

# BMJ Open Attitudes of Korean smokers towards smoke-free public places: findings from the longitudinal ITC Korea Survey, 2005–2010

Eunja Park,<sup>1</sup> Sung-il Cho,<sup>2</sup> Hong Gwan Seo,<sup>3</sup> Yeol Kim,<sup>3</sup> Hyun-Suk Jung,<sup>4</sup> Pete Driezen,<sup>5</sup> Janine Ouimet,<sup>5</sup> Anne C K Quah,<sup>5</sup> Geoffrey T. Fong<sup>5,6,7</sup>

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For numbered affiliations see end of article.

**Correspondence to**  
Professor Sung-il Cho;  
[persontime@hotmail.com](mailto:persontime@hotmail.com)

## ABSTRACT

**Objective** Prior to December 2012, restaurants in South Korea were required to implement only partial smoking bans. This study documents the changes in Korean smokers' attitudes towards smoking bans between 2005 and 2010 and explores the effects of anti-smoking advertising as a correlate of support for total smoking bans in public places.

**Design** Longitudinal cohort study of Korean adult smokers.

**Setting** The data were derived from three waves (2005, 2008 and 2010) of the International Tobacco Control (ITC) Korea Survey.

**Participants** The ITC Korea Survey respondents were a probability-based, nationally representative sample of Korean smokers aged 19 and older. The current analysis includes 995 smokers who participated in Wave 1 (2005), 1737 smokers who participated in Wave 2 (2008) and 1560 smokers who participated in Wave 3 (2010).

**Primary and secondary outcome measures** Changes in respondents' awareness of secondhand smoke (SHS) harm, attitudes towards smoking bans and personal rules for smoking in private homes and/or vehicles were analysed. Correlates of support for smoking bans in public places were examined using generalised estimating equation regression models.

**Results** More than 80% of Korean smokers are aware of the harms of SHS. The proportion of smokers who support smoke-free restaurants or smoke-free bars increased twofold between 2005 and 2010. Smokers who were aware of the dangers of SHS were more likely to support a total smoking ban in workplaces. Noticing anti-smoking advertising or information was not significantly associated with support for a total smoking ban in public places.

**Conclusions** Korean smokers became more supportive of smoking bans in public places between 2005 and 2008. These results show that smokers' attitudes towards smoking bans can change with the implementation of smoke-free policies, even in a country that has a high prevalence of smokers.

## INTRODUCTION

The detrimental health effects of secondhand smoke (SHS) on non-smokers are well established.<sup>1 2</sup> The WHO Framework Convention

## Strengths and limitations of this study

- A key strength of this study is its longitudinal study design analysis of smokers' attitudes towards smoking bans in public places during the period of the introduction of smoke-free policies (2005–2010).
- The influence of various policy-relevant variables and mediators on smokers' attitudes towards smoking ban was analysed using nationally representative International Tobacco Control Korea survey data.
- As the study population consisted entirely of smokers, the results may not be generalisable to non-smokers or to the general population.

on Tobacco Control (FCTC) includes a provision for protection from exposure to tobacco smoke (Article 8), and smokers and non-smokers alike are increasingly aware of the need for such protection. Recent studies have shown that comprehensive smoke-free policies in public places have positive effects on smokers' health by encouraging smoking cessation.<sup>3 4</sup>

Although smoking in workplaces and public places is prohibited by law in many countries,<sup>5</sup> Asian countries, such as the Republic of Korea and China, have been slower to introduce smoke-free policies, compared with Western countries, including Ireland, Australia, Scotland and France.<sup>6–10</sup> Countries with stronger smoke-free policies increasingly implement new smoke-free laws, not only for indoor areas but also for outdoor areas and recreational venues.<sup>6–9 11</sup> The different social environment in Asian countries in comparison to Western countries, as well as the Asian countries' positioning at an earlier stage along the tobacco epidemic trajectory, may influence the attitudes and behaviours of Asian smokers towards smoke-free policies. To date, Asian smokers' knowledge, attitudes

and behaviours towards complete smoking bans have not been fully examined.<sup>11</sup>

### Smoke-free policies in South Korea

Since 1995, the Republic of Korea National Health Promotion Act (NHPA) has stipulated partial smoking bans that allow designated smoking areas (DSAs) in large buildings, stores, theatres, hospitals and public transport facilities, among others. Additional policies have since mandated partial smoking bans in places such as schools and public baths (1999); large restaurants, game rooms and government buildings (2003); and factories and local government buildings (2006). Comprehensive smoke-free regulation has been implemented in schools, hospitals and childcare facilities since 2003.

