

Prevalence and social determinants of smoking in the adult Greek Cypriot population

Nicolaou SA¹, Heraclides A², Markides KS³, Charalambous A²

¹Department of Life and Health Sciences

²Medical School, Center of Primary Care and Population Health
University of Nicosia, Nicosia, Cyprus

³Department of Preventive Medicine and Community Health, University of Texas Medical Branch, Galveston, USA

Abstract

Background: Smoking remains a major public health concern in Europe. In the current study, we investigate the prevalence and socioeconomic factors that contribute to smoking disparities in Greek Cypriot adults.

Material and methods: In 2009, using the Countrywide Integrated Noncommunicable Disease Intervention questionnaire a representative sample of Greek Cypriot adults was surveyed (response rate 100%). Socioeconomic and demographic data were collected and analyzed.

Results: The prevalence of smoking in Greek Cypriot adults was 50.8 % among men and 21.2 % among women. Sociodemographic disparities in smoking prevalence were identified, characterized by higher prevalence in urban vs rural centers (especially among women), and higher prevalence among employed women vs housewives. Socioeconomic inequalities in prevalent smoking were gender-specific, with occupational social class showing an inverse association among men and a direct among women, with income showing an inverse association (mostly among men), and educational attainment showing a clear inverse gradient among men and a direct gradient among women.

Conclusion: Striking gender-specific bidirectional associations between socioeconomic factors and smoking prevalence were identified among Greek Cypriot adults, which may promote targeted intervention programmes aiming at halting and reversing smoking behaviors in Cyprus. Hippokratia 2016, 20(4): 284-291

Keywords: Socioeconomic factors, smoking prevalence, Cyprus

Corresponding author: Stella A. Nicolaou, Department of Life and Health Sciences, University of Nicosia, 46 Makedonitissas Avenue, Engomi, P.O.Box 24005, 1700 Nicosia, Cyprus, tel: +35722841783, fax: +35722357481, e-mail: nicolaou.s@unic.ac.cy

Introduction

Despite efforts to decrease the prevalence of smoking worldwide tobacco use remains a major public health concern. Encouragingly, tobacco use in the adult population appears to be decreasing in some developed countries. However, the decrease has been slower among low socioeconomic groups where a general pattern of higher smoking prevalence is observed^{1,2}. Still, according to the World Health Organization (WHO) the European region has the highest current adult tobacco use³.

While prevalence data are important, investigating existing disparities in smoking is also critical^{2,4-13}. In general, the literature suggests that socioeconomic factors such as education, occupational social class, and income are inversely associated with smoking in most developed countries^{1,2,5-15}. The prevalence is higher among people in lower occupational classes^{4,8,9}, lower income^{9,10,12}, and lower educational attainment¹³. In addition, people living in urban areas are more likely to smoke than people living in rural areas^{5,6}. Further, being divorced/separated is also strongly associated with smoking^{7,8,16}. This inverse

social gradient in smoking prevalence seems to affect mainly developed countries, as in developing countries a direct social gradient (higher smoking prevalence among higher social classes, and people with higher income and educational attainment) has been observed^{17,18}.

Based on a European Union Barometer survey the prevalence of smoking varies greatly among countries of the European Union ranging from 13-40 %. Cyprus is reported at 30 % placing it just above the EU average (28 %)⁴. Although smoking is apparently highly frequent among Greek Cypriot adults, no properly designed large-scale epidemiological study has investigated the exact prevalence so far. Furthermore, the socioeconomic factors that influence smoking prevalence remain unknown. Although Cyprus is a highly developed country, this development has occurred in a very short duration of time (a few decades), so it is still unknown whether, in terms of health behaviors, such as smoking, social determinants follow the patterns observed in developed or those observed in developing countries. This is a very big gap in knowledge as interventional programmes aiming at re-

ducing the prevalence of smoking in the Greek Cypriot population, have to be targeted to those social strata within the population where smoking frequency is at its peak. In response to this need, the current study aimed firstly to determine smoking frequency and volume among a random sample of Greek Cypriot adults. Secondly, it aimed to determine the major social determinants of smoking and the presence of socioeconomic disparities in smoking among the Greek Cypriot population.

Methods

Study setting and participant recruitment

This is a cross-sectional household panel survey conducted in the Republic of Cyprus between 2009-2010, among a random sample of 3,021 young and middle-aged adults (25-64 years old) of Greek Cypriot origin. The sample number has been estimated to be satisfactory for determining the associations of interest in a representative sample of the young and middle-aged Greek Cypriot population, giving a 95 % confidence level with a maximum statistical error margin of ± 1.78 .

The sampling frame for the current survey was all streets in the areas in the urban and rural areas of all the provinces controlled by the Republic of Cyprus. Multi-stage sampling was used with the street being the initial sampling unit for urban areas and village for the rural areas. For recruitment, streets were randomly chosen in urban areas, while villages were randomly chosen in rural areas. Households within streets/villages were selected systematically (e.g., every second house on the right). In the case of apartment buildings, one apartment was selected from each floor, and in the case of double-dwellings, the ground floor and the upper floor were chosen alternately. Finally, there was a sampling of individuals into predefined strata based on age-group and gender. These predefined strata were created proportionally to those recorded in the 2001 population census; thus our sample is representative of the country's young and middle-aged population¹⁹. In cases of absence, the researcher returned for a second visit.

