

## RESEARCH ARTICLE

# Patterns of Use, Cessation Behavior and Socio-Demographic Factors Associated with Smoking in Saudi Arabia: a Cross-Sectional Multi-Step Study

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## Abstract

Smoking is accountable for the fatality of a substantial number of persons and increases the likelihood of cancer and cardiovascular diseases. Although data have shown high prevalence rates of cigarette smoking in Saudi Arabia, relatively little is known about the broader scope. The objectives of this study were to investigate socio-demographic factors, patterns of use and cessation behavior associated with smoking in Saudi Arabia (KSA). The study utilized a cross-sectional, multi-step design of sampling. Residents (N=1,497; aged 15 years and older) were recruited from seven administrative areas in Southwest Saudi Arabia. A pretested questionnaire was utilized to obtain data on participant cigarette smoking, including their daily use, age, education, income, marital status and employment status. The current study is the first of its kind to gather data cessation behavior of Saudi subjects. With the exception of 1.5% females, all the respondents were male. The majority of the respondents were married, had a university level of education, were employed, and were younger than 34 years old. The same trends were also observed among smokers' samples. The current prevalence of cigarette smoking was 49.2% and 65.7% of smokers had smoking at less than 18 years of age. The mean daily use amongst smokers was 7.98 cigarettes (SD=4.587). More than 50% of the study sample had tried at least once to quit smoking. However, 42% of the smokers participating had never. On the other hand, about 25% of the respondents were willing to consider quitting smoking in the future. Modeling of cigarette smoking suggested that the most significant independent predictors of smoking behavior were geographic area, gender, marital status, education, job and age. Considerable variation in smoking prevalence was noted related with participant sociodemographics. Findings recommend the necessity for control and intervention programs in Saudi community.

**Keywords:** Smoking - cigarette - demography - cessation - Saudi Arabia

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## Introduction

The increase of tobacco use is an exhausting mania for those involved in health care. Tobacco use resulted globally in one hundred million fatalities throughout the last century, and statistical reports point to the prospect of the estimated raise in the statistics of fatalities. This is approximate to be more than 75% of all drug and chemicals associated death (Fiore and Baker, 2009; Stewart et al., 2009; Glynn et al., 2010). Chemical compounds in tobacco estimated to be over 4000 and many of these hazardous agents are toxic and tumorigenic (Pera, 2003; Shevchenko, 2012). Nicotine is the chemical agent of cigarette smoking that responsible for its addictive properties but is not the main constituent related with disease caused by smoking. (Schmeltz and Hoffmann, 1977; Shihadeh and Saleh, 2005). Smoking is also the

predisposing agent responsible for the furthest danger of sickness (loss of health and premature mortality) in the world (La Greca and Mackey, 2009). About 50% of regular smokers dies of a smoking associated illnesses (Jha, 2009). More than 25 diseases are known to be associated with tobacco use, including pulmonary diseases and cancers and cardiovascular problems. Management of post-surgical wound is much complicated in smokers (Guo and DiPietro, 2010). The unfavorable side-effects of tobacco smoking are reversible, with cardiovascular risk declining considerably within the initial two years of smoking quitting (Gratziou, 2009).

Even though KSA is not a tobacco or cigarettes manufacturing country, cigarette smoking has existed in this kingdom for more than half decade. Import of manufactured cigarette has amplified noticeably with a cost of more than half billion Saudi Riyals (1Riyal=

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3.76USD). Moreover, the health, public, religious and financial troubles of tobacco use, has an expenditure of more than four billion Riyals (1Riyal=3.76USD) nearly per year. Where the anticipated cost-effective burden of KSA due to premature deaths and productivity wastes due to tobacco from (1961-2004) more than 75 billion Riyals, as well as considerable number of premature fatalities cases due to ailment due to smoking as, lung and renal cancer, and heart diseases (Jarallah et al., 1999). Publications for the International Bank suggested that, nations and governments with high income pay yearly between 6-15 % from the healthcare overall expenditure to treat illnesses caused by smoking. Tobacco Control programs aim to reduce the health and financial burden related with smoking (AL-Doghether, 2004; Bassiony, 2009a).

