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## High prevalence of smoking in Northern Greece

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### KEYWORDS

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### Summary

**Aim:** To investigate the prevalence of smoking in the general population and in specific population sub-groups in Northern Greece.

**Methods:** A cross-sectional study was conducted during the period 1999–2001 on a 5% sample (23,840) of those people aged between 21 to 80 out of a total general population of 653,249. 21,854/23,840 general population subjects were interviewed. In addition, we interviewed 9,276 high school students, 1,072 medical students, 597 medical doctors within the National Health System, 825 teachers, and 624 subjects who regularly exercised in a privately-owned gym. A specially modified ICRF study group questionnaire was used.

**Results:** 34.4% of the general population sample were current smokers (47.8% of males and 21.6% of females). Smoking prevalence rates in the population sub-groups were: 29.6% of high school students; 40.7% of medical students; 44.9% of medical doctors; 46.4% of teachers; and 36.9% of the gym group.

**Conclusion:** The prevalence of smoking in Northern Greece is high. High school and medical students present with high smoking rates, and the same situation is observed in medical doctors and teachers. An intensification of preventive antismoking measures is required.

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### Introduction

The recognition that tobacco smoking represents a significant health hazard has led to the implementation of smoking restriction programs in many countries.

In Greece, following a twenty-one year period of relative inactivity, the Ministry of Health and Welfare has recently re-implemented an anti-smoking campaign. One of the reasons for this is data from 1990 showing that Greece has the highest annual incidence of lung neoplasm in young men under the age of 45 amongst all European Union countries - 4.1 per 100,000 population as opposed to an EU average of 2.5 per 100,000 [1]. This

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high incidence corresponds to the increased annual per capita consumption of cigarettes observed in Greece over the last 20 years; Greece was ranked 16th worldwide with an annual per capita consumption of 2,640 cigarettes in 1970–72, fourth worldwide (3,440 cigarettes) in 1980–82, and second worldwide (3,590 cigarettes) in 1990–92, according to World Health Organisation (WHO) data [2].

In Greece, smoking data are based on statistical surveys of cigarette sales from the Ministry of Commerce, and not on direct epidemiological investigations. This study attempts to fill this gap, by examining the prevalence of smoking in the general population and in special population groups. These groups were: (a) High school students, since they properly best reflect the evolution of the habit of smoking and near future trends; (b) Medical students of the Aristotle University of Thessalonica, since they will be the future health experts; (c) Medical doctors of the National Health System, since they are the most powerful opinion group with regard to health issues; (d) Teachers, since their influence on both students and the general population is considered to be important; and (e) Exercising persons, since they reflect, in practice, the concept of a healthier lifestyle.

The aim of this study was to investigate the prevalence of smoking in the general population and in specific population sub-groups in Northern Greece. The exact knowledge of the extent of the smoking epidemic is not only of scientific interest but is of practical importance. Increased awareness of the problem will facilitate action plans, including mass media-based anti-smoking campaigns, and State-driven anti-smoking initiatives in workplaces, schools and universities.

## Methods

The study was conducted in ten cities in Northern Greece on a total population of 653,249 people. The cities studied were: Thessalonica and Kavala (the two largest cities in Northern Greece, with important commercial harbors and a population of 369,987 and 63,774 respectively); Kozani (35,242 people) and Ptolemaida (28,679 people), two cities within an industrially developed area; Grevena (in a mountainous region with a population of 37,017); Florina (17,069 people), Kastoria (20,590 people) and Edessa (25,307 people), three semi-mountainous cities; and finally, Kilkis (25,134 people) and Yiannitsa (30,450 people), two cities in a large plain area. Thessalonica is sheer urban

and the second biggest city in Greece, whereas Kavala is a regional urban city. Florina, Kilkis and Grevena are three of the poorest cities in Greece. The first two are agricultural cities while the basic occupation of Grevena is stockbreeding. Ptolemaida and Kozani are important industrial areas where 75% of the country's electricity is produced. Edessa and Yiannitsa are two quite rich cities with a mixed economy. Finally, Kastoria used to be the main fur-production city worldwide with the greatest income per person.

