

Juncheng Qian et al.

Smoking and smoking cessation in China, 1993–2003

## Trends in smoking and quitting in China from 1993 to 2003: National Health Service Survey data

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### ABSTRACT

**Objective** China has around 350 million smokers, more commonly men. Using data from National Health Service Surveys conducted in 1993, 1998 and 2003, we (i) estimated trends in smoking prevalence and cessation according to sociodemographic variables and (ii) analysed cessation rates, quitting intentions, reasons for quitting and reasons for relapsing.

**Methods** Data were collected from approximately 57 000 households and 200 000 individuals in each survey year. Household members > 15 years of age were interviewed about their smoking habits, quitting intentions and attitudes towards smoking. We present descriptive data stratified by age, sex, income level and rural versus urban residence.

**Findings** In China, current smoking in those > 15 years old declined from 60% to 49% in men and from 5% to 3.2% in women over 1993–2003. The decline was more marked in urban areas. However, heavy smoking ( $\geq 20$  cigarettes daily) increased substantially overall and doubled in men. The average age of uptake also dropped by about 3 years. In 2003, 7.9% of smokers reported intending to quit, and 6% of people who had ever smoked reported having quit. Of former smokers, 40.6% quit because of illness, 26.9% to prevent disease and 10.9% for financial reasons.

**Conclusion** Smoking prevalence declined in China over the study period, perhaps due to the combined effect of smoking cessation, reduced uptake in women and selective mortality among men over 40 years of age. However, heavy smoking increased. People in China rarely quit or intend to quit smoking, except at older ages. Further tobacco control efforts are urgently needed, especially in rural areas.

## Introduction

About one in every three adults (or 1.1 billion adults) smokes worldwide, and 80% of smokers live in the developing world.<sup>1</sup> China is the world's largest cigarette consumer and producer.<sup>2</sup> In 2002, about 350 million adults reported having smoked at some point and 300 million reported being smokers at the time.<sup>3</sup> According to previous surveys, smoking prevalence and cigarette consumption increased during the 1980s and 1990s.<sup>4</sup> By 1996, 63% of men and 4% of women > 15 years of age had smoked at least one cigarette per day at some point in their lives.<sup>4</sup> By 2002, the fraction of men who smoked had risen to 66%, and the fraction of women smokers had dropped to 3.1%.<sup>3</sup> Over 80 000 million packets of cigarettes were sold in China in 1998, or four times more than in 1970.<sup>5</sup> According to serial surveys in Beijing, by the mid-1990s male smokers were consuming an average of 2 to 4 cigarettes more each day than in the mid-1980s,<sup>6</sup> probably as a result of increased economic prosperity, limited public health measures and poor anti-tobacco legislation in China.<sup>7</sup> Most tobacco consumed in China is produced by the China State Tobacco Corporation.<sup>8</sup> However, China's entry into the World Trade Organization in 2001 marked the beginning of an increase in cigarette imports and a drop in the cost of foreign brands.<sup>8</sup> Some fear that Western marketing practices may increase smoking in China among young people in general and especially women, who still smoke relatively little.<sup>2</sup>

Smoking is a major cause of disability, premature death and loss of productivity.<sup>9-11</sup> In China, the health risks of smoking appear to be as high as in Western countries, where the smoking epidemic started earlier.<sup>12-14</sup> Approximately one-third to one-half of current male smokers in China are likely to have died from smoking-related diseases by 2030 if they do not quit.<sup>15,16</sup>

Many industrialized nations have witnessed substantial declines in smoking prevalence resulting from a greater awareness of the health risks, higher cigarette taxes,<sup>17</sup> increased use of pharmacotherapy and other methods to quit smoking,<sup>18,19</sup> and, most recently, bans on smoking in public places.<sup>20,21</sup> In contrast, few Chinese people fully appreciate the harm that smoking can cause.<sup>4</sup> In China cessation rates are low, few people intend to quit<sup>22,23</sup> and relapse rates are high.<sup>24</sup> We present data from large nationally-representative household surveys conducted in 1993, 1998 and 2003 to summarize smoking prevalence by sociodemographic characteristics,

cigarette consumption and smoking cessation over a 10-year period. National Smoking Prevalence Surveys<sup>3,4</sup> (NSPS) have also been conducted in China, but they have been temporally far apart (1984, 1996, 2002) and the one in 2002 had a relatively small sample size (approximately 16 000). Our survey therefore complements the NSPS.

