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Environmental tobacco smoke risk perception and smoking behavior in Portugal

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ABSTRACT

This study analyzes public attitudes towards environmental tobacco smoking (ETS) risks, ETS legislation and smoking behaviors using recent data from Special Eurobarometer 272 that is a unique database on public perception of ETS. Some major conclusions are drawn: (1) both smokers and non-smokers are aware of health consequences from ETS, (2) moderate and heavy smokers tend to be less concerned with seriousness of the health consequences, (3) that the belief that ETS increases the risk of a serious disease decreases the probability of being smoker, (4)ETS beliefs do not affect the quitting decision, (5) those who smoke at home appear to be aware of health consequences of ETS, (6) ETS health risk beliefs is negatively associated with the number of cigarette consumed.

JEL classification: I12, I 18, D80

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I. Introduction

For many years smoking has been viewed as posing serious health risks to the smoker and identified as the single greatest cause of preventable death (WHO 2003). More recently, the potential effects of exposure to environmental tobacco smoke (ETS) have also received an increased scrutiny. Evidence of the health impact of ETS on health has been building up over the past two decades. Several epidemiological studies have found a weak, but consistent association between health problems in non-smokers and ETS. Comprehensive reviews link ETS to heart diseases, sudden infant death syndrome, lung and nasal sinus cancer, as well as serious effects on fetus and childhood health consequences [US National Research Council (1986), USDHHS (1986, 1988), US Environmental Protection Agency(1993), California Environmental Protection Agency (1997), WHO(1999)]. Although health risks appear to be small when compared to those from active smoking, the diseases associated with ETS are common and therefore the overall health impact can be large. The number of attributed deaths is still in dispute. The US Environmental Protection Agency (1993) and The Centers for Disease, Control and Prevention (2005) claim that passive smoking kills around 50,000 annually. The California Environmental Protection Agency (1997) estimates that ETS is responsible each year for 3000 deaths from lung cancer, 35000 to 62000 deaths from ischemic heart disease and 1900 to 2700 sudden infant deaths. López et al. (2007) estimated that deaths attributable to ETS in Spain ranged from 1228 and 3246, in 2002. The economic costs are substantial: Behan et al. (2005) estimated that the US annual costs for conditions associated with ETS, excluding the economic losses related to pregnancy and the new born, were over $5billion in direct medical costs and $5billion in indirect costs.

A number of studies have shown that adults have substantial awareness of the health risks posed by smoking [Viscusi (1990, 1992), Liu and Hsieh (1995), Antoñanzas et al. (2000), Rovira et al. (2000), Hakes and Viscusi (2007), Lunborg and Lindgren (2004), Costa-i-Font and Rovira-Forns (2005)] , individuals tend to have incomplete knowledge of the effects of smoking [Kenkel (1991), Hsieh et al. (1996)]. There is still a debate if individuals overestimate the risks [Viscusi (1990, 1992), Liu and Hsieh (1995), Antoñanzas et al. (2000), Rovira et al. (2000), Lunborg and Lindgren (2004), Hakes and Viscusi (2007)] or, in opposite, underestimate the risks [Hammar and Johasson-Stenman (2204), Costa-i-Font and Rovira-Forns (2005)], when compared to scientific evidence. Nonetheless, it appears to be consensual that knowledge and high risk beliefs decrease the likelihood of being smoker and the amount of smoking [Viscusi (1990, 1992), Lunborg and Lindgren (2004), Kenkel (1991), Hsieh et al. (1996)].

While ETS risks appear to be lower and non-consensual, the public attention to these risks has been considerable and increasing. Influencing people's beliefs concerning ETS has been a primary focus of government interventions. As consequence one might expect a potential overestimation of risks. Rovira et al. (2000) explored an original dataset from Spain and found that indeed risks beliefs on ETS are high and as well dwarfing scientific evidence.

Rovira et al. (2000) found a strong correlation between risk beliefs regarding active and passive smoking. Therefore, we may anticipate that passive smoking risks beliefs are associated with ETS smoking decisions, as well as general smoking decisions. We will explore this hypothesis in this paper.

The study has two main goals: (1) Explore the Eurobarometer data on public perception on ETS and ETS legislation, (2) Understand the role of beliefs on smoking decisions. Moreover, the role of demographic and social factors that drive smoking behavior and risk beliefs is also of substantial interest in this paper. We are aware that our risk awareness measure is imperfect and therefore this should be viewed as an exploratory study.

The paper is organized as follows: Section II resumes the ETS regulatory environment in Portugal. Section II briefly presents the data. Section IV describes the dataset on smoking behavior, on ETS awareness, ETS behavior and on acceptance of legislation. Section V presents and discusses the results. Section VI concludes the paper.

II. ETS regulatory environment in Portugal

For long, the importance of legislation on smoking has been enhanced at different times by the several organizations such as WHO, Council of Europe and European Union. In Portugal the first legislation efforts began in the end of the 50's. Since then, following the international approach, there has been an increasing legislation effort to regulate use, sales, advertising and risk information. The Portuguese law was made more coherent in 1983 with the creation of the Council for Smoking Prevention (CPT), a body responsible for the implementation of measures and programs to reduce the consumption of tobacco.

