Prevalence and Main Determinants of Tobacco Use in Cyprus Youth Through the Use of the GYTS

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Abstract

Background: Tobacco use is the single most preventable cause of morbidity and mortality in humans. Limited data exist regarding the extent of the problem among Cyprus youth. We use the Global Youth Tobacco Survey to assess smoking prevalence and the main determinants of tobacco use in middle and high school students in Cyprus.

Methods: The survey was conducted by the Cyprus International Institute for the Environment and Public Health in association with Harvard School of Public Health. A two-stage cluster sample design was used to select a representative sample of students from both middle schools and high schools registered with Ministry of Education in Cyprus in the academic year 2005-2006. The study questionnaire consisted of 99 questions and participation in the survey was voluntary. Statistical analyses were performed with consideration of the specific survey methodology utilized taking into account the sampling frame and design and the sample weights associated with each completed questionnaire.

Results: The prevalence of tobacco use in middle schools is 14% among boys and 7% among girls, where the corresponding figures in high schools are 37% among boys and 23% among girls. Furthermore, about one of every six middle school students and one of every four high school students that had never smoked indicated that they are likely to initiate smoking within the next year. Exposure to environmental tobacco smoke is also very high with more than 9 out of 10 students reporting being exposed. In addition, more than 95% of the current smokers reported that they had bought cigarettes in a store during the past month and were not refused cigarettes because of their age.

Conclusion: Smoking prevalence among Cyprus middle school and high school students is extremely high and there is an alarming increase in the prevalence of smoking among girls with their smoking rates being twice those of adult females. Susceptibility rates, exposure to second-hand smoke, and access to and availability of cigarettes to youth are also very high and concerning. The present survey indicates that the problem of tobacco use among youth in Cyprus is enormous and requires collective action immediately.
BACKGROUND

Tobacco smoking is a major public health problem worldwide and it is the single most preventable cause of morbidity and mortality in humans\textsuperscript{1,2,3}. Approximately 5 million people die prematurely every year due to tobacco-related diseases, and this rate is projected to double by the year 2020\textsuperscript{4,5,6,7,8}.

Many chemicals in tobacco smoke are directly associated with the development of cancer in humans\textsuperscript{9}. Tobacco smoke is associated with several types of cancer such as lung, mouth, larynx, pancreas, stomach and others, and it accounts for at least 30\% of all cancer deaths in developed nations\textsuperscript{10}. It is also a major risk factor for cardiovascular and respiratory diseases. Further, the use of tobacco decreases significantly the Quality Adjusted Life Years (QALY), diminishing both the productivity and the quality of life of individuals. Smoking is not only harmful to smokers themselves but it is also a major risk factor to non-smokers, especially children, who are involuntarily exposed to and breathe second-hand smoke, inhaling the same toxic chemicals as smokers\textsuperscript{11}.

The Global Youth Tobacco Survey (GYTS) was developed as a joint project by the World Health Organization (WHO), the United States Center for Disease Control and Prevention (CDC), and the Canadian Public Health Association (CPHA). The survey collects data regarding youth smoking behavior, knowledge, and attitudes, as well as factors affecting the youth initiation of smoking. It is designed to provide current and comparable data regarding tobacco use among youth around the world, and has been already conducted in more than 131 countries worldwide\textsuperscript{5,12,13,14}.
Most adult smokers initiate tobacco use before the age of eighteen years old. A large percentage of smokers start at an even earlier age when they are easily influenced by their peers, social norms, and tobacco advertising. Due to the highly addictive nature of tobacco most young people who smoke regularly during teenage years continue to smoke throughout adulthood. Therefore, tobacco research and prevention programs must focus on the early years of life and include education to prevent youth from initiating smoking.