During the household visit, trained research assistants informed potential participants in detail about the aims of the study, and after signing an informed consent, participants were included in the survey. In total, 3,021 adults (1,393 men and 1,628 women) participated in the study. The response rate was 100 % since this was a household survey done in person with full cooperation of the individuals in all households approached. Mentally and/or cognitively disabled individuals were excluded since they were unable to respond to the questionnaire.

Data collection

The study questionnaire was based on the CINDI (Countrywide Integrated Noncommunicable Disease Intervention) program previously used in different surveys internationally²⁰. The questionnaire was translated into the Greek language, and minor additions were made aimed at covering specific social factors relevant to the Greek Cypriot population. Specifically, questions were

added on the city/village of residence, refugee status and gross income. Before the questionnaire was finalized, 30 questionnaires were distributed on a pilot basis to identify any weaknesses or omissions.

Assessment of smoking-related variables

For the assessment of smoking and the classification of all smoking-related variables, we followed the approach of the Canadian Tobacco Use Monitoring Survey (CTUMS)²¹. A smoker was defined as a person that smoked any type of tobacco daily. Current smoker was defined as any individual who had smoked ≥ 100 cigarettes (or cigars/pipe) in their lifetime and reported smoking daily/occasionally during the 30 days before data collection. Light/moderate/heavy smokers were defined as any person smoking between 1-10, 11-19, and ≥ 20 cigarettes per day, respectively. All cigar and pipe smokers also smoked cigarettes; thus their intensity of smoking was assigned based on the number of cigarettes they smoked. Never-smoker was defined as any person reporting not smoking at the time of the interview, and also reported that had not smoked more than 100 cigarettes (or any cigars/pipe) in their life. Former smoker was defined as any person reporting not smoking at the time of the interview but reported smoking more than 100 cigarettes (or any cigars/pipe) in the past. The current non-smoker category combined the never-smokers and the former smokers. Occasional smoker was defined as any person reporting smoking occasionally (i.e., not on a daily basis). Short-term and long-term quitters were defined as any former smoker who quit smoking < 1 year and ≥ 1 year before the survey, respectively.

Assessment of socioeconomic factors

Socioeconomic and demographic characteristics were self-reported by the participants. Refugee was defined as any person having to flee from his/her home and was permanently restricted access after the 1974 Turkish invasion to the island of Cyprus.

Marital status was self-reported as single, married, engaged, cohabiting, divorced, or widowed. For the analysis, the categories of married/engaged/cohabiting were combined in a single category, due to the small number of participants in engaged/cohabiting categories.

Employment status was categorized as employed, housewife, student, retired, or unemployed. The occupational social class was assigned using the UK's Registrar General's Social Class system (higher managerial and professional, lower managerial and professional, intermediate, skilled non-manual, skilled and semi-skilled manual, unskilled). An additional category included everyone not included in the active workforce (primarily housewives and students).

Total family net income was self-reported as $\leq \text{€}1,000$, $\text{€}1,001-2,000$, $\text{€}2,001-3,000$, $\text{€}3,001-4,000$, $\text{€}4,001-5,000$, and $\geq \text{€}5,001$, per month.

Educational attainment was self-reported as primary school (ages 6-12) or no formal education, Gymnasium (ages 12-15), Lyceum (ages 15-18), Undergraduate Uni-

versity degree, and Postgraduate University degree.

The approval for the analysis of the data was provided by the Cyprus National Bioethics Committee (28/4/2014, EEBK/EII/2014/01.56).

Statistical analysis

Associations between baseline characteristics (demographic and socioeconomic factors) were determined using the chi-squared test when both variables of interest were categorical and with a t-test when the dependent variable was numeric (i.e., smoking duration in years). All dependent numeric variables were tested for deviations from normality. None of the variables tested deviated significantly from normality, and thus parametric statistical techniques were followed. Logistic regression was used to derive Odds Ratios (OR) [95 % Confidence Intervals (95 % CI)] for the association between different demographic/socioeconomic factors and current smoking (binary outcome). We stratified our logistic regression analyses by gender and used two models, one adjusting for age and the other adjusting for age and district. A p value of <0.05 was taken as evidence for the presence of a statistically significant association in all analyses. All analyses were performed using STATA version 11 (STATA Corp., TX, USA).

Results

Prevalence and duration of smoking and cessation-related information by gender

The survey sample comprised of 3,021 adults (46.1 % men, 53.9 % women). Gender differences were observed in all socioeconomic factors of interest (Table 1), as well as for smoking status (Table 2). The prevalence of current smoking was 50.8 % among men and 21.2 % among women. Further, 19.7 % of men and 5 % of women, and 29.6 % of men and 73.8 % of women reported being former or never smokers, respectively (Table 2).

Current daily smoking differed substantially by gender (47.1 % men, 18.4 % women), especially heavy smoking (35.0 % men, 8.1 % women). Men were also much more likely to report former heavy smoking (15.3 % men, 1.8 % women), with the majority reporting being long-term quitters. The average duration of smoking also differed between genders, being higher among men (20.7 years) than women (14.1 years) (Table 2).

Over half of current smokers (56.9 % men, 54.9 % women) would be willing to quit smoking, however, about half of them find it difficult (Table 2). In addition, the majority of participants reported not having been advised to quit by a healthcare provider or a friend and such advice appeared to be gender-specific (men advised 31.9 %, women 12.7 %). Overall, the majority of our sample is worried about the health effects of smoking (men 75.5 %, women 76.8 %).

Demographic and socioeconomic determinants of smoking status

All demographic and socioeconomic factors showed strong associations with smoking status (apart from refugee

Table 1: Demographic characteristics by gender of the 3,021 participants of the cross-sectional household panel survey that investigated the prevalence and socioeconomic factors that contribute to smoking disparities in Greek Cypriot adults.

