

Modelling the Revenue and Health Implications of Tobacco Tax Policy in Pakistan: Options for the Federal Budget 2021-22

Global evidence has established that tobacco use is a leading cause of deaths due to non-communicable diseases (NCDs), including cancers, chronic respiratory diseases, and cardiovascular diseases.¹ Pakistan is not an exception to this situation: it has a high burden of tobacco use with resulting high costs from tobacco-related morbidity and mortality. With a prevalence rate of 19.1 percent, about 30 million adults (age 15 +) currently use tobacco in the country.² Previous research shows that tobacco use killed an estimated 163,360 people in 2017 in Pakistan.³

Tobacco taxation, widely regarded as a critical element of tobacco control strategy,⁴ is used as a policy instrument for tobacco control in Pakistan, serving a dual objective of public health promotion and revenue generation. However, in the absence of a long-term and consistent policy, tobacco tax rates are prone to fluctuation. Changes in tax rates/structure are generally introduced when the federal budget is prepared for a new fiscal year.⁵ Since Federal Excise Duty (FED) on cigarettes is the major tobacco tax in Pakistan,⁶ this note assesses the expected impact of excise tax and price increases on cigarette consumption, tax revenues, and health outcomes using predictive modelling techniques.

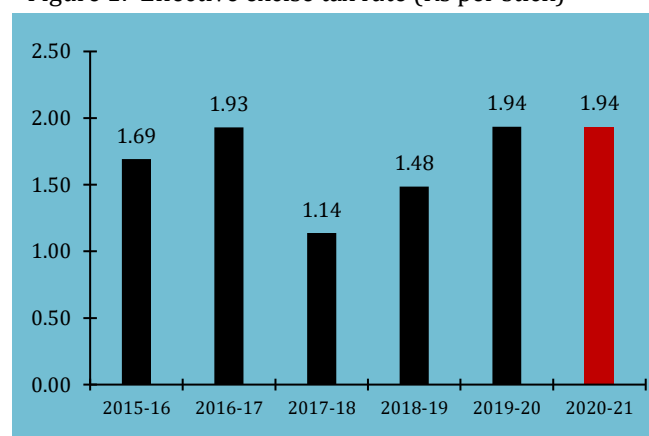
TAX CHANGES AND CIGARETTE PRICES

At present, a system of specific excise tax on cigarettes is in place. The FED rate is applied on the basis of two price tiers: low-priced and premium brands or high-priced.⁷ A brand is categorized as low-priced if the on-pack printed retail price does not exceed Rs5,960 per thousand cigarettes, whereas cigarettes with a retail price above this threshold are treated as premium. The FED rate on low-priced and premium brands is Rs1,650 and Rs5,200 per thousand cigarettes, respectively. Given the prevailing retail prices, the equivalent excise tax share on low-priced and premium brands is 42.6 percent and 59.8 percent of the retail price, respectively. Thus, there is a large excise tax gap

between the two tiers. Due to the large share of low-priced cigarettes in total consumption, the average effective excise tax rate is 45.4 percent of the retail price, much lower than the WHO recommendation that excise tax share should be at least 70 percent of the retail price.

To see the recent trend in the excise tax rate, effective excise tax rate (weighted average per stick) is computed by dividing domestic excise duty collection with the total declared cigarette production. Figure 1 highlights two important insights. First, the excise duty rate sharply declined in 2017-18 due to the introduction of a three-tier excise duty structure – with a new tier for the low-priced brands. The tax rate applicable to the new tier was reduced by 48 percent. While the third tier was withdrawn in 2018-19, the effective duty rate remained low compared to 2016-17. Second, the effective excise tax rate on cigarettes in 2020-21 is still the same as was in 2016-17. As a result, cigarettes in Pakistan became more affordable in 2020-21 compared to 2016-17 due to a combination of two factors: no change in excise tax and increases in nominal income and inflation.