In 2010, local governments were given the authority to designate outdoor smoke-free areas and to impose fines for violations. As a result, the local government of Seoul, South Korea's capital city, implemented smoke-free regulations in several outdoor areas, including plazas, bus stops and parks.<sup>12 13</sup> Other city or provincial governments have also implemented smoke-free laws,<sup>14</sup> and the NHPA 2012 Amendment banned smoking at expressway service stations and designated cultural heritage areas. In December 2012, Korea introduced a complete smoking ban in the indoor areas of restaurants. The law was initially phased in for large restaurants (>150 m<sup>2</sup> area) in December 2012, then for middle-sized restaurants (>100 m<sup>2</sup> area) in January 2014 and finally for all restaurants by January 2015.<sup>12</sup>

Factors that have contributed to the delay in introducing smoke-free laws in Korea compared with other high-income countries include the high smoking prevalence among male adults (40.7% in 2016)<sup>15</sup> and the pro-smoking social culture.<sup>16</sup>

Smoking bans contribute to a gradual process of 'denormalisation' of smoking over time, in which attitudes of smokers and non-smokers shift from acceptance to regarding smoking as an atypical behaviour. During this shift of cultural norms, smoking becomes increasingly stigmatised.<sup>17 18</sup> As a result of such a cultural environment, smokers may increasingly recognise non-smokers' desires for smoke-free environments and choose to modify their own smoking behaviours.<sup>19</sup>

The current study adds to the literature by examining changes in smokers' attitudes to smoking bans in South Korea, a country with high smoking prevalence compared with other industrialised nations. Because the Korean government ran mass media campaigns advertising the restriction of smoking in public places since 2005, this study specifically examined the effects of anti-smoking advertising on smokers' support for total smoking bans in public places during the study period.

The International Tobacco Control Policy Evaluation (ITC) Project is a series of longitudinal cohort surveys aimed at evaluating the tobacco control policies of the WHO FCTC, which has been conducted across 29 countries.<sup>20 21</sup> The ITC Korea Survey was initiated in 2005 to

examine patterns of smoking behaviours and the impact of tobacco control policies in South Korea.<sup>22</sup>

The objectives of this paper were (1) to describe changes in Korean smokers' self-reported awareness of the harms of SHS exposure, attitudes towards total smoking bans and personal rules regarding banning or allowing smoking in private homes or vehicles and (2) to explore the effects of anti-smoking advertising on self-reported support for total smoking bans in public places given that partial, rather than complete, smoking bans were in force between 2005 and 2010.

## METHODS

### Study design and procedures

Longitudinal data from three waves of the ITC Korea Survey were used to estimate changes in self-reported awareness, attitudes and personal rules from 2005 (Wave 1) to 2010 (Wave 3). The ITC Korea Survey is a nationally representative cohort survey of Korean adult smokers aged ≥19 years. Data were collected using a computer-assisted telephone interviewing method. In short, the ITC Korea Survey assessed smokers' knowledge, attitudes, beliefs, perceptions and behaviours regarding tobacco use and tobacco control policies.<sup>20</sup>

The survey questions were selected from a database of ITC Project questions that had initially been developed through systematic and iterative expert review and revision, and in many cases, tested in different populations. The selected questions were then adapted to the Korean context. The adapted ITC Korea Survey questions and any uniquely new questions were refined via the standard ITC systematic process by the Korea Team and ITC International Team. The survey items were pilot tested in a sample of smokers prior to full implementation.<sup>21 22</sup>

A nationally representative sample of 1002 Korean adults who had smoked cigarettes in the last month and had smoked at least 100 cigarettes in their lifetimes was sampled in Wave 1 (2005) using a probability-based stratified random sampling design. For Waves 2 (2008) and 3 (2010), respondents who had completed the survey in Wave 1 were re-contacted. A replenishment sample of new respondents replaced smokers lost to attrition. The retention rate was 44.01% in Wave 2 and 56.60% in Wave 3.<sup>23 24</sup> Details of the survey data collection methodology have been reported elsewhere.<sup>4 23–26</sup>

In this study, respondents who had ceased smoking at the time of the survey were excluded from the analyses (n=7 at Wave 1, n=81 at Wave 2 and n=193 at Wave 3). Therefore, the results are based on 995 smokers who participated in Wave 1, 1737 smokers who participated in Wave 2 and 1560 smokers who participated in Wave 3.

### Patient and public involvement

Data obtained from smokers who participated in ITC Korea Survey pilot study informed the relevance of questions. A summary of the data analyses are presented online.<sup>22</sup>

## Measures

The following questions related to participants' awareness of anti-smoking advertising and the harm of SHS as well as their attitudes towards smoking bans in public places and personal rules for smoking in private homes and vehicles were asked.

### Awareness of anti-smoking advertising or information

1. 'Now I would like you to think about advertising or information that addresses the dangers of smoking or encourages quitting. In the last 6 months how often, if at all, have you noticed such advertising or information?' (1=never, 2=rarely, 3=sometimes, 4=often, 5=very often). Smokers who selected sometimes, often or very often were classified as having noticed anti-smoking advertising or information.