Limited data existed in Cyprus regarding the prevalence of smoking among youth. A survey conducted by the Ministry of Health in 1997 revealed that about one third of high school students over fifteen years of age were current smokers and the average age for smoking initiation was between 12 and 13 years. Similar surveys in adults were conducted by the Cyprus Statistical Service which showed that smoking prevalence in adult men remained relatively steady at about 38% between the years 1997 and 2003, while the smoking prevalence among women increased from 7.5% to 10.5%. The most recent figures from the Cyprus Statistical Service indicate that 623 million cigarettes or cigars were imported into Cyprus in 2004. The total per capita consumption in Cyprus is 3,720 cigarettes whereas the corresponding figure in 15 of the European countries is only 1,866.

The present study was conducted to assess smoking prevalence among middle school students ages 12-15 years and among high school students ages 15-18 years in Cyprus and to study the psychosocial, environmental, and behavioral factors associated with smoking among youth in these ages. The goal of the study is to provide scientific information and evidence in order to help create effective smoking prevention and cessation programs and reduce the smoking rate among youth in Cyprus. We report results regarding the prevalence of youth smoking and the factors that influence youth smoking, exposure to second-hand
smoke, access to and availability of tobacco products, exposure to media and advertising, cessation programs, and smoking-related education in Cyprus.

METHODS

The GYTS was conducted by the Cyprus International Institute for the Environment and Public Health in association with Harvard School of Public Health (CII), in collaboration with the Harvard School of Public Health (HSPH), the WHO, the CDC, and the Ministries of Health and Education and Culture of the Republic of Cyprus.

Population

All middle schools and high schools registered in the academic year 2005-2006 with the Ministry of Education in Cyprus with 40 or more students were included in the sampling frame for the GYTS. A two-stage cluster sample design was implemented by the CDC with the goal of selecting a representative sample of students from the Republic of Cyprus drawn from the country’s five regions, namely Lefkosia, Lemesos, Paphos, Larnaka, and Ammochostos. In the first stage, all schools with 1st, 2nd, 3rd, 4th, 5th, and 6th grades were sampled with the probability of selection being equal to the school’s enrollment size. In the second stage, classes within chosen schools were selected using a systematic equal-probability sampling with a random start. All classes in the selected schools were included in the sample and all students in the selected classes were eligible to participate in the survey.

Data collection
The study questionnaire was developed based on the Greek translation of the GYTS core questionnaire used in Greece in 2005\textsuperscript{16}, and modified to include questions sensitive to the Cypriot culture, mainly regarding the family role and potential effect of grandparents on tobacco use by their grandchildren. The final study questionnaire consisted of 99 structured response item questions that included demographic information, individual smoking habits, exposure to tobacco advertisements, attitudes and beliefs towards tobacco, exposure to passive smoking, access to tobacco products, school anti-smoking and prevention programs, and the habits and attitudes of family and friends regarding tobacco use.

The study supervisors received training at a GYTS workshop in Denmark in November 2005. Prior to the start of the study, several field workers were recruited by CII and were specifically trained on the study methodology during a five-day seminar at the CII’s premises.

A standardized methodology was followed for the preparation of the questionnaires, the selection of the sample, the field work, and the processing of the data, details of which are described elsewhere\textsuperscript{5,12,13,14}. Permission to conduct the study was obtained from the Ministry of Education and Culture of the Republic of Cyprus prior to the initiation of the field work and data collection. The students’ parents were informed about the aims and the methodology of the study in a letter sent to them prior to conducting the survey. The students were briefed about the survey before participating, and they participated on a voluntary basis. The questionnaires and corresponding answer sheets were completed anonymously, and no personal identifier data were collected. The self-administered questionnaires were distributed
to the students by the trained field workers and completed in a class group setting during school hours between February 2006 and May 2006.

Students recorded their responses on standardized answer forms which were subsequently sent to the CDC for processing. The resulting electronic databases were then returned to CII for further analyses. The results will be used to provide information to educate the public and help form the nation’s public policy regarding the tobacco use among youth.

