

# Smoking in Saudi Arabia

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### ABSTRACT

الغرض من هذا البحث هو مراجعة الأبحاث التي اهتمت بمدى انتشار، استهلاك، تجارة، مكافحة وعلاج التدخين في المملكة العربية السعودية. وقد وجد البحث أن معدل انتشار التدخين بين السعوديين بشكل عام يتراوح ما بين (2.4-52.3%) (المتوسط = 17.5%). كانت نسبة انتشار التدخين بين طلبة المدارس تتراوح ما بين (12-29.8%) (المتوسط = 16.5%)، وبين طلبة الجامعة (2.4-37%) (المتوسط = 13.5%)، وفي البالغين ما بين (11.6-52.3%) (المتوسط = 22.6%). أما في كبار السن فكانت نسبة التدخين (25%). وقد كانت نسبة التدخين في الذكور تتراوح بين (13-38%) (المتوسط = 26.5%)، وفي الإناث (1-16%) (المتوسط = 9%). ولخصت الدراسة إلي أن التدخين منتشر في المملكة العربية السعودية، وأن نسبة انتشاره في الذكور تفوق نسبة انتشاره في الإناث في مختلف الفئات العمرية، كما وتوصي الدراسة بمزيد من البحوث في مجال مكافحة وعلاج التدخين في المملكة.

This article reviewed the literature on the epidemiology, consumption, trade, control, prevention, and treatment of tobacco smoking in Saudi Arabia. The prevalence of current smoking in Saudi Arabia ranges from 2.4-52.3% (median = 17.5%). Among school students, the prevalence of current smoking ranges from 12-29.8% (median = 16.5%), among university students from 2.4-37% (median = 13.5%), and among adults from 11.6-52.3% (median = 22.6%). In elderly people, the prevalence of current smoking is 25%. The prevalence of smoking in males ranges from 13-38% (median = 26.5%), while in females it ranges from 1-16% (median = 9%). To conclude, smoking is prevalent in the Saudi population at different age groups. The prevalence of current smoking is much higher in males than in females at different ages. More research is needed in the area of prevention and treatment of smoking.

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Tobacco smoking is a great health problem. Tobacco smoking is a direct cause of high morbidity and mortality all over the world, which could be prevented. Five million persons die from smoking-related diseases every year in the world, particularly in developing countries.<sup>1</sup> Around 6.4 million children less than 18 years will die at an earlier age as adults because they initiated their smoking during adolescence.<sup>1</sup> The tobacco-related health problems cost the USA \$167 billion per year.<sup>2</sup> Around \$160 million is used for purchasing tobacco in Saudi Arabia every year.<sup>3</sup> People continue to smoke tobacco in spite of all the negative consequences because of nicotine dependence.<sup>4</sup> Islam prohibits the use of any substance, which might harm health. This is the reason behind total prohibition of smoking by King Abdulaziz in 1926 as being un-Islamic.<sup>5</sup> The objective of this article is to review the literature, which investigated the epidemiology, consumption, trade, control, prevention, and treatment of smoking in Saudi Arabia. All papers published in English in national and international journals, in addition to Medline data, were included in this article. The World Health Organization (WHO) and the Center for Disease Control and Prevention (CDC) reports related to policy, production, trade, industry, and consumption are also reviewed. This report, which investigated smoking in Saudi Arabia, can help to see the whole picture instead of seeing the picture from different perspectives.

