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Research Report

The Crowding Out Effect of Tobacco Spending in Pakistan

2021

SOCIAL POLICY AND DEVELOPMENT CENTRE

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The Crowding Out Effect of Tobacco Spending in Pakistan

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Social Policy and Development Centre

March 2021

The University of Illinois Chicago's (UIC) Institute for Health Research and Policy is funding a group of economists to develop evidence-based policy support for effective tobacco tax policies in low- and middle-income countries with the highest rates of tobacco consumption. The global collaboration on the economics of tobacco is facilitated through Tobacconomics, a web-based platform. UIC is a partner of the Bloomberg Initiative to Reduce Tobacco Use.

The Social Policy and Development Centre (SPDC) is funded by the UIC Institute for Health Research and Policy to conduct economic research on tobacco taxation in Pakistan. The views expressed in this report cannot be attributed to, nor do they represent, the views of UIC, the Institute for Health Research and Policy, or Bloomberg Philanthropies.

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Executive Summary

Pakistan is a high-tobacco-burden country where more than 29 million adults use tobacco in some form, and tobacco expenditures constitute a sizeable portion of household budgets. Tobacco expenditure occurs at the cost of spending on necessities such as basic food, health, education, and housing. Therefore, policy interventions aimed at reducing tobacco use can have a significant impact on household welfare. Tobacco taxation, the most effective and cost-effective intervention to reduce tobacco use, is utilized in Pakistan as a policy tool for tobacco control. However, the government made a substantial reduction to the excise tax on cigarettes in 2017–18, which led to a price decline and fuelled cigarette consumption.

In this context, the current study assesses the impact of tobacco use on household expenditure patterns in Pakistan using data from the Household Integrated Economic Survey of 2015–16 and 2018–19. The study complements the authors' earlier work on the crowding out effect of tobacco expenditure in Pakistan. The key findings are the following:

- In Pakistan, overall tobacco-user households spend nearly three percent of their monthly budget on tobacco, while poor households devote more of their budget to tobacco compared to rich households.
- As a result of the tax-reduction policy, the real prices of cigarettes declined sharply by more than 27 percent in 2017–18. A comparison of the inflation-adjusted price index of cigarettes between 2015–16 and 2018–19 shows a decline of 22 percent during this period.
- The share of tobacco in total household expenditure decreased from 2.9 percent to 2.7 percent between 2015–16 and 2018–19. However, despite a decline in the tobacco budget share, monthly consumption of cigarettes per household increased by 27 percent, owing to reduced prices.
- The study finds strong evidence of a crowding out effect in Pakistan, where tobacco expenditure occurred at the expense of other household expenditures, in both years of analysis. The results for 2018–19 suggest that despite the decrease in its budget share, tobacco spending had a negative effect on the shares devoted to food, health, education, housing, household durables, and other commodities. The simulation analysis suggests that a reduction in tobacco expenditures by 50 percent would lead to an aggregate increase of 12 percent in expenditure on these commodity groups.

For lower-income households, the major share of this increase would be devoted to basic food (47 percent) and health (21 percent).

- Some significant differences are observed between tobacco-user households belonging to different income groups. Basic food is the commodity that is most affected by tobacco use in lower-income households. In contrast, the budget shares of basic food and education are not affected by tobacco spending in higher-income households. A comparison of 2015–16 and 2018–19 indicates no profound differences in the pattern of crowding out effects at the aggregate level.

1 INTRODUCTION

Tobacco use has been globally acknowledged as a critical public health concern and is estimated to cause more than eight million deaths each year.[1] Pakistan is a high-tobacco-burden country where 31.8 percent of adult men and 5.8 percent of adult women use tobacco in some form.[2] Based on population projections for 2021,[3] this may translate to a population of more than 29 million tobacco users. The prevalence of tobacco use is higher among poor households. Estimates[4] based on Pakistan's Household Integrated Economic Survey (HIES) 2018–19 indicate that tobacco is consumed in 45.5 percent of households in the country—the ratio is 48.8 percent and 37.9 percent in poor and rich households, respectively.

The detrimental impacts of tobacco use are not limited to health alone, as it also affects people's economic and social well-being across the globe. At the household level, tobacco spending can crowd out necessary expenditures on basic needs (Wang et al., 2006) and thus can have a direct bearing on household welfare. The research evidence suggests that household consumption patterns are significantly affected by tobacco expenditure. Moreover, the crowding out effect is generally greater among poor households—especially when it comes to food and education-related expenditures.[5] Analysing household spending patterns, therefore, becomes crucial for understanding the opportunity cost of tobacco use.

With regard to Pakistan, a study by the Social Policy and Development Centre (SPDC), using HIES 2015–16 data, found strong evidence of a crowding out effect where tobacco expenditure led to reduced spending on basic needs, particularly among poor households (Saleem & Iqbal, 2020). The analysis revealed that poor households spend more of their budget on tobacco than rich households, and the budget share allocated to tobacco is even greater than education and health. The current study is a continuation of the abovementioned research and uses the latest HIES 2018–19 data to estimate the impact of tobacco use on household consumption patterns. Exploring the change in these patterns is particularly important, considering the changes in tax policy and cigarette prices during this period.

The research evidence suggests that household consumption patterns are significantly affected by tobacco expenditure.

[1] https://www.who.int/news-room/fact-sheets/detail/tobacco

[2] Global Adult Tobacco Survey (GATS) Pakistan, 2014, available at https://www.who.int/tobacco/surveillance/survey/gats/pak/en/

[3] https://www.census.gov/data-tools/demo/idb/informationGateway.php

[4] Authors' estimates based on data from the Household Integrated Economic Survey, Pakistan Bureau of Statistics, Government of Pakistan (2018–19)

[5] See for example Efroymson et al. (2001), Wang et al. (2006), John (2008), San & Chaloupka (2016), Paraje & Araya (2018), and Saleem & Iqbal (2020).

