Nicotine & Tobacco Research, Volume 11, Number 5 (May 2009) 503–513

Original Investigation

Moving toward people's needs for smoke-free restaurants: Before and after a National Promotion Program in Taiwan, 2003–2005

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Abstract

Introduction: In Taiwan, the Smoke-Free Restaurant Program (SFRP) was implemented from 2003 to 2005 as an initial phase before the introduction of restrictive legislation promoting smoke-free restaurants (SFRs). No studies have evaluated trends in public opinion before and after a national health promotion campaign for the introduction of SFRs on a voluntary basis. The present study investigated whether public opinion with respect to eliminating environmental tobacco smoke (ETS) in restaurants changed after implementation of the SFRP.

Methods: Data were obtained from four large-scale, nationally representative surveys conducted in 2003–2005 before and after implementation of the SFRP. Weighted analyses were performed to obtain nationally representative results.

Results: After a series of SFRP campaigns, reported exposure to ETS in restaurants by survey participants decreased by approximately 14%. Approximately 20% more people had heard of SFRs, and approximately 25% more had chosen to dine in a smoke-free restaurant. We found consistently high community support for SFRs (ca. 95%), and approximately 80% supported smoke-free restaurant legislation, although both rates dropped slightly in 2005. People aged 60 years or more, nonsmokers, and those who had greater knowledge of ETS hazards were more likely to support smoke-free restaurant legislation.

Discussion: The SFRP was effective at promoting SFRs on a voluntary basis. Strong community endorsement has major implications for legislators who are considering the nature and extent of further smoke-free restaurant legislation in Taiwan and other countries.

Introduction

Evidence on the severe acute and chronic health hazards of environmental tobacco smoke (ETS) is accumulating (California Environmental Protection Agency, 1997; Glantz & Parmley, 1991, 1995; National Cancer Institute, 1999; U.S. Department of Health and Human Services, 2001; U.S. Environmental Protection Agency, 1992). ETS is one of the top five leading causes of preventable death in the United States and other countries (McGinnis & Foege, 1993; Williams, Peterson, Knight, Hiller, & Pelletier, 2004) and has, thus, become a critical public health concern.

Taiwan has a higher rate of smoking among males than do most other developed countries, which leads to a higher risk of ETS exposure. Based on national surveys in 2004 (Bureau of Health Promotion, Department of Health, 2006), the overall adult smoking rate in Taiwan was 24% (42.8% for males and 4.5% for females). Approximately 8.5% of boys and 4.2% of girls aged 13–15 years reported that they currently smoked. Moreover, family ETS exposure was estimated at 27.6% for males and 37.3% for females, whereas workplace ETS exposure was 50.3% for males and 25.5% for females. According to Siegel (1993), the extent of ETS in restaurants was 1.6–2.0 times higher than that estimated in other workplaces and 1.5 times higher than that assessed in homes with one or more smokers.

Over the past 20 years, public support and demand for smoke-free public spaces have continued to intensify as bans on smoking in restaurants have quickly become widespread in many countries (Allwright et al., 2005; Chang, Leighton, Mostashari, McCord, & Frieden, 2004; Gallus et al., 2006; Kotani, Osaki, Kurozawa, & Kishimoto, 2005; Lam et al., 2002; C. Miller,

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doi: 10.1093/ntr/ntp037
Advance Access publication on April 8, 2009
Received December 14, 2006; accepted February 12, 2009

Wakefield, Kriven, & Hyland, 2002; Skeer & Siegel, 2003; Thomson & Wilson, 2006; Weber, Bagwell, Fielding, & Glantz, 2003). Since the 1980s, studies have reported a reduction in ETS exposure among nonsmokers (Borland, Mullins, Trotter, & White, 1999; Heloma, Jaakkola, Kahkonen, & Reijula, 2001; Pirkle, Bernert, Caudill, Sosnoff, & Pechacek, 2006). Increased restrictions on smoking in public places are the most likely explanation for this decrease (Pirkle et al., 2006).

In Taiwan, to provide a legal basis for tobacco control in restaurants and in other public places, the Tobacco Hazards Prevention Act was passed in 1997. Under this law, smoking is allowed only in designated areas, except in restaurants with less than 200 m^2 of open space (i.e., no ventilation system or air conditioner), for which no regulation was defined. However, evidence shows that restricting smoking in restaurants to certain parts of the seating area might not safeguard patrons and employees from ETS hazards (Akbar-Khanzadeh, 2003; Brauer & Mannetje, 1998; Lambert, Samet, & Spengler, 1993; U.S. Department of Health and Human Services, 2006). Ventilation systems cannot fully eliminate the health risk since ETS-related contamination can circulate between smoking and nonsmoking sections (Repace, Hyde, & Brugge, 2006).