## Methods

### Data sources

The methods used in the National Health Services Surveys (NHSS) have been described in detail elsewhere.<sup>25–28</sup> In brief, multistage stratified cluster random sampling was used. The first stage sampled counties/districts, the second townships/streets; the third stage randomly sampled two villages (rural areas) or residents' committees (urban areas) in each township or street. The last stage randomly sampled 60 households in selected villages/residents' committees; all household residents were included. The surveys encompassed all 31 provinces in mainland China. The 1993 survey included 92 counties, 55 000 households and 215 163 people. The 1998 survey sampled 95 counties, 57 000 households and 216 101 people. The 2003 survey included 95 counties, almost 57 000 households and 193 698 people.

Face-to-face interviews were conducted by trained, local investigators. Information was collected on sociodemographic variables, medical histories, health risk behaviours and medical care utilization and expenditures. Every person over 15 years of age in the household completed a questionnaire that covered smoking behaviour. Data quality checks included repeat interviews on a random sample of households. Response rates were consistently very high owing to the use of local interviewers, local sampling frames with replacement for empty households, and use of proxy respondents within the household. In 2003, over 99% of households initially selected agreed to take part, and 99.6% of respondents answered the smoking-related questions. The NHSS samples were consistent with census estimates in terms of age and sex structure and household size (Appendix A, available from: <http://www.ncl.ac.uk/ihs/research/project/1635> ).

### Definitions

Respondents were questioned on current smoking habits, age at uptake, attempts to quit, intention to quit, main reason for quitting and main reason for relapsing (2003 survey only). Those individuals who reportedly smoked at the time of the survey and who had smoked at least 100 cigarettes during their lifetime were defined as "current smokers". Those who either smoked at the time of the survey or who had previously smoked but had quit were defined as "ever smokers". The 1993 questions were more limited than those in later surveys and included current smoking prevalence only; they did not cover smoking history, attempts or intention to quit, age at uptake or the number of cigarettes smoked daily. The 2003 survey included an additional question to identify current smokers who had smoked at least 1 cigarette daily for a continuous period of at least 6 months. The prevalence estimate using this definition is presented separately. A question on the number of cigarettes smoked daily was included in both the 1998 and 2003 surveys, but in 1998 it was formulated in broad categories only (<10, 10–19, 20+), whereas in 2003 the exact number was requested. The 2003 data were therefore divided into three categories, and the coding change may have introduced slight bias. Heavy smokers were defined as those smoking at least 20 cigarettes daily. Similarly, the length of time since former smokers had quit the habit was coded in months in 2003 and in years in 1998. We defined as "successful quitters" those individuals who had not smoked at all over the previous 24 months or more. We chose this stringent definition because the relapse rate was expected to be high, many people smoked occasionally, and the definition was consistent with the categories reported in the NSPS in China.<sup>4</sup> We defined as "current quitters" those individuals who reported having quit within the previous 24 months. We present these results separately as well as combined with the results for "successful quitters" (and labelled the combination variable as "total quitting".)

## **Data analysis**

We estimated the proportion of current and ever smokers; average cigarette consumption; cessation rates; quitting attempts, and attitudes towards quitting by age, sex, sociodemographic and economic variables (income, educational level), rural or urban location and survey year. Substantial differences exist between rural and urban parts of China in terms of household income (approximately three times higher in urban areas),<sup>29</sup> occupation (predominantly agricultural, including tobacco farming, in rural areas,) and mortality (30% higher in rural

areas).<sup>30</sup> For consistency with other research conducted in China,<sup>4,31</sup> we applied the definitions of the Ministry of Health to stratify urban and rural areas. We used logistic regression with robust standard errors (adjusting for “clustering” of smokers within households) to estimate associations between smoking, quitting, gender and socioeconomic variables, after controlling for possible confounders (Appendix B, available at: <http://www.ncl.ac.uk/ihs/research/project/1635> ).

