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Improvement in Compliance With Smoke-Free Environment Regulations at Hotels and Restaurants in Vietnam After an Administrative Intervention

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ABSTRACT

INTRODUCTION: Vietnam is among the countries with the highest smoking prevalence among male adults, as well as high prevalence of secondhand smoke exposure at indoor places. In many countries, including Vietnam, exposure to tobacco smoking is greatest in restaurants/bars and hotels. This study aims to analyze the compliance of hotels and restaurants to smoke-free environment regulations before and after an intervention.

METHODS: Direct observations were done at the receptions, conference rooms, designated smoking areas, restaurants, and lobbies of 140 hotels and the dining rooms, kitchens, and toilets of 160 restaurants before and after an intervention. The intervention was a training course conducted by police officers followed by 3 monthly supervision visits by police officers. Compliance with smoke-free enviornment regulations was observed and assessed to generate a compliance score for each location and overall. Tobit regression was used to examine the relationship between compliance scores and the intervention and other variables such as hotel and restaurant characteristics.

RESULTS: Before the intervention, the highest compliance rates were found for "no tobacco advertisement" and "no cigarette selling" regulations (95%-100%) in almost all sites in hotels and restaurants. The lowest compliance rates were found for "having nonsmoking signs." The rate of compliance with all regulations was only 5% for hotels and 0.06% of restaurants. Improvement after intervention was clearly observed, in the rate of compliance with all regulations by more hotels (15.7%) and overall compliance scores of hotels and restaurants.

CONCLUSIONS: The intervention with participation of the police officers proved to be effective in improving compliance with smoke-free regulations. It is recommended to continue this intervention in the same areas as well as to expand the intervention to other areas.

KEYWORDS: Smoke-free environment, compliance, hotel, restaurants, intervention

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Introduction

The harmful effects of tobacco on health have been well-documented; globally, nearly 8 million people die every year of tobacco-related diseases.[1] Among all measures to reduce these harmful effects, the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) identified "Protection from exposure to tobacco smoke" as one of the nonprice measures to reduce the demand for tobacco.[2] With many efforts worldwide during the past 10 years, significant improvement has been seen in implementing smoke-free environments in indoor and public places in many countries. However, according to the recent Global Adult Tobacco Survey, exposure to tobacco smoking in restaurants/bars is still highly prevalent in many countries in Asia, including Vietnam, Thailand, China, Bangladesh, and the Philippines[3-7] as well as in Europe, as in Romania and Russia.[8,9] Although data on smoke-free environments in hotels are not as easily available as those for restaurants, implementation of a smoke-free environment, and exposure to tobacco smoking at hotels has also been an issue.[10-12]

Vietnam is among the countries with the highest prevalence of smoking among male adults (47.4% in 2010 and 45.3% in 2015), as well as high prevalence of secondhand smoke (SHS) exposure at indoor places.[13,14] During the past decades, the Government of Vietnam has made several efforts to control tobacco use. The National Tobacco Control Policy in 2000 identified objectives on several aspects of tobacco control, including, but not limited to, public education; prohibitions on tobacco advertising, promotion, and sponsorship; health warnings; tax and price increases; promoting smoking cessation; and restrictions on public smoking. Vietnam signed the WHO FCTC in August 2003, and ratified it in November 17, 2004. The comprehensive Law on Prevention and Control of Tobacco Harms was enacted in 2012[15] and took effect on May 1, 2013. The new law is in accordance with the FCTC. Under this law, smoke-free places were established, in addition to regulations

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on increasing the size of graphic health warning labels; restricting tobacco advertising, promotion, and sponsorship; as well as establishing a tobacco control fund. The law prohibits smoking in hotels and restaurants, but they are allowed to have designated smoking areas with conditions: (1) to have separate rooms and ventilation systems from the nonsmoking area; (2) to have equipment to contain cigarette ends, ashes, and signs in suitable and easy-to-see positions; (3) to be equipped with fire extinguisher devices. Government Decree no. 176 in 2013 imposed sanctions on administrative violations of public health,[16] in which violations of smoke-free environments are also included.

