

# Secondhand Smoke Exposure in Spanish Adult Non-Smokers Following the Introduction of an Anti-Smoking Law

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**Introduction and objectives.** The aim was to investigate the prevalence of secondhand smoke exposure and active smoking in the Spanish population following the introduction of an anti-smoking law.

**Methods.** This cross-sectional study involved a telephone survey (in June and July 2006) of a representative sample of the Spanish population aged at least 18 years-old (1221 men and 1301 women). The prevalence of secondhand smoke exposure among non-smokers was determined in terms of the context of exposure (ie, at home, in the place of work or study,

during leisure activities, or in transportation) and in general (ie, in any context). In addition, the prevalence of active smoking in the general population was also determined.

**Results.** Overall, 74.3% of non-smoking men and 70.1% of non-smoking women had been exposed to secondhand smoke in one of the four defined contexts. In men, the age-standardized prevalence of exposure was 26.4% at home, 39.8% at the place of work or study, 61.1% during leisure activities, and 37.2% in transportation. In women, the prevalence of secondhand smoke exposure was 31.4% at home, 30.7% at the place of work or study, 51.9% during leisure activities, and 45.5% in transportation. Prevalence of active smoking was 26.7% of men and 21.1% of women.

**Conclusions.** One-third of the Spanish non-smoking population are still exposed to second hand smoke in their work place or study center despite the ban introduced by the new law.

**Key words:** *Secondhand smoke. Passive smoking. Cross-sectional study. Survey. Prevalence. Epidemiology*

## Exposición al humo ambiental de tabaco en población adulta no fumadora en España tras la Ley de medidas sanitarias frente al tabaquismo

**Introducción y objetivos.** Analizar las prevalencias de exposición al humo ambiental de tabaco y de consumo de tabaco de la población española tras la entrada en vigor de la Ley de medidas sanitarias frente al tabaquismo.

**Métodos.** Estudio transversal mediante encuesta telefónica (junio-julio de 2006) a una muestra representativa

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de la población española de 18 o más años (1.221 varones y 1.301 mujeres). Se ha calculado la prevalencia de exposición al humo ambiental de tabaco de los no fumadores según ámbito de exposición (domicilio, trabajo/centro de estudios, tiempo libre y transporte) y en general (en cualquiera de ellos). Se ha calculado la prevalencia del consumo de tabaco en la población general.

**Resultados.** El 74,3% de los varones y el 70,1% de las mujeres no fumadoras están expuestos al humo ambiental de tabaco en alguno de los cuatro ámbitos estudiados. Entre los varones, la prevalencia de exposición estandarizada por edad fue del 26,4% en el domicilio, el 39,8% en el trabajo/centro de estudios, el 61,1% durante el tiempo libre y el 37,2% en los medios de transporte. Entre las mujeres, la exposición al humo ambiental de tabaco fue del 31,4% en el domicilio, el 30,7% en el trabajo/centro de estudios, el 51,9% durante el tiempo libre y el 45,5% en los medios de transporte. La prevalencia de consumo de tabaco fue del 26,7% de los varones y del 21,1% de las mujeres.

**Conclusiones.** Una tercera parte de la población no fumadora sigue expuesta en el lugar de trabajo o centro de estudios pese a la prohibición introducida por la nueva Ley.

**Palabras clave:** Humo ambiental de tabaco. Tabaquismo pasivo. Estudio transversal. Encuesta. Prevalencia. Epidemiología.

#### ABBREVIATIONS

CI: confidence interval.

ETS: environmental tobacco smoke.

## INTRODUCTION

Scientific evidence indicates that exposure to environmental tobacco smoke (ETS) is associated with a greater risk of coronary heart disease and lung cancer in nonsmokers.<sup>1,2</sup> Recent studies have associated prohibiting smoking in public areas with a reduction in the incidence of acute myocardial infarction.<sup>3-7</sup> Passive smoking has also been associated with other diseases in adults (asthma and chronic respiratory symptoms) and children (low birth-weight, sudden infant death syndrome, acute and chronic respiratory symptoms, asthma, ear infections, etc), and evidence exists suggesting that no level of exposure to ETS is free from risk.<sup>8,9</sup>