Finally, for validation we assessed the level of agreement between current smoking prevalence in 1998 and a variable combining the prevalence of current smoking in 2003 with the proportion of ever smokers who had quit in the preceding 5 years, stratified by gender and 5-year age group. All analyses were performed using SAS statistical software version 9.1 (SAS Institute, Inc., Cary, USA).

## Results

### Trends in smoking prevalence

In 2003, 27.7% of the Chinese population aged 15 years or over had smoked cigarettes at some point, and 26.0% were smoking at the time they were interviewed (Table 1). The prevalence of current smoking fell from 32.2% in 1993, to 28.9% in 1998, to 26.0% in 2003. When the stricter definition of smoking was introduced in 2003 (at least 6 continuous months of smoking a minimum of 1 cigarette daily), prevalence for that year dropped from 26.0% to 20.6%.

Smoking prevalence has decreased among both men and women in all age groups (Fig. 1). In 1993, 59.6% of men and 5.1% of women were current smokers; by 2003, the figures had fallen to 48.9% of men and 3.2% of women (Table 1). Smoking has declined more sharply among women (37.3%) than among men (18.0%), and smoking in men remains common. Over 60% of men aged 35–54 years reported being current smokers in 2003 (Fig. 1). Smoking was most frequent among men aged 35–64 years (55–61%) and among women 65 years of age or older (nearly 8%).

### Trends in consumption and age at uptake

Between 1998 and 2003, the proportion of heavy smokers ( $\geq 20$  cigarettes daily) among current smokers doubled (rose from 25.6% to 51.3%, Fig. 2), with the rise slightly greater in men than

in women. In 2003, 17.1% of current smokers reported an increase in cigarette consumption, 13% reported a decrease and 70% reported no change.

From 1993 to 1998, the age of smoking uptake among current smokers rose slightly, but it dropped from 1998 to 2003, although it remains higher in China than in developed economies, particularly among women. The age at uptake declined from 32.1 years in 1998 to 27.0 years in 2003 for women and from with 23.9 years to 21.5 for men.

### **Intention to quit**

In 2003, 2.5% of men and 3.2% of women respondents were successful quitters (Table 2). An additional 3.6% of men and 3.9% of women were current quitters. Of current smokers, 15.8% reported having tried to quit during the year before the survey, but the relapse rate was high; in both men and women, the mean duration of quitting was 5 months. Not surprisingly, quitting increased with age (Fig. 1), and there were more quitters in urban than in rural areas, but even in the latter cessation rates remained extremely low. Most worryingly, smoking cessation rates were lower in 2003 than in 1998 (Fig. 1). In 2003, only 7.9% of current smokers reported intending to quit over the next 2 years, and 62.1% of current smokers reported having no intention to quit smoking over this period (Table 3).

Our data suggests that smoking prevalence fell over the period from 1993 to 2003, but that smoking cessation did not increase. Although this seems counter-intuitive, if one compares the prevalence of current smoking (and of having quit within the 5 previous years) in 1998 and 2003 by age and sex, the “missing smokers” appear to be mainly men over 40 years of age (Appendix C, available at: <http://www.ncl.ac.uk/ihs/research/project/1635> ).

### **Reasons for quitting**

Successful quitters gave different reasons for quitting: 40.6%, cited illness; 26.9%, preventing disease; 10.9%, financial reasons; 5.3%, family disapproval, and 4.8%, physician’s advice (Fig. 3). Older people reported poor health as the main reason for quitting, whereas middle-aged people (ages 35–54) stated wanting to prevent disease. More people quit smoking for prevention in urban than in rural areas (28% versus 26%, respectively,  $P = 0.0028$ ), and in rural areas more people quit for financial reasons (8% versus 13%, respectively,  $P = 0.0041$ ). The results were similar for current quitters.

## Reason for relapses

In the 2003 NHSS survey, 53.8% of all quitters who had relapsed reported as the reason that they had been unable to control their smoking, more than likely owing to physiological or psychological addiction. Social interactions and friends were also commonly given as reasons, presumably because smoking is common among their friends. About 6.8% of those who relapsed reported that they needed cigarettes for energy, and about 5% reported that their relapse had resulted from a change in health status, whether an improvement or a decline, after quitting smoking (Fig. 4).