In Vietnam, during the period from 2010 to 2015, the prevalence of indoor SHS exposures in most places declined significantly, including the home (73.1%-59.9%), the workplace (55.9%-42.6%), universities (54.3%-37.3%), public transportation (34.4%-19.4%), and schools (22.3%-16.1%). An increase in public awareness about the harmful health effects of smoking and exposure to SHS was also observed between 2010 and 2015. However, similar to other countries, the prevalence of tobacco smoke exposure remained very high in restaurants, at 80.7%.[13,14]

To enforce smoke-free regulations in Vietnam, the WHO Representative Office for Vietnam in collaboration with the Vietnam Tobacco Control Fund, Ministry of Health, and the Medical Administration of the Ministry of Police conducted an intervention targeting hotels and restaurants in 2 provinces in Northern Vietnam. This article reports a study aimed at measuring the compliance of hotels and restaurants to the regulations on a smoke-free environment before and after the intervention.

Methods

Study settings

The surveys were conducted in selected hotels and restaurants in 2 provinces in Northern Vietnam. One was Hai Phong city, which has the largest seaport in the North of Vietnam and is a cultural, medical, educational, scientific, commercial, and technological center for the Northern Coastal region. It is the second largest city in the North after the capital, Hanoi, and is one of 5 cities in Vietnam falling directly under the Central Government. In 2018, Hai Phong had the 8th largest population density of Vietnam with around 2 million inhabitants and ranked the second in terms of gross domestic product. The total area of Hai Phong city is 1519 km^2, including 2 island districts. The second surveyed province was Thai Nguyen, in the Northeast region, a political center for the Midland Northeast Mountainous region and the gateway of socioeconomic exchange between that region and the Northern Plains. In 2019, Thai Nguyen ranked 14th in terms of gross domestic product and 27th in terms of population density, with a population of about 1.3 million with an area of 3.563 km^2. Thai Nguyen is a major socioeconomic center of the Northeast region, for both the Northern Midlands and Mountains.

Study design

Two repeated cross-sectional surveys were conducted at the selected hotels and restaurants, one before and one after the intervention. The pre-intervention survey was done 1 month before the intervention and the post-intervention survey was done 1 month after the intervention. Direct observation was done in different places in the surveyed hotels and restaurants for each survey. In all selected the hotels, we observed the reception area and the lobby. In some hotels, if they were available, we also observed the designated smoking area, the conference room, and the hotel's restaurant. Due to client's privacy issue, we did not observe inside of the hotel rooms. In the selected restaurants, we observed the dining rooms, kitchen, and toilets.

Intervention

To strengthen enforcement of smoke-free environment policy in Vietnam, the Ministry of Public Security, with technical support from the WHO and the Ministry of Health, organized capacity-building workshops and monitoring missions in the 2 cities, Hai Phong and Thai Nguyen, during the third and fourth quarters of 2018. In each of the 2 cities, a 2-day capacity-building workshop was organized for representatives of hotels, restaurants, and local police officers. The participants were provided information on the harms of smoking and secondhand tobacco smoke, the law and regulations on a smoke-free environment, and how to effectively implement a smoke-free environment in hotels and restaurants. After the workshops, monthly missions from central and local levels were organized to monitor and strengthen the implementation of the smoke-free environment in the 2 cities. A supervision procedure with structured forms was developed and used in both provinces. This was the first time the police officers had organized monitoring missions to hotels and restaurants; in the past, only warnings were given to hotel and restaurants that had violated the smoking ban. It was planned that, after the first monitoring missions, those hotels and restaurants that still violated the law would be given fines in accordance with government regulations.

Sampling and sample size

The sample size for quantitative surveys and before and after interventions was estimated using the WHO formula for estimating samples for comparison of 2 proportions with 2-tailed test. We used a significance level of 5%; the proportion of hotels/restaurants having at least one sign of violation of the smoke-free environment regulations before intervention was 0.81 according to the Global Adult Tobacco Survey 2015.[14] The survey was expected to detect an absolute change of 0.2, meaning that the proportion of hotels/restaurants having at least one sign of violation of smoke-free environment

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regulations after intervention would be 0.61. The required sample size was thus 107. To compensate for possible cases of nonresponse, the final sample size applied was 150 restaurants/hotels in each province. As there were more restaurants in each province than hotels, the final sample size included 70 hotels and 80 restaurants in each province. This sample size is sufficient for comparison of the enforcement of smoking environment regulations overall between the 2 provinces, as well as a before-after comparison for hotels and restaurants separately. From the list of hotels and restaurants in Thai Nguyen and Hai Phong provided by the Ministry of Public Security, a simple random procedure was used to select 70 hotels and 80 restaurants in each province.

