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# Changes in Smokers' Attitudes Toward Intended Cessation Attempts in Japan

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A B S T R A C T

**Background:** Japan has the highest smoking prevalence among the G7 countries, and the Japanese government is expanding tobacco control measures, such as financial support for nicotine replacement therapy and cigarette price increases, to reduce smoking. In 2006, we examined intended quit attempts using hypothetical questions. Since then, a price increase for cigarettes has been proposed and has come closer to being realized. **Objective:** To examine attitude changes in intending to quit attempts according to the reinforcement of tobacco control policies and to clarify the attitudes toward the smoking policies under debate. **Method:** In July 2006, a discrete choice experiment was performed in 616 current smokers. In January 2010, we conducted the same discrete choice experiment in 600 current smokers. In addition, we investigated attitudes toward increased cigarette price and amendments to the laws regulating the tobacco industry. **Results:** In general, between 2006 and 2010, the discrete choice experiment indicated that the smoking continuation rate decreased for highly dependent smokers and increased for low and moderately dependent smokers. Regarding individual measures, increases in tobacco price consistently persuaded smokers of all dependence levels to attempt to quit smoking, whereas factors such as risk information and a smoking ban were effective only for low-dependence smokers. Current smokers show less support for a price increase and legislation of health promotion than nonsmokers. Of current smokers, those with greater nicotine dependence support these policies less. **Conclusions:** The shift of preference for intended attempts to quit is diverse according to nicotine dependence. These differences may be derived from the variations of their time and risk preference and their trust in the tobacco price policies.

*Keywords:* cigarette price increase, discrete choice experiment, mixed logit model, smoking cessation, tobacco control policy.



## Introduction

The Japanese prevalence of smoking among people aged 15 years and older is the highest, at 25.7% of the population, among the G7 countries. This proportion, however, has dropped from 37.4% in 1990 and 32.9% in 2000 [1]. Large cohort studies have provided evidence of the health effects of smoking. It is reported that the life expectancy of male smokers aged 40 years was 3.9 years shorter than that of male never-smokers and 1.6 years shorter than that of ex-smokers; the corresponding differences for women were 3.6 and 3.3 years, respectively [2].

Reduction of the smoking rate has been one of the central issues of public health policy, and various measures have been taken to achieve this reduction in Japan. Among tobacco-control programs, the following six interventions are regarded as being cost-effective: price increase, ban on smoking in public and workplaces, improvement of public knowledge about the effects of smoking, restriction of advertisement, health warnings on tobacco products, and cessation support for smokers [3]. Joossens and Raw [4] indexed the level of development of these six measures as the Tobacco Control Scale (TCS) to compare the tobacco control policies of 30 European countries. The TCS in Japan in 2005 was lower than in all 30 European countries [5]; tobacco control in Japan was slow to take hold.

In July 2006, we examined the effects of possible tobacco control measures on quitting attempts using hypothetical questions. Since then, the environment surrounding Japanese smokers has changed. From June 2006, nicotine replacement therapy is covered by public health insurance and people can access this treatment for a lower out-of-pocket payment. The tobacco price increase was delayed in Japan, but the tax was increased in October 2010. This tax increase resulted in a 33% increase in the retail price of common tobacco products (one pack of 20 cigarettes) from 300 Japanese yen (US$3.30, 1 US$ = 90 JPY) to 400 Japanese yen (US$ 4.40). The mark-up rate of this price increase was the highest in the past 30 years.

The goal of tobacco control is to make current smokers quit smoking. In 2006, we used a discrete choice experiment (DCE) to investigate what information and individual characteristics encouraged smokers to attempt to quit smoking [6]. Was there any change in intended quitting attempts before and after the intervention? The main aim was to examine attitude changes in intended quitting attempts according to the reinforcement of tobacco control policies.

What do the Japanese think about tighter tobacco regulations and sharp price increases? Previous studies consistently found that never-smokers and ex-smokers were more supportive of tobacco regulations than current smokers [7,8]. Among current

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smokers, it was reported that the more nicotine-dependent smokers were more likely to object to antismoking policies [6]. However, research on Japanese attitudes toward the recent tobacco control measures for both smokers and nonsmokers is scarce, and little is known about whether these measures are supported by the public. We also aimed to clarify the attitudes toward smoking policies.

## Methods

### Data

In July 2006 and January 2010, we conducted a questionnaire survey of Japanese adults who were registered with a consumer-monitoring investigative company (the total number of registrants was approximately 220,000). The registrants had a mean age of 37.5 years, 51.5% were female, the proportion of those who received a higher education was 43.7%, and the average household income was 5,650,000 JPY (US$62,800).