The influence of friends or of the social environment were given as reasons for relapsing by 30% of the men as opposed to 13% of the women who had relapsed. These reasons for relapsing were also given more often by urban dwellers (32% in urban areas versus 27% in rural areas,  $P = 0.0002$ ) and by younger people (42% at age 15–24, falling to 17% among those aged 65 or over;  $\chi^2$  test for trend,  $P < 0.0001$ ).

## Discussion

Using data from a national survey, we analysed trends in smoking and smoking cessation in China over a 10-year time period. Although smoking prevalence declined significantly between 1993 and 2003, smoking remains very common among Chinese men. Smoking prevalence was low in women in 1993 and has fallen more in women than in men probably as a result of a cohort effect, since female smokers were older than males in 1993. Quitting is rare. In 2003, only 6% of individuals who had ever smoked reported having quit, probably because relatively few national tobacco control measures were adopted between the late 1990s and 2003. Few current smokers (7.9%) reported intending to quit sometime in the 2 following years; and 15.8% of those who had previously quit reported having relapsed. The findings of other Chinese surveys are similar. In a study of urban, rural and migrant workers in Zhejiang, 9% of the men had quit for at least 1 month, and the percentage that attempted to quit was comparable with the 15.8% reported in the NHSS.<sup>23</sup> According to the NSPS, in 1996 2% of ever smokers had quit for over 2 years<sup>22</sup>, similar to the estimate derived from the NHSS. The major advantage of the NHSS surveys is their size, probabilistic nature and broad geographical coverage within China. As in many large surveys,<sup>4</sup> smoking status was based on self-report, but this method

appears to be generally accurate compared with the use of biochemical markers.<sup>32</sup> Ideally, future surveys should include biochemical validation for a subsample of respondents.

Our estimates of current smoking and of having smoked at some point are somewhat lower than estimated by the NSPS.<sup>3,4</sup> In the 2002 NSPS, 66% of the men and 3.1% of the women over 15 years of age reported having smoked at some point,<sup>3</sup> compared with 52.1% and 3.5%, respectively, in the 2003 NHSS. However, the two surveys differ in many ways, including in their definition of current smoking, sampling frames, geographic coverage and age groups included. The NSPS was specifically designed to estimate smoking prevalence, but the NHSS surveys are larger and more frequent.

The decline in smoking prevalence suggests that tobacco control efforts and improved education have been beneficial, particularly in urban areas, but certain trends are worrisome. First, the proportion of current heavy smokers doubled between 1998 and 2003; by 2003, over half of current smokers were heavy smokers. Lighter smokers may have found it easier to quit than heavy smokers, who may have been physiologically addicted. Perhaps more important, however, is the ability of current smokers to afford more cigarettes owing to China's economic growth.<sup>33,34</sup>

Second, the self-reported age at which smoking begins has fallen. People who start smoking at a young age are more likely to become addicted and less likely to quit.<sup>35</sup> Community and media interventions and the enforcement of laws against cigarette sales to minors are somewhat successful in preventing uptake.<sup>36-37</sup> Messages highlighting the opportunity costs of smoking may also be effective in preventing uptake among the young,<sup>23</sup> although direct evidence is lacking.

Third, overall smoking cessation fell over the period from 1998 to 2003. Although cigarette prices increased during the 1990s, cigarettes may have become more affordable owing to China's economic growth and increased prosperity.<sup>33,34</sup> Some restrictions on smoking in public places were implemented in 1996–1997,<sup>38</sup> particularly in urban areas, and this may explain why attempts to quit smoking increased around 1998. Between 1998 and 2003, no substantial new tobacco control measures were implemented and some existing projects even contracted. It is also possible that smokers who quit many years before a survey was conducted

self-reported as never smokers; in the 2003 survey, very few former smokers reported having quit more than 5 years before (data not shown). Despite some reduction in smoking, all these findings suggest that smoking-related diseases will continue to impose a major health burden on China for many decades to come.