In Taiwan, although numerous studies have proposed that full protection would require legislation mandating 100% smoke-free restaurants (SFRs) (Akbar-Khanzadeh, 2003; Brauer & Mannetje, 1998), the hospitality industry is reluctant to accept this restriction. Based on a government report, approximately 80% and 60% of people dine out for lunch and dinner, respectively. Dining-out expenses accounted for 30.7% of total household food expenses in 2004 and has grown by approximately 10% in the past 10 years (Directorate-General of Budget Accounting and Statistics, 2003, 2004). The rapidly increasing dining-out population has highlighted a deficiency in current laws and the immediate need to safeguard peoples' right to be protected from ETS health hazards in restaurants. Thus, the Smoke-Free Restaurant Program (SFRP), a campaign that recruited SFRs based on voluntary participation, was promoted by the Taiwanese government between 2003 and 2005, with an annual budget of approximately US$650,000, as an initial and transitional phase before the introduction of restrictive legislation requiring 100% SFRs.

To encourage restaurant owners to voluntarily become completely smoke free (including kitchens and restrooms), and to attract the public to dine in SFRs, the concept of ETS hazards in restaurants was promoted in the media (e.g., recommendations in magazines, on Web sites, and on television). Each smoke-free restaurant was evaluated by experts, and a certificate was awarded for qualification. A Web site was built and maintained for the public and restaurant owners with the exclusive purpose of updating information on the SFRP. By September 2003, the SFRP announced approximately 700 SFRs; this number increased rapidly, reaching approximately 10,000 (out of 47,360 restaurants, about 21.1% in Taiwan) in 2005 (Directorate-General of Budget Accounting and Statistics, 2001). Nevertheless, during the enrollment of restaurants, attempts to introduce a smoke-free restaurant ordinance were obstructed by owners' concerns about low community support and revenue loss.

In addition, the particular food culture of Taiwan made SFRs fairly challenging, especially in traditional Chinese restaurants. Many people consider cigarettes to be fine gifts for significant others and smoking to be an essential part of social and commercial occasions. For example, sharing tobacco and alcohol are considered to be part of dining hospitality. It is thought to be common courtesy for one to offer all other persons at the table a cigarette before smoking. A traditional Chinese custom considers cigarettes to be essential in wedding feasts to symbolize wishes that the couple soon has a son. In the SFRP, the concepts of detrimental health effects from ETS exposure were widely advertised and the virtue of not harming others was highly emphasized. For example, stick candies were suggested as a possible substitute for cigarettes if people insisted on following the traditional custom at weddings.

Community support for smoke-free dining has been reported in places such as the United States, Australia, and Hong Kong (Brooks & Mucci, 2001; Friis & Safer, 2005; Gallus et al., 2006; Lam et al., 2002; C. Miller et al., 2002; Mullins & Borland, 1995), but there has been no documentation of community support in Taiwan. Furthermore, no studies have evaluated trends in public opinion before and after a national health promotion campaign for the introduction of SFRs on a voluntary basis. Legislation to ban smoking completely in restaurants and bars remains under review in Taiwan. Findings of community support from the present study might provide information for legislators who are considering further smoke-free restaurant legislation in Taiwan and other countries.

The present study used four large-scale, nationally representative surveys from 2003 to 2005 to investigate whether public opinion on eliminating ETS in restaurants changed as a result of the SFRP. The study's objectives were to investigate (a) the change in restaurant ETS exposure, (b) the change in awareness and participation of SFRs, and (c) the change in public support for smoke-free restaurant legislation before and after implementation of the SFRP.

Methods

Samples

The SFRP officially began announcing restaurants with 100% smoke-free air to the public in September 2003. Four nationally representative samples especially designed for the SFRP—one before (February 2003) and three after (November 2003, 2004, and 2005) the campaign—were drawn by stratified random sampling. A telephone interview was adopted for investigation since 99% of Taiwanese households had a telephone in 1999 (Ministry of the Interior, 1999). To obtain adequate sample sizes, we used the proportional allocation method with stratification according to county of residence. In each stratum, one telephone number was selected at random; then random digit sampling based on the last two digits of that particular number was used to randomly choose households. This strategy ensured that all residents of Taiwan with a home phone had a chance of being selected, regardless of the number's appearance in a phone book. In each household, the first individual who answered the phone who was at least 12 years old was invited to participate. Up to four telephone callbacks at different times were made to contact the chosen household before a replacement was drawn from the same stratum. Chi-square tests showed that the samples were representative of the national demographic in terms of

sex, age (categorized as aged 12–19, 20–29, 30–39, 40–49, 50–59, and 60+ years), and county of residence (i.e., 25 counties in total, $p > .05$ indicating no difference). Further, samples were weighted to correspond to the national distribution of age, gender, and county of residence.

Once a participant was contacted by telephone, a trained interviewer explained the study's purpose and then emphasized confidentiality and voluntary participation. After the interviewee agreed to participate, the interviewer read each item of the instrument using standardized procedures; participant responses were recorded immediately. The four surveys had, respectively, 2,978, 2,900, 1,336, and 1,290 respondents. Data from the first two surveys were representative at the county level, and the latter two were at the national level. Although findings representative of the national level were reported, the modification of sample sizes should not be a critical issue. Among all phone calls made, about 40% (37%–43%) were unanswered, 20% (18%–23%) were ineligible (e.g., nonresidential household), and 10% (7%–11%) refused. The interview completion rates ranged approximately from 29% to 32%.