A main focus of the smoking regulatory environment aims at protecting citizens from the harmful effects of involuntary exposure. In last decades restrictions have been held to smoking in enclosed spaces such as theaters, sports arenas, public services, health services, schools, museums, libraries, lifts, public transport and places with fire risk[1,2,3,4]. From January 2008 smoking is not

[1] Decree-Law n.º 42 661, of November 20, 1959
[2] Decree-Law - n.º22/82, of August 17, 1982
[3] Portaria n.º 23 440, of June 19, 2003
[4] Decree-Law No. 283, of September 17, 1998

allowed in public areas except in some business areas under very strict conditions. The new legislation increased the public debate on the consequences of ETS.

Additionally, there has been an increasing effort to inform and to educate on health risks associated with tobacco consumption. Since 1990, legislation requires that all packs of cigarettes have to display messages on both sides warning about the harmful effects of tobacco, the levels of nicotine and classification referencing the contents of tobacco.[5,6] Recently an EU Directive was transposed into national law[7] which regulates such matters, including the levels, and their measurement, of nicotine, tar, carbon monoxide and additives. The law also updated the health warning messages on packages and prohibited expressions that suggest that certain tobacco products are safer than others, such as the use of terms light, ultra-light, soft, etc Typical ETS warnings are followers: "Protect the children: do not make them breathe your smoke"; "If you are pregnant: smoking harms the health of your child"; "Smoking seriously harms you and those who surround you". Government bodies sponsor information campaigns aimed at communicating health consequences on media, health facilities and schools.

III. Data

The main cross sectional data used in this study came from Special Eurobarometer 272. The survey was conducted during November ad December in 2006 in 30 European countries, including 27 member states, covering different social and health topics, including smoking habits, passive smoking exposition and ETS risk perceptions. The Portuguese sample consisted in 1006 respondents older than 15 years, of whom 38% were males. The data includes demographic variables, health status variables, information on smoking behavior, ETS exposition and awareness. Sample weights are considered in the analysis.

Additionally, we use data from Eurobarometer 38 carried out in 1992 in 15 European Union countries, for comparative purposes. Although the two surveys are not fully comparable, the analysis gives insights on the evolution of ETS awareness. The Portuguese sample consisted of 1000 respondents older than 15 years.

Data on demographic and health status variables from Special Eurobarometer 272 are presented in table 1. Unfortunately, Eurobarometer data has no good information on income and education. This is an important limitation of the analysis. The occupation variables likely capture part of the education effect. The number of durable goods, from a previous list, is taken as a proxy

[5] Decree-Law No. 253/90 of August 4 1990, Decree-Law No. 200/91 of May 29, 1991
[6] Portaria No. 821/91 of August 12, 1991
[7] Decree-Law No. 25/2003 of 4 February, 2003

for income. Detailed information on smoking variables, risk awareness and legislation support are presented in next sections.

(Table 1 here)

IV. Exploratory analysis of the data

4.1 Smoking behavior

Several dummy variables were created to describe smoking behavior (SMOKE, QUIT, REGULAR, CIGARETTE, LIGHT, MODERATE and HEAVY) (table 1). The current smoking status breakdown indicates a relative low smoking prevalence when compared with average incidence in the European Union countries. In the 2006 survey, almost 64% of respondents declared that they have never smoked, 11.6% declared that they have stopped smoking and 24% were self-reported smokers.[8] Data from all Eurobarometer sample shows that on average, 32% of Europeans are smokers, 47% have never smoked and 21% have quitted smoking. According to the survey data, Portugal ranks second among the EU27 countries with lower incidence of smoking (following Sweden with 18% of smokers). Moreover, the evidence suggests that smoking prevalence is decreasing over the last decade; in 1992 survey more than 25% of respondents were smokers.

As expected the majority of smokers (89%) do it in regular basis, and the most popular product is packed cigarettes (96% among smokers). Approximately 28.6% are "light smokers", while 33.3% are "moderate smokers", and 38.2% are "heavy smokers". The distribution of number of cigarettes, by intervals, smoked daily is presented in table 2.

(Table 2 here)

An analysis of the socio-demographic variables shows that men are more likely to smoke than women (35.1% against 13.9%). Almost 80% of women have never smoked compared to just 48% of men. Moreover, the youngest and oldest age groups score highest amongst the people who have never smoked. On average smokers tend to be older than non-smokers: Average age of smokers is 47 years and for non-smokers is 38 years old. It also appears that the people less likely to be smokers are those who look after the household (4%), retired (9.8%) and students (19%).

[8] The percentage of current smokers in this study is higher than expected. According to the 1998/99 INS smoking prevalence in Portugal is 19.2%.

4.2. ETS awareness

Both 1992 and 2006 surveys asked respondents about ETS consequences. Although the questions have different formulations, responses are comparable. Data is reported in table 3.

(Table 3)

We are aware that responses are not perfect measure of ETS risk beliefs or make possible to determine whether the public perceives risk accurately. Nonetheless they provide useful information for an exploratory analysis of health risk perception.