Statistical Analyses

Analyses were performed using the Statistical Analysis Software (SAS) version 9.1. The analyses took into account the specific sampling frame, the correlation of the data and the specific weight associated with each one of the questionnaires. This weight is the product of the inverse of the probability of selecting the school, the inverse of the probability of selecting a classroom within the school, the school-level non-response adjustment factor calculated by school size category (small, medium, large), the class adjustment factor calculated by school, and the student-level non-response adjustment factor calculated by class. Weights are used to reflect the likelihood of sampling of each student and to reduce bias by compensating for differing patterns of non-response. Qualitative variables are described as frequencies together with their corresponding percentages and 95% confidence intervals. All statistical tests reported are two-sided, and a p-value < 0.05 is considered to be statistically significant.

RESULTS
A total of 13,246 students (7,294 from middle schools and 5,952 from high schools) from 90 schools (51 middle schools and 39 high schools) participated in the survey. There were 3,651 middle school boys, 3,579 middle school girls, 2,619 high school boys, and 3,312 high school girls that provided usable questionnaires. The overall school response rate was 96.2% for middle schools and 90.7% for high schools. The student response rate was 92.2% for middle schools and 89.7% for high schools, resulting in an overall response rate (equal to the product of the school and student response rates) of 88.7% for middle schools and 81.4% for high schools.

**Prevalence**

Table 1 presents the prevalence of tobacco use among youth in Cyprus middle schools and high schools for all students combined and for boys and girls separately. Smoking rates were statistically significantly different between the middle and high school students and between girls and boys within middle and high schools; the only exception to this was the percentage of never smokers that are likely to initiate smoking in the next year within middle schools, in which no statistically significant difference was observed between boys and girls.

**Middle schools (ages 12-15 years)**

Our data show that more than one in four (28.1%) of middle school students (35.3% for boys and 20.8% for girls) had ever smoked cigarettes (even one or two puffs) and more than one in five students (20.3%) initiated smoking before the age of ten (23.4% for boys and 14.3% for girls). Furthermore, 10.7% of middle school students (13.6% of boys and 7.3% of girls) are currently users of some tobacco product, and one in ten students are currently cigarette smokers (12.7% for boys and 7.0% for girls). Among students that never tried smoking,
16.0% reported that they are susceptible to initiate smoking within the next year (16.6% for boys and 15.4% for girls), a rate which is higher than the current smoking rates.

**High schools (ages 15-18 years)**

The proportion of high school students reporting that they had ever smoked cigarettes is 58.0% (66.4% for boys and 51.2% for girls); 7.8% of the students initiated smoking before the age of ten (9.9% for boys and 5.6% for girls). The data suggest an alarming prevalence of approximately three in ten students (29.3%) currently using some form of tobacco (36.8% for boys and 23.1% for girls), and 28.7% of students indicated that they are currently smoking cigarettes (35.7% for boys and 23.2% for girls). Among students ages 17 years or older, the prevalence of smoking is 36.5% (44.6% for boys and 30.0% for girls). Figure 1 presents the proportion of current smokers by age, for boys and girls, and shows a statistically significant increasing trend over ages 12 to 17 years old for both boys and girls. In addition, about one of every four students (24.4%) that had never smoked indicated that they are likely to initiate smoking within the next year (19.9% for boys and 26.9% for girls).

**Environmental Tobacco Smoke**

Cypriot students are exposed to second-hand smoke at extremely high frequencies. Fifty-four percent of them have one or more parents that smoke, 85% live in homes where others smoke in their presence, and more than nine in ten students are present around others who smoke in places outside the home. Notably, 70% of the students “definitely think” that smoke from others is harmful to them and more than eight out of ten think that smoking should be banned from public spaces. These rates are significantly higher among non-smokers than among current smokers. Ninety percent of non-smokers and 45% of smokers reported wanting to ban
smoking from public places; and 75% of non-smokers and 48% of smokers think that second-hand smoke is harmful.