### Awareness of harms of secondhand smoke exposure

2. 'Does smoking cause lung cancer in non-smokers from secondhand smoke?' (1=yes, 2=no, 9=do not know). This question was asked in Waves 1 and 2 only.
3. 'Do you agree/disagree with the following statement: cigarette smoke is dangerous to non-smokers' (1=strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree and 5=strongly disagree). This variable was classified as a dichotomous variable (strongly disagree, disagree or neither agree nor disagree vs strongly agree or agree) in regression models.

### Support for smoking bans in public places

4. 'For each of the following public places, please tell me if you think smoking should be allowed in all areas, in some areas or not allowed at all.'
  - a. Workplace: (1=all indoor areas, 2=some indoor areas, 3=not at all).
  - b. Indoor areas, 'indoor areas of restaurants/cafes' and 'indoor areas of drinking establishments': (1=all indoor areas, 2=some indoor areas, 3=not at all).
  - c. Outdoor areas, 'outdoor areas of restaurants/cafes', 'outdoor areas of drinking establishments', 'bus stops', 'crowded streets' and 'parks': (1=all outdoor areas, 2=some outdoor areas, 3=no outdoor areas at all). These questions were asked in Waves 2 and 3 only.

Three categories of attitudes towards workplace smoking bans were created: (1) total smoking ban (ie., smoking should not be allowed at all); (2) partial smoking ban (ie., smoking should be allowed in some indoor areas) (3) and no ban (ie., smoking should be allowed in all indoor areas). The same categories were used to classify the attitudes for smoking bans in indoor areas of restaurants/cafes or drinking establishments. Attitudes for outdoor smoking bans were also defined using these categories: (1) total smoking ban (ie., smoking should not be allowed at all); (2) partial smoking ban (ie., smoking should be allowed in some outdoor areas) (3) and no ban (ie., smoking should be allowed in all outdoor areas).

### Personal rules banning smoking in private homes and vehicles

5. 'Which of the following best describes smoking inside your home?' (1=smoking is allowed anywhere in my home, 2=smoking is never allowed anywhere in my home, 3=something in between). 'Smoking is never allowed anywhere in my home' was coded as a total home smoking ban.
6. 'When you are in a car or other private vehicle with non-smokers do you...?' (1=smoke as you normally smoke, 2=never smoke, 3=something in between). 'Never smoke' was coded as having a smoking restriction in vehicles.

### Sociodemographics and smoking-related characteristics

Sociodemographic variables included age (18–24 years, 25–39, 40–54, 55+), gender (male, female), marital status (married, never married, others (separated, widowed and divorced)), highest level of educational attainment (middle school or lower, high school, college or higher) and household income (low <30 000 000 KRW, middle=30 000 000–44 999 000 KRW, high ≥45 000 000 KRW). Cigarette consumption was measured in terms of cigarettes per day (1–10, 11–20, 21+) by asking the respondents how many cigarettes they smoked daily.

### Time-in-sample and survey year

Since 45% of respondents recruited in Wave 1 were followed up in subsequent waves, samples from Waves 2 and 3 were composed of respondents who were re-contacted from previous waves as well as newly recruited respondents. To adjust for differences between the newly recruited respondents and cohort respondents who had participated in previous waves, a time-in-sample variable (the number of ITC Korea Survey waves completed by each respondent) was used as a covariate in the regression models. The survey year was also added to the regression models to examine the period effect.

### Statistical analysis

Descriptive statistics were presented for the characteristics of the study population, SHS-related harm awareness, attitudes towards smoking bans and personal rules for smoking in private homes and/or vehicles. Multinomial logistic regression was used to test for changes in awareness of the harm associated with SHS and attitudes towards smoking bans and restrictions between 2005 and 2008 and between 2008 and 2010. Standard errors were adjusted for clustering among individual participants.

We used generalised estimating equation (GEE) regression models with an exchangeable correlation matrix to examine the association between awareness of anti-smoking advertising and attitudes towards total smoking bans in public places across the three waves. GEE models not only provide population-averaged estimates for repeated measures data, but can also be used to test the temporal trend across survey waves. To examine the robustness of the GEE regression model assumptions, we repeated the analysis using an unstructured working



