



***PREDICTORS OF CIGARETTE AND WATER PIPE SMOKING
BEHAVIOURS AMONG FEMALE SCHOOL STUDENTS AGED 12 TO 19
IN JEDDAH, SAUDI ARABIA***

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By

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**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

April 2016

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DEDICATION

This thesis lovingly dedicated to my mother, Fatimah Mohammad Al-Shuaibi who has always been my role-model for hard work, persistence and personal sacrifices, and who instilled in me the inspiration to set high goals and the confidence to achieve them.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

**PREDICTORS OF CIGARETTE AND WATER PIPE SMOKING
BEHAVIOURS AMONG FEMALE SCHOOL STUDENTS
AGED 12-19 YEARS IN JEDDAH, SAUDI ARABIA**

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April 2016

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Faculty : Medicine and Health Sciences

Water pipe smoking is an increasing public health concern, with supportive global reports of higher prevalence than cigarette among female school students particularly in the Middle East countries. The objective of this study was to determine the prevalence and predictors of cigarette and water pipe smoking behaviours among female school students (aged 12-19 years) in Jeddah, Saudi Arabia.

A cross-sectional study was carried out among Saudi female school students aged 12 to 19 years in Jeddah. A multistage probability proportionate to size sampling method was applied. Sample size (N=5,150) was calculated using a formula for testing hypothesis of two population proportions. The data was collected using validated self-administrated questionnaire that requiring information on smoking behaviours, as well as selected demographic, social, attitudinal/ environmental and psychological variables. Data was analysed using SPSS version 21. Pearson's chi-square test was used to determine the differences in the prevalence of smoking and factors. Multivariate logistic regression was used for determining predictors of smoking behaviours.

The prevalence of ever water pipe smoking was 36.2% while cigarette smoking prevalence was 30.9%. The prevalence of current water pipe smoking was about double that of cigarette smoking (15.8% and 9.1% respectively). Bivariate analysis showed that smoking prevalence was significantly ($P<0.05$) higher among private school students than public school students, for current cigarette smoking (35.3% and 28.3% respectively) and for ever water pipe smoking (41.1% and 35.2% respectively). The multivariate analysis showed that, close friend's smoking, number of smoking friends, accessibility to smoking and self-efficacy to resist smoking were significant predictors for both ever and current cigarette/ water pipe smoking behaviours among the respondents. Among the predictors, close friend's smoking was the strongest predictor for ever cigarette smoking (AOR=1.73, 95%CI:1.39-2.15), while sister's smoking was the strongest predictor for ever water pipe smoking (AOR=3.24, 95%CI:2.47-4.25) among the respondents. Father's smoking, brother's smoking and

perceived difficulty to quit smoking were significant predictors of respondents' ever cigarette and water pipe smoking, but not with current smoking behaviours. Exposure to second hand smoking in homes was significant predictor of current cigarette smoking (AOR=1.42, 95%CI:1.04-1.93) while exposure to second hand smoking in public places was predictor of current water pipe smoking (AOR=1.47, 95%CI:1.12-1.92). Student allowance and exposure to pro-smoking messages in stores were significantly predicted cigarette smoking behaviour while parents' educational levels, family structure, perceived prevalence of smoking, perceived parents' disapproval of smoking, exposure to smoking control activities, depression and stress were significant predictors of respondents' water pipe smoking behaviour.

In conclusion, ever water pipe smoking (36.2%) and cigarette smoking behaviours (30.9%) are highly prevalent among Saudi female school students in Jeddah. The findings of the predictors highlighted the need for development and enhancement of more effective anti-smoking intervention programs for the female school students in Jeddah to help them change their positive normative perceptions and attitudes towards smoking and to improve their smoking refusal skills.

