

Will any future increase in cigarette price reduce smoking in Saudi Arabia?

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Abstract:

CONTEXT: In Saudi Arabia, no studies have been conducted on the correlation between any possible cigarette's price increase and its effects on cigarette consumption.

AIMS: The aim of this study was to determine the prevalence of cigarette smoking in Saudi Arabia and to predict the effect of price increase on cigarette consumption.

SETTINGS AND DESIGN: A cross-sectional study was conducted in April and May 2013.

METHODS: We developed an Arabic questionnaire with information on demographic and socioeconomic factors, smoking history, and personal opinion on the effect of price increase on cigarette consumption. The questionnaire was distributed in public places such as malls and posted on famous Saudi athlete media's twitter accounts.

RESULTS: Among the 2057 included responses, 802 (39%) were current smokers. The smokers' population constituted of 746 (92%) males, of which 546 (68%) had a monthly income equal or greater to 800 US dollars, and 446 (55%) were aged between 21 and 30 years. Multivariate analyses of the risk factors for smoking showed that male gender and older age were associated with greater risk. Despite the current low prices of 2.67 US dollars, 454 smokers (56%) thought that cigarette prices are expensive. When asked about the price of cigarettes that will lead to smoking cessation, 443 smokers (55%) expected that a price of 8.27 US dollars and more per pack will make them quit.

CONCLUSIONS: Increasing the price of popular cigarettes pack from 2.67 US dollars to 8.27 US dollars is expected to lead to smoking cessation in a large number of smokers in the Saudi population.

Key words:

Cessation, cigarette, price increase, Saudi Arabia, smokers, smoking, tobacco

With more than 4000 chemicals and toxins in cigarettes, smoking constitute a health hazard around the globe.^[1] While smoking in public places has been prohibited in Saudi Arabia since 2004, the kingdom ranked fourth in tobacco import worldwide.^[2] The economic loss caused by tobacco over the last 10 years in the kingdom was estimated at 20.5 billion US dollars.^[3]

In the WHO report on the global Tobacco Epidemic, the prevalence of tobacco use among adults in the general population of Saudi Arabia was 22%, as estimated in a study conducted in 2006.^[4] The number has increased to 27.9% in the 2012 BREATH study.^[5] Furthermore, alarming smoking rates have been reported among high school students,^[6] college students,^[7] and medical students.^[8,9] Surprisingly, 24.8% of male medical students were current smokers,^[9] despite their good knowledge on the hazards of tobacco consumption. In other studies conducted on adults attending primary health care, prevalence of current smokers varied from 25% in 1996^[10] to 34% in 2001.^[11] Studies on school children and university students revealed that risk factors for smoking were found to be mainly smoking friends and parents.^[7,12,13]

Worldwide, cigarette consumption has been found to be affected by taxes significantly.^[14] Tax had more effect on consumption than health scare created by the government in the 1960s in Surgeon General's reports.^[14] The World Health Organization Framework Convention on Tobacco Control (WHO FCTC) predicted that a 10% increase in tobacco prices would reduce the consumption by about 4% in high-income countries.^[1]

Encouraging examples confirming an inverse relation between price and consumption of cigarettes have been observed in different countries.^[15-18] In Italy, a small price increase of 1% led to a 0.30% decline in the prevalence of smoking.^[15] In Mexico,^[17] a 12.7% price increase resulted in 13% smoking cessation after a follow-up of minimum 1 month. In Australia,^[17] a study predicted that majority of smokers would seriously consider quitting smoking if their favorite pack reached the equivalent of 17.84 US dollars. In the United states of America,^[18] where prices of cigarettes varies per state, it was observed that smokers living in states with the lowest cigarette prices (≤ 3.20 US dollars) smoked 22% more cigarettes per day

than those living with the highest cigarette prices (≥ 4.50 US dollars).

There has been no recent price increase of cigarettes in Saudi Arabia. With the average price per pack of 2.67 US dollars, these prices remain cheaper than developed countries and within an affordable reach of most of the population. On the other hand, there are no currently reported studies in Saudi Arabia on the correlation between any possible cigarette's price increase and its effects on cigarette consumption. The aim of this study was to determine the prevalence of cigarette smoking in Saudi Arabia and to predict the effect of price increase on cigarette consumption.

Methods

This cross-sectional study was conducted in Saudi Arabia in April and May 2013. Due to the uniqueness of such studies in Saudi Arabia, it was important to develop a new questionnaire in Arabic language that focused on factors affecting cigarettes consumption, the prevalence of smoking among Saudi population, and analyzing the populations' perception on price increase and its effects on smoking reduction.

The questionnaire was distributed manually in public places such as malls in the capital city of Riyadh and electronically via famous Saudi athlete media's twitter accounts. This study included smokers and nonsmokers from all genders, aged 11-70 years. Non-Saudi questionnaire respondents were excluded.

We used the adjective smokers to describe current smokers, whereas nonsmokers referred to individuals who are currently nonsmoking regardless of previous smoking history.

