


# SWITCH, REDUCE, OR QUIT: HOW DO SMOKERS RESPOND TO TOBACCO TAX INCREASES IN PAKISTAN?

APRIL  
2021



Durre Nayab  
Muhammad Nasir  
Junaid Alam Memon  
Omer Siddique





The Pakistan Institute of Development Economics (PIDE) is funded by the University of Illinois Chicago's (UIC) Institute for Health Research and Policy to conduct economic research on tobacco taxation in Pakistan. UIC is a partner of the Bloomberg Initiative to Reduce Tobacco Use. The views expressed in this document cannot be attributed to, nor do they represent, the views of UIC, the Institute for Health Research and Policy, or Bloomberg Philanthropies

## Executive Summary

Smoking is one of the leading causes of preventable deaths globally. Among various policy interventions to reduce cigarette consumption, tobacco taxation is the most effective. Evidence suggests that higher cigarette taxes deter smoking initiation, reduce cigarette consumption, and even lead smokers to quit. Hence, the price-increase strategy through taxation effectively reduces the overall prevalence of smoking.

Three conditions are critical for an effective tobacco tax policy. These are: (i) significant pass-through of a tax increase to prices; (ii) price elasticity of demand for cigarettes; and (iii) “sticky” or unaltered behavior of smokers to not switch across brands or other tobacco products. Pakistan meets the first two conditions. The pass-through effect of a tax increase to the final price is 80 percent, whereas the demand for cigarettes is price elastic in Pakistan at 1.06. However, smokers can change their behavior to offset the impacts of a price increase and keep their consumption level unaltered by simply switching to lower-priced cigarette brands or other tobacco products. This is referred to as an economic compensation strategy.

Existing empirical research confirms the pass-through effect and price elasticity dynamics. Anecdotal evidence suggests that smokers do not switch across tobacco products. The present study rigorously analyzes the switching-behavior effects of a tax-induced price change for Pakistan. Switching behavior is captured through a direct question on how smokers would respond if the brand they are using becomes unaffordable. For observing the change in smoking behavior due to price changes, an affordability index or relative price index is constructed. The higher the value of this index, the lower the affordability of cigarettes will be.

According to the results, in some cases, the tobacco initiation age is as young as six years, but the proportion who begin consuming tobacco at this age is negligible. A more worrying observation is that the initiation of tobacco use among adolescents is significantly high. **Around 60 percent of smokers start using tobacco during their adolescent years.** Most users initiate with smokeless tobacco products (47 percent) and cigarettes (45 percent); only a small proportion start with water pipes (eight percent). **Among smokers, the majority (65 percent) use cheaper brands. Hence, affordability encourages smoking.**

Regarding switching, only 2.6 percent of smokers said they would switch to other brands or other tobacco products in response to a price increase. This is an indication of strong brand or product loyalty. This also demonstrates the reluctance of Pakistani tobacco users towards switching.

The analysis of the relationship between successive price increases and intentions to quit smoking shows that as prices increase, the number of quitters increases. For example, a 50 percent increase in price would result in almost half of smokers quitting smoking. The stated preferences by the smokers for different price hikes result in an inverse relationship between price and demand for cigarettes.

Smokers’ responses to changes in price relative to their income reveal that 52.5 percent would quit, and 38 percent would reduce tobacco consumption when affordability decreases.

Only nine percent said they would switch to other products. Of these nine percent, 42 percent would switch brands, 19 percent would switch to smokeless tobacco products, and 14.6 percent would switch to non-tobacco products. In other words, when cigarettes become unaffordable, smokers - on average - prefer to quit instead of switching to other brands or products.

The analysis and the results of the report have important implications for framing effective policies for curbing tobacco use in Pakistan. The key findings include the following:

- The results suggest that, on average, **smokers prefer to quit or reduce consumption instead of switching across brands or other tobacco products**. Moreover, a higher increase in prices is associated with increased cessation.
- **There is plenty of room for significant increases in tobacco taxes**. The mean maximum willingness to pay (MWTP) of Rs 35.80 per stick translates to Rs 716 (US\$ 4.5) for a pack of 20 cigarettes. The price of a pack of Marlboro in Pakistan is US\$ 1.55, almost three times lower than the MWTP of cigarette consumers. No cigarette brand in Pakistan sells at Rs 716 or more. This demonstrates **how low the price of cigarettes is in Pakistan**.

The findings that cigarette affordability facilitates smoking and that smokers do not switch to other brands or products - along with the fact cigarette prices are significantly lower than smokers' willingness to pay - make a compelling case for effective tobacco taxation policies. Tobacco excise taxes as a proportion of prices are much lower than the 70 percent minimum suggested by the WHO. The taxes should be increased to this threshold to have a meaningful impact on reducing cigarette consumption.

These findings also help counter the illicit trade argument that tobacco users are prone to switch to illicit products and show the effectiveness of tobacco tax policies. This study can also help the government use taxation policy more effectively to reduce tobacco consumption and its associated harms. Finally, these findings demonstrate unequivocally that most smokers start young or very young, and therefore programs aimed at discouraging tobacco initiation should be redesigned to effectively target the youth, especially those in their teens and early twenties. Among various awareness campaigns and other tobacco control measures, making tobacco products expensive through taxation can be a useful tool.

## TABLE OF CONTENTS

1. INTRODUCTION	5
2. LITERATURE REVIEW	7
3. DATA AND METHODOLOGY	9
3.1 DATA AND VARIABLES	9
3.2 METHODOLOGY	10
4. RESULTS AND DISCUSSION	11
4.1 INITIATION, AFFORDABILITY, AND SWITCHING	11
4.2 PRICE INCREASES AND SMOKING CESSATION	12
4.3 AFFORDABILITY AND SWITCHING BEHAVIOR	12
4.4 DETERMINANTS OF MAXIMUM WILLINGNESS TO PAY	17
5. CONCLUSIONS AND POLICY IMPLICATIONS	19
REFERENCES	21
APPENDIX	22

## 1. INTRODUCTION

Smoking is the leading cause of preventable deaths globally. Consequently, various programs and interventionist policies have been suggested and implemented to curb tobacco use and reduce cigarette consumption. Among these, tobacco taxation is the most effective. Evidence suggests that significant increases in cigarette taxes are effective in reducing smoking initiation by non-smokers and cigarette consumption of smokers – either by reducing the number of cigarettes, they smoke or quitting completely (Hanewinkel & Lsensee, 2007). Hence, the price-increase strategy – executed through taxation – effectively reduces the overall prevalence of smoking. Such evidence provides strong encouragement to public health experts worldwide, including those in Pakistan, to push their respective governments to use tax policy as a tool in the fight against tobacco consumption and its associated harms.

