



Association of Socio-Demographic Factors with Smoking in the Cypriot Population: Results from a Population-Based Survey

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Abstract

Background: Smoking remains one of the leading preventable causes of premature death, disease, and disability in the world. Previous studies have considered various factors that influence smoking prevalence in the Cypriot population, however, smoking behaviour remains highly prevalent in the population. The present study aims to use recent data to estimate the smoking prevalence and identify socio-demographic factors associated with an increased likelihood of smoking within the Cypriot population.

Methods: The study uses data from a population survey that was administered to the Cypriot population in 2019 to assess the use of legal and illegal psychoactive substances among young and middle-aged adults between the ages of 15-64 years old. Multivariable logistic regression was performed with the outcome variable being current smoking.

Results: The prevalence of current smoking in the Cypriot population, defined as having smoked cigarettes on one or more days of the week in the past 12 months, was estimated to be 39.9%. After adjusting for the effect of other predictors in the model, the strongest predictor of smoking was being male (OR=2.65, 95% CI: 2.28, 3.07). Age, marital status, employment status, and residing in an urban area in the past 12 months were all statistically significant predictors of current smoking.

Conclusion: In designing smoking prevention programs, socio-demographic factors, such as gender, age, place of residence, employment as well as educational status, should be considered, for targeted intervention programmes aiming at tackling smoking behaviours.

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Introduction

Smoking remains one of the leading preventable causes of premature death, disease, and disability in the world. According to the World Health Organization (WHO), there are more than 1 billion smokers worldwide and, on average, 1 in 5 (20%) adults smoke tobacco [1]. In the United States, about 2000 people younger than 18 years smoke their first cigarette daily [2]. It is also estimated that 13.7% of all adults in the USA aged 18 years or older (~34.2 million) smoke cigarettes (15.6% of men and 12.0% of women) [3], and 480,000 people die every year from smoking [4]. Smoking is in fact responsible for 6 million deaths annually, an average of one person every six seconds, and accounts for 6% and 12% of all female and male deaths, respectively [1]. Furthermore, smoking is directly responsible, among others, for 87% of all lung cancer deaths [5], 42% of chronic respiratory diseases, and approximately 10% of cardiovascular diseases [6]. It may also increase the risk of communicable diseases such as tuberculosis and lower tract respiratory infections [7].

Despite efforts to decrease the prevalence of smoking, tobacco use remains a major public health concern. Encouragingly, tobacco use in the adult population appears to be decreasing in some developed countries [7]. However, such a decrease is not evident among low socioeconomic groups where an increase in smoking prevalence is instead observed [6]. Despite the European region being considered developed, it continues to have the highest prevalence of tobacco smoking among adults (28%) compared to other WHO regions [8].

Previous studies indicate that socioeconomic factors, such as education, occupation, social class, and income, are associated with smoking in most developed countries [9,10]. Also, low socioeconomic status [10], low income [11], and low educational attainment [12] were all shown to be linked with smoking. Furthermore, people living in urban areas are more likely to smoke than people living in rural areas [13]. Being divorced or separated is also strongly associated with cigarette smoking [14]. This inverse social gradient in smoking prevalence seems to affect mainly developed countries, while in developing countries a higher smoking prevalence in higher social classes and people with higher income and educational attainment has been observed [9]. Studies in the United States show that adults are more likely to smoke when they live with children as well as when living with adult children [15]. Moreover, larger household size has been linked with an increased likelihood of smoking [16], and a study in Italy showed that having a child at home is linked with increased consumption of cigarettes by adult smokers [17]. Also, the male gender is associated with an increased likelihood of initiating smoking behaviours [18,19].

