

BMJ Open Self-rated chronic conditions and 2-week prevalence in adults in Zhongshan, China: an epidemiological survey

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ABSTRACT

Objective: To examine the association between behavioural factors and the risk of chronic conditions and 2-week prevalence.

Design: This was a cross-sectional survey.

Setting: The study was conducted in Zhongshan, China.

Participants: A multistage clustering sampling method was used to select a representative sample of residents from the household registration system between July and September 2011. The overall sample replacement rate was 9.4%, and the final sample included 43 028 individuals.

Outcome measures: Chronic conditions and 2-week prevalence.

Results: 4979 (11.6%) of the participants reported having at least one chronic condition, 1067 (2.5%) had two or more concurrent chronic conditions, and 6830 (15.9%) reported having at least one disease in a 2-week recall period. The most common chronic condition was primary hypertension, which was reported by 6.8% of participants. Logistic regression models demonstrated that the main factors for having a chronic condition and 2-week prevalence were older age (≥ 65 years of age; OR 44.91, 95% CI 33.05 to 61.03; and OR 12.71, 95% CI 10.44 to 15.46, respectively), obesity (OR 3.00, 95% CI 2.63 to 3.42; and OR 2.50, 95% CI 2.22 to 2.82, respectively) and being a former smoker (OR 3.02, 95% CI 2.54 to 3.58; and OR 3.24, 95% CI 2.74 to 3.82, respectively).

Conclusions: This study suggests that older age, obesity and unhealthy behaviours are high-risk factors for poorer health status among the residents of Zhongshan, China. The present findings highlight the importance of recognising and managing harmful behaviours in order to improve health.

INTRODUCTION

Since 1990, there has been a substantial epidemiological shift away from communicable diseases in children to more non-communicable diseases in adults.¹

Strengths and limitations of this study

- Our findings from a large representative sample will help improve our understanding of health status in this region of the country.
- Our findings will be useful for implementing further health education and behavioural interventions.
- Causal relationships cannot be identified in a cross-sectional study.
- Recall bias may exist and all data except weight and height were collected by self-report.

A relatively small number of modifiable behavioural risk factors, including tobacco smoking, excessive drinking, physical inactivity, unhealthy diet and alcohol use, are major contributors to the development of adult chronic diseases.^{1–3} The risk of adverse health outcomes increases with the number of unhealthy behaviours.⁴ Studies have shown that chronic disease accounts for the majority of deaths in low-, middle- and high-income countries.^{5 6} Self-rated health and morbidity are important indices of health and have particular relevance for public health.⁷ Previous studies have investigated how risk behaviours interact with related factors among adolescents and adults in developed countries.^{8 9}

By the end of 2010, more than 97% of residents were covered by the New Rural Cooperative Medical System (NRCMS) launched by the Chinese Government in 2003. Implementation of NRCMS and the dramatic socioeconomic growth during recent years have greatly improved general health. However, health inequalities among residents with different socioeconomic and geographical characteristics are increasing. Those inequalities are considered a serious public health problem and reducing

inequalities has been recognised as a major objective of healthcare policies in China. At the same time, as a result of rapid economic development and improved disease prevention and control in recent decades, China has undergone an epidemiological transition, so that the greatest problems are now due to non-communicable chronic diseases.¹⁰

Chronic diseases have become the leading cause of morbidity and mortality, as related behavioural risk factors have changed dramatically in China.¹¹ Consequently, 2-week prevalence, an index of health service need and one of the morbidity indicators used to investigate inequalities in health status, also rose in China (from 143 per thousand population in 2003 to 189 per thousand population in 2008), with most of the rise due to increased chronic diseases. However, medical treatment can be expensive and difficult to obtain. As the burden of chronic diseases and 2-week prevalence increases, there are substantial but preventable increases in morbidity and mortality. Many studies have investigated lifestyle health-related behavioural risk factors and their potential correlates in China.^{3 12} Previous reports and surveillance of major chronic diseases, especially obesity, overweight and hypertension, revealed that the prevalence of chronic risk factors in adults was high but not increasing in urban areas.^{12 13} Notwithstanding the enormous burden of chronic diseases, few studies have focused on the relationship between multiple behavioural risk factors and self-rated chronic conditions as well as 2-week prevalence rate in China. Community- and population-based programmes to prevent risky behaviours may be an effective strategy.