No countrywide researches on tobacco smoking have been conducted in KSA. Few studies have demonstrated a variable smoking prevalence of between 8% and 57%; the minority of these, however, was based on the whole community sampling. A family-based survey to investigate the prevalence and factors associated with cigarette smoking, utilizing national survey data of metabolic syndromes from three regions of KSA (AL-Doghether, 2004; Bassiony, 2009a). The percentage of cigarette smokers in KSA, on the base of a number of researches, approximately (35 to 45%) among males (more than 15 years old), and (24 %) among schools' students (less than 15 years old). To this end, using a cross-sectional study design, the main rationale of this current research was to study cigarette smoking patterns in Saudi residents living in Jazan, the Southern region of the Kingdom. A second purpose of the study was to evaluate sociodemographic associates of cigarette smoking and the cessation behaviors of smokers as well.

## Materials and Methods

### *The study's geographic area*

The study's geographic area covered seven major administrative areas (Al-Towal, Samtah, Al-shamhanyeh, Al-Garadyeh, Al-Khograh, Al-Moasem and Ahd Al-Masarhah) in Southwest region in Saudi Arabia. Jazan region extend to cover some 300 km along the southern Red Sea coastline. It covers a region of 11,672 km<sup>2</sup> with a population of 1,365,110. The principal city is Jazan. The choice to decide on these seven administrative areas as the study sampling outline was stood on the reality that these areas enclosed a variety of population bulk that permitted us to detain distinction in smoking prevalence within and between areas.

### *Sampling technique and data collection*

This is a cross-sectional design of study, which recruited three stages organized sampling process to engage participants (N=1497). Firstly, seven administrative areas of Jazan region stated earlier were chosen based on previous justification. Secondly, from these areas, some public health care (PHC) centers within each area were sampled. Thirdly, Saudi citizens seeking health services from these PHC centers were randomly

interviewed. Participants who were qualified to partake in the interview were aged 15 years or older. Data was collected by three trained health professionals. Upon getting survey explanations clarified by the research assistants, respondents were requested to fill out the study questionnaire which lasted about 25 minutes. Each respondent was allowed to ask any questions concerning research or questionnaire items and sufficient time to fill in the questionnaire. The Ethics Committee of the Substance Abuse Research Centre, Jazan University accepted the study and a printed informed consent were attained from each respondent. At the beginning of the study, a pilot study was conducted for some participants and some of the questionnaire's items were then rephrased and customized accordingly. Data from pilot study were not included in the final study. A smoker in this research was considered one who ever smoked and continues to smoke, even occasionally, but who does not depict himself as a past smoker. Exclusion criteria include people who are non-Arabic speakers, less than 15 years old and Sheesha smokers. The low response rate of females also mirrors the common unwillingness of Saudi women to contribute in studies of this kind.

### *Measures*

The objective of this project was to investigate the socio-demographic factors, patterns of use and cessation behavior associated with cigarette smoking. To achieve this objectives some relevant measures (socio-demographic factors, patterns of use & cessation behavior) were conventionally used due to their psychometric properties and previous use in many researches. These measures included geographic area, gender, marital status, education, income, job and age. Respondents were also questioned about their starting age of smoking, frequency of smoking, daily smoking, number of cigarettes smoked per day, reasons for smoking and easiness of getting the cigarettes. On the other hand smokers were asked about smoking previous and future quitting trails. To smear this research with potential prevention opportunities, participants were also asked about their perception of the most successful cessation program. All these items were designed in a questionnaire of 24 items.

### *Statistical Analysis*

The collected data were validated and processed using SPSS20.0 software (IBM, NY, USA). A bivariate analysis was performed using Chi-squared tests with smoking status as the dependent variable and geographic area, gender, marital status, education, income, job and age as independent variables. A logistic regression was used to model and predict smoking. Smoking status as a dependent variable was coded as 0 for non-smokers and 1 for smokers. 2-tailed probabilities values of 0.05 or less were taken as statistical threshold of significance. Descriptive statistics were conducted utilizing percentages and means.