Cyprus is a European country located at the southeastern border of the EU and the Mediterranean Sea. Based on the European Union barometer survey, the prevalence of smoking in Cyprus was reported to be 30%, placing it just above the EU average (28%) [20]. In the 2006 Cyprus Global Youth Tobacco Survey (GYTS), the prevalence of cigarette smoking among youth aged 13-15 years old was found to be 10.3% which was less than the average in the European Region (19.2%) but greater than the average in the Eastern Mediterranean Region (4.9%) [21]. Also, the prevalence of smoking among middle-school and high-school boys was 12.7% and 35.7%, respectively, whereas it was 7.0% and 23.2% among middle-school girls and high-school girls, respectively [21]. Similarly, the European School Survey Project on Alcohol and Other Drugs (ESPAD) reported that 22% (30% for boys and 14% for girls) of 15-16 years old students surveyed

in Cyprus in 2003 had smoked at least once in the past 30 days [22]. Previous studies conducted in Cyprus revealed that having peers that smoked was the strongest predictor of adolescent smoking [19,21]. Other significant predictors of cigarette smoking included gender, having a parent or sibling that smoke, access to pocket money or allowance [19,21], places of residence, educational aspiration, and ease of buying cigarettes [21].

When in pursuit of strategies to reduce smoking prevalence, an understanding of the particular characteristics that predict an individual's likelihood of smoking will likely make the strategy employed more efficient and help towards its success. The purpose of the present study was to investigate the prevalence of smoking in the Cypriot population using recent data, as well as examine how different socio-demographic factors are associated with an increased likelihood of smoking.

Methods

Participants

The present study used data from a population survey conducted by the National Documentation and Monitoring Centre for Drugs (EKTEPN), which functions under the Cyprus National Addictions Authority (<https://www.naac.org.cy/el/home-en>), to assess the use of legal and illegal psychoactive substances in the general population. The fieldwork was run by CYMAR Market Research Ltd (<https://www.cymar.com.cy/en-gb/home/>) and was administered to the Cypriot population in 2019.

The survey used a multistage stratified sample design to select a representative sample of the general population aged 15-64 years old living in the areas controlled by the Republic of Cyprus between August 2019 and November 2019. More specifically, the strata utilized were the urban and rural areas within the major provinces in the government-controlled areas, namely, Nicosia, Limassol, Larnaca, Pafos, and the free part of Famagusta (considered rural). For the sample selection, plots and villages were randomly chosen as initial sampling points in urban and rural areas respectively. At each randomly selected sampling point, a starting point was randomly selected, from where equal numbers of households were selected (10 households) by systematic sampling. Finally, there was a sampling of individuals into predefined strata based on age group. In cases of absence, the researcher returned for a second visit. During the household visit, potential participants were informed in detail about the aims of the study by trained study researchers, and after signing an informed consent, participants were included in the survey. A total of 3511 individuals participated in the study, and a response rate of 49.8% was recorded. The only exclusion criteria were persons living in institutions or who could not communicate in the Greek language.

Data collection

The study questionnaire was based on the standardized and structured European Model Questionnaire (EMQ), [23] previously used in different surveys internationally. The original English questions used were translated to Greek and back-translated to English. Additional questions were included regarding the use of tobacco, alcohol, sedatives, and new substances, as well as regarding betting. The questionnaire was first administered in a pilot study, and necessary corrections were made to ensure the validity of the instrument.

Variables

Current smoking is defined as having smoked at least one

cigarette on one or more days of the week during the last 12 months; respondents who reported having not smoked in their lifetime or those who reported not currently smoking are defined as non-current smokers. Several covariates were considered in the analysis, including gender; age, defined as 15-35 years old and 36 years and older; marital status, defined as single, married, or separated; nationality, reported as Greek-Cypriot or other nationality; employment status, reported as unemployed, employed, or student; monthly household income in \leq €1000, €1001-€2000, or \geq €2001; educational status as primary school or less, secondary, and university or higher; household composition as living alone, family with children, or family without children; having children under 18 years living in the household, classified as yes or no; place of residence in the last 12 months, defined as rural or urban; place of residence for most of life, defined as rural or urban; the age of first use of smoking in years; and household size in number.

Statistical analysis

Categorical variables of interest were described as frequencies and percentages and were compared between current and non-current smokers using the chi-square test of independence. Continuous variables of interest were described using means \pm standard deviations and compared between groups using the independent sample t-test. Logistic regression analysis was used to assess the effects of different variables on the likelihood of smoking, both in univariate and multivariable models; Odds Ratios (OR) are reported together with the corresponding 95% Confidence Intervals (CI). A p-value of 0.05 was considered to be statistically significant and all tests presented are two-sided. The Statistical Analysis Software (SAS) version 9.2 (SAS Cary Inc., NC, USA) was used for all analyses.