	Men (n=1393) % (number)	Women (n=1628) % (number)
Age group		
25-34	25.8 (360)	24.0 (391)
35-44	23.9 (333)	24.9 (406)
45-54	24.3 (339)	26.8 (436)
55-64	25.9 (361)	24.3 (395)
District of residence		
Nicosia	39.4 (549)	41.6 (676)
Limassol	28.3 (394)	28.9 (470)
Larnaca	17.8 (248)	15.9 (259)
Paphos	9.1 (127)	9.6 (156)
Amochostos	5.3 (74)	4.1 (66)
Urbanization		
Urban	67.4 (937)	68.7 (1117)
Rural	32.6 (453)	31.3 (509)
Refugee status		
refugee	33.3 (459)	35.0 (563)
not refugee	66.7 (921)	65.0 (1046)
Marital status*		
single	16.2 (225)	10.6 (173)
married/engaged/ cohabiting	80.0 (1113)	78.6 (1279)
divorced	3.0 (42)	7.9 (128)
widowed	0.9 (12)	3.0 (48)
Employment status*		
employed	86.7 (1190)	62.2 (1003)
housewife	0 (0)	30.7 (495)
student	1.2 (17)	1.4 (22)
retired	3.8 (52)	2.5 (41)
unemployed	8.3 (114)	3.2 (52)
Occupational social class*		
unskilled	8.5 (117)	10.5 (170)
skilled and semi- skilled manual	38.0 (522)	9.0 (145)
skilled non-manual	28.0 (385)	36.3 (586)
intermediate	6.3 (87)	3.3 (53)
lower managerial and professional	2.6 (36)	1.7 (27)
higher managerial and professional	3.1 (43)	1.4 (22)
not included in active workforce	13.3 (183)	37.8 (610)
Total family net income*		
≤1000	11.3 (151)	19.3 (299)
1001-2000	44.4 (595)	42.3 (654)
2001-3000	24.7 (330)	24.0 (371)
3001-4000	10.3 (138)	8.0 (124)
4001-5000	5.1 (68)	3.0 (47)
≥5001	4.3 (57)	3.3 (51)
Educational attainment*		
primary school or no formal education	16.4 (227)	19.5 (316)
Gymnasium	14.7 (204)	11.4 (184)
Lyceum	38.1 (529)	34.5 (559)
University (Undergraduate)	23.2 (222)	29.2 (474)
University (Postgraduate)	7.6 (106)	5.4 (88)

*: p < 0.001.

Table 2: Smoking status, duration and cessation-related information by gender of the 3,021 Greek Cypriot adult participants of the cross-sectional household panel survey.

	Men % (number)	Women % (number)	p value for gender difference
Smoking status¹			
never-smoker	29.6 (413)	73.8 (1201)	
former light/ moderate smoker (short-term quitter)	1.0 (14)	0.9 (14)	
former light/ moderate smoker (long-term quitter)	3.4 (47)	2.3 (37)	
former heavy smoker (short- term quitter)	2.7 (37)	0.4 (7)	
former heavy smoker (long- term quitter)	12.6 (175)	1.4 (23)	
occasional smoker	3.7 (51)	2.8 (46)	
daily light/ moderate smoker	12.1 (168)	10.3 (168)	
daily heavy smoker	35.0 (488)	8.1 (132)	<0.001
Smoking duration in years² - mean (standard deviation)			
	20.7 (11.5)	14.1 (9.7)	<0.001
Willing to quit smoking²			
no	25.4 (173)	30.6 (103)	
yes	31.8 (217)	35.6 (120)	
not sure	17.7 (121)	14.5 (49)	
yes but find it difficult	25.1 (171)	19.3 (65)	0.049
Attempted to quit smoking and managed to do so for at least for 24 hours²			
no	34.1 (235)	41.2 (142)	
yes	65.9 (455)	58.8 (203)	0.025
Advised to quit smoking²			
no	68.1 (949)	87.3 (1422)	
yes by doctor or health provider	14.9 (208)	5.8 (95)	
yes by family member or friend	16.9 (236)	6.8 (111)	<0.001
Worry about adverse effects of smoking on health²			
not at all	13.6 (96)	14.4 (50)	
not really	11.2 (79)	8.9 (31)	
somewhat	25.2 (178)	28.2 (98)	
yes at a big extent	30.1 (213)	29.3 (102)	
yes at a huge extent	19.9 (141)	19.3 (67)	0.71

1: Never-smoker defined as not smoking at the time of the interview and not smoked <100 cigarettes/cigars/pipe in the past; Former smoker defined as not smoking at the time of the interview, but smoked >100 cigarettes/cigars/pipe in the past; light smoker defined as smoking between 1-10 cigarettes per day, moderate smoker defined as smoking between 11-19 cigarettes per day, and heavy smoker as smoking ≥20 cigarettes per day; Occasional smoker was defined as smoking occasionally; Short-term quitter defined as any former smoker who quit smoking less than one year prior to the survey and long-term quitter as any former smoker who quit smoking more than one year prior to the survey.