## Results

A total of 1497 respondents participated in this study.

The response rate was 99.8%. The sociodemographic uniqueness of the sample is depicted in Table 1. With the exception of 10.6% female, all the respondents were male. The majority of the respondents was married, had a university level of education, was employed, was younger than 34 years old and was living in Samtah Area (Table 1). This trend was also observed among smokers' samples (Table 1).

The current prevalence of cigarette smoking was observed to be 49.2%. Table 2 depicted smoking behaviors of 736 smokers. The average age of smoking initial start was 17.85 years (SD=4.075). The mean use per day amongst smokers was 7.98 cigarettes (SD=4.587). Over 29 percent (n=218) of smoker participants report smoking of more than 10 cigarettes on daily basis. Most of the respondents were influenced by their life tensions and

**Table 1. Sociodemographic Characteristics of the Study Sample (N=1497)**

Variable	N	% of total	Smokers	
Geographic area			n	%
Al-Towal	272	18.6	113	15.4
Samtah	494	33.7	242	33.1
Al-shamhanyeh	30	2	10	1.4
Al-Garadyeh	21	1.4	6	0.8
Al-Khograh	144	9.8	59	8.1
Al-Moasem	249	17	97	13.3
Ahd Al-Masarhah	256	17.5	205	28
		$\chi^2=766.95, df=6, P<.001$		
Gender				
Male	1338	89.4	725	98.5
Female	159	10.6	11	1.5
		$\chi^2=928.55, df=1, P<.001$		
Marital status				
Single	649	43.4	300	40.8
Married	730	48.8	390	53
Divorced/ widowed	118	7.9	46	6.3
		$\chi^2=442.9, df=2, P<.001$		
Education				
University	634	42.4	339	46.1
Postgraduate	28	1.9	15	2
High Secondary	645	43.1	299	40.6
Elementary Schools	143	9.6	69	9.4
Uneducated	47	3.1	14	1.9
		$\chi^2=1313.36, df=4, P<.001$		
Income (SAR*)				
0-2500	229	21	92	16.1
2501 - 5000 SAR	543	49.8	287	50.1
5001 - 7500 SAR	247	22.6	136	23.7
More than 7500 SAR	72	6.6	58	10.1
		$\chi^2=424.97, df=3, P<.001$		
Mean (Income) $\pm$ SD	4397.10 $\pm$ 2341.492 (SAR*)			
Job				
Yes	1007	67.3	551	74.9
No	490	32.7	185	25.1
		$\chi^2=178.55, df=1, P<.001$		
Age (years)				
less than 25	321	21.4	114	15.5
25-34	728	48.6	375	51
35 - 44	330	22	196	26.6
More than 44	118	7.9	51	6.9
		$\chi^2=522.63, df=3, P<.001$		
Mean (Age) $\pm$ SD	30.80 $\pm$ 8.974 (Years)			

\*US1 = SAR3.76

peers to start smoking.

Table 3 shows smoking cessation behavior among the study sample (N=736). More than 50% of the study sample has tried at least once to quit smoking. However, 42% of the smokers participated in this study have never tried before to quit smoking. On the other hand, about 25% of the respondents were willing to quit smoking in the future. Although smokers are aware of the available smoking cessation programs, their perception of the most successful cessation program was studied in this research. 88.6% of the respondents felt that school awareness programs are potentially successful (Table 3).

