Impact of Legislation on Passive Smoking in Spain

Carlos A. Jiménez Ruiz Juan A. Riesco Miranda Neus Altet Gómez
Jaime Signes Costa-Miñana Jose Javier Lorza Blasco Joan Ruiz Manzano
Pilar de Lucas Ramos

Smoking Department, Spanish Society of Pulmonology and Thoracic Surgery, Barcelona, Spain

Key Words

Smoking · Antismoking legislation · Passive smoking

Abstract

Background: In 2005, the Spanish government approved Law 28/2005 on health measures against smoking; this was amended in 2010 by Law 42/2010. **Objective:** The purpose of this study was to assess the impact of these laws on passive smoking. **Methods:** Three epidemiological studies were conducted on a representative sample of the population via telephone surveys. The first was conducted prior to the first law coming into force, the second a year after its approval and the third a year after the approval of the second. **Results:** Six thousand eight hundred people were surveyed in 2005, 3,289 in 2007 and 3,298 in 2011. The first survey showed that 49.5% of nonsmokers were exposed to second-hand smoke (SHS) while by 2007, following the introduction of Law 28/2005, this exposure had been reduced to 37.9% (results previously published in 2008). The 2011 survey, conducted following the introduction of Law 42/2010, showed that just 21% of people were exposed. These data indicate that overall exposure to SHS was reduced by 22% between 2005 and 2007 and by a further 16.9% between 2007 and 2011. The overall impact of Law 42/2010 is estimated to be around 44% and Law 28/2005 around 22%. **Conclusion:** Legislation introduced in Spain has markedly reduced the exposure of nonsmokers to SHS.

© 2014 S. Karger AG, Basel

Introduction

Exposure to passive smoking is considered to be the third leading cause of preventable death in Spain. There are no specific data available, but passive smoking is estimated to cause 1,200–3,500 deaths in Spain each year [1]. Various diseases such as lung cancer, cardiovascular disease, lower respiratory tract infections and acute exacerbations of asthma have been attributed to exposure to environmental tobacco smoke or second-hand smoke (SHS) [2–4].

The implementation of legislative measures to regulate smoking in public spaces has proven to be one of the most effective ways of controlling exposure to SHS among nonsmokers [5]. There are several studies that have proven that such measures are effective in reducing exposure within homes and in reducing active smoking [6–8]. Two national laws have been passed in Spain aimed at controlling smoking in public places. The first was approved in December 2005 (Law 28/2005) [9]. The main features of this law were the complete ban on smoking at healthcare facilities, educational institutions and places of work. It also partly restricted smoking at entertainment facilities (bars, restaurants and nightclubs/discotheques). The law stipulated that entertainment venues of $\leq 100 \text{ m}^2$ in size could choose whether or not to allow smoking. Larger venues had to provide separate smoking and nonsmoking areas.

In the wake of the introduction of this law, several studies found that the reduction in exposure to SHS was not as marked as expected and, of course, that no reduction was noted at entertainment venues [10–12]. In a previous study that we undertook to evaluate the impact of this law, we found that the overall prevalence of exposure to environmental tobacco smoke decreased from 49.5% in 2005 to 37.9% in 2007, with the greatest reduction in this prevalence occurring in the workplace. Smaller reductions occurred in the home and at recreation venues [10]. Moreover, 1 study found that multinational tobacco companies were putting pressure on the governments of European countries that were in the midst of discussions to implement legislative measures to control smoking to introduce similar practices to those introduced in Spain [13].

This led the Spanish government to amend the law in late 2010 [14]. Law 42/2010 was passed and came into force in January 2011. The main provision of this new legislation was the complete ban on smoking at all entertainment venues (bars, restaurants and nightclubs/discotheques).

In order to analyze the impact of both these laws on the prevalence of passive smoking among the general Spanish population, the Sociedad Española de Neumología y Cirugía Torácica [SEPAR (Spanish Society of Pulmonology and Thoracic Surgery)] conducted three surveys on a representative sample of the general Spanish population. The first was conducted in 2005, a year prior to the implementation of the first law (Law 28/2005), the second in 2007, a year after the implementation of Law 28/2005 and the third in 2011, a year after the implementation of the second law (Law 42/2010).

This article discusses the results of these surveys.

Methods

Three epidemiological, observational and transversal studies were carried out on a randomized and representative sample of the Spanish population, using a CATI (computer-assisted telephone interview) system. The validity of this study method has been documented in previous studies [15].