The questionnaire included two forms of questions: yes/no and multiple-choice questions, it consisted of three sections. The first section included demographic and socioeconomic factors such as gender, age, annual income, nationality, and educational level; the second section focused on the smoking history; while the third section aimed to predict the effect of price increase on cigarette consumption using a direct question with yes/no answer and a multiple choice question of the price of the cigarette that would lead to smoking reduction in Saudi Riyals.

The sample size was determined using an online sample size calculator (Raosoft, Inc. Sample Size Calculator 2004, Sample Size Calculator 2012). Due to the nonexistence of previous studies on whether increasing prices of cigarettes will decrease consumption in Saudi Arabia, and based on similar studies conducted in other countries,^[19,20] it was decided to use the common numbers for all the variables. Namely, a 50% agreement on the relationship between the consumption and price increase, 95% confidence level with margin of error of 2.11, were chosen. As a result, a sample size of 2160 was recommended by the statistical software.

Data management and analyses was carried out using the Statistical Software for Social Sciences (SPSS) version 14 and Spreadsheet software (Microsoft Excel for Mac, 2012). Descriptive analyses were carried out by reporting the

number and percentage for the different categorical variables. As for the inferential statistics, the association between the perception of the price increase and the different subject's characteristics was evaluated using chi-square, and a *P*-value was reported. To identify predictors of the agreement with the increase in price, we carried out multivariate logistic regression analysis to identify the significant variables. For this, adjusted Odds Ratio (OR), and 95% Confidence Interval (CI) were reported. A *P*-value < 0.05 was used to indicate statistical significance.

Results

There were 2160 completed questionnaires, of which 103 were excluded because they were completed by non-Saudi nationals. Results of the remaining 2057 questionnaires completed by Saudi nationals were analyzed.

Table 1 summarizes the demographics of the nonsmoking population versus the smoking population. Among the included questionnaire respondents, 808 (39 %) were current smokers. A majority of 746 smokers (92%) were males, while only 608 (48.7%) nonsmokers were males. The smokers were concentrated in the age group of 21-30 years, with 446 of them (55%) in this age group. However, only 104 smokers (13%) were aged 11-20 years. Smokers had a higher income, with only 262 (32%) of smokers having an income lower than 800 US dollars, compared to 806 (64.5%) of nonsmokers. Interestingly, smokers were more educated with 780 (97.1%) smokers having completed secondary schooling or higher education compared to 1,105 (89%) nonsmokers. Among the included respondents, the number of nonsmokers was 1,249 (61%). The nonsmokers were the younger group, aged 30-year old and less. The nonsmokers group included both ex-smokers and never smokers.

Table 1: Demographics of the nonsmoking population versus the smoking population

		Non-smokers N = 1249 (%)	Smokers N = 808 (%)	P
Gender	Male	608 (48.7)	746 (92.3)	<0.0001
	Female	641 (51.3)	62 (7.7)	
Age group	11 to 20	601 (48.1)	104 (12.9)	<0.0001
	21 to 30	489 (39.2)	446 (55.2)	
	31 and above	159 (12.7)	258 (31.9)	
*Income US dollars/month	Less than 800	806 (64.5)	262 (32.4)	<0.0001
	800-1867	153 (12.2)	212 (26.2)	
	1867-3200	156 (12.5)	211 (26.1)	
	3200-4800	62 (5.0)	61 (7.5)	
	4800-6666	33 (2.6)	41 (5.1)	
	More than 6666	39 (3.1)	21 (2.6)	
Education level	Uneducated/intermediate	139 (11.2)	23 (2.9)	<0.0001
	Secondary	446 (35.9)	289 (36.0)	
	Higher education	659 (53.0)	491 (61.1)	

*Income in questionnaire was in Saudi Riyals, this was converted to US dollars by dividing by 3.75

Table 2 presents multivariate analysis of smoking risk factors. We found that females were less likely to be smokers (Adjusted OR = 0.12, 95% CI = 0.09-0.17, *P*-value <0.0001), whereas people with older age were more likely to be smokers (Adjusted OR=1.96, 95% CI = 1.61-2.31, *P*-value <0.0001).

Cigarette prices

Smoking affected the opinion about cigarette prices, with 454 smokers (56%) regarding current prices as expensive, while 720 nonsmokers (58%) regarding them as expensive [Table 3]. However, when asked about the effect of price increase on cigarette consumption, 490 smokers (61%) thought it will not affect consumption, while 929 nonsmokers (74%) thought it will decrease consumption [Table 4].

Table 5 shows the opinion of the studied sample on what price will make people stop smoking. Only 443 smokers (55%) thought that a price of 8.27 US dollars and more will lead to smoking cessation, compared to 1,040 nonsmokers (83.5%). In fact, a quarter of the smokers thought that increasing prices will not lead to smoking cessation.

Increasing cigarette prices

In the multivariate analysis to assess the predictors of the opinion regarding increasing cigarette prices [Table 6], we found that females were less likely to agree with the price increase (adjusted OR = 0.32, 95% CI = 0.18-0.57, *P*-value <0.0001). As expected, those who smoked a higher number of cigarettes were less likely to agree with the price increase (adjusted OR = 0.68, 95% CI = 0.59-0.80, *P*-value <0.0001). Finally, subjects who thought that the current price is expensive were less likely to agree with the price increase (adjusted OR = 0.33, 95% CI = 0.27-0.39, *P*-value <0.0001).