The belief that exposition to a tobacco environment can cause illness has dramatically increased over the last decade. In 1992 less than 50% of the respondents believed that passive smoking could cause health problems, against almost 80% in 2006. In 2006, 34.1% of respondents believed that smoking can cause some health issues such as respiratory problems, and 44.5% believed that smoking can cause serious illnesses, such as cancer. The proportion of people that considered smoking harmless was small and had decreased compared to 1992. Nonetheless, Portuguese appear to have a lower estimation of the potential serious health risks of ETS, compared mean values for the surveyed countries .

An analysis of the results in socio-demographic terms reveals that women are slightly more likely to associate smoking to health risks (81% vs. 78%) and are slightly more likely to believe that passive smoking can result serious health problem than men ((47% vs. 43%). Moreover, non-smokers (54%) are considerably more likely to believe that passive smoking can cause serious health problems than smokers (34%).

(Table 4 here)

4.3 ETS behaviors and ETS exposition

The majority of Portuguese households implement some non-smoking policy. In 29.1 % of households smoking is never allowed, in 11.9% of households smokers can smoke only outside and in a 3% further of households smokers voluntarily do not smoke. In 17.7% of households, smokers can only smoke in certain rooms and in 4% of households, smoking is not allowed, but there are exceptions at times. In 33.9% there are no smoking norms.

(Table 5)

Nonetheless, almost 77% of the smokers report to smoke alone at home at least occasionally (18%). Differences in (mean) health risk perception between those who smoke at home and those who do not smoke are not statistically significant (Uncorrected chi2(2) = 0.443, P = 0.821). Moreover, 37% of smokers do not smoke at home in the presence of non-smokers, while 69% do not smoke at home in front of children at and 77% do not smoke in front of pregnant woman. The difference in (mean) risk perception between smokers who smoke or not in presence of others is statistically significant only at 10% level (Uncorrected chi2(2) = 5.970, P = 0.060).

Approximately half of the smokers (48%) state that they never smoke inside a car in presence of non-smokers, 84% do not smoke in car in the presence of children and 85% do not smoke in the car in front of pregnant woman. The decision to smoke or not in presence of others inside the car is not statistically associated with reported health risk beliefs (Uncorrected chi2(2) = 3.325, P = 0.228). Overall, the results suggest that the message warning that passive smoking may harm fetuses is the most successfully one. Comparing to 1992 data, the results suggest that smokers' concerns about the impact of passive smoking have significantly increased.

Despite the restrictions 45.5% of the respondents are still exposed to smoking at home, and 7.6% are exposed more than 5 hours a day. Almost one third of the respondents (31%) are exposed to smoking environment in the work place, 6% are exposed for more than 5 hours at work.

4.4 ETS laws acceptance

For long there has existed a favorable environment for anti-smoking laws. In the 1992 survey, 95% of the respondents were strongly or somewhat in favor of smoking legislation and 90% were favorable to laws to stop tobacco advertisement (Table 6).

(Table 6)

The 2006 survey addressed anti-ETS legislation. Attitudes towards ETS policies were assessed with a 4 points rating scale. The majority of European citizens are in favor of smoke-free regulations (Table 7). An overwhelming majority are favorable to a smoking ban in indoor workplaces (93%), in indoor public space (92%) and smoking ban in restaurants (85%). Nonetheless, never-smokers show a stronger opinion on banning smoking in restaurants (76% totally agree), indoor workplace (84% totally in favor) as well as indoor public space (83.7% totally agree). The other socio-demographic characteristics reveal no significant differences on this question.

(Table 7)

Support seems to be less evident for smoking bans in bars and pubs. Nonetheless the large majority of the respondents are favorable to restrictions in bars and pubs. The majority of non-smokers totally (61%) or somewhat (19.2%) support a smoking ban when compared to a minority of smokers (25% totally agree, 19% somewhat agree) supporting the ban. Women's overall support (80%) for smoke-free bars and pubs exceeds that of men (67%). Moreover, the oldest respondents tend to be more supportive when compared to young respondents.

There is a general knowledge of the existence of anti-smoking laws but also a general skepticism about their compliance: 95.3% of respondents believe that smoke-free laws exist but only 35.8% believe that the laws are respected.

V. Regression estimates

5.1. Regression estimates of the determinants of risk beliefs

Table 8 provide Probit estimates where the dependent variable is the binary variable for whether the respondent beliefs that ETS can cause health problems (HEALTH). Marginal effects are reported. A simultaneity problem may exist in the Probit equation with smoking variable; if smoking status is endogenous one equation Probit estimation would be biased. This possibility was explored and rejected.[9] Past smoking decision (QUIT) is predetermined and then can be treated as

[9] We estimated a bivariate Probit model. To identify the model the model we used the instrumental variables method. We excluded the variables age, age2, and alcohol from the HEALTHC model and used those variables as instruments for smoking behavior. Wald test could not reject the null hypothesis of exogeneity. The test of over identification restrictions for the excluded instrumental variables is also passed

exogenous. The consistency of one-model Probit estimates has been also reported by previous studies [Hakes and Viscusi (2007)].