Measurements

A structured 15-min questionnaire titled "Public Opinions on Smoke-Free Restaurants" was developed based on previous studies and interviews with public health practitioners. About 30 forced-choice questions dealing with knowledge and attitudes toward ETS and the participation of, satisfaction with, and support for SFRs were distributed in four distinct sections. Part 1 assessed the participants' dining-out experiences and their feelings and reactions when exposed to ETS in restaurants. Part 2 consisted of a series of questions dealing with knowledge about ETS and its effects on health, as well as participants' attitudes toward restricting smoking in restaurants. Part 3 dealt with participants' dining experiences and support for SFRs. Finally, all respondents were asked to provide demographic information and their current smoking status. Content validity was assessed and ascertained by six to eight experts in tobacco control–related fields. Pilot studies were done in advance and the Cronbach's alphas ranged from .67 to .75 for items with a similar scale for internal consistency.

Eight binary smoking-related variables were extracted, including whether participants (a) had been exposed to ETS in restaurants in the past 3 months (ETS exposure), (b) felt uncomfortable when exposed to ETS in restaurants, for those who answered positively in the ETS exposure item only (felt uncomfortable with ETS exposure), (c) realized the negative health impacts of ETS (antitobacco knowledge), (d) believed that tobacco smoke should be banned in restaurants (protobacco-free attitude), (e) had heard of SFRs (SFR awareness), (f) had dined out in SFRs (been to SFR), (g) supported popularizing SFRs (support of SFR), and (h) supported prohibiting tobacco smoke in restaurants by law (support of SFR legislation).

Over the years, the wording and items in the instrument could be modified to better measure the study variables of interest. For example, to increase the sensitivity of detecting a protobacco-free attitude, the item "Have you requested that someone who is smoking stop smoking in a restaurant?" in 2003–2004 was rephrased as "Do you agree that people should be prevented from smoking in restaurants?" in 2005. Sociodemographic characteristics (age, gender, education, city of residence) also were collected. Participants who currently smoked and who consumed up to 100 cigarettes during their lifetime at the time of the interview were categorized as smokers. A smoking prevalence rate of 15% was consistently reported in the four surveys and was slightly lower than estimates in national surveys. Reasons for underestimates might be recruitment of approximately 15% youth aged 12–19 years, who have a lower smoking prevalence than adults. Additionally, questions on SFRs in previous sections may cause smoking to be underreported.

Data analyses

Weighted analyses were performed to obtain nationally representative results. Since the data were weighted to account for the differential probability of being selected based on gender, age, and residence, we used Stata version 7.0 to account for the sampling scheme and weighting. We estimated proportions with 95% confidence intervals and trend tests for smoking-related variables in the four surveys. The differences between smokers and nonsmokers were assessed using chi-square tests. To examine the progression of issues related to SFRs over the past 3 years (from February 2003 to November 2005), we used binary logistic regression to calculate adjusted odds ratios (*AOR*s) and 95% confidence intervals. Finally, logistic regression analyses were conducted to assess the effects of individual characteristics on the implementation of the SFRP. All tests of significance were two tailed, with the level of significance at $p < .05$.

Results

The sociodemographic characteristics of the participants in the four surveys did not differ significantly. Males accounted for approximately half of the participants; about 70% were adults aged 20–59 years; two-thirds of the participants completed at least high school; approximately 15% lived in the metropolitan areas of Taipei and Kaohsiung; and approximately 15% were smokers.

Trends in issues related to SFRs before and after implementation of the SFRP, 2003–2005

Absolute changes across time. Absolute changes in participants' responses to issues related to SFRs before and after the SFRP are reported at the top of Table 1 and their differences by smoking status are shown in Figure 1. Overall, in February 2003, before the SFRP, approximately 68.8% of participants had been exposed to ETS in restaurants in the previous year. After the SFRP, ETS exposure in the previous 3 months decreased from 55.7% to 48.2%, but this rate increased slightly in 2005 to 54.9% ($p < .001$ for trend). The proportion that felt uncomfortable with ETS exposure among smokers increased considerably from 2003 to 2005. Both before and after the SFRP, nonsmokers were less likely than smokers to be exposed to ETS in restaurants; however, they were far more likely to feel distressed with ETS exposure. Furthermore, an increasing number of participants possessed antitobacco knowledge ($p < .001$ for trend) and protobacco-free attitudes ($p < .001$ for trend). The proportions of participants who had heard of SFRs and had dined in a smoke-free restaurant increased significantly across the years (both $p < .001$ for trend). Smokers were significantly more likely

Table 1. Trends in issues related to SFRs before and after the SFRP, both absolute and relative changes