Discussion

A striking 39% of our questionnaire respondents were current smokers. The smokers' population was mainly constituted of males with monthly income equal or greater to 800 US dollars, and mostly aged 21 to 30 years. Multivariate analyses of the risk factors for smoking showed that male gender and older age were associated with greater risk. Despite the low current cigarette prices, 56% of smokers thought that cigarette prices are expensive. When asked about the price of cigarettes that will lead to smoking cessation, 55% of smokers predicted that a price of 8.27 US dollar and more per pack will make them quit.

In comparison to earlier studies,^[4,5,10,21] our results demonstrate that smoking prevalence is increasing in Saudi Arabia. The previously noted gender difference with smokers being mostly males^[22] still holds true. In addition, our study showed that smoking is more common among individuals with higher income.

With the hope of preventing tens of millions of tobacco-attributable deaths, WHO has set a goal to decrease the prevalence of smoking by a third by 2025.^[23] This target could be solely achieved by increasing cigarette prices.^[24] In Saudi Arabia, there has been no recent price increase of cigarettes. To the best of our knowledge, no studies have been conducted to investigate the relationship between cigarette prices and

Table 2: Multivariate analyses of the risk factors of smoking (income is stratified into dummy variables)

Predictor	Adjusted OR (95% CI)	P-value
Female gender	0.12 (0.09-0.17)	<0.0001
Age	1.96 (1.61-2.31)	<0.0001
Income US dollars/month 800-1866	1.73 (1.32-2.26)	<0.0001
Income US dollars/month 1867-3200	1.40 (1.08-1.85)	0.02

Variables included in the model were = Gender, age, income (US dollars per month) 800-1866, income 1867-3200, income 3200-4800, income 4801-6666, and income more than 6666

Table 3: Opinion about cigarette prices of nonsmokers versus smokers

Opinion about cigarette price	Non-smokers	Smokers
	N = 1249 (%)	N = 808 (%)
Cheap	720 (57.6)	146 (18.1)
Average	298 (23.9)	208 (25.7)
Expensive	231 (18.5)	454 (56.2)

Table 4: Opinion about whether increasing cigarette prices leads to less smoking in non-smokers versus smokers

Will increasing pack prices lead to less smoking?	Nonsmokers	Smokers
	N = 1249 (%)	N = 808 (%)
Yes	929 (74.4)	318 (39.4)
No	320 (25.6)	490 (60.6)

Table 5: Opinion about what price will lead to smoking cessation in smokers vs. nonsmokers

Price of cigarette pack that may make smokers quit smoking	Nonsmokers	Smokers
	N = 1249 (%)	N = 808 (%)
Price increase will not affect smoking	64 (5.1)	209 (25.9)
*5.33-8 US dollars	145 (11.6)	156 (19.3)
8.27-13.33 US dollars	251 (20.1)	167 (20.7)
13.60-18.67 US dollars	232 (18.6)	105 (13.0)
18.93-24.00 US dollars	557 (44.6)	171 (21.2)

*Prices in questionnaire were in Saudi Riyals, these were converted to US dollars by dividing by 3.75

Table 6: Multivariate analysis to assess the predictors of the opinion regarding increasing cigarette prices

Predictor	Adjusted OR (95% CI)	P-value
Female gender	0.32 (0.18-0.57)	<0.0001
Number of cigarettes/day	0.68 (0.59-0.80)	<0.0001
Opinion on cigarette prices	0.33 (0.27-0.39)	<0.0001

Variables included in the model were = gender, number of cigarettes consumed/day, and opinion on cigarettes prices

consumption. Our study is an eye opener on cigarette prices in the Kingdom of Saudi Arabia. It could constitute a useful guide for policy-makers considering increasing cigarette price. It highlights both the value and the limitation of price increase as a possible strategy to reduce smoking in the Kingdom. This could be an urgent measure in this country, where cigarette imports have reached a high peak in 2012 with up to 0.9 billion US dollars consumed on imported cigarettes.^[25]

The principal finding in our study is that cigarette price exceeding 8.27 US dollars may lower consumption. Our results highlight the importance of increasing the price of cigarette packs in Saudi Arabia. However, the price of a pack of cigarette must be at least tripled in order to observe a significant reduction in cigarette consumption. Increasing the price of popular cigarettes pack from 2.67 US dollars to 8.27 US dollars is expected to lead to smoking cessation in a large number of smokers in the Saudi population. We anticipate that individuals with income less than 800 US dollars, which constitute about 30% of the smokers' population, are more likely to benefit from this increase.

Our study has certain limitations. Our novel questionnaire has not, as yet, been validated. Future research with a validated questionnaire and with more items added to predict the factors that would encourage smokers to quit is needed. Another major limitation is the use of famous Saudi athlete media's twitter accounts for distribution of the questionnaire, a factor which limit our sample to followers of this account.

Nevertheless, this study constitutes an eye opener on cigarette prices. The price of a pack of cigarette must be at least tripled in order to observe a significant reduction in cigarette consumption.

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