Finally, although smoking prevalence fell in 1998–2003, smoking cessation did not increase. These “missing smokers” are almost entirely men aged over 40 (Appendix C) and selective mortality in this group is a possible explanation. There may be an increasing tendency for those who quit smoking in the distant past to self-report as never smokers, or for smokers to deny their habit for fear of social disapproval, although this seems unlikely because in China no stigma is attached to smoking among men.

Few report a physician’s advice as the main reason for quitting, which suggests that in China few physicians promote smoking cessation. The smoking rate of among male physicians is above 50%,<sup>2</sup> and doctors may need training on brief interventions to promote cessation.<sup>39</sup>

Around 16% of those who have tried to quit smoking report having relapsed, and most start again because they “can’t control” their behaviour, which suggests they are dependent. Relapses for social reasons are common, perhaps not surprisingly since smoking is highly prevalent and tolerated in many public places in China, particularly among men. Chinese society has traditionally offered cigarettes to household guests as gifts to strengthen personal relationships. Qualitative research has also shown that social situations and peer influences are important in triggering smoking among Chinese men,<sup>24</sup> a situation that highlights the challenges involved in reducing male smoking further. Smoking in women has remained relatively uncommon, and women smokers are somewhat more likely to quit the habit than men, both in this study and in other studies conducted in China.<sup>22,40</sup>

In China, smoking contributes to social inequities, both in terms of health and of financial status. Our previous work has shown that households that consume more tobacco spend less on education and medical care.<sup>41</sup> Medical care costs are very high in households where someone has quit smoking, and the true costs are probably higher since health insurance coverage was very low in rural areas until recently<sup>42</sup> and many poorer smokers may be foregoing health care.<sup>41</sup> Smoking is more common in rural areas and among those who are less

educated, yet many rural areas of China have not been targeted by sustained tobacco control interventions or public education campaigns.<sup>43</sup> Cessation clinics have now been opened in large cities, but support and pharmacotherapy are not generally available in rural China. They should be promoted and provided under the health insurance schemes being rapidly developed in recent years. Other effective measures leading to smoking cessation, such as telephone support lines,<sup>44</sup> are rare. Extending and enforcing smoke-free policies in public places<sup>20</sup> or increasing taxes – a more controversial measure – have been shown to reduce smoking prevalence in similar areas and may bring economic and health benefits to China.<sup>33,34</sup> In May 2009, the Chinese Government announced a new tobacco tax structure intended to increase retail prices by 3.4%.<sup>45</sup> This price increase, which appears to be a response to economic recession primarily, has not yet been passed on to the consumer. Still, it may reduce future consumption.<sup>45</sup> Increased funding for tobacco control is also becoming available in China and other developing countries through partnerships such as the one between Bill Gates and Mayor Bloomberg of New York City.<sup>46</sup>

China's ratification of the WHO Framework Convention on Tobacco Control has almost certainly provided additional leverage. For example, China has recently agreed to larger and more prominent written health warnings (but not pictorial warnings) on cigarette packs. However, policy implementation has been slow, and few developing countries have made progress in implementing all six MPOWER policies to reduce smoking prevalence ((i) monitor tobacco use and prevention policies; (ii) protect people from tobacco smoke; (iii) offer help to quit tobacco use; (iv) warn about the dangers of tobacco; (v) enforce bans on tobacco advertising, promotion and sponsorship, and (vi) raise taxes on tobacco).<sup>47</sup> In general, tobacco use has either increased or remained stable in other low- and middle-income countries over the past decade<sup>48</sup>, and substantial increases in consumption have been seen in some countries, such as Viet Nam and Thailand.<sup>48,49</sup> In developing countries, tobacco control tends to begin with awareness and to progress from there to increased policy enactment, and then to enforcement of many strong anti-tobacco policies with both governmental and activist support.<sup>49</sup> While many developing countries have moved towards increasing tobacco control policies, enforcement is often problematic, particularly in rural areas. Rapid economic growth, as achieved in China over the past three decades, may facilitate tobacco control policy development. Whether the

current global economic recession will impede the progress of tobacco control activities in the developing world or whether it will result in higher cessation rates requires careful monitoring and evaluation.

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### **Competing interests:**

None declared.