The first survey was conducted in February 2005, prior to the introduction of Law 28/2005. The second was conducted in January 2007, a year after the implementation of Law 28/2005 and the third in 2011, a year after Law 42/2010 came into force.

Participants

Stratified and randomized sampling was used to set quotas by gender (male, female), age (<13, 13–40, 41–65 and >65 years) and environment (rural <5,000 inhabitants and urban >5,000 inhabitants), based on the data on the composition of the Spanish popula-

Table 1. Demographic characteristics of participants

	Number	%
<i>Survey 2005</i>		
Male	3,332	49.0
Female	3,468	51.0
Age, years		
<13	833	12.3
13–40	2,873	42.3
41–65	1,989	29.3
>65	1,105	16.3
Rural inhabitants	1,020	15.0
Urban inhabitants	5,780	85.0
<i>Survey 2007</i>		
Male	1,615	48.97
Female	1,683	51.03
Age, years		
<13	400	12.16
13–40	1,393	42.35
41–65	969	29.46
>65	527	16.02
Rural inhabitants	493	14.95
Urban inhabitants	2,805	85.05
<i>Survey 2011</i>		
Male	1,615	48.97
Female	1,683	51.03
Age, years		
<13	408	12.37
13–40	1,394	42.27
41–65	969	29.38
>65	527	15.98
City size, ≤5,000 people	476	14.43
City size, >5,000 people	2,822	85.57

tion provided by the National Institute of Statistics. The 2005 survey involved 6,800 people, the 2007 survey involved 3,289 and the 2011 survey involved 3,298. Demographic characteristics are shown in table 1.

In 2005, with this sample size, the accuracy of the estimation of the percentage of people affected by passive smoking as well as the percentage of smokers (assuming a maximum variability of 50%) at a national level was 1.2%. In 2007 and 2011, with this sample size, this figure was 1.7%.

Data Collection and Analysis

The data were collected by survey-takers with knowledge of the use of the CATI system and who had received training in the conducting of electronic surveys. Responses were incorporated into the database using automatic filters and logical sorting routines, with the aim of eliminating inconsistent responses. Of the 6,800 people surveyed in February 2005, 6,533 cases were considered valid after having been filtered into the database. The 2007 and 2011 surveys were considered fully valid. The descriptive analysis of the information was carried out by technical staff, using version 9.1.3 of the SAS statistics program.

Table 2. Change in the prevalence of passive smoking overall and in different environments from 2005 to 2011

Location	2005		2007			2011		
	n	% exp	n	% exp	% D1	n	% exp	% D2
Home	3,907	29.5	2,174	21.4	27 (p < 0.0001)	1,987	8	62.6 (p < 0.0001)
School	1,175	17.8	521	8.8	49.8 (p < 0.0001)	1,022	6.3	28.4 (p = 0.0048)
Workplace	1,308	25.8	727	11	58 (p < 0.0001)	1,071	6	45.4 (p < 0.0001)
Entertainment venues	3,907	37.4	2,171	31.8	14.7 (p < 0.0001)	1,916	12	62.2 (p < 0.0001)
Overall	3,907	49.5	2,174	37.9	22 (p < 0.0001)	1,987	21	44.4 (p < 0.0001)

Reference is made to the percentage decrease following the introduction of each of the laws. % D1 = Percentage decrease between 2005 and 2007; % D2 = percentage decrease between 2007 and 2011; % exp = percentage of respondents exposed.

Because we had no control group, the impact of Laws 12/2005 and 12/2010 on exposure to tobacco smoke were estimated by the difference of exposure before and after the laws came into force.

Ethical Issues

The survey was approved by the SEPAR ethical committee and, according to Spanish law, followed current regulations on the protection of personal data.

Results

Prevalence of Smoking in Spain

In accordance with the results obtained, figure 1 shows the estimated prevalence of smoking in 2005, 2007 and 2011. A drop in prevalence was seen between 2005 and 2007. Nevertheless, there was a slight increase in 2007 and in 2011. Respondents smoked an average of 12 cigarettes per day (men: 13.37/day and women: 10.3/day).

Other data of interest in the group of smokers were the following: 27% of those surveyed attempted to give up smoking following the introduction of Law 42/2010 – 14% of these lasted <24 h and 72% did not manage >4 weeks of not smoking. In addition, only 12% of the smokers who attempted to give up smoking received medical help to do so.