The low explanatory power of the models suggests that factors other than those considered account for smoking risk perceptions. Because the principal goal is to test our hypothesis with respect to the determinants of the health risk belief rather than make predictions, the relatively low explanatory power of the regressions is not very disturbing.

In order to examine the robustness of the results the first equation in table 8 omits the smoking behavior variables. Demographic variables appear to not influence health risk perception of passive smoking. We cannot support previous claims than women tend to have higher risk beliefs [(Hakes and Viscusi (2007)]. Since young people were raised in a strong anti-smoking environment we would expect to find a negative impact of age. [Viscusi (1992); Hakes and Viscusi (2007)], but we did not find a statistically significant association. Household characteristics are thought to affect one's risk attitudes [Hakes and Viscusi (2007)]. Nonetheless we did not find that presence of children influence the likelihood of health risk beliefs, nor does number of durables goods at home. Only married status appears to affect the likelihood for identifying ETS with health risk. Nonetheless the estimated coefficient is small and the statistical evidence is weak. Surprisingly those who drink are not more likely to report concerns on ETS related health risks that those who do not drink: the estimated coefficients are small and not statistically significant.

People who report very good health status (omitted variable) tend to have lower health risks perception. There are no significant differences on the estimated coefficients for other health status. Individuals suffering from asthma are less aware of health complications from ETS. Smoking exposure at home appears to slightly increase the likelihood of health risk beliefs but the estimated coefficient is not statistically significant at conventional levels. Risk beliefs associations are not clearly associated; Individuals that are more concerned with electromagnetic risks are more likely to associate ETS with health problems. On opposite, people that report cholesterol tests are less likely to associate ETS to health risks.

The second equation includes dummy variables identifying current smokers (SMOKE) and those that quit (QUIT). Overall the inclusion of the variables does not change the significant variables to any large extent. The magnitudes (sign) of some other variables did change but the estimates are still not statistically significant. The effect of being smoker was to lower the probability of perceived risk probability of a health risk by 14.5 percentage points compared to being a non-smoker. This result would be expected from rational behavior models. Quitters appear to be less likely to perceive health risks from passive smoking, but the estimated coefficient is small and not statistically significant. The third equation shows the results where intensity of smoking is controlled for. As expected intensity of smoking is negatively associated with the perception that

passive smoking has a negative impact on health. Light smokers' beliefs are not statistically different from the non-smokers (omitted variable). Estimated coefficients on Moderate and Heavy smokers are not statistically different.

Although the estimates are more difficult to interpret we also estimated an Ordered Probit model, using the original information provided by the survey question on three different levels of health risks awareness (BELIEFS). Estimates are reported in table 9. The most interesting conclusion is that the intensity of smoking is clearly strongly and negatively associated with the intensity of ETS risks beliefs. The estimates also indicate an inverted U relation between health status and ETS risk beliefs. The results confirm that light smokers beliefs are not statistically different from non-smokers. Moreover, exposition to ETS at home is an important determinant of the intensity of adverse health risk perceptions associated with ETS.

5.2 Smoking decisions regressions

There is strong evidence that risks beliefs regarding the hazards of smoking can influence smoking behavior in many ways - whether to smoke, whether to quit, whether smoking in presence of no-smoker and how much the person smokes. Therefore, we would expect that risk beliefs regarding passive smoking may also influence smoking decisions. We analyze the different smoking decisions separately.

We begin our analysis with full sample estimates of being current smoker. Table 10 presents three different specifications of the current smoking-participation equation. Marginal estimates are reported. The first excludes the passive health risks perception. The second includes a dummy variable for risk. Finally the third estimates include risk beliefs' intensity variables. Health status variables were excluded from the equations because of potential endogeneity problems

The demographic profile of smokers is consistent with previous studies. Older and males have a higher probability of being smoker, while students and married are less likely to be smokers. The latter estimate is barely statistically significant and sensitive to specification. The risk taking behavior appears to be consistent; drinking alcohol and smoking habits are positively associated and individuals that control for cholesterol are less likely to smoke. Individuals exposed to ETS at home are more likely to be smokers. We do not find that white or blue collars workers have different probability of being current smokers. This is an unexpected result given that there is no control for education level in the model. The ETS health risk beliefs variable (HEALTHC) is significant and negatively correlated with current smoking. Believing that ETS can cause health problems reduces the smoking probability by 14.2 percentage points. Inclusion of risk variable did not alter the significance and magnitude of the coefficients of the other variables to any large extent. We did not

find any significant difference on the discrete smoking decision between those who believe that ETS has "some health problems" and those who believe that can cause "serious health problems".

Table 11 reports marginal coefficients quitting decision estimates. [10] Overall the estimated model is not very helpful to understand quitting decisions. Despite the relative high pseudo-R^2 and F-test, the estimated coefficients are overall not statistically significant in the restricted sample. The model shows no evidence of lack of fit based on the H-L statistic.[11] Married people and those that are not exposed to smoking at home appear to quit more. We do not find any statistical evidence that ETS health risks beliefs have an effect on the decision to quit.