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**Table 1. Trend in the prevalence of smoking, currently or ever in the past, by gender and urban or rural location, China, 1993–2003**

Year	<i>n</i>			Current smokers <sup>a</sup>			Ever smokers <sup>b</sup>		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
<b>Urban</b>									
1993	–	–	–	–	–	–	31.1	57.3	6.4
1998	–	–	–	30.3	55.8	5.9	27.2	50.3	5.1
2003	–	–	–	26.1	49.6	4.0	23.9	45.4	3.6
2003	–	–	–	–	–	–	19.0	36.3	2.7
<b>Rural</b>									
1993	–	–	–	–	–	–	32.6	60.4	4.6
1998	–	–	–	31.4	58.0	3.9	29.5	54.5	3.6
2003	–	–	–	28.4	53.0	3.2	26.8	50.2	3.0
2003	–	–	–	–	–	–	21.3	40.0	2.2
<b>All<sup>c</sup></b>									
1993	156 908	77 962	78 946	–	–	–	32.2	59.6	5.1
1998	165 225	83 066	82 159	31.1	57.4	4.5	28.9	53.4	4.0
2003	153 449	76 580	76 869	27.7	52.1	3.5	26.0	48.9	3.2
2003	153 449	76 580	76 869	–	–	–	20.6	39.0	2.3

<sup>a</sup> In 1993, 1998 and 2003, the category “current smokers” included those individuals who reported smoking at the time of the survey and had smoked at least 100 cigarettes in their lifetime. In 2003, the category was more stringently defined as individuals who, in addition to smoking at the time of the survey, had smoked at least one cigarette daily for a continuous period of at least 6 months. This explains the two sets of figures for 2003, the first of which complies with the broader and the second with the narrower definition.

<sup>b</sup> In all survey years, “ever smokers” were defined as those individuals who were either current smokers or who had smoked sometime in the past.

<sup>c</sup> Approximately 30% of the total sample was from urban areas and 70% from rural areas.

Data obtained from China's 1993, 1998 and 2003 National Health Services Surveys.

Table 2. **Past attempts to quit and intention to quit among current smokers, China, 2003**

Area	<i>n</i>	No attempts, no intention <sup>a</sup>	No attempt but intending to quit <sup>b</sup>	Quit but relapsed <sup>c</sup>
Total	39 904	62.1	7.9	15.8
Urban	10 200	65.3	6.9	17.3
Rural	29 704	61.1	8.2	15.3

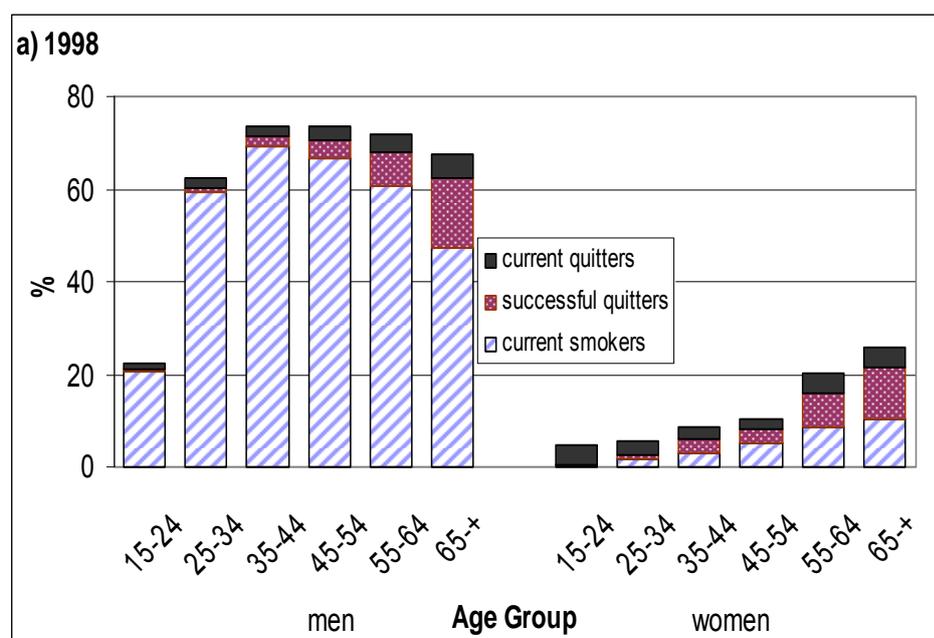
<sup>a</sup> Not quit in last year and no intention to quit in the next 2 years.