Figures for the population exposed to ETS mainly come from epidemiological studies employing questionnaires based on the subjective reports of the participants.<sup>1</sup> The prevalence of exposure to ETS in nonsmokers varies considerably by country and place of exposure. Thus, studies have reported 50% of the population being exposed to ETS in the work environment in Hong Kong<sup>10</sup> and Switzerland<sup>11</sup> or only 16% in

Finland.<sup>12</sup> Most studies report that the proportion of those exposed to ETS at home is less than at work.<sup>12,13</sup> In Spain, population surveys have not included passive exposure until recently. Thus, in Barcelona (Spain), the prevalence of exposure to ETS among nonsmokers in 2002 was 61.1% among men and 59.4% among women, only taking into account exposure at home and work.<sup>14</sup> If exposure during leisure time is also taken into account, prevalence was 69.5% among men and 62.9% among women, as reported by a study conducted in Cornellà de Llobregat (Barcelona, Spain).<sup>15</sup> These figures, however, may have changed after the new law on smoking and health was implemented. In order to protect the health of nonsmokers, this law prohibits tobacco use in all public places and workplaces (unless they are in the open air), and with certain exceptions in the catering and hospitality sectors.<sup>17,18</sup>

The main aim of the present study was to investigate the prevalence of exposure to ETS among the Spanish adult nonsmoking population in different exposure contexts (home, workplace or educational center, during leisure time and on transportation), as well as the prevalence of active tobacco use in the total population.

## METHODS

This was a cross-sectional study of a representative sample of the adult population (age  $\geq 18$  years). The theoretical sample size was 2500 people to obtain a total margin of error of  $\pm 2\%$  for a 95% confidence interval (CI) and  $P=q=0.50$ . The theoretical sample was adjusted by regional community, size of residential municipality, sex, and age group, and, in the case of nonresponders, substitutions were allowed using participants from the same strata. Participants were selected by telephone survey in two phases: in the first phase, homes were randomly chosen from a directory of fixed telephones, and in the second, a person from the home was selected who would respond to the survey, based on the sample strata. The final sample included 2538 people, obtaining a total of 2522 valid surveys (1221 men and 1301 women).

A telephone questionnaire on exposure to ETS was developed within the framework of a European study,<sup>19</sup> based on questionnaires used in previous research.<sup>14,15,20,21</sup> People were defined as smokers if they smoked at least 1 cigarette a day (people who only smoked cigars, small cigars, or pipes were not included; this group formed less than 1% of the prevalence of tobacco use). Questions on exposure to ETS were divided according to the environment in which exposure could take place. Thus, hours of passive exposure per day were quantified at home, in the workplace or educational center and during leisure time, distinguishing between working and nonworking days. Exposure on transportation (public and private) was collected through a dichotomous exposure variable (no/yes) for the following environments: subway train or tram, subway or tram station, train, train

station, bus, bus stop or station, taxi, private car, and airport. Based on the quantitative questions on exposure, dichotomous variables were created for each environment ("unexposed" for 0 h/d exposure and "exposed" for >0 h/d exposure). A dichotomous variable was also constructed for "general exposure" or in any environment, for subjects reporting exposure to ETS at home, in the workplace or educational center, during leisure time or while using some form of transport.<sup>15</sup> Age was coded in three categories (18-39 years, 40-59 years and  $\geq 60$  years), as well as the level of education (primary or lower, secondary and university).

Professional interviewers conducted the telephone surveys during June and July 2006. All people  $\geq 18$  years were included who gave oral consent to the telephone survey and answered the questions on active or passive smoking.

A descriptive analysis was conducted on the prevalence of exposure to ETS and tobacco use based on sex, age and educational level (95% CI). Given the marked differences in age, the combined estimations of prevalence were age-adjusted or age-standardized using the direct method, based on a projected Spanish reference population  $\geq 18$  years old in 2006, according to data from the Spanish National Institute of Statistics.<sup>22</sup> Medians (h/d) were calculated for exposure to ETS at home, in the workplace, educational center and during leisure time for men and women, as these variables did not follow a normal distribution. A *P* value of 5% was considered statistically significant. All analyses were performed using SPSS statistical software, version 13 (SPSS, Chicago, Illinois, USA).