The Federal Excise Duty (FED) is the major tax levied on cigarettes in the country, and its structure is based on a price-tier system; higher specific rates are applied to brands with higher prices. In 2015–16, the reference year of the previous study, a two-tier FED structure was in place. In 2017, the government introduced a three-tier excise duty structure for cigarettes—with a new tier for the low-priced brands. The tax rate applicable to the new tier was substantially reduced, which led to a decline in cigarette prices (SPDC, 2018). The price data of the Pakistan Bureau of Statistics (PBS) shows that the average price of cigarettes in 2018–19 was less than that in 2015–16, which would have affected cigarette consumption. In this context, the current research aims to compare the crowding out effects of tobacco expenditure for 2015–16 and 2018–19 and assess whether there was any change in the pattern of household expenditure, especially consumption expenditure on tobacco. The analysis is carried out separately for poor and rich households.

This report is organized into seven sections. Trends in tax policy, cigarette prices, and tobacco spending are given in Section 2, while Section 3 provides estimates of cigarette consumption in relation to tax and price changes. Section 4 presents data sources and descriptive analysis. Research findings and the simulated effect of tobacco expenditure are discussed in sections 5 and 6, respectively. The closing section draws conclusions and policy implications.

2 TREND IN TAX RATES, CIGARETTE PRICES, AND TOBACCO SPENDING

The structure and rates of FED have gone through several revisions during the last few years. A major change was made in 2017–18 when the federal government introduced a three-tier FED structure for cigarettes—with a new tier for the low-priced brands. The tax rate applicable on the new tier was reduced by 48 percent, from Rs 1.5 per stick to Rs 0.8 per stick. The reason given by the government for drastically reducing the tax rate was to eliminate the illicit trade of cigarettes by reducing the price differential for the lowest tier and enhancing revenue by increasing the share of duty-paid cigarettes.[6] However, contrary to the government's expectation, the tax rate reduction led to a loss of potential revenue (SPDC, 2018a). As shown in Figure 1, the effective FED rate declined from Rs 1.9 per stick to Rs 1.1 from 2016–17 to 2017–18. Comparison of the two years selected for the analysis shows that the effective tax rate declined by 12 percent between 2015–16 and 2018–19.

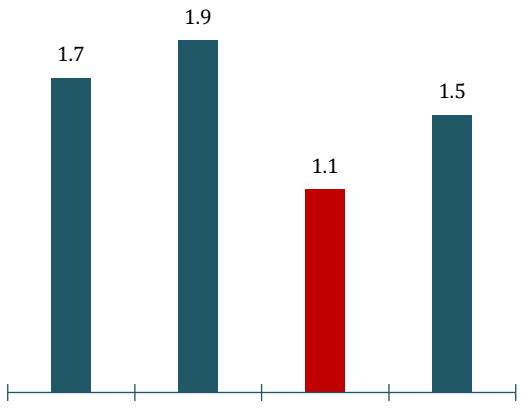
The effective tax rate declined by 12 percent between 2015–16 and 2018–19.

[6] See SPDC (2018) for further details.

Table 1. Structure of federal excise duty on cigarettes	
Tier: Price per thousand sticks	FED Rate
2015–16	
Tier 1: ≤ Rs 3,600	Rs 1,420
Tier 2: > Rs 3,600	Rs 3,155
2016–17	
Tier 1: ≤ Rs 4,000	Rs 1,536
Tier 2: > Rs 4,000	Rs 3,436
2017–18	
Tier 1: ≤ Rs 2,950	Rs 800
Tier 2: > Rs 2,950 ≤ Rs 4,500	Rs 1,670
Tier 3: > Rs 4,500	Rs 3,740
2018–19	
Tier 1: ≤ Rs 2,950	Rs 848
Tier 2: > Rs 2,950 ≤ Rs 4,500	Rs 1,770
Tier 3: > Rs 4,500	Rs 3,964
2019–20	
Tier 1: ≤ Rs 5,960	Rs 1,650
Tier 2: > Rs 5,960	Rs 5,200
Source: Federal Bureau of Revenue (FBR)	

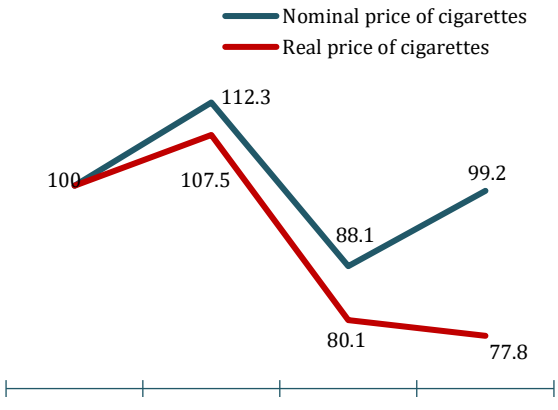
The lower FED rate contributed to lowering the price of cigarettes. Figure 2 shows that the real price of cigarettes (nominal price divided by general consumer price index) decreased by more than 27 percent in a year—from Rs 107.5 in 2016–17 to Rs 80.1 in 2017–18. During the period of analysis (2015–16 to 2018–19), the value of the real price index of cigarettes fell from 100 to 77.8. It is important to note that the nominal price also declined.

Figure 1. Effective excise duty per cigarette



Source: FBR

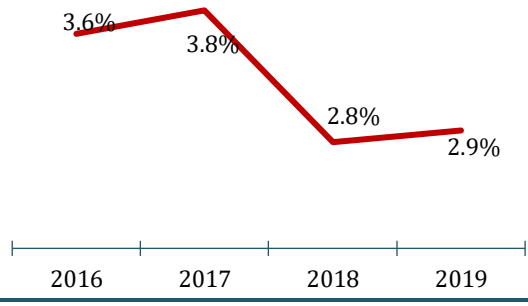
Figure 2. Index of the nominal and real price of cigarettes



Source: Monthly Bulletin of Statistics, PBS

The decrease in cigarette prices also affected the affordability of cigarettes, which is considered a key determinant of tobacco use behaviour since it combines the impact of tobacco price changes and economic growth (He et al., 2018). Affordability is calculated using the relative income price ratio, defined as the percentage of per capita GDP required to purchase 100 packs (or 2000 sticks) of cigarettes. As plotted in Figure 3, cigarettes have become more affordable as the ratio decreased from 3.6 percent to 2.9 percent from 2015–16 to 2018–19.