**Table 1** Characteristics of the study population, ITC Korea Survey

	2005 (W1) (n=995)	2008 (W2) (n=1737)	2010 (W3) (n=1560)
<b>Age (years), n (%)</b>			
18–24	74 (7.4)	129 (7.4)	81 (5.2)
25–39	313 (31.5)	485 (27.9)	353 (22.6)
40–54	347 (34.9)	596 (34.3)	503 (32.2)
55+	261 (26.2)	527 (30.4)	623 (40.0)
<b>Gender, n (%)</b>			
Male	954 (95.9)	1668 (96.0)	1484 (95.1)
Female	41 (4.1)	69 (4.0)	76 (4.9)
<b>Marital status, n (%)</b>			
Married	722 (72.8)	1234 (71.3)	1121 (71.9)
Never married	200 (20.2)	394 (22.8)	316 (20.3)
Others	70 (7.0)	102 (5.9)	122 (7.8)
<b>Educational attainment, n (%)</b>			
Middle school or less	209 (21.2)	319 (18.9)	324 (21.3)
High school	420 (42.7)	773 (45.8)	679 (44.5)
College or more	356 (36.1)	595 (35.3)	522 (34.2)
<b>Household equivalent income,* n (%)</b>			
Low	431 (47.3)	696 (46.0)	682 (51.0)
Middle	239 (26.2)	362 (23.9)	287 (21.4)
High	242 (26.5)	456 (30.1)	370 (27.6)
<b>Cigarettes per day, n (%)</b>			
1–10	284 (28.5)	550 (31.7)	535 (34.4)
11–20	547 (55.0)	924 (53.2)	792 (51.0)
21+	164 (16.5)	263 (15.1)	227 (14.6)
<b>Notice anti-smoking advertising or information, n (%)</b>			
No	525 (52.8)	552 (32.0)	613 (39.8)
Yes	470 (47.2)	1173 (68.0)	929 (60.2)
<b>Wave of recruitment, n (%)</b>			
Wave 1	995 (100.0)	360 (20.7)	215 (13.8)
Wave 2		1377 (79.3)	621 (39.8)
Wave 3			724 (46.4)

\*Low: <30 000 000 won; middle: 30 000 000–44 999 000 won; high: ≥45 000 000 won.

correlation. The results of both analyses were similar; therefore, we presented only the results of the models that were estimated using an exchangeable correlation matrix. ‘Do not know’, ‘Refused’ and ‘Not Applicable’ responses were treated as missing, and respondents with missing data on the explanatory or outcome variables were excluded from the GEE regression analysis. Data were weighted so that results represent the population

of adult smokers in Korea (except in [table 1](#)). Data were analysed using STATA (V.11.0; Stata Corp, College Station, Texas, USA) for Windows. A p-value<0.05 was considered statistically significant.

## RESULTS

### Sociodemographic and smoking profile

Respondents aged 25–54 accounted for 66.4% of the study population in 2005, 62.2% in 2008 and 54.8% in 2010. The proportion of respondents who were aged ≥55 increased from 26.2% in 2005 (Wave 1) to 40% in 2010 (Wave 3) ([table 1](#)). Approximately, one-third of respondents were college graduates, and around half smoked 11–20 cigarettes per day. By 2010 (Wave 3), 60% of smokers reported having noticed anti-smoking advertising or information, compared with 47% in 2005 (Wave 1).

### Awareness of harms of SHS exposure

[Table 2](#) presents the changes over time in awareness of SHS-related harm, support for smoking bans in public places and personal rules for banning/allowing smoking in private places between 2005, 2008 and 2010. In 2005 and 2008, 79% and 85% of smokers, respectively, knew that passive smoking caused lung cancer in non-smokers. Across all three waves, >80% of smokers agreed that SHS was dangerous to non-smokers.

### Support for total smoking bans

Support for total smoking bans in both indoor and outdoor public places increased between 2005 and 2010 ([table 2](#)). Support for total smoking bans in the indoor areas of workplaces increased from 17.7% in 2005 to 34.4% in 2010 (p<0.001 from 2005 to 2008, p=0.315 from 2008 to 2010). The proportion of smokers who supported 100% smoke-free restaurants or smoke-free bars approximately doubled between 2005 and 2008 (restaurant and cafe indoor areas: 15.6% vs 29.7%, drinking establishment indoor areas: 5.8% vs 12.0%), but the majority of smokers expressed support for partial smoking bans compared with total smoking bans, particularly for drinking establishments. Around 54.6% supported partial bans compared with 14% who supported complete bans in the indoor areas of drinking establishments in 2010. Although the proportion of smokers who supported total smoking bans in the outdoor areas of restaurants or drinking establishments increased over time (p<0.001), <10% of smokers in any wave supported a total smoking ban. However, the proportions of smokers who supported a total smoking ban at bus stops, on crowded streets or in parks significantly increased from 29.9%, 28.0% and 18.4%, respectively, in 2008 to 44.2%, 36.6% and 29.8% in 2010 (p<0.001).

There was a significant increase in the percentage of smokers who implemented personal smoking bans in private homes (p<0.001) or vehicles (p<0.001) between 2005 and 2010. More than half of the smokers reported

**Table 2** Changes in harm awareness regarding SHS and attitudes towards smoking bans and smoking restrictions among smokers between 2005 and 2010