Table12 assesses the determinants of smoking at home in presence of non-smokers, which are of particular interest. Again, the regression is carried on in a sub-sample of smokers and therefore estimates may be biased. Smokers who drank in last 30 days and those who are involuntary exposed to smoking at home are more likely to smoke at home in presence of non-smokers. Workers, in particular blue collars, are less likely to smoke at home ("Unemployed and retired" variable omitted). Surprisingly, ETS moderate health risk belief appears to have a positive association with smoking behavior at home: among smokers those who have moderate risks awareness are 20.3 percentage points more likely to smoke at home.

Smoking is not a discrete activity and the number of cigarettes consumed poses different risks to the individuals. The survey presents consumption in 9 intervals (Table 2). We created a new variable (CIGARETTE) equal to 0, 1, 2,….9 identifying the consumption interval for each respondent. For non-smokers, the number is zero, leading to the use of a Tobit estimation procedure for the equations in which CIGARETTE is the dependent variable. Table 13 reports the estimates

The number of cigarettes smoked per day is higher for older, male and those who live in a large town. Individuals that are exposed to smoking at home and those who drink tend also to smoke more. On other hand, students and those who check for cholesterol are more likely to smoke less. The role of health risk beliefs in relationship to the number of cigarettes smoked is also apparent in table 13. ETS health beliefs appear to play a strong role on decreasing the number of

[10] Excluding never smokers from the analysis of the quit decisions makes the estimates conditional on the first stage outcome and therefore estimates may be biased and inconsistent from the standpoint of the overall population's behavior. To circumvent the potential problem of sample selectivity bias, a two-step Probit selection model is applied, following Van de Venn and van Praag (1981). The technique tests for the presence of sample selection and allows for the never smokers respondents to be represented in the estimation sample. To identify the model we change first-stage equation regressors (ever smoke) excluding age regressors and including "health status report" and "has asthma" variable. We also not included "alcohol" control in the second stage equation. The insignificant estimates for the correlation error correlation and for the test of independent equations suggest that selection is not affecting the second stage (quit decision). Since identification of the model raises concerns we decided that restricted sample estimation is a better estimate.

[11] Hosmer-Lemeshow test was run on a Probit model without sample weighs

cigarettes smoked daily. Nonetheless, the estimated coefficients on intensity of health serious consequences are similar and not statistically different

(Table 11 here)

VI. Conclusions

The analysis of Eurobarometer data adds new insights into passive smoking risk perception and smoking behavior. Overall, there is a generalized awareness of ETS risks for non-smokers and a widespread support for smoking regulation in Portugal. Moreover ETS awareness has increased in last decades.

Beliefs concerning the ETS health related risks to others affect smoking behaviors. These ETS consequences to others have a substantial significant effect on individual current smoking participation and extent of consumption. We do not find evidence that ETS health risks awareness affect the decision of quitting or refrain smokers from smoking at home in presence of non-smokers.

Risk perceptions appear to be correlated: those who are concerned with electromagnetic hazards are also more likely to be concern with ETS. Moreover cigarette consumption is a risk behavior that is correlated to other risk behaviors: negatively with drink behavior and positively with checking for cholesterol. Smoking appears to be a “family matter”: individuals exposed to smoking at home are more aware of ETS consequences, but more likely to smoke, to consume more cigarettes and less likely to quit.

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Table 1 – Mean (standard deviation)

		All sample	Smokers sample
Married	Dummy variable equal to 1 if respondent is married	0.596	0.585
Male	Dummy variable equal to1 if respondent is male	0.478	0.702
Age	Age of respondent	45.317 (0.639)	38.462 (1.012)
Job	Dummy variable equal to1 if respondent has job	0.483	0.634
White	Dummy variable equal to1 if respondent has a "white collars" Job	0.247	0.336
Blue	Dummy variable equal to1 if respondent has a "blue collars" job	0.236	0.298
Student	Dummy variable equal to1 if respondent is student	0.108	0.086
Children	Number children at home	0.413 (0.028)	0.547 (0.069)
Alcohol	Dummy variable equal to1 if respondent drunk in last month	0.558	0.789
Durables	Number of durable goods at home (from a lit in survey)	3.680 (0.061)	3.680 (0.061)
Rural / village	Dummy variable equal to1 if respondent lives in rural area or village	0.490	0.490
Small/middle town	Dummy variable equal to1 if respondent lives in small or middle sized town	0.304	0.304
Large town	Dummy variable equal to1 if respondent lives in a large town	0.207	0.207
Health status			
Very good	Dummy variable equal to1 if respondent reports very good health	0.116	0.129
Good	Dummy variable equal to1 if respondent reports good health	0.538	0.659
Neither good, nor bad	Dummy variable equal to1 if respondent reports neither good, nor bad health	0.255	0.178
Bad	Dummy variable equal to1 if respondent reports bad health	0.078	0.032
Very Bad	Dummy variable equal to1 if respondent reports very bad health	0.013	0.003
Asthma	Dummy variable equal to1 if respondent reports asthma problems	0.079	0.085
Cholesterol test	Dummy variable equal to1 if respondent did cholesterol test in	0.569	0.413
Electromagnetic risks	Four level ordinal variable equal to 1 if very concern, and equal to 4 if not concern at all.	2.486 (0.032)	2.493 (0.071)
SMOKE	Dummy variable equal to 1 if respondent smokes	0.240	
QUIT	Dummy variable equal to1 if respondent quitted smoke	0.116	0.325
REGULAR	Dummy variable equal to1 if respondent is a regular smoker	0.214	0.893
LIGHT	Dummy variable equal to 1 if smoke less than 10 cigarettes daily	0.065	0.271 .
MODERATE	Dummy variable equal to 1 if smoke more 10 cigars and less than 20 daily	0.076	0.315
HEAVY	Dummy variable equal to 1 if smoke 20 cigars or more daily	0.087	0. 361
BELIEFS	Ordinal variable equals to 1 if smoking is harmless or can cause discomfort, equals to 2 if cause "health problems" and equals to 3 if cause "serious health problems".	1.140 (0.025)	0.991 0.059
HEALTHC	Dummy variable equal to 1 if health consequences of ETS	0.795	0.694

