs) and lower-level governments can count on the tobacco tax revenues for their expenditures, a phenomenon called "tobacco finance" in China.

To our knowledge, this study is the first to conduct an empirical analysis of local brands in China. The objective of this study was to assess the percentage of LB smoking among adult smokers in a diversity of cities in China and to identify factors associated with LB smoking including demographic characteristics and patterns of smoking such as cigarettes per day.

This project analyzed data from the Wave 5 International Tobacco Control (ITC) China Survey that was conducted between November 2013 and July 2015 (*9–10*). The ITC China Survey is a longitudinal cohort survey of smoking behavior and knowledge, beliefs, opinions, and attitudes about cigarette smoking and tobacco use among adults aged 18 and older in China. The Wave 5 Survey was conducted in 10 locations, including urban residents in 5 large cities (Beijing, Guangzhou, Kunming, Shanghai, and Shenyang) and residents in 5 rural areas (Changzhi, Huzhou, Tongren, Yichun, and Xining). The 10 locations were selected based on size, geographical representations, and levels of economic development (*11–12*).

Kunming, Guangzhou, Shanghai, Huzhou, Tongren, and Beijing have LBs and local cigarette manufacturing facilities; all of these locations were therefore labeled as local ventures (LVs) in this study excluding Beijing, which entered into a venture with a non-local company (Shanghai Tobacco Group) and a local cigarette factory and was labelled a non-local venture (NLV). Changzhi does not have LBs but has manufacturing facilities in its province and was labeled as NLV; Shenyang and Yichun have few LBs produced by subsidiaries of non-local parent companies and local cigarette factories and were also labelled NLVs. Xining has neither LBs nor local manufacturing facilities and was excluded. A multistage cluster sampling method was used to create a representative sample of adults aged 18 and older; more detail is provided in the Supplementary Material (available in https://weekly.chinacdc.cn/). More information on sampling methodology and sampling weights can be found in the ITC technical documentation (*10*).

The outcome variable in this study was LB smoking status, which was determined by the following question: "In the last 30 days, what brand of cigarettes did you smoke more than any other?" (*12*), and the information regarding provincial subsidiary manufacturer for each brand collected in the ITC China Survey. The answer to this question was defined as the smoker's primary brand. If the province (or PLAD) of manufacture for a smoker's primary brand was the smoker's province of residence, this smoker was defined as an LB smoker; otherwise, they were defined as a non-local-brand (NLB) smoker. For example, if a smoker from Kunming City of Yunnan Province listed Red Pagoda Hill (Hong Ta Shan) as their primary brand and the Yunnan Tobacco Company is the provincial subsidiary manufacturer, then this smoker was categorized as an LB smoker. Those who refused to answer or reported unknown status were coded as missing and excluded from our sample.

The covariates considered in this study included sociodemographic characteristics, an indicator for rural/urban area type, an indicator for NLVs/LVs, city of residence, and smoking behaviors. Sociodemographic characteristics included sex (female and male), age groups (18–24, 25–39, 40–54, and 55+), ethnicity (non-Han and Han), monthly household income [high income (≥3,000 CNY, 482 USD of 2015 exchange rate (*13*)], medium income

(1,000–2,999 CNY, 161–482 USD), low income (<1,000 CNY, 160 USD), and unknown, education high (at least some college), medium (senior high school), and low (less than senior high school), and marital status (married or living with a partner, divorced or separated, widowed, and single). Participants who did not report income (995 of 6,642) were not excluded but were classified in the "unknown" group because data on income might not be missing at random. Smoking behaviors included smoking frequency (daily and non-daily), smoking intensity (heavy: ≥10 cigarettes per day; and light: 0–10 cigarettes per day), and time to smoke the first cigarette after waking (0–30 min and ≥30 min).

A total of 9,880 adults participated in the survey, including 7,583 current smokers, 234 former smokers, and 2,063 never smokers. This study focused on current smokers, defined as those who have smoked at least 100 cigarettes in their lifetime and currently smoking cigarettes at least once a week (*11*). After excluding those with missing data on LB smoking status, the sample size for analyzing the percentage of the LB smoking included 6,642 current smokers. For the multiple logistic regression described below, participants that had missing values for age, ethnicity, education, marital status, and smoking intensity were excluded and resulted in a final study sample of 6,419 participants.