The effectiveness of tobacco tax policy in Pakistan, like everywhere else, depends on three conditions: (i) significant pass-through of tax increase to prices, (ii) price-elasticity for the demand for cigarettes, and (iii) “sticky” behavior of smokers, meaning they do not switch across brands or other tobacco products. The importance of the first two conditions is obvious. If the increase in taxes does not transmit to prices or if cigarette consumption is price insensitive, the tobacco tax policy will be rendered ineffective in curbing tobacco use. The pass-through effect of cigarette tax increases into the final price in Pakistan is 80 percent, which is significant enough to affect cigarette demand (Cevik, 2018). Similarly, the demand for cigarettes is found to be price responsive in Pakistan (Mushtaq et al., 2011).<sup>1</sup> A recent study estimated the price elasticity of cigarette demand to be 1.06 (Nayab et al., 2020). Hence, the first two conditions are empirically verified for Pakistan.

However, for the price-increase strategy to effectively reduce cigarette consumption, the third condition must also be met. It is possible that smokers may change their behaviors in such a way as to offset the impacts of price increases and keep their level of consumption unaltered. For instance, instead of changing the level of current consumption, they may simply switch to lower-priced, unregulated, or illegally manufactured cigarette brands or other tobacco products as a compensating strategy for the lost consumption of their preferred brand resulting from tax-induced price increases (Lee et al., 2009; Wiltshire et al., 2001). This is referred to as an economic compensation strategy (Tsai et al., 2005). This strategy can have relatively more adverse health consequences for these smokers. This is the same argument that the tobacco industry in Pakistan relies on to resist any proposed tax increases on cigarettes. The industry argues that an increase in cigarette taxes would only increase illicit trade, resulting in an unaltered level of consumption along with reduced government revenue.

It is for this reason that the likelihood of unchanged behavior is a necessary condition for the efficacy of tobacco tax policies. As discussed earlier, the pass-through effect and price elasticity of cigarette demand are empirically tested for Pakistan. It remains to be examined empirically how smokers react to a tax-induced price change. There is some indirect evidence that smokers do not switch across tobacco products. For instance, the price elasticity of cigarette demand in Nayab et al. (2020) suggests that consumption decreases relative to increases in price. Since this elasticity is estimated using household data, which includes

---

<sup>1</sup> Mushtaq et al. (2011) estimated the price elasticity of cigarette demand to be 1.17. Hence, a ten percent increase in prices is expected to reduce cigarette demand by 11.7 percent.

consumption from all brands and sources (including illicit tobacco), this finding indicates that smokers do not switch and instead reduce consumption. Had they switched, the consumption levels would have remained fairly consistent, and the elasticity would have been much lower. This also implies that the tobacco industry's claim that illicit trade makes up 40 percent<sup>2</sup> of the tobacco market in Pakistan is exaggerated; this is confirmed by a recent survey that estimates the illicit share at 16 percent.<sup>3</sup> Similarly, the cross-price elasticity between cigarettes and chewing tobacco is found to be statistically insignificant (Nayab et al., 2020).

These analyses, however, come with some caveats. For instance, the evidence of cross-price elasticity is restricted only to chewing tobacco. Hence, a separate study is required to empirically examine smokers' behavioral change in response to a tax-induced price increase. The current study fills this gap by asking smokers to state their preferred response to such changes. The results suggest that, on average, smokers prefer to quit or reduce consumption instead of switching across brands or other tobacco products. Moreover, a higher increase in prices is associated with increased cessation. These findings add to the evidence base on the effectiveness of tobacco tax policies and can help counter the illicit trade argument. This study can also help the government use taxation policy more effectively in the fight against tobacco consumption.

---

<sup>2</sup> <https://illicittobacco.oxfordeconomics.com/markets/pakistan/>

<sup>3</sup> [http://theinitiative.org.pk/wp-content/uploads/2019/06/STOP\\_factsheet\\_Final\\_12-05-2020.pdf](http://theinitiative.org.pk/wp-content/uploads/2019/06/STOP_factsheet_Final_12-05-2020.pdf)

## 2. LITERATURE REVIEW

The findings from prior studies vary on the extent of brand switching caused by tax-induced price increases. Although the majority of the literature confirms a reduction in tobacco consumption in response to increases in prices, there are studies that show that some tobacco users alter their behaviors to offset the effect of tax increases and maintain consistent tobacco intake. For instance, Cummings et al. (1997) estimate the average annual brand switching rate to be 9.5 percent across 20 communities in the United States. They find that females are more likely to switch brands than males. Furthermore, brand switching is found to be more common among smokers who are more sensitive to changes in price and belong to lower income groups.

Tsai et al. (2005) report that, due to an increased tax in 2002, almost 17.4 percent of male smokers in Taiwan preferred to buy cigarettes of cheaper brands. They find that personal income has no significant association with reduction in cigarette consumption and switching behaviors, while the price has a significant and positive influence only on brand switching. A study by Hanewinkel and Isensee (2007) reports similar results for Germany, where a price increase caused 11.0–18.4 percent of smokers to switch to cheaper brands and 11.5–16.6 percent of smokers to reduce smoking from 2002 to 2005. Before the actual tax increase, a survey was conducted to understand smokers' intentions in the face of an expected tax increase. The survey results revealed that 10 percent of smokers intended to quit smoking, and 10–16 percent of smokers had the intention of switching.

The extent of smoking cessation, reducing, and switching also vary across different age groups. Biener et al. (1998) examine the behavior of smokers in response to tax increases in Massachusetts between adult and teenaged smokers. Quitting is found to be higher among adults (35 percent) than teenagers (21 percent) owing to increased prices, while 19 percent of adult smokers and 26 percent of teenagers switched to cheaper brands to reduce the cost of smoking. Similarly, the behavior of adolescent (14–19 years of age) smokers towards quitting and reduction in Korea was studied by Kim et al. (2012) after the implementation of a tax on smoking products. According to their study, increased prices caused 11.7 percent of smokers to quit smoking and 32 percent to switch to cheaper brands. They also find that reduction in smoking is found to be more pronounced among females (31.8 percent) than males (24.3 percent). Another study finds that an increase in cigarette prices by ten percent led to a decline in consumption by seven percent among young smokers in the US (Grossman & Chaloupka, 1997).