## RESULTS

A total of 73.3% of men and 78.9% of women reported themselves as nonsmokers. In this sample of nonsmokers, the prevalence of exposure to ETS in any of the 4 environments studied (general exposure) was 72.2% (95% CI, 70.4-74), with no significant difference between sexes (74.3% among men and 70.1% among women). A trend was observed in both sexes of a decrease in general exposure to ETS with age, ranging from 88% among those <40 years to 50.2% among those >59 years among men (linear trend,  $\chi^2=112.2$ ; *P*<.05) and from 82.1% to 47.5% among women, respectively (linear trend,  $\chi^2=103.1$ ; *P*<.05). It was found that, among women, exposure to ETS was more common among those with a higher level of education (linear trend,  $\chi^2=16.1$ ; *P*<.05), but this was not the case among men (Table 1).

A total of 29.2% (95% CI, 27.2-31.2) of nonsmokers reported exposure to ETS at home, with no significant difference between sexes, although there was a significant difference according to age (decreased exposure as age increased). Regarding educational level, passive exposure to ETS at home was somewhat greater among those with

a lower level of education (Table 1). The median for exposure at home was 1 h/d, with no significant differences between men and women. When exposure at home was compared by working or nonworking day, it was found that both men and women underwent greater exposure during nonworking days, although these differences were not statistically significant (Table 2).

A total of 35% (95% CI, 27-43) of nonsmokers who worked or were students reported being exposed to ETS in their workplace or educational center, with no significant difference according to sex (Table 1). There was an age-related trend toward decreased exposure to ETS at work or in the educational center: from 40% among those <40 years to 31.8% among those >59 years among men (linear trend,  $\chi^2=12.3$ ; *P*<.05) and from 40.8% to 30% among women, respectively (linear trend,  $\chi^2=10.3$ ; *P*<.05) (Table 1). No obvious pattern emerged in relation to exposure according to educational level. The duration of exposure at work or in educational centers was equal in both sexes (median, 1 h/d).

During leisure time, 56.2% (95% CI, 54.1-58.3) of the sample of nonsmokers reported exposure to ETS. The prevalence was higher in men (61.1%; 95% CI, 58.1-64.1) than in women (51.9%; 95% CI, 49-54.8; *P*<.05), although the intensity of exposure was similar in both sexes (median, 1 h/d). A statistically significant age-related trend of decreasing exposure was found in both sexes during leisure time (Table 1). Among women, exposure to ETS during leisure time was more frequent among those with a higher level of education (linear trend,  $\chi^2=38.8$ ; *P*<.05) (Table 1). When exposure was compared based on the day of the week, it was found that exposure was greater during nonworking days in both in men and women, with significant differences according to age (Table 2).

Exposure to ETS in transportation was greater among women (45.5%; 95% CI, 41.8-49.2) than men (37.2%; 95% CI, 33.3-41.1; *P*<.05) (Table 1). No clear linear trend emerged among men in relation to age. There was an age-related decrease in exposure to ETS among women that did not reach statistical significance. An inverse pattern of exposure according to educational level was observed, with exposure being greater in people with a higher level of education, although this did not reach statistical significance. The prevalence of exposure to ETS differed according to the mode of transport. Thus, among people using some form of transport, 25.8% (95% CI, 22.5-29.4) of men reported exposure to ETS at bus stops, 11.3% (95% CI, 9-14.1) in private cars, and 8% (95% CI, 6.1-10.4) in train stations, whereas among women exposure was 35% (95% CI, 31.5-38.7), 11.9% (95% CI, 9.6-14.5), and 9.9% (95% CI, 7.9-12.4), respectively (Figure). Given the high exposure at bus stops, which are usually in open buildings or in the open air, we also calculated the prevalence of ETS in transportation without this source of exposure, obtaining a prevalence of 28.1%

**TABLE 1. Prevalence (%) and 95% Confidence Interval for Exposure to Environmental Tobacco Smoke of Nonsmokers According to Sex, Age, Site of Exposure and Educational Level**