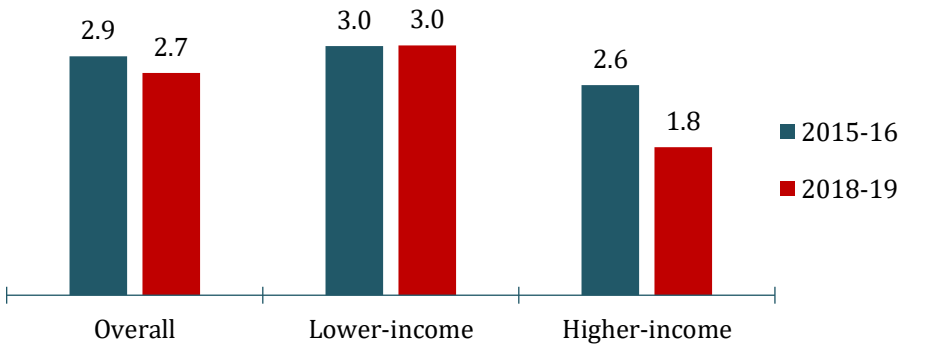
Figure 3. Affordability of cigarettes



Source: PBS, Pakistan Economic Survey

The reduction in cigarette prices seems to have affected households' level of tobacco expenditure as well. The share of tobacco in total household expenditure decreased from 2.9 percent in 2015–16 to 2.7 percent in 2018–19 (Figure 4), which is mainly driven by a decline of 0.8 percentage points in higher-income households—from 2.6 percent to 1.8 percent. This could be for two reasons: a decline in prices or consumption. The trend in cigarette prices and affordability presented above indicate that the share of tobacco expenditure may have decreased primarily due to the reduction in cigarette prices compared to other commodities and not due to a decrease in cigarette consumption (cigarette consumption trends are discussed in the next section). It is also important to mention that the share of tobacco expenditure (2.7 percent) is not trivial in relation to other categories, as food is the single largest category of expenditures in Pakistani households, accounting for more than 40 percent of the total household budget. Therefore, even a small proportion of disposable income available for spending on basic needs may matter for lower-income households.

Figure 4. Share of tobacco in total household expenditures (%)



Source: HIES, 2015–16 and 2018–19

3 THE IMPACT OF TAX CHANGES ON CIGARETTE PRICES AND CONSUMPTION LEVELS

As mentioned earlier, a substantial reduction in FED rates was introduced in 2017–18, particularly for low-priced brands. Therefore, this study attempts to observe any changes in cigarette consumption corresponding to the changes in tax rates and prices during this period. For this analysis, consumption of cigarettes is divided into two categories or tiers, based on retail prices and applicable statutory rates. For example, the maximum retail price of a low-priced brand in 2015–16 was Rs 72.5 per pack of 20 cigarettes (or Rs 3.625 per stick). Therefore, if the price reported by households (in HIES 2015–16 data) is less than Rs 3.625 per stick, it is categorized as a low-priced brand, while a reported price above this threshold is considered as high-priced.

A comparison of tax rates applicable in 2015–16 and 2018–19 shows that the statutory tax rate for low-priced brands declined from Rs 1.42 to Rs 0.85 per stick (Table 2). Similarly, the average price reported by households was lower in 2018–19 (Rs 2.2 per stick) as compared to 2015–16 (Rs 2.7 per stick). Correspondingly, reported monthly consumption of cigarettes per household increased from 357 sticks to 436 sticks during the same period. Furthermore, consumption of high-priced brands also increased from 227 to 329 sticks. Overall, cigarette consumption increased by 27 percent (from 326 sticks to 414 sticks).

Monthly consumption of cigarettes per household increased from 357 sticks in 2015–16 to 436 sticks in 2018–19.

Table 2. Reported consumption of cigarettes at household level

Category of cigarette	Statutory rate (Rs per stick)	Reported consumption [e]	Reported price per stick (Rs)
		2015–16	
Low-priced [a]	1.420	357	2.7
High-priced [b]	3.155	227	6.4
Overall		326	3.6
		2018–19	
Low-priced [c]	0.848	436	2.2
High-priced [d]	3.964	329	5.9
Overall		414	2.7

[a] If the reported price per stick is less than Rs 3.625

[b] If the reported price per stick is greater than Rs 3.625

[c] If the reported price per stick is less than Rs 3.45

[d] If the reported price per stick is greater than Rs 3.45

[e] Number of sticks per household per month

Sources: HIES, 2015–16 and 2018–19; Monthly Bulletin of Statistics, PBS

4 THE DATA AND DESCRIPTIVE ANALYSIS

The data source and descriptive statistical analysis of the variables used for estimating the crowding out effect of tobacco use are presented in this section, whereas the research methodology, including the theoretical framework of the study and estimation of the regression model, is provided in Appendix A.

The primary source of data for tobacco expenditure and consumption is the HIES 2015–16 and 2018–19, conducted by the Pakistan Bureau of Statistics (PBS). The other data sources include the Federal Board of Revenue (for tax-related data), Pakistan Economic Survey, and PBS's Monthly Bulletin of Statistics (for prices and cigarette production).

HIES is a nationally representative survey that collected data from 24,238 households in 2015–16 and 24,469 households in 2018–19.[7] Consumption expenditures for more than 300 commodities at the household level are covered in the survey. For the analysis presented in this report, expenditures are divided into the following 13 commodity groups, which mostly correspond to the HIES categories (see Appendix B). The 'food' group is subdivided into basic food and other food, where the former includes all food items except for food eaten in restaurants.

• Basic food	• Transport
• Other food	• Communication
• Tobacco	• Energy
• Clothing	• Housing
• Health	• Household durables
• Education	• Leisure
	• Others

A household is categorized as a tobacco-user household if it reports any expenditure on any tobacco product, whether the expenditure was incurred by a single person or by multiple persons. Furthermore, households are divided into two groups with respect to their income: the bottom 60 percent are categorized as lower-income and the top 40 percent as higher-income.[8] A comparative analysis of tobacco-user and tobacco non-user households is presented in Table 3, while further details of descriptive statistics for both years (2015–18 and 2018–19) are provided in Appendix C.