Some studies analyze the switching behavior of smokers over time by dividing cigarettes into different price tiers. A study by White and Ross (2015) shows that there is low brand loyalty among smokers in Thailand, and they willingly switch across different brands. The researchers considered three waves of data from a longitudinal survey for analyzing the switching behavior of smokers and found that more than 38 percent of smokers switched from one price tier to another price tier due to increases in taxes and price. Likewise, by studying multiple years of the Global Adult Tobacco Survey (GATS) data, Husain et al. (2017) find that almost 40 percent of smokers switched from one price tier to another in Thailand. Additionally, they find that increased taxes caused a significant decline in cigarette consumption for the higher price tier with a corresponding increase in the use of cigarettes in the middle and bottom price tiers. In response to increases in taxes, shifting from high-



priced international cigarettes to low-priced national cigarettes is also a common phenomenon (Saenz de Miera et al., 2010).

Switching across cigarettes with different levels of nicotine is also observed by some studies. Using US data for 1979 and 1987, Evans and Farrelly (1998) find that smokers may also switch to cigarettes higher in tar and nicotine. In contrast to this, no clear association is found between cigarette habit and nicotine intake by Finnegan et al. (1945). According to the authors, heavy smokers can easily switch to cigarettes containing low nicotine. Moreover, smokers who switch to lower nicotine/tar cigarettes tend to smoke more vigorously by increasing the number of cigarettes smoked per day (Marian et al., 2009).

Increased prices of smoking products can also cause an increase in the use of smuggled cigarettes. According to Lee et al. (2009), smokers with lower monthly income are more inclined towards the use of smuggled cigarettes. In this case, 38 percent of smokers whose monthly income was less than 10,000 Taiwan dollars were more likely to use smuggled cigarettes than those who earned more. For smokers with lower monthly income combined with low education, 54 percent were more likely to use smuggled cigarettes. According to Wiltshire et al. (2001), since it is difficult for smokers to stop smoking due to addiction or lack of support, switching towards smuggled cigarettes to deal with the increased costs of smoking is common.

In contrast to this, according to Saenz de Miera et al. (2014), no downward switching occurred in Mexico due to a decline in affordability caused by an increase in the ad valorem excise tax on cigarettes. Similarly, Chen et al. (2014) report that after the imposition of a tax, an increase in price is associated with a lower likelihood of brand switching, and a decrease in consumption is found among only 24 percent of smokers. Moreover, smokers in Australia who belong to a high-income group do not prefer to switch brands in response to a price increase (Cowie et al., 2015). Similarly, Wangen and Biørn (2006) conclude that small changes/variations in price do not encourage Norwegian smokers to shift between different types of tobacco products. For Li et al. (2016), smokers from low-income groups in China are 5.6 percent more likely to switch between cigarette brands due to a price increase.

Overall, there is mixed evidence of switching between brands and various tobacco products in response to tax-induced price increases. These responses also vary across dimensions such as age and socioeconomic status. The fact that there are spatiotemporal variations in results stresses the need for a separate study for Pakistan. To the best of the authors' knowledge, this is the first study that exclusively examines the switching behavior of smokers in response to tax-induced price changes in Pakistan.

## 3. DATA AND METHODOLOGY

### 3.1 DATA AND VARIABLES

There is no existing data set that contains information on the switching behavior of smokers. The existing national-level data sets such as Pakistan Social and Living Standards Measurements (PSLM)/ Household Integrated Economic Survey (HIES)/ Household Integrated Income and Consumption Survey (HIICS) provide information only on the quantity purchased and value of various tobacco products. These can be used only indirectly (through cross-price elasticity across products) for evidence on switching behavior. However, no direct information is available that can be used for direct evidence of compensating behaviors by smokers. This situation demands primary data collection through a nationally representative survey of smokers that covers relevant details for exploring the switching behavior of tobacco users.

The present study is based on information on switching behavior that was collected in the Economic Burden of Tobacco Use Survey, a nationally representative survey of 12,140 households. Details of the survey are available in the PIDE report entitled *Economic Cost of Tobacco-Induced Diseases in Pakistan*, collected as part of a larger survey that was done for the estimation of smoking-attributable health and economic costs at the national and disaggregated levels. For this purpose, the WHO's *Economics of Tobacco Toolkit* (WHO 2011) was used as a guide to design a comprehensive questionnaire.

#### Variables Description

For this study, a range of variables from the survey is used. Switching behavior is captured through a direct question asking how smokers would respond if the brand they are using becomes unaffordable. The respondents were given three mutually exclusive choices: (i) quit completely, (ii) reduce consumption, or (iii) switch to other products. These are quantified in two ways for an empirical analysis of switching behavior. In the first case, three dummy variables are constructed for the three responses. For instance, the variable "quit" takes the value 1 if the respondent chooses this option and 0 otherwise. Similar variables are constructed for "reduce" and "switch." In the second case, a variable with these three categories is constructed where quit, reduce, and switch takes the values 0, 1, and 2, respectively. These different variables are constructed to model the switching behavior in two ways, as discussed in the next section.

For observing the change in smoking behavior of smokers with respect to changes in prices, an affordability index is constructed. The affordability index /relative price index takes the ratio of the per-pack price of cigarettes (20 sticks) to per capita annual employment income of individuals multiplied by 100. In the construction of this index, the retail price per pack of cigarettes is used. Data on per capita income is used from the survey. The higher the value of this index, the lower the affordability of cigarettes will be.

Another important variable is the maximum willingness to pay (MWTP) for a cigarette stick. Each respondent reported their MWTP for a cigarette stick in Pakistani rupees (Rs). Control variables include the age of the respondent in years, income in Rs, gender, marital status,

employment status, region of residence, and the province of residence as dichotomous variables. These variables are used both as determinants of MWTP and as controls in switching-behavior models. An important variable is the initiation age of tobacco use. This is the age at which the respondent started using a tobacco product. Table A1 in the Appendix provides descriptive statistics of these variables.

