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Exploring the Individual, Socioeconomic and Contextual Determinants Associated with Daily Tobacco Consumption in Portugal

Análise das Determinantes Individuais, Socioeconómicas e Contextuais do Consumo Diário de Tabaco em Portugal

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ABSTRACT
The National Program for Tobacco Prevention and Control reflects awareness of tobacco as a major public health problem in Portugal. To infer which population groups should be targeted, we estimate sex-specific logistic regressions to analyze the determinants of daily tobacco consumption, using the most recent microeconomic data from the Portuguese Health Interview Survey. To assess the existence of inequalities, we calculate concentration indices, ranking individuals by income and education. Nine percent of women and twenty percent of men smoke on a daily basis, with drinking, depression and living in Azores significantly increasing the risk. Secondary (upper) education increases the odds of daily smoking for women and decreases the odds for men. Unemployment increases the odds for men only and depression puts women at significantly higher risk. The results highlight the importance of not only adopting cross-cutting policies to reduce tobacco consumption, but also targeting the most vulnerable to mitigate existing income- and schooling-related health inequity.
Keywords: Daily tobacco consumption, determinants, health inequalities, Portuguese Health Interview Survey, odds ratio, concentration index

JEL Classification: C21; I12; I14.

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1. Introduction

1.1. Context

As tobacco smoking is considered to be a global epidemic by the World Health Organization (WHO) (WHO, 2008, 2021), many countries have implemented policies and legislation aimed at reducing smoking prevalence and thereby improving public health.

The United Nation's Sustainable Development Goal 3 concerns ensuring healthy lives and promoting well-being for all (UN, 2015), and involves the implementation of the WHO Framework Convention on Tobacco Control (FCTC) (WHO, 2003). Following the FCTC, several policies and legislation to reduce tobacco consumption or mitigate its effects on public health (Chung-Hall et al., 2019) resulted in a generalized decrease in the prevalence of smoking in developed countries (Reitsma et al., 2021). Nonetheless, cigarette smoking remains the single most preventable cause of death worldwide, being associated with more than 8 million deaths yearly (Dattani et al., 2023; WHO, 2021).

In the European Union (EU), tobacco is a significant risk factor for the two most common causes of avoidable death: ischemic heart disease and lung cancer (Eurostat, 2023). Tobacco consumption is the main cause of avoidable cancer in Europe, with 27% of all cancers attributable to tobacco use. The EU's health program "Europe's Beating Cancer Plan" (European Commission, 2021) aims at "Achieving a Tobacco-Free Europe" by 2040, meaning a prevalence of consumption of less than 5% by that year and the reduction of 30% from 2010 to 2025.

In Portugal, tobacco smoking remains one of the most pressing public health issues and is a major driver of cancer-related mortality (OECD, 2023). In 2019, 6.17% (1.97%) of men's (women's) deaths were due to tracheal, bronchus and lung cancer, with a risk factor attribution to tobacco of 72.36% (35.81%) (IHME – Institute for Health Metrics and Evaluation, 2020).

Under the National Health Plan 2012-2016, reducing smoking was considered to be a public health priority, which led to the creation, in 2012, of the National Programme for Tobacco Prevention and Control (NPTPC), whose goals were to reduce smoking prevalence, lessen smoking initiation between ages 13 and 18, and increase taxes on tobacco products, among others (OECD, 2023). The NPTPC2020, currently in force, further includes health equity as a priority (Directorate-General of Health of Portugal, 2021) and emphasizes the importance of tobacco control particularly among young women and girls.

The negative health outcomes associated with tobacco use can be estimated in terms of their costs for public healthcare, as well as for the economy in terms of productivity loss (Reitsma et al., 2021; Rezaei et al., 2016), with the global economic burden of tobacco use estimated to be over 1 trillion US dollars annually (Goodchild et al., 2018).

The aim of this work is twofold. First, to examine which factors are the most significant determinants of daily tobacco consumption, providing crucial insights for the elaboration and implementation of effective tobacco control policies. Second, to determine to what extent tobacco use may be unequally distributed across income and education levels, a crucial aspect for addressing and mitigating inequality in the pursuit of health equity.

