

# Correlates of ever-smoking habit among adolescents in Tabuk, Saudi Arabia

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الترباطات في العادات لدى المراهقين ممن سبق لهم أن دخنوا في تبوك، المملكة العربية السعودية  
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**الخلاصة:** أجرى الباحثون دراسة للترباطات عبر القطاعات مستخدمين استبياناً حول المراهقين الذين سبق لهم أن دخنوا في المدارس الحكومية في تبوك في المملكة العربية السعودية. وبلغ عدد التلاميذ 1505، وكانت أعمارهم تتراوح بين 12 و19 عاماً، وتبين أن 657 منهم (43.7%) سبق لهم التدخين، أي أنهم حاولوا تدخين السجائر، ولو نفخة واحدة أو نفختين، وقد كان 65% من هؤلاء من الذكور و23.1% من الإناث. وباستخدام التحوُّف اللوجستي تبين أن المنبئات ذات الاعتداد الإحصائي لمن سبق له التدخين؛ أن يكون ذكراً، والاعتقاد أن التدخين يساعد الناس على الشعور بالراحة في الأوضاع الاجتماعية المختلفة، ووجود شيء ذي قيمة في شعارات الحوض على التدخين، والحصول على مصروف جيب قدره عشرون ريالاً أو أكثر يومياً، والأداء السيئ في المدرسة، ووجود أصدقاء أو آباء مدخنين.

**ABSTRACT** A cross-sectional questionnaire study of the correlates of ever-smoking among adolescents was made in Tabuk government schools in Saudi Arabia. Of 1505 students aged 12–19 years, 657 (43.7%) were ever-smokers (i.e. ever tried cigarette smoking, even 1 or 2 puffs); 65.0% of males and 23.1% of females. In logistic regression analysis significant predictors for ever-smoking were: male sex, belief that smoking helps people feel comfortable in social situations, owning something with a cigarette logo, having pocket money  $\geq$  20 riyals/day, poor school performance and having friends or parents who smoked.

## Corrélat de l'expérience du tabagisme chez les adolescents de Tabouk (Arabie saoudite)

**RÉSUMÉ** Une étude transversale par questionnaire sur les corrélat de l'expérience du tabagisme chez les adolescents a été réalisée dans les écoles publiques de Tabouk (Arabie saoudite). Sur 1 505 élèves âgés de 12 à 19 ans, 657 (43,7 %) avaient déjà fumé (ne serait-ce qu'une fois, même une ou deux bouffées) ; 65,0 % des garçons et 23,1 % des filles. Dans l'analyse de régression logistique, les facteurs prédictifs significatifs de l'expérience du tabagisme étaient l'appartenance au sexe masculin, la croyance que le tabagisme aide à se sentir plus à l'aide en société, la possession d'un objet comportant un logo de cigarette, le fait de recevoir au moins 20 riyals d'argent de poche par jour, les mauvais résultats scolaires et le fait d'avoir des amis ou des parents fumeurs.

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## Introduction

Tobacco use is a grave threat to health around the world; it has been linked to many diseases and health problems. Over 4 million people die prematurely from tobacco-related diseases each year, and by the year 2030 the annual mortality is projected to rise to 10 million [1,2]. The financial burden associated with smoking-related illness is overwhelming, including the cost of treatment and the loss of productivity from morbidity and premature death.

Teenage smoking has become a major health problem throughout the world. While the serious complications of smoking usually occur later in adult life, even at young ages there are numerous adverse health conditions, including reduction in the rate of lung growth and in the level of maximum lung function, increase in the number and severity of respiratory illnesses and unfavourable effects on blood lipid levels. There is also evidence that 4 out of every 5 persons who use tobacco begin smoking before they reach adulthood and that an earlier start to smoking makes it more difficult to break nicotine dependence [3]. Hence it is of paramount importance that tobacco prevention activities should focus on school-age children and adolescents to reduce future smoking-related illness and associated costs.

Previous studies on smoking habits have been conducted in Saudi Arabia in the capital city Riyadh [4–8] but to the best of our knowledge none have conducted in the Tabuk area. The aim of this study was to describe the prevalence of ever-smoking and to analyse the relationship between variables related to tobacco use, including the sociodemographic and educational characteristics of students, knowledge, attitudes and social influences, in an attempt to identify the correlates of ever-smoking among adolescents in Tabuk.