Time	ETS exposure	Feel uncomfortable with ETS exposure	Antitobacco knowledge	Protobacco-free attitudes	SFR awareness	Been to SFR	Support of SFR	Support of SFR legislation
Absolute change								
Before SFRP[a]								
February 2003 ($N = 2,978$) (95% *CI*)	68.8 (66.7–70.9)	69.7 (67.2–72.2)	61.7 (59.5–63.8)	72.9 (70.9–74.8)	45.2 (43.0–47.4)	NA	96.6 (95.6–97.3)	NA
After SFRP[a]								
November 2003 ($N = 2,900$) (95% *CI*)	55.7 (53.3–58.2)	69.2 (66.1–72.1)	62.2 (59.9–64.3)	73.2 (71.2–75.2)	59.1 (56.8–61.2)	17.5 (15.8–19.5)	98.8 (98.1–99.2)	NA
November 2004 ($N = 1,336$) (95% *CI*)	48.2 (45.2–51.2)	70.5 (66.4–74.3)	64.7 (62.0–67.4)	79.0 (76.7–81.2)	56.6 (53.8–59.3)	34.6 (31.9–37.5)	98.5 (97.6–99.1)	84.6 (82.4–86.6)
November 2005 ($N = 1,290$) (95% *CI*)	54.9 (51.7–58.0)	69.5 (65.4–73.3)	88.3 (86.4–90.0)	84.1 (82.0–86.1)	65.9 (63.3–68.5)	43.5 (40.6–46.4)	95.9 (94.5–96.9)	79.9 (77.4–82.1)
p value for trend	<.001	.29	<.001	<.001	<.001	<.001	.99	<.001
Relative change								
Before SFRP[a]								
February 2003 ($N = 2,978$) *OR*[b]	1.0	1.0	1.0	1.0	1.0	NA	1.0	NA
After SFRP[a]								
November 2003 ($N = 2,900$) *OR*[b] (95% *CI*)	0.6*** (0.5–0.7)	0.9 (0.8–1.2)	1.0 (0.9–1.2)	1.0 (0.9–1.2)	1.8*** (1.5–2.0)	1.0	2.8*** (1.7–4.6)	NA
November 2004 ($N = 1,336$) *OR*[b] (95% *CI*)	0.4*** (0.4–0.5)	1.0 (0.8–1.2)	1.1 (1.0–1.3)	1.4*** (1.2–1.7)	1.6*** (1.4–1.8)	2.5*** (2.1–3.0)	2.3** (1.3–4.1)	1.0
November 2005 ($N = 1,290$) *OR*[b] (95% *CI*)	0.5*** (0.5–0.6)	1.2 (0.9–1.5)	4.7*** (3.9–5.7)	2.1*** (1.7–2.5)	2.3*** (2.0–2.7)	3.6*** (3.0–4.3)	0.9 (0.6–1.3)	0.7** (0.6–0.9)

Note. *OR* = odds ratio; ETS = environmental tobacco smoke; SFR = smoke-free restaurants; SFRP = Smoke-Free Restaurant Program; NA = data not available. Values for absolute changes are in percentages with 95% *CI*s.

[a]The SFRP was announced to the public in September 2003.

[b]Adjusted ORs were obtained through binary logistic regression and controlled for smoking status.

*$p < .05$; **$p < .01$; ***$p < .001$.