	%			beta (95% CI)		
	2005 (W1)	2008 (W2)	2010 (W3)	2008 versus 2005 (reference)	2010 versus 2005 (reference)	2010 versus 2008 (reference)
Harm awareness of secondhand smoke exposure						
Smoking causes lung cancer in non-smokers						
Yes	79.2	85.0		-0.37 (-0.62 to 0.11)*		
No	20.8	15.0		Ref		
Smoke is dangerous to non-smokers						
Strongly agree or agree	87.6	86.8	83.8	0.07 (-0.32 to 0.46)	-0.04 (-0.54 to 0.47)	-0.10 (-0.50 to 0.29)
Neither agree nor disagree	5.5	6.9	9.5	0.40 (-0.16 to 0.97)	0.48 (-0.18 to 1.14)	0.08 (-0.43 to 0.58)
Strongly disagree or disagree	6.9	6.3	6.7	Ref	Ref	Ref
Attitudes to smoking bans in public places						
Smoking ban in workplace indoor areas						
Total ban	17.7	30.8	34.4	0.56 (0.03 to 1.08)*	0.33 (-0.32 to 0.98)	-0.23 (-0.78 to 0.33)
Partial ban	78.1	65.7	61.7	-0.10 (-0.60 to 0.41)	-0.39 (-1.01 to 0.23)	-0.30 (-0.84 to 0.25)
No ban	4.2	3.5	3.9	Ref	Ref	Ref
Smoking ban in restaurants and cafes indoor areas						
Total ban	15.6	29.7	31.0	1.09 (0.71 to 1.47)*	1.32 (0.82 to 1.82)*	0.23 (-0.17 to 0.63)
Partial ban	71.3	61.7	62.1	0.38 (0.63 to 0.70)*	0.67 (0.22 to 1.13)*	0.29 (-0.10 to 0.68)
No ban	13.1	8.6	6.9	Ref	Ref	Ref
Smoking ban in drinking establishments indoor areas						
Total ban	5.8	12.0	13.9	0.90 (0.52 to 1.28)*	0.91 (0.47 to 1.34)*	0.01 (-0.27 to 0.30)
Partial ban	50.3	49.8	54.6	0.17 (-0.03 to 0.38)	0.33 (0.07 to 0.60)*	0.16 (-0.06 to 0.37)
No ban	43.9	38.2	31.5	Ref	Ref	Ref
Smoking ban in restaurants and cafes outdoor areas						
Total ban		4.1	9.7			1.99 (1.59 to 2.40)*
Partial ban		41.3	60.1			1.14 (0.92 to 1.35)*
No ban		54.6	30.2			Ref
Smoking ban in drinking establishments outdoor areas						
Total ban		3.4	4.6			0.55 (0.14 to 0.97)*
Partial ban		37.5	46.9			0.48 (0.29 to 0.68)*
No ban		59.1	48.5			Ref
Smoking ban in bus stops						
Total ban		29.9	44.2			1.05 (0.76 to 1.35)*
Partial ban		47.3	45.4			0.70 (0.41 to 0.99)*
No ban		22.8	10.4			Ref
Smoking ban in crowded streets						
Total ban		28.0	36.6			0.70 (0.44 to 0.96)*
Partial ban		43.8	46.1			0.62 (0.37 to 0.87)*
No ban		28.2	17.3			Ref
Smoking ban in parks						
Total ban		18.4	29.8			1.27 (0.98 to 1.57)*
Partial ban		56.4	57.6			0.80 (0.54 to 1.06)*
No ban		25.2	12.6			Ref

Continued

Table 2 Continued

	%			beta (95% CI)		
	2005 (W1)	2008 (W2)	2010 (W3)	2008 versus 2005 (reference)	2010 versus 2005 (reference)	2010 versus 2008 (reference)
Rules for smoking in private places						
Home smoking ban						
Total ban	29.2	43.3	52.2	0.66 (0.39 to 0.93)*	0.74 (0.40 to 1.08)*	0.08 (−0.17 to 0.33)
Partial ban	47.5	36.8	25.7	0.24 (−0.24 to 0.28)	−0.54 (−0.88 to −0.20)*	−0.57 (−0.85 to −0.29)*
No ban	23.3	19.9	22.1	Ref	Ref	Ref
Smoking restriction in automobile						
Never smoke	49.4	64.0	69.9	1.32 (0.95 to 1.70)*	1.62 (1.07 to 2.16)*	0.29 (−0.20 to 0.79)
Something in between	36.6	29.9	25.7	0.81 (0.42 to 1.19)*	0.94 (0.38 to 1.50)*	0.13 (−0.38 to 0.64)
Smoke	14.0	6.1	4.4	Ref	Ref	Ref

\*P value <0.05 from multinomial regression adjusted for age, gender, marital status, educational attainment, household equivalent income, cigarette consumption and time-in-sample.

SHS, secondhand smoking.

that smoking was never allowed anywhere in their homes or vehicles in 2010 (home: 52.2%, vehicle: 69.9%) compared with 2005 (home: 29.2%, vehicle: 49.4%).

#### Factors associated with support for total smoking bans

Tables 3 and 4 show the results of the GEE regression models with regard to awareness of anti-smoking advertising (explanatory variable #1); awareness of SHS-related harm (explanatory variable #2); support for total smoking bans in indoor areas (outcome variables) and support for total smoking bans in the outdoor areas of public places (outcome variables) controlling for covariates (ie., socio-demographic characteristics, smoking intensity, personal rules for smoking in homes and/or vehicles, time-in-sample and survey year).