The weighted percentage of LB smoking was estimated for all current smokers and for subgroups stratified by each covariate using sampling weights provided by the Wave 5 ITC China Survey, further details can be found in the Technical Report (*10*). The bivariate analysis chi-square test was conducted to determine if there was any statistically significant difference in the percentage of LB smoking across all subgroups of each covariate. A multiple logistic regression model was used to estimate the propensity of LB smoking among current smokers, adjusting for all the covariates except employment status and city of residence because employment status was highly correlated with age, and city of residence was highly correlated with the rural/urban area type. The model used the sampling weights. The association between each covariate and LB smoking was determined by an estimated adjusted odds ratio (AOR). All analyses were conducted in R (version 4.1.1., R Core Team, Vienna, Austria). Estimates were considered to be statistically significant if the two-tailed *p*-value was <0.05.

Table 1 shows that among 6,642 current smokers, most participants were men (96.2%), aged 40–54 (41.9%), of Han ethnicity (87.4%), had high income (59.7%), had medium education (62.7%), were married or living with a partner (86.6%), resided in an

TABLE 1. Distribution of the study sample and the percentage of local brand smoking by sociodemographic characteristics and smoking behaviors among current smokers in Wave 5 of the international tobacco control China Survey (n=6,642).

Characteristic	Number-total	Percentage-subgroup (%)	Number-LB smokers	Percentage-LB smokers (%)	Chi-square	*p*-value
Total	6,642		3,173	47.6		
Sex					17.07	<0.001
Female	288	3.8	100	34.8		
Male	6,354	96.2	3,073	48.1		
Age group (years)					47.09	<0.001
18–24	148	2.7	83	56.9		
25–39	1,165	18.8	631	55.3		
40–54	2,885	41.9	1,359	46.4		
55+	2,439	36.5	1,099	44.4		
NA	5		1			
Ethnicity					290.34	<0.001
Non-Han	852	12.6	658	75.2		
Han	5,775	87.4	2,510	43.7		
NA	15		5			
Income					46.01	<0.001
High (≥3,000 CNY)	3,935	59.7	1,974	50.6		
Medium (1,000–2,999 CNY)	1,310	20.8	524	40.7		
Low (<1,000 CNY)	402	5.8	178	41.4		
Unknown	995	13.8	497	48.1		

TABLE 1. (Continued)

Characteristic	Number-total	Percentage-subgroup (%)	Number-LB smokers	Percentage-LB smokers (%)	Chi-square	*p*-value
Education Group*					30.75	<0.001
High	1,047	15.5	567	54.2		
Medium	4,158	62.7	1,889	45.2		
Low	1,412	21.8	708	50.0		
NA	25	23.7	9			
Marital Status					30.28	<0.001
Married or living with a partner	5,813	86.6	2,758	47.3		
Divorced or separated	315	5.0	146	42.2		
Widowed	161	2.6	67	42.2		
Single	338	5.8	195	60.1		
NA	15		7			
Rural/urban area type†					21.01	<0.001
Rural area	3,207	48.6	1,438	44.8		
Urban area	3,435	51.4	1,735	50.4		
NLVs/LVs§					2825.58	<0.001
NLV	2,901	43.5	322	10.5		
LV	3,741	56.5	2,851	76.2		
City of Residence					3172.81	<0.001
Beijing¶	661	10.1	102	11.1		
Shenyang¶	636	9.1	17	2.5		
Shanghai¶	730	11.1	441	61.5		
Guangzhou¶	664	9.9	460	70.7		
Kunming¶	744	11.1	715	96.0		
Changzhi**	804	12.2	0	0.0		
Yichun**	800	12.1	203	26.7		
Huzhou**	799	12.1	552	70.2		
Tongren**	804	12.2	683	82.1		
Smoking Frequency					12.39	<0.001
Daily	6,128	92.4	2,959	48.3		
Non-daily	514	7.6	214	40.1		
Smoking Intensity					19.30	<0.001
Heavy	3,987	60.0	1,988	49.9		
Light	2,628	40.0	1,172	44.4		
NA	27		13			
Time to Smoke the First Cigarette After Waking					0.93	0.334
0–30 min	3,794	58.2	1,820	48.1		
≥30 min	2,750	41.8	1,307	46.9		
NA	98		46			

Note: *p*-values are calculated from the weighted bivariate analysis chi-square tests.
Abbreviations: LB=local brand; NA=not applicable; NLV=non-local venture; LV=local venture.
* Education was categorized as high education (more than senior high school), medium education (senior high school), and low education (less than senior high school).
† Rural areas consisted of Changzhi, Yichun, Tongren, and Huzhou. Urban areas consisted of Beijing, Shenyang, Guangzhou, Shanghai, and Kunming.
§ This indicator variable consisted of areas with NLVs (non-local brands using local cigarette factories including Beijing, Shenyang, Changzhi, and Yichun) or LVs (local brands using local cigarette factories including Kunming Guangzhou, Shanghai, Huzhou, and Tongren).
¶ These are cities.
** These are rural areas.

urban area (51.4%), resided in areas with a LV (56.5%), were daily (92.4%) or heavy smokers (60.0%), and smoked their first cigarette 0–30 min after waking (58.2%).