**Epidemiology.** There were 34 studies<sup>6-39</sup> published between 1987 and 2008, which investigated the epidemiology of tobacco use in school students (adolescents), university students (young adults), adults and other population groups in Saudi Arabia as shown in Table 1. According to these studies, the prevalence of current smoking among the Saudi population ranges from 2.4-52.9% (median 17.5%). This difference in prevalence among studies is due to the inclusion of different populations, using different criteria for current smoking, and estimating the prevalence in different regions, and at different times. Most studies recruit people from schools, universities, and health care facilities. Only one study included people from the community.<sup>31</sup> Most studies included only males and were carried out in Riyadh. These weaknesses might

**Table 1** - Prevalence of smoking in Saudi Arabia.

Study	Sample size	Population	Current smoking (%)
<i>School students</i>			
Abdalla et al <sup>6</sup>	1505	School students	22.3
Abolfotouh et al <sup>7</sup>	289	Secondary school students	14.5
Al-Damegh et al <sup>8</sup>	2203	Male secondary school students	29.8
Al-Faris <sup>9</sup>	358	Secondary school boys	17.0
Almas et al <sup>10</sup>	290	Secondary school students	15.0
Al-Yousaf & Karim <sup>11</sup>	819	Secondary school students	20.0
Felimban & Jarallah <sup>12</sup>	1312	Secondary school boys	12.0
Jarallah et al <sup>13</sup>	1382	Secondary school boys	13.2
Rolands & Shipster <sup>14</sup>	434	School boys	12.0
Saeed et al <sup>15</sup>	?	Secondary health students	22.0
<i>University students</i>			
Abolfotouh et al <sup>16</sup>	202	Medical students	13.6
	300	Education students	17.5
Al-Arif <sup>17</sup>	400	Male pharmacy students	13.4
Almas et al <sup>18</sup>	481	Dental students	7.9
Al-Turki & Al-Rowais <sup>19</sup>	337	Female medical students	2.4
Al-Turki <sup>20</sup>	322	Medical students	13.0
Felimban <sup>21</sup>	663	Female university students	6.7
Hasim <sup>22</sup>	712	Medical science students	29.0
Jarallah et al <sup>23</sup>	414	Medical students	33.0
Merdad et al <sup>24</sup>	1050	Female university students	11.0
Saeed <sup>25</sup>	647	Medical science students	29.0
Taha et al <sup>26</sup>	2165	University students	37.0
<i>Adults</i>			
Al-Arif <sup>27</sup>	261	Community pharmacists	19.9
Al-Haddad et al <sup>28</sup>	1752	PCCs	52.3
Al-Qhtani et al <sup>29</sup>	1208	Soldiers	30.5
Al-Shahri <sup>30</sup>	89	Primary care physicians	17.0
Jarallah et al <sup>31</sup>	8310	Community	11.6
Saeed et al <sup>32</sup>	698	Physicians	16.0
Saeed <sup>33</sup>	698	Physicians	34.0
Saeed et al <sup>34</sup>	1534	Adults, PCCs	25.3
Siddiqui & Ogbeide <sup>35</sup>	230	Health staff	19.0
Siddiqui et al <sup>36</sup>	634	Male PCCs	34.4
<i>Other groups</i>			
Almas et al <sup>37</sup>	214	Elderly people	25.0
Almas et al <sup>38</sup>	525	Bedouin (2-90 years)	15.0
Al-Dawood et al <sup>39</sup>	2964	Parents of school boys	18.2

PCCs - Primary Care Clients  
? data not available

limit the generalizability of the findings and increase the need for epidemiological studies in the community including people from both genders, all age groups with different sociodemographic backgrounds and from all cities of the kingdom.

**Prevalence among subgroups. 1. Adolescence.** Ten studies have investigated the prevalence of smoking among adolescents (school students) in Saudi Arabia during the last 22 years. The prevalence of current smoking among adolescents ranges from 12-29.8% (median = 16.5%).<sup>6-15</sup> The prevalence of ex-smoking ranges from 12-27% (median = 15%).<sup>11,12,14</sup>