Smokers who agreed that smoke is 'dangerous to non-smokers' had a 1.55 times greater likelihood of supporting a total smoking ban in workplaces than smokers who did not agree (95% CI: 1.17 to 2.04,  $p < 0.001$ , table 3). Having personal rules against smoking at home and/or in private vehicles was positively associated with support for total smoking bans in public places. However, awareness of anti-smoking advertising/information was not associated with support for total smoking bans in indoor areas of public places. Older age, male gender, lower educational attainment and lower cigarette consumption were positively related to support for total smoking bans in the indoor areas of public places but not to all of the outcome variables. The likelihood of the respondents supporting total smoking bans in the indoor areas of workplaces, restaurants/cafes and drinking establishments increased significantly between 2005 and 2008, whereas the differences between 2008 and 2010 were not significant (table 3). Support for total smoking bans in the outdoor areas of restaurants/cafes increased significantly between 2008 and 2010 (table 4). There was no significant association between respondents' having noticed anti-smoking advertising/information and their

support for total smoking bans in the outdoor areas of public places.

#### DISCUSSION

This paper documents the changes in Korean smokers' awareness of the harms associated with SHS exposure, the attitudes towards total smoking bans and personal rules regarding banning or allowing smoking in private homes and vehicles between 2005 and 2010. The majority of Korean smokers were well aware that SHS is dangerous to non-smokers (84% in 2010), and there were notable increases in the proportion of smokers who supported total smoking bans in public places, and who adhered to personal rules against smoking in private homes and/or in private vehicles with non-smoking passengers between 2005 and 2008. This result is noteworthy in that men still show a high rate of smoking prevalence in South Korea. The smoking prevalence of men was not much changed during the study period from 51.6% in 2005 to 48.3% in 2010.<sup>15</sup> Despite the high smoking rate and pro-smoking culture, the proportion of smokers who supported 100% smoke-free restaurants or smoke-free bars increased greatly between 2005 and 2008.

Smoking was a socially acceptable behaviour for Korean men in the past,<sup>16</sup> but the prevalence of smoking among men decreased substantially between 1989 and 2003.<sup>27</sup> Regulations on smoking in public places have become stronger, and anti-smoking campaigns have become more focused on SHS. For example, the theme of an anti-smoking campaign in 2007–2008—'say no to SHS'—suggested that non-smokers should tell smokers not to smoke in their presence.

Our study results did not indicate a significant positive association between noticing anti-smoking advertising/information and support for a total smoking ban in public places (ie., indoor areas of workplaces, and

**Table 3** Odds ratio (95% CI) of support for total smoking ban in indoor areas of public places over three waves (in 2005, 2008 and 2010) of the ITC Korea Survey

	Workplace (n=3475)	Restaurants or cafes (n=3530)	Drinking establishments (n=3494)
Notice anti-smoking advertising or information			
No	1.00	1.00	1.00
Yes	0.91 (0.76 to 1.09)	0.94 (0.79 to 1.13)	1.08 (0.85 to 1.38)
Smoke is dangerous to non-smokers			
Do not agree/neither agree nor disagree	1.00	1.00	1.00
Strongly agree or agree	1.55 (1.17 to 2.04)*	1.25 (0.95 to 1.66)	1.44 (0.96 to 2.14)
Age (years)			
18–24	1.00	1.00	1.00
25–39	2.08 (1.25 to 3.48)*	0.97 (0.61 to 1.53)	1.40 (0.61 to 3.24)
40–54	2.50 (1.44 to 4.32)*	0.93 (0.56 to 1.54)	2.36 (0.96 to 5.80)
55+	2.32 (1.31 to 4.11)*	1.10 (0.65 to 1.87)	3.64 (1.48 to 8.96)*
Gender			
Male	1.00	1.00	1.00
Female	0.65 (0.41 to 1.03)	0.61 (0.38 to 0.98)*	0.49 (0.26 to 0.90)*
Marital status			
Married	1.00	1.00	1.00
Never married	0.90 (0.67 to 1.21)	0.87 (0.65 to 1.17)	0.82 (0.51 to 1.32)
Others	1.07 (0.72 to 1.58)	1.19 (0.81 to 1.75)	1.27 (0.82 to 1.97)
Educational attainment			
Middle school or less	1.00	1.00	1.00
High school	0.72 (0.56 to 0.94)*	0.88 (0.67 to 1.15)	0.62 (0.45 to 0.85)*
College or more	0.83 (0.62 to 1.10)	0.84 (0.62 to 1.13)	0.53 (0.37 to 0.76)*
Household equivalent income†			
Low	1.00	1.00	1.00
Middle	1.09 (0.86 to 1.38)	0.92 (0.73 to 1.17)	1.22 (0.90 to 1.65)
High	1.11 (0.88 to 1.39)	0.93 (0.74 to 1.18)	0.89 (0.65 to 1.23)
Cigarettes per day			
1–10	1.00	1.00	1.00
11–20	0.76 (0.63 to 0.92)*	0.77 (0.63 to 0.95)*	0.92 (0.70 to 1.20)
21+	0.64 (0.48 to 0.85)*	0.82 (0.60 to 1.11)	1.11 (0.74 to 1.66)
Total home smoking ban			
No	1.00	1.00	1.00
Yes	1.15 (0.96 to 1.37)	1.39 (1.16 to 1.67)*	1.63 (1.28 to 2.09)*
Smoking restriction in automobile			
No	1.00	1.00	1.00
Yes	1.66 (1.36 to 2.03)*	1.66 (1.35 to 2.04)*	2.10 (1.57 to 2.81)*
Time-in-sample			
Once	1.00	1.00	1.00
Twice	1.42 (1.15 to 1.75)*	1.44 (1.17 to 1.77)*	1.38 (1.05 to 1.82)*
Thrice	0.92 (0.63 to 1.36)	1.35 (0.92 to 1.98)	1.76 (1.10 to 2.80)*
Survey year			
2008	1.00	1.00	1.00