Keywords: Female School Student, Age 12-19 Years, Jeddah, Cigarette Smoking, Water pipe Smoking, Predictors

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PERAMAL TINGKAHLAKU MENGHISAP ROKOK DAN SHISHA “WATER PIPE” DI KALANGAN PELAJAR SEKOLAH PEREMPUAN, BERUMUR 12-19 TAHUN DI JEDDAH, ARAB SAUDI

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Merokok Menghisap SHISHA “Water-pipe” merupakan masalah kesihatan awam yang semakin membimbangkan. Laporan global menkankan bahawa kelaziman menghisap SHISHA lebih tinggi daripada menghisap rokok di kalangan pelajar sekolah perempuan terutamanya di negara-negara Timur Tengah. Objektif kajian ini adalah untuk menentukan kadar kelaziman dan peramal tingkahlaku menghisap rokok dan SHISHA “*water-pipe*” di kalangan pelajar sekolah perempuan (berusia 12-19 tahun) di Jeddah, Arab Saudi.

Satu kajian keratan rentas dikalangan pelajar sekolah perempuan berumur 12 hingga 19 tahun di bandaraya Jeddah, Kaedah persampilan secara kebarangkalian yang setanding dengan saiz telah digunakan. Size persampelan ($n = 5,150$) telah dikira dengan menggunakan formula bagi pengujian hipotesis dua perkadaran populasi dan dijalankan. Pengumpulan data dilakukan dengan menggunakan borang soal selidik yang disahkan, yang merangkumi maklumat mengenai tingkahlaku menghisap rokok, serta pembulehubah demografi, sosial, pembolehubah sikap / persekitaran dan psikologi. Data di analisis menggunakan SPSS versi 21. Ujian “Pearson’s chi-square” telah digunakan untuk menentukan perbezaan kelaziman bagi penggunaan tembakau dan faktor-faktornya. Pelbagai ujian regresi logistik multivariat telah digunakan untuk menentukan peramal penggunaan tembakau.

Kadar Kelaziman dikalangan yang pernah menghisap SHISHA ialah 36.2%, manakala menghisap adalah 30.9%. Kelaziman menghisap SHISHA semasa adalah dua kali ganda lebih tinggi daripada kelaziman menghisap rokok (masing-masing 15.8% dan 9.1%). Analisis bivariat menunjukkan bahawa perokok adalah jauh lebih tinggi ($P < 0.05$) di kalangan pelajar sekolah swasta berbanding pelajar sekolah awam, pagi penghisap rokok semasa (35.3% dan 28.3%), dan pernah menghisap SHISHA (41.1% dan 35.2%). Keputusan analisis multivariat menunjukkan bahawa, kawan rupa yang merokok, bilangan kawan yang merokok, akses kepada merokok, dan keberkesanan menahan diri dari merokok adalah peramal yang signifikan bagi tingkahlaku bagi

kedua-dua responden yang pernah dan prokok semasa (Rokok dan SHISHA). Antara peramal, kawan rapat yang merokok adalah peramal yang paling kuat bagi tingkahlaku “pernah merokok” (AOR=1.73, 95%CI:1.39-2.15), manakala “kakak yang merokok” adalah peramal yang paling kuat bagi responden yang pernah menghisap SHISHA (AOR=3.24, 95%CI:2.47-4.25). Bapa dan abang yang merokok, serta persepsi kesukaran berhenti merokok adalah peramal yang ketara terhadap responden yang pernah menghisap SHISHA dan rokok tetapi bukan terhadap penghisap SHISHA semasa. Pendedahan kepada asap rokok “second hand smoking” di rumah adalah peramal yang signifikan kepada perokok semasa (AOR=1.42, 95%CI:1.04-1.93) manakala pendedahan kepada asap rokok di tempat awam adalah peramal terhadap tingkah laku penghisap SHISHA semasa (AOR=1.47, 95%CI:1.12-1.92). Elaun pelajar dan pendedahan kepada mesej pro-merokok di kedai-kedai telah dengan ketara meramalkan tingkah laku merokok, manakala tahap pendidikan ibu bapa, struktur keluarga, kelaziman tanggapan merokok, penolakan merokok oleh ibu bapa, pendedahan kepada aktiviti kawalan merokok, kemurungan dan menghadapi tekanan, adalah peramal yang signifikan kepada tingkah laku responden terhadap menghisap SHISHA dan rokok.