### 3.2 METHODOLOGY

Two empirical models are estimated to examine the relationship between smokers' decisions to quit, reduce, or switch in the face of price increases. The first empirical model examines a smoker's choice with respect to the rest of the choices, as discussed above. The smoker's decision (quitting, reducing, or switching) is assumed to be the function of affordability and other factors such as age, gender, education, marital status, employment status, region, and province. This study adopts the empirical model given by Chen et al. (2014), which requires the estimation of a single equation for each decision through logit regression. The empirical model is given below:

$$Z_{ik} = \beta_0 + \beta_1 AI_k + \beta'_{2k} X_i + \varepsilon_i \quad (1)$$

Here,  $AI$  is the affordability index, and  $X$  represents the vector of control variables,  $i$  stands for  $i^{th}$  smoker, and  $k$  varies from a value of one to three (for quitting, reduction, and switching, respectively).

The second model considers all three choices simultaneously. When the dependent variable is composed of more than one and unordered alternative choices, then the suitable model is multinomial logit. Through this model, the probability of different choices can be estimated, and these probabilities add up to one. The multinomial logit model uses one choice as a base category and provides the probability estimates of other choices or outcomes. The coefficients are interpreted relative to the base category and in probability form. That is, a smoker is either more or less likely to adopt this choice compared to the base choice. As these coefficients do not reflect a marginal increase or decrease in outcome carried out by a change in regressors, after estimating the coefficients it is necessary to obtain the marginal impacts for each outcome (including the base category).

In addition to empirically examining the relationship between price changes and switching behavior, this study also explores initiation age and how affordability is an important determinant for early initiation age. Moreover, whether people switch across tobacco products over their lifetime is discussed. These analyses are done through graphs and descriptive statistics such as means and percentages.

## 4. RESULTS AND DISCUSSION

### 4.1 INITIATION, AFFORDABILITY, AND SWITCHING

The first analysis considers the initiation age for tobacco products and switching behavior regarding these products over time. Figure 1 shows the distribution across initiation age for tobacco use. It is evident from the figure that tobacco use is initiated as early as six years of age. The proportion of smokers who start consuming tobacco at such an early age is, however, negligible. A more worrying observation is the fact that initiation of tobacco use among adolescents is significantly high. Around 60 percent of smokers start using tobacco during the second decade of their lives. The tail of this distribution starts to die down when people reach their forties.

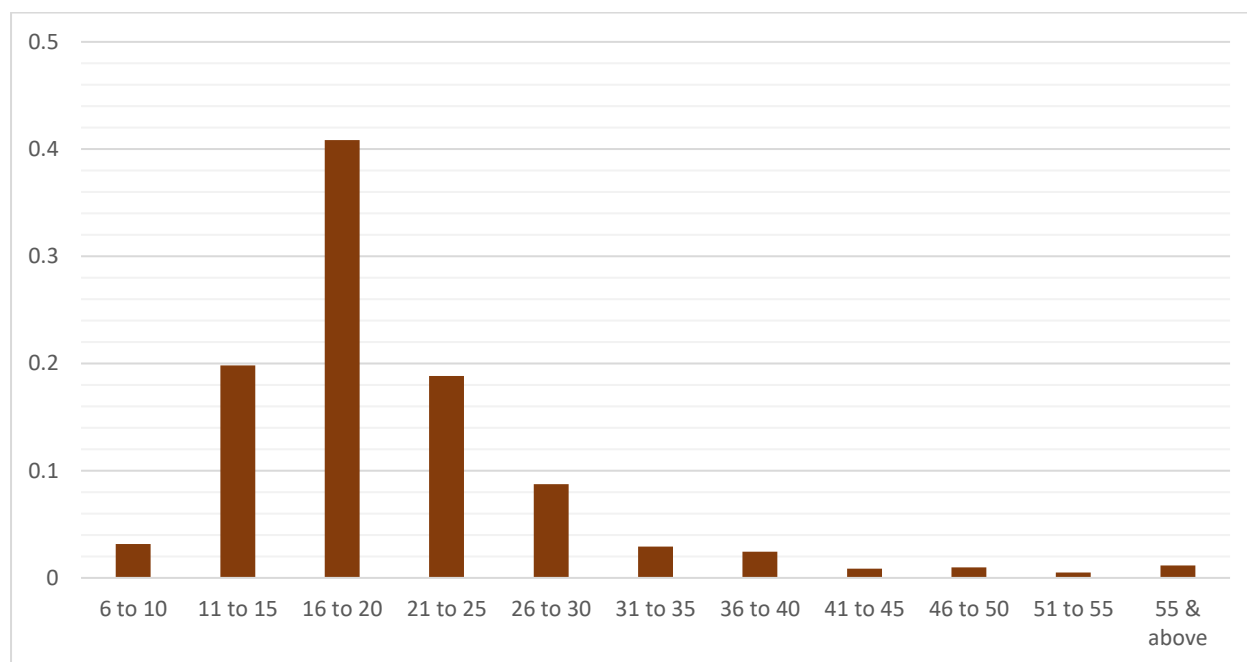


Figure 1. Age of tobacco initiation

The majority of users initiated with smokeless tobacco products (47 percent) and cigarettes (45 percent), whereas a small proportion started using water pipes (eight percent). Among smokers, the majority (65 percent) used cheaper brands (such as Capstan, Morven Gold, and Gold Flake). Hence, affordability facilitated smoking. When respondents were asked if they continued using the same product till now (or until they quit), only 2.6 percent responded that they have switched to other brands or other tobacco products. This is an indication of strong brand or product loyalty. This also hints at the reluctance of tobacco users towards switching.

These findings suggest that programs aimed at discouraging tobacco initiation should be redesigned to make them effective in targeting the youth, especially those who are in their teens and early twenties. Among various awareness campaigns and other tobacco control measures, making tobacco products expensive through taxation can be an effective tool.

## 4.2 PRICE INCREASES AND SMOKING CESSATION

Next, the relationship between successive price increases and intentions to quit smoking is explored. In the survey, smokers were given various scenarios of price increases (20 percent, 30 percent, 40 percent, and 50 percent) in their preferred product and were asked if they would continue to use it in the case of such a price hike. Those who said they will not quit at a 20 percent price increase were subsequently asked the same question with a 30 percent increase in price and so on. Figure 2 shows that the higher the percentage increase in price, the lower the number of people who would continue to smoke. The stated preferences by smokers for different price hikes result in an inverse relationship between price and demand for cigarettes.