Exposure of NonSmokers to SHS at Home

Of the 3,907 nonsmokers surveyed in 2005, 1,153 (29.5%) lived in households with at least one smoker. Of the 2,174 nonsmokers surveyed in 2007, 466 (21.4%) were exposed to tobacco smoke at home and of the 1,987 nonsmokers surveyed in 2011, the percentage of nonsmokers exposed was 8% (table 2).

Fig. 1. Estimated prevalence of smoking in Spain. Columns: left = 2005, center = 2007 and right = 2011. Smokers 2005: 21.2% (95% CI 20.2–22.1%), 2007: 17.2% (95% CI 15.9–18.4%) and 2011: 18.75% (95% CI 17.42–20.08%). Nonsmokers 2005: 59.8% (95% CI 58.63–60.9%), 2007: 65.9% (95% CI 64.3–67.5%) and 2011: 64.1% (95% CI 62.5–65.7%). Exsmokers 2005: 19% (95% CI 18.1–19.9%), 2007: 16.8% (95% CI 15.6–18.0%) and 2011: 17.1% (95% CI 15.9–18.3%).

Exposure of NonSmokers to SHS in Schools

Of the 1,161 nonsmokers whose data were analyzed in 2005, 29.7% were in school. Of these, 17.8% suffered some degree of exposure to tobacco smoke in school. This percentage had decreased to 8.8% in 2007 and to 6.3% in 2011 (table 2).

Exposure of NonSmokers to SHS in the Workplace

In 2005, 337 (25.8%) of the 1,308 nonsmokers were exposed to tobacco smoke in the workplace. This dropped to 11% in 2007 and to 6% in 2011 (table 2). In accordance with these data, the prevalence of passive smoking in the work environment fell by 58% between 2005 and 2007 and a further 45% between 2007 and 2011.

Table 3. Impact of Laws 12/2005 and 12/2010 on exposure to SHS

	Prior to the 1st law 12/2005 1st study, %	1st law 1/2007 2nd study, %	2nd law 12/2010 3rd study, %
Smokers	21.2	17.2	18.75
Nonsmokers	59.8	65.93	64.16
Exsmokers	19	16.87	17.1
Nonsmokers – overall passive exposure	49.5	37.9	21.09
Overall impact of the law		23.43	44.3
Nonsmokers – passive exposure at home	29.5	21.4	8
Impact of the law at home		27	62.6
Nonsmokers – passive exposure at school	17.6	8.83	6.26
Impact of the law at school		49.8	28.4
Nonsmokers – passive exposure in the workplace	25.8	11.04	5.88
Impact of the law in the workplace		58	45.4
Nonsmokers – passive exposure at entertainment venues (bars, restaurants and nightclubs)	37.4	31.9	12
Impact of the law at entertainment venues		14.7	62.38

Exposure of NonSmokers to SHS at Entertainment Venues

There has been a marked reduction in exposure at entertainment venues. In 2005, 1,461 (37.4%) of the 3,007 nonsmokers who were surveyed reported being exposed to tobacco smoke in these places. In 2007, this had dropped to 31.8% and in 2011 it affected just 12% (table 2).

Overall Exposure

According to a previous study [10], the overall prevalence of exposure to SHS in 2005 was 49.5%. Table 2 and figure 2 show the changes observed in overall exposure to SHS in 2007 and 2011.

The first survey in 2005 showed that 49.5% of non-smokers were exposed to tobacco smoke while by 2007 and following the introduction of Law 28/2005, this exposure had dropped to 37.9%. The 2011 survey, conducted following the introduction of Law 42/2010, showed that just 21% of people were exposed (table 2; fig. 2). These data demonstrate that the overall prevalence of exposure to SHS fell by 22% between 2005 and 2007 and a further 16.9% between 2007 and 2011.

Estimated Impact of Legislation

According to these results, legislation is estimated to have markedly decreased overall exposure (table 3). The overall impact is estimated to be around –23.4% for the first law and –44% for the second law. The first law had a notable impact in schools (49.8%) and workplaces (58%), while Law 42/2010 led to a marked decrease in ex-

Fig. 2. Overall passive smoking in Spain: before first law (2005), law 42/2010 (2007), law 01/12/2011 (2011). The differences in percentages between 2005 and 2007 and between 2007 and 2011 are statistically significant ($p < 0.0001$).

posure in bars, restaurants and entertainment venues (62.3%) as well as in homes (62.6%) and workplaces (45.4%). In contrast, the legislation did not lead to any decrease in the number of active smokers between 2007 and 2010.