Study tools

Structured observation forms were used to guide direct observation at the hotels and restaurants. The forms were developed based on the supervision forms used by the Vietnam Tobacco Control Fund. For hotels, the form covered observation of the reception, lobby, restaurant, designated smoking areas (if available), and conference rooms (if available). For restaurants, the form supported observation of the dining room, kitchen, toilets, and designated smoking areas (if available).

Variables

Background information of the hotels/restaurants included their classification according to owner (private, government, other), level of services (for hotel: below 3 stars, or 3 stars and above; for restaurants: common, standard, and luxury). The restaurant classification rating was done by the restaurants' owners based on 3 criteria, including price of food, quality of food, and facilities.

Compliance with smoke-free environment regulations was assessed using the following criteria:

For hotels:
- In the reception area: having no-smoking signs; absence of ashtrays or cigarette containers, no cigarette ash observed, no cigarette smell, no one smoking, no sign of cigarette advertisements, no sign of cigarette selling.
- In the designated smoking area: having regulations for smoking area, availability of ashtrays or containers, having a ventilation system, having a fire alarm system.
- In the conference room: having no-smoking signs, absence of ashtrays/cigarette containers, no cigarette ash observed, no cigarette smell, no one smoking, no sign of cigarette advertisement.
- In the hotel restaurant: having no-smoking signs, absence of ashtrays, no cigarette ash, no cigarette smell, no one smoking.
- In the lobby: having no-smoking signs; no cigarette ash observed, no cigarette smell, no one smoking, no sign of cigarette advertisements.

For restaurants:
- In the dining room: having no-smoking signs; absence of ashtrays or cigarette containers, no cigarette ash observed, no cigarette smell, no one smoking, no sign of cigarette advertisements, no sign of cigarette selling.
- In the kitchen: availability of regulations, having no-smoking signs; absence of cigarette ash, no cigarette smell, no one smoking, no sign of cigarette advertisements.
- In the toilet: having no-smoking signs; absence of cigarette ash, no cigarette smell, no sign of cigarette advertisements.

*Compliance score*s for each site were created based on the number of compliance criteria achieved. Thus, a score for the hotel reception area ranged from 0 to 7, for a designated smoking area from 0 to 4, for a hotel restaurant and for a hotel lobby from 0 to 5, and for a hotel conference room from 0 to 6. In a restaurant, the scores ranged from 0 to 7 for the dining room, from 0 to 6 for the kitchen, and from 0 to 4 for the toilet. Because not all hotels had designated smoking areas, conference rooms or a restaurant, to make comparison possible the total scores for each hotel/restaurant were estimated using a scale with a maximum score of 100 meaning perfect compliance in all available places. For example, if a hotel did not have designated smoking areas, it could still have a score of 100 if it had perfect compliance in other areas: reception, conference room, lobby, and restaurant.

Data collection process

A local collaborator helped to list all hotels and restaurants in the province before fieldwork started using the listed of selected locations. The local collaborator accompanied survey team members to each selected hotel or restaurant. The survey team members did the direct observations at each site using the observation form.

Data management and analysis

Data were cleaned and entered in the Epi Data software. Check files was used to limit logical errors during data entering. STATA 14 was used for data analysis. Descriptive statistics were used for frequencies, percentages, means, median, standard deviation, and interquartile range. The Tobit model that is also called censored regression model is designed to estimate the linear relationship between variables where the dependent variable is either left or right censoring.[17,18] Because compliance score was a censore variable as it ranged from 0 to 100, Tobit regression models were used to examine the association between compliance scores of each site as well as the overall

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Table 1. Characteristics of surveyed hotels and restaurants in 2 provinces.