The data sampling was performed in the two stages. First, we randomly selected more than 6500 registrants from the monitors and classified smoking status. We stratified the population by age and sex to correlate these demographic characteristics with the national figures. A current smoker is defined as someone who has been smoking for a month or more and has thus far smoked at least 100 cigarettes [9]. The current smokers were grouped into three types based on the Fagerstrom Test for Nicotine Dependence (FTND) [10]. By aggregating the responses to the FTND, we defined respondents scoring a total of 0 to 3 points as having low nicotine dependence, a total of 4 to 6 points as moderate nicotine dependence, and a total of 7 points or more as displaying high nicotine dependence. We followed the same classification as was used in recent addiction literature [11,12]. Next, we surveyed a random sample of approximately 200 respondents from the three categories and invited them to participate in the DCE described here. We performed DCE in both waves and asked about attitudes toward smoking policies only in the 2010 wave.

### Smoking policy attitudes

We also investigated two tobacco policies under debate: a tobacco price increase and an amendment of the Tobacco Industries Act (enacted in August 1984). Each respondent was asked to use a five-point scale to assess attitudes toward two particular policy proposals.

1. There is an argument that tobacco prices (per pack of 20 cigarettes) should be increased to 600 to 700 Japanese yen (US$6.60–7.70), which is similar to the levels in other developed countries. How do you feel about this argument? (1 = totally agree, 5 = totally disagree).
2. The current aim of the Tobacco Industries Act is to realize the sound and consistent development of tobacco industries and to secure stable governmental revenue from tobacco tax. There is an argument that the government should amend the law to realize health promotion in the nation. How do you feel about this argument? (1 = totally agree, 5 = totally disagree).

### DCE on intended quitting attempts

In the DCE, any goods or services are described by bundling their attributes or characteristics. The extent to which an individual values goods or services can be evaluated by the selection of hypothetical choices that mimic the daily decision-making process. This technique has been applied in health-care settings, and the outcomes have revealed that DCE results have internal validity and consistency [13].

It is very important to choose proper attributes that express goods or services. Too many attributes can impose an information-processing burden on respondents, whereas too few can prevent an accurate depiction of their characteristics. We used the same DCE questionnaire that was used in the 2006 wave of surveys. After group discussions with clinicians, and pretests undertaken in smokers whom we asked about factors associated with consideration of smoking cessation, the following five attributes were identified as the most important factors: the price of a pack of cigarettes, fines for smoking in public places, long-term health risks (mortality risk), short-term health risks (risk of upper respiratory infection), and health risks to others.

In Japan, cigarette prices have been increasing slowly. To assess the impact of a substantial increase, we asked respondents the maximum price for one pack of cigarettes they would pay to continue smoking. Price levels were set within the range of the result of this question. This avoided presenting excessively high prices that would lead to individuals refusing to make a considered choice. Smoking bans were introduced in several countries, and these measures have been found to be effective in reducing smoking [14,15]. Several Japanese municipalities have adopted penalties and fines for smoking on busy streets, where a JPY 2000 (US$22.20) fine is the most common. In this research, we set a smoking ban (supported by a fine) in public places—not only on streets but also on public transportation and in government offices—as an attribute. Higher cigarette prices and the existence of fines were expected to reduce smoking continuation and to increase quitting attempts.

We considered three types of health risk. First, it has been found that smoking increases overall mortality [16,17]. This is referred to as the long-term health risk. Second, smoking also causes and worsens common diseases. One example is upper respiratory tract infection [18]. We supposed that smoking compromised the respondents' activities of daily life by making them more susceptible to illness, and this is referred to as the short-term health risk, which was assumed to increase the disadvantage of smoking and was expected to promote cessation attempts. The third type of health risk is the one that is caused by passive smoking. For this type, we considered the risk of lung cancer caused by passive smoking [19].

There are many epidemiological studies concerning the health risks caused by smoking. The magnitude of the health risks depends on demographic characteristics such as sex, race, and age. Furthermore, these health risks can be altered by technological innovation of health care. Accordingly, it is meaningful to determine the responses when people are presented with different types of risks at various levels. Table 1 summarizes the attributes and levels included in the DCE.

The number of possible combinations is $4 \times 2 \times 3 \times 3 \times 2 = 144$. However, the number of scenarios is too high to answer if we consider them all. We used an orthogonal planning method to avoid this problem. Finally, we reduced the number of scenarios to 16 and divided them into 2 categories (8 scenarios each). Respondents were randomly assigned to either of the two categories. If respondents had stable preferences in eight choice questions, the error term could be assumed to be random and internal validity ensured. The evidence from a large proportion of studies indicated that choice experiments generally passed these tests of internal validity [20]. Totally, we gathered 1600 observations for each of the three types of nicotine dependence.

We also included age, sex, and knowledge about smoking, income, and education as independent variables. Previous research showed that quitting smoking is closely associated with knowledge about the harm of smoking [21]. We asked respondents about the prevalence of smoking among Japanese males and females and its association with the following smoking-related diseases: lung cancer, stomach cancer, colon cancer, coronary heart disease, lung cancer caused by passive smoking, and miscarriage caused by passive smoking. Each question contained four choices. Based on the total number of correct answers, we created an index of knowledge about smoking. Income and education are also important factors for smok-