It is noted that the overall impact of the second law was greater than that of the first, 44.3 versus 23.4% ($p < 0.0001$). The differences were significant in both homes ($p < 0.0001$) and at entertainment venues ($p < 0.0001$).

Exposure at Different Entertainment Venues

The 2011 survey specifically analyzed the prevalence of exposure to SHS at different entertainment venues, i.e. bars, restaurants and nightclubs/discotheques. In this survey, a prevalence of 3, 7 and 11%, respectively, was reported.

Discussion

The main findings of our study were as follows. (1) Spanish regulations to control smoking in public places have resulted in a sharp reduction in overall exposure to SHS, with the prevalence of overall exposure dropping from around 50% in 2005 to 21% in 2011. (2) The 2010 legislation, which imposed a full ban on smoking in public places, led to a significantly greater overall reduction than the 2005 legislation, which only imposed a partial ban on smoking. Moreover, the 2010 legislation led to a significantly greater reduction in exposure in homes and at entertainment venues than the 2005 legislation. (3) The prevalence of active smoking in the general Spanish population over the age of 13 years increased slightly by 1.5% between 2007 and 2010, with no evidence that Law 42/2010 had any impact on reducing this level. (4) Although the most recent law (Law 42/2010) banned smoking at all entertainment venues, our study showed that 11% of people who frequented nightclubs/discotheques and 7% of people who visited restaurants complained of people smoking in these places.

The greatest reduction in overall exposure to SHS was achieved by the second law which resulted in a reduction of 44.4% compared with 22% for the first law. This figure argues in favor of the importance of implementing laws that impose a full ban on smoking in public places. Our data are consistent with those presented by Fong et al. [8] which compare the reduction in exposure to SHS in Ireland, following the introduction of legislation banning smoking in all public places, to the reduction seen in a control area where no ban was imposed. The authors found that the prevalence of exposure in Ireland fell from 62% prior to the introduction of the law to 14% 8 months afterwards whereas in the control area, it fell from 37 to 34% [15].

It also appears very significant that the introduction of Law 42/100 contributed to a sharp reduction in exposure to SHS in homes. It is worth noting that the 2005 law only resulted in a 27% reduction in homes, while the law in 2010 led to a reduction of 62%. This demonstrates that the introduction of laws that fully restrict the consumption of

tobacco in public places also helps to control smoking in homes. It would appear that smokers whose awareness has been raised by the legislation that prohibits them from smoking in public places are more inclined not to smoke in their own homes. This has been demonstrated in other studies. In 2005, Farrelly et al. [16] found that in the state of New York, following the introduction of legislation that fully prohibited smoking in public places, the reduction in exposure to SHS was also noted in homes. The average period of exposure to SHS fell from 14.5 h prior to the introduction of the law to 0.8 h afterwards.

While the main purpose of our study was to assess the prevalence of exposure to SHS, it also collected data on the prevalence of active smoking. These data should be assessed with caution. It is worth noting that the 2005 law succeeded in drastically reducing the prevalence of active smoking by 4 percentage points (from 21.2 to 17.2%). However, the 2010 law did not change these figures. In fact, prevalence was found to have increased slightly from 17.2 to 18.7%. One possible explanation for this was found when we analyzed what happened with the percentage of nonsmokers between these dates. In 2007, the prevalence of nonsmokers was 65.9% while in 2010, this figure had dropped to 64.1%. That is to say, the percentage of nonsmokers fell by almost 2 percentage points. Taking into account that the sample population being analyzed was made up of people ≥ 13 years old, it is possible that this increase is due to a rise in the number of youngsters who started smoking between these years. On the other hand, we did not note a very significant change in the number of exsmokers, a difference of only 0.3 percentage points between 2007 and 2011. This would indicate that very few smokers quit smoking between these years. This theory is supported by other data in the 2011 survey. Despite the fact that in that year 27% of smokers made a serious attempt to quit, 86% of them failed. Very few of them received help from a health professional in order to give up smoking. Some studies have found that the introduction of legislation to control smoking in public places can have an impact on the reduction of active smoking. In Italy, for example, the law coming into force resulted in a drop in the prevalence of smoking among men from 34.9% prior to the introduction of the law to 30.5% a year after; among women, a reduction from 20.6 to 20.4% was noted [17]. Other studies, however, have not noted this same change [18].