- Linearized standard errors

Table 2- Daily consumption of cigarettes (Smokers sample)

	Prevalence
< 5	0.179
≥ 5 & < 10	0.107
≥ 10 & < 15	0.137
≥ 15 & < 20	0.197
≥ 20 & < 25	0.281
≥ 25 & < 30	0.039
≥ 30 & < 35	0.015
≥ 35 & < 40	0.018
≥ 40	0.028

Table 3 – Consequences of ETS on non-smokers

	1992[12]	2006[13]
Is harmless	3.9	1.1
Cause discomfort	47.6	19.2
Cause illness (HEALTHC)	43.8	(78.6)
Some health problems		44.5
Serious health problems		34.1
It depends (Spontaneous)	5.7	1.2

Table 4: Health risk beliefs by smoking behavior (%)

	1992		2006	
	Smoke	Non-Smoke	Smoke	Non-Smoke
Is harmless	4.7	2.4	1.7	0.9
Cause discomfort	45.1	48.4	27.9	16.4
Cause illness (HEALTHC)	39.2	45.3	(67.2)	(82.2)
Some health problems			38.5	46.4
Serious health problems			28.7	35.8
It depends	11	3.9	3.6	0.6

[12] Do you think that, for the non-smoker, other people's smoke is harmless, can cause discomfort, or can even in the long term cause serious illnesses such as cancer ?

[13] "Do you think that for a non-smoker, other people's smoke…?"

Table 5 - Smoking habits in household

Not allowed for anyone	0.291
Not allowed, but sometimes is permitted	0.044
Allowed in certain rooms only	0.177
Allowed only outside	0.119
People voluntarily do not smoke	0.030
No smoking norms	0.339

Table 6 - Attitudes towards anti ETS legislation – 1992

	strongly in favor	somewhat in favor	somewhat opposed	strongly opposed
Smoking regulations	0.618	0.346	0.031	0.051
Tobacco advertise stop	0.497	0.410	0.076	0.017

Table 7 - Attitudes towards anti ETS legislation – 2006

	Totally agree	Somewhat agree	Somewhat disagree	Totally disagree
Restaurants	0.656	0.193	0.103	0.048
Bar/Pubs	0.533	0.210	0.175	0.082
Indoor workplace	0.759	0.175	0.032	0.034
Indoor public space	0.766	0.157	0.048	0.029

Table 8 - Probit model for health risk belief

	HEALTHC	HEALTHC	HEALTHC
Age	-0.000	0.001	0.001
	(0.006)	(0.005)	(0.005)
Age^2	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Male	-0.012	0.011	0.014
	(0.031)	(0.032)	(0.032)
Blue	0.034	0.024	0.025
	(0.041)	(0.042)	(0.042)
White	0.017	0.006	0.001
	(0.044)	(0.045)	(0.045)
Student	0.067	0.031	0.031
	(0.062)	(0.069)	(0.069)
Married	0.072	0.063	0.062
	(0.038)*	(0.037)*	(0.037)*
Children	-0.005	-0.004	-0.003
	(0.021)	(0.020)	(0.020)
Alcohol - last 30 days	-0.017	0.005	0.003
	(0.032)	(0.033)	(0.033)
Durables	-0.007	-0.008	-0.008
	(0.010)	(0.010)	(0.010)
Small/middle town	0.048	0.049	0.048
	(0.034)	(0.033)	(0.033)
Large town	0.048	0.054	0.055
	(0.035)	(0.035)	(0.035)
Good	0.172	0.173	0.173
	(0.051)***	(0.050)***	(0.050)***
Neither Good Neither bad	0.159	0.156	0.157
	(0.040)***	(0.040)***	(0.040)***
Bad	0.163	0.160	0.162
	(0.030)***	(0.029)***	(0.029)***
Very Bad	0.146	0.139	0.141
	(0.042)***	(0.044)***	(0.043)***
Asthma	-0.207	-0.196	-0.205
	(0.069)***	(0.069)***	(0.071)***
Exposition at Home	0.028	0.042	0.044
	(0.043)	(0.045)	(0.045)
Electromagnetic risks	-0.061	-0.062	-0.064
	(0.016)***	(0.016)***	(0.016)***
Cholesterol Test	-0.079	-0.094	-0.093
	(0.033)**	(0.033)***	(0.033)***
Smoke		-0.145	
		(0.044)***	
Quit		-0.034	-0.030
		(0.052)	(0.051)
Light			-0.100
			(0.074)
Moderate			-0.173
			(0.072)**
Heavy			-0.169
			(0.077)**
Pseudo R^2	0.081	0.097	0.097
Observations	865	865	865