We focused on ever-smokers because it is vital to identify factors associated with initiation and uptake of the habit. Such information is a prerequisite for designing, implementing, monitoring and finally evaluating a comprehensive tobacco prevention programme to reduce ever-smokers among adolescents in Tabuk. Other communications will deal with attempts to quit and their outcomes among ever-smokers as a prerequisite for designing a smoking cessation programme as part of a comprehensive tobacco prevention and control programme in Tabuk that could be extended to other regions.

## Methods

This was a cross-sectional school-based study in Tabuk government schools at grades 7–12 (intermediate and secondary schools), corresponding to ages 12–19 years. This was preferred to a household survey because it is logistically easier and cheaper and gives more freedom for students, particularly females, to express their habits and views away from family pressure.

A 2-stage stratified cluster sampling method was used. All public schools with any classes of grades 7–12 in Tabuk city were placed in 2 categories according to school level (intermediate or secondary). Then each category was stratified into 2 categories according to sex. In the first stage, 16 schools were randomly selected comprising 8 intermediate schools (4 for boys and 4 for girls) and 8 secondary schools (4 for boys and 4 for girls). Then 1 class was randomly selected from each grade (3 classes per school). This yielded 48 classes with 1566 students, all of whom were included in the study. The average class size for the whole group was around 32–33 students and there were no obvious differences between males and females in this respect.

The study tool was a pilot-tested, anonymous, self-administered questionnaire consisting of 56 questions, with core items selected from the Global Youth Tobacco Survey items (Arabic version) [9]. Background characteristics were collected, such as age, sex, school grade, type of school, school performance (student performance in the last final year examination) and amount of pocket money. The smoking questions were grouped into categories relating to tobacco use, prevalence of tobacco use, knowledge and attitude toward smoking, exposure to environmental tobacco smoke, attitude toward cessation of smoking, exposure to tobacco-related advertisements in the media, minor's access to tobacco and education on tobacco and smoking in school. The definition of an ever-smoker was any student who had ever tried cigarette smoking, even 1 or 2 puffs.

Questionnaires were distributed during the mid-morning classes to include students arriving late but to avoid lunchtime. The collection of data was conducted under the supervision of trained health-care workers in school and in the absence of any school-teacher or any other school personnel. Students were assured about the confidentiality of responses (written and verbal) and that the data would be used only for the stated research purposes.

The health workers were responsible for the delivery and collection of questionnaires and for reporting on the number of students not attending class on the date of the survey or refusing to participate. Completed questionnaires were collected and checked manually for completeness and then entered into a personal computer and analysed using *SPSS*, version 11.5.

Descriptive statistics for sociodemographic and other background variables was done, and univariate analysis using chi-squared tests was performed to identify sig-

nificant correlates of ever-smoking. Logistic regression was used to detect significant factors predicting initiation of smoking.

## Results

A total of 1566 questionnaires were distributed; 1505 were completed and returned, giving a response rate of 96.1% with no significant differences between males and females (738 males and 767 females). The mean age of the total sample was 15.6 years [standard deviation (SD) 1.7] years: 15.7 (SD 1.7) years for males and 15.5 (SD 1.7) years for females. There were no significant differences in age according to grade between males and females.

Of the 1505 students who returned completed questionnaires, 657 (43.7%) were ever-smokers. Ever-smoking was mostly a male habit: 65.0% of all males were ever-smokers compared with 23.1% of females. More than 50% of ever-smokers initiated the habit at age 10–13 years.