**Access and Availability**

More than six in ten current smoker students buy their cigarettes in a store. Although a law exists in Cyprus prohibiting the sale of cigarettes to children under the age of 18, more than 95% of the current smokers reported that they bought cigarettes in a store in the past month and were not refused cigarettes because of their age.

**Cessation**

Nearly half of the current smokers want to stop smoking. Sixty-one percent of current smokers reported that they tried unsuccessfully to stop smoking during the past year, and more than 70% reported that they received help to stop smoking at some point. At the same time, 28.2% of current smokers are dependent on tobacco, which is defined as admitting to always having or feeling like having a cigarette first thing in the morning. These rates are not statistically different between middle and high schools and are therefore reported as a combined sample (Table 2). No statistically significant gender differences were observed.

**Media and Advertising**

More than 16% of the students reported owning an item with a cigarette brand logo, and about an equal proportion reported that they had ever been offered free cigarettes by a tobacco company representative. Significantly more current smokers own an object with a cigarette brand logo than non-current smokers (35.0% vs. 12.5%, respectively). About half of the students reported having seen anti-smoking media messages on television and in
newspapers and magazines, while an even higher proportion reported having seen pro-
cigarette advertisements.

**School**

About four in ten students reported that during the past year they had been taught in class about the dangers of smoking and that they had discussed with their teachers and their classmates reasons why people of their age smoke. About an equal proportion stated that they had been taught in school about the harmful effects of tobacco use. No significant gender differences were observed, but more middle school students than high school students reported being taught in class about tobacco and its harmful effects and discussed the reasons for children their age smoking.

**DISCUSSION**

A number of findings from the present analysis of Cyprus GYTS raise concerns. The smoking rate among high-school boys is very high being 37%. Even more concerning though is the especially high smoking rate among high-school girls, ages 15-17 years old, which at 23% is more than double the prevalence among adult women, as reported by an earlier survey conducted by the Cyprus Statistical Service (a rate which had increased from 7.5% to 10.5% in the 6-year period 1997-2003). This trend is likely due to aggressive marketing efforts by tobacco companies that include advertising in fashion magazines targeting younger women especially. This alarming increase in the prevalence of smoking among girls and the narrowing of the gap in the corresponding rates between boys and girls is something that has been observed and reported frequently elsewhere\(^{12,16,17}\).
Youth smoking rates in Cyprus are much higher than those in Jordan, Kuwait, Syria and other countries in the Eastern Mediterranean region where the GYTS was also conducted. In comparison, Greece using the GYTS in 2005 reported prevalence rates among children 13-15 years old of 11% for boys and 9% for girls\(^{18}\). Furthermore, based on the European School Survey Project on Alcohol and Other Drugs (ESPAD) 22% of 15-year-old students surveyed in Cyprus in 2003 had smoked in the past 30 days, compared with an average of 35% in the remaining 34 participating countries\(^{19}\).

Similarly, the susceptibility rates reported are very high. Girls at both middle and high school that have never smoked and boys at middle school that have never smoked indicated that they are likely to initiate smoking within the next year at rates higher than the existing prevalence of current smokers. If that holds true then a further increase in prevalence rates can be expected, especially among teenage girls in high school whose susceptibility rates are significantly higher than boys.

Based on the above it is clear that smoking, and associated health effects, is a major problem in Cyprus. Conservative estimates suggest that between 600-700 people die every year in Cyprus because of smoking (about 12%-13% of about 5,000 deaths of individuals 35 years and older)\(^{15}\). In light of the present smoking rates and the increasing trend in smoking among young women, approximately 28,000 of the approximately 200,000 children under 20 years old alive today are projected to die prematurely as adults before their time and many more will suffer from illnesses due to smoking. The government, school officials, health professionals and the society as a whole have to intervene as rapidly as possible to counteract this trend.
The prevalence of exposure to second-hand smoke, which consists of smoke from the burning end of a cigarette and the smoke exhaled by a smoker, is also extremely high. This is the case both in the homes of students, where about 85% report being exposed to smoke, and in other public spaces outside the home, where more than 90% report exposure. Second-hand smoke is a serious danger even at low levels and is classified by IARC as a known cause of cancer⁹. Measures must therefore be taken to eliminate the exposure of non-smokers (especially children) to the dangers of passive smoking.