1.2. Determinants of Tobacco Consumption

Different variables have been found to be associated with an increased likelihood of tobacco consumption, ranging from demographic and individual health behavior to socioeconomic factors including social context.

1.2.1. *Individual Characteristics*

Gender has been found to be a major determining factor of propensity for tobacco use. Although women tend to have a lower prevalence of tobacco use than men, in some countries, including Portugal, there has been an upwards trend on consumption among this group (Carreira et al., 2012; Leite et al., 2019; Reitsma et al., 2021).

Age has also been previously confirmed as an important predictor of tobacco consumption (Ciapponi et al., 2014; Viscusi, 1991), with older adults tending to have a lower prevalence of smoking than younger's (Appel & Aldrich, 2003). In Portugal, for both men and women, the prevalence of current daily smoking was found to initially increase with age, peaking at the age range of 35-44, and then gradually decreasing in the older groups (Machado et al., 2009).

Tobacco smoking is known to cluster with other health risk behaviors, such as physical inactivity, poor nutrition, and particularly alcohol use, meaning that their combination is observed more frequently than predicted if they were independent (Meader et al., 2016).

There is generally a strong negative association between daily smoking and obesity (Mackay et al., 2013; Quintal, 2021; Twardella et al., 2006).

Depression has often been associated with tobacco smoking, with smoking rates increasing with the severity of the disease, although the direction of the causality between depression and tobacco use is still up for debate (Fluharty et al., 2017).

Although tobacco consumption may be associated with lower self-assessed health (Jurewicz & Kaleta, 2020), some studies have identified that individuals who reported better self-assessed health status had higher odds of current tobacco smoking (Semyonov et al., 2012).

1.2.2. *Socioeconomic Characteristics*

One major socioeconomic factor which can affect an individual's propensity for tobacco use is income level (Casetta et al., 2017; Ciapponi et al., 2014). Although higher income has been linked to higher tobacco consumption, lower income has generally been associated with a higher likelihood of tobacco use across all age-sex groups in Portugal (Leite et al., 2019; Machado et al., 2009).

Regarding educational attainment, the sign of the effect is not consensual (Huisman et al., 2005; Nketiah-Amponsah et al., 2018). For most studies, a higher educational level has been associated with a lower prevalence of smoking (OECD, 2019). In this vein, Schaap et al. (2008) found that groups with a higher educational level were more likely to quit smoking than those with lower education, in all age-sex groups. Nevertheless, there is also some

evidence of a direct relationship between higher education and tobacco consumption levels in Europe, namely for women in Southern Europe (Alves et al., 2015; Bosdriesz et al., 2016; Leite et al., 2019; Loring, 2014; Machado et al., 2009; OECD, 2019).

Employment status can also be associated with tobacco consumption (Haustein, 2006). While unemployment can naturally have negative implications for disposable income and income stability, it is also a significant risk factor for various types of substance abuse including tobacco (Henkel, 2011). The significance of unemployment as a predictor of tobacco use has been demonstrated for Portugal (Leite et al., 2019; Machado et al., 2009; Santos & Barros, 2004).

Family relationship status may also play a role, with divorcees being at higher risk of increased tobacco consumption (Alves et al., 2015; Machado et al., 2009; Santos & Barros, 2004). Last but not the least, higher social capital, that captures interactions with other individuals, organizations and institutions, is associated with lower prevalence of smoking (Lindström, 2008).

1.2.3. *Contextual Characteristics*

The context in which an individual lives can also be a determinant of tobacco consumption. One example is given by location (Islami et al., 2015; Reitsma et al., 2021). In Portugal, the Azores region has been afflicted with the highest overall prevalence of smoking in 2005/2006 (Machado et al., 2009), as well as the highest prevalence of smoking for men in 2014 (Leite et al., 2019).

As to the degree of urbanization, some authors argue that the lower access to health information in rural areas may lead to higher levels of smoking, while others state that the greater exposure to advertising in urban areas may lead to higher smoking prevalence and lower likelihood to quit (e.g., Chen et al., 2019; Valiente et al., 2021).