Figure 1: Effective excise tax rate (Rs per stick)



Source: SPDC estimates, based on Economic Survey of Pakistan 2019-20, and FBR Revenue Division Yearbook 2019-20

A comparison of Pakistan with its neighbouring countries indicates that the price of the most sold brand of a pack of 20 cigarettes was among the lowest in 2018 (Figure 2). The low rate of excise duty on cigarettes in Pakistan is one of the major factors contributing to the low cigarette prices. Also, Pakistan is ranked among the worst-performing countries in the Tobacconomics Cigarette Tax Scorecard with a score of less than one on a five-point scale.⁸ Due to the availability of cigarettes at low prices, more than 400,000 people are estimated to start smoking in 2020-21.⁹

Figure 2: Price of the most sold brand of cigarette Pakistan and select LMICs in 2018

(At International dollars at Purchasing Power Parity)



Source: WHO. Report on the Global Tobacco Epidemic 2019.

METHODOLOGY

Data Sources

The modelling exercise presented in this paper uses several data sources to develop a baseline of Pakistan's cigarette market for 2020-21, including the age-specific rate of smoking among adults from the Global Adult Tobacco Survey (GATS) Pakistan 2014. It relies on published documents of the Federal Board of Revenue (FBR) for the tax rate on cigarettes and revenue collection. The data for cigarette production and consumer prices of leading brands, including tobacco inflation, are taken from the Pakistan Bureau of Statistics (PBS). Also, information about the printed price of leading brands was collected from retailers. Macroeconomic variables, such as Pakistan's Gross Domestic Product (GDP) and the inflation rate, were taken from the International Monetary Fund's (IMF) World Economic Outlook. The population estimates were obtained from the United States Census Bureau.¹⁰

Market Share

The latest brand-wise or FED tier-wise data are not readily available. Therefore, the starting point of the predictive component of this assessment is the estimation of tier-wise market share. Given the two-tier FED system, the effective tax rate is used to compute the market share by using the following equation:

$$\text{Market Share: } S_{1t} + S_{2t} = 1 \quad \dots\dots\dots (1)$$

$$\text{Effective Tax Rate: } ETR_t = \frac{TR_t}{Q_t} = S_{1t} * R_{1t} + S_{2t} * R_{2t} \quad \dots (2)$$

where, ETR = Effective tax rate

TR = Total domestic revenue from FED

Q = Total domestic production of cigarettes

S = Market share of respective tier

R = Tier wise duty rate

Subscript 1 and 2 indicate low-priced and premium brand cigarettes, respectively, while subscript t indicates the year. Equation 1 states that the sum of the market share of both tiers is one. Equation 2 states that the effective tax rate per stick is the ratio of tax revenues from FED and total domestic production, which is equal to the weighted average sum of the product of statutory rates and market share.

Substituting the value of S_2 in equation (2) and solving for S_1 yields the following equation:

$$S_{1t} = (ETR_t - R_{2t}) / (R_{1t} - R_{2t}) \quad \dots\dots\dots (3)$$

$$S_{2t} = 1 - S_{1t} \quad \dots\dots\dots (4)$$

Equation 3 and 4 are used to compute the tier-wise market share.

Taxes and Prices

FED and General Sales Tax (GST) are the two major taxes on cigarettes. FED is a fixed amount per cigarette tax, while GST is an ad valorem tax levied on printed price inclusive of FED. Based on these, the weighted average retail price (RP) of a pack of 20 cigarettes in each tier (i) can be deconstructed into the following components:

$$RP_{it} = PP_{it} + TR_{it} + \{PP_{it} + TR_{it}\} \times V_t \quad \dots\dots\dots (5)$$

$$TR = R_{it} \times 20$$

where PP is the producer price of a pack of 20 stick inclusive of retail margin, TR is the FED rate per pack of 20 sticks, and V is the GST rate.

Given the behaviour of the cigarettes industry in 2020-21 (where tax rate remained constant and the consumer retail price was increased in line with tobacco inflation), while predicting new retail price (RP) for 2021-22 after a hypothetical increase in the FED rate, an ex-ante full tax pass-through and an increase in producer price in line with general inflation is assumed.

$$RP_{it}^p = PP_{i(t-1)} (1 + \pi_t) + TR_{it} (1 + \delta) + \dots \dots \dots (6)$$

$$\{PP_{i(t-1)} (1 + \pi_t) + TR_{it} (1 + \delta)\} \times V_t$$

where the projected retail price (RPP) has an impact of both inflation (π) and percentage change in tax rate (δ).