2: The specific questions were answered only by individuals who reported that they are currently smoking.

status) (Table 3). Prevalence of smoking was higher in younger age-groups and the large urban centers (Nicosia 32.7 %, Limassol 35.1 %, Larnaca 31.4 %), compared to the smaller ones (Paphos 26.5 % and Ammochostos 20.7 %). Within each district, rural areas had a much lower prevalence of smoking than urban areas. The frequency of smoking was higher in divorced (48.9 %) and single (39.1 %) individuals as compared with the married/engaged/cohabiting (29.5 %) and widowed (20 %). Smoking was also more frequent among employed or retired individuals rather than the unemployed. Regarding socioeconomic determinants, crude (unadjusted, non-stratified) associations revealed differences in smoking status between strata of occupational social class, income, and educational attainment, without apparent gradients.

When this analysis was repeated only for current smoking as the outcome of interest, and with adjustment for age and district and stratification by gender, the effect of each demographic and socioeconomic factor became clearer and striking gender differences in these associations emerged (Table 4). Specifically, the protective effect of rural living and being married (compared to being single) was only apparent among women (OR: 95 % CI: 0.34: 0.25; 0.48 and 0.58: 0.40; 0.84, respectively). Gender-specific effects were also observed regarding employment status. Specifically, being a housewife was associated with a 49 % lower probability of being a current smoker compared to being employed (OR: 95 % CI 0.51: 0.37; 0.71). In contrast, retired women were more likely to smoke compared to employed women (OR: 95 % CI 2.84: 1.46; 5.51); this was not apparent among men (OR: 95 % CI 1.32: 0.74; 2.33).

Gender differences were also apparent in the occupational social class-smoking associations. Despite the lack of clear gradients in smoking, prevalence by occupational social class, a trend of lower smoking prevalence among higher occupational social class men and higher smoking prevalence among higher occupational social class women was apparent.

Regarding income, there was a clear trend of decreasing the smoking frequency with increasing family net income (i.e., inverse gradient) among men. Among women, a similar inverse gradient was apparent, yet less steep, which however diverged into an increased likelihood of smoking when it comes to the maximum family net income category (≥ €5,001/month) (i.e., a 'U-shaped' relationship).

Educational attainment also showed a clear inverse gradient in smoking prevalence among men (the higher the educational attainment the lower the likelihood of smoking), but this time there was an apparent direct gradient among women, with women holding a Postgraduate University degree being much more likely to smoke compared to those with little or no formal education, even after adjustment for age and district (OR: 95 % CI 2.65: 1.44; 4.87).

Table 3: Demographic and socioeconomic characteristics in relation to smoking status of the 3,021 Greek Cypriot adult participants of the cross-sectional household panel survey.

	Smoking status						p value
	never smoker	former light/moderate smoker	former heavy smoker	occasional smoker	current light/moderate smoker	current heavy smoker	
