

## Determinants and Health Impacts of Tobacco Use: A Quantitative Method Investigation in District Shahdadt, Sindh, Pakistan



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### Abstract

Tobacco has deemed to be the source of income in many nations but has also been considered to be the significant public health concern in Pakistan, specifically in the regions where the healthcare access, education and income level are low. This study investigates the key determinants and self-reported health impacts of tobacco use among adults in District Shahdadt, Sindh, using a quantitative cross-sectional design. Data were collected through structured questionnaires administered to a stratified random sample of 250 participants. The analysis reveals that tobacco use is especially prevalent among males (87.2%), individuals aged 26–35 (39.2%), and those with low levels of education and income. More than 44% of smokers earned below PKR 15,000 per month, with this group spending nearly 28.5% of their income on tobacco—an alarming figure that underscores the financial burden placed on already vulnerable households. Regression analysis showed a strong positive association between the numbers of cigarettes smoked per day and reported health symptoms, including chronic cough (71.2%), reduced stamina (74.8%), and frequent headaches (53.6%). Earlier initiation of smoking was linked with more severe health consequences, reinforcing concerns about adolescent vulnerability. Psychosocial factors such as stress relief, peer pressure, and family disapproval also influenced tobacco behavior, while nearly 72% of smokers had attempted to quit at least once. The study further revealed a significant opportunity cost associated with tobacco spending, especially for low-income users who sacrificed food, healthcare, and education to sustain their smoking habits. These findings call for localized and multidimensional tobacco control interventions that consider the socio-economic realities of rural populations. There is a pressing need for culturally sensitive education campaigns, economic support for cessation, and stronger policy enforcement targeting informal tobacco markets. This research contributes empirical evidence to inform public health policy, especially in resource-limited settings.

**Keywords:** Tobacco use, Health impacts, Smoking behavior, financial burden, Public health, Shahdadt, Rural Pakistan.

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Received: 03 January 2025; Received in revised form 04 February 2025; Accepted: 11 February 2025;

Available Online: 16 February, 2025

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## Introduction

Tobacco consumption continues to pose a major public health threat across the globe, accounting for millions of preventable deaths each year (Novotny & Slaughter, 2014). Its burden falls disproportionately on low- and middle-income countries, where healthcare systems often lack the capacity to manage tobacco-related diseases (He et al., 2022). According to the World Health Organization (WHO, 2021), tobacco use is responsible for over 8 million deaths annually, with more than 80% of tobacco users living in developing regions. In Pakistan, the rising trend of tobacco consumption, particularly among disadvantaged and rural populations, signals an urgent need for targeted health interventions. Tobacco is a known risk factor for numerous non-communicable diseases (NCDs), including heart disease, chronic respiratory illnesses, and various cancers (WHO, 2022)<sup>a</sup>. Tobacco smoke adds to toxicants in the air inhaled by inhabitants of indoor public and work spaces, including houses, and these toxicants can cause disease in those who do not use tobacco themselves (Clayton et al., 2020). At least 70 of the more than 7000 compounds found in tobacco smoke have been linked to cancer in both humans and animals. Third-hand smoke is the tobacco smoke and its chemical byproducts that are still present in the air and on surfaces after smoking tobacco indoors. These chemicals pollute surfaces and ambient air and produce secondary pollutants when they interact with oxidants and other substances in the environment (Novotny et al., 2015). Residue removal from this pollution is expensive and may be harmful to the health of young children who live in the house. Due to the lung inflammation caused by second-hand smoke exposure, school-aged children who are exposed to second-hand smoke's negative effects are also at risk for developing asthma (Ravi et al., 2024). Despite public health awareness campaigns and increased regulation, the use of tobacco remains widespread in certain parts of the country, pointing to deeply rooted socio-economic, behavioral, and cultural influences that require further exploration (WHO, 2022)<sup>b</sup>. One such area is District Shahdadkot in Sindh province, where a unique set of local factors make it a critical case for studying tobacco use and its related health outcomes. The region is marked by persistent poverty, limited access to formal healthcare, low levels of literacy, and cultural norms that normalize or even promote tobacco use. In these settings, tobacco consumption is not just a health hazard—it is embedded in social identity, stress coping mechanisms, and intergenerational behaviors. Although national surveys have provided broad data on smoking and other tobacco habits, they often overlook regional nuances. There is a clear gap in research at the district level, particularly in areas like Shahdadkot, where contextual variables such as age, gender, education, income, and occupational exposure may play a significant role in influencing tobacco habits and their health effects.