Kesimpulannya, kelaziman terhadap tingkahlaku pernah menghisap SHISHA dan rokok di kalangan pelajar sekolah perempuan Saudi di Jeddah adalah tinggi (36.2% dan 30.9%). Penemuan peramal ini menekankan bahawa perhatian perlu di tumpu terhadap pembangunan dan penambahbaikan program intervensi anti-merokok untuk pelajar-pelajar sekolah perempuan di Jeddah bagi membantu pencapaian perubahan persepsi normatif dan sikap terhadap merokok serta meningkatkan kemahiran mereka menentang keinginan merokok.

Kata kunci: pelajar sekolah perempuan, berumur 12-19 tahun, Jeddah, merokok, Menghisap SHISHA, peramal

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LIST OF ABBREVIATIONS

AOR	Adjusted Odd Ratio
CDC	Centers for Disease Control and Prevention
EMR	Eastern Mediterranean Region
FCTC	Framework Convention on Tobacco Control
GYTS	Global Youth Tobacco Survey
KSA	Kingdom of Saudi Arabia
NYTS	National Youth Tobacco Survey
OR	Odd Ratio
SHS	Second hand smoking
SR	Saudi Riyal
UK	The United Kingdom
USA	The United States of America
WHO	World Health Organisation

CHAPTER 1

INTRODUCTION

1.1 Background

Smoking still remains one of the leading global health risks for disease and premature death (Eriksen *et al.*, 2012). Globally, smoking causes 71% of lung cancer, 42% of chronic respiratory disease and 10% of cardiovascular disease (Alwan, 2011). In 2011, there were nearly six million tobacco smoking related deaths globally, with 80% of these premature deaths being in low and middle income countries. Tobacco smoking has been globally known as a male's problem (Eriksen *et al.*, 2012). Worldwide, it is estimated that men smoke nearly four times as much as women (48% vs. 12%), however, this situation is gradually changing (Corrao *et al.*, 2000). Smoking prevalence among males has peaked and are decreasing globally while smoking prevalence among females is increasing rapidly (Samet & Yoon, 2010).

There is increasing evidence showed that tobacco companies are concentrating their efforts on promoting tobacco smoking among young females in developing countries using seductive but false images of vitality, slimness, modernity, liberation, and freedom (Petticrew *et al.*, 2015; WHO, 2013a). The results of the worldwide Global Youth Tobacco Survey (GYTS) highlights the increasing of smoking epidemic among female school students (Warren *et al.*, 2008). It reported that there was no difference in smoking prevalence between male and female school students in 58% of the 165 countries surveyed, and 3% of the countries showed higher prevalence of smoking among female school students than males. In addition, about half of the countries indicated greater prevalence of smoking among female school students than that of adult females (Warren *et al.*, 2009).

Although the use of various tobacco products varies from one region of the world to the other, the current most common tobacco products used globally are cigarette smoking and water pipe smoking (Eriksen *et al.*, 2015). Manufactured cigarette represents the predominant form of tobacco smoking among different groups, globally (Eriksen *et al.*, 2012). However, water pipe smoking (also named shisha or hookah) represents both a modern revival of an old public health threat and the emergence of a new tobacco smoking epidemic (Maziak, 2010; Wasim. Maziak, Kenneth D. Ward, *et al.*, 2004). Marketing strategies have made water pipe smoking very appealing for school students around the world, as being less harmful, and a good alternative, to cigarette smoking (Akl *et al.*, 2013; Akl *et al.*, 2011). There is no such thing as a 'safe tobacco product'. Water pipe smoke contains at least as harmful toxins as cigarette smoke (Cobb *et al.*, 2011).

A global estimation showed that 14% of female school students (aged 13 to 15) currently use tobacco products. Overall, 7% of them smoke cigarettes and 8% use other

tobacco products including water pipe smoking (Warren *et al.*, 2009). The prevalence of smoking among female school students varies across countries depending on availability, affordability of tobacco products and cultural norms (GYTSCG, 2002). Cigarette smoking is significantly higher than water pipe smoking among female school students in European (17% vs. 8%) and American regions (15% vs. 7%). However, the use of water pipe smoking is significantly higher than cigarette smoking among female school students in the African (11% vs. 5%) and the Eastern Mediterranean regions (9% vs. 2%) (Warren *et al.*, 2008).

