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Smoking and Human Health: Socio-economic Analysis

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Abstract

Smoking causes a large number of diseases in human beings. About six million people die each year due to smoking, and predictions have shown that this number will increase to ten million in 2030. Pakistan has the highest consumption of tobacco in South Asia. Cross sectional data was used for study and it was collected through personal interviews of 175 respondents from different areas of Faisalabad, Punjab. Study focused on the determinants of smoking and its impact on the economy of households. Logistic regression model was used because the dependent variable is of dichotomous nature. The effects of smoking on the economy of household were measured by expenditures on diseases caused by smoking. The main determinants of smoking included the presence of smokers in family and friend circle, low level of education and marital status. The results of underlying study revealed that smokers have had more diseases as compared with their counterparts and hence medical expenditures of smokers were found greater than those of non-smokers. In the light of study findings, we suggest that government should launch awareness programs to help smokers in quitting smoking. People need to know that if they stop smoking, they can save their smoking expenditures that will eventually be spent on basic needs and medical expenditures. Study data showed that the majority of smokers were unable to attribute reasons for unsuccessful quitting.

Keywords: Smoking; health cost; income level; logistic regression; Pakistan

Introduction

Smoking is the practice in which a person inhales the smoke of a burning cigarette, cigar or shisha, which are the most common means of smoking (Shah et al., 2012). Mostly available cigarettes in the market are manufactured and the loose tobacco is also sold which is rolled into the cigarette paper for smoking purpose. It is known to be one of the greatest practice that changes the feelings and perceptions of people. Universally tobacco smoking is the common practice, followed by above 1 billion people, most of which belong to developing countries. Moderation, smoking cues, and hectic circumstances in the atmosphere are the reasons that provoke the smokers' wish to smoke (Difranza, 2010). While smoking, smoke containing nicotine is inhaled into the lungs. Nicotine is considered as a psychoactive drug in certain ways like heroin and cocaine. Many smokers feel difficulty to quit smoking because of its emphasizing effect and hence smoking becomes an emotional and bodily obsession (Kusi-Appau, 2011).

Smoking is responsible for fifteen types of cancer in human body and it can cause more than 25 diseases in human beings including verbal crack, ischemic heart disease and continuing swelling of throat. In different diseases like asthma, diabetes, reduced lung function and growth, osteoporosis and cardiovascular (Bonnie et al., 2015), smoking is considered as an influential reason or fundamental instrument. As compared to non-smokers, the risk of premature death is larger among smokers. Passive smokers also share these health hazards. At the end of this century, it is expected that the deaths caused by smoking related diseases will increase to four million per year globally (Skurnik and Shoenfeld 1998). Predictions show that in 2030 this number could increase by ten mil-

lion per year. Tar and nicotine are the main components of cigarettes that seriously damage the health. Apart from other diseases, smoking also causes high blood pressure and speeds up the process of aging (Ekpu and Brown 2015; Egbe et al., 2016). Moreover, tobacco smoking is not only dangerous for health but expensive as well. These expenses affect the other important expenditures such as basic household needs (Wang et al., 2006). This affect is greater in developing countries, and affecting the smokers as well as their whole family. Smoking is an expensive addiction (Hu et al., 2005). Expenses on alcohol and tobacco are higher than the expenditures on health. Tobacco expenses affect the social capital investment, financial security and future agricultural production. The expenditures on the basic needs of other family members such as utilities and food are affected by the smoking expenditures. Smoking has the significant intra family distributional effects (Liu et al., 2006).

Smoking cause many diseases that increase the medical expenditures, and also result in less ability to work and early deaths. Smoking also has negative effects on the living standard of the households, when the smokers have fewer resources and they use these resources on smoking expenditures instead of necessary expenditures. Then expenditures that are being spent on smoking instead of food, education and other necessities can cause low nutrition, low level of human capital and consequently low level of living. This habit decreases the share of income to be spent on essential requirements of the households who already have low level of income (Ahmed et al., 2008). Smoking cost affects the smokers in various ways and goes beyond buying the products of tobacco. Smokers spend a lot of money on protection price, medical bills and missing incomes. It is observed that people smoke less in higher socioeconomic classes as compared to lower socioeconomic classes (Irfan et al., 2014; WHO, 2015). Smoking affects the incomes of households negatively in many ways, like diseases, productivity loss and deaths. Moreover, when the incurring diseases risks are increased as a result, the expenditures on health also increase, which are the significant economic burden on poor families (Malik et al., 2010).