Results

A total of 3511 people participated in the survey, out of whom 39.9% were current smokers (having smoked at least one cigarette on one or more days of the week during the last 12 months) while 60.1% were non-current smokers.

Table 1 summarizes the socio-demographic characteristics of the participants, overall and by smoking status. Among current smokers, 64.0% were males whereas among non-current smokers the percentage of males was 39.9% ($p < 0.001$). The

mean age was lower among current smokers than non-current smokers (33.9 ± 12.5 years old vs 35.6 ± 14.4 years old, respectively, $p < 0.001$). Also, 90.2% of the participants reported their nationality as Greek-Cypriot (88.5% among current smokers vs. 91.4% among non-current smokers, $p = 0.006$). Statistical significant differences between the two groups were also observed in marital, employment, and educational status, as well as with monthly household income, household size, children under 18 years old living in the household, place of residence for the last 12 months, and household composition (all $p < 0.05$). No significant differences were observed in terms of place of residence for most of life.

Among the $n = 1404$ who reported being current smokers, the mean age of having the first cigarette was reported at 17.8 ± 4.4 years old (Table 2). Furthermore, 50.1% of current smokers have tried to quit smoking in the past and 46.1% want to quit smoking in the future.

Univariate and multivariate logistic regression analysis was used to identify the socio-demographic predictors of smoking. The results of these analyses are summarized in Table 3. All demographic and socioeconomic factors showed statistically significant associations with smoking in the univariate analyses, apart from place of residence for most of life. After adjusting for the effect of all the other predictors in a multiple logistic regression model, several determinants of smoking remained significant. Gender was the strongest determinant of smoking, with males more likely to smoke than females (OR=2.65, 95% CI: 2.28, 3.07). Being between 15-34 years old was associated with an increased odds of smoking (OR=1.72, 95% CI: 1.44, 2.06). Marital status maintained its significant effect as a determinant of smoking (OR=1.83, 95% CI: 1.37, 2.44), as is employment status, with the highest odds of smoking among those being employed compared to those that were unemployed (OR=1.28, 95% CI: 0.34, 0.62). Furthermore, individuals that lived in urban areas in the past 12 months had higher odds of smoking than those who lived in rural areas (OR=1.35, 95% CI: 1.03, 1.76). Also, being a Greek-Cypriot maintained its protective effect of smoking (OR=0.74, 95% CI: 0.58, 0.94). On the contrary, monthly household income, children under 18 in the household, household size, place of residence for most of life, and household composition did not reach statistical significance.

Table 1: Socio-demographic characteristics, overall and by smoking status.

	Overall (n=3511)	Current smoker (n=1404)	Non-current smokers (n=2107)	P-value
Gender				<0.001
Male	1738 (49.5)	898 (64.0)	840 (39.9)	
Female	1773 (50.5)	506 (36.0)	1267 (60.1)	
Age (years)	34.9 \pm 13.7	33.9 \pm 12.5	35.6 \pm 14.4	<0.001
Marital status				0.002
Single	1800 (53.6)	704 (50.1)	1176 (55.8)	
Married	1365 (38.9)	577 (41.1)	788 (37.4)	
Divorced/ widowed	266 (7.5)	123 (8.8)	143 (6.8)	
Nationality				0.006
Greek-Cypriot	3168 (90.2)	1243 (88.5)	1925 (91.4)	
Others	343 (9.8)	161 (11.5)	182 (8.6)	
Employment status				
Unemployed	528 (15.0)	169 (12.0)	359 (17.0)	<0.001