[7] HIES is a cross-sectional survey repeated every 2 to 3 years.

[8] In absolute rupee terms, the cut-off point is annual per capita income of Rs 72,000.

As far as the composition of household expenditure is concerned, around 40 percent of the household budget is allocated to basic food, reflecting the low income level of households in Pakistan. Other expenditure groups absorbing larger budget shares include housing, energy, and clothing. Altogether, these commodity groups consume nearly 70 percent of the household budget. Education and health, which have a direct bearing on household welfare, receive low priority due to resource constraints.

The HIES 2018–19 data indicate that on average tobacco-user households spend 2.7 percent of their monthly budget on tobacco products, while the ratio for lower-income and higher-income households is 3.0 percent and 1.8 percent, respectively. Similarly, rural households allocate more of their budget (2.8 percent) to tobacco than urban households (2.5 percent). The analysis also indicates that female-headed households spend a lesser share of their budget on tobacco than male-headed households (Appendix C). This finding also corresponds with the difference in the average number of male adults per household, since the prevalence of tobacco use in Pakistan is much higher among men than women—about 85 percent of adult tobacco users in the country are males.[9]

On average, tobacco-user households spend 2.7 percent of their monthly budget on tobacco products.

Table 3. Average share of commodity groups in household expenditures (%)

	Budget shares of commodity groups, 2018–19				Difference in shares Users – Non-users	
	Tobacco non-user households	Tobacco-user households				
		Overall	Lower-income	Higher-income	2018–19	2015–16
Commodity groups						
Basic food items	38.42	40.33	42.43	34.35	1.91*	2.41*
Other food items	2.65	2.60	2.57	2.70	-0.05	-0.08*
Tobacco	0.00	2.70	3.03	1.80	2.70*	2.90*
Clothing	7.95	7.54	7.70	7.13	-0.41*	-1.00*
Health	3.31	3.36	3.43	3.10	0.05	-0.11
Education	3.76	2.56	1.83	4.73	-1.20*	-1.37*
Transportation	6.60	5.82	5.40	7.03	-0.78*	-0.52
Communication	1.79	1.73	1.63	2.09	-0.06*	-0.32*
Energy	8.99	8.86	9.17	8.02	-0.13*	-0.13
Housing	14.11	12.25	11.50	14.42	-1.86*	-1.46
Household durables	3.40	3.43	3.30	3.85	0.03	-0.01*
Leisure	0.63	0.64	0.67	0.55	0.01	-0.07*
Others	8.37	8.17	7.43	10.22	-0.20*	-0.26
Number of observations	13,344	11,125	7,743	3,382		
Monthly expenditure (Rs)	42,254	40,313	31,851	59,686		

* Significant at 5% level
Source: HIES 2015–16 and 2018–19

[9] Global Adult Tobacco Survey (GATS) Pakistan, 2014, available at https://www.who.int/tobacco/surveillance/survey/gats/pak/en/

There are significant differences in the budget shares of various commodity groups. As compared to tobacco non-user households, tobacco-user households allocate a lower budget share to most commodity groups except for basic food. The commodities receiving lower shares (with a statistically significant difference) include clothing, education, transport, communication, energy, housing, and other basic food. Health, household durables, and leisure receive slightly higher shares, but the differences are small and statistically insignificant.

As compared to tobacco non-user households, tobacco-user households allocate a lower budget share to most commodity groups except for basic food.

Within tobacco-user households, the budget shares of lower-income households are higher for tobacco, basic food, clothing, health, and energy than higher-income households. On the other hand, they spend less on some important commodities such as education and housing. The consumption expenditure pattern in 2015–16 is more or less the same as in 2018–19. The differential analysis indicates that tobacco use may have influenced intra-household resource allocation, where tobacco-user households spent less on other goods and services because of their tobacco spending.

5 METHODOLOGY AND RESULTS

In order to estimate the crowding out effect of tobacco spending on the expenditure of other goods and services, this research involves an econometric analysis of household spending patterns—which controls for the effects of other variables, such as socioeconomic and demographic characteristics of households—to determine whether there are any differentials in the spending preferences of tobacco-user and non-user households.

The theoretical framework developed by John (2008) is used for this analysis. A key assumption of the framework is that each household wants to maximize utility given a set of socioeconomic characteristics. Households make decisions about the consumption of each commodity, considering their income and the prices of commodities. An econometric model for conditional demand functions is used, which assumes that a household's expenditure on tobacco is predetermined, implying that a household has already decided the level of tobacco expenditure, and the household has to maximize utility subject to the expenditure in excess of the pre-allocated tobacco expenditure—that is, within the reduced income level (see Appendix A for details).

Results and Discussion

A summary of the estimated coefficients of the regression model is presented in Table 4. A negative and significant coefficient of the total amount of tobacco spending (Ai) corresponding to a specific commodity group indicates that tobacco-user households allocate to this commodity group a lower budget share than tobacco non-user households. The results show that an increase in the total amount of tobacco spending would lead to a decrease in the budget shares of food, health, education, housing, household durables, and other commodities.

Table 4. Crowding out effects of tobacco expenditure: Regression results, 2018–19

Independent variables	Total tobacco spending (Ai)		
	All households	Lower-income	Higher-income
Basic food	-0.0014**	-0.001***	-0.0012
Other food	-0.0017***	0.012	-0.0008***
Clothing	0.0010***	0.004***	0.001
Health	-0.0004*	-0.001*	-0.0009*
Education	-0.0009***	-0.0001***	0.0016
Transport	0.0011***	0.001***	0.0022
Communication	0.0003**	0.001	0.0006
Housing	-0.0025***	-0.008***	-0.0021*
Household durables	-0.0003*	-0.002*	-0.0008*
Leisure	0.0002	0.004	0.0001
Other	-0.0003*	-0.004*	-0.0012*

Note: The main purpose of this study is to focus on the effect of tobacco expenditure on spending for other commodities, so the coefficients of household characteristics are not reported. All commodity groups are considered as dependent variables.