Table 1 also shows that the percentage of LB smoking was 47.6% among all current smokers. The bivariate analysis results indicated that the percentage of LB smoking was significantly different by sex (34.8% for female and 48.1% for male), age, ethnicity (75.2% for non-Han ethnicity and 43.7% for Han), income, education, marital status, area type (44.8% for rural area and 50.4% for urban area), NLVs (10.5%) *vs.* LVs (76.2%), smoking frequency (48.3% for daily smokers and 40.1% for non-daily smokers), and smoking intensity (49.9% for heavy smokers and 44.4% for light smokers), but was not statistically different by time to smoke the first cigarette after waking. As shown in Figure 2, among the 9 locations, the percentage of LB smoking was high for areas with LVs (Kunming at 96.20% and Tongren at 84.85%) and low for areas with NLVs (Changzhi at 0.00%). The percentage of LB smoking in Shenyang was 2.7%, which was due to a limitation in defining LB smoking — these LB smokers smoked Ren Min Da Hui Tang that are produced locally by an NLV.

Table 2 shows that after controlling for covariates, the odds of LB smoking were significantly higher among those aged 25–39 (AOR: 1.65; 95% CI: 1.35–2.03) and 40–54 (AOR: 1.35; 95% CI: 1.16–1.57) compared to those aged ≥55; those with medium income (AOR: 1.29; 95% CI: 1.07–1.55) compared to those with high income; and those residing in areas with a LV (AOR: 30.95; 95% CI: 26.36–36.49) compared to those residing in areas with NLVs. The odds of LB smoking were significantly lower among those with medium education (AOR: 0.67; 95% CI: 0.55–0.83) and low education (AOR: 0.53; 95% CI: 0.41–0.69) compared to those of high education, and among those residing in urban areas (AOR: 0.79; 95% CI: 0.67–0.93) compared to those residing in rural areas.

DISCUSSION

This study showed evidence that smokers residing in provinces that produced LB cigarettes were significantly more likely to smoke LB cigarettes than those residing in provinces that relied on NLVs. This is likely due to the current tobacco excise tax system that rewards local governments relying on tobacco finance to enact protectionist measures to protect production and sales of local brands (*14*). Some of the measures that were used included inspections and fines on the sale of non-local cigarettes and provincial tobacco corporations requiring their subordinate companies to sell designated quantities of LB cigarettes (*14*). These results were similar to a previous study by Yang et al., which found increased odds of being a current smoker for individuals living in provinces that produced cigarettes (*15*). This study found that among the nine

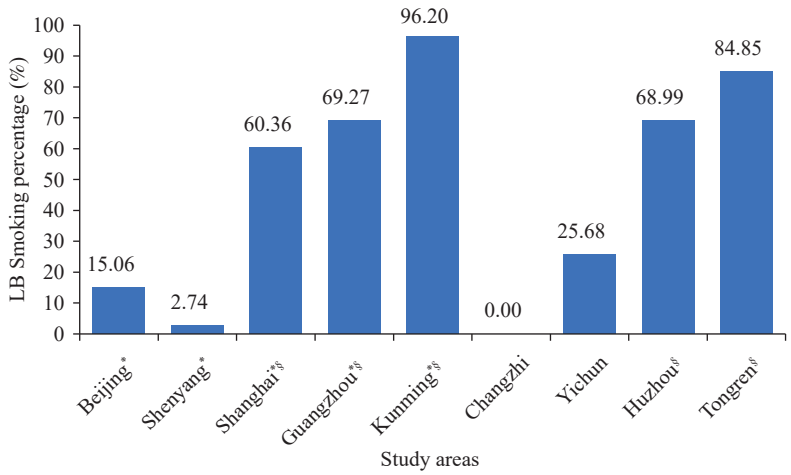

FIGURE 2. Percentage of LB smoking in each of the 9 study areas (city/rural areas) included in Wave 5 of the ITC China Survey.
Abbreviations: LB=local brand; ITC=International Tobacco Control.
* designated urban cities; unmarked locations were rural areas.
§ designated areas with local ventures (LVs; local brands using local cigarette factories); unmarked locations did not have local ventures.

TABLE 2. Estimated multivariate logistic regression model for local brand smoking in current smokers in Wave 5 of the international tobacco control China Survey (n=6,419).