Subjects were selected from the consumer records of the Water Supply Organization based on systematic random sampling. The above method was used due to the large sample of the study. In addition, university students made door-to-door visits and filled in the questionnaires. A total of 21,854 questionnaires were completed with the help of researchers, from a total of 23,840 subjects initially selected to undergo examination i.e., 5% of the total population between 21 and 80 years old. The questionnaire was given to the interviewed subjects and consequently collected. Permission was granted from the relevant competent authorities.

Certain special population sub-groups were also investigated using the same method (immediate hand to hand collection):

- (A) High school students (9,276) from six cities (Thessalonica, Kozani, Florina, Ptolemaida, Grevena and Kastoria), aged  $17.5 \pm 1.3$  years,
- (B) Medical students of the Aristotle University of Thessalonica (1,072) aged  $22.4 \pm 2.4$  years,
- (C) Medical doctors of the National Health System (597) from Hospitals in six cities, aged  $36.9 \pm 8.2$  years,
- (D) Teachers (825) from six cities, aged  $39.8 \pm 7.1$  years
- (E) Exercising persons (624) from a privately-owned gym in Thessalonica, aged  $29.2 \pm 9.6$  years.

The research was conducted in the period between 1999–2001 and a special modified ICRF study group questionnaire was used [3] (see Appendix A). Questionnaires were anonymous, so confidentiality was ensured.

A smoker was considered a person who was smoking at least one cigarette daily, whereas an ex-smoker was a person who had been smoking at least one cigarette on a daily basis for at least one year and had quit smoking over the previous 12 months. All other subjects were regarded as non-smokers and handed in uncompleted questionnaires.

For the statistical analysis, the test  $\chi^2$  was used.

**Table 1** Smoking habits in the general population of Northern Greece: smoking prevalence according to age groups, and the smoking history in terms of pack-years, for male and female subjects

Age	Smokers		Ex smokers		Non smokers
	%	Pack-years	%	Pack-years	%
(a) Men					
21–40	59.5	17.7 ± 16.2	13.6	14.9 ± 8.8	26.9
41–60	47.7	41 ± 22.6	27.8	36.8 ± 26	24.5
61–80	27.2	55.5 ± 30.5	32.9	47.9 ± 27.3	39.9
(b) Women					
21–40	40.2	8.5 ± 8.4	2.6	10.8 ± 6.6	57.2
41–60	15	18.3 ± 18	2.6	20.5 ± 14.5	82.4
61–80	2.4	23.3 ± 16	1.7	27.6 ± 22.3	95.9

## Results

Smoking prevalence figures in the general population sample are presented in Table 1. Subjects are classified as current smokers, ex-smokers and non (ever)-smokers, and the Table shows the smoking prevalence by age group, and the smoking history according to pack-years (the number of daily smoked cigarettes, multiplied by the years of smoking, divided by 20), for male and female subjects separately.

Overall, the percentage of current smokers decreases as a function of increasing age, whereas the number of pack-years (i.e. cumulative exposure to tobacco smoke) is approximately double for men compared to women. The number of ex-smokers increases with age in men, but decreases in women, due to the relatively recent spread of smoking among women in Greece. In line with this, in females there is a considerably higher percentage of non-smokers (i.e. never smoked) in the older age groups.

In order to define the overall smoking rates in the general population, demographic data for the year 2000 from the National Statistical Service

of Greece have been considered. Accordingly, the overall Greek population is 10.6 million, grouped by age as follows: 21–40 years (14.8% of the total male population-14.6% of women), 41–60 years (12.2% men-12.5% women), 61–80 years (8.4% men-9.8% women). By comparing the sampled population to these total population figures, we deduce that male smokers represent a percentage of 47.8% of the total population, whereas ex-smokers represent 23.1%. The percentage of female smokers is 21.6%, whereas that of female ex-smokers 2.4%. In total, the percentage of smokers is 34.4%, whereas that of ex-smokers is 12.5%.