Smoking is very popular in Pakistan, as it is common in the other countries of the world. In Pakistan ninety percent of cancer cases pertain to lung cancer. It is observed that smoking rate in Pakistan is increasing every year. Pakistan is among the top 15 countries for burden of tobacco related morbidities and mortality (Alters and Schiff, 2009). There are almost 24 million tobacco users in the country (Cawley, 2004). Tobacco industries in Pakistan are increasing at the rate of five percent every year. Cigarettes that are found in Pakistan have the highest quantity of nicotine and tar as compared to those, which are found in the other countries of the world.

Pakistan is a developing country, which lacks proper anti-smoking regulations and people have lack of knowledge related to diseases caused by smoking. Although a lot of work has been done on the health risks caused by smoking and individual's well being internationally (Hosmer and Lemeshew, 1989) but there exist literature gap related to this topic for low-income developing countries like Pakistan. Previous studies like (Max, 2001) worked on the same aspect by reviewing the available literature but this study is unique in the sense that it has not only combined the medical aspects of smoking with economics but also used cross sectional data. This study was aimed at fulfilling this need. In this paper socio-economic determinants of smoking were estimated. Impacts of smoking on the economy of household were analyzed and recommendations were suggested in the light of investigated findings. This section was about the background of topic under study. In the next section data, its sources and models being employed are discussed. In the third part results and discussions are given. In the last part conclusion of study are discussed.

Materials and Methods

In order to achieve our objectives, we devised fundamental parameters from the data and followed econometric technique to check the significance, truthfulness and usefulness of our study. The data for the study was collected through personal interviews. A well-structured and pre-tested questionnaire was designed for the interview and questions were asked from the respondents according to the nature of the topic. In questionnaire, first section or aspect was about personal information of the respondents such as name, age, education, marital status, family size etc, in second aspect, information about income and expenditures were asked. Then, questions related to smoking status of respondents, the smoking status of their family and friends were asked.

We used primary (cross sectional) data and it was collected through personal interviews of 175 respondents from different areas of Faisalabad, Punjab. The dependent variables according to objectives of the study were smoking behavior of respondents, and it was of dichotomous nature. It was equal to 1, if a person smokes and 0 otherwise for visits to doctor or a hospital in a year or the expenditures spent on the diseases caused by smoking. Independent variables were personal, household and locational characteristics like age, education, income, family size etc.

Logit model was used because dependent variable was binary and the independent variables were continuous as well as discrete. It is a method for quantifying the association of the dependent and independent variables. The model is best for finding the determinants and the causes of smoking. Logit model is simple in calculation and the probability of this model lies between 0 and 1. When the values of independent variables are getting lower the probability it tends to 0 at lower rate. And when the value of independent variable getting higher the probability it tends to 1 at very lower rate.

Logistic Regression Analysis

Logit regression model is used when the dependent variable is of categorical nature and having two possible values 0 or 1. It is a beneficial method for describing the relationship between one or more independent variables for example age, education, income etc and dependent variable of categorical nature that have only two values such as whether a person smokes or don't smoke.

Logit regression model extends the methods of multiple regression models. Firstly, we must established the details for any multiple regression model and then set up the Logit model. We explain the logistic regression function f*(y)* that defines the calculated form of the model and suppose a group of *n* independent variables symbolized by the vector $x_i = (x_1, x_2 \ldots x_n)$. It is considered that the dependent variable *y* is linear mixture of a set of independents. It is better to use Logit model as the binary resultant variable is tremendously elastic (Hosmer and Lemeshew1989).

$$Y = \propto + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots\cdots\cdots + \mu_i \qquad (1)$$

Y is the outcome variable showing the smoking behavior of a person. It is a dummy variable having value of 0 or 1.

α is a constant term that represents the unknown parameters.

β_1, β_2 and β_3 are the vectors of parameters to be estimated.

X_i= age of the respondents in years, years of education, monthly income and so on.