***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level

The regression analysis is also carried out separately for lower-income and higher-income households to understand how the crowding out effect of tobacco expenditure differs between the two income groups. The findings suggest that crowding out is more prominent in lower-income households, particularly in the case of basic food and education.

A comparison of regression results of 2015–16 and 2018–19 indicates that the pattern of crowding out effects has not changed much. However, a prominent difference appears in the 'other food' category, where the sign of the coefficient turns from positive to negative, indicating the presence of a crowding out effect in this category. Also, a crowding out effect becomes evident in 2018–19 with regard to basic food and housing in higher-income and lower-income groups, respectively. In contrast, the coefficient of 'leisure' is observed to be insignificant in 2018–19 (see Appendix D for regression results for 2015–16).

The pattern of crowding out effects has not changed much between 2015–16 and 2018–19.

6 SIMULATED EFFECT OF A REDUCTION IN TOBACCO EXPENDITURE

The above analysis suggests that tobacco spending affects intra-household resource allocation. A simulation is carried out to estimate the impact of a reduction in tobacco expenditures on household budget allocation, assuming that household expenditure on tobacco is reduced by 50 percent. The values used for the simulation analysis for 2018–19 are presented in Table 5. It is important to note that real expenditures at 2015–16 prices are used to make the results comparable for both years—that is, for 2015–16 and 2018–19. Simulation results for 2015–16 are provided in Appendix E.

Table 5. Value used for simulation analysis: Monthly expenditures of tobacco-user households, Rs/month, 2018–19 (at 2015–16 prices)

	Average values		
	All households	Lower-income	Higher-Income
Total expenditure	34,310	26,210	50,414
Tobacco expenditures	858	706	1,070
Share of tobacco expenditures in total expenditures (%)	2.5	2.7	2.1
Tobacco expenditures after 50% reduction	429	353	535
50% reduction in tobacco expenditures as share of total expenditures (%)	1.3	1.5	1.1
Total expenditures after adjusting for new tobacco expenditures	33,479	25,532	49,879

Source: HIES 2018–19

On average, tobacco expenditure is reduced from Rs 858 to Rs 429 per month, which reduces the total monthly expenditure of tobacco-user households by 2.4 percent (from Rs 34,310 to Rs 33,479). The new household expenditure (after reduction of Rs 429) is then multiplied with the coefficients of (Ai) given in Table 3 for each commodity group, which shows the impact on intra-household budget allocation for the respective commodity. The same exercise is done for lower-income and higher-income groups.

Table 6 provides the actual and simulated budget shares of those commodity groups where an increase is expected in response to a 50-percent reduction in tobacco expenditure. The results for aggregate households show that the share of expenditure on food (basic and other) and housing is expected to increase substantially. The budget share of food increases from 38.4 percent to 42.3 percent, while that of housing rises from 11.2 percent to 12.4 percent.

Other commodity groups with likely increases are health, education, housing, household durables, and others. As far as the lower-income group is concerned, the impact is more prominent in food and health—the share of food is expected to increase substantially by 5.2 percentage points (45.1 percent to 50.3 percent). Major commodities with an expected increase in the higher-income group include household durables, health, other food, and housing. Comparing these results with those of 2015–16 shows that, while some changes are observed in the magnitude of shares, the pattern of the crowding out effect in terms of major commodity groups remains more or less the same, as mentioned above.

Table 6. Actual and simulated budget shares, 2018–19 (%)

	All households			Lower-income			Higher-income		
	Actual	Simulated	Difference	Actual	Simulated	Difference	Actual	Simulated	Difference
Basic food	36.0	37.3	1.2	42.0	45.9	3.9			
Other food items	2.4	5.0	2.6				3.1	5.6	2.5
Health	2.9	3.8	0.9	3.1	4.4	1.3	2.6	5.1	2.5
Education	2.7	3.4	0.7	1.4	1.4	0.1			
Housing	11.2	12.4	1.2	9.5	10.0	0.5	14.5	15.9	1.4
Household durables	3.2	3.9	0.7	3.1	4.0	0.9	3.2	7.4	4.2
Others	7.1	7.9	0.8	6.6	7.6	1.0	8.0	12.2	4.2

Source: HIES 2018–19

Table 7 presents the changes in the patterns of household expenditure in absolute rupee terms. It appears that a 50-percent reduction in tobacco spending would lead to an aggregate increase of 12 percent in expenditure on food (basic and other), health, education, housing, household durables, and other commodities—from Rs 22,481 to Rs 25,124 per month. A relatively higher increase is observed in other food items, housing, and health—these commodities together absorb 70 percent of the total increase.

For lower-income households, the expected increase in total expenditure on the commodity groups experiencing a crowding out effect is nine percent (from Rs 17,202 to Rs 18,713). An important observation is that about half of the total increase (47 percent) is likely to be devoted to basic food. Other commodities with a large increase are health (21 percent) and household durables (14 percent). As far as the higher-income group is concerned, household durables, health, and other food items receive the major share of the expenditure increase.

Table 7. Simulated impact on intra-household expenditures, 2018–19

Tobacco-user households	Rupees per month			Distribution of increased expenditure
	Current expenditure	Simulated expenditure	Increase in expenditure	
All households				
Basic food	12,357	12,473	116	4.4
Other food items	820	1,671	850	32.2
Health	996	1,264	268	10.1
Education	963	1,198	234	8.9
Housing	3,826	4,563	738	27.9
Household durables	1,088	1,299	212	8.0
Others	2,431	2,656	225	8.5
Total	22,481	25,124	2,643	100.0
Lower-income				
Basic food	11,005	11,715	710	47.0
Health	807	1,123	316	20.9
Education	363	367	4	0.3
Housing	2,477	2,541	64	4.2
Household durables	811	1,022	211	14.0
Miscellaneous	1,740	1,945	205	13.6
Total	17,202	18,713	1,510	100.0
Higher-income				
Other food items	1,539	2,769	1,231	17.0
Health	1,288	2,537	1,249	17.3
Housing	7,324	7,945	621	8.6
Household durables	1,596	3,686	2,090	28.9
Miscellaneous	4,021	6,065	2,044	28.3
Total	15,768	23,002	7,234	100.0

Source: HIES 2018–19

7 CONCLUSIONS AND POLICY IMPLICATIONS

Using HIES data from 2015–16 and 2018–19, this study compares the impact of tobacco use on household consumption patterns in Pakistan against the backdrop of a substantial reduction in excise tax on cigarettes made by the government in 2017–18. As a result of the tax reduction, particularly on low-priced brands, the real prices of cigarettes went down—as reflected by a 22-percent reduction in the inflation-adjusted price index of cigarettes between 2015–16 and 2018–19. During the same period, the share of tobacco in total household expenditure decreased from 2.9 percent to 2.7 percent. However, despite a decline in the budget share of tobacco, the overall consumption of cigarettes per household increased from 326 sticks to 414 sticks, owing to

reduced prices. Poor households devoted more of their budget to tobacco as compared to rich households in both years, while the consumption of low-priced brands increased from 357 sticks to 436 sticks.