Item	Sample size of adults	Sample size of LB smokers	AOR	95% CI	*p*-value
Intercept			0.22	0.13–0.37	<0.001
Sex					
Female	276	97	Reference		
Make	6,143	2,979	0.72	0.50–1.05	0.087
Age group, years					
18–24	142	79	1.52	0.95–2.46	0.086
25–39	1,121	610	1.65	1.35–2.03	<0.001
40–54	2,798	1,319	1.35	1.16–1.57	<0.001
55+	2,358	1,068	Reference		
Ethnicity					
Non-Han	817	632	Reference		
Han	5,602	2,444	0.82	0.66–1.01	0.061
Income					
High (≥3,000 CNY)	3,842	1,933	Reference		
Medium (1,000–2,999 CNY)	1,280	513	1.29	1.07–1.55	0.008
Low (<1,000 CNY)	379	170	1.26	0.91–1.74	0.161
Unknown	918	460	0.89	0.73–1.10	0.284
Education[†]					
High	1,017	556	Reference		
Medium	4,045	1,840	0.67	0.55–0.83	<0.001
Low	1,357	680	0.53	0.41–0.69	<0.001
Marital Status					
Married or living with a partner	5,634	2,675	Reference		
Divorced or separated	307	146	0.74	0.55–1.01	0.054
Widowed	154	65	0.75	0.50–1.13	0.167
Single	324	190	0.95	0.69–1.31	0.749
Rural/urban area type[¶]					
Rural area	3,072	1,385	Reference		
Urban area	3,347	1,691	0.79	0.67–0.93	0.005
NLV/LV[§]					
NLV	2,796	1,385	Reference		
LV	3,623	1,691	30.95	26.36–36.49	<0.001
Smoking Frequency					
Daily	5,960	2,886	1.04	0.79–1.38	0.765
Non-Daily	459	190	Reference		
Smoking Intensity					
Heavy	3,886	1,946	1.04	0.90–1.20	0.637
Light	2,533	1,130	Reference		

Note: *p*-values are calculated from the weighted bivariate analysis chi-square tests.
Abbreviations: LB=local brand; AOR=adjusted odds ratio; CI=confidence interval; NLV=non-local venture; LV=local venture.
[†] Education was categorized as high education (more than senior high school), medium education (senior high school), and low education (less than senior high school).
[¶] Rural areas consisted of Changzhi, Yichun, Tongren, and Huzhou. Urban areas consisted of Beijing, Shenyang, Guangzhou, Shanghai, and Kunming.
[§] This indicator variable consisted of areas with non-local ventures (NLVs; non-local brands using local cigarette factories including Beijing, Shenyang, Changzhi, and Yichun) or local ventures (LVs; local brands using local cigarette factories including Kunming Guangzhou, Shanghai, Huzhou, and Tongren).

cities/rural areas, Kunming and Tongren have the highest LB percentages and they both are famous for their provincially-produced cigarette brands, such as Hong Ta Shan from Yunnan and Yun Yan from Guizhou, respectively.

Furthermore, smokers residing in urban areas were less likely to smoke LB cigarettes than smokers residing in rural areas, which may suggest the existence of supply-side factors reducing the number of available brands to rural smokers that may, in turn, increase LB smoking. This uneven geographical distribution of LB cigarette smoking is concerning because the overall smoking prevalence is also higher in rural areas than in urban areas in China (*2*).

Though some sociodemographic factors (i.e., age, income, and education) were identified to have significant odds of LB smoking, the associations of these factors with LB smoking were likely mediated by price and affordability. As shown by Xu et al., the CNTC's "premiumization" strategy first reduced the number of brands to consolidate product appeal. Over a 5-year period from 2010–2015, newly released cigarette brand variants were mostly premium-branded cigarettes. From 2012 to the first half of 2017, 510 of 615 new brand variants were premium brands (*4*). The sociodemographic factors of age, income, and education were found to have significantly different odds of smoking premium-branded, mid-price branded, and discount-branded cigarettes (*4*) and, therefore, might not be directly linked to LB smoking. This should be explored in future research.

This study was subject to some limitations. First, this study lacked analysis on particular brands of cigarettes and their characteristics, such as brand names and packaging. Some brands of cigarettes may have clear direct marketing that targeted local sentiments, i.e., being named after a local landmark or icon. Second, cigarette pricing and associated taxes are also an important predictor for cigarette consumption behavior as many Chinese smokers tend to switch to cheaper brands in response to increased taxes (*16*). Third, the cities and rural areas included in this analysis were likely differentially impacted by the availability of LB cigarettes. Inclusion of other areas may help to provide a more complete understanding of LB smoking in China.

In summary, our study found that LB smoking significantly varied in smokers by several sociodemographic characteristics and by smoking intensity. There was a wide variation in the percentage of LB smoking across cities and rural areas, which may suggest external factors such as supply-side policies to ensure LB sales or targeted cultural marketing that appeals more to certain demographics. Tobacco control policies that restrict marketing strategies using LB-related names and icons could have the potential to reduce cigarette smoking and ultimately the health burden of smoking in China.