<sup>b</sup> Not tried to quit in last year, but intending to in next 2 years.

<sup>c</sup> Relapsed quitters (have tried to quit but relapsed).

Data obtained from China's 2003 National Health Services Survey.

Fig. 1. **Proportion of current smokers,<sup>a</sup> successful quitters<sup>b</sup> and current quitters,<sup>c</sup> by age and sex, China, 1998 and 2003**



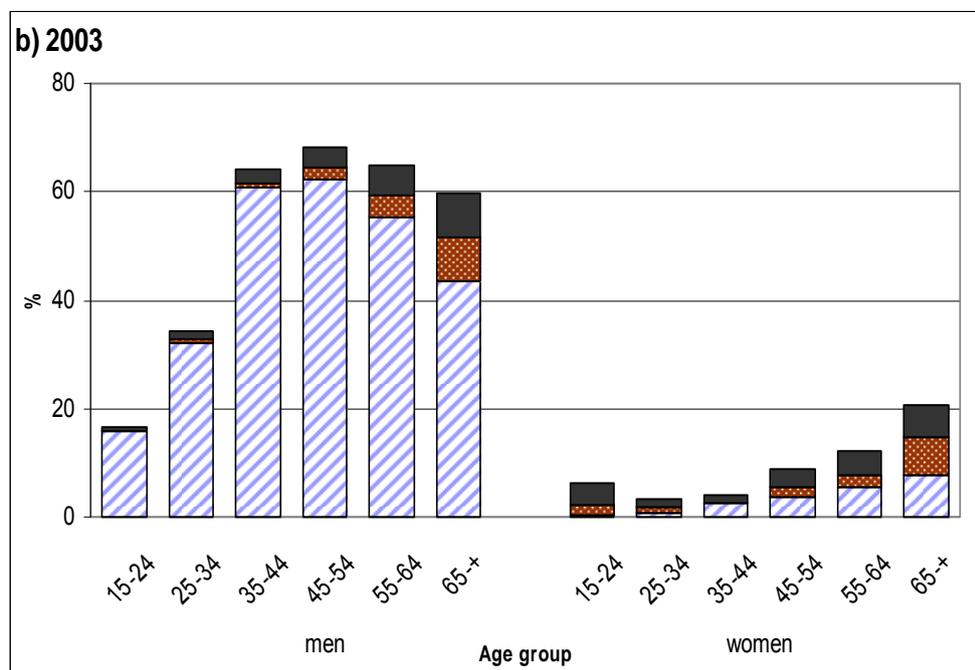
<sup>a</sup> “Current smokers” were defined as those individuals who self-reported smoking at the time of the survey and who had smoked at least 100 cigarettes during their lifetime.

<sup>b</sup> “Successful quitters” were defined as former smokers who reported not having smoked at all over the previous 24 months or more.

<sup>c</sup> “Current quitters” were defined as former smokers who reported having quit smoking within the previous 24 months.

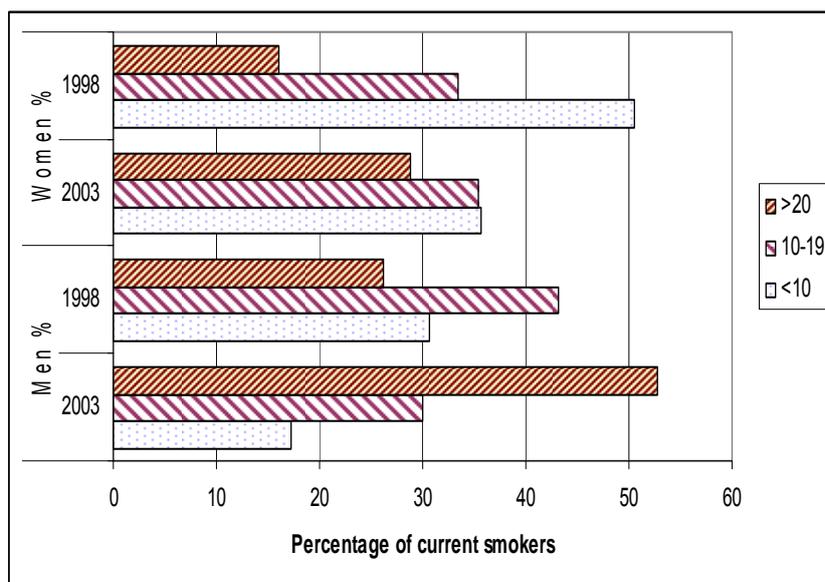
Data obtained from China's 1998 and 2003 National Health Services Surveys.