	Men				Women			
	%	95% CI	Trend $\chi^2$	P	%	95% CI	Trend $\chi^2$	P
General								
Total <sup>a</sup>	74.3	71.6-77			70.1	67.5-72.7		
Age								
18-39 y	88	84.3-90.9			82.1	77.8-85.7		
40-59 y	75.6	70-80.4			71.1	65.7-75.9		
≥60 y	50.2	44.1-56.3	112.2	<.05	47.5	42.4-52.5	103.1	<.05
Education <sup>a</sup>								
Primary	72.1	66.8-77.4			63.2	56.1-70.3		
Secondary	73.9	68.8-79			77.3	71.9-82.7		
University	74.3	68.1-80.5	0.4	.509	76.1	68.8-83.4	16.1	<.05
Household								
Total <sup>a</sup>	26.4	23.5-29.3			31.4	28.5-34.3		
Age								
18-39 y	31.7	27.2-36.5			36.9	32.1-42		
40-59 y	25.6	20.6-31.2			28.3	23.5-33.6		
≥60 y	18.7	14.4-24	13.2	<.05	25.7	21.6-30.4	11.8	<.05
Education <sup>b</sup>								
Primary	28.2	22-34.4			33.2	25.3-41.1		
Secondary	26.4	22.1-30.7			34.9	28.7-41.1		
University	21.8	17.1-26.5	2.9	.089	28	20.9-35.1	0.9	.324
Workplace or educational center <sup>b</sup>								
Total <sup>a</sup>	9.8	33.5-46.1			30.7	24.2-37.2		
Age								
18-39 y	40	34.8-45.4			40.8	35.2-46.7		
40-59 y	24.4	18.7-31.3			25.2	18.8-32.9		
≥60 y	31.8	16.4-52.7	12.3	<.05	30	14.6-51.9	10.3	<.05
Education <sup>a</sup>								
Primary	27.7	19.7-35.7			23.8	13.7-33.9		
Secondary	38.6	33.2-44			41.7	35.0-48.4		
University	29.2	24.3-34.1	0.2	.684	21.8	15.9-27.7	1.2	.277
Leisure time								
Total <sup>a</sup>	61.1	58.1-64.1			51.9	49.0-54.8		
Age								
18-39 y	77.5	73-81.4			66.9	62.0-71.6		
40-59 y	60.9	54.8-66.6			52.3	46.7-57.9		
≥60 y	33.9	28.3-39.9	120.5	<.05	23.9	19.8-28.4	141.5	<.05
Education <sup>a</sup>								
Primary	58.3	52-64.3			40.3	32.1-48.5		
Secondary	61.2	55.8-66.6			54.9	48.8-61		
University	58.3	52.9-63.7	0	.948	62.7	53.8-71.6	38.8	<.05
Transportation								
Total <sup>a</sup>	37.2	33.3-41.1			45.5	41.8-49.2		
Age								
18-40 y	41.6	36.1-47.4			49.2	43.2-55.3		
40-59	32.5	25.8-40			44.9	38.3-51.7		
≥60 y	35.2	27.9-43.2	4.2	.123	41.1	34.5-48.1	3	.22
Education <sup>a</sup>								
Primary	33.4	26.5-40.3			42.8	35.2-50.4		
Secondary	33.8	28.2-39.4			47.9	40.3-55.5		
University	40.7	35-46.4	2.5	.117	49	41.4-56.6	1.6	.203

CI indicates confidence interval.

<sup>a</sup>Age-standardized using the direct method.<sup>b</sup>This includes the workplace or educational center.

**TABLE 2. Prevalence (%) and 95% Confidence Interval for Exposure to Environmental Tobacco Smoke of Non-Smokers at Home and During Leisure Time According to Day of the Week and Age**

	Men				Women			
	Working Day		Nonworking Day		Working Day		Nonworking Day	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
At home								
Total <sup>a</sup>	19.8	17.2-22.4	23.3	20.5-26.1	24.7	22-27.4	28	25.2-30.8
Age								
18-39 y	23.3	19.3-27.8	27.7	23.5-32.4	26.7	22.4-31.5	33.1	28.4-38.1
40-59 y	19	14.7-24.2	22.1	17.5-27.5	23.7	19.5-28.8	25.3	20.8-30.5
≥60 y	14.7	10.9-19.7	16.7	12.6-21.8	22	18.1-26.5	22	18.1-26.5
Leisure time								
Total <sup>a</sup>	48.1	44.9-51.3	50.4	47.3-53.5	38	35-41	44.4	41.5-47.3
Age								
18-39 y	57.6	52.6-62.5	67.5	62.7-72	47.7	42.6-52.8	59	53.8-63.9
40-59 y	51.6	45.5-57.6	47.3	41.3-53.4	38.5	33.2-44.1	41.8	36.4-47.4
≥60 y	29.1	23.8-35	24.7	19.8-30.4	18.8	15.1-23	20.4	16.6-24.8