Conflicts of interest: Geoffrey T. Fong has been an expert witness or consultant on behalf of governments in litigation involving the tobacco industry. All other authors have no conflicts of interests to declare.

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[#] Corresponding author: Peter Hao, phao@umich.edu.

[1] Chinese Center for Disease Control and Prevention, Beijing, China; [2] University of Waterloo, Waterloo, Ontario, Canada; [3] Institute for Health & Aging, School of Nursing, University of California at San Francisco, San Francisco, CA, USA; [4] Center for Tobacco Control Research and Education, University of California at San Francisco, San Francisco, California, USA; [5] Tobacco Control Office, Chinese Center for Disease Control and Prevention, Beijing, China; [6] Ontario Institute for Cancer Research, Toronto, Ontario, Canada.

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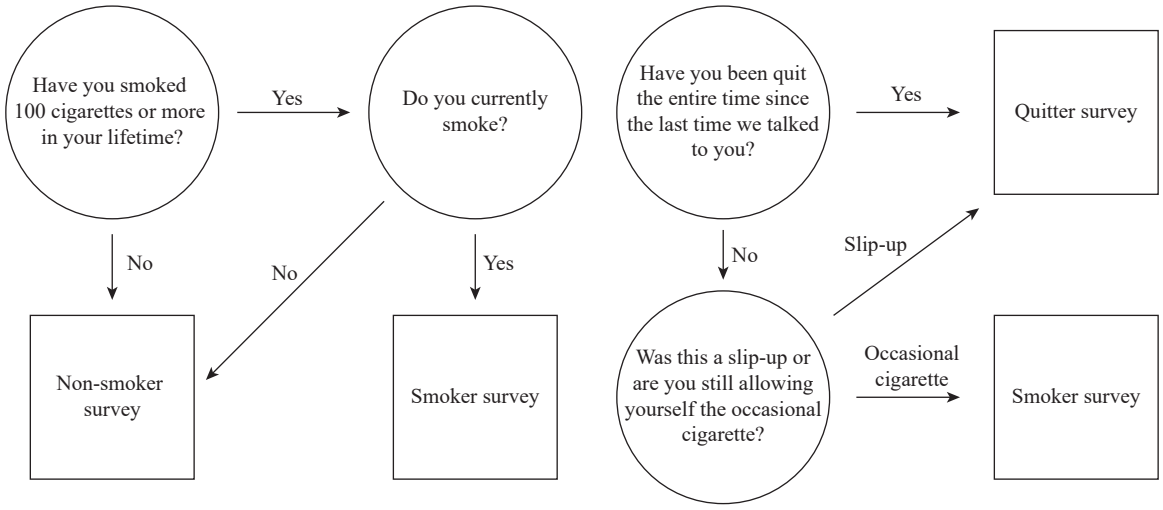
Supplementary Material

The ITC China Survey is part of the ITC Policy Evaluation Project of 31 countries in the WHO FCTC (*1*). The ITC China Survey is a longitudinal survey which has been conducted in 5 waves from 2006 to 2015. The ITC China data contains almost 200 self-reported variables including smoking history, frequency, consumption behavior, dependence, quitting attempts, beliefs, brand usage, gifting, etc. (*2*). This project was a cross-sectional study that will seek to categorize smokers in Wave 5 of the survey as local-brand smokers and non-local brand smokers.

Smokers were defined by the ITC as having smoked more than 100 cigarettes in their lifetime and currently smoking cigarettes at least once a week. Quitters were defined as being included in the ITC study as a smoker in a previous wave but quit smoking in subsequent waves. Supplementary Figure S1 shows a flowchart of screening questions the ITC used to sample smokers, non-smokers, and quitters (*3*).



SUPPLEMENTARY FIGURE S1. The ITC survey screening questions for smokers, non-smokers, and quitters.
Notes: The diagram on the left is for new participants. The diagram on the right is for participants who identified themselves as quitters.
Source: ITC China Survey (*3*).

The ITC China Survey first team selected 10 street districts (*jiedao*) with the probability of selection being proportional to the population of each street district among each of the 5 urban cities. In each of these street districts, 2 residential blocks were then selected. A sample of 300 household addresses was drawn using simple random sampling without replacement. These addresses were then randomly ordered and surveyed until a designated quota of 40 adult smokers and 10 adult non-smokers was reached. Each city contributed a sample of approximately 800 current smokers and 200 non-smokers. The same technique was used for rural areas with 10 village districts among each of the 5 rural areas, weighted by population, being selected, 2 villages from each village district, and 300 households chosen from each village. The ITC China Survey team provided sampling weights for the dataset to better represent the population (*3*). The methods for determining the sampling weights can be found in the ITC China Survey Wave 5 Technical Report (*4*).