Continued

Table 3 Continued

	Workplace (n=3475)	Restaurants or cafes (n=3530)	Drinking establishments (n=3494)
2005	0.57 (0.45 to 0.72)*	0.54 (0.42 to 0.70)*	0.54 (0.38 to 0.78)*
2010	1.04 (0.84 to 1.28)	0.92 (0.75 to 1.13)	0.93 (0.71 to 1.21)

\*P value<0.05 from GEE regression.

†Low: <30 000 000 won; middle: 30 000 000–44 999 000 won; high: ≥45 000 000 won.

GEE, generalised estimating equation.

indoor and outdoor areas of restaurants/cafes/drinking establishments). This result was contrary to that of a US study.<sup>28</sup> The anti-smoking campaigns may not have had a positive effect on smokers' support for total smoking bans, because total smoking bans in restaurants or cafes were not introduced until 2012. Korean smokers were allowed to smoke in DSAs in public places during the study period. So, smokers may think that a total smoking ban is too strict, although they know the adverse health effect of SHS through anti-smoking advertising.<sup>12 29</sup>

In addition, in the ITC Korea survey, respondents were asked if they had noticed anti-smoking advertising or information about the dangers of smoking or that encouraged quitting. It is possible that advertising concerning smoking cessation may have less influence on smokers' attitudes towards smoking bans in public places, compared with advertisements about harms of SHS. More research is required regarding the effects of anti-smoking campaigns on Korean smokers' support for total smoking bans.

Previous studies show that implementing smoke-free policies results in changed attitudes towards smoking bans in public places.<sup>30–32</sup> Kelly et al. found that the implementation of a smoke-free law reinforced the denormalisation of smoking.<sup>18</sup> Korean smokers' preference for partial smoking bans (ie., DSAs allowed) may, in part, be attributable to the fact that Korean law permitted DSAs until 2012. Similarly, low support for total smoking bans in restaurants/bars was reported in China, where there was no national smoking restrictions in these venues.<sup>33</sup> We also found that support for total smoking bans in drinking establishments, where smoking was not regulated, was lower than those in the indoor areas of restaurants/cafes or outdoor public places, such as bus stops.

A commonly cited concern is that a total ban on smoking in public places will lead to an increase in smoking in private places such as homes or vehicles. In fact, previous studies have shown that 100% smoke-free bans are associated with stronger personal bans in private homes.<sup>32 34–37</sup> We found that the proportion of smokers who reported rules against smoking in their homes or vehicles increased between 2005 and 2010; however, despite this relative increase, in 2010, around half of Korean smokers reported smoking in their homes.

Many Koreans, including children, are exposed to SHS; specifically, 17.8% of Korean men and women are exposed

to SHS in the indoor areas of workplaces, and 21.1% are exposed in public indoor areas.<sup>15</sup> Total smoking bans are more effective than partial bans (which allow DSAs) in reducing SHS exposure.<sup>1 8 11 38–40</sup> In fact, Fernández et al. found that partial bans in hospitality venues were ineffective in reducing SHS exposure.<sup>38</sup>

Support for bans in public places increased in Korea between 2005 and 2008, although overall support for total smoking bans in Korea was lower than in ITC countries such as Australia and Thailand.<sup>10 31</sup> Studies in other countries have shown that support for smoking bans increased after the implementation of smoke-free laws.<sup>6 39 41</sup> More smoke-free regulations have been implemented since 2005, and smokers may come to accept that smoking in public places is undesirable or socially unacceptable. Smokers' attitudes towards smoking bans should be carefully monitored with the expansion of smoke-free policies. As Korea's national smoke-free restaurants policy was introduced in December 2012, additional studies are required to examine the impact of this law on smokers' attitudes and compliance.