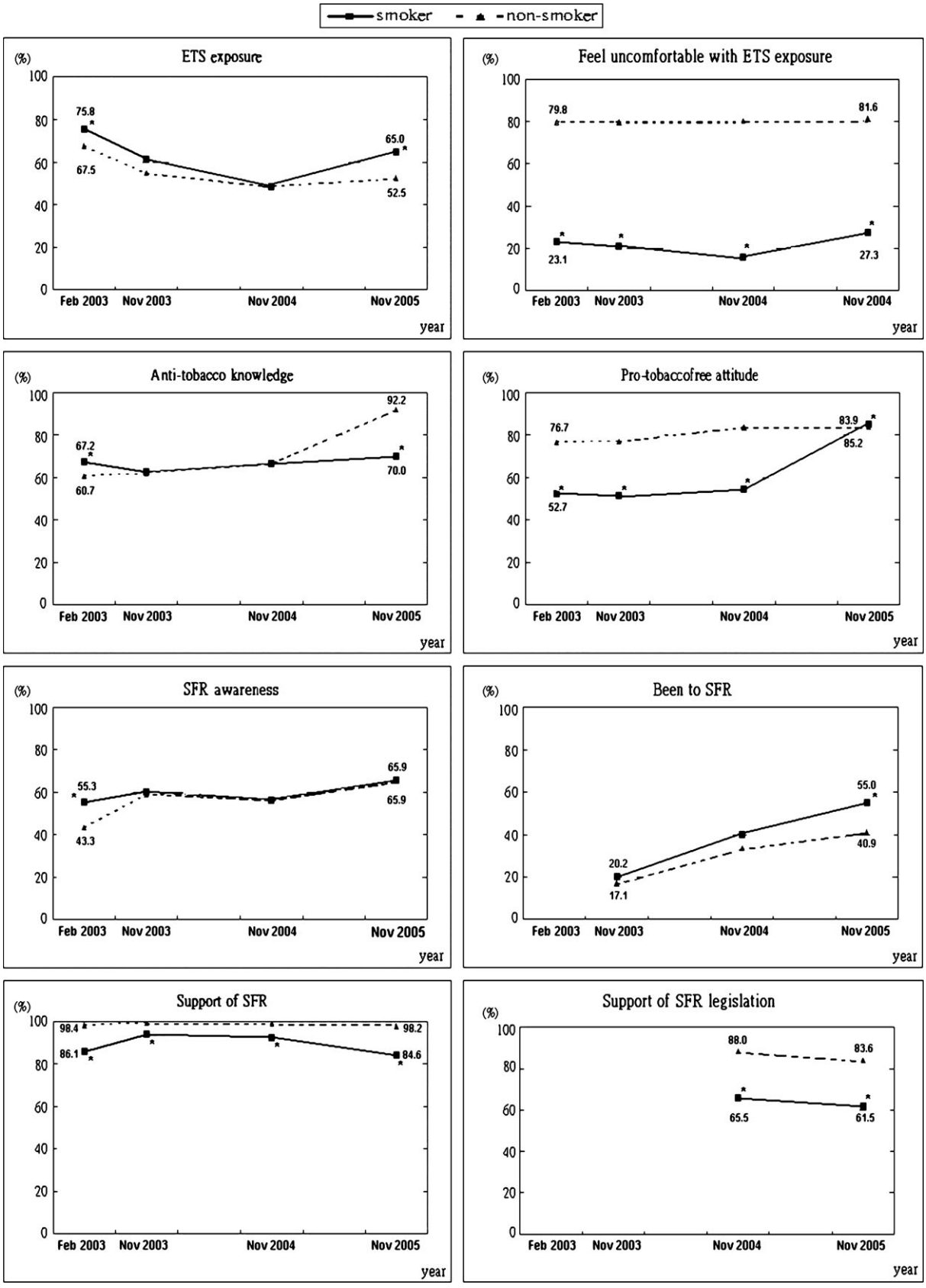

Figure 1. Absolute differences in issues related to smoke-free restaurants (SFR) before and after the Smoke-Free Restaurant Program, by smoking status, 2003–2005. ETS, environmental tobacco smoke. *$p < .05$; p values were obtained with chi-square tests indicating statistically significant differences between smokers and nonsmokers.

to have dined in a smoke-free restaurant, whereas nonsmokers were more likely to support SFRs. More than 95% of participants consistently supported popularizing SFRs; however, the percentage of participants who supported smoke-free restaurant legislation decreased slightly in 2005 ($p < .001$ for trend).

Relative changes across time. Logistic regression analyses were carried out to further investigate relative changes in public opinion over time, with surveys done after the SFRP (November 2003 to 2005) to be compared with the referent data (i.e., February 2003, before the SFRP) (bottom of Table 1). *AOR*s were calculated after controlling for smoking status. After the SFRP, the odds of ETS exposure in restaurants decreased significantly. Furthermore, significantly more people realized the negative impact of ETS on health and possessed stronger attitudes toward prohibiting smoking in restaurants. The odds of hearing of a smoke-free restaurant increased after the SFRP (all $p < .001$). Compared with November 2003, when the SFRP had just been announced to the public, the odds of having dined in a smoke-free restaurant increased from 2.5 in 2004 to 3.6 in 2005 (both $p < .001$). The odds of supporting the promotion of SFRs increased in 2003 and 2004 but not 2005. Starting in 2004, support for prohibiting smoking in restaurants by law was assessed, and an approximately 30% reduction was reported in 2005, compared with 2004 ($p < .01$).

Factors affecting implementation of the SFRP, 2005

Factors involved in implementation of the SFRP were more comprehensively investigated in 2005, when the SFRP had been in place for nearly 3 years. Although consistently more than 95% of the public supported the promotion of SFRs throughout 2003–2005, the percentage that sustained a complete prohibition (54%; 58.1% of nonsmokers and 30.4% of smokers) dropped considerably in 2005, when a partial ban on smoking in restaurants (44.7%; 41.2% of nonsmokers and 65.5% of smokers) was listed as an alternative in the same question. Table 2 shows the distribution of individual characteristics in the support of different levels of restaurant smoking bans in 2005. Overall, females, those aged 60 years or more, nonsmokers, those who did not dine out frequently, those with higher antitobacco knowledge and a stronger protobacco-free attitude, and those who supported smoke-free restaurant legislation were significantly more supportive of SFRs than of a partial ban on smoking in restaurants (all $p < .05$).

To further explore the extent to which each factor might influence the implementation of SFRs, we estimated *AOR*s for the association between the promotion of SFRs in 2005 and individual characteristics after controlling for gender, residence (metropolitan vs. nonmetropolitan), and all other model variables. In 2005, participants aged 60 years or greater, those who were nonsmokers, and those who had strong protobacco-free attitudes were significantly less likely to have been exposed to ETS in the past 3 months (data not shown). Smoke-free restaurant awareness was reported to vary by age and education level (Table 3). As for smoke-free restaurant participation, people whose education level was below high school and who were nonsmokers were less likely to dine in SFRs, whereas those who dined out more frequently and possessed strong protobacco-free attitudes were more likely to have been to a smoke-free restaurant. With respect to support for smoke-free restaurant legislation, people aged 60 years or greater, those who were nonsmokers, and those who had greater knowledge of the negative health impacts of passive smoking were more likely to support such legislation.

