



Early Assessment of Impact of Increased Value Added Tax on Smoking Behaviors and Financing among Adult Smokers in Saudi Arabia

*Sudhakar Vundavalli¹, Alwaleed Bader R Alarjan¹, Radhika Doppalapudi², Namdeo Prabhu², *Rakhi Issrani¹, Naif Abdulrahman Aljunaydi¹, Muhammad Nadeem Baig¹*

1. Department of Preventive Dentistry, College of Dentistry, Jouf University, Saudi Arabia

2. Department of Oral and Maxillofacial Surgery and Diagnostic Sciences, College of Dentistry, Jouf University, Saudi Arabia

*Corresponding Author: Email: dr.rakhi.issrani@jodent.org

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Abstract

Background: Cigarette smoking has been identified as most perilous risk factor for several health ailments. Increased price may discourage smoking habits. There is limited literature available on impact of price rise on smoking behaviors in Saudi Arabia, which is the fourth largest importer of cigarettes and this study assessed the impact of tax increase (in 2020) on smoking behaviors.

Methods: A cross-sectional survey was carried out between July 2021 and December 2021.i.e.one year after new value added tax (VAT) system came into force. Data was collected with 14-item pretested questionnaire from 721 adult smokers in Al-Jouf Region of Saudi Arabia selected through stratified cluster ransom sampling. We measured effects of tax increase on smoking behaviors, its impact on decision to quit and perceived health improvements as outcome variables.

Results: Nearly 40% of the respondents said that increased price lead them to smoke less number of cigarettes per day ($P=0.000$), decreased smoking improved their health in terms of breathing capacity, mood, ability to exercise and sleep in hierarchy. 67.4% of the participants are currently thinking of quitting smoking due to increased prices ($P=0.001$) and logistic regression models identified reduced smoking due to tax rise (Odds=5.68), improvement in health (Odds=2.94) and excess spending of above 20% (Odds=1.72) significantly associated with intentions to quit smoking.

Conclusion: Increased price of cigarettes due to VAT significantly decreased smoking behaviors and has impact on smokers' decision to quit smoking. Future studies needed to assess the long-term effect of increased tax on smoking behaviors and its relapse.

Keywords: Cigarette; Increased price; Smoking cessation; Taxation; Saudi Arabia

Introduction

Of all the deleterious products that are available for the humans, there is hardly any merchandise that has wreaked havoc at social, mental, physical and financial dimensions like that by tobacco.

Tobacco smoking is one of the most common modifiable risk factors for mortality and morbidity seen in almost all the countries of the world (1). The World Bank estimates that smoking ac-



counts for 15% of health care costs in high-income countries (2). Globally, Saudi Arabia ranks forty-second in population, but ranks fourth in tobacco imports and sales. Apart from mortality and morbidity caused by smoking, its detrimental effects on loss of GDP increased from 0.22% in 2012 to 0.97% in 2016 (3). According to the Saudi Health Interview Survey (2013), about 12.2% adults aged 15 years and above are smokers and prevalence was seen more in the males than in females (21.5% vs. 1.1%) (4). Tobacco consumption not only leads to significant mortality and morbidity, but also increased health care costs with nearly 1% loss of gross domestic product (GDP) in the year 2016 for Saudi Arabia (5).

As an effort to reduce the prevalence of smoking, Saudi Ministry of Health initiated a national tobacco control program in 2002 and joined the WHO Framework Convention for Tobacco Control (FCTC) in the year 2005 (6). As part of the FCTC, the import tariff on tobacco products was increased, doubling the price of cigarettes (7). Additionally, the recently implemented value added tax system boosted cigarette prices by an additional 5%.