It has been indicated by existing literature that tobacco use is instigated by a number of factors. Research in South Asia has associated an increased consumption level with poverty, low education, and stress associated with work (Rosilawati et al., 2024; Ekpenyong et al., 2024). Tobacco use in the rural environment can be strengthened by peer groups, the family community, and ignorance in terms of the long-term health effects (Aryee et al., 2024). There are speculations that gendered social norms in Pakistan cause increased reporting of prevalence among men due to the social aspect of tobacco in females and adolescents. Some of the long term health complications linked to smoking tobacco include chronic coughing, lung problems and heart related diseases such as hypertension as well as oral diseases- these are being frequently diagnosed and treated in areas without adequate health care facilities and health literacy. The current study attempts to uncover these research gaps by performing a quantitative study in a district level research that investigates the social and behavioral determinants

of tobacco usage combined with a study that attempts to determine the perceived health outcome of tobacco usage among the adult population of Shahdadkot.

This study will produce evidence that can guide more culturally sensitive and responsive policies of tobacco control because it focuses on a risk district that has not been studied before. This knowledge will be made useful in the more general aims of the National Health Vision 2025 of Pakistan and comply with international obligations in the WHO Framework Convention on Tobacco Control (FCTC). Finally, this study will show how necessary it is to create locally specific health interventions promoting a healthy lifestyle using an understanding of the needs of people and the realities of the disease in communities where tobacco abuse is a social and a medical problem.

## **Methodology**

### **Research Design**

This study employed a quantitative, cross-sectional design to investigate the factors contributing to tobacco use and its self-reported health effects among adult residents of District Shahdadkot in Sindh, Pakistan. The approach was selected to capture a broad overview of behavioral and demographic trends associated with tobacco consumption at a specific point in time. A structured questionnaire enabled the systematic collection of measurable data for statistical analysis.

### **Study Area and Population**

District Shahdadkot, located in northern Sindh, was chosen due to its unique socio-economic profile, limited health infrastructure, and high prevalence of tobacco use. The district includes both rural and semi-urban settlements, with agriculture and daily-wage labor as dominant occupations. The study population consisted of adult men and women aged 18 years and above, residing in selected areas of the district. Individuals who had been living in the district for at least one year were eligible to participate.

### **Sampling Procedure and Sample Size**

A multistage stratified random sampling technique was used to ensure representation from taluka Shahdadkot and communities. The communities were randomly selected with the main respondents who were current smokers as well as some non-smokers. Selection of the respondents were chosen from the hotels, play grounds, community parks as well as markets to gather the justifiable information. The final sample consisted of 250 respondents, calculated using a standard formula for a finite population with a 95% confidence level and 5% margin of error. This sample size allowed for reliable regression analysis and subgroup comparisons.

### **Data Collection Instrument**

Data were collected through a structured, interviewer-administered questionnaire, developed after reviewing existing literature on tobacco use and health outcomes in rural South Asia. The questionnaire was divided into three sections:

**Section A** gathered demographic information, including age, sex, education, income, and occupation.

**Section B** focused on tobacco-related behavior, such as type and frequency of use, age of initiation, and social influence.

**Section C** covered self-reported physical symptoms potentially linked to tobacco use, including chronic cough, chest discomfort, fatigue, and oral health complaints.

The questionnaire was first piloted with 30 participants from a non-sampled village to test for clarity and relevance. Adjustments were made based on the pilot feedback. Data collection took place from March to May 2024, conducted by trained local enumerators fluent in Sindhi and familiar with local cultural norms.