	BEFORE INTERVENTION						AFTER INTERVENTION					
	HAI PHONG		THAI NGUYEN		TOTAL		HAI PHONG		THAI NGUYEN		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Hotel	(n=70)		(n=70)		(n=140)		(n=70)		(n=70)		(n=140)	
Hotel owner												
Government	3	4.3	0	0	3	2.1	4	5.7	0	0	4	2.9
Private	60	85.7	67	95.7	127	90.7	57	81.4	67	95.7	124	88.6
Other	7	10	3	4.3	10	7.2	9	12.9	3	4.3	12	8.5
Level of services												
No star	35	50.0	52	74.3	87	62.1	36	51.4	49	70.0	85	60.7
1-2 stars	23	32.9	11	15.7	34	24.3	23	32.9	13	18.6	36	25.7
3 stars	4	5.7	6	8.6	10	7.1	3	4.3	6	8.6	9	6.4
4-5 stars	8	11.4	1	1.4	9	6.4	8	11.4	2	2.9	10	7.1
Restaurant	(n=80)		(n=80)		(n=160)		(n=80)		(n=80)		(n=160)	
Restaurant owner												
Government	0		0		0		2	2.5	0		2	1.3
Private	79	98.8	79	98.8	158	99.4	77	96.2	80	100	157	98.1
Other	1	1.2	1	1.2	1	0.6	1	1.3	0		1	0.7
Size of restaurants												
Small restaurants	43	53.8	41	51.2	84	52.5	45	56.3	48	60.0	93	58.1
Standard restaurant	34	42.5	29	36.3	63	39.4	33	41.2	29	36.2	62	38.8
Luxury restaurant	3	3.7	10	12.5	13	8.1	2	2.5	3	3.8	5	3.1

scores of the hotel/restaurant and the hotel/restaurant characteristics. The lower limit for significance was set at .05.

Ethical clearance

This study was approved by the Research Ethics Committee at the Hanoi University of Public Health in Hanoi; consent was also obtained from local authorities and property owners.

Results

Overall, 88.6% hotels in the survey were private hotels, only 2.9% were government hotels and the rest were joint-stock hotels. The majority were below the 3-star level (86.4%), whereas 13.6% were 3- to 5-star hotels. The rates of "no star" hotels in Thai Nguyen were clearly lower than in Hai Phong, both before and after intervention. Only one 5-star hotel in Hai Phong participated in the survey.

Almost all participating restaurants (98.1%) were private; only 0.7% of the restaurants were joint stock; 58.1% and 38.8% of restaurants were small and standard restaurants, respectively, whereas only 9.1% restaurants were classed as luxury (Table 1).

Before intervention, the highest compliance rate among surveyed hotels was for the regulation on "no cigarette advertisement" at the reception (99.3%), in conference rooms (100%), and in the lobby (100%). The criterion with second highest compliance rate was "no cigarette selling" (95.7%), and "no smoking behavior" (94.3%) at the reception. Signs of tobacco smoking were still observed in other parts of surveyed hotels. For instance, "no cigarette smell" was observed in 86.4% to 92.1% hotel location. "No cigarette ash" was observed in 72.1% to 90.9% of hotel locations. The regulation with the least compliance in hotels was "having no-smoking signs," especially in the hotel reception areas and lobbies. Such signs were only observed in 25.7% of hotel reception areas, 16.4% of hotel lobbies, 52.3% of hotel restaurants, and 64.1% of conference rooms. Only 9 hotels had designated smoking areas, but none of these had a ventilation system. Only 5% of hotels complied with regulations in all locations (Table 2).

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Table 2. Proportion of hotels complying with smoke-free regulations at different places before and after intervention.

RECEPTION	BEFORE INTERVENTION		AFTER INTERVENTION	
	% (N = 140)	95% CI	% (N = 140)	95% CI
Having nonsmoking sign[a]	25.7	19.1-33.7	60.7	52.3-68.5
No ashtray	57.9	49.4-65.8	68.6	60.3-75.8
No cigarette ash	72.1	64.0-79.0	78.6	70.9-84.7
No cigarette smell	86.4	79.6-91.2	92.9	87.1-96.1
No smoking behavior	92.4	88.9-97.1	97.9	93.5-99.3
No cigarette advertisement	99.3	95.0-99.9	99.3	95.0-99.9
No cigarette selling	95.7	90.7-98.1	96.4	91.6-98.5
Designated smoke area	n = 9		n = 10	
Having regulation	44.4	13.4-80.5	50	18.1-81.9
Having ashtray	80.0	37.8-96.3	100.0	
Having ventilation system	0		11.1	0.9-62.6
Having fire alarm	33.3	8.2-73.8	40.0	12.5-75.7
Conference room	n = 39		n = 36	
Having nonsmoking sign	64.1	47.4-78.0	83.3	66.6-92.6
No ashtray	84.6	68.9-93.2	75.0	57.6-86.9
No cigarette ash	87.2	71.8-94.8	88.9	72.9-96.0
No cigarette smell	100.0		100.0	
No smoking behavior	100.0		100.0	
No cigarette advertisement	100.0		100.0	
Hotel restaurant	n = 44		n = 48	
Having nonsmoking sign	52.3	37.2-67.0	70.8	56.0-82.2
No ashtray	75.0	59.6-85.9	60.4	45.6-73.6
No cigarette ash	90.9	77.4-96.7	91.7	79.2-97.0
No cigarette smell	90.1	77.4-96.7	100.0	
No smoking behavior	100.0		100.0	
No cigarette advertisement	100		97.9	85.8-99.7
Hotel lobby	n = 140		n = 140	
Having nonsmoking sign	16.4	11.1-23.6	42.9	34.8-51.3
No cigarette ash	79.3	71.7-85.3	84.3	77.2-89.5
No cigarette smell	92.1	86.3-95.6	97.1	92.6-98.9
No smoking behavior	97.9	93.4-99.9	99.3	94.9-99.9
No cigarette advertisement	100		100	
Compliance with all regulations[a]	5.0	2.3-10.2	15.7	10.5-22.8