2. **Data and Methodology**

The data used is sourced from the Portuguese Health Interview Survey (PHIS) 2019, a cross-sectional and nationally representative survey which contains information on the individual, socioeconomic, and contextual characteristics of 22,191 representative households (Data Access Request PED- 604037775). Only one individual was selected from each household, with a total of 14,617 valid responses. The target population was the set of all individuals 15 years and older that lived in the Portuguese territory. Data collection took place between September 2019 and January 2020. After dropping all observations with missing values for our variables of interest, our analysis comprises a total of 9,900 observations (5,325 female and 4,575 male respondents).

In line with previous evidence, the variables used in our research are age band, alcohol consumption, physical activity, obesity, depression, self-assessed health status (individual-level variables); income, education, employment and family relationship status, social capital

(socioeconomic variables); and region and urbanization (contextual variables). Full description of these variables is given in Appendix, Table A1.

We estimate logistic regression models separately for male and female, with robust standard errors and then we calculate the odds ratio (OR). In each case, the omitted category acts as a reference for the interpretation of the estimated coefficients, such that the estimated OR either represent an increase or a decrease in the likelihood of tobacco use in comparison to that category.

The logistic model that was estimated is specified as follows:

$$\ln\left(\frac{p(Daily\ tobacco\ consumption)}{1-p(Daily\ tobacco\ consumption)}\right)=\beta_0+\sum_{i=1}^{n}\beta_i X_i \tag{1}$$

where X_i are the explanatory variables listed in Table A1 and β_i are the corresponding logistic regression coefficients. We ran sex-specific regressions to ascertain whether and to what extent certain variables differently affected the odds of daily tobacco consumption across sexes.

Following the regression estimates, we compute concentration indices (CIs). These indices are used to assess inequalities in the probability of daily tobacco consumption, as they encapsulate the information about inequality contained in concentration curves as one concise, easily comparable estimate relying on socioeconomic features.

The standard CI can be defined as:

$$C(h\mid y)=\frac{2\,cov(h_i,R_i)}{\overline{h}}=\frac{1}{n}\sum_{i=1}^{n}\left[\frac{h_i}{\overline{h}}(2R_i-1)\right] \tag{2}$$

where h_i is the variable of interest in which inequality is measured and R_i is the ranking variable (O'Donnell et al., 2008). The value of CI ranges between –1 and +1.

We calculate CIs with robust standard errors, in which individuals are ranked by net income quintile per equivalized adult, and, alternatively, by the level of educational attainment (O'Donnell et al., 2016). A negative/positive CI indicates that tobacco consumption is disproportionately concentrated among lower income (lower-educated)/wealthier (more educated) individuals.

3. Results and Discussion

3.1. Characterization of Male and Female Populations

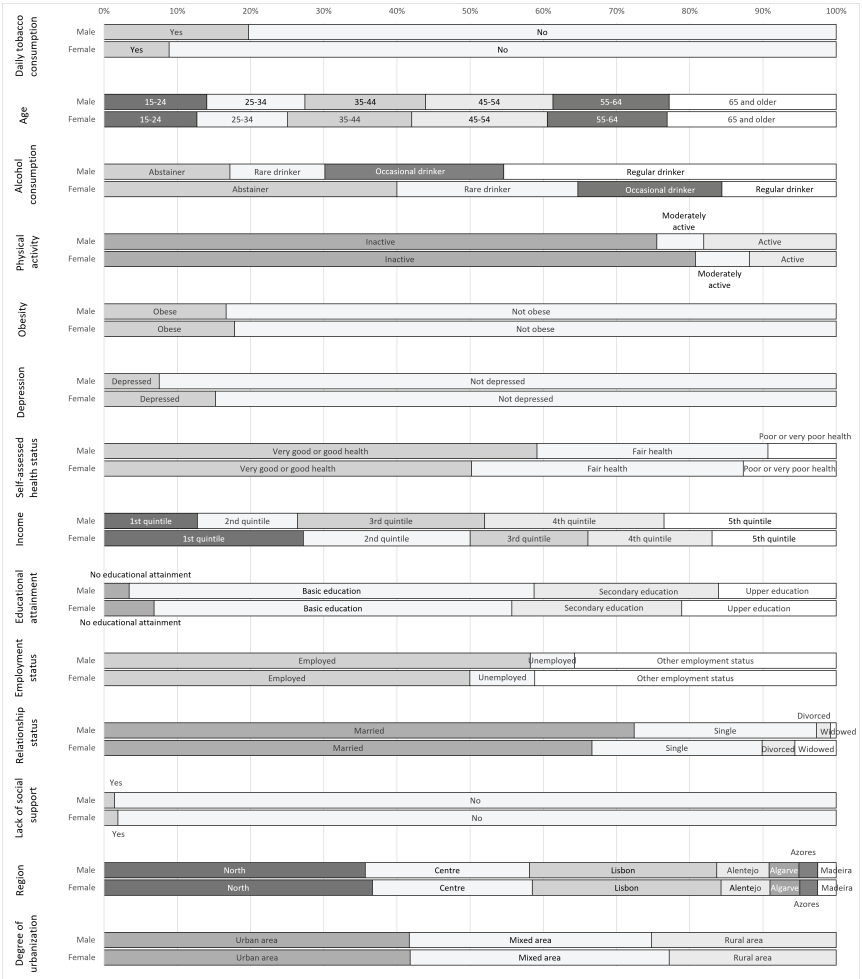
Figure 1 illustrates the share of each category of individual, socioeconomic and contextual variables, for both populations. 19.72% (8.89%) of men (women) are daily tobacco users. The most representative group for both sexes in terms of age is that of 65 years or older. When it comes to alcohol consumption habits, most of the men (women), 45.40%, (40.00%) were regular drinkers (abstainers).