Patrons' observations on restaurant business before and after the SFRP, 2005

Given that most restaurant managers are concerned about losing revenue because of smoke-free restaurant policies, participants of the 2005 survey were asked for their opinions about restaurant business before and after implementation of a smoke-free policy in restaurants (data not shown). About 35% (37.6% of nonsmokers and 24.8% of smokers) reported that the introduction of the nonsmoking policy had led to an increase in business, 39% (37.4% of nonsmokers and 44.3% of smokers) reported no effect on business, and 3.7% (2.8% of nonsmokers and 6.6% of smokers) reported that there was a loss of business. Approximately 20% reported "don't know or can't say." Nonsmokers were more likely to report that business had improved, whereas smokers were more likely to report no change. In addition, 63.3% (66.5% of nonsmokers and 52.4% of smokers) agreed that "the introduction of a nonsmoking policy had resulted in more family parties with a greater number of children, pregnant women, and elderly patronizing restaurants."

Discussion

After a series of SFRP campaigns, exposure to ETS in restaurants decreased by approximately 14 percentage points. Awareness of and exposure to SFRs increased by approximately 20% and 25%, respectively. We found consistently high community support for SFRs (ca. 95%), and approximately 80% of respondents supported SFR legislation, although both rates dropped slightly in 2005.

Several limitations of the present study merit attention. First, the cross-sectional design limited the investigation to only broad trends in public support and did not allow for measurement of individual changes in attitudes about, participation of, or support for SFRs over time. Additional limitations may have been introduced by modifications in the wording of the surveys, especially for assessing antitobacco knowledge and attitudes in 2005. This might have limited our ability to compare adequately the results of the different surveys over time. By its nature, the self-report data used in this study may be subject to participant interpretation, and respondents may have answered questions in socially desirable ways. In addition, smoking status was assessed at the end of the questionnaire and might have been underreported after previous questions pertinent to SFRs. Differences between smokers and nonsmokers on issues related to SFRs might have been attenuated accordingly. True discrepancy was anticipated to be more substantial. Finally, sales after restaurants switched to a smoke-free policy could not be estimated directly, and patrons' observations were assessed as a proxy. To avoid subjects' personal interpretations, more objective data are needed for further clarification. Nevertheless, studies conducted in other countries have demonstrated no negative economic impact of SFRs (Glantz & Smith, 1997; Kunzli et al., 2003; Scollo, Lal, Hyland, & Glantz, 2003; Wakefield et al., 2002) and were consistent with what we observed.

Table 2. Distribution of individual characteristics in the support of a complete ban, a partial ban, or no ban on smoking in restaurants, 2005

Characteristic (number of responses)[a]	Support SFRs ($n = 663$)	Support smoking in designated areas only ($n = 549$)	Support no regulation on smoking ($n = 15$)	p value
Sex				
Male (582)	49.5 (45.3–53.6)	48.4 (44.3–52.6)	2.1 (1.2–3.7)	.002
Female (645)	57.3 (53.4–61.1)	42.2 (38.4–46.1)	0.5 (0.2–1.5)	
Age (years)				
Below 19 (159)	41.3 (33.8–49.2)	58.7 (50.8–66.2)	0	<.001
20–59 (911)	51.6 (48.3–55.0)	47.2 (43.9–50.5)	1.2 (0.6–2.2)	
60+ (153)	74.7 (67.0–81.0)	22.5 (16.5–29.9)	2.8 (1.1–7.3)	
Education				
Less than high school (347)	55.7 (50.4–61.0)	42.5 (37.3–47.8)	1.8 (0.8–4.0)	.09
High school (398)	47.7 (42.7–52.8)	50.9 (45.9–56.0)	1.3 (0.6–3.2)	
At least some college (469)	55.7 (51.1–60.2)	43.5 (39.0–48.2)	0.8 (0.2–2.3)	
Residence				.57
Metropolitan (242)	56.4 (50.0–62.6)	42.6 (36.5–49.0)	1.0 (0.2–3.8)	
Nonmetropolitan (984)	52.7 (49.5–55.9)	45.9 (42.7–49.1)	1.4 (0.8–2.4)	
Dining-out frequency				
≤3 times/month (577)	57.6 (53.4–61.7)	41.2 (37.2–45.4)	1.2 (0.5–2.6)	.02
1+/week (601)	49.1 (45.0–53.1)	49.5 (45.5–53.6)	1.4 (0.7–2.8)	
Smoking status				
Smoker (200)	30.4 (24.4–37.3)	65.5 (58.5–71.9)	4.0 (2.0–7.9)	<.001
Nonsmoker (1,027)	58.1 (55.0–61.1)	41.2 (38.1–44.3)	0.7 (0.4–1.6)	
ETS exposure				
No (449)	57.4 (52.6–62.0)	41.2 (36.6–45.9)	1.4 (0.6–3.2)	.01
Yes (540)	47.4 (43.1–51.7)	51.4 (47.0–55.7)	1.2 (0.5–2.7)	
Antitobacco knowledge				
Low (116)	24.4 (17.3–33.3)	64.4 (55.0–72.8)	11.2 (6.4–18.7)	<.001
High (1,111)	56.3 (53.3–59.3)	43.4 (40.4–46.4)	0.3 (0.1–1.0)	
Protobacco-free attitudes				
Weak (162)	43.0 (35.5–50.8)	52.1 (44.3–59.8)	4.9 (2.5–9.6)	<.001
Strong (1,065)	55.0 (51.9–58.0)	44.3 (41.2–47.3)	0.7 (0.4–1.6)	
SFR awareness				
No (392)	56.9 (51.8–61.8)	41.0 (36.2–46.1)	2.0 (1.0–4.3)	.06
Yes (835)	51.7 (48.3–55.2)	47.3 (43.9–50.8)	1.0 (0.5–1.9)	
Been to SFR				
No (632)	54.8 (50.8–58.7)	43.6 (39.7–47.6)	1.6 (0.8–3.1)	.19
Yes (502)	51.4 (46.9–55.8)	47.9 (43.5–52.4)	0.7 (0.3–2.0)	
Support of SFR legislation				
No (224)	21.2 (16.3–27.1)	74.7 (68.5–80.1)	4.0 (2.0–7.9)	<.001
Yes (905)	63.0 (59.7–66.2)	36.5 (33.3–39.7)	0.5 (0.2–1.3)	