Cigarette Consumption and Sales

For modelling the price response on consumption of cigarettes, several economic parameters for the baseline and simulated year were employed. The key economic parameter is the price elasticity of demand (ϵ) which measures the extent to which an increase in the price of cigarettes will reduce consumption of cigarettes. For taxable sales of cigarettes (S), the number of packs of 20 sticks sold in response to the price increase is calculated as,

$$S_{it} = S_{i(t-1)} (1 + \Delta RP_{it} \times \epsilon_p) \dots \dots \dots (7)$$

where ΔRP is the percentage change in the retail price of taxable cigarettes and ϵ_p is the short-term price elasticity of demand based on time series data of production.¹¹ However, Pakistan's cigarette market contains some degree of illicit trade as well. To incorporate illicit trade of cigarettes in the modelling exercise, total sales of cigarettes is estimated by using cross-section price elasticity (ϵ_c).¹²

$$TS_{it} = TS_{i(t-1)} (1 + \Delta WRP_{it} \times \epsilon_c) \dots \dots \dots (8)$$

where total sales of cigarettes (TS) depends on change in weighted average retail price and consumption elasticity.

The estimation assumes a 15 percent share of illicit trade in the base year and 85 percent for taxable sales. For the computation of illicit trade in the simulated year, taxable sales is subtracted from total sales.

$$\text{Illicit Sales} = TS_{it} - S_{it} \dots \dots \dots (9)$$

Public Health Outcomes

Following the methodology adopted by Goodchild et al. (2016),¹³ a single cohort approach is used to

estimate the impact of tobacco taxation on the expected number of smoking-attributable deaths among adults alive in 2021.

The modelling for health outcomes of an increase in the FED rate involves several steps based on plausible assumptions. For instance, the number of adult smokers (15 years and above) is estimated by using GATS 2014 cohort-wise prevalence rate for male and female separately multiplied with the respective population for the current year. A 50 percent prevalence share in elasticity is assumed, which implies that any drop in consumption of cigarettes is equally attributed to a fall in the number of smokers and a reduction in the number of sticks per smoker.

To estimate the number of smoking-attributable deaths, it is assumed that half of the current adult smokers prematurely die due to smoking-attributable NCDs. Like Goodchild et al. (2016), the positive impact of tobacco taxation on health is estimated as the expected decrease in the number of smoking-attributable deaths—after accounting for those current smokers who will quit smoking before they die. A mortality adjustment factor is used, indicating that 70 percent of smoking-attributable deaths can be avoided if current smokers quit smoking.

The prevalence of smoking among future smokers is estimated based on the population of under-15 years. It is assumed that future smokers and present youth are more responsive to the changes in cigarette prices as compared to adult smokers. Therefore, a youth elasticity factor of 2 is used along with a mortality adjustment factor of 70 percent for future smokers who quit. These assumptions are in line with the literature on low- and middle-income countries.¹⁴ Basic parameters of the health model based on these assumptions are presented in Table 1.

Heads	Values
Prevalence share in elasticity	50%
Prevalence elasticity	-0.22
Percentage of smokers who die prematurely	50%
Percentage of smokers who survive if quit smoking	70%
Youth elasticity factor	2

RESULTS

Market Share of Cigarette Brands

Table 2 shows the base year's tier-wise market shares (2020-21), estimated by using equations 3 and 4. It appears that the cigarette market in Pakistan is overwhelmingly captured by low-priced brands with a share of 92 percent.

Table 2: Tier-wise market shares

Tiers	Market share (%)	Production million sticks	FED collection Rs million	FED rate Rs/stick
Tier - 1 (low-priced)	92%	42,108	81,495	1.65
Tier - 2 (premium)	8%	3,681	7,125	5.20
Both tiers	100%	45,789	88,620	1.94

Source: FED collection from FBR Revenue Division Yearbook 2019-20 & Monthly Bulletin of Statistics, Pakistan Bureau of Statistics

Taxes and Prices

In 2020-21, the weighted average of FED collection is estimated to be Rs38.70 per 20-cigarette pack, which represents 43.2 percent of the average retail price of Rs89.50 per pack (see Annexure–Table A1).