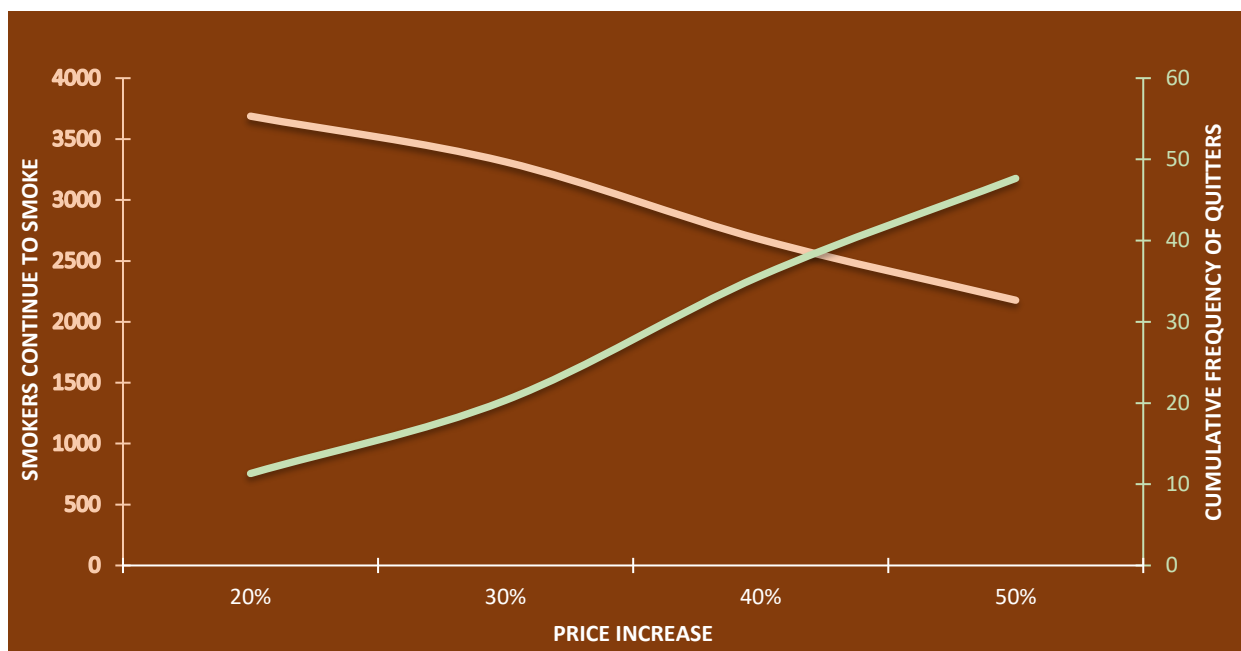


Figure 2. Price increases, smoking continuity, and quitting

Figure 2 also shows the relationship between price increases and the cumulative frequency of quitters at each bidding price. As expected, the relationship is upward sloping. The higher the prices, the higher the number of quitters. The figure also shows that a 50 percent increase in price would result in almost half of the smokers quitting smoking. In other words, a 50 percent increase in price would lead to the same amount of reduction in cigarette demand. This suggestive evidence supports the finding by Nayab et al. (2020) that cigarette demand is unitary elastic in Pakistan.<sup>4</sup>

## 4.3 AFFORDABILITY AND SWITCHING BEHAVIOR

The next analysis considers how smokers respond to changes in price relative to their income, also known as affordability. Do they reduce or quit smoking? Or do they switch to other brands or products to compensate for the lost consumption due to price increase? In the survey, the respondents were asked about their response to their preferred product becoming unaffordable. They were given three options; quit, reduce, or switch. These options were mutually exclusive. The “quit” and “reduce” options were selected by 52.5 percent and

<sup>4</sup> Although not reported here, the regression results show that the sequential increases in prices reduce the probability of continuing smoking.

38 percent of respondents, respectively. Only nine percent said they would switch to other products. Of these nine percent, 42 percent will go for brand switching, and 19 percent will switch to smokeless tobacco products, whereas 14.6 percent will shift to non-tobacco products (see Table 1). Hence, the switching towards other brands or tobacco products is only around seven percent.

**Table 1. Intended change in smoking due to unaffordability**

Behavior	Freq.	Percent
Quit	2,144	52.52
Reduce	1,559	38.19
Switch	379	9.28

These responses are analyzed by constructing three dummy variables for the three options and regressing them separately (logistic regressions) and simultaneously (multinomial logit) on the affordability index variable. Table 2 presents the results for logistic regressions.

**Table 2. Logistic regression for affordability and behavioral changes**

VARIABLES	Quit		Reduce		Switch	
	Coefficients	ME	Coefficients	ME	Coefficients	ME
<b>Affordability</b>	0.180**	0.042**	-0.0532	-0.012	0.059	0.005
	(0.088)	(0.021)	(0.113)	(0.023)	(0.143)	(0.012)
<b>Constant</b>	-0.487		-0.320		-0.928	
	(0.517)		(0.519)		(1.158)	
<b>Observations</b>	3,371	3,371	3,371	3,371	3,371	3,371
<b>Control</b>	Yes	Yes	Yes	Yes	Yes	Yes
Note:	*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. ME stands for marginal effects. The control variables in the regression analysis include age, gender, education, marital status, employment status, region, and provincial fixed effects.					

The table shows that the affordability index has a significant positive association with quitting. Due to the construction of the affordability index, one must take caution in interpreting this relationship. Here an increase in the affordability index means an increase in price relative to per capita annual household income. In other words, an increase in the index means that the products are becoming less affordable. Hence, the positive sign here suggests an inverse relationship. For instance, the coefficient of the quit variable shows that an increase in the affordability index (that is, a reduction in affordability) is likely to increase smoking cessation. The marginal effect reveals that one standard deviation increase in the affordability index increases the probability of cessation by 4.2 percent. Interestingly, and as expected, the coefficient of the switch variable is not statically significant. That is, when cigarettes become unaffordable, smokers on average prefer to quit instead of switching to other brands or products.

For the reasons discussed in Chapter 3, a multinomial logit is used to simultaneously determine the response to an increase in unaffordability. Table 3 provides the results for a multinomial logit regression examining the relationship between the affordability index and switching behavior. The base category is “reduce.” The first block in the table shows the coefficients from multinomial logit regressions. The second block shows the marginal effects for the three choices. The coefficient of the affordability index shows that, compared to the base category (reduced smoking), an increase in unaffordability is associated with a higher likelihood of smoking cessation. Switching, on the other hand, is not significantly associated

with the affordability index. The marginal effects show that an increase in the affordability index (unaffordability) increases the probability of cessation by 4.6 percent, whereas it reduces the probability of smoking reduction by five percent. No impact on switching is found. These results are in line with the findings of the logit regressions in Table 2.