The two main weaknesses of our study are the absence of a control group and the fact that the data are based on the perceptions of nonsmokers in the study areas. Without a control group, we cannot assert with certainty that

the changes in the consumption of tobacco are directly attributable to the law. Although they were large surveys, they did not provide objective data that enable us to assess exposure to SHS. Another limitation of the study is that it does not distinguish between smoking in restaurants, bars or nightclubs; our results group together these three types of places, although this issue was resolved in the last study. The transversal design of the study could also be a limitation.

Finally, and as a main conclusion, the analysis of this work indicates that the legislation introduced in Spain

has markedly decreased exposure to SHS among non-smokers and its impact has been noticeable, particularly since the most recent law was introduced. The second law was much more restrictive and its impact was far greater overall.

Acknowledgements

The authors would like to thank Almirall Laboratories for the help provided for this study.

References

- 1 López MJ, Pérez-Ríos M, Schiaffino A, et al: Mortality attributable to passive smoking in Spain, 2002. *Tob Control* 2007;16:73–77.
- 2 Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion, Office of Smoking and Health: DHS Publication No. (CDC) 87-8398: The health consequences of involuntary smoking. Rockville, US Department of Health and Human Services, 1986.
- 3 Mackay DF, Irfan MO, Haw S, Pell JP: Meta-analysis of the effect of comprehensive smoke-free legislation on acute coronary events. *Heart* 2010;96:1525–1530.
- 4 Besaratinia A, Pfeifer GP: Second-hand smoke and human lung cancer. *Lancet Oncol* 2008;9:657–666.
- 5 Callinan JE, Clarke A, Doherty K, Kelleher C: Legislative smoking bans for reducing secondhand smoke exposure, smoking prevalence and tobacco consumption. *Cochrane Database Syst Rev* 2010;14:CD005992.
- 6 Ali AY, Safwat T, Onyemelukwe G, Otaibi MA, Amir AA, Nawas YN, Aouina H, Afif MH, Bolliger CT: Smoking prevention and cessation in the Africa and Middle East region: a consensus draft guideline for health-care providers – executive summary. *Respiration* 2012;83:423–432.
- 7 Fichtenberg CM, Glantz SA: Effect of smoke-free workplaces on smoking behaviour: systematic review. *BMJ* 2002;325:188.
- 8 Fong GT, Hyland A, Borland R, et al: Reductions in tobacco smoke pollution and increases in support for smoke-free public places following the implementation of comprehensive smoke-free workplace legislation in the Republic of Ireland: findings from the ITC Ireland/UK Survey. *Tob Control* 2006;15 (suppl 3):51–58.
- 9 Law 28/2005, of 26 December 2005. *Boletín Oficial del Estado* (Spanish Official State Bulletin) No. 309.
- 10 Jimenez-Ruiz C, Riesco Miranda JA, Hurt RD, et al: Study of the impact of laws regulating tobacco consumption on the prevalence of passive smoking in Spain. *Eur J Publ Health* 2008;18:622–625.
- 11 Martínez-Sánchez JM, Fernández E, Fu M, et al: Impact of the Spanish smoking law in smoker hospitality workers. *Nicotine Tob Res* 2009;11:1099–1106.
- 12 Nebot M, López MJ, Ariza C, et al: Impact of the Spanish smoking law on exposure to secondhand smoke in offices and hospitality venues: before-and-after study. *Environ Health Perspect* 2009;117:344–347.
- 13 Mugli ME, Lockhart NJ, Ebbert JE, et al: Legislating tolerance: Spain's national public smoking law. *Tob Control* 2010;19:24–30.
- 14 Law 42/2010, of 30 December 2010. *Boletín Oficial del Estado* (Spanish Official State Bulletin) No. 318.
- 15 Galán I, Rodríguez-Artalejo F, Tobías A, et al: Risk factors surveillance for noncommunicable disease through telephone survey. Results in the Autonomous Community of Madrid from 1995–2003. *Gac Sanit* 2005;19:193–205.
- 16 Farrelly MC, Nonnemaker JM, Chou R, et al: Changes in hospitality workers' exposure to second hand smoke following the implementation of New York's smokefree law. *Tob Control* 2005;14:236–241.
- 17 Cesaroni G, Forastiere F, Agabiti N, et al: Effect of the Italian smoking ban on population rates of acute coronary events. *Circulation* 2008;117:1183–1188.
- 18 Alcouffe J, Fau-Prudhomot P, Manillier P, et al: Smoking among workers from small companies in the Paris area 10 ten years after the French tobacco law. *Tob Control* 2003;12: 239–240.