Note. ETS = environmental tobacco smoke; SFR = smoke-free restaurant. All values are row percentages with 95% *CI*s.

[a]The total sample size was 1,227 because 63 participants responded, "No opinion/don't know." For each characteristic, the total of responses might be less than 1,227 because of missing values.

Despite these limitations, the data collected in this study deserve further exploration. Heavy exposure to secondhand smoke might produce salivary cotinine concentrations as high as 177.8 nmol/L, which approximates smokers' cotinine concentrations and can cause detrimental health effects (Jarvis, Foulds, & Feyerabend, 1992; Pirkle et al., 1996). Studies have found that restaurant smoking regulations reduce secondhand smoke exposure (Repace et al., 2006; Siegel, Albers, Cheng, Biener, & Rigotti, 2004) and can reduce smoking among young people because of the resulting modification of the social norm (C. L. Miller & Hickling, 2006). Our finding that, after implementation of the SFRP, the proportions of people exposed to ETS in restaurants were reduced significantly by about 14 percentage points (from 68.8% in 2003 to 48.2% in 2004 and 54.9% in 2005) was noteworthy. Considerably more smokers felt uncomfortable with ETS exposure (15.5% in 2004 to 27.3% in 2005). Increased awareness of ETS might result in increased reporting of exposure and discomfort attributed to the smoke. These reports warrant further long-term study to determine whether these changes were crucial warning signs or only fluctuations over time.

For restaurant owners, the potential economic impact of making restaurants completely smoke free is likely the most crucial concern. Studies conducted in various regions have shown repeatedly that restaurant or bar revenues were not adversely affected by smoke-free restaurant laws (Bartosch & Pope, 1999;

Table 3. Adjusted ORs (from logistic regression) for the association between the promotion of smoke-free restaurants and individual characteristics, 2005

Characteristic	SFR awareness		Been to SFR		Support of SFR legislation	
	Percent[a]	*OR*[b] (95% *CI*)	Percent[a]	*OR*[b] (95% *CI*)	Percent[a]	*OR*[b] (95% *CI*)
Age (years)						
Less than 19	73.3	1.6 (1.0–2.6)*	37.1		77.2	
20–59	70.5	1.0	48.8	1.0	78.6	1.0
60+	39.9	0.6 (0.4–1.0)*	24.6		89.8	2.6 (1.1–6.0)*
Education						
Less than high school	45.5	0.5 (0.3–0.7)***	25.7	0.7 (0.5–1.0)*	83.1	
High school	74.4	1.0	47.9	1.0	79.9	1.0
At least some college	76.4		54.8		77.8	
Dining-out frequency						
≤3 times/month	60.9	1.0	32.7	1.0	83.1	1.0
1+/week	74.1		56.2	1.9 (1.4–2.5)***	76.1	
Smoking status						
Smoker	65.9	1.0	55.0	1.0	61.5	1.0
Nonsmoker	65.9		40.9	0.5 (0.3–0.7)***	83.6	2.8 (1.7–4.6)***
ETS exposure						
No	72.8	1.0	51.9	1.0	82.0	1.0
Yes	71.3		49.4		75.9	
Antitobacco knowledge						
Low	46.4	1.0	35.3	1.0	60.1	1.0
High	68.5		44.5		82.0	3.3 (1.9–5.6)***
Protobacco-free attitudes						
Weak	43.5	1.0	25.7	1.0	76.5	1.0
Strong	70.2	2.0 (1.3–3.1)**	46.7	2.0 (1.2–3.2)**	80.4	
SFR awareness						
No	NA		NA		81.9	1.0
Yes					78.9	
Been to SFR						
No	NA		NA		81.7	1.0
Yes					78.0	

Note. OR = odds ratio; ETS = environmental tobacco smoke; SFR = smoke-free restaurants; NA = data not applicable.