	% (number)	% (number)	% (number)	% (number)	% (number)	% (number)	
Gender							
men	29.6 (413)	4.4 (61)	15.2 (212)	3.7 (51)	12.1 (168)	35.0 (488)	
women	73.8 (1201)	3.1 (51)	1.8 (30)	2.8 (46)	10.3 (168)	8.1 (132)	<0.001
Age group							
25-34	49.9 (376)	3.9 (29)	4.9 (37)	4.5 (34)	15.9 (120)	20.8 (157)	
35-44	57.5 (425)	3.2 (24)	4.3 (32)	3.2 (24)	10.8 (80)	20.8 (154)	
45-54	52.6 (408)	4.5 (35)	7.1 (55)	3.0 (23)	11.1 (86)	21.7 (168)	
55-64	53.7 (406)	3.2 (24)	15.6 (118)	2.1 (16)	6.7 (51)	18.7 (141)	<0.001
District of residence							
Nicosia	49.0 (601)	5.8 (71)	9.7 (119)	3.8 (47)	12.0 (147)	19.7 (242)	
Limassol	54.9 (474)	2.0 (17)	5.9 (51)	2.1 (18)	11.3 (98)	23.8 (206)	
Larnaca	56.2 (285)	2.0 (10)	8.1 (41)	2.4 (12)	8.7 (44)	22.7 (115)	
Paphos	59.0 (167)	2.8 (8)	6.0 (17)	5.7 (16)	14.1 (40)	12.4 (35)	
Amochostos	62.1 (87)	4.3 (6)	10.0 (14)	2.9 (4)	5.7 (8)	15.0 (21)	<0.001
Urbanization							
Urban	50.9 (1045)	4.0 (83)	7.9 (162)	3.6 (73)	12.9 (265)	20.8 (427)	
Rural	59.0 (568)	3.0 (29)	8.2 (79)	2.5 (24)	7.5 (72)	19.8 (191)	<0.001
Refugee status							
refugee	53.5 (548)	3.4 (35)	8.5 (87)	2.9 (30)	11.3 (116)	20.3 (208)	
not refugee	53.3 (1049)	3.9 (77)	7.8 (153)	3.4 (66)	11.1 (219)	20.5 (403)	0.94
Marital status							
single	45.6 (182)	3.5 (14)	4.5 (18)	7.3 (29)	13.8 (55)	25.3 (101)	
married/engaged/ cohabiting	55.5 (1328)	3.6 (86)	8.7 (208)	2.7 (65)	10.7 (257)	18.8 (449)	
divorced	39.4 (67)	5.3 (9)	4.7 (8)	1.8 (3)	12.4 (21)	36.5 (62)	
widowed	63.3 (38)	3.3 (2)	13.3 (8)	0 (0)	6.7 (4)	13.3 (8)	<0.001
Employment status							
employed	47.9 (1051)	4.1 (91)	8.5 (187)	3.8 (84)	12.3 (270)	23.3 (512)	
housewife	85.7 (424)	1.4 (7)	1.2 (6)	0.8 (4)	5.9 (29)	5.1 (25)	
student	53.8 (21)	7.7 (3)	10.3 (4)	7.7 (3)	5.1 (2)	15.4 (6)	
retired	32.3 (30)	5.4 (5)	9.7 (9)	1.1 (1)	18.3 (17)	33.3 (31)	
unemployed	42.2 (70)	3.6 (6)	21.7 (36)	2.4 (4)	6.6 (11)	23.5 (39)	<0.001
Occupational social class							
unskilled	59.6 (171)	1.7 (5)	7.0 (20)	2.4 (7)	8.4 (24)	20.9 (60)	
skilled and semi- skilled manual	33.4 (223)	3.9 (26)	12.6 (84)	2.8 (19)	10.9 (73)	36.4 (243)	
skilled non-manual intermediate	54.6 (531)	4.8 (47)	5.8 (56)	4.5 (44)	14.4 (140)	15.8 (154)	
lower managerial and professional	45.0 (63)	4.3 (6)	10.0 (14)	6.4 (9)	12.1 (17)	22.1 (31)	
higher managerial and professional	47.6 (30)	4.8 (3)	12.7 (8)	4.8 (3)	7.9 (5)	22.2 (14)	
not included in active workforce	50.8 (33)	6.2 (4)	7.7 (5)	3.1 (2)	16.9 (11)	15.4 (10)	
Total family net income							
≤1000	68.7 (545)	2.6 (21)	6.9 (55)	1.5 (12)	7.4 (59)	12.7 (101)	<0.001
1001-2000	56.2 (253)	2.2 (10)	6.4 (29)	2.7 (12)	10.7 (48)	21.8 (98)	
2001-3000	53.2 (665)	3.3 (41)	7.6 (95)	2.6 (33)	10.4 (130)	22.9 (287)	
3001-4000	53.1 (372)	3.4 (24)	8.8 (62)	4.0 (28)	12.8 (90)	17.8 (125)	
4001-5000	49.6 (130)	6.9 (18)	6.9 (18)	3.4 (9)	11.1 (29)	22.1 (58)	
≥5001	53.0 (61)	7.8 (9)	12.2 (14)	0.9 (1)	14.8 (17)	11.1 (13)	
Educational attainment							
primary school or no formal education	49.1 (53)	6.5 (7)	10.2 (11)	12.0 (13)	10.2 (11)	12.0 (13)	<0.001
Gymnasium	58.2 (316)	1.1 (6)	10.1 (55)	1,1 (6)	6.4 (35)	23.0 (125)	
Lyceum	46.1 (179)	2.3 (9)	12.1 (47)	1.5 (6)	7.5 (29)	30.4 (118)	
University (Undergraduate)	53.7 (585)	3.7 (40)	6.8 (74)	3.1 (34)	11.2 (22)	21.5 (234)	
University (Postgraduate)	54.3 (433)	6.1 (49)	6.5 (52)	4.5 (36)	14.7 (117)	13.8 (110)	
	49.5 (963)	3.6 (7)	7.2 (14)	7.7 (15)	16.5 (32)	15.5 (30)	0.024