Employed	2351 (67.0)	1053 (75.0)	1298 (61.6)	
Student	632 (18.0)	182 (13.0)	450 (21.4)	
Educational status				<0.001
Incomplete secondary or less	708 (20.2)	250 (17.8)	458 (21.7)	
Secondary	1228 (34.9)	559 (39.8)	669 (31.8)	
University or more	1575 (44.9)	595 (42.4)	980 (46.5)	
Monthly household income (Euro)				0.003
≤1000	482 (17.8)	228 (16.1)	254 (20.1)	
1001-2000	1160 (42.8)	507 (41.5)	653 (44.7)	
≥2001	1067 (39.4)	399 (42.4)	668 (35.2)	
Household size	2.3 ± 1.45	2.2 ± 1.47	2.3 ± 1.44	0.005
Children under 18 in the household				<0.001
Yes	1554 (44.3)	564 (40.2)	990 (47.0)	
No	1957 (55.7)	840 (59.8)	1117 (53.0)	
Place of residence for most of life				0.074
Rural	1255 (35.7)	477 (34.0)	778 (36.9)	
Urban	2256 (64.3)	927 (66.0)	1329 (63.1)	
Place of residence for the past 12 months				0.008
Rural	1186 (33.8)	438 (31.2)	748 (35.5)	
Urban	2325 (66.2)	966 (68.8)	1359 (64.5)	
Household composition				0.001
Alone	944 (26.9)	415 (29.6)	529 (25.1)	
Family without children	2229 (63.5)	840 (59.8)	1389 (65.9)	
Family with children	338 (9.6)	149 (10.6)	189 (9.0)	

Table 2: Smoking characteristics and intention to quit smoking among current smokers.

	Overall (n= 1404)
Age of first use of smoking (years)	17.8 ± 4.4
Ever tried to quit smoking (%)	
Yes	50.1
No	49.9
Want to quit smoking (%)	
Yes	46.1
No	53.9

Table 3: Socio-demographic predictors of smoking – univariate & multivariate logistic regression analysis.

	Univariate analysis			Multivariate analysis		
	OR	95% CI	P-value	OR	95% CI	P-value
Gender						
Male	2.68	(2.33, 3.08)	<0.001	2.65	(2.28, 3.07)	<0.001
Female	1.00			1.00		
Age group						
15-34 years	1.35	(1.18, 1.55)	<0.001	1.72	(1.44, 2.06)	<0.001
≥35 years	1.00			1.00		
Marital status						

Divorced/ widowed	1.44	(1.11, 1.86)	0.01	1.83	(1.37, 2.44)	<0.001
Married	1.22	(1.06, 1.41)	0.01	1.22	(0.99, 1.49)	0.005
Single	1.00			1.00		
Employment status						
Employed	1.72	(1.41, 2.11)	<0.001	1.28	(0.34, 0.62)	<0.001
Student	0.86	(0.67, 1.11)	0.24	0.46	(1.02, 1.59)	0.03
Unemployed	1.00			1.00		
Educational status						
University or more	1.11	(0.93, 1.34)	0.26	0.95	(0.76, 1.17)	0.61
Secondary	1.53	(1.27, 1.85)	<0.001	1.26	(1.02, 1.56)	0.03
Primary or less	1.00					
Nationality						
Greek-Cypriot	0.73	(0.58, 0.91)	0.01	0.74	(0.58, 0.94)	0.01
Other	1.00			1.00		
Monthly household income (Euro)						
≥2001	0.94	(0.79, 1.14)	0.49	0.94	(0.78, 1.13)	0.49
1001-2000	1.23	(1.04, 1.44)	0.01	1.09	(0.91, 1.30)	0.35
≤1000	1.00				1.00	
Children under 18 in the household						
Yes	1.32	(1.15, 1.51)	<0.001	1.09	(0.91, 1.30)	0.35
No	1.00				1.00	
Household size	0.94	(0.89, 0.98)	<0.001	0.97	(0.91, 1.02)	0.24
Place of residence for most of life						
In a city	1.14	(0.99, 1.31)	0.07	0.89	(0.69, 1.16)	0.38
In a village	1.00			1.00		
Place of residence for the past 12 months						
In a city	1.21	(1.05, 1.40)	0.01	1.35	(1.03, 1.76)	0.03
In a village	1.00			1.00		
Household composition						
Family with child	1.01	(0.78, 1.29)	0.96	1.01	(0.77, 1.33)	0.95
Family without child	0.77	(0.66, 0.90)	0.001	0.95	(0.77, 1.18)	0.64
Alone	1.00			1.00		

Discussion

Several findings from this study raise concerns for the future of tobacco control in Cyprus. The prevalence of cigarette smoking among the Cypriot population, as reported in this study was 39.9% and appears to be well above the EU average of 28% [20]. Moreover, findings from our study indicate that the current smoking rate in Cyprus is slightly higher than what was reported in the 2012 European Union Barometer survey which was stated as 30% for Cyprus [20]. Our study in fact used an even stricter criterion for classifying a current smoker - reported as smoking regularly rather than occasionally for the past 12 months.