This function is known as *f(y)*, is given by

$$f(y) = \frac{1}{1 + e^{-(\alpha + \sum_{i=0}^{n} \beta_i x_i)}} \qquad (2)$$

Logistic regression model ultimately represents the dependent variable, which is created on probabilities related with the values of *Y*. The probability that *Y = 1*, will be represented by *π(x)*, *Y= 1* shows that the person is a smoker. Similarly, the probability that *Y= 0* will be represented by *1 – π(x)*, *y= 0*, shows that the person is not a smoker. The common formula for logit regression model with single variable is as follows,

$$\pi(x) = \frac{e^{\propto + \sum_{i=1}^{n} \beta_i x_i}}{1 + e^{\propto + \sum_{i=1}^{n} \beta_i x_i}} \quad (3)$$

In this equation n = the number of independent variables and P(Y= 1/x) = π(x) = the conditional probability that the person is a smoker. The above equation can be put as,

$$P\left(Y = 1 \middle| x_{1,} x_{2,\ldots..,} x_n\right) = \frac{1}{e^{-(\propto + \sum_{i=1}^{n} \beta_i x_i)}} \quad (4)$$

The natural logs of the odds, the logits, of the unknown binomial probabilities are modeled as a linear function of the X_n.

$$logit\ (\pi(x)) = \ln\left[\frac{\pi(x)}{1-\pi(x)}\right] = \propto + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots\cdots\cdots + \mu_i \quad (5)$$

Estimation of First Objective Function

We used equation (1) for this

$$Y = \propto + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + \mu_i \quad (6)$$

Y is the outcome variable showing the smoking behavior of a person. It is a dummy variable having value of 0 0r 1.

α is a constant term that represents the unknown parameters.

β_1, β_2 and β_3 ....., β_9 are the vectors of parameters to be estimated.

X_1 = Education
X_2 = Gender
X_3 = Employment Status
X_4 = Total Income
X_5 = Number of smoker friends
X_6 = Smoking Reason
X_7 = Marital Status
X_8 = Elders' smoking behavior
X_9 = Total number of smokers in family

Estimation of Second Objective Function

We used equation (1) for this

$$Y = \propto + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \mu_i \quad (7)$$

Y = medical expenditures

α is a constant term that represents the unknown parameters.

β_1, β_2 and β_3 are the vectors of parameters to be estimated.

X_1 = Gender
X_2 = Total yearly income
X_3 = Total number of diseases
X_4 = Total number of smokers in family
X_5 = Age
X_6 = Education
X_7 = Marital Status

Results

The results of logistic regression are shown in the Table 1. Smoking status of the respondents is as a dependent variable. To analyze the impacts of smoking on the household economy, we employed health cost in the model as dependent variable. Health cost includes both direct and indirect costs incurred because of smoking like visit to doctor, fee, expenditure on medicine and transac-

tion cost. Higher health cost predicts negative impact on household economy. The results of the model are given in the Table 2.

The results showed that number of smokers in family, marital status, total yearly income and having smokers in the friend circle were the reasons of started smoking for a respondent. Number of smokers and non-smoker in the sample data were 130 and 45, respectively. Smokers have mean yearly total income greater than the non-smokers. Most of the respondents in data were the married very few were single these are 137 and 38 respectively. Mean smoking expenditures of smokers were Rs. 25047 per annum. Non-smokers spend suitable amount on entertainment that was Rs. 22920 annum and for smokers this amount was Just Rs. 4296 per year.

Discussion

In Table 1, the variable representing the education of the respondents is statistically significant and shows negative sign, implying that increase in number of years spent in school has negative effect on the smoking status. For one-year increase in the education level, the probability of being a smoker for a person is decreased by 0.209. Highly educated people smoke less because they are aware of the health hazards of smoking and hence they avoid smoking. Conversely, the people with low or no education smoke more than their educated counterparts.

The results of the analysis revealed that total yearly income has significant and positive impact on the smoking behavior of respondents. For one unit increase in the level of income, the probability for a respondent of being a smoker is increased by 1.988. It shows that the people who have high level of income smoke more than those who have low income. Smoking is possible when a person can afford it. These results are consistent with the findings of (Hu et al., 2005). In Pakistan, usually an average pack of cigarettes costs around the same price as of a regular meal for a person.

Smoking is seen to be an odd in the society especially in Pakistan, where family values are given considerable importance. Young smokers usually avoid smoking in public and especially in the presence of their family members. Presence of a smoker in the family is seen to have a statistically significant and positive impact on the smoking behavior of individuals. The more the members of household are smokers; the probability for an individual of being a smoker is 2.32. Gender shows positive but statistically insignificant impact on the smoking behavior of respondents. Males smoke more than the females.

