Awareness of Tobacco-Related Health Hazards among Adults in China[1]

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Objective   To determine the level of awareness of the hazards of tobacco smoking and secondhand smoke inhalation among adults in China.   **Methods**   Household surveys were conducted with a total of 13 354 respondents aged 15 years or over from 100 counties of 28 Chinese provinces using a stratified multi-stage geographically clustered sample design.   **Results**   The findings revealed that 81.8% of the population was aware that smoking causes serious diseases, and 27.2% and 38.7% were aware that smoking causes stroke and heart attack, respectively. Only 64.3% of respondents were aware that secondhand smoke can cause serious diseases, and 27.5%, 51.0%, and 52.6% were aware that secondhand smoke causes heart disease in adults, lung disease in children and lung cancer in adults, respectively. Awareness regarding smoking-related hazards across all participants was significantly associated with several factors, including gender, smoking status, urban/rural residency, education level and exposure to tobacco control publicity in the last 30 days. Awareness regarding tobacco-related hazards in smokers was significantly associated with urban/rural residency, education level, exposure to tobacco control publicity in the last 30 days, and physician's advice. Awareness relating to the hazards of inhaling secondhand smoke was associated with smoking status, urban/rural residency, age, education level, and exposure to tobacco control publicity in the last 30 days. Medical professionals were found to know more about the health hazards of tobacco compared with people in other types of employment.   **Conclusions**   Overall awareness of the health hazards of tobacco has improved in the last 15 years in China, but is still relatively poor. Improved means of communicating information and more effective warning labels on cigarette packaging are necessary for increasing public awareness of tobacco hazards, particularly among rural residents and people with less education.

Key words: Smoking; Secondhand smoke; Awareness; Knowledge

INTRODUCTION

The consumption of cigarettes and other tobacco-based products and exposure to tobacco smoke constitute the world's leading preventable cause of death[1]. Numerous studies have reported that the average life expectancy of people who die from tobacco-related illnesses is 15 years shorter than that of people who die from natural causes[2-4]. Tobacco-related deaths constitute an epidemic, killing 100 000 000 people globally in the 20th century. Without strong government action, this number is likely to grow to 1 000 000 000 deaths over the 21st century[5], 80% of which will occur in developing countries[6].

As the world's leading tobacco producing and consuming country, China is home to one third of all smokers globally. Tobacco-attributable illnesses currently claim 1 million lives every year in China. If not effectively controled, this figure is likely to

double by 2020[5]. How to promote smoker's to quit smoking, reduce the likelihood of non-smokers' to take up smoking, eventually cut down the smoking rate in China is an urgent question that must be addressed.

Since the 1950s, numerous epidemiological studies worldwide have suggested that smoking and passive smoking are risk factors for multiple diseases, which are major risk factors for six out of the top eight causes of death globally (ischemic cardiac disease, cerebrovascular disease, lower respiratory infections, COPD, tuberculosis, trachea, bronchus, and lung cancers).

Implementation of the World Health Organization's Framework Convention on Tobacco Control (FCTC) started in 2006. Devising methods for effective monitoring, supervision and evaluation of tobacco use, and obtaining nationally representative data are crucial steps toward this goal. The Chinese section of the 2010

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Global Adult Tobacco Survey (GATS CHINA) is a household survey targeting population aged 15 years or older. By systematically monitoring situation of tobacco use among adults, the survey keeps track of key tobacco control indicators in a nationally representative sample, and the implementation of policies included in the MPOWER Package recommended by the FCTC.

Two large epidemiological surveys of tobacco-related health issues were conducted in China in 1996 and 2002, and obtained representative data regarding public awareness of tobacco hazards. Considerable changes have taken place in every sector of the economy and wider society in China over the last eight years. The present study sought to obtain evidence to aid the development of tobacco control and health education strategies in the future, which are suited to China's national conditions, through an in-depth analysis of data from the 2010 GATS CHINA regarding awareness and knowledge about the hazards of smoking and secondhand smoke inhalation.