Abbreviation: CI: confidence interval.
a: statistical difference with p value <0.05.

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Table 3. Compliance scores in different locations of restaurants and hotels before and after intervention.

VARIABLE		BEFORE INTERVENTION	AFTER INTERVENTION	*P* VALUE
Hotel				
Reception (max score = 7)	M ± SD	5.31 ± 1.25	5.94 ± 1.14	
	Median (IQR)	6 (5-6)	6 (5-7)	<.01
Smoking area (max score = 4)	M ± SD	0.12 ± 0.53	0.12 ± 0.49	
	Median (IQR)	0 (0-0)	0 (0-0)	>.05
Meeting room (max. score = 6)	M ± SD	1.49 ± 2.44	1.41 ± 2.43	
	Median (IQR)	0 (0-4)	0 (0-3.5)	>.05
Hotel restaurant (max score = 6)	M ± SD	1.6 ± 2.44	1.79 ± 2.54	
	Median (IQR)	0 (0-5)	0 (0-5)	>.05
Lobby (max score = 5)	M ± SD	3.86 ± 0.7	4.24 ± 0.66	
	Median (IQR)	4 (4-4)	4 (4-5)	<.01
Overall (max score = 100)	M ± SD	77.09 ± 13.59	84.62 ± 11.89	
	Median (IQR)	82.74 (70.83-83.33)	83.33 (79.17-91.67)	<.01
Restaurant				
Dining room (max score = 7)	M ± SD	5.169 ± 6	5.706 ± 6	
	Median (IQR)	6 (5-6)	6 (5-6)	<.01
Kitchen (max score = 6)	M ± SD	4.919 ± 5	5.025 ± 5	
	Median (IQR)	5 (5-5)	5 (5-5)	>.05
Toilet (max score = 4)	M ± SD	2.975 ± 3	2.975 ± 3	
	Median (IQR)	3 (3-3)	3 (3-3)	>.05
Overall (max score = 100)	M ± SD	76.84 ± 82.35	80.62 ± 82.35	
	Median (IQR)	82.35 (70.59-82.35)	82.35 (76.47-88.24)	<.01

Abbreviation: IQR: interquartile range.

The compliance scores were lowest in the designated smoking areas (median = 0; interquartile range [IQR]: 0-0 compared with maximum score of 4), meeting rooms (median: 0; IQR: 0-4 compared with maximum score of 6), and in the hotel restaurants (median: 0; IQR: 0-5 compared with maximum score of 6). Compared with the maximum compliance score of 100 for a hotel, the median and overall compliance score was 82.74, with IQR between 70.83 and 83.33 (Table 3).

After the intervention, the compliance of the hotels had improved. The rate of hotels totally complied increased significantly, from 5% to 15.7% (Table 2). The compliance scores were significantly improved in the reception, lobby and overall (Table 3). Tobit regression models also showed that after control for effects from other variables, the compliance scores for reception, lobby and overall were significantly improved after intervention (Table 4).

Before the intervention, similar to the case of hotels, the highest compliance rate among restaurants was for the regulation "no cigarette advertisements." The compliance rate in the dining room was 95.3%, and in the kitchen and toilet was 100%. The lowest compliance was observed for the regulation "having no-smoking signs" in all locations in the restaurants, with only 2.5% in toilets and 6.3% in dining rooms. Only 0.6% of restaurants totally complied with all regulations (Table 5). With the scale of 100 as the optimal score, the median of overall compliance scores for restaurants was 82.35 (IQR: 70.59-82.35).