**Fig. 2. Cigarette consumption among current smokers, by sex, China, 1998 and 2003**



Data obtained from China's 1998 and 2003 National Health Services Surveys.

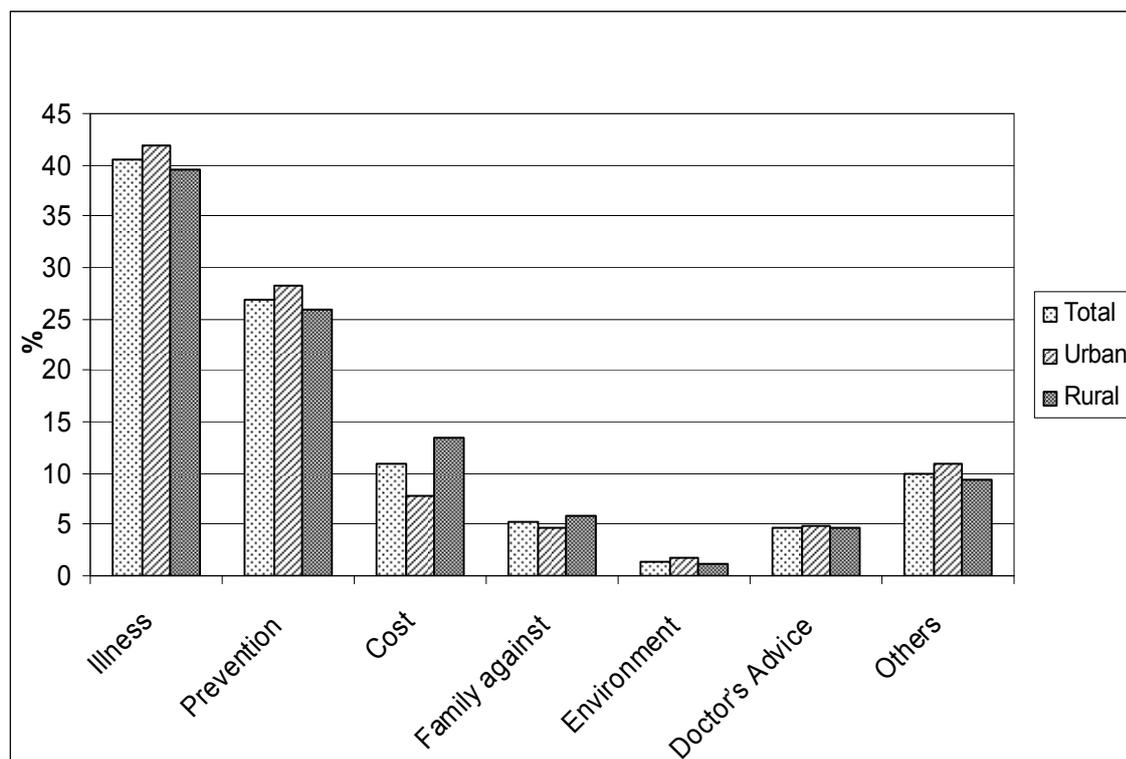
**Fig. 3. Main reasons for having quit smoking reported by successful quitters, <sup>a</sup> China, 2003**



<sup>a</sup> "Successful quitters" were defined as former smokers who reported not having smoked at all over the previous 24 months or more.

Data obtained from China's 2003 National Health Services Survey.

**Fig. 4. Main reason for relapsing reported by men and women who had quit smoking, China, 2003**



Data obtained from China's 2003 National Health Services Survey.