Apart from health education campaigns, tobacco taxation was considered as one of the most effective interventions to discourage smoking among current smokers and to decrease smoking initiation by young adults (8). Various studies in the past have revealed the significance of tobacco taxation to positive public health upshots. For example, in USA, there was a reduction of mortality by 1.5% due to respiratory cancer and this was directly attributed to 10% increase in cigarette taxes (9). Similar substantial impact was also noticed in studies reported from France in which there was a 50% reduction in lung cancer mortalities and this was directly associated to three-fold rise in taxes on Tobacco products (10). In Saudi Arabia before Value Added Tax (VAT) increase, a study was done to understand impact on smoking if there is surge of tax on cigarettes. Overall, 55% of the participants said that they would quit smoking if prices of cigarettes were increased (11). A whopping 27% decline of tobacco im-

ports was seen after tobacco taxation in Saudi Arabia from 2013 to 2019 (12). This was an indirect measure of reduction in smoking habits and there were no studies reported about general public perceptions about impact of value added tax (VAT) that was introduced from July 1, 2020 on smoking behaviors.

Henceforth, this study was conducted one year after instruction of new tax system (July 2021-December 2021) to assess the early impact of tax increase impact of increase on smoking behaviors, health outcomes and financing in Saudi Arabia.

Materials and Methods

Setting and Participants

This descriptive cross-sectional study was conducted among the people of Al-Jouf Province, Saudi Arabia who have habit of cigarette smoking between July 2021 and December 2021. Data was collected exactly one year after the induction of new VAT system in Saudi Arabia.

Inclusion criteria

- Permanent residents of Al-Jouf region who are above 18 years and has been smoking for more than one year.
- People who gave voluntary consent to participate in this study.

Exclusion criteria

- People who attended or currently attending smoking cessation interventions/clinics.
- People who failed to give consent to participate in this study.
- People who are suffering with psychological disorders who cannot answer/fill the questionnaire.

Sample size

Sample size was calculated based on the fact that the prevalence of smoking reported in National Survey in Saudi Arabia (4). Considering 95% CI and 80% power, 630 individuals were found to

be sufficient to detect clinically significant difference of 10% with design effect of two. Total sample size was adjusted to 800, expecting the fact that there are 20-30% chances of non-participation/rejection. Therefore, final sample size was 800 individuals.

$$N = (z\alpha + z\beta)P(1-P)/d^2$$

Sampling technique

Stratified cluster sampling technique was used for data collection. Initially, Al-Jouf region was stratified into two zones for administrative purpose, from each zone a cluster was selected by simple random (lottery) method and participants were selected proportionately using serpentine method in identifying households until the fulfilment of required samples from each cluster using inclusion and exclusion criteria.

Data Collection

Data was collected with the help of a questionnaire developed for this study. The questionnaire is based on Global Adult Tobacco Survey (GATS) (4) Version 2.0, November 2010 and Arabic translation was done. Face validity of the questionnaire was discussed with two people who were well versed with Arabic language and required changes were done. Internal validity of the Arabic questionnaire was pilot tested and the Cronbach's alpha score for this questionnaire was 0.90.

Outcome measures

The primary outcome measure was intentions to quit smoking due to increased price and secondary outcome measures were difference in number of cigarettes smoked per day and changes in health outcome perceptions of participants.

Ethical approval

Ethical approval for study protocol was obtained from Local Committee of Bioethics with approval number 4-4-42, Jouf University. All other required permissions to conduct this survey was obtained from concerned authorities prior to data collection.

Statistical analysis

Collected data was analyzed using Statistical Package for Social Sciences (SPSS version 20, Armonk, US). Descriptive statistics were performed and Chi-Square test was applied for bivariate analysis. Binomial logistic regression models were used to assess the factors influencing on intentions to stop cigarette smoking. For all comparisons, P -value ≤ 0.05 was considered as statistically significant.