[a]Percentage of having the particular event (i.e., SFR awareness, been to SFR, and support of SFR legislation, respectively) in each level of the characteristic.

[b]Only statistically significant results ($p < .05$) are shown. Adjusted *OR*s were obtained by binary logistic regression and controlled for gender, residence (metropolitan vs. nonmetropolitan areas), and the other variables listed in the table.

*$p < .05$; **$p < .01$; ***$p < .001$.

Centers for Disease Control and Prevention, 1995; Cowling & Bond, 2005; Glantz & Smith, 1994, 1997; Hyland, Cummings, & Nauenberg, 1999; Jones, Wakefield, & Turnbull, 1999; Kunzli et al., 2003; Thomson & Wilson, 2006; Wakefield et al., 2002), and tobacco industry claims that there would be an adverse economic impact could be rejected after reviewing the quality of studies on the economic effects of smoke-free policies (Scollo et al., 2003). These findings should be reported to restaurant owners to increase their confidence in having a legislated smoke-free environment. Health-seeking behavior is the result of the mutually dependent dimensions of knowledge, attitude, and practice (Connell, Turner, & Mason, 1985). Thus, determining how to channel the strong antitobacco knowledge and attitudes that we identified in this study toward increased dining in SFRs could attract more restaurant owners to implement such policies.

The SFRP was an initial or transitional phase to facilitate the promotion of SFRs, with legislation for a complete ban of smoking as an ultimate goal. Thus, given the significant community support for SFR found in the present study, the detrimental effects of ETS on health (California Environmental Protection Agency, 1997; U.S. Department of Health and Human Services, 2001), and the effective intervention of restaurant smoking bans on smoking prevention (Siegel, Albers, Cheng, Biener, & Rigotti, 2005), a modified version of the Tobacco Hazards Prevention Act was proposed to Legislative Yuan in 2005 (the highest legislative body in Taiwan) to restrict smoking completely in most public facilities, including restaurants and bars. Unfortunately, due to aggressive campaigns by the tobacco industry and insufficient support from the hospitality industry, this law failed to pass after extensive and controversial debates. As shown in other countries, such as the United States and Canada, as well as the recent successful passage of similar legislation in Hong Kong (Clarke, Wilson, Cummings, & Hyland, 1999; Drope & Glantz, 2003; Kiser & Boschert, 2001), the passage of smoke-free laws requires that business owners' concerns be addressed, public

support be promoted, campaigns to educate the population about ETS hazards be implemented, and efforts by the tobacco industry to undermine the law be defeated.

Based on our findings, the SFRP in Taiwan was effective at recruiting SFRs, easing the concerns of the hospitality industry, and gaining community support through health education and communication. However, when a partial ordinance (smoking permitted in designated areas) was listed as an alternative, approximately 45% of participants preferred it. This might reflect the "compromise" spirit emphasized in Chinese culture that promotes tolerance of all sides of an issue. The slight decrease in community support in 2005 also might be attributed to misperceptions of the protective effects of partial regulation fostered by protobacco industries or individuals, as they worried that rapid promotion of smoke-free policies would gradually diminish their benefits or profits obtained from smoking. Further legislation would be obstructed if these misperceptions could not be reduced. Both the public and the hospitality industry should be continually educated that only complete bans on smoking can provide effective protection from ETS exposure and toxins (Repace et al., 2006; U.S. Department of Health and Human Services, 2006).

Policy implications

A persistent health communication and education campaign, such as the SFRP, might be needed to promote an all-out ban on smoking in restaurants, especially targeting those preferring partial bans. Approaches might be extended to attract those who were under-represented in the smoke-free restaurant awareness and participation identified in this study. The strong community endorsement reported in this study has major implications for policy makers and legislators who are considering the nature and extent of further smoke-free restaurant legislation in Taiwan. Our findings also have implications for administrators who support strategies to introduce SFRs gradually on a voluntary basis in other countries or regions, as a transitional phase to the ultimate goal of smoke-free restaurant legislation.

Future research directions

Future studies are needed to examine trends in public opinion on SFRs over time and to investigate how individuals or restaurant owners might modify their attitudes and behaviors to comply fully with smoke-free laws. Our findings represent perspectives from the public; however, workers in hospitality industries should be considered and protected (Hahn et al., 2006; Hedley et al., 2006; Menzies et al., 2006; Siegel, Barbeau, & Osinubi, 2006). Future studies of restaurant workers' viewpoints are essential to address the point that implementation of smoke-free restaurant policies protect personnel from ETS exposure in restaurant workplaces.

Funding

This study is from "The Smoke-Free Restaurants Projects, 2003-2005" funded by the Bureau of Health Promotion, Department of Health, Executive Yuan, Taiwan.

Declarations of Interests

None declared.

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