**Global Youth Tobacco Survey (GYTS).** The GYTS is a school survey, which was initiated by the WHO, CDC, and the Canadian public health association in 1999. The survey includes questions related to prevalence of current smoking, use of other tobacco products,

attitudes of students to smoking, passive smoking, and school curricula on prevention and treatment of smoking.<sup>40</sup> The GYTS collects data from students aged 13-15 years by using a standardized methodology for constructing the sample frame, selecting participating schools and classes, and processing data. The survey is composed of 2 stages (sampling and randomization) to collect a representative sample of students attending public and private schools. The survey included 747,603 students in 9,900 schools from 133 countries during 1999-2005.<sup>40</sup>

**GYTS in Saudi Arabia.** The GYTS in Saudi Arabia was conducted on male students in standards 7 and 8 in 2001. According to the GYTS, 34.5% of students had, at sometime smoked cigarettes, but only 20% were using a tobacco product. These findings are in keeping with the worldwide data, which indicate that nearly 2

of every 10 students reported currently using a tobacco product.<sup>40</sup>

**The GYTS limitations.** The GYTS has 2 limitations: first, the study included only male students in seventh and eighth grades, who were present in the school on the survey day, so it is not representative of the Saudi adolescent community as a whole. Second, the study depended on self-reports so it is liable to under- or over-reporting.

**2. Early adulthood.** Eleven studies investigated the prevalence of smoking among young adults (university students) in Saudi Arabia during the past 2 decades. The prevalence of current smoking among young adults ranges from 2.4-37% (median = 13.5%).<sup>16-26</sup> The prevalence of ex-smoking ranges from 3.6-18% (median = 4.8%).<sup>17,20,21,25</sup> Eight out of 11 studies were carried out on medical science students (medical, dental, pharmacy), which could limit the generalizability of the results of these studies to young adults in general. The 2 outliers on the low side are related to smoking in female students. No study in the community including the non-student population was carried out.

**3. Adulthood.** Ten studies investigated the prevalence of smoking among adults in Saudi Arabia during the last 20 years. The prevalence of current smoking among adults ranges from 11.6-52.3% (median = 22.6%).<sup>27-36</sup> The prevalence of ex-smoking ranges from 10-32% (median = 15.2%).<sup>30,32-36</sup> Five studies that included health staff, physicians, and pharmacists, found that the prevalence of current smoking ranges from 16-34% (median = 19%). Three studies included clients of primary health care and the prevalence of current smoking ranges from 25-52.3% (median = 34.4%). This high prevalence

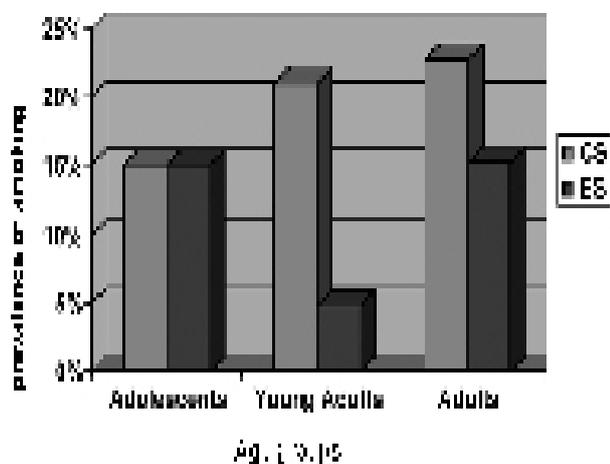
could be due to referral bias because these are patients seeking advice for different medical reasons, and it is expected to have a higher smoking rate than normal people. This is confirmed by the low prevalence of current smoking in the community (11.6%).<sup>31</sup>

**4. Elderly.** Only one study investigated the prevalence of current smoking among elderly people (50-89 years) and found that 25% of them were current smokers.<sup>37</sup> This high prevalence of smoking among elderly people needs confirmation by other studies as this group of people are at higher risk for cardiovascular and cerebrovascular diseases.