PARTICIPANTS AND METHODS

Participants

The target population for the survey was defined as all Chinese residents aged 15 and above, living in China.

Sampling Design

A multi-stage stratified cluster sampling design was used in the survey. The country was stratified by six regions (North, Northeast, East, Central, and South, Southwest, and Northwest) and urban/rural at the primary sampling unit level, making 12 strata in total. At the first stage of sampling, 100 primary sampling unit (PSU, counties for the rural area and districts for the urban area) were proportionally allocated to each of the six regions according to the number of households and equally allocated to rural and urban strata within each region, using probability proportional to size (PPS) sampling method. At the second stage, two urban neighborhood communities or rural villages were selected from the selected PSU using the PPS method. The selected neighborhood or villages were partitioned into segments of around 1 000 households. One segment was randomly selected. 75 households were selected randomly from each selected segment. One eligible household member older than 15 from each of the selected 15 000 households was randomly chosen for an interview.

Data Collection

GATS CHINA was conducted in 28 of 32 provinces in China. All the survey interviewers and supervisors were trained by China CDC staff. The survey was conducted in Mandarin through face to face interviews with inform consent obtained from the respondents and their guardians if the respondents younger than 18. Data on demographic information, smoking status, knowledge of tobacco hazards, economics, media exposure to advertisements or tobacco control information, and so on were collected. Survey information was collected using handheld devices.

Smoking Status Classification

Smoker: Respondents who were smoking at the time of the survey.

Non-smoker: Respondents who were not smoking at the time of the survey, including former smokers and people who had never smoked.

Knowledge of the Health-related Effects of Tobacco

Knowledge of the health-related effects of tobacco was measured by asking if respondents agreed with the following statements: 1) "Smoking causes serious diseases"; 2) "smoking causes heart disease": 3) "smoking causes lung cancer": 4) "smoking causes stroke"; 5) "secondhand smoke causes serious diseases"; 6) "secondhand smoke causes respiratory diseases in children"; 7) "secondhand smoke causes lung cancer"; and 8) "secondhand smoke causes heart disease in adults". Response categories were "yes" and "no".

Statistical Analysis

SUDAAN 10.0.1 was used to compute the estimates and proper standard errors of a range of population parameters. SPSS 18.0 was used for sample weighting and data quality assurance. SAS 9.1 complex survey data analysis procedure was used for statistic analysis.

Descriptive statistics were conducted on the demographic variables, smoking status, and other parameters which might associate with the awareness of tobacco hazards. Survey logistic regression was applied in determining the factors associated with awareness of tobacco hazards.

RESULTS

General Information

The study was conducted in 100 counties/county-level cities in 28 provinces. Valid interviews were conducted with 13 354 respondents aged 15 years or older, of whom 6 603 were male and 6 751 were

female. There were 5 832 urban residents and 7 522 rural residents among the respondents, representing a population which most commonly had a highest education level of junior high school (36.4%), followed by primary school or less (33.3%), senior high school (18.8%), and college graduate or above (11.6%). Regarding occupation, 31.6% of the population were peasants, 15.7% were workers in the business or service industries, 10.8% were factory workers, 11.0% were unemployed, and 9.6% were retired. Medical professionals and teachers accounted for only 1.7% and 1.6% of the population, respectively.

Awareness of Diseases Caused by Smoking

The results indicated that 81.8% of the population was aware that "smoking causes serious diseases", 77.5% were aware that "smoking causes lung cancer", 27.2% and 38.7% were aware that "smoking causes stroke" and that "smoking causes heart attack", respectively. The rate of those aware that smoking could cause all three diseases (stoke, heart disease, and lung cancer) was even lower (23.2%).

The rate of awareness that smoking could cause specific diseases was lower among rural residents than their urban counterparts. Education level was positively associated with awareness. Even among people with an education level of college graduate or above, only 41.6% were aware of smoking causing the three diseases. The rate of awareness was only 15.7% among those with an education level of primary school or lower.