Interestingly, only 7.53% of men reported struggling with depression, less than half of the percentage reported by women, of 15.22%.

Most of individuals, female and male, had attained basic education. Both the shares of men with no educational attainment (3.43%) and upper education (16.07%) were lower than women's (6.84% and 21.08%, respectively).

Most individuals were formally employed. The majority of respondents were married; only 2.70% of men were either divorced or widowed, against 10.13% of women. The lack of social support and data on contextual variables were similar across sex.

Figure 1: Characterization of male and female populations: individual, socioeconomic and contextual variables



3.2. Logistic Regressions

All OR estimates for the male and female populations can be found in the Appendix (Tables A2 and A3). Table 1 summarizes the sign of the effects of all variables on the likelihood of daily tobacco consumption, indicating also when there was no statistical significance.

Table 1: Summary of odds ratio estimates of sex-specific logistic regressions for daily tobacco consumption

Variable	Male	Female
Ages 15-24	(Omitted)	
Ages 25-34	NS	NS
Ages 35-44	NS	+
Ages 45-54	NS	+
Ages 55-64	NS	NS
Ages 65 and older	-	NS
Abstainer	(Omitted)	
Rare drinker	+	+
Occasional drinker	+	+
Regular drinker	+	+
Inactive	(Omitted)	
Moderately active	NS	-
Active	-	NS
Obesity	-	NS
Depression	+	+
Very good or good health	(Omitted)	
Fair health	NS	NS
Poor or very poor health	NS	NS
First income quintile	(Omitted)	
Second income quintile	NS	NS
Third income quintile	NS	NS
Fourth income quintile	NS	NS
Fifth income quintile	NS	NS
No educational attainment	(Omitted)	
Basic education	NS	NS
Secondary education	NS	+

Variable	Male	Female
Upper education	-	NS
Employed	(Omitted)	
Unemployed	+	NS
Other employment status	-	NS
Married	(Omitted)	
Single	NS	+
Divorced	NS	+
Widowed	NS	NS
Lack of social support	NS	NS
North	(Omitted)	
Centre	NS	NS
Lisbon	NS	NS
Alentejo	NS	+
Algarve	NS	+
Azores	+	+
Madeira	NS	NS
Urban area	(Omitted)	
Mixed area	NS	-
Rural area	NS	-

Notes: +/-: increases/decreases the odds of daily tobacco consumption (in comparison to omitted category); NS: not statistically significant at the 5% level.

Among the male (female) population, being 65 years old or more (between 35 and 54) decreased (increased) the chances of being a daily tobacco consumer.