### **Instrument Reliability and Validity**

To ensure consistency, Cronbach's alpha was calculated for key items related to health symptoms and awareness, with a reliability coefficient of 0.72, indicating acceptable internal consistency. Face and content validity were assessed through consultation with public health professionals and academics familiar with tobacco research. Linguistic adjustments were made during the pilot phase to enhance clarity in the local context.

### **Data Processing and Analysis**

All responses were coded and entered into SPSS (version 27) for statistical analysis. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize participant characteristics and tobacco use patterns. Binary logistic regression was applied to identify significant predictors of tobacco use, with independent variables including age, gender, education, income, and peer influence.

## **Results**

**Table 1: Socio-Demographic Profile of Smokers (n=250)**

<b>Variable</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age</b>	18–25 years	72	28.8%
	26–35 years	98	39.2%
	36–45 years	56	22.4%
	>45 years	24	9.6%
<b>Gender</b>	Male	218	87.2%
	Female	32	12.8%
<b>Education</b>	No formal	45	18.0%
	Primary	67	26.8%
	Secondary	92	36.8%
	Tertiary	46	18.4%
<b>Income (PKR)</b>	<15,000	112	44.8%
	15,000–30,000	85	34.0%
	>30,000	53	21.2%

Our field survey in Shahdaddkot reveals distinct smoking prevalence patterns. The data shows the highest smoking rates among 26-35 year olds (39.2%), consistent with the typical age of nicotine addiction onset in developing countries. Besides that, the lowest ration (9.6%) were observed to be exceeding age of 45 years. The striking gender disparity (87.2% male smokers) reflects cultural restrictions on female tobacco use in rural Sindh, while female with (12.8%) were also observed. Education appears inversely related to smoking - only 18.4% of smokers achieved tertiary education compared to 44.8% with primary schooling or less. This matches national literacy-smoking correlations from Pakistan's latest health survey. Most concerning is the 44.8% smoking prevalence among those earning <PKR 15,000 monthly, suggesting tobacco expenditure competes with food and healthcare in low-income households.

**Table 2: Smoking Patterns and addiction level**

Variable	Category	Frequency	Percentage
Smoking Duration	<5 years	89	35.6%
	5–10 years	102	40.8%
	>10 years	59	23.6%
Cigarettes/Day	1–5	76	30.4%
	6–10	118	47.2%
	>10	56	22.4%

The smoking patterns reveal critical public health insights. The 40.8% smoking for 5-10 years represent the prime target for cessation programs before chronic addiction develops. Nearly half of smokers (47.2%) consume 6-10 cigarettes daily - exceeding the moderate risk threshold. The 22.4% smoking >10 cigarettes/day require urgent intervention as they face the highest health risks. These findings align with recent addiction studies from rural Punjab, suggesting similar tobacco use trajectories across Pakistan's agricultural regions.

**Table 3: Hierarchical Regression for Health Impacts**

Model	Predictors	$\beta$	SE	t	p	95% CI	R <sup>2</sup> Change
1	(Constant)	1.02	0.31	3.29	0.001	[0.41, 1.63]	0.38
	Cigarettes/day	0.45	0.08	5.63	<0.001	[0.29, 0.61]	
2	Smoking duration	0.32	0.07	4.57	<0.001	[0.18, 0.46]	0.12
3	Age at initiation	-0.18	0.05	-3.60	<0.001	[-0.28, -0.08]	0.07

Our regression analysis quantifies smoking's health impacts with concerning clarity. Each additional daily cigarette increases health risks by 18% ( $\beta=0.45$ ), matching global estimates from longitudinal studies. The duration effect ( $\beta=0.32$ ) confirms that long-term smokers face compounding damage. The protective effect of later initiation age (-0.18) supports neurobiological evidence about adolescent vulnerability to nicotine. These robust findings ( $R^2=0.57$ ) provide strong evidence for stricter tobacco controls in Pakistan.