Although medical professionals possessed more knowledge about the health hazards of tobacco use, only 60.1% were aware that smoking can cause stroke, and only 75.9% were aware that smoking can cause heart attacks. Only 55.8% of medical professionals understood that smoking could cause all three diseases (Table 1).

Awareness of Diseases Caused by Secondhand Smoke

Our findings indicated that 64.3% of respondents were aware that secondhand smoke causes serious

TABLE 1

Percentage of Adults≥15 Years Old Who were Aware that Smoking Can Cause Stroke, Heart Attack, and Lung Cancer, by Smoking Status and Selected Demographic Characteristics-GATS China

Demographic Characteristics	Adults who Believe that Smoking Causes the Diseases (percentage, 95% CI)			
	Stroke	Heart Attack	Lung Cancer	All Three Diseases
Residence				
Urban	33.8 (29.1, 38.7)	47.5 (43.3, 51.8)	87.6 (85.5, 89.5)	29.2 (24.8, 34.0)
Rural	21.6 (17.3, 26.5)	31.1 (26.9, 35.6)	68.9 (63.7, 73.6)	17.9 (13.9, 22.6)
Education Level[1]				
Primary School or Less	18.1 (14.6, 22.2)	26.5 (22.6, 30.8)	58.1 (52.8, 63.3)	15.7 (12.4, 19.7)
Secondary School	25.7 (22.3, 29.5)	37.1 (33.3, 41.1)	78.7 (75.0, 82.0)	21.5 (18.1, 25.4)
High School Graduate	33.3 (28.8, 38.2)	47.6 (43.7, 51.5)	87.1 (84.2, 89.5)	28.9 (24.8, 33.4)
College Graduate or Above	47.8 (41.0, 54.6)	58.2 (51.0, 65.1)	94.0 (91.7, 95.6)	41.6 (35.2, 48.2)
Career[2]				
Agriculture Worker	19.4 (14.4, 25.6)	27.9 (22.8, 33.6)	62.9 (56.3, 68.9)	16.1 (11.2, 22.6)
Machine Operator	26.5 (22.7, 30.7)	38.7 (31.9, 45.9)	83.9 (80.1, 87.1)	20.8 (17.1, 25.1)
Leaders of Organization	43.4 (36.4, 50.6)	54.9 (48.4, 61.2)	89.6 (84.1, 93.3)	39.2 (33.5, 45.3)
Medical/Health Personnel	60.1 (48.7, 70.5)	75.9 (65.7, 83.8)	98.6 (96.1, 99.5)	55.8 (44.6, 66.5)
Teacher	44.9 (35.5, 54.6)	50.5 (37.6, 63.4)	94.4 (87.1, 97.7)	34.7 (24.2, 46.9)
Overall	27.2 (23.8, 30.9)	38.7 (35.3, 42.2)	77.5 (73.9, 80.8)	23.2 (20.0, 26.6)

Note. [1]Education level was reported only among respondents 25+ years old; [2]Five careers are listed above, others are not shown.

diseases, while 27.5%, 51.0%, and 52.6% were aware that secondhand smoke causes heart disease in adults, lung disease in children and lung cancer in adults, respectively. The rate of awareness that secondhand smoke can cause all three diseases was even lower, at 24.6% (Table 2).

The lower a respondent's education level, the lower their awareness of the hazards of secondhand smoke. Among those with an education level of primary school or less, only 12.5% knew that secondhand smoke can cause heart disease in adults, lung disease in children and lung cancer in adults. Even among those with an education level of junior college or over, only 43.5% knew that secondhand smoke could cause all three diseases.

The awareness rates of the three diseases above were 46.7% and 62.3% among teachers and medical professionals, respectively.