Despite laws in Cyprus that prohibit the sale of tobacco to minors and that ban smoking in public places, the present research suggests that these laws are not being observed. The laws should be strictly enforced and should be tightened where necessary. Laws that ban smoking in public spaces have been shown in numerous studies across a range of countries to have no detrimental affects on the businesses of restaurants and bars²⁰,²¹, hence, the argument that banning smoking in public spaces affects tourism and the sales of restaurants, bars and other similar establishments is flawed.

The present study is limited by the subjectivity of self-administered questionnaires, introducing the possibility of information bias, as well as some non-response. Nevertheless, because of the high response rate, the anonymous administration of questionnaires, the good test-retest reliability of similar data, and the openness in Cyprus about the subject of smoking, biases introduced are likely to be minimal²²,²³. Other limitations include the fact that many students in technical schools were not surveyed and that the data are limited to students attending school on the specific day the questionnaire was administered. However, the majority of people in Cyprus attend school and most of them attend non-technical schools so
we believe that the sample is representative of the whole population (if anything, including technical schools would raise the prevalence rates even higher).

Our recommendations include for the Cyprus government to ensure that the current laws regarding the sale of tobacco to minors and smoking in public spaces are enforced and to further strengthen the existing legislation. In addition, youth programs and anti-tobacco advertising campaigns need to be implemented, and increased professional help for cessation should be made available to persons who want to quit. One of the few encouraging messages from the survey is that nearly half of the current smokers want to stop smoking. Public awareness of the dangers of smoking should be promoted through public education campaigns and policy efforts need to be coordinated to address the problem. Further research is also needed in order to understand the complexity of the tobacco problem in Cyprus, the reasons for the high prevalence rates and the increase among females, as well as the specific measures that would effectively reduced tobacco use and its hazardous health effects. The Republic of Cyprus and the Ministry of Health have already adopted the ‘Strategic Plan for Tobacco Control in Cyprus’ prepared by the Tobacco Research Program of the CII\textsuperscript{15}. This plan promises to be an important start towards curtailing the problem in the years to come.

CONCLUSION

Though further research is needed in Cyprus in relation to tobacco use and more scientific and updated data should be periodically collected, the GYTS indicates that the problem of tobacco use among youth in Cyprus is enormous and that collective action needs to be taken immediately.
Competing interests

The authors declare that they have no competing interests.

Authors’ contributions

PD, GNC, CWW, and NRJ conceived the study, participated in the design, and helped in the development of the methodology. OKZ supervised and helped in the collection and compilation of the data. CAC performed the statistical analysis and developed the first draft of the manuscript. HRA revised critically the manuscript. All authors contributed towards the revision of the manuscript to its final version. All authors read and approved the final manuscript.

Acknowledgements

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References:


Figure 1: Proportion of current smokers by age, separately for boys and girls
(provided as a separate file)
Table 1: Prevalence of tobacco use in youth in Cyprus middle schools and high schools