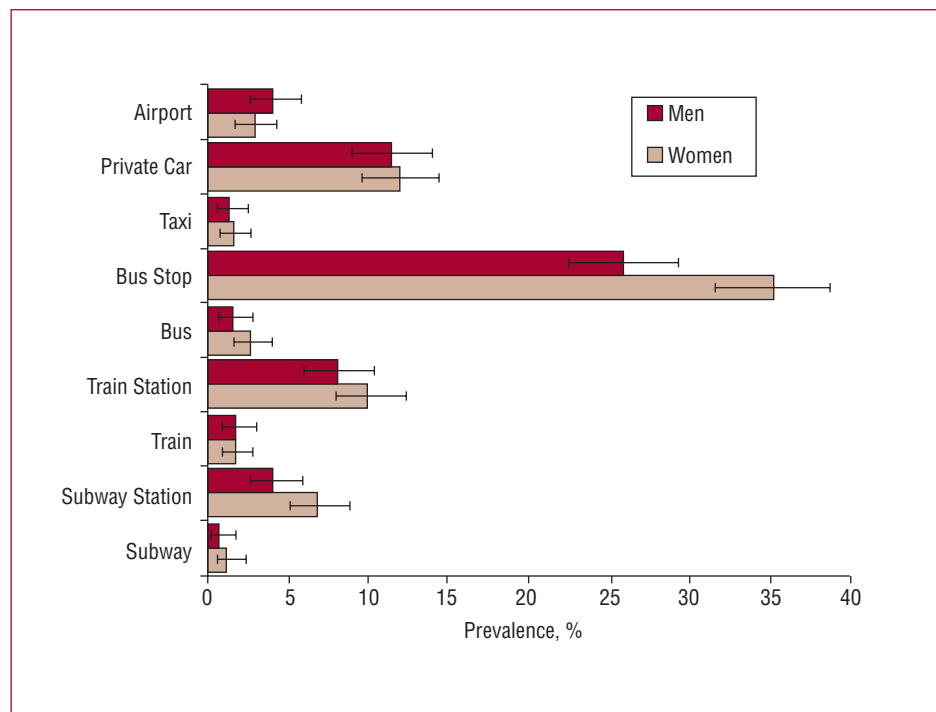
<sup>a</sup>Age-standardized using the direct method.

(95% CI, 24.2%-32%) among men and 33.2 (29.4-40%) among women.

The age-adjusted prevalence of smokers (daily and occasional) among men was 26.7% (95% CI, 24.3-29.1) and 21.1% (95% CI, 18.9-23.3) among women (Table 3). After adjusting for age, a decreasing trend was observed in the prevalence of smokers among people with a higher level of education in both men and women (linear trend, men,  $\chi^2=9.42$ ;  $P<.05$ ).

## DISCUSSION

This study presents the first data on passive exposure to ETS and tobacco use in a representative sample of the adult Spanish population after the new health law on smoking was implemented. Nearly three-quarters of the adult nonsmoking population are exposed to ETS in some of the four environments studied. Both men (61.1%) and women (51.9%) reported greater exposure to ETS during leisure time, followed by transportation for women



**Figure.** Prevalence (%), age-standardized using the direct method, and 95% confidence interval for exposure to environmental tobacco smoke in nonsmokers using transportation (n=1267).