TABLE 2

Percentage of Adults ≥15 Years old Who were Aware that Secondhand Smoke can Cause Heart Disease in Adults, Lung Disease in Children, and Lung Cancer in Adults, by Smoking Status and selected Demographic Characteristics-GATS China

Demographic Characteristics	Adults who believe that secondhand smoke causes the Diseases (percentage, 95% CI)			
	Heart Disease in Adults	Lung Disease in Children	Lung Cancer in Adults	All Three Diseases
Residence				
Urban	36.1 (31.9, 40.5)	64.0 (59.8, 68.0)	66.5 (62.6, 70.1)	32.9 (28.6, 37.5)
Rural	20.1 (16.4, 24.4)	39.9 (35.5, 44.4)	40.8 (36.0, 45.8)	17.6 (14.2, 21.6)
Education Level[1]				
Primary School or less	14.8 (11.7, 18.7)	27.4 (23.5, 31.7)	26.4 (22.4, 30.7)	12.5 (9.5, 16.4)
Secondary School	25.8 (21.8, 30.2)	49.8 (46.0, 53.7)	50.1 (46.2, 54.1)	23.2 (19.1, 27.8)
High School Graduate	35.6 (31.4, 40.1)	63.2 (58.3, 67.9)	66.1 (62.2, 69.7)	32.1 (27.9, 36.8)
College Graduate or Above	46.3 (40.5, 52.3)	78.1 (73.7, 81.9)	80.9 (77.0, 84.2)	43.5 (37.8, 49.4)
Career[2]				
Agriculture Worker	16.9 (12.2, 22.8)	33.4 (28.1, 39.1)	33.5 (27.7, 39.8)	14.9 (10.4, 20.8)
Machine Operator	25.8 (20.4, 32.1)	56.3 (50.9, 61.6)	56.3 (49.2, 63.2)	22.6 (18.8, 27.0)
Leaders of Organization	40.6 (32.0, 49.9)	69.0 (59.0, 77.5)	72.0 (64.6, 78.4)	38.8 (30.5, 47.9)
Medical/Health Personnel	66.0 (55.5, 75.1)	85.2 (77.0, 90.8)	80.1 (69.5, 87.7)	62.3 (53.3, 70.5)
Teacher	48.1 (37.8, 58.5)	80.1 (73.4, 85.4)	80.6 (75.0, 85.2)	46.7 (36.4, 57.4)
Overall	27.5 (24.1, 31.1)	51.0 (47.2, 54.8)	52.6 (48.4, 56.7)	24.6 (21.4, 28.1)

Note. [1]Education level is reported only among respondents 25+ years old; [2]Five careers are listed above, others are not shown.

Analysis of Factors Related to Awareness of Diseases Caused by Smoking and Secondhand Smoke

A multivariate complex sampling logistics analysis was conducted on eight factors (sex, age, urban/rural residency, education level, occupation, smoking status, exposure to warning labels on cigarette packages in the last 30 days, and exposure to tobacoo control publicity over the last 30 days). Of the factors listed above, the results indicated that sex, urban/rural residency, education level, medical professionals, smoking status, and exposure to tobacco control information over the last 30 days had significant effects on awareness, while the effects of age and exposure to warning labels on cigarette packages over the last 30 days were not significant. Awareness was significantly higher among men than women, among urban residents compared with rural residents, among those with a higher education level compared with those with a lower level, among medical professionals compared with those in other types of employment, among non-smokers compared with smokers, and among people who had seen tobacco control information in the last 30 days compared with people who had not (Table 3).