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Commentary

Protecting People from Tobacco Smoke in China: Current Status and Challenges

Xia Wan[1,#]

Over the past two years, many people have encountered difficulties because of the advent of coronavirus disease 2019 (COVID-19). The COVID-19 pandemic has unleashed many concerns, such as social isolation and loneliness, drastic changes to lifestyles, uncertainty for the future, and financial pressure. Some people reported smoking more than usual to reduce stress or loneliness (*1*), which made more people vulnerable to be exposed to second-hand tobacco smoke (SHS). As we know there is no safe level of exposure to SHS, and even brief exposure can cause harm (*2*). Under this circumstance, it is quite meaningful to reiterate the topic of protecting people from the harms of SHS.

To help countries fulfill the promise of the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC), WHO has established MPOWER, a package of the six most important and effective tobacco control policies: Monitoring Tobacco Use and Prevention Policies (M), Protecting People from Tobacco Smoke (P), Offering Help to Quit Tobacco Use (O), Warning about the Dangers of Tobacco (W), Enforcing Bans on Tobacco Advertising, Promotion and Sponsorship (E), and Raising Taxes on Tobacco (R). China ratified the WHO FCTC in 2005. It has been more than 16 years since the FCTC came into force in 2006. But China still has a huge population exposed to SHS with an estimation of 702 million people on the basis of the 68.1% SHS prevalence in 2018 (*3*).According to the WHO report of 2021, in China, P received the lowest grade, compared to the other five strategies (*4*–*5*). Therefore, this article will analyze the current status and challenges for P in China.

SHS REMAINING A SERIOUS ISSUE IN CHINA

The WHO FCTC requires each Party to provide a completely smoke-free environment in indoor workplaces, public transport, indoor public places, and other public places (*6*). While in China, the indoor environment remains a serious issue.

In 2010, 740 million (72.4%) non-smokers were exposed to SHS in public places in China (*7*–*8*). In 2018, the prevalence decreased slightly to 68.1% (*3*), but the total exposed population was still more than 700 million. In 2018, 50.9% reported exposure to SHS occurring at indoor workplaces and 44.9% at home. The worst exposure indoor public places were internet cafes (89.3%), nightclubs & bars (87.5%), and restaurants (73.3%).

SHS CAUSES SERIOUS HEALTH PROBLEMS

The scientific evidence of the harm of SHS has been conclusively established since 1986 (*9*), which was a key year with the US Surgeon General's report. Numerous evidence leaves no doubt that exposure to SHS contributes to a range of serious and often fatal diseases in non-smokers, including lung cancer, cardiovascular and other chronic diseases, and sudden infant death syndrome, etc. The WHO report of 2009 showed that SHS was estimated to cause about 600,000 premature deaths per year worldwide (*10*). The Global Burden of Diseases (GBD) 2019 study estimated the number had doubled, reaching 1.304 million (*11*). Of all deaths attributable to SHS, most occurred among children and women (*10*).

In China, enormous population exposure to SHS caused a huge burden of disease. Gan Q et al. reported that SHS caused around 22,200 deaths from lung cancer and 33,800 deaths from ischemic heart disease (IHD) in 2002 (*12*). According to the GBD 2019 results, the largest number of deaths attributed to SHS was observed in China, with the number increasing from 382,000 in 2010 to 416,000 in 2019. In 2019, the death number attributable to SHS in China accounted for 31.9% of the world's deaths (*13*).

The good news is that smoke-free laws could reduce exposure to SHS; 100% smoke-free environments are

the only proven way to adequately protect the health of people from the harmful effects of SHS. Smoke-free policies decreased exposure to SHS by 80%–90% in high-exposure settings (*10*). In addition, scientific evidence has firmly established that an immediate reduction in heart attacks and respiratory problems would be gained by the 100% smoke-free policy implementation. Among them, acute myocardial infarction (AMI) is the most sensitive disease to the smoke-free policy (*14*).

VARIOUS MILESTONES RELATED TO CONTROL OF SHS IN CHINA

Tobacco control in China has been conducted for more than 40 years, which could be traced to the late 1970s. The notice on *Health Education on the Harm Caused by Smoking and Control* jointly issued by Ministry of Health (MOH) and other three ministries in 1979. During the period between 1988 and 1998, a series of campaigns for smoke-free hospitals, smoke-free schools, and smoke-free public transport were carried out. Meanwhile, health promotion actions on banning smoking in indoor public places were conducted in some cities supported by international assistance, such as the WHO and World Bank. In addition, China held the 10th World Conference on Tobacco or Health with the theme "tobacco: the continuous spread of plague" in 1997, which was a great move. Notably, months before this conference, China implemented a national policy that banned smoking in public transport and its waiting areas, including in civil airports and civil aircrafts (*15*).