Table 1 shows ever-smoking according to selected sociodemographic and educational characteristics of the students. Smoking was significantly associated with male sex, older age, senior classes, having more daily pocket money and poor school performance. Ever-smoking was also significantly associated with students who had smoking parents and friends and who were more exposed to smoking at home and in public places (Table 2). Ever smoking was more frequent among students who read or watched pro-smoking messages and was significantly less among students who read or watched antismoking messages (Table 3). It was also significantly associated with positive attitudes towards smoking, such as “helps attract the opposite sex” and “helps modify body weight”, “helps one feel comfortable in social gatherings” and “helps

Table 1 Frequency of ever-smoking according to students' characteristics

Variable	Total (n = 1505)	Ever-smokers (n = 657)	P-value
Sex	%	%	
Male	49.0	65.0	0.001
Female	51.0	23.1	
School grade			
7th	19.2	29.8	0.001
8th	16.3	48.0	
9th	15.9	45.6	
10th	19.0	52.1	
11th	16.1	46.7	
12th	13.5	40.4	
Age (years)			
12/13	13.2	21.6	0.001
14	15.7	41.9	
15	20.2	45.7	
16	14.2	43.9	
17	20.5	48.1	
18+	16.2	54.9	
Pocket money <sup>a</sup>			
< 10	86.1	41.4	0.001
≥ 10 < 20	12.1	59.1	
≥ 20	1.8	63.6	
School performance			
Poor	7.3	72.0	0.001
Good	59.8	46.8	
Excellent	32.9	35.9	
Type of school			
Intermediate	51.4	40.4	0.010
Secondary	48.6	47.1	
Owns object(s) with smoking logo			
Yes	9.0	75.0	0.001
No	91.0	40.5	

<sup>a</sup>Saudi riyals/day

increase one's number of friends" among other positive attributes (Table 4).

In order to study which factors were significant correlates and possible predictors for initiating smoking (ever-smoking), stepwise multiple logistic regression was

performed (Table 5). Significant predictors for ever-smoking were: male sex [odds ratio (OR) = 4.71], student's belief that smoking helps people feel comfortable in social situations (OR = 1.70), owning something with a cigarette logo (OR = 2.75), having ≥ 20 riyals/day pocket money (OR = 1.25) and poor school performance (OR = 2.28).

Table 2 Frequency of ever-smoking according to students' smoking contacts

Variable	Total (n = 1505)	Ever-smokers (n = 657)	P-value
	%	%	
Parents are smokers			0.001
Neither	66.8	38.9	
Both	1.6	66.7	
Father only	29.8	52.9	
Mother only	0.5	62.5	
Don't know	1.3	40.0	
Friends are smokers			0.000
None	57.9	25.1	
Some	30.2	66.3	
Most	9.1	74.3	
All	2.8	83.3	
Contact with smokers at home last week (days)			0.001
0	52.9	39.0	
1-2	16.9	52.6	
3-4	8.4	65.9	
5-6	4.0	58.3	
7	17.9	59.7	
Contact with smokers in public places last week (days)			0.001
0	49.7	27.4	
1-2	18.8	52.1	
3-4	11.3	61.2	
5-6	5.9	71.9	
7	14.3	63.7	

Table 3 Frequency of ever-smoking according to students' practices

Variable	Total (n = 1505) %	Ever- smokers (n = 657) %	P-value
<i>Discussed harmful effects of smoking at home</i>			
Yes	66.3	45.3	0.070
No	33.7	40.4	
<i>Taught harmful effects of smoking at school</i>			
Yes	22.5	49.3	0.021
No	73.2	43.0	
Not sure	4.3	47.6	
<i>Reads/watches anti-smoking advertisements</i>			
A lot	22.1	36.6	0.004
A few	32.6	43.0	
None	45.2	47.6	
<i>Reads/watches pro-smoking advertisements</i>			
A lot	23.1	51.6	0.001
A few	37.5	54.4	
None	39.5	37.3	

Students who had friends and parents who smoked were also more likely to be ever-smokers.

## Discussion

Although most of the adverse effects of smoking appear in adult life, the initiation of smoking usually starts early in adolescence. Once smoking has begun, cessation is difficult. Hence surveying smoking habits and identifying the correlates and possible predictors of ever-smoking is a prerequisite for any effective smoking prevention programme.

Our findings show that about half of the students in Tabuk had ever-smoked, predominantly males, and the majority initiated the habit at or before 13 years of age. These findings are in accordance with the findings of studies conducted in other parts of Saudi Arabia [4–8], and worldwide in other countries of the Persian Gulf, Middle East, Africa, Europe, Asia and Latin America [10–15]. Adolescents who begin smoking at a younger age are more likely to become regular smokers and less likely to quit smoking [16]. This is a cause for concern in the Tabuk area, as in other areas of Saudi Arabia, and needs urgent intervention.