Table 2 shows comparatively the mean age of the participants from the population sub-groups, their mean smoking initiation age, the annual consumption of cigarettes (mean number of cigarettes smoked), smoking history in terms of pack-years, and the percentages of smokers and ex-smokers. Teachers are the group with the highest smoking prevalence (men 47.2%, women 45.5%), per capita consumption of tobacco, and the lowest rate of smoking cessation. Exercising persons have lower smoking prevalence rates (men 38.3%, women 34.8%), whereas medical doctors lie

**Table 2** The mean age, the mean smoking initiation age, the annual consumption of cigarettes, the smoking history in terms of pack-years, and the percentages of smokers and non-smokers, in each special population sub-group

	Number	Age	Smoking initiation age	Annual consumption (number of cigarettes smoked)	Smoking history (pack-years)	Smokers %	Ex-smokers %
High-school students	9,276	17.5 ± 1.3	14.4 ± 1.8	4,505	1.9 ± 1.1	29.6	
Students	1,072	22.4 ± 2.4	17.8 ± 2	6,345	5.3 ± 4.6	40.7	
Medical Doctors	597	36.9 ± 8.2	20.5 ± 3.7	6,113	22.7 ± 21.6	44.9	16.7
Teachers	825	39.8 ± 7.1	19.8 ± 4.1	6,544	23.2 ± 20.5	46.4	14.2
Exercising persons	624	29.2 ± 9.6	19 ± 4	5,579	9.5 ± 7.9	36.9	20.8

**Table 3** The percentage of positive answers to questions 6 to 9 of the ICRF smoking questionnaire (see [Appendix A](#)) for the general population and the special population sub-groups

	Question 6 - Tried to give up smoking in the last 12 months?	Question 7 - Dr or nurse advised you to give up smoking in the last 12 months?	Question 8 - Is the amount you smoke harmful to your health?	Question 9 - Would you like to give up smoking?
General population	32.7	4	79.1	61.7
High-school students			95.2	
Students			96.6	
Medical Doctors	29.3		98.6	76.3
Teachers	21.7	2.3	82.3	52.6
Exercising persons	44.1	6.1	100	91.4

in between the two groups (men 47.5%, women 40.9%). The prevalence of smoking is also high among university students (men 41.4%, women 39.6%). It is remarkable that among high-school students both the prevalence of smoking (32.6% in boys, 26.7% in girls, 29.6% in total) and the annual per capita consumption are high.

[Table 3](#) shows the percentages of smokers in both the general population sample and in the population sub-groups who gave positive answers to questions 6 to 9 of the smoking questionnaire (see [Appendix A](#)). Answers to these questions demonstrate that awareness of the harmful impact of smoking is quite high (79.1%), as is the intention to stop smoking (61.7%). A significant number of smokers (32.7%) had tried to stop smoking over the previous twelve months, but only 4% had requested medical support to do so.

## Discussion

The prevalence of smoking in the general population (34.4%) was found to be comparable to the prevalence observed in other EU countries. According to WHO data the prevalence of smoking is 37% in Denmark, 36.5% in Spain, 36% in Norway, 34.5% in Austria, 33.5% in France, and 32% in Italy [2,4]. However, the differences between male and female smokers in Greece were more pronounced as compared to these aforementioned countries. The observed sex difference in smoking prevalence rates is in line with the reported prevalence in other South European countries (Spain - 48% males and 25% females, France - 40% and 27%, Italy - 38% and 26%) and different to those in the North European countries (Denmark - 37% both for men and women, Norway - 36.4% and 35.5%, Austria - 42% and 27%).

The smoking prevalence in women has increased dramatically over the last few years, as opposed to the decrease in men, due to the increased

incidence of smoking in younger women - in line with our findings of a very high smoking prevalence rate in high-school girl students that exceeds the corresponding rate in the female general population. On the other hand, boys present a much lower percentage compared to the corresponding male general population. Similar percentages of smokers were also detected in a study of 2,032 high school students in 1989–90 conducted in the cities of Athens, Patras and Ioannina, i.e., 33.5% in boys and 26% in girls [5]. Accordingly, it can be assumed that the smoking habits of high school students in Greece has not changed since the last decade. In Budapest, in 1995, 36% of high school students were smokers, whereas in 1999 this figure was 46% [6]. In contrast, in the USA, where strict anti-smoking measures are in place, in 1998–99 12.8% of high school students were smokers [7], showing that without any implementation of antismoking measures in schools, smoking prevalence cannot be expected to decline.

The medical students of the Aristotle University of Thessalonica present a high percentage of smokers. Compared to the younger age group (21–40) of the general population, male medical students have a much lower smoking rate compared to men generally, whereas female medical students have the same smoking rates as women in the general population. This implies that female medical students do not show the high degree of awareness of the dangers of smoking as might be expected. In 1989, in 14 European countries, the percentage of medical students who were smokers was 21% [8]. For the medical students in this study, the per capita consumption rate of cigarettes was particularly high at 6,345. In comparison, the corresponding consumption in medical students in Pakistan was just 3,103 cigarettes [9].