Robust standard errors in parentheses

- significant at 10%; ** significant at 5%; *** significant at 1%

Table 9- Ordered Probit model for ETS health risks beliefs

	BELIEFS	BELIEFS	BELIEFS
Age	0.000	0.003	0.007
	(0.016)	(0.016)	(0.016)
Age^2	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
Male	-0.018	0.034	0.049
	(0.091)	(0.094)	(0.093)
Blue	0.093	0.078	0.068
	(0.121)	(0.121)	(0.122)
White	0.101	0.085	0.060
	(0.128)	(0.129)	(0.128)
Student	0.412	0.336	0.332
	(0.232)*	(0.231)	(0.232)
Married	0.218	0.196	0.189
	(0.106)**	(0.105)*	(0.106)*
Children	0.033	0.038	0.046
	(0.066)	(0.065)	(0.064)
Alcohol	-0.100	-0.055	-0.073
	(0.093)	(0.093)	(0.094)
Durables	-0.026	-0.027	-0.030
	(0.030)	(0.030)	(0.030)
Small/middle town	0.210	0.221	0.229
	(0.102)**	(0.102)**	(0.102)**
Large town	-0.035	-0.017	-0.024
	(0.106)	(0.107)	(0.108)
Good	0.389	0.390	0.382
	(0.167)**	(0.167)**	(0.169)**
Neither Good Neither bad	0.439	0.436	0.422
	(0.188)**	(0.188)**	(0.190)**
Bad	0.555	0.561	0.562
	(0.220)**	(0.219)**	(0.220)**
Very Bad	0.315	0.280	0.268
	(0.337)	(0.338)	(0.338)
Asthma	-0.328	-0.310	-0.331
	(0.181)*	(0.181)*	(0.182)*
Exposition at home	0.206	0.235	0.250
	(0.108)*	(0.111)**	(0.111)**
Electromagnetic risks	-0.190	-0.193	-0.195
	(0.048)***	(0.048)***	(0.048)***
Cholesterol test	-0.182	-0.221	-0.224
	(0.097)*	(0.098)**	(0.098)**
Smoke		-0.308	
		(0.114)**	
Quit		-0.036	
		(0.130)	
Light			-0.004
			(0.196)
Moderate			-0.404
			(0.167)***
Heavy			-0.451
			(0.174)***
Pseudo R^2	0.037	0.042	0.045
Observations	865	865	865

Robust standard errors in parentheses
* significant at 10% ;* *significant at 5%; *** significant at 1%

Table 10 - Probit regression estimates for current smoking status

	SMOKE	SMOKE	SMOKE
Age	0.018	0.017	0.017
	(0.006)***	(0.006)***	(0.006)***
Age^2	-0.000	-0.000	-0.000
	(0.000)***	(0.000)***	(0.000)***
Male	0.173	0.169	0.169
	(0.033)***	(0.033)***	(0.033)***
Blue	-0.065	-0.059	-0.059
	(0.039)	(0.039)	(0.039)
White	-0.073	-0.074	-0.075
	(0.040)*	(0.040)*	(0.040)*
Student	-0.166	-0.158	-0.158
	(0.039)***	(0.038)***	(0.038)***
Married	-0.078	-0.053	-0.053
	(0.039)**	(0.039)	(0.039)
Children	0.008	0.007	0.006
	(0.019)	(0.019)	(0.019)
Alcohol	0.165	0.158	0.158
	(0.031)***	(0.031)***	(0.031)***
Durables	-0.004	-0.004	-0.004
	(0.011)	(0.011)	(0.011)
Small or middle sized town	0.032	0.039	0.038
	(0.038)	(0.038)	(0.038)
Large town	0.057	0.075	0.076
	(0.046)	(0.046)*	(0.046)*
Exposition at home	0.106	0.101	0.101
	(0.035)***	(0.035)***	(0.035)***
Electromagnetic risks	-0.008	-0.018	-0.017
	(0.018)	(0.018)	(0.018)
Cholesterol Test	-0.110	-0.129	-0.129
	(0.035)***	(0.035)***	(0.035)***
Healthc		-0.154	
		(0.045)***	
Health risks			-0.136
			(0.037)***
Serious health risks			-0.122
			(0.036)***
Pseudo R^2	0.192	0.203	0.203
Observations	890	871	871