Alcohol consumption habits were the single most significant factor for increasing the likelihood of tobacco consumption, for both sexes: regular drinking had the largest effect on the odds of tobacco consumption, with a more pronounced effect for women.

Being (moderately) active was associated with lower odds of daily tobacco consumption for men (women). Being obese, in turn, significantly decreased the odds of being a daily tobacco user for men but was not significant for women. It is likely that being obese increases health concerns, leading to a decrease in the likelihood of tobacco consumption (Twardella et al., 2006).

Suffering from depression increased the odds of daily tobacco consumption, having a more pronounced effect in women (OR: 2.38) than in men (OR: 1.64). Self-reported health status, on the other hand, did not affect the chances of daily tobacco consumption in any circumstance.

Apparently, income does not influence the odds of tobacco consumption. It is worth noting, nevertheless, that the effect of income might already be captured by variables such as employment status. Educational attainment, in turn, played a role in the likelihood of consuming tobacco. Men (women) who had attained upper (secondary) education had lower (higher) odds of daily tobacco use (OR: 0.33 vs OR: 3.94). Our results thus support the existing evidence about inequality in tobacco consumption (Alves et al., 2015; Leite et al., 2019; Machado et al., 2009).

Being unemployed increased the chances of daily tobacco consumption for men only, while other statuses decreased those chances. Being single or divorced increased the odds of daily tobacco consumption among women only, in comparison to being married.

Women in the Alentejo, Algarve and the Azores regions had higher chances of being daily tobacco consumers (for men, only in Azores). The lower the level of urbanization, the lower the odds of daily tobacco use among females.

3.3. Concentration Indices

Table 2 displays the CIs calculated for the prevalence of daily tobacco consumption across income and education, for both sexes.

Table 2: Concentration indices of daily tobacco consumption across income and educational attainment, male and female populations

CI	Male	Female
Individuals ranked by income quintile	-0.0741 (0.0049)	0.0277 (0.4332)
Individuals ranked by educational attainment	-0.0178 (0.4430)	0.1614 (0.0000)

Note: *p*-value between parentheses, estimated with robust standards errors.

Looking at income as an avenue for tobacco inequity, the negative and significant CI indicated that daily tobacco consumption was disproportionately concentrated among poorer men, although this effect is not very pronounced. Our finding may imply that inequalities have been aggravating since 2006, in comparison to Alves et al. (2015)'s CI of -0.04, although there is not an exact match between the age interval.

Also, education is not innocuous among women. The probability of daily tobacco consumption was concentrated among women with higher levels of educational attainment, supporting the evidence of a reverse gradient for women in Portugal (Alves et al., 2015; Huisman et al., 2005). Accordingly, the main driver of inequality for men appears to be income, while for women it is education.

4. **Concluding Remarks**

The World Health Organization considers tobacco smoking to be a global epidemic, as it is one of the leading causes of preventable mortality worldwide. The present research set out to identify and assess the impact of different individual, socioeconomic and contextual variables on the prevalence of daily tobacco consumption in Portugal, using the most recent data from the Portuguese Health Interview Survey 2019. Additionally, as health equity is one of the priorities established by the National Programme for Tobacco Prevention and Control 2020, we analyzed the presence and extent of health inequalities in tobacco use.

We find that 9% of women and 20% of men are daily consumers of tobacco. Furthermore, alcohol consumption habits, depression, and living in Azores increased the odds of daily tobacco consumption for both men and women, with regular drinking being the variable with the highest (second highest) OR for men (women). Age and education are the two variables for which the effects observed for men and women diverge the most: whereas the odds of tobacco consumption for men 65 years and older were the lowest, the odds for women aged between 35 and 54 were the highest. Likewise, upper (secondary) education significantly decreased (increased) the likelihood of daily tobacco use among men (women). While employment status was only significant in predicting tobacco consumption for men, relationship status and the degree of urbanization was only significant for women.

Alcohol consumption habits and depression increased the odds of daily tobacco consumption for both men and women. Actually, integrated intervention methods, targeted at both at-risk drinking and tobacco dependence, have been shown to provide better results for tobacco cessation than standard treatment, focused solely on tobacco cessation (Alves et al., 2023).