The results from these two tables confirm the validity of anecdotal evidence that, on average, smokers in Pakistan do not switch across brands or tobacco products, as discussed in the first chapter of this study. Smokers would rather quit than switch.

**Table 3. Multinomial logit regression for affordability and behavioral changes**

VARIABLES	Coefficients		Marginal Effects		
	Quit	Switch	Quit	Reduce	Switch
Affordability	0.221** (0.0958)	0.192 (0.157)	0.0458** (0.0220)	-0.0507** (0.0218)	0.00492 (0.0116)
Constant	-0.0999 (0.537)	-0.242 (1.191)			
Observations	3,371	3,371	3,371	3,371	3,371
Control	Yes	Yes	Yes	Yes	Yes
Note:	*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. ME stands for marginal effects. The control variables in the regression analysis include age, gender, education, marital status, employment status, region, and provincial fixed effects.				

After empirically establishing the absence of behavioral change regarding economic compensating strategy, the next analysis explores heterogeneity in these results across two dimensions, namely socioeconomic status (SES) and age. First, the behavior of smokers is examined by classifying them into higher and lower socioeconomic groups. Socioeconomic status (SES) is based on household income. Respondents having an income higher than the median income (Rs 15,000 per month) in the sample are assigned to the higher SES group, whereas those with lower than median income are placed in the lower SES group. The results are reported in tables 4 and 5. Interestingly, for lower SES, both logistic and multinomial regression models show insignificant results. This may be due to the lower number of observations for this group. On the other hand, the results for the higher SES group for both the regressions are qualitatively similar to those reported in tables 2 and 3. The magnitudes are, however, larger than the overall sample. This implies that the results obtained in the overall sample are driven more by the higher SES group.

Table 4. Logistic regression for high- and low-income groups

VARIABLES	Quit		Reduce		Switch	
	Coefficient t	ME	Coefficient t	ME	Coefficient t	ME
<b>Panel A: High Income Group</b>						
Affordability	0.658** (0.260)	0.146** (0.058)	-0.046 (0.300)	-0.009 (0.063)	-0.506 (0.449)	-0.047 (0.041)
Constant	-0.474 (0.780)		-0.760 (0.784)		-1.306** (0.604)	
Observations	2,125	2,125	2,125	2,125	2,115	2,115
Control	Yes	Yes	Yes	Yes	Yes	Yes
<b>Panel B: Low Income Group</b>						
Affordability	0.000 (0.0003)	0.000 (0.000)	0.000 (0.0003)	0.000 (0.000)	-0.0226 (0.066)	-0.002 (0.005)
Constant	-0.912 (0.720)		0.462 (0.734)		-1.736 (1.432)	
Observations	1,290	1,290	1,290	1,290	1,290	1,290
Control	Yes	Yes	Yes	Yes	Yes	Yes
Note:	*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. ME stands for marginal effects. The control variables in the regression analysis include age, gender, education, marital status, employment status, region, and provincial fixed effects.					

Table 5. Multinomial logistic regression for high- and low-income groups

VARIABLES	Coefficients		Marginal Effects		
	Quit	Switch	Quit	Reduce	Switch
<b>Panel A: High Income Group</b>					
Affordability	0.621** (0.278)	-0.133 (0.480)	0.161** (0.0694)	-0.118 (0.101)	-0.0423 (0.112)
Constant	0.141 (0.800)	12.37 (646.2)			
Observations	2,125	2,125	2,125	2,125	2,125
Control	Yes	Yes	Yes	Yes	Yes
<b>Panel B: Low Income Group</b>					
Affordability	0.000 (0.0003)	-0.0226 (0.066)	0.0007 (0.0017)	0.0005 (0.0012)	-0.0012 (0.003)
Constant	-0.746 (0.756)	-1.485 (1.498)			
Observations	1,290	1,290	1,290	1,290	1,290
Control	Yes	Yes	Yes	Yes	Yes
Note	*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. ME stands for marginal effects. The control variables in the regression analysis include age, gender, education, marital status, employment status, region, and provincial fixed effects.				

Heterogeneity across age groups is reported in tables 6 and 7. The age groups are constructed using the median age in the sample (41 years). Respondents in the age group 15–41 years are placed in the younger group, while those above 41 years of age are placed in the older age



category. The results for the younger age group are statistically insignificant for the younger group. For the older group, the results are similar to those in tables 2 and 3.

Table 6. Logistic regression for young and old group

VARIABLES	Quit		Reduce		Switch	
	Coefficient	ME	Coefficient	ME	Coefficient	ME
<b>Panel A: Younger Group</b>						
Price Index	-0.0005	-0.0001	0.0008	0.0002	-0.290	-
	(0.001)	(0.0003)	(0.0013)	(0.0003)	(0.228)	0.0241
Constant	-0.804		-0.353		-0.798	
	(1.086)		(1.086)		(1.237)	
Observations	1,655	1,655	1,655	1,655	1,645	1,645
Control	Yes	Yes	Yes	Yes	Yes	Yes
<b>Panel B: Older Group</b>						
Price Index	0.143*	0.0343*	-0.075	-0.0172	-0.002	-
	(0.080)	(0.019)	(0.106)	(0.025)	(0.013)	0.0002
Constant	0.185		-0.257		-3.001**	
	(0.732)		(0.738)		(1.440)	
Observations	1,760	1,760	1,760	1,760	1,760	1,760
Control	Yes	Yes	Yes	Yes	Yes	Yes
Note:	*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. ME stands for marginal effects. The control variables in the regression analysis include age, gender, education, marital status, employment status, region, and provincial fixed effects.					

Table 7. Multinomial logistic regression for young and old group

VARIABLES	Coefficient		Marginal Effects		
	Quit	Switch	Quit	Reduce	Switch
<b>Panel A: Younger Group</b>					
Affordability	-0.001	-0.293	0.006	0.004	-0.010
	(0.001)	(0.229)	(0.026)	(0.015)	(0.040)
Constant	-0.274	12.64			
	(1.119)	(731.4)			
Observations	1,655	1,655	1,655	1,655	1,655
Control	Yes	Yes	Yes	Yes	Yes
<b>Panel B: Older Group</b>					
Affordability	0.129	0.057	0.028*	-0.025*	-0.002
	(0.083)	(0.141)	(0.017)	(0.014)	(0.010)
Constant	0.778	-2.093			
	(0.751)	(1.483)			
Observations	1,760	1,760	1,760	1,760	1,760
Control	Yes	Yes	Yes	Yes	Yes
Notes	*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. ME stands for marginal effects. The control variables in the regression analysis include age, gender, education, marital status, employment status, region, and provincial fixed effects.				