**Current smoking versus ex-smoking.** Few studies looked at the prevalence of ex-smoking in comparison with current smoking (3 out of 10 in adolescents; 4 out of 11 in young adults; 3 out of 10 in adults), which might limit the generalizability of these findings. Looking at the findings of all studies in different age groups, we can notice that the prevalence of ex-smoking was higher in adolescents than in young adults, as shown in Figure 1. This finding could be due to the fact that adolescence is the period of experimentation, so many adolescents try smoking at least once then some of them continue smoking while others quit smoking. If this is the same cohort, we expect that the number of ex-smokers becomes higher with time. In our case, this is not the same cohort, but different people from different studies at different times.

**Types of tobacco.** Tobacco is used in many ways. It can be measured in terms of the weight of imports. The most important tobacco types are jirak (for the hookah or shisha), cigarettes, and shag (for roll-your-own cigarettes). According to the GYTS in Saudi Arabia, 11% of adolescents currently smoke cigarettes, and 13% currently use some forms of tobacco.<sup>40</sup> Worldwide, the GYTS found that there was no statistically significant difference between the proportion of those reporting cigarette smoking (8.9%) and other forms of tobacco use (11.2%).<sup>40</sup> In a recent study among female university students in Jeddah, the prevalence of cigarettes smoking was 5% while 8.7% were users of water pipe (Shisha) and other tobacco products.<sup>24</sup> Another recent study in Riyadh found that 70% of female medical students were smoking shisha.<sup>19</sup> While in male medical students, 44% were smoking shisha, and 24% were smoking both shisha and cigarettes.<sup>20</sup> Many people believe that shisha is less harmful than cigarettes, although accumulating evidence suggests that shisha smoking may be as addictive as other forms of tobacco use, and may carry similar or greater risks to health.<sup>41</sup> These findings suggest that tobacco-control programs must address all forms of tobacco use, not just cigarettes.

**Gender and smoking.** The prevalence of smoking in males ranges from 13-38% (median = 26.5%), while in females ranges from 1-16% (median=9%).<sup>6,15,18,21,22,24,31,32,35,39</sup> The prevalence of smoking among females was much less



**Figure 1** - Prevalence of current smoking (CS) versus ex-smoking (ES) (using the median) among adolescents, young adults, and adults.

**Table 2** - Prevalence of smoking among females versus males at different ages and professions.

Study	Population	Male Smoking (%)	Female smoking (%)
Saeed et al <sup>15</sup>	School students	24	14
Abdalla et al <sup>6</sup>	School students	34	11.1
Felimban et al <sup>21</sup>	University students		6.7
Merdad et al <sup>24</sup>	University students		11
Hasim <sup>22</sup>	Medical students	20	9
Al-Turki, Al-Rowais <sup>19</sup>	Medical students		2.4
Almas <sup>18</sup>	Dental students	13	2
Siddique Ogbeide <sup>35</sup>	Health staff	29	11.6
Saeed et al <sup>32</sup>	Physicians	38	16
Al-Dawood <sup>39</sup>	Parents of students	32	4
Jarallah et al <sup>31</sup>	Community adults	21	1

than that among males in Saudi Arabia in secondary school students, university students, medical science students, dental students, physicians, and community adults, as shown in Table 2. According to the community study, the odds of smoking among males were 27 times those among females. However, social stigma may be responsible for underreporting among females. A recent study<sup>6</sup> found that there were significant gender differences with respect to source of cigarettes, usual place of smoking, intensity of smoking, knowledge of tobacco addiction, educational exposure, attitudes, and public exposure. However, there were no differences regarding age of initiation, health hazards knowledge, media exposure, quit motivation, and home exposure. The GYTS was applied only for males in Saudi Arabia, but worldwide was given to both males and females. This survey among adolescents found no significant difference in current cigarette smoking by gender in 3 regions (Americas, Eastern Mediterranean, and Europe) or in other tobacco use rates in 4 regions (Africa, Eastern Mediterranean, Europe, and Western Pacific).<sup>40</sup> On the contrary, males have higher rates of smoking than females during adulthood.<sup>42</sup> These findings indicate that effective tobacco-control programs with different intervention strategies must be developed and implemented for both males and females in schools, universities, and the community.