Another worrisome finding of our study was the young age of smoking initiation that was observed, consistent with previous findings [18,19,21]. This could be explained by the fact that younger people are more easily influenced by their peers, social norms, and tobacco advertising [19,21]. Family members also play a role in the early onset of smoking, as the family has a direct impact on a teenager's decision to start smoking [21]. These results suggest that when deciding a target audience

for a prevention program, the lower age associated with current smoking should be taken into consideration and this effort should be ongoing throughout secondary education and should also include family members [19].

Evidence from several studies suggests that socio-demographic factors play a role in smoking habits. In several EU countries, people who live in the urban areas tend to smoke more, [24] which may be partly attributed to the greater availability and accessibility of cheap tobacco from smuggling, and more illegal sales to minors. Also, urban areas may have a more liberal attitude towards smoking which encourages the initiation of smoking and makes it difficult to successfully quit smoking [25,26]. We also observed higher rates of current smoking in urban areas compared to rural areas. Furthermore, we found, as it has been previously reported [14], that being divorced or widowed is associated with higher odds of smoking compared to being married or single. Divorce or loss of a partner can cause considerable mental and psychosocial distress, which many times may result in cigarette smoking as a mode of adapting [27]. Consistent with our findings, previous studies showed a strong association between education and smoking behaviour

[9,10]. This could be due to the lack of knowledge about smoking, and its health impacts, among individuals with lower levels of education [9]. Also, less educated individuals tend to be less forthcoming to health education promoting a healthy lifestyle. Exposure to health education has shown to increase a better understanding of the association between healthy behaviours and outcome [28]. Regarding employment status, previous studies indicate that individuals that are unemployed exhibit higher smoking rates in most developed countries [9,10,29]. Interestingly, in our study, we found that being employed is associated with current smoking, which could be attributed to work-related factors, such as psychosocial stretch, physical work strain, and the social impact of peers at work. These factors have been also shown to impede successful smoking cessation attempts [30]. Other factors, such as monthly household income, children under 18 in the household, household size, place of residence most of their life, and household composition were not shown to be significantly associated with the odds of current smoking in our study. This result, however, does not mean that these factors should be overlooked when designing prevention programs for smoking.

We also found that half of the current smokers in the study tried unsuccessfully to quit smoking in the past and that 46% of current smokers want to quit. This is consistent with previous studies [21] and would be valuable to consider in planning smoking cessation programs, as past endeavours to quit smoking indicates a higher drive to succeed in such an attempt [21,31].

There are some limitations to our study such as the fact that the questionnaires were self-reported, introducing the possibility of information bias, though we do not expect this to have any significant impact on our results. Also, several individuals in the selected households were not surveyed and some individuals were absent on the day of the survey (for reasons other than lack of interest in the study), thus introducing the chance of some non-response bias. Furthermore, our study is limited to only socio-demographic characteristics associated with smoking. Other characteristics that have been linked with smoking behaviours previously, including, personality, temperament, coping mechanism, individual beliefs, attitudes, norms, as well as knowledge [32,33], were not available in the current study. To systematically tackle smoking in Cyprus, future studies should consider individual factors that influence smoking behaviours, when adapting and implementing any intervention strategy. Despite the above limitations, the large sample size of the study ensures high statistical power and precise estimates. The broad age range (15-65 years old) that was included in the sample further strengthens the study. Furthermore, the anonymity of the participants increases the likelihood of sincere responses. Findings from this study could be generalized to other countries with similar socio-demographic characteristics as Cyprus.

Conclusion

For any prevention programme set to systematically tackle smoking in the Cypriot population or elsewhere, it would be essential to simultaneously address the social and environmental determinants of smoking on a variety of levels. Several socio-demographic factors were shown in the current study to be associated with smoking in Cyprus, including sex, age, educational status, nationality, employment status, and place of residence. These need to be explored further and eventually considered in the design, adaptation, and implementation of any prevention and intervention programme related to smoking.

Data availability

Data are available upon request to the corresponding author *via* email.

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