The purpose of this study was to determine the prevalence of self-rated chronic conditions and 2-week prevalence among different socioeconomic and geographical groups, as well as the relationship with various behavioural risk factors in Zhongshan, China. The findings will improve our understanding of health status disparities in this region of the country.

METHODS

Study area and population

This study was conducted in Zhongshan, which was one of the cities that underwent economic policy reform and was opened to foreign trade in the 1980s. Zhongshan is located at the southern tip of the Chinese mainland on the eastern bank of the mouth of the Pearl River and occupies an area of 1800 km²; it had a population of 1.4 million in 2012. In less than 30 years, Zhongshan, a traditional agricultural town, has grown into a modern city. Lifestyle and dietary changes, including decreased physical activity and increased consumption of high-fat foods, are associated with a high prevalence of chronic disease.

Permanent residents were selected to participate in the study according to the following criteria: (1) having permanent household registration and being 18 years of

age or older, (2) living in Zhongshan when the study was carried out, and (3) able to complete the questionnaire. The protocol for this study was approved by the ethics review committees of Guangzhou Medical University, and all study participants provided voluntary signed informed consent.

Study design

This study was conducted from July to September 2011 using a cross-sectional design. A multistage clustering sampling method was used to select a representative sample of residents from the household registration system. First, 30% of streets or villages were randomly sampled from each of the 24 districts or towns in Zhongshan (for a total of 292 streets or villages). Then, 50% of households were randomly sampled from the first sampling stage. All family members meeting the inclusion criteria were eligible to participate. In order to guarantee an adequate sample size, when interviewers could not contact a sampled subject after three attempts, a substitute with a similar household structure as the originally sampled family was selected. The overall sample replacement rate among the 19 087 households identified was 9.4% (1795/19 087). A total of 49 119 individuals were selected, and 43 028 completed data collection (response rate: 87.6%).

Data collection

Information on demographics, behavioural factors, chronic diseases and 2-week prevalence was obtained via face-to-face interview by the data collectors in the participants' homes using structured questionnaires. Standard procedures were established to guide the recruitment, training and supervision of these data collectors, who underwent training to improve their skills and reduce inter and intra-collector variability.

Smoking status was determined by self-report with the question 'Do you currently use any tobacco, such as cigarettes or pipes?' Participants who replied that they smoked 'every day' or on 'some days', were classified as current smokers. Those who replied 'no' were classified as non-current smokers. Alcohol consumption was assessed by asking participants if they were non-drinkers or occasional or regular drinkers. Those who drank alcohol were also asked about the number of days over the past 2 weeks when they had drunk alcohol and how many drinks they had consumed on each occasion. 'Non-drinkers' and 'occasional drinkers' were classified as non-drinkers.

Salted food intake and smoked food intake were assessed by asking whether or not the respondent made a conscious effort to avoid eating such foods. Salted food included pickled vegetables, salted fish, salted fish roe, etc, while smoked food included smoked meat, smoked fish, etc.

Exercise was assessed by asking participants if they had done any exercise or participated in any sports or physical activities over the previous 2 weeks. They were also

asked how many times they had exercised in the previous 2 weeks. Physical inactivity was defined as exercising four times or fewer over the past 2 weeks. The number of hours of daily sitting time (0 to <8 h, \geq 8 h/day) was also recorded.