Targeted approaches to addressing health inequality in regular tobacco consumption are desirable, focusing on the most vulnerable, that have the highest likelihood of tobacco consumption and are therefore more exposed to the negative health consequences.

Additionally, interventions aiming to address sex-related inequalities in tobacco consumption should preferably target men with lower levels of income and education, and women with higher levels of educational attainment.

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Appendix

Table A1: Variable description

	PHIS2019	Variable	Description
Dependent variable	IN43	Daily tobacco consumption	Daily tobacco consumption (=1 if the individual reports currently smoking daily; 0 otherwise)
Individual variables	Sex	Male	Male (=1 if the individual is male; 0 otherwise)
	AGE_COD2	Ages 15-24 Ages 25-34 Ages 35-44 Ages 45-54 Ages 55-64 Ages 65 and older	Ages 15-24 (=1 if the individual is aged between 15 and 24 years old; 0 otherwise) Similar for the remaining (Omitted category: Ages 15-24) Source: Leite et al. (2019)
	AL1	Abstainer Rare drinker Occasional drinker Regular drinker	Abstainer (=1 if the individual has never drunk alcohol or drank just to taste, or if the individual has abstained from it in the past 12 months due to quitting; 0 otherwise) (Omitted category) Rare drinker (=1 if the individual drank alcohol up to once a month on average in the past 12 months; 0 otherwise) Occasional drinker (=1 if the individual drank alcohol on 2 to 3 days per month or 1 to 2 days per week on average in the past 12 months; 0 otherwise) Regular drinker (=1 if the individual drank on 3 or more days per week on average in the past 12 months; 0 otherwise) Source: Quintal (2021)
	PE6, PE7	Inactive Moderately active Active	Inactive (=1 if time spent on physical exercise in a week is less than 150 minutes; 0 otherwise) (Omitted category) Moderately active (=1 if time spent on physical exercise in a week is at least 150 minutes up to 300 minutes total; 0 otherwise) Active (=1 if time spent on physical exercise in a week is at least 300 minutes total; 0 otherwise) Source: (WHO, 2022)
	BM1, BM2	Obesity	Obesity (=1 if $BM2/(BM1/100)^2$ is greater than or equal to 30; 0 otherwise)
	CD1O	Depression	Depression (=1 if the individual reports suffering from depression in the last 12 months; 0 otherwise)

	HS1	Very good or good health Fair health Poor or very poor health	Very good or good health (=1 if self-assessed overall health status is very good or good; 0 otherwise) Similar for the remaining (Omitted category: Very good or good health)
	PHIS2019	Variable	Description
Contextual variables	HHINCOME	First income quintile Second income quintile Third income quintile Fourth income quintile Fifth income quintile	First income quintile (=1 if the individual's household belongs to the first income quintile; 0 otherwise) Similar for the remaining (Omitted category: First income quintile) Variables computed without separation by sex.
	HATLEVEL	No educational attainment Basic education Secondary education Upper education	No educational attainment (=1 if the individual never attained any formal education; 0 otherwise) (Omitted category) Similar for the remaining (Omitted category: No educational attainment)
	MAINSTAT	Employed Unemployed Other employment status	Employed (=1 if the individual's reported employment status is employed; 0 otherwise) Similar for the remaining (Omitted category: Employed)
	MARSTALEGAL, PARTNERS	Married Single Single Divorced Widowed	Married (=1 if the individual is married or in a common-law relationship; 0 otherwise) Similar for the remaining (Omitted category: Married) Single (=1 if the individual is single and not in a common-law relationship; 0 otherwise) Divorced (=1 if the individual is divorced and not in a common-law relationship; 0 otherwise) Widowed (=1 if the individual is widowed and not in a common-law relationship; 0 otherwise)
	SS1	Lack of social support	Lack of social support (=1 if the individual reported having no one to turn to in the case of a serious personal problem; 0 otherwise)
Socioeconomic variables	REGION	North Centre Lisbon Alentejo Algarve Azores Madeira	North (=1 if the individual resides in the NUTII region North; 0 otherwise) Similar for the remaining (Omitted category: North)
	DEG_URB	Urban area Mixed area Rural area	Urban area (=1 if the individual resides in a densely populated area; 0 otherwise) Similar for the remaining (Omitted category: Urban area)