This study complements the authors' earlier work on the crowding out effect of tobacco expenditure in Pakistan. Similar to the analysis conducted for 2015–16, tobacco expenditure occurs at the expense of other household expenditures in 2018–19. The results suggest that an increase in tobacco spending leads to a decrease in the budget shares devoted to food, health, education, housing, household durables, and other commodities. The simulation analysis suggests that a reduction in tobacco expenditures by 50 percent would lead to an aggregate increase of 12 percent in expenditure on these commodities. The estimates of crowding out differ between lower-income and higher-income households. For example, the effect on basic food is larger in magnitude in lower-income households. Whereas, in the case of education, tobacco expenditure does not influence the budget share of education in higher-income households. A comparison of 2015–16 and 2018–19 indicates that the pattern of crowding out effects has not changed much, except that crowding out is only evident in other food in 2018–19 and leisure in 2015–16.

The findings of this study draw attention to the fact that tobacco expenditure is incurred at the cost of basic necessities, such as food and education, in lower-income households. Also, there exists a negative relationship between prices and consumption of cigarettes. Therefore, the economic well-being of the poor population can be enhanced by adopting policies aimed at reducing the demand for tobacco products, particularly among the poor.

REFERENCES

de Beyer, J., Lovelace, C., & Yürekli, A. (2001). Poverty and tobacco. *Tobacco Control, 10*(3), 210-211. doi:10.1136/tc.10.3.210

Efroymson, D., Ahmed, S., Townsend, J., Alam, S. M., Dey, A. R., Saha, R., & Rahman, O. (2001). Hungry for tobacco: An analysis of the economic impact of tobacco consumption on the poor in Bangladesh. *Tobacco Control, 10*(3), 212-217. doi:10.1136/tc.10.3.212

He, Y., Shang, C., & Chaloupka, F. J. (2018). The association between cigarette affordability and consumption: An update. *PLoS ONE 13*(12): e0200665.

Jamal, H. (2016). *Poverty and vulnerability estimates: Pakistan*. Research Report No. 99, Social Policy and Development Centre.

John, R. M. (2008). Crowding out effect of tobacco expenditure and its implications on household resource allocation in India. *Social Science & Medicine, 66*(6), 1356-1367. doi:https://doi.org/10.1016/j.socscimed.2007.11.020

John, R. M., Sung, H. Y., Max, W. B., & Ross, H. (2011). Counting 15 million more poor in India, thanks to tobacco. *Tobacco Control, 20*(5), 349-352.

Paraje, G., & Araya, D. (2018). Relationship between smoking and health and education spending in Chile. *Tobacco Control, 27*(5), 560-567. doi:10.1136/tobaccocontrol-2017-053857

PIDE. (2018). *Economics of tobacco taxation and consumption in Pakistan*. Pakistan Institute of Development Economics.

Saleem, W., & Iqbal, M. A. (2020). *The impact of tobacco use on household consumption patterns in Pakistan*. Research Report. Social Policy and Development Centre (SPDC).

San, S., & Chaloupka, F. J. (2016). The impact of tobacco expenditures on spending within Turkish households. *Tobacco Control, 25*, 558-563.

SPDC. (2018). *Macroeconomic impacts of tobacco use in Pakistan*. Research Report. Social Policy and Development Centre (SPDC).

SPDC. (2018a). *Tobacco control in Pakistan: The impact of tax reduction policy*. Policy Brief. Social Policy and Development Centre (SPDC), December 2018.

Wang, Hong., Jody L. Sindelar, J., & Susan H. Busch. (2006). The impact of tobacco expenditure on household consumption patterns in rural China. *Social Science & Medicine*, 62 (2006), 1414-1426.

Appendix A: Methodology

Theoretical Framework

This study uses the theoretical framework developed by John (2008). The model assumes that each household wants to maximize its utility given a vector of socioeconomic characteristics (v). According to the model, the household decides the consumption of each commodity given the prices and income of the household. Then, the utility maximization problem (UMP) can be written in the following equation,

$$Max\ U = U(x_i; v)$$
$$S.t \sum_{i=1}^{n} p_i x_i = I$$

where x_i denotes the consumption of commodity i, p_i is the price of commodity i, and I denotes total expenditure by household. The solution of this UMP provides the unconditional demand functions.

John (2008) developed this model by using the Pollak (1969) model for conditional demand functions, which assumes that a household's expenditure on tobacco is predetermined, implying that the household has already decided the level of expenditure on tobacco independently. This means that the household now has to maximize its utility subject to the expenditure in excess of the pre-allocated expenditure for tobacco, which reduces the income level of the consumer. Assuming that tobacco is the nth commodity and all other commodities except tobacco are available in the market at given prices, then the total expenditure on all other commodities except tobacco is given as follows,

$$\sum_{i=1}^{n-1} p_i x_i = M$$

where $M = I - p_t x_t$ and $p_t x_t$ is the expenditure on tobacco products. Now the utility maximization problem can be rewritten as

$$Max\ U = U(x_i; v)$$

subject to

$$\sum_{i=1}^{n-1} p_i x_i = M$$
$$x_n = \bar{x_t}$$

where $\bar{x_t}$ is the consumption of tobacco.