**Age at onset.** According to 5 studies, 20-50% of smokers started smoking at or before the age of 15 years, while the remaining started after that age.<sup>9,15,23,26,34</sup> The average starting age for current smokers was 13.8 years.<sup>11</sup> Prevention programs should start in primary schools before this age.

**Risk and protective factors.** Higher smoking prevalence and daily cigarette consumption were associated with age, being male, single, and highly educated.<sup>13,34</sup> Desire (32%), idleness (28%), imitation (22%), and enjoyment (20%) are among the motives

to smoke.<sup>9</sup> Relief from psychological tension, boredom, and imitating others (especially friends, siblings, and parents) were the most important reasons for smoking. Among females, 30% reported no specific reasons for smoking.<sup>19</sup> Psychological pressures, smoking contacts, and travel to foreign countries were the risk factors for relapse among smokers.<sup>15</sup> Health and religious considerations were the most important reasons for not smoking and for quitting smoking.<sup>11,15,20,22,28,34</sup> Financial reasons were less important for quitting smoking, probably because of the low price of cigarettes.<sup>9</sup> Setting a good example for children was the most important reason for not smoking among physicians.<sup>33</sup>

**Motivation and reasons to stop smoking.** Over 7 in every 10 smokers want to quit, and more than 5 out of 10 tried to stop smoking during the last year among adolescents in Saudi Arabia.<sup>40</sup> Among high school students, 61% have tried to stop smoking but failed.<sup>11</sup> Among university students, 69% have thought about quitting smoking, while 57-70% of medical students have the motivation to stop smoking.<sup>20,22</sup> Smoking prevention programs should stress on prohibition of smoking by Islam due to health reasons, which is the most important protective factor against start smoking, and the most important motivation for quitting smoking.

**Attitudes and knowledge.** Seventy-three to 95% of university and high school students know that smoking is harmful, and 60% know that it is harmful to others.<sup>11</sup> The media (66%), doctors (45%), and teachers (30%) were the primary sources of information on smoking hazards.<sup>22,26</sup> According to the GYTS in Saudi Arabia, 3 in 10 students live in homes where others smoke in their presence; over 4 in 10 are exposed to smoke in public places; 2 in 10 have parents who smoke. Six in 10 students think smoke from others is harmful to them, and 3 in 4 students think smoking should be banned in public places.<sup>40</sup>

**Tobacco control program.** In 2005, Saudi Arabia ratified the world health organization's Framework Convention on Tobacco Control, the 65th country to do so. As a ratifying nation it will ban tobacco advertising, take measures to protect nonsmokers from second hand smoke, increase the cost of tobacco products, and make efforts to stop tobacco smuggling. The framework aims at preventing children from smoking and to help adults to stop the habit. Governments have up to 5 years to amend regulations in compliance with the treaty. The Gulf Cooperation Council proposed certain measures in 1987 to be implemented by all Gulf States. These measures include limits on tar and nicotine levels and a health warning that smoking is the main cause of lung and heart diseases to be printed on cigarette packets.<sup>43</sup> It also proposed that import duties on cigarettes be increased from 30-50%, that the import of chewing tobacco be banned, and the imposition of curbs on the advertisement and promotion of cigarettes. In addition, designing sweets to look like cigarettes or cigarette packets to promote smoking is banned.<sup>43</sup> The Saudi national multisectoral committee adopted a national tobacco control program. This program includes estimating the epidemiology of smoking (prevalence, consumption, economy, and morbidity) and the primary and secondary prevention. With respect to legislation, there are many policies of banning smoking in health and educational facilities and public transportation, of banning media advertisement, of banning sponsorship of sports events and of raising taxes and cost of tobacco products.<sup>44</sup>