For the tax policy options, two scenarios are simulated: an increase of 30 percent and 40 percent in FED along with 6.8 percent inflation. The estimates show that a 30 percent increase in FED would result in over 25 percent increase in GST and almost 29 percent increase in average price. Similarly, a 40 percent increase in FED would result in more than 30 percent and 37 percent increase in GST and price, respectively. In both scenarios, FED would cross Rs50 per pack while the price would cross the Rs100 mark. Moreover, the FED would increase to at least 47 percent of the final consumer price.

Taxable Sales and Consumption of Cigarettes

The estimates of simulated taxable sales and total consumption (based on equations 6 and 7) reveal that taxable sales are more sensitive to price compared to total consumption (Annexure–Table A2). For the baseline, taxable sales are estimated to be 2,615 million packs of 20 cigarettes, while total consumption is more than 3,000 million packs. The share of illicit trade for the baseline is assumed to be 15 percent. The results show that if the FED rate is increased to 30 percent, the taxable sales and total sales would decrease to 2,321 and 2,842 million packs, respectively. In contrast, the illicit sales of cigarettes would increase to 521 million packs from 461 million packs.

Tax Revenue

The revenue implications of the simulated increase in FED rate are presented in Annexure–Table A3. The analysis shows that a 30 percent increase in the FED rate would generate additional revenue of more than Rs19 billion. This amount includes FED (Rs15.5 billion) and GST (Rs3.6 billion). It is interesting to note that an increase of 40 percent in the FED rate would yield slightly less additional revenue of Rs14 billion due to a sharper decline in the consumption of cigarettes.

The increase in the FED rate has a mixed impact on the tax-to-GDP ratio. For instance, a 30 percent increase is expected to result in a marginal growth of 1.4 percent in the tax-to-GDP ratio, while a 40 percent increase would result in a marginal decline of 2 percent.

In contrast, both simulation results show an increase in per capita taxes from cigarettes. The increase in per capita tax revenues is relatively higher in simulation 1—a 30 percent increase in the FED rate. However, it is important to consider that tobacco taxation serves the dual objectives of public health promotion and revenue generation. Earlier research has shown that the long-term benefits of a reduction in tobacco use outweigh short-term economic losses.¹⁵

Public Health Implications

The estimates of simulated health implications of raising the FED rate by 30 percent and 40 percent indicate several public health benefits. For instance, a 30 percent increase in the FED rate would likely encourage more than 219,000 smokers to quit smoking (Annexure–Table A4). As the youth population is more sensitive to prices, the same increase in the FED rate would discourage almost 700,000 future smokers. Simultaneously, it would also reduce smoking intensity among adult smokers by more than 6 percent. Due to a reduction in the number of smokers, the increase in the FED rate would save more than 76,800 adult lives from smoking-attributable deaths. More importantly, 348,000 deaths can be averted among future young smokers. A 40 percent increase in the FED rate has relatively higher public health benefits in reducing the number of smokers, smoking intensity, and smoking-attributable deaths. For instance, in the case of a 40 percent tax increase, the reduction in the number of adult smokers would be 158,000 more than a 30 percent increase. Similarly, the number of future smokers would decline by 9.5 percent and 7.6 percent due to a tax increase of 40 percent and 30 percent, respectively.

CONCLUSION AND POLICY IMPLICATIONS

The analysis shows that raising FED rate even by only 30 percent would result in:

- 219,000 fewer smokers;
- 3.8 percent reduction in smoking prevalence and 6.4 percent reduction in smoking intensity among adults; and
- prevention of 424,000 smoking-attributable deaths including 78,000 current adult smokers and 348,000 future young smokers.

Further, it would generate an additional revenue of Rs19 billion—an increase of 14.4 percent over the base year collection. A 40 percent increase in the tax rate would have relatively higher public health benefits.

The results demonstrate that the proposed tobacco tax reform would greatly help the Government of Pakistan achieve its commitment to reduce tobacco use and its goal to reduce deaths from NCDs as per its pledge to achieve the Sustainable Development Goals¹⁶ and align

its tobacco tax policy with global best practices. This would not only help curb tobacco use in the country but would also contribute to generating more revenues that can be used for promoting public health.