The heights and weights of all respondents were measured, and body mass index (BMI) was computed according to the criteria of the National Health and Family Planning Commission of the People's Republic of China to determine overweight or obesity ($BMI \geq 24$). The presence of chronic diseases was determined by means of a self-report form that provided a checklist of chronic illnesses taken from the International Classification of Diseases, 10th Revision (ICD-10). During the interview, participants were asked whether they had any chronic health problems which had been confirmed by a medical doctor. Information on 2-week prevalence was obtained by means of a self-report form that provided a checklist of physical illnesses and symptoms. During the interview, participants were asked whether they had experienced any physical health problems, including infectious diseases and chronic non-communicable diseases, over the previous 2 weeks. If they had physical health problems, participants were asked whether they had received treatment from a medical doctor or had self-treated. The 2-week prevalence was calculated as (number of cases person-time that occurred over the previous 2 weeks)/(number of people in the population during this period) \times 100%. The 2-week non-

clinical visit rate was calculated as (number of cases person-time without medical treatment or with self-treatment that occurred over the previous 2 weeks)/(number of cases during this period) \times 100%. We collected data on all physical health problems reported by participants, and discuss the five most common in the Results section.

Demographic characteristics included age, sex, education (illiterate, primary school, secondary school, and university or above), marital status (single, married, separated/divorced/widowed) and medical insurance status.

Data analysis

The prevalence of selected chronic conditions and 2-week prevalence were calculated. After descriptive analysis, logistic regression analyses were used to determine the influence of independent variables on the dependent variables of chronic conditions or 2-week prevalence. This was initially done as a univariate analysis, then as a multivariable analysis using a forward stepwise method. A p value of <0.05 with a 95% CI for the population OR that excluded the null value of 1 was considered statistically significant. All analyses were conducted with SPSS V.13.0 (SPSS Inc., Chicago, Illinois, USA).

Table 1 Sociodemographic characteristics of respondents (n=43 028)

	n	Per cent
Age (year)		
Mean \pm SD	42.8 \pm 16.5	
Min–max	18–104	
Age group (years)		
18–24	7066	16.4
25–34	7993	18.6
35–44	9290	21.6
45–54	7961	18.5
55–64	6252	14.5
\geq 65	4466	10.4
Sex		
Male	21 789	50.6
Female	21 239	49.4
Marital status*		
Unmarried	8849	20.8
Married	30 953	72.6
Widowed/separated/divorced	2815	6.6
Educational level*		
Illiterate/primary	27 624	64.9
Secondary	10 682	25.1
University	4252	10.0
Medical insurance		
None	0	0.0
Yes	43 028	100.0

*Data were missing for some participants.

Table 2 Prevalence of the five leading chronic conditions and 2-week prevalence (n=43 028)

	n	Per cent
Chronic condition*		
Any diagnosis	4979	11.6
Primary hypertension	2913	6.8
Diabetes mellitus	479	1.1
Coronary heart disease	308	0.7
Chronic gastritis	259	0.6
Stroke	173	0.4
Number of chronic disease(s)		
1	3912	9.1
\geq 2	1067	2.5
Two-week prevalence		
Any diagnosis	6830	15.9
Hypertension	2913	6.8
Upper respiratory infection	825	1.9
Diabetes mellitus	479	1.1
Coronary heart disease	308	0.7
Chronic gastritis	259	0.6
Classification of diseases (ICD-10)		
Chronic diseases	4979	11.6
Non-chronic diseases	1851	4.3
Two-week non-clinical visit† rate‡	1607	23.5

*Data on chronic diseases were obtained by means of a self-report form that provided a checklist of chronic illnesses taken from the International Classification of Diseases, 10th Revision (ICD-10).

†Non-clinical visits to a medical centre (eg, for educational or information purposes).

‡Among 6830 individuals who reported any diagnosed disease in the past 2 weeks.

RESULTS

Sociodemographic factors

The overall mean age of the 43 028 residents (50.6% male, 49.4% female) who completed the surveys was 42.8 (SD 16.5) years, 64.9% were illiterate or had only received primary education, and all had medical insurance (table 1).