In 2003, China actively joined the WHO FCTC as the 77th party member, and the FCTC came into force in China in 2006. In 2007, the State Council approved the establishment of the WHO FCTC implementation coordination mechanism with the State Tobacco Monopoly Administration (STMA) as the leading group, which violated Article 5.3 of WHO FCTC. In 2018, the FCTC implementation coordination mechanism was re-organized with the National Health Commission (NHC) as a chair, which indicated big progress.

After 2016, the Post-FCTC era, China also conducted more tobacco control initiatives supported by the Chinese government and international assistance, including creating a smoke-free medical and health system nationwide, holding a "Smoke-Free Olympics" in 2008 and a "Smoke-Free World Expo" in 2010, enacting local legislations on smoke-free in indoor public places, etc. In order to meet with the Article 5.1 of WHO FCTC requirement, the China Tobacco Control Action Plan (2012–2015) was released in 2012. But unfortunately, by the end of 2015, the goals of the Plan had not been achieved. In addition, currently the plan is only one national plan on tobacco control without a follow-up one. One encouraging step undertaken by the Chinese government is the adoption of tobacco control in the Healthy China 2030 Strategy set by the Political Bureau of the Central Committee of the Chinese Communist Party in 2016. On tobacco control, the Healthy China Action Plan (2019–2030) includes two targets: 1) the smoking prevalence of people aged over 15 years old lower than 24.5% and 20% by the year 2022 and 2030, respectively; and 2) 30% and 80% of population protected by 100% smoking bans by 2022 and 2030, respectively (*16*).

STILL NO COMPREHENSIVE NATIONAL SMOKE-FREE LAW IN PLACE

According to the Article 8 of the WHO FCTC requirement, each Party shall enact a comprehensive national smoke-free law in place. The WHO report of 2021 showed that 67 countries got Grade Ⅰ for P where the smoking bans were at best-practice level (*4*). Among them, 72% countries were middle- or low-income countries. However, China received the worst grade (Grade Ⅳ) for this strategy (Grade Ⅳ means there is complete absence of national ban or up to two public places completely smoke-free across the country).

After implementing the WHO FCTC for 16 years, China still has not met its obligations and has no comprehensive national smoke-free law in place. On November 24, 2014, a long-awaited draft national tobacco control guideline was released by China's State Council, aiming to reduce the harms of tobacco smoke and protect public health. This is the first time that the Chinese government has considered state-level legislation on tobacco control. This draft was supposed to finish seeking advice, opinions, and comments from the public by the end of 2014 (*7*). But unfortunately, the draft is still stuck in that stage and has not progressed further (*17*).

The Chinese people look forward to the 100% national smoke-free regulations. Based on the national

survey in 2018, the support for a ban on smoke-free in public places was quite high. More than 90% people supported a ban on smoking in indoor workplaces and indoor public places. For the restaurants and bars/nightclubs, the proportions were a little bit lower, at 80% and 60%, respectively. Even smokers also showed high support (*3*).

SMOKE-FREE LEGISLATION AT THE SUBNATIONAL LEVEL

Currently, there are now 1.8 billion people (a quarter of the world's population) living in 67 countries (34%) covered by the best-practice smoke-free laws worldwide (*4*).

In China, although there is no comprehensive national smoke-free law in place, smoke-free momentum continues to grow at the subnational level. At present, more than 20 cities have taken promising steps to enact laws or regulations meeting with the WHO FCTC requirements, including Beijing, Shanghai, Shenzhen, Qingdao, Lanzhou, Changchun, Zhangjiakou, Qinhuangdao, Xining, Wuhan, Xi'an, Yangquan, Xinyang, Zhoukou, Putian, Chenzhou, etc. Notably, in 2021, Beijing, the capital city of China, upgraded the comprehensive smoke-free law according to the amended Minors Protection Law. The newly smoke-free law of Beijing reiterated the youth protection from SHS (*18*). As for the target in the Healthy China Action Plan — 30% of population protected by complete smoking bans by 2022 — some provinces have achieved a level of success, including Beijing (100%), Shanghai (100%), Qinghai (41.7%), Shaanxi (32.8%), and Henan (69.6%), etc. (*19*).

In China, some other cities also have amended or enacted bans of smoking in public places, but unfortunately, those cities could not be regarded as smoke-free cities due to lack of clear requirement items on complete smoke-free indoor public places, indoor workplaces, and public transportation, or due to permitting the set-up smoking areas in hotels, bars, restaurants, or places of amusement, etc. An example is Chongqing.