The medical doctors of the National Health System have a smoking prevalence of 44.9%. Again, male doctors have lower smoking prevalence rates than the general population of the corresponding

age, unlike women. According to European Union data from 1992–93, the percentage of smokers amongst medical doctors was 37%, with Spanish doctors showing the highest prevalence rates at 44%, followed by Italy with 41%, and Greece with 39%, whereas the UK ranked last with a percentage of 12% [10,11]. More recent data from Italy show that in a hospital staff sample of 959 subjects aged  $31 \pm 9$  years, the prevalence of smoking was 44%, and in medical doctors, with a mean age of 40 years old, it was 39% [12].

Forty-six percent of the Greek teachers in this study are smokers. This percentage is very high, particularly in women. According to the 1992–93 European Union data, 26% of teachers in the European Union were smokers. Italy was ranked first with a percentage of 37%, Spain second with a percentage of 35%, Denmark third with a percentage of 34% and the UK last with a percentage of 13%. Greece, with a percentage of 30%, was ranked fourth [10,11]. According to recent data from India, 51% (73.9% of men and 13.9% of women) of Indian teachers are smokers [13].

Exercising persons present a percentage of 36.9% smokers, considerably lower in both men and women compared to the general population. Exercise might be expected to affect a person's attitude positively against smoking, within the concept of a healthier lifestyle. This attitude is also detected in a study of 1,462 students from Italy, where the correlation between exercise and smoking showed that whereas smoking incidence increases according to age, exercising persons present an opposite trend [14]. Also, the frequency of physical exercise is inversely associated with smoking [15]. Participating in exercise and avoiding smoking are linked. The annual per capita consumption of tobacco is almost the same among students, medical doctors and teachers, whereas it is lower in exercising persons, meaning that people who exercise not only have a lower smoking prevalence, but they also smoke less cigarettes. Moreover, participating in exercise seems to contribute to quitting smoking, since among exercising people there is the highest percentage of ex-smokers - although they were younger compared to the other groups.

Comparison between the adult sub-groups studied shows that teachers present the highest rates of smoking prevalence and per capita consumption of tobacco, and the lowest rates of smoking cessation. Medical doctors are next, and then exercising persons, who are living a healthier way of life. It would seem that the role of theoretical knowledge and experiences (medical doctors, teachers) about the harmful impact of

tobacco smoking is not as important as the adoption of a healthy lifestyle (as shown by exercising persons) in lowering smoking prevalence rates.

The majority of smokers are aware of the harmful impact of smoking (79.1%), but this knowledge could be further disseminated. In comparison, in Saudi Arabia among 819 interviewed high-school students over 15 years old, 95% were aware of the effects of tobacco [16], and in Pakistan 98% of first-year medical students were aware that passive smoking is harmful [9].

A significant percentage of smokers in this study intended to quit smoking (61.7%) and a large number - 32.7% - had tried to stop but had been unsuccessful. This may be due to the lack of medical assistance, which was requested by only 4%. According to international data, the success figures for smoking cessation are more than doubled with the help of special medication administered under medical guidance [17]. This treatment would be more effective within the scope of a co-ordinated antismoking campaign, as recently started in Greece with the launch of the Greek Ministry of Health and Welfare initiative and the foundation of special smoking cessation consulting centers in 15 main hospitals throughout the country [18]. In the USA, their antismoking campaign has achieved excellent results: in 1965, 52% of men in the USA were smokers, in 1998 the figure was 24%, and the aim is to reduce this to 12% by 2010 [19]. We believe that the recent initiatives undertaken by the Greek Ministry of Health and Welfare will have the same effect in Greece.

## Conclusion

The prevalence of smoking in Northern Greece is high. High school and university students present with high smoking rates, whereas medical doctors and teachers have similar smoking rates to the general population. A decreasing prevalence in men and an increasing prevalence in women characterizes the diachronic development of smoking habits in Greece. An intensification of preventive antismoking measures is required, particularly aimed at the youth population and women.

## Potential conflict of interest

There are no conflicts of interest to declare.