Beyond fiscal year 2020-21, to fulfil its long-term commitment to using tax and price measures to reduce tobacco consumption, the Government must continue reforming the tobacco tax system by:

- Implementing large excise tax increases in order to make cigarettes progressively more expensive and less affordable;
- Incorporating an automatic inflation adjustment mechanism in the tax policy;
- Moving to a uniform federal excise duty for all cigarette brands to simplify the tax system; and
- Harmonizing excise taxation across all tobacco products.

¹ Jafar TH et al. Non-communicable diseases and injuries in Pakistan: Strategic priorities. *The Lancet*. 2013 June 29;381: 2281-2290.

² SPDC estimates based on GATS 2014 and population projection for 2021.

³ Institute of Health Metrics and Evaluation. Global Burden of Disease, GBD Compare. University of Washington, 2019.

⁴ A review of more than 100 international studies concluded that significant increases in tobacco taxes are a highly effective tobacco control strategy and can lead to significant improvements in public health (Frank et al, 2012).

⁵ Fiscal year in Pakistan is from 1 July to 30 June.

⁶ The second main tax is General Sales Tax (GST), which is applied on manufacturing and sales of tobacco products.

⁷ Government of Pakistan S.R.O. 608(I)/2019. Federal Board of Revenue 2019.

⁸ <https://tobacconomics.org/research/cigarette-tax-scorecard/>

⁹ SPDC estimates based on GATS 2014 and population projection for 2020-21.

¹⁰ https://www.census.gov/data-tools/demo/idb/#/country?YR_ANIM=2021&FIPS_SINGLE=PK&dashPages=BYAGE last accessed: January 04, 2021 (mid-year population)

¹¹ Burki, SJ, Pasha AG, Pasha HA, John R, Jha P, Baloch AA, Kamboh GN, Cherukupalli R, Chaloupka FJ. The Economics of Tobacco and Tobacco Taxation in Pakistan. Paris: International Union against Tuberculosis and Lung Disease. 2013

¹² SPDC CGE model.

¹³ GOODCHILD, M., PERUCIC, A.-M. & NARGIS, N. 2016. Modelling the impact of raising tobacco taxes on public health and finance. *Bulletin of the World Health Organization*, 94, 250.

¹⁴ GOODCHILD, M., PERUCIC, A.-M. & NARGIS, N. 2016. Modelling the impact of raising tobacco taxes on public health and finance. *Bulletin of the World Health Organization*, 94, 250.

¹⁵ See, for example, Macroeconomic impacts of tobacco use in Pakistan, Research Report, Social Policy and Development Centre (SDPC), 2018.

¹⁶ Particularly SDG 3 (Ensure healthy lives and promote well-being for all at all ages) and Target 3.4 to reduce premature mortality from non-communicable diseases.

ANNEXURE DETAILED SIMULATION RESULTS

Table A1: Baseline and simulated taxes and prices of cigarettes

	2020 - 21 Base year	2021-22	
		Simulation - 1	Simulation - 2
Exogenous/policy shock			
Change in FED rate		30.0%	40.0%
Inflation		6.8%	6.8%
Weighted average price and tax components (Rs per a pack of 20 sticks)			
Producer price including transportation and retail margin	38.4	41.0	41.0
Total taxes	51.1	65.9	70.4
FED rate	38.7	50.3	54.2
GST (VAT)	12.4	15.5	16.2
Consumer price per pack	89.5	106.9	111.4
Total taxes as % of price	57.1	61.6	63.2
FED (% of price)	43.2	47.1	48.6
VAT (% of price)	13.8	14.5	14.5
Percentage change in price and tax components (%)			
Percentage change in producer price		6.8	6.8
<i>Percentage change in weighted average FED</i>		30.0	40.0
<i>Percentage change in weighted average VAT</i>		25.4	30.7
Percentage change in total taxes		28.9	37.7
<i>Percentage change in final price of licit cigarettes</i>		19.4	24.4
<i>Percentage change in final price of illicit cigarettes</i>		6.8	6.8
Percentage change in weighted average price		17.5	21.8

Source: Inflation projections from IMF, World Economic Outlook Database, October 2020 Edition, Base year FED and VAT rates based on CPI Cigarettes (5%), weighted average printed VAT and FED from retailers' information.