Results

Table 1: Participant Characteristics

<i>ITEM</i>	<i>Number (%)</i>
GENDER	
Male	628(87.1)
Female	93(12.9)
Total	721(100)
AGE	
18-25 years	267(37)
26-35 years	249(34.5)
36-45 years	117(16.2)
46-60 years	77(10.7)
>60 years	11(1.6)
EDUCATION	
No formal education	8(1.1)
Primary of less than primary	19(2.7)
Secondary	216(30)
College	446(61.8)
Post-graduation or higher	32(4.4)
EMPLOYMENT STATUS	
Public sector	278(38.6)
Private sector	88(12.2)
Self employed	48(6.7)
Student	142(19.7)
Unemployed	137(19)
Retired	28(3.9)
MONTHLY INCOME (in Saudi Arabian riyals)	
<3000	198(27.5)
3001-10,000	272(37.7)
10,001-20,000	153(21.2)
>20,000	98(13.6)

*1 Saudi Arabian riyal = \$0.3

Out of 800 people contacted, 734 people agreed to participate in this study, 13 questionnaires had

incomplete data and final analysis included data from 721 participants. Six hundred and twenty-eight out of 721 participants were males and 93 were females. Two hundred and sixty-seven of them belonged to 18–25 year age group, 249 belonged to 26–35 year group, 117 in 36–45 year group, 77 in 46-60 year and 11 in above 60 year age groups. 446 of the participants had completed their college education, 216 had secondary education and only eight participants had no formal education. Two hundred and seventy- eight out of 721 participants worked in public sector, 88 in private sectors, 142 were

students, 137 were unemployed and 28 people were retired from work. 98 out of 721 participants had monthly income above twenty thousand Saudi Arabian Riyal (SAR), 272 belong to 3001-10,000 Riyal group and 198 had monthly income of less than three thousand Riyals [Table1].

Table 2 describes smoking behaviours of study participants. More than 3/4th of the participants were daily smokers and majority of the participants said that their health care provider did not advise them to quit smoking.

Table 2: Smoking behavior of participants

<i>Variable</i>	<i>Male N (%)</i>	<i>Female N (%)</i>	<i>Overall N (%)</i>	<i>Chi-Square test</i>
Current smoking behaviours				
Daily	504(80.3%)	44(47.3%)	548(76%)	X ² =48.2
Less than daily	124(19.7%)	49(52.7%)	173(24%)	P=0.000***
Age at which smoking started				
<18 years	246(39.2%)	42(45.2%)	288(39.9%)	X ² =2.99
18-30 years	368(58.6%)	51(54.8%)	419(58.1%)	P=0.223
>30 years	14(2.2%)	0	14(1.9%)	
No. of cigarettes/day				
>10	360(57.3%)	59(63.4%)	419(58.1%)	X ² =5.34
11-20	201(32.0%)	22(23.7%)	223(30.9%)	P=0.148
21-30	56(8.9%)	12(12.9%)	68(9.4%)	
>30	11(1.8%)	0	11(1.5%)	
Money spent for cigarettes/day				
<50	320(51.0%)	58(62.4%)	378(52.4%)	X ² =7.97
51-100	60(9.6%)	12(12.9%)	72(10.0%)	P=0.047**
100-200	132(21.0%)	14(15.1%)	146(20.2%)	
>200	116(18.5%)	9(9.7%)	125(17.3%)	
When do you generally have your first cigarette after waking up?				
<5 min	130(20.7%)	22(23.7%)	152(21.1%)	X ² =15.12
6-30 mins	198(31.5%)	13(14.0%)	211(29.3%)	P=0.002**
31-60 mins	113(18.0%)	28(30.1%)	141(19.6%)	
>60 mins	187(29.8%)	30(32.3%)	217(30.1%)	
Health care provider advised to quit smoking tobacco in last 12 months?				
YES	276(43.9%)	19(20.4%)	295(40.9%)	X ² =18.53
NO	352(56.1%)	74(79.6%)	426(59.1%)	P=0.000***
Past attempt to quit smoking tobacco?				
YES	227(36.1%)	31(33.3%)	258(35.8%)	X ² =0.279
NO	401(63.9%)	62(66.7%)	463(64.2%)	P=0.343