Smoking among female school students in the Arab countries is an important concern. The accruing social cultural changes in these countries have contributed to an increased acceptance of water pipe smoking behaviour over cigarette smoking behaviour for females particularly among the younger generations (Khalil *et al.*, 2013; Akl *et al.*, 2011). This notion is supported by the global data of Tobacco Surveillance System which showed that the prevalence of cigarette smoking among female school students in Arabic countries is generally lower than 8%. However, very high prevalence of other tobacco smoking product was found among female school students in Lebanon (35.7%), United Arab Emirates (24.7%) and Jordan (23.5%) (Warren *et al.*, 2009).

Although Saudi Arabia is a socially and religiously conservative country, it has been ranked among the top ten tobacco importer countries. Each year, about 15 billion cigarettes are smoked by Saudi citizens, with higher tobacco consumption being among people from the western region of the country (including Jeddah) (Al-Munif, 2009; Bassiony, 2009). Overall, the prevalence of tobacco smoking among the Saudi population ranges from 2.4 to 52.9% (median of 17.5%) (Bassiony, 2009). The rates of smoking among female school students in Saudi Arabia are quite alarming (Al-Lehiany & Stanley, 2009). According to the Saudi-GYTS (2010) report, 9.1% of female school students aged 13-15 years were current tobacco users, with a higher prevalence of water pipe smoking than cigarette smoking (7.1% vs. 5%) (Basahi, 2010).

There are some standard theories that have been used to explain ever smoking behaviour (lifetime smoking) and current smoking behaviour (smoking in the last 30 days) among school students (Collins & Ellickson, 2004). They include Theory of Planned Behaviour (TPB) (Ajzen & Fishbein, 1980), Social Learning Theory (SLT) (Bandura & McClelland, 1977), Social Attachment Theory (SAT), (Elliott *et al.*, 1985), and Problem Behaviour Theory (PBT) (Jessor & Jessor, 1977). Social psychologists have documented the need to integrate the concepts across theories into better understanding of adolescent smoking behaviour (Collins & Ellickson, 2004; Petraitis *et al.*, 1995). As a result of these understandings, smoking behaviour among school students has become preventable, and intervention that has been directed by theory based studies has shown positive results (Sussman, 2002).

1.2 Problem statement

It is currently estimated that there are about 250 million daily female smokers around the world, with 22% and 9% being in developed and developing countries respectively. If no effective actions are taken to control this current trend, it is estimated that, by

2030, about one fifth of the global female population will consist of smokers, up from 12% in 2005 (Greaves, 2007). Female smokers have higher risks of infertility and delays in conceiving than non-smokers. Smoking tobacco during pregnancy adversely affects fetal development, increases risks of premature delivery, stillbirth and newborn death. Smoking has been also found to increase women's risk for breast and cervical cancer (Gaudet *et al.*, 2013; Satcher, 2001). Nevertheless, studies on the female tobacco smoking epidemic, especially in developing countries, are not yet visible compared with male epidemiological statistics. Accordingly, tobacco control programs have remained mainly gender-blind (Samet & Yoon, 2010).

Given the evidence that smoking behaviours among Saudi females are mostly established during the second decade of life, smoking among female school students is clearly a critical public health problem in Saudi Arabia (Abdulghani *et al.*, 2013; Koura *et al.*, 2011). Female school students are the most vulnerable group to become tobacco smokers, as they are susceptible to various personal, social and environmental influences that make them an easy target for tobacco industries, and once 'hooked', they will possibly be unfailing steady consumers through their lives (WHO, 2013a).

Evidence indicates the alarming increase of water pipe smoking among female school students around the world, particularly in Middle Eastern countries where the prevalence of current water pipe smoking behaviour among female school students ranged from 9 to 25% (Akl *et al.*, 2011). Water pipe smoking presents a challenge and threat to public health on an international scale, as it is not clearly covered by tobacco control legislations (O'Connor, 2012; Maziak, 2010). The WHO reported that research on water pipe smoking is lacking. Relative to cigarette smoking, water pipe smoking is suggested to have unique characteristics and determinants, and needs specific research (WHO, 2005).