The solution of the above UMP will give the demand function for *n-1* goods and is known as the conditional demand function (CDF).

$$x_i = f_{i,n}(p_i, M, x_n; v) \ (\forall\ i \neq n)$$

The $f_{i,n}$ above is the CDF for the *i*th commodity on the consumption of *n*th commodity (tobacco). The demand function of a commodity *i* is the function of its own price, the price of other commodities, the total expenditure excess of expenditures on tobacco, and the quantities of the conditional goods. It is useful to apply conditional demand functions when dealing with a commodity that is not consumed by many households—tobacco, in this case.

The CDF can be used to test whether zero expenditure on any product is due to corner solutions or to nonparticipation by any household. From the point of view of demand functions, corner solutions mean purchases are not made because prices are at unaffordable levels, and if the prices actually decrease there may be purchases by the same consumers who had not purchased previously. In the data a large number of households report no expenditure on tobacco products, and this could be due to the fact that they do not want to consume any tobacco. However, theoretically, when one observes a large proportion of zeros for the consumption of tobacco in a cross-sectional consumer expenditure survey, it cannot be concluded that all of them are the results of pure abstention. Ignoring the possibility of infrequent purchases, a zero consumption of tobacco can appear either due to corner solutions, resulting from budget constraints, or sheer abstention. But if abstention is the actual cause of zeros, it typically means that tobacco users and non-users have different preferences (John, 2008).

Estimation of Demand Functions

Studies by John (2008), Pu et al. (2008), Paraje and Araya (2018), Husain et al. (2018), and San and Chaloupka (2016) have used the Quadratic Almost Ideal Demand System (QUAIDS) to estimate the crowding out impact of tobacco consumption. This technique, developed by Banks, Blundell, and Lewbel (1997), estimates the Engel curve using QUAIDS. QUAIDS allows for treatment of a commodity as a luxury at a certain income level and normal at another income level (John, 2008).

The Engel curve equation is estimated for each commodity group controlling for household characteristics and quadratic income term by using the following equation,

$$S_{ij} = \left(\alpha_{1j} + \alpha_{2j} dt_i + + \alpha_{3j} T_i + \gamma_{5j} A_i\right) + (\beta_{1j} + \beta_{2j} dt_i) lnM_i + (\theta_{1j} + \theta_{2j} dt_i)(lnM_i)^2 \quad \ldots\ldots\ldots\ldots [A]$$

where *S_ij* is the share of *j*th commodity group in total household expenditure of household *I*, and αi a i is a vector of household characteristics. This study uses household size, gender of household head, provincial dummies (to control for regional variations), and a dummy for urban location of the households. $[\![dt]\!]$ *i* is the dummy variable and equal to 1 if the household is observed with tobacco use. *T_i* and *A_i* are the actual level of tobacco-related expenditures for household *i*, respectively. $[\![lnM]\!]$ *i* is the natural log of total expenditure minus tobacco expenditures by household *i*. The Durbin-Wu-Hausmann test for exogeneity of *Mi* and *Ai* is also conducted, and they are found to be endogenous.

$$H_o = \alpha_{2j} = \beta_{2j} = \theta_{2j} = 0 \qquad \ldots\ldots\ldots\ldots [B]$$

If this null hypothesis in equation (B) is not rejected, it means that there is no difference between the spending patterns of smoking and non-smoking households. If this hypothesis is rejected, it is surmised that tobacco expenditures have an effect on the consumption decisions of other goods in smoking household budgets.

Appendix B: Commodity Groups

HIES commodity groups	Commodity groups used in the study
Food & beverages	Basic food items
	Other food items (ready-made food eaten out of home/public places/offices)
Tobacco	Tobacco
Clothing and footwear	Clothing (including footwear)
Health	Health
Education	Education
Transport	Transportation
Communication	Communication
Housing, water, electricity, gas, and other fuels	Housing (actual rentals, imputed rentals, maintenance)
	Energy (water, electricity, gas, and other fuels)
Furnishing, household equipment, and maintenance	Household durables
Recreation & culture	Leisure
Restaurants and hotels (include expenditure on hotels, motels, summer cottages, holiday villages, etc.; does not include food expenses)	Others
Miscellaneous goods and services (personal effects, personal care, insurance, marriages, religious ceremonies, etc.)	

Appendix C: Descriptive Statistics
2015–16 and 2018–19

Descriptive statistics on expenditure pattern, socioeconomic, and demographic variables, 2015–16 (averages)

	Tobacco non-user households	Tobacco-user households						
		Overall	Lower-income	Higher-income	Rural	Urban	Female-headed	Male-headed
Number of observations	13,403	10,835	7,627	3,208	4,123	6,712	305	10,530
Monthly expenditure (Rs)	34,289	32,522	26,318	50,878	28,940	39,862	32,676	32,517
Expenditure allocation to major consumption categories (%)								
Basic food items	38.10	40.51	43.49	31.68	43.52	34.34	35.20	41.07
Other food items	3.90	3.82	1.78	3.43	1.39	3.83	3.90	3.75
Tobacco	-	2.90	3.02	2.55	3.03	2.63	2.50	2.91
Clothing	9.29	8.29	9.60	7.91	9.55	8.41	9.15	8.01
Health	3.12	3.01	2.96	3.17	3.28	2.46	3.35	3.00
Education	3.98	2.61	2.19	3.85	2.03	3.80	2.37	2.62
Transportation	4.50	3.98	3.60	6.06	4.26	4.14	5.75	3.89
Communication	2.00	1.68	1.86	2.30	1.91	2.08	1.96	1.65
Energy	8.60	8.47	9.03	7.65	9.54	6.92	8.57	8.43
Housing	13.45	11.99	10.40	16.69	8.77	18.59	14.14	11.93
Household durables	3.94	3.93	3.72	4.58	3.75	4.32	3.98	3.93
Leisure	0.63	0.56	0.53	0.65	0.48	0.72	0.91	0.55
Others	8.50	8.24	7.83	9.47	8.49	7.75	8.22	8.25
Household size	5.9	6.7	7.3	5.2	6.9	6.4	5.7	6.8
Number of adults/HH	3.0	3.4	3.5	3.4	3.4	3.5	3.2	3.5
Number of male adults/HH	1.4	1.7	1.7	1.7	1.7	1.8	1.3	1.7