The insignificance of switching across SES and age groups is an encouraging finding for effective tobacco taxation policies. With these results, this study establishes that smokers in Pakistan do not prefer to engage in the economic compensating strategy. These results provide strong support for using tax-induced price changes as an effective tool for discouraging tobacco consumption in the country.

#### 4.4 DETERMINANTS OF MAXIMUM WILLINGNESS TO PAY

Finally, the last analysis examines the determinants for maximum willingness to pay (MWTP) per cigarette stick. The respondents were asked to report the maximum price they would be willing to pay for a cigarette stick. The mean MWTP is estimated to be Rs 35.80.

Table 8 presents the determinants for MWTP. The table shows that MWTP is positively associated with income and being a resident of an urban region. Marriage, however, reduces the MWTP for cigarettes. From these results, it can be inferred that an increase in income relaxes the budget constraint for smokers, and they can upgrade their demand for cigarettes accordingly. Being a resident of an urban region provides more opportunities to earn a higher income. Marriage increases financial responsibilities and therefore reduces the space for higher spending on cigarettes. The provincial fixed effects reveal that maximum willingness to pay is higher in Khyber Pakhtunkhwa (KP) than Punjab (which is the baseline). It is, however, lower in Sindh and Balochistan than the baseline.

Table 8. Determinants of willingness to pay

VARIABLES	WTP
Age (years)	-0.0205 (0.0485)
Education (completed years)	0.139 (0.117)
Female (= 1)	1.127 (5.648)
Employed (= 1)	-0.631 (2.937)
Married (= 1)	-4.624** (1.914)
Income (log of monthly income)	3.374*** (0.869)
Urban (= 1)	6.837*** (1.164)
Sindh (= 1)	-6.500*** (1.439)
KP (=1)	3.482* (2.004)
Balochistan (=1)	-4.314*** (1.554)
Constant	-11.66 (11.26)
Observations	3,285
R-squared	0.035
Note:	*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

There are some limitations of this study that require acknowledgment here. The first limitation is that these results are based on stated preferences in a hypothetical scenario. It is possible that the extent of the response (magnitudes) may change when real price increases are observed. The direction of response, however, is expected to remain the same as suggested by the literature (see, for instance, Hanewinkel & Isensee, 2007).

The second limitation is regarding the sample of respondents for the switching-behavior module. These questions were asked only of smokers, thereby ignoring other tobacco consumers. However, given that taxation policy is mostly for smoking products (cigarettes), the results may not have changed if data were collected from other tobacco users.

The third limitation – and this is an extension of the second – is restricting the sample to only tobacco users (smokers) in the module, ignoring the non-smokers altogether. Had the non-smokers been asked these questions, it would have provided more insight into the behavioral changes of non-smokers towards tobacco products.

## 5. CONCLUSIONS AND POLICY IMPLICATIONS

This study explores the switching behavior of cigarette consumers in response to tax-induced price increases. A nationally representative survey was conducted to collect data for this purpose. The regression results show that **a decrease in affordability is not associated with switching towards other brands or tobacco products. Instead, it is associated with smoking cessation.** Heterogeneity analysis reveals that these results are primarily driven by smokers with higher SES and belonging to the older age group.

The descriptive analysis shows that only nine percent of cigarette users would opt to switch. The rest either opt to quit or to reduce their cigarette consumption. Of the nine percent who would switch, around 15 percent of users intend to switch to non-tobacco products. Hence, **effectively the switching rate across brands and other tobacco products is only seven percent.** These findings validate the indirect evidence discussed in the first chapter regarding unchanged behavior in the face of a price increase. The study findings also invalidate the illicit trade argument advocated by the tobacco industry.<sup>5</sup>

Additionally, the results confirm that **increases in prices reduce cigarette consumption.** The higher the prices, the higher the reduction will be. A 50 percent increase in price would lead to the same amount of reduction in cigarette demand, thereby confirming the findings by Nayab et al. (2020) that cigarette demand in Pakistan is unitary elastic. It is, however, to be acknowledged that the actual response is likely to be lower than the hypothetical response given the addictiveness of smoking.

It is also observed that **the initiation age for tobacco use is as early as six years.** Young people in general and adolescents, in particular, are the most vulnerable to initiate tobacco use. The probability of starting using tobacco fades as people reach their forties. **Affordability is found to be the main facilitator for smoking, especially at a younger age.**

The mean value of maximum willingness to pay (MWTP) for a cigarette stick is found to be Rs 35.80. For a pack of 20 cigarettes, this amounts to Rs 716 (or US\$ 4.5). The price of a pack of Marlboro in Pakistan is US\$ 1.55<sup>6</sup>, almost three times lower than the MWTP of cigarette consumers. No cigarette brand in Pakistan sells at the price of Rs 716 or more. This shows how low the prices of cigarettes in Pakistan are and that **there is plenty of space for a significant increase in tobacco taxes.**

The findings that cigarette affordability facilitates smoking and that smokers do not switch to other brands or products - along with the fact cigarette prices are significantly lower than the smokers' willingness to pay - make a compelling case for effective tobacco taxation policies. The tobacco excise taxes as a proportion of prices are much lower than the 70 percent minimum suggested by the WHO. **The taxes should be increased at least to this threshold to have a meaningful impact on reducing cigarette consumption in Pakistan.**

---

<sup>5</sup> The lack of switching preferences also negates the existence of biological compensation strategy in which the smokers may switch to high nicotine-level brands to compensate for the reduced quantity of cigarettes due to a price hike.

<sup>6</sup> [https://www.numbeo.com/cost-of-living/country\\_price\\_rankings?displayCurrency=USD&itemId=17&region=142](https://www.numbeo.com/cost-of-living/country_price_rankings?displayCurrency=USD&itemId=17&region=142)

The research demonstrates unequivocally that most smokers start when they are young, even very young. Therefore, another policy implication is that the **programs directed at discouraging tobacco initiation should be redesigned to make them effective in targeting young people in general and adolescents in particular**. An effective taxation policy supported through various tobacco control policies, including awareness campaigns, would serve this purpose.