**Limitations and obstacles.** The limitations include the lack of research encouragement, lack of protection of passive smoking rights, lack of banning sales to minors, and lack of smoking bans in closed places. The obstacles include the lack of human resources experienced in tobacco control, lack of financial resources, lack of a comprehensive national plan, and absence of Non-Government Organizations and civil society groups interested in tobacco control.<sup>44</sup>

**Tobacco production, trade, and industry.** Tobacco is not grown or produced in Saudi Arabia, but imported from abroad in the form of jirak, shag, cigars, chewing tobacco, and snuff. Nineteen billion manufactured cigarettes and 1600 tones of unmanufactured tobacco were imported by Saudi Arabia in 1990 and 1992.<sup>43</sup> In 1993, tobacco import costs amounted to US\$ 351.8 million (0.7% of total imports), up from US\$ 250 million in 1990.<sup>43</sup>

**Tobacco consumption.** Between 1982-1988, manufactured cigarettes represented less than 50% of tobacco imports (by weight). There is an increase in cigarette consumption per person from 1220 in the 1970s to 2130 in the 1990s.<sup>43</sup> Saudi people smoke 15 billion cigarettes annually, which makes the Kingdom the fourth importer all over the world. People from

the western region smoke tobacco heavily followed by those from the southern region in comparison with other regions of the Kingdom.<sup>43</sup> The average daily consumption ranges from 15.4 (WHO, 2001) to 16.8 cigarettes per day between 1995 and 1999. The annual number of cigarettes consumed (in millions) ranges from 8,646-20,000. The retail price of 20 cigarettes in USD, including taxes ranges from 0.27 to 1.32.<sup>43</sup>

**Prevention.** Primary and secondary prevention programs are applied in Saudi Arabia through schools and media. According to the GYTS in Saudi Arabia, 7 of 10 students saw anti-smoking media messages in the past 30 days. Students had been taught in class, during the past year, of the dangers of smoking (54%), reasons why people their age smoke (47%), and the effects of tobacco use (49.5%).<sup>40</sup> However, there was a lack of a comprehensive national prevention program.

**Treatment.** Thirty-three antismoking clinics were established across the Kingdom during the last 2 decades for providing treatment services (pharmacological and nonpharmacological) for smokers. The success rate for smoking cessation was 13%.<sup>45</sup> In another smoking cessation program, the quit rate was 38.3% after 6 months of follow-up.<sup>46</sup> However, the use of these clinics is still limited.<sup>31</sup>

In conclusion, the prevalence of current smoking among the Saudi population ranges from 2.4-52.3% (median = 17.5%). Currently, smoking is prevalent in all age groups. The prevalence of smoking is much higher in males than in females at different ages. Imitating others is one of the most common risk factors for smoking while adherence to religious values is the most common protective factor. Most people know the hazards of smoking and have the motivation to stop, but they need encouragement and help. This review's findings highlighted the importance of initiating programs for treating nicotine dependence and tobacco-related diseases. It also emphasizes the need to implement prevention programs directed to both genders, aiming to prevent not only tobacco smoking, but also the use of other tobacco products. The mosque could play a role in a religion-oriented population such as that in Saudi Arabia.

## References

1. Peto R, Lopez AD. Future worldwide health effects of current smoking patterns. In: Koop CD, Pearson C, Schwarz MR, editors. Critical issues in global health. New York (NY): Jossey-Bass; 2001. p. 154-162.
2. Marshall L, Schooley M, Ryan H, Cox P, Easton A, Heaton C, et al. Youth tobacco surveillance--United States, 2001-2002. *MMWR Surveillance Summ* 2006; 55: 1-56.
3. Ministry of Finance and National Economy. Foreign trade statistics in Saudi Arabia, 1985-1995. Riyadh (KSA): Ministry of Finance and National Economy; 1996. p. 15.