**Table 4: Self-Reported Health Issues (Multiple Response)**

Symptom	Frequency	Percentage	Odds Ratio	p-value
Chronic cough	178	71.2%	3.21	<0.001
Shortness of breath	145	58.0%	2.78	0.003
Chest pain	92	36.8%	1.95	0.021

Frequent headaches	134	53.6%	2.12	0.008
Reduced stamina	187	74.8%	4.02	<0.001
Sleep disturbances	78	31.2%	1.67	0.042
Digestive issues	65	26.0%	1.42	0.087

The symptom profile reveals tobacco's devastating multi-system effects. The 71.2% chronic cough rate exceeds urban studies, likely due to Shahdadkot's poorer air quality exacerbating smoking damage. Severe stamina loss (74.8%) indicates significant cardiovascular impairment. Emerging digestive complaints (26%) require further study given new research on smoking's gastrointestinal impacts. These findings demonstrate that rural smokers suffer broader health consequences than typically recognized.

**Table 5: Psychosocial Factors (5-point Likert)**

Statement	Mean	SD	% Agree	Factor Loading
"Smoking helps me relax"	4.1	0.9	82.4%	0.72
"I smoke more when stressed"	3.8	1.1	76.0%	0.68
"Quitting seems impossible"	3.2	1.3	48.8%	0.61
"Family disapproves of my smoking"	4.3	0.8	86.0%	0.55
"I've tried quitting before"	3.7	1.2	72.4%	0.59
"Health warnings scare me"	3.5	1.0	64.8%	0.49
"I smoke due to peer influence"	2.9	1.4	42.0%	0.38

The psychosocial data reveals complex behavioral drivers. While 82.4% use smoking for stress relief, the high quit attempt rate (72.4%) shows motivation exists but fails without support. Strong family disapproval (86%) contrasts with urban studies, possibly reflecting conservative rural values. Besides that, the smoking was noticed to be adopted when felt stressed with the (76%). Since, the lowest concern with (42%) was smoking due to peer influence. The identified stress, social and health motivation factors should guide development of culturally-appropriate cessation programs for Sindh.

**Table 6: Financial Burden by Income Quintile**

Income (PKR/month)	Avg. Spend	% Income	Health Spend	Opportunity Cost
<10,000	2,850	28.5%	1,200	3.2x food budget
10,000-20,000	3,700	18.5%	1,850	2.1x education
20,000-30,000	5,200	17.3%	2,600	1.8x utilities
30,000-40,000	6,800	17.0%	3,400	1.5x savings
>40,000	9,100	18.2%	4,550	0.9x leisure

The financial analysis exposes tobacco's role in perpetuating poverty. The poorest spend 28.5% of income on tobacco - more than triple their typical food budget. The near-parallel tobacco and health spending (r=0.79) creates a devastating double burden. When cigarettes cost 3.2 times more than food staples, this constitutes a dire public health equity crisis requiring immediate policy action.

## Discussion

Tobacco consumption and aligned health risks reflecting economic impacts were investigated in district Shahdadkot reflecting global trends specifically in low and middle income countries where

structural inequalities shape behavioral health outcomes. This study's results, including high smoking prevalence among low-income, less-educated males aged 26–35, are strikingly similar to findings from rural Nepal, where a national health survey revealed that over 65% of adult male smokers were from the lowest income quartile and reported higher rates of tuberculosis and chronic respiratory conditions (Thappa et al., 2024). Like Shahdadt, tobacco spending in Nepalese households often surpassed expenditures on nutrition and children's education, reinforcing intergenerational cycles of poverty and poor health. Comparable trends were documented in Indonesia, where a World Bank study found that the poorest households spent over 11% of their total income on tobacco—frequently more than on essential food items—leading to heightened child malnutrition and stunted growth (Sahadewo et al., 2024; Swarnata et al., 2024). In a similar vein, studies from sub-Saharan Africa, particularly in Nigeria and Kenya, reported that tobacco usage was most prevalent among young men engaged in informal or agricultural labor (Onoh et al., 2021). In these contexts, tobacco was consumed both as a stimulant to endure physically demanding work and as a socially accepted method of stress relief, echoing the 82.4% of respondents in Shahdadt who used smoking to cope with emotional distress.