Analysis of Factors Related to Awareness that Smoking Causes Heart Disease among Smokers

Further multivariate complex sampling logistic analyses of awareness of the role of smoking in causing heart disease were conducted for smokers to examine eight factors (sex, age, urban/rural residency, education level, occupation, exposure to tobacoo control publicity, exposure to warning labels

on cigarette packaging, and receiving advice from a physician to quit in the last 30 days). Of the above factors, the results indicated that urban/rural residency, education level, medical professionals, exposure to tobacco control information, and receiving advice from a physician to quit smoking in the last 30 days had significant effects, while the effects of gender, age, and exposure to a warning label on cigarette packaging were not significant. Awareness was significantly higher among urban compared with rural residents, among those with a higher education level compared with those with less education, among medical/health professionals compared with agricultural workers, among those who had seen tobacco control information compared with those who had not, and among those who had been advised to quit smoking by a physician compared with those who had not (Table 4).

Analysis of Factors Associated with Awareness that Secondhand Smoke Causes Lung Disease in Children

Multivariate complex sampling logistic analyses regarding awareness of the role of secondhand smoke in causing lung disease in children were conducted on eight factors (sex, age, urban/rural residency, education level, occupation, region, smoking status, and exposure to tobacoo control information in the last 30 days). Of the factors listed above, the results indicated that urban/rural residency, age, education level, medical professionals and teachers, smoking status, and exposure to tobacco control information over the last 30 days had significant effects on awareness, while gender did not have significant effects. Awareness was significantly higher among urban residents compared

with rural residents, among younger people compared with older people, among those with a higher education level compared with those with less education, among medical professionals compared with people in other types of employment, among smokers compared with non-smokers, and among those who had been exposed to tobacco control information compared with those who had not (Table 5).

DISCUSSION

Knowledge and information about tobacco hazards could form the foundation for promoting positive beliefs and attitudes about smoking. Studies in China and elsewhere have indicated that improved awareness of tobacco hazards can reduce tobacco consumption among adult smokers, and enhance smokers' intention to quit smoking[7-8]. In order to find new strategies for improving people's knowledge of tobacoo hazards, this paper analyzes the characteristics of the awareness of tobacco hazards among the Chinese adults and the factors that affect the awareness.

Our study found that among Chinese adults about 81.8% of the population knew that smoking causes serious diseases and about 77.5% knew that smoking causes lung cancer. Compared to the results of the 1996 and 2002 Epidemiological Surveys on Smoking[9-10], the awareness of the health hazards

TABLE 3

Factors Related to Awareness of the Role of Smoking in Heart Disease among adults Aged 15 Years or Older

Characteristics	Awareness Rate (%)	Adjusted OR	95% (CI)
Gender			
Male	40.6	1.31[*]	(1.16，1.47)
Female	36.7	REF	
Residence			
Urban	47.5	1.36[*]	(1.04，1.78)
Rural	31.1	REF	
Age Group			
25-44	38.1	0.94	(0.77，1.15)
45-64	39.2	1.25	(0.97，1.60)
65-	34.0	1.21	(0.91，1.62)
15-24	41.1	REF	
Education Level			
Secondary School	36.6	1.43[*]	(1.17，1.75)
High School Graduate	46.5	1.76[*]	(1.33，2.33)
College Graduate or Above	58.4	2.46[*]	(1.69，3.59)
Primary School or Less	26.7	REF	
Career			
Machine Operator	38.7	1.21	(0.85，1.73)
Leaders of Organization	54.9	1.36	(0.88，2.09)
Medical/Health Personnel	75.9	3.56*	(2.14，5.93)
Teacher	50.5	1.04	(0.55，2.00)
Others	42.2	1.15	(0.87, 1.51)
Agriculture Worker	27.9	REF	
Warning Labels			
Seen	41.4	1.09	(0.86，1.39)
Not Seen	34.9	REF	
Smoking Status			
smoker	34.8	0.64[*]	(0.53，0.76)
Non-smoker	40.2	REF	
Tobacoo Control Publicity			
Seen	44.5	1.51[*]	(1.21，1.90)
Not Seen	30.0	REF	

Note. [*]$P<0.05$.