**TABLE 3. Prevalence (%) and 95% Confidence Interval for Smokers, Former Smokers, and Non-Smokers by Sex, Age and Educational Level**

	Men						Women					
	Smokers (Daily + Occasional)		Former Smokers		Never Smoked		Smokers (Daily + Occasional)		Former Smokers		Never Smoked	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Total <sup>a</sup>	26.7	24.3-29.1	36.6	34.1-39.1	36.7	34.1-39.3	21.1	18.9-23.3	19.1	17-21.2	59.8	57.3-62.3
Age												
18-39 y	29.7	26-33.6	21.4	18.1-25	49	44.8-53.2	31.8	28-35.8	22	18.9-25.7	46.2	42.1-50.5
40-59 y	33.2	28.7-38	39.9	35.1-44.9	26.9	22.8-31.6	22.3	18.4-26.6	24.8	20.8-29.3	52.9	48.0-57.8
≥60 y	14	10.5-18.5	58.9	53.2-64.4	27.1	22.3-32.4	1.3	0.6-3.1	8.7	6.3-12	89.9	86.5-92.6
Educational level <sup>a</sup>												
Primary or lower	34.3	29.1-39.5	33.9	29.3-38.5	32	26.9-37.1	27.9	22.4-33.4	15	11.3-18.7	57.2	51.9-62.5
Secondary completed	25.1	21.1-29.1	40.3	35.5-45.1	34.3	29.5-39	24.8	21.1-28.5	23.6	18.8-28.4	57.2	53.1-61.3
University	22.7	17.5-27.9	37.6	32-43.2	39.4	34.1-44.7	17.7	12.4-23	28.7	22.3-35.1	53.7	47-60.4

<sup>a</sup>Age-standardized using the direct method.

(45.5%) and at work or educational center for men (39.8%).

Taking into account the environments of exposure, the current prevalence is somewhat lower than that found in previous studies conducted in 2002 in Barcelona, Spain<sup>14</sup> and Cornellà de Llobregat, Spain.<sup>15</sup> The Encuesta Gallega de Consumo de Tabaco (Galician Survey of Tobacco Use) conducted between December 2004 and January 2005, before the implementation of the antismoking law, obtained very similar results to those found in the present study on exposure to ETS in the total study population, although the differences in exposure were more pronounced by sex (80.5% among men and 68.2% among women).<sup>16</sup> The preliminary results of another Spanish survey, which was conducted shortly before law 28/2005 became effective, indicate that 29.5% of nonsmokers were exposed to ETS at home and 25.8% at work.<sup>23</sup>

The reduction in active tobacco use together with the decrease in the prevalence of general ETS exposure seems to indicate that the new legislation on controlling smoking and protecting passive smokers appears to be effective. However, despite the current law that prohibits smoking in enclosed public places and workplaces, the prevalence of exposure to ETS is still very high at work or in educational centers (35%). This prevalence is higher than that observed among smokers in Ireland<sup>24</sup> (14%) after the complete prohibition of tobacco use at work, and higher than that found in a study conducted in the Region of Madrid, where the prevalence of occupational exposure was 9% after the law was implemented.<sup>25</sup> Possible explanations for these differences include the different geographical and temporal frameworks of the 2 studies and, in particular, that our study included exposure in educational centers. Specifically, 65% of the 163 students in our survey reported being exposed. If these were excluded, the prevalence of occupational exposure would be 28%. Furthermore, different questions

were employed in the questionnaire used to measure occupational exposure: in the study by Gallant et al<sup>25</sup> a person was considered to have been exposed to ETS if he/she positively answered the question “do you have a workmate who smokes near you at work (such that the smoke reaches you)?”, whereas our study asked for details on hours of exposure per day (“how many hours a day do you think you are exposed to tobacco smoke on average?”). This question could identify a greater number of exposed people, since it includes not only the respondents exposed by workmates who smoke near them, but also exposure to tobacco smoke in other communal areas at work, such as rooms used for breaks, meeting rooms or even at the workstations of people who smoke and that the respondent has to frequent.

The high prevalence of exposure at work suggests a certain degree of noncompliance with the new legislation and that will have to definitely improve in the near future. In this regard, it is worth noting that the survey was conducted during June and July 2006, that is, barely 6 months after the law was implemented, and that this may have led to a lack of compliance due to the law being new or perhaps because of a certain level of relaxation in standards after the initial months had passed. Furthermore, these results could vary according to the type of work, since in the hotel sector the smoking ban is restricted to sites >100 m<sup>2</sup> and thus has a minimal impact on the health of these types of worker.