After the intervention, a significant improvement was observed in the restaurant dining room regarding the proportion complying with the "having no-smoking signs" and "no ashtrays" regulations. Although the rate of restaurants that totally complied with all observed regulations did not differ

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Table 4. Tobit regression models of compliance scores in different locations in hotel and associated factors.

	RECEPTION		SMOKE AREA		MEETING ROOM		HOTEL RESTAURANT		LOBBY		OVERALL	
	COEF.	*P* VALUE	COEF.	*P* VALUE	COEF.	*P* VALUE	COEF.	*P* VALUE	COEF.	*P* VALUE	COEF.	*P* VALUE
Intervention												
Before	Ref		Ref		Ref		Ref		Ref		Ref	
After	0.92	.000	0.15	.863	−0.59	.755	1.18	.364	0.50	.000	8.22	.000
Hotel classification												
No star	Ref		Ref		Ref		Ref		Ref		Ref	
1-2 stars	−1.29	.002	−3.28	.025	−23.96	.000	−12.97	.000	−0.62	.005	−13.41	.000
3 stars	−0.45	.290	−2.14	.123	−12.69	.001	−7.15	.006	−0.25	.283	−4.15	.242
4-5 stars	−0.94	.072	2.03	.221	−4.92	.251	−1.50	.625	−0.22	.455	−7.36	.100
Province												
Hai Phong (better developed)	Ref		Ref		Ref		Ref		Ref		Ref	
Thai Nguyen	0.05	.799	−4.06	.011	−0.84	.668	−8.06	.000	−0.11	0.312	1.60	.336
Cons	*6.31*	*.000*	*1.84*	*.316*	*11.75*	*.004*	*17.10*	*.000*	*4.53*	*.000*	*84.87*	*.000*

Note: Italic letters/values at the last row are just for easier to see.

after the intervention, the compliance scores in the dining room and the overall compliance were significantly higher after the intervention (Table 3). Tobit regression models confirmed the improvement in the compliance score in the dining room and the overall compliance score for restaurants (Table 6).

Discussion

Our study was conducted in 2 provinces in Northern Vietnam. One province is among the most developed provinces and the second province is more average province in Northern Vietnam. We found that the overall compliance rate in all locations in the hotels was only 5% and that of restaurants was much lower, at 0.6%. A similar result was reported from a study in Indonesia. Although the overall compliance rates in that study were higher (11% of hotels and 6% of restaurants), the similarity lies in the observation that compliance with smoke-free regulations was lower in restaurants than in hotels.[19]

Most hotels and restaurants complied well with the regulations on "no cigarette advertisements" and "no tobacco selling" (compliance rates ranged from 95.7% to 100%). Our results are in accordance with what was reported from Indonesia in 2018, where the compliance rate for the "no cigarette advertisement" regulation among hotels was 100% and among restaurants was 95%, whereas the compliance rate for the "no tobacco selling" regulation was 89% among hotels and 94% among restaurants.[19] Our findings are also in line with a study in another province in Vietnam in 2015, which reported that 6.8% of people who had visited food facilities within 30 days prior to the interview noticed tobacco marketing at the restaurants.[20]

Although the Law on Tobacco Control requires restaurants and hotels to have "no-smoking signs" in the public areas, this simple regulation was not well complied with, as only 27.7% of hotel reception areas, 16.4% of hotel lobbies, and 10.6% of restaurant dining rooms had these signs before the intervention. The study in Indonesia reported a similar trend; "no-smoking signs" were found in only 11% of hotels and 18% of restaurants.[19]

According to one study, outdoor or indoor signage banning smoking was not found to affect SHS concentrations.[21] Most other studies, however, concluded that no-smoking signs are very important to remind smokers not to smoke in public and indoor locations, and that they were effective to reduce both smoking rate and SHS.[22-24] Therefore, interventions to increase compliance with the regulation "having no-smoking signs" are still highly recommended.

Our study indicates that a short intervention with training for related staff at the hotel and restaurants by police officers followed by supervision visits by police officers had positive impacts on compliance with smoke-free regulations. An intervention that requires posttraining supervision visits may be difficult to implement regularly because of shortages in human as well as financial resources. However, this intervention is recommended at certain time interval and in certain areas to better enforce the smoke-free

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Table 5. Proportion of restaurants complying with smoke-free regulations at different places before and after intervention.