Using longitudinal study design analysis, this study showed that Korean smokers' support towards smoking bans in public places increased during the period of the introduction of smoke-free policies (2005–2010). The findings of this study should be considered in light of its limitations. First, the ITC Korea Survey relies on self-reported measures; thus, recall bias and social desirability may have influenced respondents' answers. Second, although we analysed the data using weights and adjusted for time-in-sample, the high attrition rate between waves was another limitation of our study. Third, the study population consisted of smokers only, so the results may not be generalisable to non-smokers or to the general population, particularly since non-smokers may be more likely to support total smoking bans.<sup>42 43</sup> Finally, the majority of respondents were men, since smoking prevalence among Korean women was low. Therefore, further research incorporating more female smokers is needed to assess their knowledge, attitudes and behaviours in more detail.

## CONCLUSION

Although the proportion of smokers who support total smoking bans is lower in Korea than it is in Western countries, such as Australia, France and Ireland, this paper



**Table 4** Odds ratio (95% CI) of support for a total smoking ban in outdoor areas of public places, ITC Korea Survey Wave 2 (2008) and Wave 3 (2010)

	Restaurants or cafes (n=2628)	Drinking establishments (n=2615)
Notice anti-smoking advertising or information		
No	1.00	1.00
Yes	0.82 (0.56 to 1.19)	0.90 (0.57 to 1.42)
Smoke is dangerous to non-smokers		
Do not agree/neither agree nor disagree	1.00	1.00
Strongly agree or agree	1.56 (0.87 to 2.80)	1.00 (0.51 to 1.94)
Age (years)		
18–24	1.00	1.00
25–39	1.55 (0.57 to 4.22)	1.31 (0.32 to 5.41)
40–54	2.02 (0.68 to 6.03)	2.30 (0.51 to 10.39)
55+	2.08 (0.70 to 6.20)	3.26 (0.70 to 15.14)
Gender		
Male	1.00	1.00
Female	0.68 (0.28 to 1.67)	0.79 (0.30 to 2.03)
Marital status		
Married	1.00	1.00
Never married	1.28 (0.70 to 2.37)	1.04 (0.46 to 2.35)
Others	1.97 (1.12 to 3.45)*	1.63 (0.92 to 2.90)
Educational attainment		
Middle school or less	1.00	1.00
High school	0.93 (0.58 to 1.51)	0.76 (0.43 to 1.35)
College or more	0.65 (0.36 to 1.18)	0.64 (0.33 to 1.23)
Household equivalent income†		
Low	1.00	1.00
Middle	1.07 (0.67 to 1.70)	0.92 (0.51 to 1.67)
High	1.11 (0.69 to 1.80)	1.29 (0.75 to 2.22)
Cigarettes per day		
1–10	1.00	1.00
11–20	0.81 (0.55 to 1.17)	0.91 (0.58 to 1.44)
21+	0.90 (0.54 to 1.52)	0.75 (0.38 to 1.47)
Total home smoking ban		
No	1.00	1.00
Yes	1.29 (0.89 to 1.89)	1.29 (0.83 to 2.00)
Smoking restriction in automobile		
No	1.00	1.00
Yes	1.29 (0.82 to 2.03)	1.58 (0.92 to 2.69)
Time-in-sample		
Once	1.00	1.00
Twice	0.79 (0.54 to 1.16)	0.91 (0.59 to 1.40)
Thrice	0.39 (0.20 to 0.77)*	0.71 (0.34 to 1.50)
Survey year		
2008	1.00	1.00
2010	3.46 (2.33 to 5.11)*	1.32 (0.87 to 2.00)

\*P value <0.05.

†Low: <30 000 000 won; middle: 30 000 000–44 999 000 won; high: ≥45 000 000 won.

found a significant increase in the support of Korean smokers for smoking bans in public places between 2005 and 2008. This shows that smokers' attitudes towards smoking bans have changed in response to the implementation of smoke-free policies in Korea, a country that has a high smoking prevalence.

#### Author affiliations

<sup>1</sup>Center for Food and Drug Policy Research, Korea Institute for Health and Social Affairs, Sejong, Korea (the Republic of)

<sup>2</sup>Department of Public Health Science, Seoul National University Graduate School of Public Health, Seoul, Korea (the Republic of)

<sup>3</sup>Center for Cancer Prevention and Detection, National Cancer Center, Goyangsi, Korea (the Republic of)

<sup>4</sup>Total Healthcare Center, Kangbuk Samsung Hospital, Seoul, Korea (the Republic of)

<sup>5</sup>Department of Psychology, University of Waterloo, Waterloo, Ontario, Canada

<sup>6</sup>School of Public Health and Health Systems, University of Waterloo, Waterloo, Ontario, Canada

<sup>7</sup>Ontario Institute for Cancer Research, Toronto, Ontario, Canada

**Contributors** EP and SIC conceptualised the paper, performed analyses and wrote the manuscript. HGS, YK and H-SJ lead the ITC Korea Survey and managed the collection of data. PD, JO, ACKQ and GTF contributed in the revisions of the manuscript.

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