<table>
<thead>
<tr>
<th>Smoking Prevalence</th>
<th>Prevalence</th>
<th>(95% Confidence Interval)</th>
<th>Prevalence</th>
<th>(95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Middle School</td>
<td>High School</td>
<td>Middle School</td>
<td>High School</td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>Boys</td>
<td>Girls</td>
<td>Overall</td>
</tr>
<tr>
<td>Ever smoked cigarettes</td>
<td>28.1</td>
<td>(26.3, 30.0)</td>
<td>35.3</td>
<td>(32.9, 37.6)</td>
</tr>
<tr>
<td>Ever smokers initiated smoking before age of ten</td>
<td>20.3</td>
<td>(18.8, 21.9)</td>
<td>23.4</td>
<td>(20.7, 26.0)</td>
</tr>
<tr>
<td>Current tobacco users</td>
<td>10.7</td>
<td>(9.1, 12.2)</td>
<td>13.6</td>
<td>(11.5, 15.8)</td>
</tr>
<tr>
<td>Current cigarette smokers</td>
<td>10.0</td>
<td>(8.4, 11.5)</td>
<td>12.7</td>
<td>(10.5, 14.9)</td>
</tr>
<tr>
<td>Never smokers likely to initiate smoking next year</td>
<td>16.0</td>
<td>(14.8, 17.3)</td>
<td>16.6</td>
<td>(15.2, 18.0)</td>
</tr>
</tbody>
</table>
Table 2: Other attributes related to tobacco use

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Proportion (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental Tobacco Smoke</strong></td>
<td></td>
</tr>
<tr>
<td>Have one or more parents who smoke</td>
<td>53.7 (52.8, 54.7)</td>
</tr>
<tr>
<td>Exposed to smoke in their home</td>
<td>84.8 (83.9, 85.6)</td>
</tr>
<tr>
<td>Around others who smoke in places outside home</td>
<td>91.2 (90.6, 91.7)</td>
</tr>
<tr>
<td><strong>Access and Availability (Current Smokers)</strong></td>
<td></td>
</tr>
<tr>
<td>Buy cigarettes in a store</td>
<td>60.8 (57.6, 64.1)</td>
</tr>
<tr>
<td>Not refused purchase of cigarettes because of their age</td>
<td>95.3 (94.0, 96.6)</td>
</tr>
<tr>
<td><strong>Cessation</strong></td>
<td></td>
</tr>
<tr>
<td>Want to stop smoking</td>
<td>46.8 (42.7, 50.8)</td>
</tr>
<tr>
<td>Tried to stop smoking during the past year</td>
<td>60.9 (57.0, 64.7)</td>
</tr>
<tr>
<td>Have ever received help to stop smoking</td>
<td>70.6 (68.1, 73.2)</td>
</tr>
<tr>
<td>Dependent on cigarette smoking</td>
<td>28.2 (26.1, 30.3)</td>
</tr>
<tr>
<td><strong>Media and Advertising</strong></td>
<td></td>
</tr>
<tr>
<td>Own an object with a cigarette brand logo</td>
<td>16.7 (15.6, 17.9)</td>
</tr>
<tr>
<td>Offered free cigarettes by a tobacco company representative</td>
<td>16.4 (15.4, 17.5)</td>
</tr>
<tr>
<td>Saw anti-smoking ads in newspapers/magazines</td>
<td>48.3 (46.8, 49.8)</td>
</tr>
<tr>
<td>Saw pro-cigarette ads in newspapers/magazines</td>
<td>62.5 (61.3, 63.7)</td>
</tr>
<tr>
<td><strong>School</strong></td>
<td></td>
</tr>
<tr>
<td>Had been taught about the dangers of smoking</td>
<td>46.3 (44.5, 48.2)</td>
</tr>
<tr>
<td>Had discussed reasons why people their age smoke</td>
<td>42.1 (40.0, 44.3)</td>
</tr>
<tr>
<td>Had been taught the effects of tobacco use</td>
<td>46.8 (44.9, 48.7)</td>
</tr>
</tbody>
</table>
Table 3: Attitude towards second-hand smoking by current smoking status

<table>
<thead>
<tr>
<th></th>
<th>Proportion (95% Confidence Interval)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
</tr>
<tr>
<td>Think smoke from others is harmful to them</td>
<td>69.9 (68.5, 71.3)</td>
</tr>
<tr>
<td>Think smoking should be banned from public places</td>
<td>81.4 (80.2, 82.5)</td>
</tr>
</tbody>
</table>
Figure 1