Robust standard errors in parentheses

- * significant at 10%; **significant at 5%; *** significant at 1%

Table 11- Probit estimated for former smoker status

	QUIT	QUIT	QUIT
Age	-0.003	-0.000	-0.000
	(0.011)	(0.012)	(0.012)
Age^2	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Male	-0.093	-0.088	-0.088
	(0.075)	(0.075)	(0.075)
Blue	0.009	-0.012	-0.012
	(0.087)	(0.087)	(0.087)
White	0.118	0.104	0.104
	(0.085)	(0.088)	(0.088)
Student	0.258	0.239	0.238
	(0.202)	(0.201)	(0.199)
Married	0.166	0.149	0.149
	(0.065)**	(0.071)**	(0.071)**
Children	0.027	0.025	0.025
	(0.035)	(0.038)	(0.038)
Alcohol	-0.029	-0.014	-0.014
	(0.063)	(0.064)	(0.064)
Durables	0.006	0.005	0.005
	(0.021)	(0.021)	(0.021)
Small or middle sized town	-0.004	-0.011	-0.011
	(0.070)	(0.074)	(0.075)
Large town	0.007	-0.005	-0.006
	(0.082)	(0.083)	(0.083)
Exposition at Home	-0.220	-0.194	-0.194
	(0.103)**	(0.104)**	(0.104)*
Electromagnetic risks	0.001	0.007	0.007
	(0.033)	(0.034)	(0.034)
Cholesterol Test	0.122	0.137	0.137
	(0.062)*	(0.064)**	(0.064)**
Healthc		0.096	
		(0.067)	
Health risks			0.104
			(0.080)
Serious health risks			0.100
			(0.089)
Pseudo R^2	0.196	0.203	0.203
Observations	290	282	282

Robust standard errors in parentheses

** significant at 10%;; ** significant at 5%; *** significant at 1%

Table 12 -Probit model for smoke at home in presence of non-smokers

	SMOKEH	SMOKEH	SMOKEH
Age	0.026	0.028	0.026
	(0.016)	(0.017)	(0.017)
Age^2	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Male	0.132	0.132	0.119
	(0.091)	(0.092)	(0.094)
Blue	-0.260	-0.274	-0.297
	(0.111)**	(0.114)**	(0.117)**
White	-0.219	-0.208	-0.221
	(0.118)*	(0.123)*	(0.125)*
Student	-0.059	-0.065	-0.057
	(0.194)	(0.198)	(0.199)
Married	-0.087	-0.144	-0.130
	(0.092)	(0.098)	(0.098)
Children	0.047	0.046	0.050
	(0.051)	(0.054)	(0.056)
Alcohol	0.260	0.266	0.264
	(0.099)***	(0.100)***	(0.101)***
Durables	-0.007	0.002	0.007
	(0.030)	(0.032)	(0.032)
Small or middle sized town	0.159	0.138	0.152
	(0.087)	(0.093)	(0.094)
Large town	0.155	0.118	0.086
	(0.094)	(0.103)	(0.107)
Exposition Home	0.286	0.296	0.321
	(0.144)**	(0.141)**	(0.144)**
Electromagnetic risks	0.009	0.018	0.010
	(0.046)	(0.048)	(0.048)
Test	-0.097	-0.054	-0.060
	(0.084)	(0.089)	(0.091)
Healthc		0.117	
		(0.088)	
Health risks			0.203
			(0.088)**
Serious health risks			0.009
			(0.106)
Observations	184	176	176

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; ** significant at 1%

Table 13 – Tobit estimates for number of cigarettes smoked

	CIGARETTES	CIGARETTES	CIGARETTES
Age	0.338	0.319	0.318
	(0.102)***	(0.102)***	(0.101)***
Age^2	-0.005	-0.005	-0.005
	(0.001)***	(0.001)***	(0.001)***
Male	3.759	3.622	3.617
	(0.559)***	(0.557)***	(0.557)***
Blue	-1.056	-1.006	-1.010
	(0.697)	(0.696)	(0.695)
White	-1.149	-1.203	-1.202
	(0.725)	(0.729)*	(0.728)*
Student	-4.332	-4.116	-4.101
	(1.343)***	(1.326)***	(1.326)***
Married	-1.241	-0.855	-0.847
	(0.584)*	(0.593)	(0.594)
Children	0.357	0.263	0.267
	(0.311)	(0.324)	(0.324)
Alcohol	2.592	2.418	2.413
	(0.572)***	(0.565)***	(0.564)***
Durables	-0.046	-0.061	-0.063
	(0.173)	(0.173)	(0.173)
Small/middle town	0.744	0.658	0.669
	(0.582)	(0.588)	(0.589)
Large town	1.266	1.360	1.342
	(0.644)**	(0.643)**	(0.645)**
Exposition Home	2.564	2.455	2.465
	(0.826)***	(0.817)***	(0.817)***
Electromagnetic risks	-0.070	-0.255	-0.261
	(0.279)	(0.280)	(0.281)
Test	-1.636	-1.873	-1.870
	(0.529)***	(0.532)***	(0.532)***
Healthc		-2.112	
		(0.577)***	
Health risks			-2.044
			(0.624)***
Serious health risks			-2.205
			(0.666)***
Constant	-11.352	-8.639	-8.606
	(2.640)***	(2.639)***	(2.639)***
Pseudo R^2	0.1240	0.1274	0.1274
Observations	880	861	861

Standard errors in parentheses

* significant at 10%; ** significant at 5%; ** *significant at 1%