Although the relative prevalence of exposure during leisure time is lower, since this takes up less time (although in some cases smoking exposure can be very intense),<sup>20</sup> it is noteworthy that in Spain 50%-60% of nonsmokers report themselves as being exposed. Much of this exposure has to occur in bars, restaurants, discotheques, or music pubs and other places connected with the hotel and catering industry that have remained de facto outside the ambit of the law. It has been estimated that 80% of these

types of site with <100 m<sup>2</sup> surface area have chosen to allow unrestricted smoking.<sup>26</sup> Unlike the Spanish law, Irish legislation prohibits tobacco use in all work places—pubs, bars and restaurants included—with the result that the prevalence of exposure in these leisure zones is barely 5%.<sup>24</sup>

The high prevalence of exposure to ETS in transportation is noteworthy, given that law 28/2005 and previous legislation had already prohibited tobacco use on public transport. However, it is worth noting that we included public and private transport and not only exposure in vehicles, but also at stops, stations and airports. Law 28/2005 does not limit tobacco use in open spaces, such as at most bus stops, and allows for rooms isolated from smokers in non-open-air stations and airports. The results of our study show that a large number of nonsmokers perceive themselves as being exposed in these places, even though up to now these sources of exposure have not usually been taken into consideration.<sup>11,12,14</sup>

This study shows that 26.7% of men and 21.1% of women are daily or occasional smokers. These results match the prevalence (26.2% among men and 21.4% among women) reported by a survey on tobacco use conducted in November 2006 by the Centro de Investigaciones Sociológicas (Center of Sociological Research) on a representative population sample of 1501 Spanish people aged ≥18 years by telephone interview.<sup>27</sup> These figures indicate a decrease in prevalence among men and its stabilization among women when compared to figures obtained during the 1990s.<sup>28</sup> Furthermore, a clear decreasing trend was found in the prevalence of smokers among people with higher levels of education. This smoking distribution pattern matches the beginning of phase IV of the descriptive model of the smoking epidemic.<sup>29</sup>

### Study Limitations

Among the limitations of this study, we note that the information obtained by the questionnaire could be biased as it reflects subjective exposure and this could well underestimate real exposure to ETS. However, preliminary analyses indicate a clear association between the exposure to ETS reported in this questionnaire and cotinine concentrations in saliva,<sup>21</sup> in addition to being appropriate to estimate general exposure (sensitivity of 75.8% for exposure in any place and specificity of 80.6% for perceived exposure in at least three environments).<sup>30</sup> The survey was conducted in June and July, that is, in summer, when temperatures already begin to be high throughout Spain and thus enclosed spaces are better ventilated (naturally or artificially). If this is the case, then the perception of being exposed to ETS could be biased by a tendency to underestimate real exposure, leading to underestimations in the results, although this would occur nondifferentially in relation to the main variables of the

study. Unfortunately, information is not available from cross-sectional studies conducted before the law was implemented such that direct comparisons could be made of the prevalence of exposure before and after this event, unlike a previous study conducted in the Region of Madrid.<sup>25</sup> The range and representativeness of the sample, together with substitutions by people of equal age, sex and population characteristics in the case of nonresponse, mean that possible biases in participant selection can be ruled out. A further supporting factor is provided by the consistency of our results on tobacco use with those obtained in 2006 by a survey conducted by the Centro de Investigaciones Sociológicas (Center for Sociological Research), since it is very unlikely that the same type of error would occur in surveys developed completely independently.

### CONCLUSIONS

The proportion of people exposed to ETS is still very high in Spain. Specifically, special care should be taken in working environments or educational centers regarding exposure to ETS, which continues to be elevated despite law 28/2005 on health and smoking being implemented and that prohibits the consumption of tobacco in these places. In the light of this, it is clear that greater efforts must be made to change the social norm that smoking, both active and passive, is acceptable. Increased knowledge on the harmful effects of involuntary exposure to ETS on health leads to the approval of and support for smoking control policies.<sup>24,25</sup> It is essential to change perceptions and social awareness regarding the risks of passive smoking and, at the same time, legislators should extend the prohibition of tobacco consumption to all catering establishments and intensify measures aiming at compliance in all work places. Only by these means can real reductions in exposure to ETS be obtained.

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