Table A2: Estimated odds ratio of daily tobacco consumption obtained by logistic regression analysis, male population

Number of observations = 4,575
Wald chi2(35) = 241.92
Prob > chi2 = 0.0000
Log pseudolikelihood = -1533859.9
Pseudo R2 = 0.1128

Daily tobacco consumption	Odds ratio	Robust standard error	z	P>z	[95% confidence interval]	
Ages 15-24	(Omitted)					
Ages 25-34	1.25708	0.3776652	0.76	0.446	0.697647	2.265113
Ages 35-44	1.41359	0.4621504	1.06	0.290	0.7447953	2.682935
Ages 45-54	1.218021	0.4184522	0.57	0.566	0.6211893	2.388283
Ages 55-64	0.6163194	0.2143363	-1.39	0.164	0.3117346	1.218503
Ages 65 and older	0.3031812	0.1124124	-3.22	0.001	0.1465875	0.6270578
Abstainer	(Omitted)					
Rare drinker	1.942416	0.4868789	2.65	0.008	1.188457	3.17469
Occasional drinker	1.890104	0.4144181	2.90	0.004	1.229856	2.904808
Regular drinker	2.136295	0.4662544	3.48	0.001	1.392783	3.276719
Inactive	(Omitted)					
Moderately active	0.8647998	0.2533967	-0.50	0.620	0.4869713	1.535776
Active	0.6094979	0.1122275	-2.69	0.007	0.4248539	.8743894
Obesity	0.6936319	0.1172232	-2.16	0.030	0.4980543	.9660096
Depression	1.64312	0.3981065	2.05	0.040	1.021961	2.641827
Very good or good health	(Omitted)					
Fair health	0.854207	0.1311023	-1.03	0.305	0.6322984	1.153996
Poor or very poor health	0.7047105	0.1938436	-1.27	0.203	0.4110287	1.20823
First income quintile	(Omitted)					
Second income quintile	1.12715	0.2705961	0.50	0.618	0.7040975	1.80439
Third income quintile	1.282074	0.3047913	1.05	0.296	0.8045523	2.043016
Fourth income quintile	1.216823	0.2892205	0.83	0.409	0.7636769	1.938855
Fifth income quintile	1.101209	0.3006299	0.35	0.724	0.6448988	1.880389
No educational attainment	(Omitted)					
Basic education	0.9080585	0.3177402	-0.28	0.783	0.457371	1.802848

Daily tobacco consumption	Odds ratio	Robust standard error	z	P>z	[95% confidence interval]	
Secondary education	0.5257572	0.2033463	-1.66	0.096	0.2463584	1.122027
Upper education	0.3313351	0.1408662	-2.60	0.009	0.1440063	0.7623481
Employed	(Omitted)					
Unemployed	1.936858	0.4522396	2.83	0.005	1.225602	3.060877
Other employment status	0.5138627	0.1226363	-2.79	0.005	0.3218867	0.820335
Married	(Omitted)					
Single	1.344467	0.2847486	1.40	0.162	0.8877114	2.036239
Divorced	1.905716	0.7638789	1.61	0.108	0.868693	4.180711
Widowed	0.8375417	0.453027	-0.33	0.743	0.2901288	2.417809
Lack of social support	1.655756	0.6266933	1.33	0.183	0.7885363	3.476728
North	(Omitted)					
Centre	0.868832	0.1451662	-0.84	0.400	0.6262032	1.20547
Lisbon	0.7982986	0.1676641	-1.07	0.283	0.5289203	1.204871
Alentejo	1.405959	0.2642122	1.81	0.070	0.9727745	2.032044
Algarve	1.185063	0.2139558	0.94	0.347	0.8318833	1.688188
Azores	1.620583	0.2748245	2.85	0.004	1.162309	2.259547
Madeira	0.9280651	0.170081	-0.41	0.684	0.6480131	1.329147
Urban area	(Omitted)					
Mixed area	0.8139208	0.1390753	-1.20	0.228	0.5822864	1.1377
Rural area	0.6992468	0.1325763	-1.89	0.059	0.4822183	1.013952
Constant	0.2820369	0.160476	-2.22	0.026	0.0924658	0.8602619