The probability of being a smoker is increased by 1.028 when the gender of respondent is male. Marital status has positive but insignificant impact on the smoking behavior of individuals. Results show that the respondents who are married smoke more as compared to single respondents. It can be justified by the reason that married people are usually socially and economically independent. The smoking behavior of elders has significant and positive impact on the smoking behavior of respondents, which was validated by (Hu et al., 2005; Liu, 2006). Each additional elder person in the household who smoke in front of the respondents, the probability for a respondent to being a smoker is increased by 3.026. Total number of friends who smoke cigarettes has significant and positive impact on the smoking behavior of respondents. Against a smoker friend, the probability of being a smoker for the respondent is increased by 1.483.

Table 1. Logistic model results for smoking status

Variables	Coefficients	S.E	z	P > z
Education	-0.209	0.118	-1.76	0.078
Gender	1.027	1.062	0.97	0.334
Employment Status	-0.440	1.059	-0.42	0.678
Total income	1.988	0.995	2.00	0.046

Variables	Coefficients	S.E	z	P > z
Smoker friends	1.483	0.401	3.69	0.000
Smoking reason	1.102	0.647	1.70	0.089
Marital status	0.988	0.987	1.00	0.317
Elders behavior	3.848	1.369	2.81	0.005
Total number of smokers in family	3.026	0.733	4.13	0.000
Constant	-12.361	3.127	-3.95	0.000

In Table 2, education is statistically significant but negatively related with the medical expenditure of the respondents. For one unit change in the education, the probability of medical expenditure for a smoker is decreased by 0.144. As more people are educated, the chances of falling into poverty trap would decrease. As educated people smoke less so their medical expenditure would also be less and they may have better living standards and having positive impact on the household economy.

Diseases have statistically significant and positive relation with medical expenditure. For one unit increase in the number of diseases the probability of medical expenditure for a smoker is increased by 2.691. The respondents who smoke have higher number of diseases; as a result, they spend a lot of money on the medical expenditure. They can spend this money on the other basic needs of the family and their own as well. Presence of a smoker in the family is positively and significantly related to the poverty, putting household economy on stake. With the increase of a smoker in family, the probability of medical expenditure (health cost) is increased by 2.580.

Total annual income has significant and positive impact on medical expenditure of respondents. One unit increase in the total income would increase the probability of medical expenditure (health cost) by 1.442. The results suggest that people with high level of income will have greater expenditures on health, as they smoke more. These results are consistent with the findings of (McCay et al., 2009; Peretti-Watel et al., 2013). Gender is statistically insignificant but positively related with medical expenditure of respondents. The males smoke more than the females. So, they have medical expenditures greater than the females. The more the male respondent smoke the probability of the medical expenditure for a smoker is increased by 0.481 implying that males usually ignore their family welfare and tend to lower down their household economics.

Table 2. Logistic model results for impacts of smoking on the household economy

Variables	Coefficients	S.E	z	P > z
Gender	0.481	0.739	0.65	0.515
Total income	1.442	0.621	2.32	0.020
Number of diseases	2.691	0.941	2.86	0.004
Total number of smokers in family	2.580	0.506	5.10	0.000
Age	0.020	0.026	0.79	0.431
Education	-0.144	0.072	-1.99	0.047
Marital status	1.482	0.840	1.76	0.078
Constant	-6.490	1.780	-3.65	0.000

Conclusions

The study revealed promising results about the causes and effects of smoking on the smokers and their families and also about the negative effects on the household economy. The results showed

that number of smokers in family, marital status, total annual income and having smokers in the friend circle were the major reasons of starting smoking. Education was negatively related with the smoking status of respondents as the increase in the number of years of schooling decreases the chances of being a smoker. The effect on the household economy was analyzed by the expenditures spent on the medical bills. It is concluded that smoking damages the human health, and to fight with this damage, respondents have to spend a significant portion of their income on the medical expenditures causing negative impact on the household economy.