## REFERENCES

- Biener, L., Aseltine JR, R. H., Cohen, B. & Anderka, M. (1998). Reactions of adult and teenaged smokers to the Massachusetts tobacco tax. *American Journal of Public Health, 88*(9), 1389-1391.
- Cevik, S. (2018). Smoke Screen: Estimating the tax pass-through to cigarette prices in Pakistan. *Review of Development Economics, 22*(3), e1-e15.
- Chen, C.-M., Chang, K.-L., Lin, L. & Lee, J.-L. (2014). Brand switching or reduced consumption? A study of how cigarette taxes affect tobacco consumption. *The European Journal of Health Economics, 15*(9), 991-998.
- Cowie, G. A., Swift, E., Partos, T. & Borland, R. (2015). Quitting activity and tobacco brand switching: Findings from the ITC 4-Country Survey. *Australian New Zealand Journal of Public Health, 39*(2), 109-113.
- Cummings, K. M., Hyland, A., Lewit, E. & Shopland, D. (1997). Use of discount cigarettes by smokers in 20 communities in the United States, 1988-1993. *Tobacco Control, 6*(suppl 2), S25.
- Evans, W. N., & Farrelly, M. C. (1998). The compensating behavior of smokers: Taxes, tar, and nicotine. *The Rand Journal of Economics, 578-595*.
- Finnegan, J., Larson, P. & Haag, H. (1945). The role of nicotine in the cigarette habit. *Science, 102*(2639), 94-96.
- Grossman, M., & Chaloupka, F. J. (1997). Cigarette taxes: The straw to break the camel's back. *Public Health Reports, 112*(4), 290.
- Hanewinkel, R., & Isensee, B. (2007). Five in a row—reactions of smokers to tobacco tax increases: population-based cross-sectional studies in Germany 2001–2006. *Tobacco Control, 16*(1), 34-37.
- Husain, M. J., Kostova, D., Mbulo, L., Benjakul, S., Kengganpanich, M. & Andes, L. (2017). Changes in cigarette prices, affordability, and brand-tier consumption after a tobacco tax increase in Thailand: Evidence from the Global Adult Tobacco Surveys, 2009 and 2011. *Preventive Medicine, 105*, S4-S9.
- Kim, H.-C., Cho, K.-S., Kwon, S.-M. & Lim, J.-Y. (2012). The effect of the increase in tobacco price on adolescent smoking in Korea: Smoking reduction and brand switching. *Health and Social Welfare Review, 32*(3), 429-460.
- Lee, J.-M., Chen, S.-H., Chen, H.-F. & Jeng, H.-Y. J. (2009). Price sensitivity and smoking smuggled cigarettes. *The European Journal of Public Health, 19*(1), 23-27.
- Li, J., White, J. S., Hu, T.-W., Fong, G. T. & Yuan, J. (2016). The heterogeneous effects of cigarette prices on brand choice in China: Implications for tobacco control policy. *Economics of Tobacco Control in China: From Policy Research to Practice, World Scientific*, 109-127.
- Marian, C., O'connor, R. J., Djordjevic, M. V., Rees, V. W., Hatsukami, D. K. & Shields, P. G. (2009). Reconciling human smoking behavior and machine smoking patterns: Implications for understanding smoking behavior and the impact on laboratory studies. *Cancer Epidemiology Biomarkers and Prevention, 18*(12), 3305-3320.
- Mushtaq, N., Mushtaq, S., & Beebe, L. A. (2011). Economics of tobacco control in Pakistan: estimating elasticities of cigarette demand. *Tobacco control, 20*(6), 431-435.
- Nayab, D., Nasir, M., Memon, J. A., Khalid, M. & Hussain, A. (2020). Estimating the price elasticity for cigarette and chewed tobacco in Pakistan: Evidence from microlevel data. *Tobacco Control, 29*(s5), 319-325

SAENZ-DE-MIERA, B., Thrasher, J. F., Chaloupka, F. J., Waters, H. R., Hernandez-Avila, M. & Fong, G. T. (2010). Self-reported price of cigarettes, consumption and compensatory behaviours in a cohort of Mexican smokers before and after a cigarette tax increase. *Tobacco Control*, 19(6), 481-487.

SAENZ-DE-MIERA, B. S., Thrasher, J. F., Shigematsu, L. M. R., Ávila, M. H. & Chaloupka, F. J. (2014). Tax, price and cigarette brand preferences: A longitudinal study of adult smokers from the ITC Mexico Survey. *Tobacco Control*, 23(suppl 1), i80-i85.

Tsai, Y. W., Yang, C. L., Chen, C. S., Liu, T. C. & Chen, P. F. (2005). The effect of Taiwan's tax-induced increases in cigarette prices on brand-switching and the consumption of cigarettes. *Health Economics*, 14(6), 627-641.

Wangen, K. R., & Bjørn, E. (2006). How do consumers switch between close substitutes when price variation is small? The case of cigarette types. *Spanish Economic Review*, 8(4), 239-253.

White, J. S., & Ross, H. (2015). Smokers' strategic responses to sin taxes: Evidence from panel data in Thailand. *Health economics*, 24(2), 127-141.

Wiltshire, S., Bancroft, A., Amos, A. & Parry, O. (2001). "They're doing people a service"—qualitative study of smoking, smuggling, and social deprivation. *BMJ*, 323(7306), 203-207.

## APPENDIX

Table A1. Descriptive statistics of individual and household characteristics

Variable	Mean (SD)
Age (in years)	45.0 (14.35)
Completed years of schooling	5.00 (5.17)
Tobacco initiation age (in years)	21.46 (9.53)
Income (Rs)	20351 (18087)
Affordability index	0.64 (3.51)
<b>Categorical Variables</b>	
Male	96.43
Married	86.13
Employed	79.62
Rural	51.74
Punjab	41.49
Sindh	28.05
KP	10.25
Balochistan	20.22



Pakistan Institute of Development  
Economics (PIDE), Quaid-i-Azam  
University Campus, P.O. Box. 1091,  
Islamabad, 44000, Pakistan.



Tel: +92-51-9248074  
Fax: +92-51-9248065



Email:  
publications@pide.org.pk



[www.pide.org.pk](http://www.pide.org.pk)