*: P≤0.05, **: P≤0.01, ***: P≤0.001

Table 3: Impact of VAT on smoking

<i>Variable</i>	<i>Male N (%)</i>	<i>Female N (%)</i>	<i>Overall N (%)</i>	<i>Chi-Square test</i>
Do you think price of the cigarettes increased after new Value Added Tax (VAT) system implemented?				
YES	569(90.6)	83(89.2)	652(90.4)	X ² =0.173
NO	59(9.4)	10(10.8)	69(9.6)	P=0.678
If yes, does it made you to buy and smoke less number of cigarettes?				
YES	218(39)	52(62.6)	270(41.1)	
NO	341(61)	31(37.4)	382(58.9)	X ² =31.3 P=0.000***
Increased VAT forced me to?				
Spending more money	276(43.9)	19(20.4)	295(40.9)	X ² =18.53
Shifted to cheaper brand	352(56.1)	74(79.6)	426(59.1)	P=0.000***
Others	0	0	0	
Reduced number of cigarette smoking per day has improved my health?				
YES	282(49.6)	51(61.4)	333(51.1)	X ² =4.13
NO	287(50.4)	32(38.6)	319(48.9)	P=0.126
How it improved your health?				
Breathing capacity	104(16.6)	15(16.1)	119(16.5)	X ² =10.73
Ability to exercise	59(9.4)	10(10.8)	69(9.6)	P=0.031*
Sleep	49(7.8)	16(17.2)	65(9.0)	
Mood	68(10.8)	12(12.9)	80(11.1)	
N.A.	348(55.4)	40(43.0)	388(53.8)	
How much more money you have to spend because of new VAT system?				
5%-10%	182(29.0)	33(35.5)	215(29.8)	X ² =1.69
11-20%	230(36.6)	32(34.4)	262(36.3)	P=0.428
>20%	216(34.4%)	28(30.1)	244(33.8)	
I am thinking of quitting smoking due to increased prices?				
Yes	442(71.1)	44(47.3)	486(67.4)	X ² =19.6
No	186(29.6)	49(52.7)	235(32.6)	P=0.000***

*: $P \leq 0.05$, **: $P \leq 0.01$, ***: $P \leq 0.001$

Impact of increased VAT on tobacco smoking behaviours was presented in able 3. Nearly ninety percent of the participants believed that the price of cigarettes had increased after imposing VAT and nearly half of them said they were forced to buy less cigarettes per day and sixty-

seven percent of the participants were in thinking of quitting smoking.

Binary logistic regression models [Table 4 and 5] were constructed to assess the predictors of quitting smoking.

Table 4: Association between intention to stop smoking due to increased cigarette prices and socio-demographic variables

<i>Variable</i>	<i>P-value</i>	<i>OR (95% CI)</i>
GENDER		
Male		1 (ref.)
Female	0.224	0.29(0.26 -0.30)
AGE		
18-25 years		1 (ref.)
26-35 years	0.718	0.81 (0.66–1.12)
36-45 years	0.422	0.71 (0.381–1.23)
46-60 years	0.145	0.53 (0.342–1.0)
>60 years	0.424	0.52 (0.364–1.31)
EDUCATION		
No formal education		1 (ref.)
Primary of less than primary	0.490	1.97(0.288-13.44)
Secondary	0.802	0.68 (0.41–1.35)
College	0.555	0.57(0.087-3.72)
Post-graduation or higher	0.820	0.89(0.334-2.38)
EMPLOYMENT STATUS		
Public sector		1 (ref.)
Private sector	0.434	1.63(0.47-5.58)
Self employed	0.023*	4.56(1.23-16.90)
Student	0.113	3.06(0.76-12.16)
Unemployed	0.103	3.01(0.79-11.37)
Retired	0.498	1.58(0.42-5.97)
MONTHLY INCOME		
< 3000 Riyals		1 (ref.)
3001-10,000	0.926	0.975(0.57-1.65)
10,001-20,000	0.745	0.921(0.56-1.51)
>20,000	0.187	0.685(0.39-1.20)

CI: Confidence interval, OR: Odds ratio, *: $P \leq 0.05$, **: $P \leq 0.01$, ***: $P \leq 0.001$

Of the variables, self-employed people were 4.56 times more into the thought of quitting tobacco smoking ($P=0.023$). Other significant domains associated with participants' perception of quitting cigarettes were; increased monthly spending

on smoking (1.78 times), decreased number of cigarettes (5.68 times), having the perception that reduced smoking improved their health (2.94 times), improved sleep (2.45) and spending 20% more than before for cigarettes.