Source: HIES, 2015–16 (Reproduced from Saleem & Iqbal, 2020)

Descriptive statistics on expenditure pattern, socioeconomic, and demographic variables, 2018–19 (averages)

	Tobacco non-user households	Tobacco-user households						
		Overall	Lower-income	Higher-income	Rural	Urban	Female-headed	Male-headed
Number of observations	13,344	11,125	7,743	3,382	7,512	3,613	41	11,084
Monthly expenditure (Rs)	42,254	40,313	31,851	59,686	34,935	51,495	29,434	40,353
Expenditure allocation to major consumption categories (%)								
Basic food items	38.4	40.3	42.4	34.4	43.3	34.6	39.5	40.3
Other food items	2.7	2.6	2.6	2.7	2.1	3.5	2.3	2.6
Tobacco	0.0	2.7	3.0	1.8	2.8	2.5	2.2	2.7
Clothing	8.0	7.5	7.7	7.1	7.9	6.8	6.4	7.5
Health	3.3	3.4	3.4	3.1	3.7	2.6	3.8	3.4
Education	3.8	2.6	1.8	4.7	1.9	3.9	1.9	2.6
Transportation	6.6	5.8	5.4	7.0	5.9	5.7	3.1	5.8
Communication	1.8	1.7	1.6	2.1	1.6	1.9	1.4	1.7
Energy	9.0	8.9	9.2	8.0	9.3	8.1	11.6	8.9
Housing	14.1	12.2	11.5	14.4	9.0	18.5	17.8	12.2
Household durables	3.4	3.4	3.3	3.8	3.5	3.3	3.9	3.4
Leisure	0.6	0.6	0.7	0.5	0.7	0.6	0.5	0.6
Others	8.4	8.2	7.4	10.2	8.3	7.9	5.5	8.2
Household size	5.8	6.8	7.2	6.4	6.9	6.5	6.0	6.8
Number of adults/HH	4.3	5.0	4.1	3.2	5.0	5.0	4.6	5.0
Number of male adults/HH	2.2	3.1	3.2	2.7	3.1	2.4	1.3	3.2

Source: HIES, 2018–19

Appendix D: Regression Results
2015–16

Crowding out effects of tobacco expenditure: Regression results, 2015–16

Independent Variables	Total tobacco spending (Ai)		
	All households	Lower-income	Higher-income
Basic food	-0.005 *	-0.011 **	0.0004
Other food	0.011 ***	0.011 ***	0.001 ***
Clothing	0.008 ***	0.009 ***	0.005 ***
Health	-0.005 ***	-0.043 **	-0.114 **
Education	-0.009 ***	-0.013 ***	-0.007 **
Transport	0.012 ***	0.012 ***	0.01 ***
Communication	0.005 ***	0.006 ***	0.0004 ***
Housing	-0.008 ***	-0.001	-0.01 ***
Household durables	-0.004 ***	-0.004 ***	-0.003 **
Leisure	-0.001 **	-0.002 **	-0.00007
Other	-0.004 **	-0.005 **	-0.003

***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level

Source: HIES, 2015–16 (Reproduced from Saleem & Iqbal, 2020)

Appendix E: Simulation Analysis
2015–16

Value used for simulation analysis: Monthly expenditures of tobacco-user households (Rs/month), 2015–16

	Average values		
	All households	Lower-income	Higher-income
Total expenditure	32,522	26,318	50,878
Tobacco expenditures	943	795	1,300
Tobacco expenditures as % of total expenditures	2.9	3.0	2.6
Tobacco expenditures after 50% reduction	472	397	650
50% reduction in tobacco expenditures as % of total expenditures	1.45	1.5	1.3
Total expenditures after adjusting for new tobacco expenditures	32,050	25,921	50,229

Source: HIES, 2015–16 (Reproduced from Saleem and Iqbal, 2020.)

Actual and simulated budget shares (%), 2015–16

Commodity groups*	All households			Lower-income			Higher-income		
	Actual	Simulated	Difference	Actual	Simulated	Difference	Actual	Simulated	Difference
Basic food	40.5	42.3	1.8	43.5	47.3	3.9	-	-	-
Health	3.0	4.8	1.8	3.0	4.5	1.5	3.2	5.5	2.3
Education	2.6	6.2	3.6	2.2	6.8	4.6	3.8	7.5	3.7
Housing	12.0	15.4	3.4	10.4	10.8	0.4	16.7	23.3	6.7
Household durables	3.9	5.4	1.4	3.7	5.1	1.4	4.6	6.3	1.8
Leisure	0.6	0.9	0.3	0.5	1.1	0.6	-	-	-
Others	8.2	9.7	1.5	7.8	9.5	1.7	-	-	-

Source: HIES, 2015–16 (Reproduced from Saleem & Iqbal, 2020)

Simulated impact on intra-household expenditures (tobacco-user households), 2015–16				
Commodity groups*	Rupees per month			% distribution of increased expenditure
	Current expenditure	Simulated expenditure	Increase in expenditure	
All households				
Basic food	13,175	13,560	385	9.4
Health	979	1,551	572	14.0
Education	849	1,975	1,126	27.5
Housing	3,900	4,924	1,024	25.0
Household durables	1,279	1,725	446	10.9
Leisure	182	289	107	2.6
Others	2,681	3,116	435	10.6
Total	23,045	27,140	4,095	100.0
Lower-income				
Basic food	11,447	12,292	845	24.8
Health	778	1,164	386	11.3
Education	577	1,763	1,186	34.8
Housing	2,738	2,810	72	2.1
Household durables	978	1,333	355	10.4
Leisure	139	292	153	4.5
Others	2,061	2,471	410	12.0
Total	18,718	22,125	3,407	100.0
Higher-income				
Health	1,612	2,738	1,126	16.0
Education	1,957	3,783	1,826	25.9
Housing	8,491	11,724	3,233	45.9
Household durables	2,330	3,186	857	12.2
Total	14,390	21,431	7,041	100.0

Source: HIES, 2015–16 (Reproduced from Saleem & Iqbal, 2020)

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