Former smoker defined as any person reporting not smoking at the time of the interview, however, reported that has smoked more than 100 cigarettes/cigars/pipe in the past; light smoker defined as any person reporting smoking between 1-10 cigarettes per day, moderate smoker defined as any person reporting smoking between 11-19 cigarettes per day, and heavy smoker as any person reporting smoking ≥ 20 cigarettes per day; Occasional smoker was defined as any person reporting smoking occasionally.

Table 4: Multivariate-adjusted Odds Ratios (95% Confidence Intervals) for current smoking¹ by sociodemographic characteristics among men and women Greek Cypriot adult participants of the cross-sectional household panel survey.

District of residence	Age-adjusted model		Age- and district-adjusted model	
	MEN (n=1392)	WOMEN (n=1561)	MEN (n=1392)	WOMEN (n=1561)
Nicosia	1.00	1.00	n/a	n/a
Limassol	1.47 (1.13; 1.91)	0.82 (0.62; 1.09)	n/a	n/a
Larnaca	1.07 (0.80; 1.45)	0.64 (0.44; 0.92)	n/a	n/a
Paphos	1.11 (0.75; 1.64)	0.59 (0.38; 0.93)	n/a	n/a
Amochostos	0.75 (0.46; 1.23)	0.08 (0.02; 0.34)	n/a	n/a
<i>heterogeneity p value</i>	0.019	<0.001	n/a	n/a
Urbanization				
Urban	1.00	1.00	1.00	1.00
Rural	1.01 (0.81; 1.27)	0.31 (0.22; 0.42)	1.16 (0.90; 1.49)	0.34 (0.25; 0.48)
<i>heterogeneity p value</i>	0.90	<0.001	0.25	<0.001
Marital status				
single	1.00	1.00	1.00	1.00
married/engaged/ cohabiting	0.80 (0.58; 1.10)	0.58 (0.40; 0.84)	0.80 (0.58; 1.11)	0.58 (0.40; 0.84)
divorced	1.44 (0.72; 2.87)	2.48 (1.50; 4.07)	1.45 (0.72; 2.91)	2.48 (1.50; 4.07)
widowed	0.23 (0.07; 1.11)	0.87 (0.37; 2.01)	0.28 (0.07; 1.09)	0.87 (0.37; 2.01)
<i>heterogeneity p value</i>	0.057	<0.001	0.055	<0.001
Employment status				
employed	1.00	1.00	1.00	1.00
housewife	n/a	0.47 (0.35; 0.66)	n/a	0.51 (0.37; 0.71)
student	0.46 (0.17; 1.27)	0.68 (0.25; 1.88)	0.45 (0.16; 1.24)	0.64 (0.23; 1.78)
retired	1.40 (0.79; 2.47)	2.49 (1.31; 4.73)	1.32 (0.74; 2.33)	2.84 (1.46; 5.51)
unemployed	0.69 (0.45; 1.04)	1.09 (0.52; 2.28)	0.66 (0.44; 1.06)	1.53 (0.69; 3.37)
<i>heterogeneity p value</i>	0.063	<0.001	0.088	<0.001
Occupational social class				
unskilled	1.00	1.00	1.00	1.00
skilled and semi-skilled manual	1.24 (0.83; 1.86)	1.55 (0.91; 2.63)	1.25 (0.83; 1.88)	1.48 (0.86; 2.54)
skilled non-manual intermediate	0.88 (0.58; 1.33)	1.28 (0.83; 2.00)	0.91 (0.60; 1.40)	1.18 (0.75; 1.84)
lower managerial and professional	0.93 (0.53; 1.62)	1.39 (0.67; 2.88)	0.96 (0.54; 1.68)	1.18 (0.56; 2.48)
higher managerial and professional	0.67 (0.32; 1.44)	1.44 (0.56; 3.73)	0.67 (0.31; 1.44)	1.48 (0.56; 3.91)
not included in active workforce	0.56 (0.27; 1.16)	1.88 (0.70; 5.05)	0.59 (0.29; 1.23)	1.86 (0.67; 5.12)
<i>heterogeneity p value</i>	0.86 (0.53; 1.38)	0.85 (0.54; 1.33)	0.85 (0.53; 1.38)	0.82 (0.52; 1.29)
<i>trend p value</i>	0.035	0.061	0.061	0.11
Total family net income				
≤1000	1.00	1.00	1.00	1.00
1001-2000	0.81 (0.56; 1.16)	0.72 (0.52; 1.01)	0.77 (0.54; 1.12)	0.62 (0.44; 0.88)
2001-3000	0.75 (0.51; 1.11)	0.66 (0.45; 0.96)	0.72 (0.49; 1.07)	0.53 (0.36; 0.79)
3001-4000	0.65 (0.41; 1.03)	0.85 (0.52; 1.40)	0.64 (0.40; 1.03)	0.70 (0.42; 1.17)
4001-5000	0.34 (0.18; 0.61)	0.68 (0.31; 1.49)	0.33 (0.18; 0.62)	0.52 (0.23; 1.15)
≥5001	0.36 (0.19; 0.69)	1.64 (0.86; 3.10)	0.36 (0.19; 0.69)	1.28 (0.66; 2.49)
<i>trend p value</i>	<0.001	0.67	<0.001	0.009
Educational attainment				
primary school or no formal education	1.00	1.00	1.00	1.00
Gymnasium	0.84 (0.57; 1.23)	1.84 (1.14; 2.98)	0.85 (0.58; 1.26)	1.68 (1.03; 2.74)
Lyceum	0.78 (0.56; 1.08)	1.26 (0.83; 1.90)	0.74 (0.53; 1.04)	1.17 (0.77; 1.80)
University (Undergraduate)	0.53 (0.37; 0.76)	1.63 (1.05; 2.53)	0.51 (0.35; 0.75)	1.41 (0.90; 2.21)
University (Postgraduate)	0.40 (0.25; 0.66)	3.13 (1.73; 5.67)	0.39 (0.23; 0.65)	2.65 (1.44; 4.87)
<i>trend p value</i>	<0.001	0.005	0.001	0.009

1: 'Current smoking' classified as 'occasional smoker' + 'current light/moderate smoker' + 'current heavy smoker'

Discussion

The current study provides an overview of the smoking prevalence and socioeconomic determinants of smoking in the adult Greek Cypriot population. This study reveals a much higher prevalence of smoking in men than women. Further, we found gender-specific bidirectional associations between socioeconomic status and smoking, with higher socioeconomic status associated clearly with decreased prevalence of smoking in men, but with higher prevalence among women. In particular, remarkable op-

posing gender differences were noted for the association of educational attainment with current smoking.

Prevalence and cessation of smoking

In the current study we found that the prevalence of smoking in Cyprus differs from the EU average, with Greek Cypriot men having a higher prevalence than the average European man and Greek Cypriot women a lower prevalence than the average European woman (Men: EU: 32 %, CY: 47.1 %, Women: EU: 24 %, CY: 18.4

%)^{4,22}. Interestingly, a recent study in Greece indicated a lower percentage of smoking in men (38.2 %) while Greek women smoking prevalence was higher (25.7 %)²³. Further, we found that 11.7 % of Greek Cypriots reported quitting smoking similar to data for Cyprus from the EU⁴. Previous EU surveys have shown that the rate of quitting smoking is low in Cyprus (13 %) as compared to other EU countries (21 %)⁴. However, a study in Greek Cypriot adolescents indicated that about half (46.7 %) were considering quitting and over 70 % indicated that they sought some sort of support^{4,24,25}.

Socioeconomic determinants of smoking in Cyprus

Evidence from several studies suggests that socioeconomic factors play a role in smoking prevalence. As in other EU countries, the prevalence of smoking was higher in urban centers, and this may be attributed to the low prevalence of smoking among women in rural areas⁵. This was different from Greece where similar results were recorded²³. Further, we found, as has been previously reported, that living with a spouse is protective regarding smoking as compared to being single while being divorced has been linked to higher smoking frequency than being single^{7,8,16}. In fact, it was shown that smokers without a spouse have higher nicotine dependence and separated/divorced, never married individuals have an increased risk of nicotine dependence^{7,8}.