A preliminary univariate analysis (Table 1) was conducted to identify potential risk factors, [age, gender, education level, marital status, residence and occupation], followed by binomial multivariate logistic regression analysis (Table 4). Modeling of cigarette smoking, was based on current smoking as dependent variable (0 for non-smoker and 1 for smoker), suggesting that the most

**Table 2. Smoking behavior among the study sample (N=736)**

Variables	Total N	Percentage
Starting Age (Years)		
<18	482	65.7
18 - 20	121	16.5
$\geq$ 21	131	17.8
Smoking status		
Yes	736	49.2
No	731	50.8
Daily smoking		
Yes	635	86.3
No	101	13.7
Frequency of smoking		
Once a day	26	3.5
Two to three time a day	235	31.9
Frequently/day	343	46.6
Two to three time a week	81	11
Irregular smoker	51	6.9
Number smoked per day (cigarettes)		
< 10	518	70.4
19-Oct	153	20.8
20 or more	65	8.8
Reasons for smoking (Yes %)		
For entertainment	535	72.7
Because of my friend smoke	232	31.5
Because of my parents smoke pressure	550	74.7
	628	85.3
Easiness of getting the cigarettes		
Very Easy	528	71.7
Easy	172	23.4
Difficult	35	4.8
Impossible	1	0.1
How do you get the cigarettes		
By buying it	555	75.4
share it with friends	151	20.5
Getting it from my parents	27	3.7
Others	3	0.4
How many of your friends are smokers		
None of them	34	4.6
Few of them	220	29.9
Most of them	318	43.2
All of them	164	22.3

**Table 3. Smoking cessation behavior among the study sample (N=736)**

Variables	Total N	Percentage
Have you ever tried to quit smoking?		
Yes	417	56.8
No	317	43.2
Number of cessation trails (times)		
0	315	42.8
1	71	9.6
2	171	23.2
3	86	11.7
4	32	4.3
More Than 4	61	8.3
Will you quit smoking in the future		
Surely Yes	182	24.8
Surely No	101	13.8
Possibly Yes	326	44.4
I don't think so	125	17
Perception on the most successful cessation program (Yes)		
School awareness program	650	88.6
Nicotine mixed gum (NRT)	521	70.9
TV	577	78.5
Radio	547	74.4
Others	73	9.9

significant independent predictors of smoking behavior were geographic area, gender, marital status, education, job and age. Results showed that respondents living in the Ahd Al-Masarhah were more aptly to smoke than those living in Al-Towal (OR=4.426, 95% C.I.=2.638-7.425). Similarly, people who were unmarried were 2.0 more likely to smoke than those who were divorced/widowed, after controlling for additional variables in the model. Therefore, the odds of being smoker for unemployed respondents compared to working people will be decreased by a factor of 0.42 (95.0% C.I. for OR is 0.235 to 0.749), after controlling for additional variables in the model.

## Discussion

The current paper was designed to investigate the demography, patterns of use and cessation behavior associated with smoking in the selected seven administrative areas of Jazan region. The current prevalence of cigarette smoking was observed to be 49.2%. A previous study conducted in Saudi Arabia showed that prevalence of cigarette smoking among Saudi male graduate students was 21.6% (Al-Mohamed and Amin, 2010). However, the prevalence of different types of smoking (cigarette and waterpipe) was reported to be from 2.4-52.3% (Bassiony, 2009b). Varying smoking prevalence rates have been reported for developing and developed countries (Saeed et al., 1996).

The prevalence of smoking in males is 54.2% (n=725), while in females is 6.9% (n=11). The general pattern of lesser smoking prevalence and minor daily cigarette use among women is reported for almost all developing societies. This may be connected to social, religious and cultural factors, and the economic dependence of women on men. However, smoking surveys among women in developing countries and Arab and Moslem communities