	BEFORE INTERVENTION (N = 160)		AFTER INTERVENTION (N = 160)	
	%	95% CI	%	95% CI
Dining room				
Having no-smoking sign[a]	10.6	6.7-16.5	30.0	23.3-37.6
No ashtray[a]	63.1	55.3-70.3	74.4	67-80.6
No cigarette ash	73.1	65.6-79.5	81.9	75.1-87.2
No cigarette smell	83.8	77.1-88.7	91.3	85.7-94.8
No smoking behavior	91.3	85.7-94.7	96.3	91.8-98.3
No selling cigarettes	100		100.0	
No cigarette advertisements	95.0	90.3-97.5	97.5	93.5-99.1
Kitchen				
Having smoking regulation	6.3	3.4-11.3	13.8	9.2-20.1
Having nonsmoking signs	6.3	3.4-11.3	8.75	5.2-14.3
No cigarette ash	96.9	92.6-98.7	97.5	93.5-99.1
No cigarette smell	96.3	91.8-98.3	98.2	94.2-99.4
No smoking behavior	98.8	95.1-99.7	99.4	95.6-99.9
No cigarette advertisements	100.0		100.0	
Toilet				
Having nonsmoking sign	2.5	0.9-6.5	2.5	0.9-6.5
No cigarette ashes	95.0	90.3-97.5	94.4	89.5-97.1
No cigarette smell	100.0		100.0	
No cigarette advertisements	100.0		100.0	
Compliance with all regulations	0.6	0.09-4.0	0.6	0.09-4.0

Abbreviation: CI: confidence interval.
a: statistical difference with p value <0.05.

Table 6. Tobit regression models of compliance scores in different locations in restaurants and asociated factors.

	DINNING		KITCHEN		TOILET		OVERALL	
	COEF.	*P* VALUE	COEF.	*P* VALUE	COEF.	*P* VALUE	COEF.	*P* VALUE
Intervention								
Before	Ref		Ref		Ref		Ref	
After	0.672	<.001	0.100	.158	0.000	.992	3.580	<.001
Type of restaurant								
Low level	Ref		Ref		Ref		Ref	
Mid level	0.008	.963	−0.051	.484	0.032	.333	−0.569	.590
Luxury	−0.295	.409	−0.454	.005	−0.036	.611	−5.031	.030
Province								
Hai Phong (better off)	Ref		Ref		Ref		Ref	
Thai Nguyen	0.124	.377	−0.034	.587	0.056	.047	1.335	.142
Cons	5.027	<.001	5.037	<.001	2.882	<.001	75.40	<.001

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regulations in the hotels and restaurants. Furthermore, as their tasks, the police officers have to do security supervisions regularly and randomly; they then could combine with the supervision for smoke-free regulation at the restaurants and the hotels. Thus, the impact of intervention could be sustained.

Although we found that the improvements in compliance with "having no-smoking signs" and "having no ashtrays" were significant and that the rate of totally compliant hotels significantly increased from 5% to 15.7%, there is still much room for improvement. It is really worthwhile to concentrate on enforcement of the regulations "having no-smoking signs"[22-24] and "having no ashtrays," because having ashtrays was found to be strongly associated with the existence of indoor SHS.[21]

We observed a significant improvement in the compliance scores in the hotel reception and hotel lobby areas and in restaurants' dining rooms, whereas no significant improvement was found in the designated smoking area of the hotel, hotel restaurant, kitchen, or toilet in restaurants. This result might result from a lack of interest during training or supervision visits, leading to less action by the owners of the hotels and restaurants. Thus, further research works are recommended to understand better the motivation of the hotel and restaurant owners and managers, as well as to help develop better training contents and more effective supervision approaches.

Conclusions

The very low rates of compliance with all smoke-free regulations by the hotels and restaurants indicate the need for more effective interventions. The intervention with participation of the police officers was effective in improving compliance with smoke-free regulations, so it is recommended to continue such interventions in the same areas as well as to expand the intervention to other geographical areas.

Author Contributions

The first author leads the whole process from designing research protocol, developing questionnaire, planning field work, data collection, data analysis and writting paper. All co-authors involved in developing study tools, data collection, analysis strategy and paper writting.

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