Our data in Tabuk showed a significant association of ever-smoking in students with parents, peers and friends who smoke, which is in accordance with previous studies in Saudi Arabia [4–8]. One of the most consistent findings in the literature is that of the social influence of peers on adolescent smoking. Modelling, direct pressure and normative beliefs have been suggested as mechanisms of influence and investigated along with the potential importance of levels of social interactions [17]. Of particular interest is research suggesting that ever-smoking is best modelled as a prevalence-driven behaviour depending upon the degree to which an adolescent comes into contact with others displaying the behaviour [18]. Our study and other studies in Saudi Arabia and in many other countries in the region showed that parents who smoke tend to have ever-smoking children [4–8, 11, 19]. Family members, particularly parents and siblings, exert their influence through providing access, communicating information, modelling and demonstrating how to use cigarettes as well as conveying attitudes and social norms favourable to smoking.

For males in Tabuk, pocket money was significantly correlated with ever-smoking. The personal income of adolescents has

**Table 4 Frequency of ever-smoking according to attitudes and beliefs of students**

<b>Believe that smoking:</b>	<b>Total (n = 1505)</b>	<b>Ever-smokers (n = 657)</b>	<b>P-value</b>
	<b>%</b>	<b>%</b>	
<i>Is harmful to smokers' health</i>			
Definitely no	3.8	52.6	0.001
Probably no	3.1	71.7	
Probably yes	10.2	66.0	
Definitely yes	83.0	39.5	
<i>Is harmful to non-smokers' health</i>			
Definitely no	6.3	37.9	0.007
Probably no	6.8	53.4	
Probably yes	21.1	49.7	
Definitely yes	65.7	41.3	
<i>Helps attract the opposite sex</i>			
More	18.6	54.6	0.001
Less	55.8	39.2	
No difference	25.6	45.5	
<i>Helps modify body weight</i>			
Gain weight	4.7	47.1	0.694
Lose weight	62.2	44.0	
No difference	33.1	42.4	
<i>Helps one feel comfortable in social gatherings</i>			
More	13.5	69.0	0.001
Less	21.1	39.6	
No difference	18.4	43.3	
Don't know	46.9	38.4	
<i>Helps increase one's number of friends</i>			
More	33.5	49.6	0.001
Less	33.5	34.5	
No difference	33.0	47.0	
<i>Should be banned</i>			
Yes	76.4	40.0	0.001
No	23.6	55.5	

been associated with adolescent smoking; young people with more spending money have higher levels of ever-smoking, presumably because money is needed for the purchase of cigarettes [20,21]. Adequate income may supersede other protective factors and young people who are working and have their own personal income show higher cigarette use [22].

Ever-smoking was significantly more prevalent in students with poorer school performance. Smoking status has been found in many studies to be consistently related to academic success and this may show that beliefs about smoking and attitudes to academic performance are inter-connected [23–25].

In this study ever-smoking was associated with students who possessed objects with smoking logos, who believed that smoking made one feels more comfortable in social events and who watched or read smoking promotion advertisements. The opposite was also true; students who thought that smoking was hazardous to smokers and their contacts and who watched or read anti-smoking messages were less likely to be smokers. This is not surprising since more positive attitudes toward smoking and smokers tended to be related to an increased likelihood of smoking and vice versa.

Discussing the harmful effects of smoking at school or at home was not significantly associated with ever-smoking. This needs further examination to assess what information and how discussion of harmful effects are presented. Good knowledge *per se* may not be a deterrent to ever-smoking, as witnessed by the fact that many health professionals are smokers.

Weight considerations were not a significant correlate of ever-smoking in our study. There is evidence from international

studies that youth, especially girls, use smoking for weight control. These studies have established a positive association between weight concerns and cigarette smoking among female, but not among male, adolescents [16,26,27]. However, the temporal relation between weight concerns and smoking behaviour has not been clearly established, and this has to be confirmed by proper prospective studies.

We believe that the data generated in this study will help in assessing the magnitude and the contributing factors of the problem among students. Although it is often assumed that research findings will inevitably be translated into intervention programmes, the data may instead remain within the academic community and fail to be disseminated to experts in programme and policy development. It is essential that experts work together to ensure that the information is translated into programmes, the programmes are implemented and evaluated and the results are disseminated widely. We are determined to make that a reality. Emphasis will centre on the significant determinants identified in this study.