Prevalence of chronic conditions and 2-week prevalence

Of 43 028 participants, 4979 (11.6%) reported having at least one chronic condition, while 1067 (2.5%) had two or more concurrent diagnosed chronic conditions (table 2). The most common of the five leading chronic conditions was hypertension, which was reported by 6.8% of participants. The prevalence of the other four leading chronic conditions ranged from 0.4% to 6.8%.

Approximately 16% of respondents reported having at least one diagnosed disease during the 2-week recall period, the most common being hypertension. Overall, 11.6% of diagnosed respondents reported they had a chronic disease and 4.3% a non-chronic disease, while 23.5% of respondents in general reported that they had not visited a medical practitioner (table 2).

Stroke was more common in men than in women, while upper respiratory infections were much more prevalent in women, which resulted in a substantially higher 2-week prevalence of any diagnosis and a greater prevalence of non-chronic diseases in women (table 3).

The prevalence of chronic conditions and 2-week prevalence were much higher in older adults (≥ 55 years) than in young (18–44 years) or middle-aged adults (45–54 years). Young and middle-aged adults had higher rates of 2-week non-clinical visits to a medical centre (eg, for educational or information purposes). (table 4).

With the exception of physical inactivity, the prevalence of chronic conditions and 2-week prevalence were much higher in adults with behavioural risk factors, such as obesity, current smoking, regular drinking, sitting for >8 h/day, and consuming salted and smoked food than in adults without these risk factors (all $p < 0.01$; table 5). However, the evidence showed negative associations between physical inactivity and both chronic conditions and reported 2-week prevalence.

Multivariable logistic regression

Logistic regression analysis was performed with sociodemographic variables and unhealthy behaviours as covariates (table 6). Any diagnosis of a chronic condition and 2-week prevalence were independently associated with being female, older (vs 18–24 years), widowed/separated/divorced (vs never married), obese, sitting for >8 h/day, consuming smoked food and consuming salted food. Diagnosed chronic conditions and 2-week prevalence were much less common in individuals with a secondary education (vs those who were illiterate or had only primary education) and physically inactive

Table 3 Comparison of the prevalence of chronic diseases and 2-week prevalence

	Male (n=21 789, %)	Female (n=21 239, %)	Female:male OR (95% CI)	p Value
Chronic disease*				
Any diagnosis	11.5	11.6	1.01 (0.96 to 1.08)	0.666
Primary hypertension	6.6	6.9	1.05 (0.97 to 1.13)	0.248
Diabetes mellitus	1.0	1.2	1.15 (0.96 to 1.38)	0.128
Coronary heart disease	0.7	0.8	1.14 (0.91 to 1.43)	0.255
Chronic gastritis	0.5	0.7	1.21 (0.95 to 1.54)	0.130
Stroke	0.5	0.3	0.52 (0.38 to 0.71)	<0.001
Number of chronic diseases				
1	9.0	9.2	1.01 (0.93 to 1.07)†	0.714
≥ 2	2.6	2.4		
Two-week prevalence				
Any diagnosis	15.4	16.3	1.07 (1.01 to 1.12)	0.015
Hypertension	6.6	6.9	1.05 (0.97 to 1.13)	0.248
Upper respiratory infection	1.7	2.1	1.22 (1.06 to 1.40)	0.005
Diabetes mellitus	1.0	1.2	1.15 (0.96 to 1.38)	0.128
Coronary heart disease	0.7	0.8	1.14 (0.91 to 1.43)	0.255
Chronic gastritis	0.5	0.7	1.21 (0.95 to 1.54)	0.130
Classification of diseases (ICD-10)				
Chronic diseases	11.5	11.6	1.02 (0.96 to 1.08)‡	0.488
Non-chronic diseases	3.9	4.7	1.20 (1.09 to 1.31)‡	<0.001
Two-week non-clinical visit§ rate	24.3	22.7	0.92 (0.82 to 1.02)	0.123

*Data on chronic diseases were obtained by means of a self-report form that provided a checklist of chronic illnesses taken from the International Classification of Diseases, 10th Revision (ICD-10).

†Cumulative logit model.