**Table 4. Modeling of smoking behavior using logistic regression (SLR)**

Variables	$\beta$	P	Odd ratio	95.0% C.I. for OR	
				Lower	Upper
Geographic area					
Al-Towal		0	1		
Samtah	-0.027	0.89	0.973	0.66	1.433
Al-shamhanyeh	-0.714	0.11	0.489	0.204	1.175
Al-Garadyeh	-0.66	0.221	0.517	0.179	1.488
Al-Khograh	-0.209	0.411	0.811	0.492	1.336
Al-Moasem	0	0.999	1	0.651	1.536
Ahd Al-Masarhah	1.488	0	4.426	2.638	7.425
Gender					
Male			1		
Female	-2.725	0	0.066	0.031	0.139
Marital status					
Single		0.008	1		
Married	0.066	0.669	1.069	0.788	1.449
Divorced/ widowed	-0.692	0.009	0.501	0.298	0.842
Education					
University		0.145	1		
Postgraduate	-0.293	0.523	0.746	0.304	1.834
High Secondary	-0.054	0.748	0.947	0.68	1.319
Elementary Schools	-0.274	0.282	0.761	0.462	1.252
Uneducated	-1.22	0.013	0.295	0.113	0.771
Job					
Yes					
No	-0.868	0.003	0.42	0.235	0.749
Income (SAR*)					
0-2500		0.117	1		
2501 - 5000 SAR	0.015	0.94	1.016	0.679	1.52
5001 - 7500 SAR	-0.357	0.163	0.7	0.423	1.156
More than 7500 SAR	0.334	0.425	1.397	0.614	3.179
Age (years)	0.024	0.036	1.024	1.002	1.047
Constant	-0.389	0.353	0.678		

Dependent variable coding: 0= Non\_Smoker (No); 1=Smoker (Yes); Hosmer and Lemeshow goodness of fit test  $\chi^2= 18.456$  P=0.018; -2 Log likelihood ratio = 1239.235; B: Regression coefficient

in particular may be less precise because some women may deny the practice where it is still socially undesirable. The low response rate of females also mirrors the common unwillingness of Saudi women to contribute in studies of this kind (Al-Sanosy, 2009; Vicknasingam et al., 2010). Such low prevalence of smoking women was also reported previously (Abed et al., 1988; Saeed et al., 1996).

Significantly higher smoking prevalence and daily cigarette consumption were reported earlier to be associated with high level of education (Nagelhout et al., 2012). In our study, we found that more than 46% of the smokers are university graduates. Higher level of education may help policy makers and health educators to design appropriate smoking cessation campaign with acceptable rate of quitting success.

Among the positive aspects of this study was the finding that depicts the smoking cessation behavior. The majority of respondents plans to quit or had already tried to quit. This finding is a strong encouragement for policy makers and health educators to plan for smoking cessation programs. We have intensively reviewed cessation efforts in Muslim communities in our previously published review

paper (Abdelwahab et al., 2013), and some conclusion of that review paper could be merged with the results of this paper to succeed in the fighting against smoking. On the other hand, the current study also investigated the perception of respondents on the most successful cessation program. Respondents have ranked the programs according to their experience and perception, with school awareness program on the top.

The results of the logistic regression model showed that geographic area, gender, marital status, education, job and age were the only significant variables in this model. The significant different effects of the different areas studied in this paper on the smoking behavior may be due some dissimilarities in standards of living and cultural values (Yang et al., 2008). Results indicated that participants living in the Ahd Al-Masarhah area were more likely to smoke than those living in Al-Towal (OR=4.426, 95% C.I.=2.638-7.425). Constant with previous results (Hong and Wang, 2007; Al Ghobain et al., 2011; Mahfouz et al., 2014), respondents age was another sociodemographic variable that was associated with smoking, with the oldest age category being more likely to engage in smoking (Beta:0.024; SEM:0.011; P-value: 0.036). Also constant with the scientific literature (Broms et al., 2004; Yang et al., 2005) is the result that married people were more likely to smoke than single persons, a finding that is in dissimilarity to those that stated no variation by marital status (Unger et al., 2003; Yang et al., 2008).

The limitations of this cross-sectional research were the exclusion of seven governorates of Jazan regions for the sake of a uniform sociodemographic data and the lesser number of female participants to surmount some administrative and social difficulties related to including women in this study and limits its generalizability. Future studies are desirable to collect both longitudinal and cross-sectional smoking survey statistics in all the regions of Saudi Arabia.

In conclusion, the current study is the first of its kind in discussing the smoking behavior and cessation in the general population regardless of taking special sector. A quick and well-planned control programs are highly required to counter the high prevalence of smoking. Unique data obtained on cessation behavior are a corner stone to target some specific sectors of the smokers.

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