4. Campo-Arias A. [The prevalence of nicotine dependency in some populations: a systematic review]. *Rev Salud Publica (Bogota)* 2006; 8: 98-107. Review. Spanish.
5. Al-Mana M. The unification of the Kingdom of Saudi Arabia. 1st edition. Dammam (KSA): Motawaa Printing Co; 1982. p. 109-126.
6. Abdalla AM, Al-Kaabba AF, Saeed AA, Abdulrahman BM, Raat H. Gender differences in smoking behavior among adolescents in Saudi Arabia. *Saudi Med J* 2007; 28: 1102-1108.
7. Abolfotouh MA, Abdel Aziz M, Badawi IA, Alkija W. Smoking intervention programme for male secondary school students in south-western Saudi Arabia. *Eastern Med Health J* 1997; 3: 90-100.
8. Al-Damegh SA, Saleh AS, Al-Alfi MA, Al-Hoqail IA. Cigarette smoking behavior among male secondary school students in the central region of Saudi Arabia. *Saudi Med J* 2004; 25: 215-219.
9. al-Faris EA. Smoking habits of secondary school boys in rural Riyadh. *Public Health* 1995; 109: 47-55.
10. Almas K, Maroof F, McAllister C, Freeman R. Smoking behaviour and knowledge in high school students in Riyadh and Belfast. *Odontostomatol Trop* 2002; 25: 40-44.
11. Al-Yousaf MA, Karim A. Prevalence of smoking among high school students. *Saudi Med J* 2001; 22: 872-874.
12. Felimban FM, Jarallah JS. Smoking habits of secondary school boys in Riyadh, Saudi Arabia. *Saudi Med J* 1994; 15: 438-442.
13. Jarallah JS, Bamgboye EA, al-Ansary LA, Kalantan KA. Predictors of smoking among male junior secondary school students in Riyadh, Saudi Arabia. *Tob Control* 1996; 5: 26-29.
14. Rowlands DF, Shipster PJ. Cigarette smoking among Saudi school boys. *Saudi Med J* 1987; 8: 613-618.
15. Saeed AA, al-Johali EA, al-Shary AH. Smoking habits of students in secondary health institutes in Riyadh city, Saudi Arabia. *J R Soc Health* 1993; 113: 132-135.
16. Abolfotouh MA, Abdel Aziz M, Alakija W, Al-Safy A, Khattab MS, Mirdad S, et al. Smoking habits of King Saud University students in Abha, Saudi Arabia. *Ann Saudi Med* 1998; 18: 212-216.
17. Al-Arifi MN. Smoking habits among pharmacy students at a university in central Saudi Arabia. *Saudi Med J* 2005; 26: 893-895.
18. Almas K, Al-Hawish A, Al-Khamis W. Oral hygiene practices, smoking habit, and self-perceived oral malodour among dental students. *J Contemp Dent Pract* 2003; 4: 77-90.
19. Al-Turki YA, Al-Rowais NA. Prevalence of smoking among female medical students in the college of medicine, Riyadh, Saudi Arabia. *Saudi Med J* 2008; 29: 311-312.
20. Al-Turki YA. Smoking habits among medical students in Central Saudi Arabia. *Saudi Med J* 2006; 27: 700-703.
21. Felimban FM. The smoking practices and attitudes towards smoking of female university students in Riyadh. *Saudi Med J* 1993; 14: 220-224.
22. Hasim TJ. Smoking habits of students in college of applied medical science, Saudi Arabia. *Saudi Med J* 2000; 21: 76-80.
23. Jarallah JS. Smoking habits of medical students at King Saud university, Riyadh. *Saudi Med J* 1992; 13: 510-513.
24. Merdad LA, Al-Zahrani MS, Farsi JMA. Smoking habits among Saudi female university students: prevalence, influencing factors and risk awareness. *Ann Saudi Med* 2007; 27: 366-369.