‡Generalised logit model.

§Non-clinical visits to a medical centre (eg, for educational or information purposes).

Table 4 Comparison of the prevalence of the main chronic conditions and 2-week prevalence by age group

	Age						OR (95% CI)
	18–24 (n=7066) (%)	25–34 (n=7993) (%)	35–44 (n=9290) (%)	45–54 (n=7961) (%)	55–64 (n=6252) (%)	≥65 (n=4466) (%)	
Chronic condition†							
Any diagnosis	1.2	1.8	4.7	11.3	24.0	42.9	2.45 (2.39 to 2.51)*
Primary hypertension	0.1	0.2	1.3	5.7	15.2	30.8	3.13 (3.01 to 3.25)*
Diabetes mellitus	0.0	0.0	0.3	0.9	2.8	4.5	2.55 (2.35 to 2.77)*
Coronary heart disease	0.1	0.1	0.1	0.5	1.2	3.8	2.87 (2.55 to 3.19)*
Chronic gastritis	0.2	0.2	0.4	0.9	1.1	1.2	1.53 (1.40 to 1.66)*
Stroke	0.0	0.0	0.0	0.2	0.7	2.4	3.77 (3.14 to 4.53)*
Two-week prevalence							
Any diagnosis	4.7	4.9	8.7	16.9	28.8	48.4	1.96 (1.92 to 2.00)*
Hypertension	0.1	0.2	1.3	5.7	15.2	30.8	
Upper respiratory infection	1.7	1.6	1.7	2.3	2.2	2.4	1.10 (1.05 to 1.15)*
Diabetes mellitus	0.0	0.0	0.3	0.9	2.8	4.5	
Coronary heart disease	0.1	0.1	0.1	0.5	1.2	3.8	
Chronic gastritis	0.2	0.2	0.4	0.9	1.1	1.2	
Two-week non-clinical visit‡ rate	25.3	32.1	27.7	27.8	23.7	17.4	0.86 (0.83 to 0.90)

*p<0.01.

†Data on chronic diseases were obtained by means of a self-report form that provided a checklist of chronic illnesses taken from the International Classification of Diseases, 10th Revision (ICD-10).

‡Non-clinical visits to a medical centre (eg, for educational or information purposes).

(vs physically active). The 2-week prevalence was also independently associated with being a current or former smoker and being a regular drinker. Moreover, any diagnosis of a chronic condition was more common in former smokers (vs never smokers). Unexpectedly, being a current smoker (vs never smoker) and being a regular drinker (vs non-drinker) were not significantly associated with chronic condition diagnoses.

DISCUSSION

This study considered a large representative sample to examine the associations between demographic characteristics, behavioural factors, chronic conditions and 2-week prevalence. Results showed that 11.6% of the population had at least one chronic condition, 2.5% had two or more concurrent diagnoses, and approximately 16% reported at least one disease in a 2-week recall

Table 5 Prevalence of unhealthy behaviours for chronic conditions and 2-week prevalence

Behaviours	No (%)	Yes (%)	Yes:no OR (95% CI)	p Value
Chronic condition (any diagnosis)*				
Obesity	n=38 049	n=4979		
Obesity	3.0	9.3	3.37 (3.01 to 3.77)	<0.001
Current smoker	19.7	24.3	1.31 (1.22 to 1.41)	<0.001
Regular drinker	4.7	8.0	1.75 (1.56 to 1.96)	<0.001
Physical inactivity	67.2	63.6	0.85 (0.80 to 0.91)	<0.001
Sitting for >8 h/day	13.7	17.9	1.38 (1.28 to 1.49)	<0.001
Salted food consumption	7.3	11.8	1.70 (1.55 to 1.87)	<0.001
Smoked food consumption	4.7	6.4	1.39 (1.23 to 1.57)	<0.001
Two-week prevalence				
Obesity	n=36 198	n=6830		
Obesity	2.9	7.9	2.88 (2.58 to 3.20)	<0.001
Current smoker	19.4	24.8	1.38 (1.29 to 1.46)	<0.001
Regular drinker	4.5	8.1	1.85 (1.67 to 2.04)	<0.001
Physical inactivity	67.3	64.1	0.87 (0.83 to 0.92)	<0.001
Sitting for >8 h/day	13.7	16.9	1.29 (1.20 to 1.38)	<0.001
Salted food consumption	7.2	11.2	1.64 (1.50 to 1.78)	<0.001
Smoked food consumption	4.6	6.4	1.43 (1.28 to 1.59)	<0.001