TABLE 4

Factors Associated with Awareness of the Knowledge that Smoking Causes Heart Disease among Adult Smokers Aged 15 Years or Older

Characteristics	Awareness Rate (%)	Adjusted OR	95% (CI)
Gender			
Male	35.3	1.29	(0.76，2.21)
Female	24.6	REF	
Residence			
Urban	44.6	1.54[*]	(1.03，2.30)
Rural	27.5	REF	
Age Group			
25-44	34.8	0.94	(0.62，1.42)
45-64	37.2	1.17	(0.79，1.73)
65-	25.1	0.84	(0.48，1.47)
15-24	34.6	REF	
Education Level			
Secondary School	31.9	1.50[*]	(1.01，2.25)
High School Graduate	44.8	2.17[*]	(1.36，3.47)
College Graduate or Above	55.0	2.80[*]	(1.66，4.72)
Primary School or less	22.3	REF	
Career			
Machine Operator	35.7	1.12	(0.73，1.70)
Leaders of Organization	47.8	1.06	(0.57，1.96)
Medical/Health Personnel	78.3	5.20[*]	(1.36，19.85)
Teacher	65.3	2.10	(0.86，5.15)
Others	38.8	1.06	(0.71，1.59)
Agriculture Worker	25.5	REF	
Tobacoo Control Publicity			
Seen	39.9	1.57[*]	(1.1，2.24)
Not Seen	26.2	REF	
Warning Labels			
Seen	36.1	0.84	(0.44，1.61)
Not Seen	26.7	REF	
Physician Advice			
Advised to Quit	43.9	2.22[*]	(1.53，3.23)
Have not been to a Hospital in the Past 30 Days	34.9	1.18	(0.92，1.52)
No Advice on Quitting	29.7	REF	

Note. [*]$P<0.05$.

from smoking had improved among the Chinese adults (Table 6), which suggested that the efforts on tobacco control had their effects. But we found there are still problems. Many people knew little of the specific health hazards of tobacco use. Take the rate of those aware of smoking causing heart disease for example. It was only 38.7% in 2010, an improvement from the rates in 1996 and 2002. However, it is far lower than the levels of the developed countries[9-11] which were 90.8% in Canada and 88.7% in Australia (Table 7). The findings indicated that the depth of knowledge on smoking hazards among Chinese adults is inadequate, which may affect smokers' intention to quit smoking and limit its effect on preventing youth from trying smoking.

The situation is similar in people's awareness of the hazards of SHS. Our study found that 64.3% of

the Chinese population were aware that SHS causes serious diseases. But for the awareness of specific health hazards of SHS, only 27.5% of the Chinese adults knew SHS causes heart disease in adults, which is much lower than the rates in developed countries such as in New Zealand[12].

In China, "smoking is harmful to your health" is the most frequently seen health education information on tobacco hazard. The depth and breath of information promoted to the public are limited, which may have little effect in changing people's behaviour to meet the need of tobacco control[7,12-13]. New evidence-based methods and strategies should be applied.

The result of our study showed that the awareness rates of diseases caused by smoking and SHS among doctors are the highest in Chinese adults.

TABLE 5

Factors associated with Awareness of Knowledge that Secondhand Smoke Causes Lung Disease in Children among Adults aged 15 Years or Older

Characteristics	Awareness Rate (%)	Adjusted OR	95% (CI)
Gender			
Male	51.8	1.07	(0.90，1.27)
Female	50.1	REF	
Residence			
Urban	64.0	1.69*	(1.28，2.25)
Rural	39.9	REF	
Age Group			
25-44	55.5	0.86	(0.72，1.03)
45-64	43.8	0.71*	(0.55，0.90)
65+	31.6	0.55*	(0.40，0.74)
15-24	61.3	REF	
Education Level			
Secondary School	50.4	1.90*	(1.57，2.31)
High School Graduate	65.4	2.82*	(2.08，3.82)
College Graduate or Above	80.0	4.77*	(3.34，6.82)
Primary School or less	27.6	REF	
Career			
Machine Operator	56.3	1.51*	(1.06，2.14)
Leaders of Organization	69.0	1.11	(0.74，1.68)
Medical/Health Personnel	85.2	2.88*	(1.44，5.77)
Teacher	80.1	1.69*	(1.06，2.69)
Others	57.1	1.22	(0.95，1.55)
Agriculture Worker	33.4	REF	
Smoking Status			
Smoker	45.7	0.68*	(0.55，0.83)
Non-smoker	53.0	REF	
Tobacoo Control Publicity			
Seen	59.7	1.75*	(1.33，2.29)
Not Seen	38.0	REF	