This was essentially a collaborative multidisciplinary effort involving schools, families, health providers, social and religious leaders and organizations, media and Internet. Intervention programmes should include measures to convince non-smokers to continue as such and to help smokers to quit and continue as successful quitters. The programme should be appealing and acceptable to adolescents to meet their individual needs, and be flexible. We have started such programmes in schools in the Tabuk area which focused on the hazards of smoking including health, social, economic, educational and above all religious implications. We plan to communicate the results to health care and education authorities, the media, social and sports youth clubs and or-

Table 5 Stepwise multiple logistic regression of significant predictors of ever-smoking

Predictor	Adjusted OR	95% CI
<b>Sex</b>		
Female	1	
Male	4.71	3.49–6.36
<b>School performance</b>		
Excellent	1	
Good	1.70	0.99–2.92
Poor	2.28	1.30–4.01
<b>Pocket money<sup>a</sup></b>		
< 10	1	
≥ 10 < 20	0.61	0.40–0.91
≥ 20	1.25	0.48–3.24
<b>Parents are smokers</b>		
Both	1	
None	0.37	0.13–1.10
Father only	0.47	0.35–0.64
Mother only	0.40	0.07–2.44
<b>Friends are smokers</b>		
All	1	
Most	0.36	0.26–0.48
Some	0.29	0.18–0.48
None	0.30	0.11–0.80
<b>Smoking helps one feel comfortable in social gatherings</b>		
Don't believe	1	
Believe	1.70	1.05–2.75
No difference	1.83	1.19–2.81
<b>Smoking is harmful to non-smokers' health</b>		
Don't believe	1	
Believe	0.64	0.43–0.97
<b>Owns object(s) with smoking logo</b>		
No	1	
Yes	2.75	1.64–4.61

OR = odds ratio; CI = confidence interval.

<sup>a</sup>Saudi riyals/day

ganizations with an active role in combating adolescents' smoking. Health providers in particular need to be actively involved, and should enquire about tobacco use by clients

and convince smokers to quit and provide necessary help to achieve that.

There were some limitations to the study. Every possible effort was made to ensure privacy and confidentiality, but problems of underreporting or misreporting, intentionally or non-intentionally, cannot be definitely ruled out. We were not able to validate smoking status by any other means than this self-reporting methodology. We hope, however, that the results reflect the real situation to a large extent as such studies are generally considered acceptable and valid for surveying smoking habits [28,29].

Future studies might include other variables, such as the role of religious beliefs and Internet use on initiation of ever-smoking, continuation and cessation of smoking among students. Religion was a very powerful factor for not smoking and for quitting or attempting quitting smoking in all previous studies in Saudi Arabia [4–8]. The Internet is fast becoming a new battleground between tobacco control advocates and pro-tobacco forces, and this new medium will certainly have a greater impact on tobacco use in the future. The Internet can encourage youth smoking by providing access to tobacco products and offering content that glamorizes smoking lifestyle and culture in websites and chat

rooms. In contrast, smoking among youth is discouraged by online grassroots advocacy and counter-marketing websites [30].

Future studies should be longitudinal in nature to establish cause-and-effect associations and decrease bias and confounding effects.

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### World report on child injury prevention

Every day more than 2000 children and teenagers die from an injury which could have been prevented. This joint WHO/UNICEF report is a plea to keep kids safe by promoting evidence-based injury prevention interventions and sustained investment by all sectors. The report presents the current knowledge on the 5 most important causes of unintentional injury: road traffic injuries, drowning, burns, falls and poisoning—and makes 7 recommendations for action.

#### Child-friendly version

UNICEF and WHO have produced a child-friendly version of the report, which aims to inform children aged 7–11 years about various types of injuries and how these may be prevented, using a mixture of facts, puzzles, games and other visual material. This document is available in 5 languages, including English, French and Spanish.

Both versions are freely downloadable and can be accessed from: [http://www.who.int/violence\\_injury\\_prevention/child/injury/world\\_report/en/index.html](http://www.who.int/violence_injury_prevention/child/injury/world_report/en/index.html)