Table 5: Association between intention to stop smoking due to increased cigarette prices and smoking related factors

<i>Variable</i>	<i>P-value</i>	<i>OR (95% CI)</i>
Current smoking behaviours		
Daily	0.783	1.07(0.64-1.79)
Less than daily		1 (ref.)
Money spent for cigarettes/day in Riyals		
<50		1 (ref.)
51-100	0.633	0.25(0.12-0.51)
100-200	0.044*	1.78(1.01-3.13)

>200	0.434	0.57(0.33-0.98)
When do you generally have your first cigarette after waking up?		
<5 min		1 (ref.)
6-30 min	0.055	0.54(0.29-1.01)
31-60 min	0.393	0.75(0.38-1.45)
>60 min	0.075	0.57(0.31-1.05)
Health care provider advised to quit smoking		
YES	0.000	0.03(0.02-0.05)
NO		1 (ref.)
Cigarette prices increased after new Value Added Tax (VAT) system implemented		
YES	0.348	0.72(0.37-1.41)
NO		1 (ref.)
It leads to smoke less number of cigarettes		
YES	0.003**	5.68 (1.79-18.01)
NO		1 (ref.)
Increased VAT forced me to?		
Spending more money	0.356	1.24(0.78-1.99)
Shifted to cheaper brand		1 (ref.)
Reduced smoking has improved my health?		
YES	0.018**	2.94(1.20-7.22)
NO		1 (ref.)
How it improved your health?		
Breathing capacity	0.076	1.88(0.09-3.78)
Ability to exercise	0.698	0.85(0.39-1.87)
Sleep	0.017**	2.45(1.17-5.14)
Mood	0.611	0.82(0.39-1.71)
No improvement		1 (ref.)
Increased spending due to new VAT system?		
5%-10%		1 (ref.)
11-20%	0.195	1.41(0.83-2.37)
> 20%	0.046*	1.72(1.01-2.93)

CI: Confidence interval, OR: Odds ratio, *: $P \leq 0.05$, **: $P \leq 0.01$, *** = $P \leq 0.001$

Discussion

Several researches from last ten decades accentuate that tobacco smoking is a common risk factor for many non-communicable diseases, and a prevalent cause for mortality and morbidity (4,10,12). The WHO also aptly responded to tackle this modifiable risk factor through the WHO FCTC (13) and 172 countries has currently signed this framework. FCTC directs member countries to introduce various anti-tobacco measures and increasing tax to discourage smoking of tobacco (12,13). In last 2-3 decades, many countries have raised the taxes on tobacco products along with many other anti-smoking or smoking cessation measures that has gained a rapid momentum. Saudi Arabia is in an imitable position because of its high prevalence of ciga-

rette smoking (13). Apart from increased tax on tobacco products in the year 2013 under FCTC obligation, the recent implementation of a new VAT system in 2020 increased the cost of cigarettes by 15 % (14). This study was conducted a year after the new tax system was implemented, and it was found to be an optimum time to study an early impact.

One of the alarming findings of this study is that nearly 40% of the participants started smoking before 18 years of age. Even though legislation prohibits selling of cigarettes to minors, there seem to be high prevalence of underage population having direct access to tobacco products. These findings are consistent with study reported by Amin TT et al in which smoking prevalence in secondary school children were 27% in Al-Ahsa region of Saudi Arabia (15). This calls for an ac-

tion for strict implementation of anti-tobacco laws for selling tobacco products to minors and for conducting aggressive school-based health education programs about hazards of smoking.