Chongqing is one of four municipalities directly administrated under the Central Government, with the largest land area and largest population. In September 2020, Chongqing passed the *Smoke-Free Law in Public Places in Chongqing*, which permits to set up smoking areas in indoor areas of restaurants, hotels, and places of amusement (*20*). This law with such a low-level loophole lags far behind laws from the above 20 cities. As one of the most important central cities in China, the law of Chongqing sets a negative example for other provinces and counters the good momentum on tobacco control in China.

In brief, in China, only 195 million people (13.8% of the population) are protected from the smoke-free environment, which shows a huge gap to the Healthy China Action Plan (2019–2030) targets (*19*).

CURRENT STATUS OF POLICY ENFORCEMENT IN CHINA

Smoking prevalence is declining in cities that have comprehensive smoke-free laws. Beijing and Shanghai municipalities started to enforce the comprehensive smoke-free law in 2015 and in 2017, respectively. The smoking prevalence rate declined from 23.4% in 2014 to 20.3% in 2019 in Beijing (*21*), and from 23.3% in 2014 to 19.9% in 2018 in Shanghai (*22–23*), respectively. In 2014, a year after the 100% smoke-free law enforcement in Qingdao, the SHS prevalence in public places, workplaces, and in homes was 42.39%, 26.62%, and 40.53%, respectively, which was much lower than the national level in 2015 (*24*). After the 100% law enforcement in Lanzhou, significant effectiveness has been achieved. The smoking prevalence rate decreased 8.8% in the past decade, while the SHS prevalence decreased from 44.2% to 21.3% in indoor workplaces from 2013 to 2020 (*25*).

For some cities with partial smoke-free laws, the effectiveness of tobacco control is still lacking. For example, in Tianjin Municipality, after the law was implemented in 2012 (*26*), the smoking prevalence and SHS decreased 1% and 3.3%, respectively, compared to the year 2010. When using the incidence or mortality rates of AMI and stroke, the smoke-free law implementation evaluation for Tianjin showed that immediate post-legislation reductions in mortality were not statistically significant (*27*).

As only a few cities are implementing 100% smoke-free laws, the process of implementing the FCTC is very slow. Yang et al. evaluated the FCTC implementation in China by using the policy performance indicators in 2011. The results showed that China only scored 37.3 out of a possible 100 (*28*). Globally, between 2007 and 2019, smoking prevalence rate decreased from an average of 22.7% to 17.5% (*4*), showing a relative reduction of 23% over 12 years. The relative reduction of the current smoking prevalence

rate and SHS prevalence between 2010 and 2018 in China was only 5.3% and 4.3% for the past eight years, respectively. Therefore, if the smoking prevalence rate reaches the goal of Healthy China 2030 as we anticipate, one of most effective ways is to adequately implement the existing subnational comprehensive smoke-free law.

CONCLUSION AND RECOMMENDATIONS

Implementing a 100% smoke-free environment is the most effective strategy to reduce tobacco smoke exposure to safe levels in indoor environments and to provide an acceptable level of protection from the dangers of SHS exposure. China urgently needs national smoke-free legislation, which is not only the obligation of WHO FCTC implementation, but also the obligation to protect the population's health and wellbeing. The Chinese people also look forward to the 100% national smoke-free regulations.

However, tobacco control in China has remained particularly difficult because of interference by the tobacco industry. Therefore, there is a long way to go to enact national smoke-free legislation. Under this situation, policymakers should consider ensuring the successful implementation of the existing subnational comprehensive smoke-free law, which also could effectively protect the Chinese population from SHS exposure. Once those laws are adequately enforced, the benefits would be shown, such as fresher air and an immediate reduction in heart attacks and respiratory problems. Therefore, it is critical to evaluate the effectiveness of the policy implementation by disseminating it, which is important to raise awareness among decisionmakers and public health advocates about the necessity for smoke-free environments to protect their health and their broad acceptance and endorsement. Therefore, we call for conducting monitoring and evaluation at subnational level regularly and disseminating it rapidly. This would accelerate the national smoke-free legislation process.

The phased goal of the end of 2022, proposed by Healthy China Action Plan (2019–2030), is not waiting for us, and targets of 2030 are what we are heading for. A tobacco-free world is crucially dependent on more rapid progress in China.

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[#] Corresponding author: Xia Wan, xiawan@ibms.pumc.edu.cn.

[1] Institute of Basic Medical Sciences, Chinese Academy of Medical Sciences and School of Basic Medicine, Peking Union Medical College, Beijing, China.

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