Furthermore, the health impacts recorded in Shahdadt—including chronic cough (71.2%), reduced stamina (74.8%), and frequent headaches (53.6%)—are consistent with epidemiological data from China, where rural smokers were significantly more likely to experience early onset of chronic obstructive pulmonary disease (COPD) and elevated risk of stroke (Ying et al., 2024). In Vietnam, a study in semi-urban provinces found that early smoking initiation was correlated with poor lung capacity in adulthood, reinforcing the Shahdadt regression analysis, which showed that early initiation of smoking significantly worsened health outcomes ( $\beta = -0.18$ ) (Tran & Oh, 2019). Additionally, in Turkey, where tobacco usage among working-class men remains high, health expenditure and lost productivity due to tobacco-related illness contributed substantially to national economic losses (Caglayan-Akay et al., 2024). These international patterns lend support to the argument that tobacco use in marginalized settings is less about individual irresponsibility and more about limited alternatives for stress management, social acceptance, and misinformation about health risks.

The psychosocial dimensions identified in Shahdadt, such as strong familial disapproval (86%) but high relapse rates despite quit attempts (72.4%), are reflected in studies from Bangladesh and Egypt, where male smokers reported community pressure to quit but lacked access to counseling or nicotine replacement therapy (Rashid et al., 2024). In South Africa, similar behavioral contradictions emerged: while a high proportion of smokers acknowledged the dangers of tobacco, few had access to structured cessation programs, particularly in rural districts (Reddy et al., 2015). These shared challenges suggest that structural deficits—such as weak health systems, informal tobacco markets, and insufficient regulation—contribute to the persistence of tobacco use across geographically and culturally diverse contexts. Moreover, in Latin America, research in rural Bolivia and Peru showed that local economies partially rely on tobacco sales, complicating anti-tobacco efforts and creating a conflict between livelihood and health (Sonora et al., 2022), a tension echoed in parts of Sindh where informal trade sustains tobacco affordability and accessibility.

These case studies illustrate that the Shahdadt findings are not isolated but emblematic of a wider global health crisis fueled by poverty, misinformation, and policy inertia. The convergence of behavioral, economic, and structural determinants of tobacco use in countries as diverse as Indonesia,

Nigeria, Vietnam, Egypt, and Peru confirms that comprehensive interventions must go beyond awareness campaigns. Instead, they must incorporate economic supports, education reforms, healthcare accessibility, and stronger enforcement mechanisms. Shahdadtot thus serves as a microcosm of global tobacco-related inequities, providing critical empirical insights for crafting context-specific, yet globally informed, strategies to combat the tobacco epidemic.

## Conclusion

The results of this research point out to a major public health concern in the District Shahdadtot with such intense connectedness to the use of tobacco, socio-economic realities and day to day coping mechanisms. The use of tobacco was revealed to be prominently associated with poor income, male gender, little education, and mental strain and the health effects of tobacco were as regards to the respiratory and cardiovascular symptoms as well as sleeping and stamina. The economic analysis indicated that poor smokers spend a huge share of the little they have on the consumption of tobacco products at the expense of other important practices like food, health care and education. These two burdens: poor health and monetary insecurity, illustrate the systematic quality of the toll that tobacco takes in deprived rural environments. The intergenerational cycle of addiction, disease, and poverty will probably continue without extensive local interventions, and tobacco will serve as the significant contributor to health disparity in Sindh.

## Policy Recommendation

These findings have strongly notified the policymakers that the controlling of tobacco in rural areas such as Shahdadtot should be a top priority, using an integrated approach. To begin with, there should be the adoption of linguistically and culturally oriented community-wise awareness programs that address the misperceptions among tobacco and stress-related relief to stress. Second, offer tobacco tax rebate or conditional cash transfer opportunity on attempts to quit tobacco usage to also lessen economic dependence on tobacco sales among low-income users. Third, anti-tobacco education should be included in basic healthcare and schools, and the rural cessation services should be broadened to include the mobile clinics, and the nicotine replacement therapy. Finally, control informal selling of tobacco, packaging regulation, and subsidize alternative programs that will earn the younger and informal employees income with which they will not be tempted to get into addiction. Equity-based approach, with a reduced scale, is critical and would help to minimize the morbidity-related to tobacco and would promote the public health in marginalized districts of Pakistan.

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