We discovered that 67.4% of the study participants intended to quit smoking as a result of increased taxes, despite the fact that 35.8% of them had previously attempted to quit smoking, implying that increased taxes impacted an extra 31.6% of the participants. Our findings are similar to other studies reported in the past. 38.9% of the smokers in Saudi Arabia attempted to quit smoking after 100% increase in tax as a part of FCTC framework in the year 2013 (16). In Saudi Arabia 33.3% of the smokers believed that increased taxation forced them to smoke less (5).

Among the demographic factors associated with intentions of quitting, being self - employed is the only factor found statistically significant and self-employed people are 4.56 times more in the quitting mode than others are. It can be explained by the fact that the self-employed people have tendency to make their decisions concretely compared to others (17,18). There was no association found between level of education and intentions to quit smoking, which are consistent with previous studies reported (19).

Further, it was observed that participants who already started smoking lesser number of cigarettes due to increased VAT, have 5.68 times more chances of quitting smoking in future. This finding complements the previous researches (1,20) and a study reported from China, which identified that 11% price hike on cigarettes lead to 7.8% decrease in cigarette sales and 0.6% reduction in adult smokers (21).

A reduction in smoking habits, on the other hand, has the significant benefit of improving the likelihood of later quitting, especially when smoking reductions are at or above 50% of daily smoking (20, 22). As a result, reducing smoking behaviors have been identified as a technique to help resistant smokers quit (21). Our findings that smokers' lower their daily smoking behaviors in response to cigarette price hikes adds to the body of knowledge concerning a significant public health strategy.

Perceived improvement in health (odds ratio=2.94) due to reduced number of cigarettes per day and improvement in the sleep (odds ratio=2.45) are also significantly associated with future intentions of quitting. Even though there is no concrete evidence suggesting the immediate benefits of reduction in smoking (23), several research reports concluded about long term benefits of quitting smoking, for example US surgeon's general reported; after a few years of smoking cessation, there was a reduction in the risks for bladder cancer by about 50% and lung cancer by 30-40% (24-26).

One of the financial factors identified in this was excess spending on smoking over 20%. This increased the decision of smoking cessation by 1.72 times and 59.1% of the participants shifted to cheaper brands to cope up with increased prices of cigarettes. These findings were similar to a study reported in the USA, in which shifting to a cheaper brand, online shopping, cutting down or quitting and changing to cigarillos, etc. were the few price minimizing behaviors reported (20). These behaviors prompted the suggestion that taxes should be applied flat to all cigarette brands in order to prevent smokers from moving to cheaper brands.

Present study imply that the smokers were subjected to a complex set of pressures that shape their reactions to a significant price increase. In response to the new tax, several participants expressed desire to either quit smoking, reduce their consumption, or switch to cheaper brands. Such shifts were thought to be the result of growing public awareness of the harmful effects of smoking, as well as aggressive tobacco control initiatives. Authors did not examine exposure to anti-smoking media efforts, increased access to cessation programs, participants' medical history, etc. but there is a strong mandate that these factors may have contributed to the larger reduction in smoking for individuals with higher daily cigarette usage. Therefore, reductions in cigarette consumption following the tax should be considered fragile, and future studies should focus on the long-term impacts of raising the pricing on cigarettes.

One of the limitations of the present study is that heavy consideration was given to smokers self-reported perceptions on tax increase. This may be different from participant's actual smoking behaviors. In addition, social undesirability is another factor, which may influence the response of the participants. Other limitation of this study is that the candidates were chosen from a specific region of Saudi Arabia and this does not represent the whole country population. Having said that and acknowledging that these limitations do affect the contemplation, the findings of the study are striking. In conclusion, we recommend further escalation to tax percentage in par with increase in per capita incomes that will promote further reductions in consumption and prevent relapses in quitting smoking. Data-driven and evidence-based policy improvements are required. Finally, the tax system needs to apply to all tobacco products, not just cigarettes, in order to stop people from switching to other types of smoked or smokeless tobacco. Future research should look into conducting a similar national level studies to provide larger and more detailed insights for tobacco control legislation, as well as recognizing smokers' true behaviour changes when cigarette price increased.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The authors declare that there is no conflict of interests.

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