The Saudi Arabian culture has built upon Islamic Shari'ah rules, in which tobacco smoking behaviours in general is prohibited (based on Islamic *Fatwa*) for both genders. Nevertheless, it is culturally deemed more unacceptable social behaviour for females. Despite the fact, every year more than 4,700 people in Saudi Arabia are killed by tobacco smoking related disease, while 28,400 female school students smoke cigarettes each day, which reveals the sign of an on-going serious public health concern (Eriksen *et al.*, 2015). A review of 34 tobacco smoking related studies conducted in Saudi Arabia between 1987 and 2008 showed that smoking behaviour is firmly established among different subgroups of the population in Saudi Arabia. However, most of these studies were conducted among male students, and come from the central region of the country. There is lack of data on the prevalence and predictors of cigarette and water pipe smoking behaviours among female school students in Saudi Arabia (Bassiony, 2009).

1.3 Significance of the study

Results from this study will increase the knowledge of prevalence and factors associated to smoking behaviours, especially water pipe smoking, among Saudi female

school students. The findings of factors associated will also provide information for preparation of intervention programs. The findings from this research will also add to the much needed data base to reduce the information gaps.

1.4 Research questions

1. What is the prevalence of ever and current cigarette/ water pipe smoking behaviours among female school students (aged 12-19 years) in Jeddah, Saudi Arabia?
2. What are the characteristics of ever and current cigarette smoking behaviours among the respondents?
3. What are the characteristics of ever and current water pipe smoking behaviours among the respondents?
4. Is there an association between the demographic characteristics, social factors, attitudinal/ environmental factors and psychological with prevalence of ever and current cigarette smoking behaviours among the respondents?
5. Is there an association between the demographic characteristics, social factors, attitudinal/ environmental factors and psychological factors with prevalence of ever and current water pipe smoking behaviours among the respondents?
6. Do the demographic characteristics, social factors, attitudinal/ environmental factors and psychosocial factors significantly predict ever and current cigarette smoking behaviours of the respondents?
7. Do the demographic characteristics, social factors, attitudinal/ environmental factors and psychosocial factors significantly predict ever and current water pipe smoking behaviours of the respondents?

1.5 Study objectives

1.5.1 General objective

To determine the prevalence and predictors of cigarette smoking and water pipe smoking behaviours among female school students (aged 12 to 19 years) in Jeddah, Saudi Arabia.

1.5.2 Specific objectives

1. To determine the demographic characteristics, social factors, attitudinal/ environmental factors and psychological factors of the respondents.
2. To determine the prevalence of ever and current cigarette smoking and water pipe smoking behaviours among the respondents.
3. To determine the characteristics of ever and current cigarette smoking behaviours among the respondents.
4. To determine the characteristics of ever and current water pipe smoking behaviours among the respondents.
5. To determine the association between the demographic characteristics, social factors, attitudinal/ environmental factors and psychological factors with

prevalence of ever and current cigarette smoking behaviours among the respondents.

6. To determine the association between the demographic characteristics, social factors, attitudinal/ environmental factors and psychological factors with prevalence of ever and current water pipe smoking behaviours among the respondents.
7. To determine the predictors of ever and current cigarette smoking behaviours among the respondents.
8. To determine the predictors of ever and current water pipe smoking behaviours among the respondents.

1.6 Hypothesis

1. There is a significant association between ever and current cigarette smoking behaviours and the demographic characteristics, social factors, attitudinal/ environmental factors and psychological factors among the respondents.
2. There is a significant association between ever and current water pipe smoking behaviours and the demographic characteristics, social factors, attitudinal/ environmental factors and psychological factors among the respondents.
3. The demographic characteristics, social factors, attitudinal/ environmental factors and psychological factors are significant predictors of ever and current cigarette smoking behaviours among the respondents.
4. The demographic characteristics, social factors, attitudinal/ environmental factors and psychological factors are significant predictors of ever and current water pipes smoking behaviour among the respondents.

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