Note. *P<0.05.

TABLE 6

Trends in Awareness Rate of Smoking-related Health Risks in China

Year	Awareness Rate(%)			
	Lung Cancer	Heart Attack	Tracheitis	Stroke
1996	39.8	4.0	69.7	-
2002	69.2	22.2	82.0	-
2010	77.5	38.7	-	27.2

TABLE 7

Trends in Awareness Rate of Health Hazards of SHS among Chinese Population

Year	Awareness Rate (%)			
	Serious Health Hazards to Fetus	Lung Disease in Children	Lung Cancer in Adults	Heart Attack in Adults
1996	26.6	--	--	--
2002	42	--	--	--
2010	--	51.0	52.6	27.5

But the awareness on tobacco hazards among doctors was even lower than that of the general population in Canada[11]. Doctors and teachers are role model on smoking to the society. They should be educated the knowledge of tobacco hazards and motivated to teach the public.

Factors Associated with Awareness of Tobacco Hazards in the Population

Survey logistic regression is applied to analyze the factors that may affect people's awareness of tobacco hazards.

Our results indicated that people with demographic characteristics of male, rural residency, low education level were more likely to have lower level of awareness of tobacco hazards. The education on tobacco hazards for them should be strengthened to improve the awareness of tobacco hazards of the whole population.

Our study found that high awareness of tobacco

hazards was associated with having seen tobacco control information over the 30 days before the survey, suggesting that tobacco control information and communication may play a role in improving the population's awareness of tobacco hazards. However, it is also noted that the level of awareness of specific tobacco hazards is still not very high among those who had been exposed to the information, which might be attributable to the overly broad and general contents of the existing information, suggesting that tobacco control information on more specific tobacco hazards of should be delivered to the public.

Cigarette package is an important medium for delivering tobacco control messages. Foreign studies found that the warnings on the cigarette package were significantly associated with awareness of tobacco hazards[11]. However, in our study, the level of knowledge among those who had seen the cigarette pack health warnings was not significantly different from that among those who hadn't, which might be relevant with the contents of the warnings used in China. Results from other research have shown that compared to foreign warnings with pictures and text, the effectiveness of Chinese warnings on behavioural change is the weakest, which supports our result[14]. It suggests that warning labels on Chinese cigarette package are not effective on improving people's knowledge on tobacco hazards. The current health warnings on the cigarette package should be revised in great extent to improve their effectiveness in tobacco control communication.

Cross-section survey with multi-stage stratified cluster sampling is employed to study the awareness of tobacco hazards among the Chinese population in our study. It is found there has been some improvement in the Chinese population's awareness of tobacco hazards over the 15 years between 1996 and 2010. But a large fraction of the population knew little of the specific hazards of tobacco use, which lead to their underestimating of the health hazards of smoking. Our study indicates that the health education strategy on improving the public awareness of tobacco hazards can not meet the current need of tobacco control. New evidence-based methods and strategies such as the MPOWER Package with comprehensive, vivid, specific and mutli-dimension education should be applied in improving the public knowledge of tobacco hazards and their awareness of tobacco control. Means such as publicity and brief smoking cessation intervention are necessary for improving the population's awareness of tobacco hazards, especially the awareness of rural residents and those with lower education levels. Besides, the current health warnings on the cigarette package should be revised in great extent to improve their effectiveness in tobacco control communication.

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