*Data on chronic diseases were obtained by means of a self-report form that provided a checklist of chronic illnesses taken from the International Classification of Diseases, 10th Revision (ICD-10).

Table 6 Multivariable logistic regression model of explanatory variables against chronic conditions† and 2-week prevalence (n=43 028)

	Chronic conditions, adjusted OR (95% CI)‡	Two-week prevalence, adjusted OR (95% CI)‡
Age group (years)		
18–24	1.00 (Reference)	1.00 (Reference)
25–34	1.47 (1.07 to 2.01)*	0.97 (0.80 to 1.16)
35–44	3.72 (2.73 to 5.06)**	1.61 (1.33 to 1.95)**
45–54	9.05 (6.67 to 12.29)**	3.25 (2.68 to 3.94)**
55–64	21.04 (15.50 to 28.55)**	6.04 (4.98 to 7.33)**
≥65	44.91 (33.05 to 61.03)**	12.71 (10.44 to 15.46)**
Sex		
Male	1.00 (Reference)	1.00 (Reference)
Female	1.12 (1.03 to 1.21)**	1.27 (1.19 to 1.36)**
Marital status		
Never married	1.00 (Reference)	1.00 (Reference)
Married	0.98 (0.80 to 1.20)	1.06 (0.91 to 1.24)
Widowed/separated/divorced	1.43 (1.15 to 1.79)**	1.56 (1.31 to 1.86)**
Educational level		
Illiterate/primary	1.00 (Reference)	1.00 (Reference)
Secondary	0.77 (0.69 to 0.88)**	0.84 (0.76 to 0.92)**
University	0.89 (0.72 to 1.08)	0.87 (0.76 to 1.01)
Obesity		
No	1.00 (Reference)	1.00 (Reference)
Yes	3.00 (2.63 to 3.42)**	2.50 (2.22 to 2.82)**
Smoking status		
Never smoker	1.00 (Reference)	1.00 (Reference)
Current smoker	1.06 (0.97 to 1.15)	1.21 (1.12 to 1.31)**
Former smoker	3.02 (2.54 to 3.58)**	3.24 (2.74 to 3.82)**
Regular drinker		
No	1.00 (Reference)	1.00 (Reference)
Yes	1.05 (0.92 to 1.20)	1.18 (1.05 to 1.32)**
Physical inactivity		
No	1.00 (Reference)	1.00 (Reference)
Yes	0.78 (0.73 to 0.84)**	0.80 (0.75 to 0.85)**
Sitting for >8 h/day		
No	1.00 (Reference)	1.00 (Reference)
Yes	1.16 (1.06 to 1.27)**	1.11 (1.02 to 1.20)*
Salted food consumption		
No	1.00 (Reference)	1.00 (Reference)
Yes	1.49 (1.34 to 1.66)**	1.44 (1.30 to 1.58)**
Smoked food consumption		
No	1.00 (Reference)	1.00 (Reference)
Yes	1.22 (1.06 to 1.41)**	1.29 (1.14 to 1.46)**

*p<0.05; **p<0.01

†Data on chronic diseases were obtained by means of a self-report form that provided a checklist of chronic illnesses taken from the International Classification of Diseases, 10th Revision (ICD-10).