Table A3: Estimated odds ratio of daily tobacco consumption obtained by logistic regression analysis, female population

Number of observations = 5,325
Wald chi2(35) = 242.53
Prob > chi2 = 0.0000
Log pseudolikelihood = -980870.13
Pseudo R2 = 0.1448

Daily tobacco consumption	Odds ratio	Robust standard error	z	P>z	[95% confidence interval]	
Ages 15-24	(Omitted)					
Ages 25-34	1.875688	0.6909945	1.71	0.088	0.9111334	3.86135
Ages 35-44	2.662109	1.019646	2.56	0.011	1.2566	5.639682
Ages 45-54	2.222769	0.8918648	1.99	0.047	1.012413	4.880123
Ages 55-64	1.49325	0.6091696	0.98	0.326	0.6712525	3.321844
Ages 65 and older	0.7075796	0.3232806	-0.76	0.449	0.2889857	1.732504
Abstainer	(Omitted)					
Rare drinker	2.6583 96	0.5551205	4.68	0.000	1.765524	4.002817
Occasional drinker	3.098463	0.7091946	4.94	0.000	1.978419	4.852598
Regular drinker	3.376313	0.8654498	4.75	0.000	2.042934	5.57996
Inactive	(Omitted)					
Moderately active	0.5127432	0.1863392	-1.84	0.066	0.2515124	1.045298
Active	0.7142547	0.173974	-1.38	0.167	0.443121	1.151287
Obesity	0.8049797	0.1852152	-0.94	0.346	0.5127843	1.263674
Depression	2.377057	0.5265426	3.91	0.000	1.53989	3.669353
Very good or good health	(Omitted)					
Fair health	0.825124	0.1580145	-1.00	0.316	0.5669056	1.200958
Poor or very poor health	0.5814773	0.1996908	-1.58	0.114	0.2966288	1.139862
First income quintile	(Omitted)					
Second income quintile	1.121182	0.2522529	0.51	0.611	0.7213831	1.742556
Third income quintile	1.251254	0.3129594	0.90	0.370	0.7663833	2.042891
Fourth income quintile	1.030045	0.2641127	0.12	0.908	0.6231617	1.702597
Fifth income quintile	1.602645	0.428562	1.76	0.078	0.9488952	2.706802
No educational attainment	(Omitted)					
Basic education	2.398553	1.251897	1.68	0.094	0.862332	6.67151
Secondary education	3.944173	2.185716	2.48	0.013	1.331225	11.68586

Daily tobacco consumption	Odds ratio	Robust standard error	z	P>z	[95% confidence interval]	
Upper education	1.074853	0.6326293	0.12	0.902	0.3391213	3.406773
Employed	(Omitted)					
Unemployed	1.416224	0.3490851	1.41	0.158	0.8736134	2.295856
Other employment status	0.6584011	0.184498	-1.49	0.136	0.3801594	1.14029
Married	(Omitted)					
Single	1.873834	0.4310767	2.73	0.006	1.193745	2.941376
Divorced	2.320176	0.5799554	3.37	0.001	1.42152	3.786943
Widowed	0.6338943	0.2466926	-1.17	0.241	0.2956343	1.359186
Lack of social support	1.280469	0.6653139	0.48	0.634	0.4624841	3.545207
North	(Omitted)					
Centre	1.332725	0.3055637	1.25	0.210	0.8503142	2.088824
Lisbon	1.177818	0.2790743	0.69	0.490	0.7402746	1.873973
Alentejo	2.531161	0.6310532	3.72	0.000	1.552757	4.126064
Algarve	1.644966	0.3837153	2.13	0.033	1.041359	2.598446
Azores	2.452146	0.5564612	3.95	0.000	1.571754	3.825674
Madeira	1.23626	0.2842961	0.92	0.356	0.7877044	1.940243
Urban area	(Omitted)					
Mixed area	0.6608947	0.1310479	-2.09	0.037	0.4480728	0.9748009
Rural area	0.5042578	0.1272266	-2.71	0.007	0.3075321	0.8268272
Constant	0.0099111	0.0069332	-6.60	0.000	0.0025158	0.0390454