Table A2: Baseline and simulated consumption of cigarettes

	2020 - 21 Base year	2021-22	
		Simulation - 1	Simulation - 2
Price elasticity - taxable sales		-0.58	-0.58
Change in consumption (%)		-11.2	-14.2
Estimated volume of taxable sales (million packs)	2,615	2,321	2,244
Price elasticity - total consumption		-0.44	-0.44
Change in consumption (%)		-7.6	-9.5
Total consumed including illicit sales (million packs)	3,076	2,842	2,784
Estimated volume of illicit sales (million packs)	461	521	540
Proportion of illicit trade (%)	15.0	18.3	19.4

Source: Base year taxable sales based on 5 months production taken from Quantum Index Numbers of Large-Scale Manufacturing Industries, Pakistan Bureau of Statistics.

Table A3: Revenue impact

	2020 - 21 Base year	2021-22	
		Simulation - 1	Simulation - 2
Total and additional tax revenues (Rs million)			
Total revenue	133,612	152,828	147,776
Excise tax revenue	101,218	116,787	112,926
VAT revenue	32,393	36,041	34,850
Additional total tax revenue		19,216	14,164
Additional excise tax revenue		15,568	11,707
Additional VAT revenue		3,648	2,456
Percentage increase in tax revenue (nominal)			
Total tax revenue		14.4	10.6
FED revenue		15.4	11.6
VAT revenue		11.3	7.6
Tax revenues (% of GDP)			
Total tax revenue	0.290	0.294	0.284
Excise tax revenue	0.220	0.224	0.217
VAT revenue	0.070	0.069	0.067
Percentage change in tax revenue (real-GDP)			
Change in total tax revenue		1.4	-2.0
Change in FED revenue		2.2	-1.1
Change in VAT revenue		-1.4	-4.7
Per capita tax revenues (Rs)			
Total per capita tax revenues	561	629	608
Per capita excise tax revenue	425	481	465
Per capita VAT revenue	136	148	143
Percentage change in total per capita tax revenue			
Change in per capita tax revenue		12.1	8.4
Change in per capita FED revenue		13.1	9.4
Change in in per capita VAT revenue		9.1	5.5

Source: Tax revenues are based on Tax Rate from Table 2 and Taxable Sales from Table 3.

Table A4: Public health impacts

	2020 - 21 Base year	2021-22	
		Simulation - 1	Simulation - 2
Prevalence and number of adult smokers			
Change in adult prevalence (%)		-3.81	-4.75
Change in prevalence rate (percentage points)		-0.41	-0.51
Prevalence rate (%)	10.76	10.35	10.25
Number of adult smokers (in thousands)	16,507	16,287	16,129
Change in number of adult smokers (in thousands)		219.5	378.2
Prevalence and number of future smokers			
Change in youth prevalence (%)		-7.6	-9.5
Change in future smokers (in thousands)		-695.0	-865.9
Future smokers (in thousands)	9,113	8,418	8,247
Smoking-attributable deaths (in thousands)			
Adult smoking-attributable deaths	8,253	8,177	8,121
Change in adult deaths		-76.8	-132.4
Youth smoking-attributable deaths	4,557	4,209	4,124
Change in youth deaths		-348	-433
Total smoking-attributable deaths	12,810	12,386	12,245
Change in total deaths		-424	-565
% Reduction in adult deaths		-0.93	-1.60
% Reduction in youth deaths		-7.63	-9.50
% Reduction in total deaths (%)		-3.31	-4.41
Number of sticks per smoker			
Average sticks per smokers	3,727	3,490	3,452
Change in average sticks per adult smoker per year		-238	-275
% Reduction in smoking intensity		-6.38	-7.38
Source: Estimates based on gender and age cohort-wise prevalence rate from GATS 2014, and population estimates from https://www.census.gov/data-tools/demo/idb/#/country?YR_ANIM=2021&FIPS_SINGLE=PK&dashPages=BY AGE last accessed: January 04, 2021 (mid-year population)			

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