25. Saeed AA. Smoking habits of students in College of Allied Medical Sciences, Riyadh. *J R Soc Health* 1987; 107: 187-188.
26. Taha A, Bener A, Noah MS, Saeed A, Al-Harthy S. Smoking habits of King Saud university students in Riyadh. *Ann Saudi Med* 1991; 11: 141-143.
27. Al-Arifi MN. Prevalence of smoking and attitudes towards smoking cessation among community pharmacists, Saudi Arabia. *J Pharm Technol* 2004; 20: 329-333.
28. Al-Haddad NS, Al-Habeeb TA, Abdelgadir MH, Al-Ghamdy YS, Qureshi NA. Smoking patterns among primary health care attendees, Al-Qassim region, Saudi Arabia. *East Mediterr Health J* 2003; 9: 911-922.
29. Al-Qahtani DA, Abdulla OM, Imtiaz ML. Prevalence of smoking and frequency of visits to primary health care clinics. *Saudi Med J* 2005; 26: 687-689.
30. Al-Shahri MZ, Al-Almaie SM. Promotion of non-smoking: the role of primary health care physicians. *Ann Saudi Med* 1997; 17: 515-517.
31. Jarallah JS, al-Rubeaan KA, al-Nuaim AR, al-Ruhaily AA, Kalantan KA. Prevalence and determinants of smoking in three regions of Saudi Arabia. *Tob Control* 1999; 8: 53-56.
32. Saeed AAW, Taha AM, Al-Shahri AH. Smoking habits of physicians in Riyadh, Saudi Arabia. *Saudi Med J* 1989; 10: 508-511.
33. Saeed AA. Attitudes and behaviour of physicians towards smoking in Riyadh city, Saudi Arabia. *Trop Geogr Med* 1991; 43: 76-79.
34. Saeed AA, Khoja TA, Khan SB. Smoking behavior and attitudes among adult Saudi nationals in Riyadh city, Saudi Arabia. *Tob Control* 1996; 5: 215-219.
35. Siddiqui S, Ogbeide DO. Profile of smoking amongst health staff in a primary care unit at a general hospital in Riyadh, Saudi Arabia. *Saudi Med J* 2001; 22: 1101-1104.
36. Siddiqui S, Ogbeide DO, Al Khalifa I. Smoking in a Saudi community: prevalence, influencing factors, and risk perception. *Fam Med* 2001; 33: 367-370.
37. Almas K, al-Shammari B, al-Dukhyeel S. Education level, oral hygiene and smoking habits of an elderly Saudi population in Riyadh. *Odontostomatol Trop* 2003; 26: 4-6.
38. Almas K, al-Amri M, al-Eid A, al-Shahrani S. Oral hygiene, dietary pattern and smoking habits of Bedouin (nomadic Arabs) population in Saudi Arabia. *Odontostomatol Trop* 2003; 26: 19-23.
39. Al-Dawood K. Parental smoking and the risk of respiratory symptoms among schoolboys in Al-Khobar City, Saudi Arabia. *J Asthma* 2001; 38: 149-154.
40. Centers for Disease Control and Prevention (CDC). Use of cigarettes and other tobacco products among students aged 13-15 years worldwide, 1999-2005. *MMWR Morb Mortal Wkly Rep* 2006; 55: 553-556.
41. Maziak W, Ward KD, Eissenberg T. Interventions for waterpipe smoking cessation. *Cochrane Database Syst Rev* 2007; 4: CD005549. Review.
42. Mackey J, Eriksen M. The tobacco atlas. Geneva (Switzerland): World Health Organization; 2002.
43. World Health Organization. WHO Global Status Report. Geneva (Switzerland): World Health Organization; 1997.
44. World Health Organization. EMRO Tobacco Free Initiative. Geneva (Switzerland): World Health Organization; 2001.
45. Saudi Smoking Charitable Society. Report of activities. Riyadh: Saudi Smoking Charitable Society; 1996. p. 1-3.
46. Saleh MA, Farghaly AB. Determinants of outcome among smokers in a smoking cessation program. *J Fam Commun Med* 1997; 4: 22-31.