For researchers, we recommend that the study needs to be replicated in the other areas of the country as well. It needs to be taken as an urgent and top priority issue by the government as smoking apart from causing health hazard; it has negative effects on the economy of household. Moreover, it is suggested that there is acute need for government and non-government organizations to launch awareness programs as smoking not only affects the smokers but their friends and families as well. Study data shows that the majority of smokers are unable to attribute reasons for unsuccessful quitting, while others relate it to addiction, stress and peer pressure (Sturm, 2002; Peretti-Watel et al., 2013; Shaheen et al., 2018) and consequently smoking related disease tend to increase significantly.

References

Ahmed R, Rizwan-ur-Rashid MP, Ahmed SW (2008). Prevalence of cigarette smoking among young adults in Pakistan. *J Pak Med Assoc*, *58*(11), 597-601.

Alters S, Schiff W (2009). Essential concepts for healthy living. Jones & Bartlett Publishers.

Bonnie RJ, Kwan LY, Stratton KR (2015). Public health implications of raising the minimum age of legal access to tobacco products. Washington, DC: National Academies Press.

Cawley J (2004). An economic framework for understanding physical activity and eating behaviors. *American journal of preventive medicine*, *27*(3): 117-125.

Difranza J (2010). A new approach to the diagnosis of tobacco addiction. *Addiction*, 105(3): 381-382.

Egbe CO, Petersen I, Meyer-Weitz A (2016). Knowledge of the Negative Effects of Cigarette Smoking on Health and Well-Being among Southern Nigerian Youth. *International Journal of Social Science and Humanity*, 6(3): 184.

Ekpu VU, Brown AK (2015). The economic impact of smoking and of reducing smoking prevalence: review of evidence. *Tobacco use insights*, *8*, TUI-S15628.

Hosmer DW, Lemeshew S (1989). Applied Logistic Regression. A Wiley-Inter science Publication, New York.

Hu TW, Mao Z, Liu Y, de Beyer J, Ong M (2005). Smoking, standard of living, and poverty in China. *Tobacco control*, *14*(4): 247-250.

Irfan M, Haque AS, Awan S, Khan JA (2014). Reasons of failure to quit smoking: a cross sectional survey in major cities of Pakistan. *European Respiratory Journal*, *44:* (Suppl 58), 44-66.

Kusi-Appau I (2011). Smoking habits among adolescents: a literature review. Bechlor Degree Thesis. Turku University of Applied Sciences. Online available at: www.theseus.fi

Liu Y, Rao K, Hu TW, Sun Q, Mao Z (2006). Cigarette smoking and poverty in China. Social science & medicine, 63(11): 2784-2790.

Malik AK, Chaudhry A, Karamat A, Arif N, Cheema MA, Rauf A (2010). Cigarette smoking and health care professionals at Mayo Hospital, Lahore, Pakistan. *JPMA. The Journal of the Pakistan Medical Association*, *60*(6): 509-512.

Max W (2001). The financial impact of smoking on health-related costs: a review of the literature. *American Journal of Health Promotion*, *15*(5): 321-331.

McCay W, Dingwell H, Golden RN, Peterson FL (2009). The Truth about Smoking. Second edition. USA. DWJ Books LLC. Pages 76 – 77.

Peretti-Watel P, L'haridon O, Seror V. (2013). Time preferences, socioeconomic status and smokers' behaviour, attitudes and risk awareness. *The European Journal of Public Health*, *23*(5): 783-788.

Shah BK, Nepal AK, Agrawal M, Sinha AK (2012). The effects of cigarette smoking on hemoglobin levels compared between smokers and non-smokers. *Sunsari Technical College Journal*, *1*(1): 42-44.

Shaheen K, Oyebode O, Masud H (2018). Experiences of young smokers in quitting smoking in twin cities of Pakistan: a phenomenological study. *BMC public health*, *18*(1): 466.

Skurnik Y, Shoenfeld Y (1998). Health effects of cigarette smoking. *Clinics in dermatology*, *16*(5): 545-556.

Sturm R (2002). The effects of obesity, smoking, and drinking on medical problems and costs. *Health affairs*, *21*(2): 245-253.

Wang H, Sindelar JL, Busch SH (2006). The impact of tobacco expenditure on household consumption patterns in rural China. Social Science & Medicine, 62(6): 1414-1426.

World Health Organization (WHO): Fact Sheet on Tobacco control in Pakistan (2015). Retrieved from http://www.who.int/tobacco/about/partners/bloomberg/pak/en/. Accessed 15 Jan 2018.