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## Appendix A. ICRF Study Group Smoking questionnaire

1. Are you or have you ever been a smoker?	Yes _____ No _____
2. At what age did you first smoke regularly (at least once a day)?	<input type="checkbox"/> years of age
3. For how many years altogether have you smoked/did you smoke regularly?	<input type="checkbox"/> years smoked regularly
4. Do you CURRENTLY smoke at least once a day?	Yes _____ No _____
5. On average, how many cigarettes do you smoke a day?	<input type="checkbox"/> cigarettes per day
6. In the last 12 months have you SERIOUSLY tried to give up smoking?	Yes _____ No _____
7. In the last 12 months has a doctor or nurse advised you to give up smoking?	Yes _____ No _____
8. Do you think the amount you smoke is harmful to YOUR health?	Yes _____ No _____ Don't know _____
9. Would you like to give up smoking?	Yes _____ No _____ Don't need to _____
10. Sex	<input type="checkbox"/> male <input type="checkbox"/> female

## References

- [1] International Agency for Research on Cancer. Cancer in the European Union in 1990. EUCAN 90 Version 1.1, Copyright IARC 1996. International Agency for Research on Cancer, Lyon 1997.
- [2] World Health Organization. Tobacco or Health: First Global Status Report. Geneva: WHO, Tobacco or Health Programme; 1997.
- [3] Fowler G. Smoking Cessation. The role of general practitioners, nurses and pharmacists. In: Bolliger CT, Fargerström KO, editors. The tobacco epidemic. Progress in Respiratory Research 1997; 28: 165–77.
- [4] World Health Organization. Tobacco or Health: A Global Status Report. Geneva: WHO; 1998.
- [5] Marselos M, Fragidis H, Michalopoulos V. Diachronic study on smoking. *Iatriki* 1993;63:140–6.
- [6] Prevalence of cigarette smoking among secondary school students- Budapest, Hungary, 1995 and 1999. *MMWR Morb Mortal Wkly Rep* 2000;49:438–41.
- [7] Youth tobacco surveillance - United States, 1998–1999. *MMWR CDC Surveill Summ* 2000;49:1–94.
- [8] Tessier JF, Freour P, Crofton J, Kombou L. Habit of smoking and attitudes of medical students towards smoking and anti/smoking campaigns in fourteen European countries. *Eur J Epidemiol* 1989;5:311–21.
- [9] Hussain SF, Moid I, Khan JA. Attitudes of Asian medical students towards smoking. *Thorax* 1995;50:996–7.
- [10] Bosanquet N. Europe and Tobacco. *BMJ* 1992;304:370–2.
- [11] Piha T, Besselink E, Lopez AD. Tobacco and health. *World Health Stat Q* 1993;46:188–94.
- [12] Nardini S, Bertolotti R, Rastelli V, Ravelli L, Donner CF. Personal smoking habit and attitude towards smoking among the health staff of a general hospital. *Monaldi Arch Chest Dis* 1998;53:74–8.
- [13] Pandey GK, Raut DK, Hazra S, Vajpayee A, Pandey A, Chatterjee P. Patterns of tobacco use amongst school-teachers. *Indian J Public Health* 2001;45:82–7.
- [14] Donato F, Assanelli D, Chiesa R, Poeta ML, Tomasoni V, Turla C. Cigarette smoking and sports participation in adolescents: a cross-sectional survey among high school students in Italy. *Subst Use Misuse* 1997;32:1555–72.
- [15] Holmen TL, Barrett-Connor E, Clausen J, Holmen J, Bjerner L. Physical exercise, sports, and lung function in smoking versus nonsmoking adolescents. *Eur Respir J* 2002;19:8–15.
- [16] Al-Yousaf MA, Karim A. Prevalence of smoking among high school students. *Saudi Med J* 2001;22:872–4.
- [17] Hurt RD, Sachs DP, Glover ED, Offord KP, Johnston JA, Dale LC, et al. A comparison of sustained-release bupropion and placebo for smoking cessation. *N Engl J Med* 1997;227:1195–202.
- [18] Ministry of Health and Welfare of Greece. World No-smoking Day, May 31 2002. Available from: URL: <http://www.yppy.gr/>.
- [19] Cigarette smoking among adults - United States, 1999. *MMWR Morb Mortal Wkly Rep* 2001;50:869–73.

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