‡Adjusted for other variables in the model.

period. The most common disease was hypertension (6.8%). The chronic disease rate, 2-week prevalence and prevalence of hypertension in the study were similar to the 15.7%, 18.9% and 5.49%, respectively, reported in the 2012 Chinese health statistics summary, while the 2-week rate of non-clinical visits to a medical centre (eg, for educational or information purposes) (23.5%) was higher than the national rate of people who are sick but do not visit a clinic/doctor (3.82%).¹⁴

Our study identified those adults who may be vulnerable to chronic conditions and 2-week prevalence: they

were more likely to be female, middle-aged or older (≥35 years), have a low educational level, be previously married (widowed/separated/divorced) and obese. Most of the findings are consistent with previous reports.^{3 12 13}

Hypertension was the most frequently reported chronic disease. This illustrates the importance of addressing factors influencing risk for hypertension in these communities. Lower educational level, as a proxy for socioeconomic status, and obesity were significantly more prevalent among participants who reported having chronic diseases than those who did not. Maintaining a

healthy lifestyle, including a healthy diet and regular physical activity, is an effective approach for preventing and managing hypertension.^{15 16}

Existing evidence indicates that the risk of chronic diseases increases exponentially with age; elderly participants tended to report poorer health and a higher prevalence of chronic diseases.^{17 18} In this study, the prevalence of chronic disease and 2-week prevalence increased with age, with a higher prevalence of both found in respondents aged 65 and older.

In China, many people are generally unaware of the impact of unhealthy behaviours, for instance, smoking, excessive alcohol intake, physical inactivity and poor dietary habits.¹² Most adults had at least two behavioural risk factors, while a previous study reported a strong possibility that those who self-reported being free of chronic diseases would later develop such conditions.³ Our results indicate that being obese, a former smoker, a regular drinker, sitting for >8 h/day, and consuming salted and smoked foods were associated with having a chronic disease and 2-week prevalence. In addition, being a current smoker was related to increased chronic diseases but not with 2-week prevalence. This result is in line with personal behaviour in China: most people smoke, but cease if they have health problems.

Physical inactivity was previously reported to be a risk factor for chronic disease;^{3 19} however, in our study it showed a negative association with chronic disease prevalence. This might be because participants with chronic diseases (especially hypertension and diabetes mellitus) may change their unhealthy behaviours and begin to exercise. Behavioural risk factors can vary over time, so a combination of multiple interventions addressing the full range of risk factors for chronic disease and morbidity, could generate larger health gains than a single intervention, often with a favourable cost-effective profile.²⁰

On the other hand, health inequalities as a result of chronic disease have become very challenging in China as the social determinants of health become more inequitable.^{10 11} In our study, young to middle-aged adults experiencing diagnosable disorders in the past 2 weeks may disproportionately fail to seek treatment because of lack of knowledge (thinking the condition is not serious or that there are no effective treatments) or lack of time. These disparities must be considered when planning efforts to promote health and prevent and control chronic conditions in China.

Several limitations in the study warrant comment. A limitation of cross-sectional studies is that causal relationships cannot be identified. In addition, most data in this study were self-reported, which could be a source of bias. Also, recall bias may have influenced our results, as all data except weight and height were collected by self-report. However, our results for well-established factors, the rate of chronic diseases, and 2-week prevalence are consistent with the literature.

Despite these limitations, the data in the present study are as complete as possible, and we were able to identify

factors associated with the risk of chronic disease and 2-week prevalence.

CONCLUSIONS

In conclusion, obesity, current smoker status, regular alcohol use, sitting for >8 h/day, and salted and smoked food consumption are associated with increased risks for chronic disease and 2-week prevalence. The results highlight the necessity to encourage comprehensive and integrated public health intervention strategies that target multiple behavioural factors.

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Contributors All authors contributed to the writing of this manuscript and revised it for intellectual content. CZ directed study implementation, including quality assurance and control, and drafting the article. XS analysed and interpreted the data. QG designed the study and reviewed the article. RF designed the analytical strategy and reviewed the article. HY helped to supervise the field activities and prepared the discussion sections of the text. WJ designed the analytical strategy and helped to conduct the literature review.

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