Occupational social class and employment status may also be used to characterize a person's socioeconomic status¹⁰. Regarding occupational class and similar to other studies, we found lower smoking frequency among higher occupational social class men, but the opposite among women^{8,9}. Our data differ from the EU data in the prevalence of smoking in the category for unemployed people, where the Greek Cypriot adult population, in fact, had a lower prevalence⁴. In the current study, people were also asked to report their family income which could be significant when investigating health status¹. We found that in both men and women there was a trend for decreased smoking with higher income, but women in the highest income category had higher prevalence than any other income group. Other studies indicated that lower-income people smoke more^{8,12}.

Another important socioeconomic factor that has frequently been investigated and associated with smoking is educational attainment². In relation to academic attainment, previous studies have shown that among Greek Cypriot men there is an increase in the frequency of tobacco smoke up until lyceum and then it drops⁴. This was also observed in other studies that indicated that education is inversely related to nicotine dependence^{7-9,12}. In our study, unlike data from Greece, there was an obvious inverse gradient (higher education lower smoking prevalence) among men²³. However, similarly to Greece, Greek Cypriot women do not fit this pattern, and instead higher educational attainment is associated with increased smoking prevalence²². The pattern observed in women may signal innovation and emancipation among higher

educated women. This pattern was observed in Southern European countries that are lagging behind the Northern countries in the smoking epidemic model^{9,12,17}.

Smoking epidemic model in Cyprus

Cyprus falls in the category of developed countries that developed rapidly. This study demonstrates that while in some areas it is much like developed countries in others it's lagging behind still in the developing stage, as regards to smoking attitudes. The smoking progression observed in the current survey fits in well with the smoking epidemic curve proposed by Lopez¹⁷ and modified later on considering recent data¹⁸. In this model, smoking is first initiated by higher socioeconomic class, and it progresses to those of lower socioeconomic status, with women lagging behind men. Using Lopez's original model in developed countries Cyprus is entering stage III lagging behind other developed countries¹⁷. In the past, there was a demonstrated trend for Northern European countries to be ahead of the curve as compared to the Southern European countries^{9,12} and Cyprus seems to be in line with this pattern.

Further support for this staging is provided by diseases that have been strongly related to smoking such as lung cancer and cardiovascular disease (CVD). Greek Cypriot men have an increased lung cancer mortality as compared to women (24.6 vs 5.8 / 100,000) with male rates approaching Northern European countries while female rates comparable to Southern European countries²⁶. A similar pattern is observed with CVD mortality rates²⁷.

Limitations of this study

The major limitation of this study is the use of self-reported information, thus increasing the chance of information bias. We do not expect this to have a significant impact on our results, however, as the questionnaires were interviewer-administered by trained research assistants and our results follow similar patterns with previous surveys in Cyprus and Europe^{4,5,12,24,25}. In addition, non-response to recruitment might give rise to selection bias as it might compromise the original random selection of participants, however in our case, the response rate was 100 %. Thus selection bias is not expected to be an issue. A further limitation is the lack of elderly (i.e., >65-year-olds) and younger adults (<25) data on smoking in our study, which prevents a direct comparison with some international studies, with a wider age distribution.

Future Directions

Cyprus has changed its policy towards tobacco and enforced a smoking ban in public places (2010) along with an increase in taxes and information relating to smoking^{28,29}. Further, Cyprus signed the WHO Framework Convention on Tobacco Control (WHO FTC) in 2004 and has implemented tobacco control policies consistent with it³⁰. These data were collected before the smoking ban and the economic crisis. A follow-up study to determine the effects of these parameters would be useful.

The results obtained will serve as a useful baseline to not only evaluate the smoking status in the future but to also compare the effectiveness of the smoking prevention measures taken since 2010. These data will also be valuable for initiating targeted, more effective public health programmes aiming at reducing social inequalities in smoking, which based on the current findings, need to be gender-specific.

Conflict of Interest

The authors have no conflict of interest to declare.

Funding

This work was supported by the Cyprus Ministry of Health.

References

1. Hiscock R, Bauld L, Amos A, Fidler JA, Munafò M. Socioeconomic status and smoking: a review. *Ann N Y Acad Sci.* 2012; 1248: 107-123.
2. Schaap MM, Kunst AE. Monitoring of socio-economic inequalities in smoking: learning from the experiences of recent scientific studies. *Public Health.* 2009; 123: 103-109.
3. World Health Organization. Global Health Observatory (GHO) data. Prevalence of tobacco use. Available at: <http://www.who.int/gho/tobacco/use/en/>, last accessed: 15/2/2016.
4. European Commission. Special Eurobarometer 385, Attitudes of Europeans Towards Tobacco Report; 2012. Available at: https://ec.europa.eu/health/sites/health/files/tobacco/docs/eurobaro_attitudes_towards_tobacco_2012_en.pdf, last accessed: 18/12/2017.
5. Idris BI, Giskes K, Borrell C, Benach J, Costa G, Federico B, et al. Higher smoking prevalence in urban compared to non-urban areas: time trends in six European countries. *Health Place.* 2007; 13: 702-712.
6. Pitel L, Geckova AM, van Dijk JP, Reijneveld SA. Degree of urbanization and gender differences in substance use among Slovak adolescents. *Int J Public Health.* 2011; 56: 645-651.
7. Goodwin RD, Pagura J, Spiwak R, Lemeshow AR, Sareen J. Predictors of persistent nicotine dependence among adults in the United States. *Drug Alcohol Depend.* 2011; 118: 127-133.
8. Pennanen M, Broms U, Korhonen T, Haukkala A, Partonen T, Tuulio-Henriksson A, et al. Smoking, nicotine dependence and nicotine intake by socio-economic status and marital status. *Addict Behav.* 2014; 39: 1145-1151.
9. Schaap MM, van Agt HM, Kunst AE. Identification of socioeconomic groups at increased risk for smoking in European countries: looking beyond educational level. *Nicotine Tob Res.* 2008; 10: 359-369.
10. Galobardes B, Shaw M, Lawlor DA, Lynch JW, Davey Smith G. Indicators of socioeconomic position (part 1). *J Epidemiol Community Health.* 2006; 60: 7-12.
11. Galobardes B, Shaw M, Lawlor DA, Lynch JW, Davey Smith G. Indicators of socioeconomic position (part 2). *J Epidemiol Community Health.* 2006; 60: 95-101.
12. Huisman M, Kunst AE, Mackenbach JP. Inequalities in the prevalence of smoking in the European Union: comparing education and income. *Prev Med.* 2005; 40: 756-764.
13. Huisman M, Kunst AE, Mackenbach JP. Educational inequalities in smoking among men and women aged 16 years and older in 11 European countries. *Tob Control.* 2005; 14: 106-113.
14. Laaksonen M, Rahkonen O, Karvonen S, Lahelma E. Socioeconomic status and smoking: analysing inequalities with multiple indicators. *Eur J Public Health.* 2005; 15: 262-269.
15. Huisman M, Van Lenthe FJ, Giskes K, Kamphuis CB, Brug J, Mackenbach JP. Explaining socio-economic inequalities in daily smoking: a social-ecological approach. *Eur J Public Health.* 2012; 22: 238-243.
16. Oh DL, Heck JE, Dresler C, Allwright S, Haglund M, Del Mazo SS, et al. Determinants of smoking initiation among women in five European countries: a cross-sectional survey. *BMC Public Health.* 2010; 10: 74.
17. Lopez AD, Collishaw NE, Piha T. A descriptive model of the cigarette epidemic in developed countries. *Tob Control.* 1994; 3: 242-247.
18. Thun M, Peto R, Boreham J, Lopez AD. Stages of the cigarette epidemic on entering its second century. *Tob Control.* 2012; 21: 96-101.
19. Statistical service of Cyprus. Population Census 2001. Available at: http://www.mof.gov.cy/mof/cystat/statistics.nsf/populationcondition_22main_gr/populationcondition_22main_gr?OpenForm&sub=2&sel=1, last accessed: 15/1/2015.
20. World Health Organization, CINDI Health Monitor: A Study of feasibility of a health behavior monitoring survey across CINDI countries, 2003. Available at: http://www.euro.who.int/__data/assets/pdf_file/0017/240236/e79396.pdf, last accessed: 18/12/2017.
21. Statistics Canada (2011) Canadian Tobacco Use Monitoring Survey (CTUMS). Ottawa, ON: Statistics Canada. Available at: <https://www.canada.ca/en/health-canada/services/publications/healthy-living/canadian-tobacco-use-monitoring-survey-ctums-2011.html>, last accessed: 18/12/2017.
22. Zatoński W, Przewoźniak K, Sulkowska U, West R, Wojtyła A. Tobacco smoking in countries of the European Union. *Ann Agric Environ Med* 2012; 19: 181-192.
23. Rachiotis G, Barbouni A, Katsioulis A, Antoniadou E, Kostikas K, Merakou K, et al. Prevalence and determinants of current and secondhand smoking in Greece: results from the Global Adult Tobacco Survey (GATS) study. *BMJ Open.* 2017; 7: e013150.
24. Christophi CA, Kolokotroni O, Alpert HR, Warren CW, Jones NR, Demokritou P, et al. Prevalence and social environment of cigarette smoking in Cyprus youth. *BMC Public Health.* 2008; 8: 190.
25. Karekla M, Symeou A, Tsangari H, Kapsou M, Constantinou M. Smoking prevalence and tobacco exposure among adolescents in Cyprus. *Eur J Public Health.* 2009; 19: 655-661.
26. World Health Organization. GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012. Available at: http://globocan.iarc.fr/Pages/summary_table_pop_sel.aspx, last accessed: 24/2/2015.
27. Nichols M, Townsend N, Luengo-Fernandez R, Leal J, Gray A, Scarborough P, et al. European Cardiovascular Disease Statistics 2012. European Heart Network, Brussels, European Society of Cardiology, Sophia Antipolis. 2012. Available at: https://www.escardio.org/static_file/Escardio/Press-media/press-releases/2013/EU-cardiovascular-disease-statistics-2012.pdf, last accessed: 18/12/2017.
28. Joossens L, Raw M. The Tobacco Control Scale: a new scale to measure country activity. *Tob Control.* 2006; 15: 247-253.
29. Ministry of Health, Cyprus. [National Strategy for the control of smoking in Cyprus (2012)]. Available at: http://www.moh.gov.cy/moh/moh.nsf/page75_gr/page75_gr?OpenDocument, last accessed: 15/1/2016.
30. World Health Organization. Parties to the WHO Framework Convention on Tobacco Control. Available at: http://www.who.int/fctc/signatories_parties/en/, last accessed: 15/1/2015.