

Simulating Fiscal and Public Health Effects of a Proposed Jordan's Cigarette Tax Reform

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EXECUTIVE SUMMARY

This revised report updates the Jordan 2024 cigarette tax simulation. The revision updates scenario definitions, fiscal outputs, consumption estimates, prevalence estimates, premature-death estimates, and the methodology text in response to all inserted reviewer comments. The model incorporates major methodological improvements compared with the earlier model published in the Eastern Mediterranean Health Journal (EMHJ) (Al-Sheyab et al., 2024), including updated elasticities for adults and youth, modernized mortality risk calculations, updated excise structures, dynamic illicit trade adjustments, improved price and consumption data, and more robust demographic projections. Overall, the model reflects Jordan's current high tobacco burden and underscores the continued need for stronger fiscal measures to reduce tobacco affordability, protect young people from smoking initiation, and strengthen domestic revenue.

The model assessed four policy scenarios: the baseline/status quo scenario, a combined increase in both the specific and tiered excise components, an increase in the tiered excise component only, and an increase in the specific excise component only. Under the status quo scenario, total government revenue is estimated at 1,256.3 million JOD, cigarette consumption at 1,123.0 million packs, the retail price at 1.62 JOD per pack, and smoking prevalence at 35.6%. All three tax-increase scenarios improve both fiscal and public health outcomes compared with the status quo. Scenario 3, which increases only the tiered excise component by 15%, raises revenue by 54.4 million JOD, equivalent to a 4.3% increase, while reducing consumption by 23.8 million packs, or 2.1%. Scenario 4, which increases only the specific excise component by 15%, performs better than Scenario 3, increasing revenue by 66.4 million JOD, or 5.3%, and reducing consumption by 29.3 million packs, or 2.6%.

However, Scenario 2 produces the strongest overall impact among the modeled options. By increasing both the specific and tiered excise components by 15%, Scenario 2 raises the retail price by 13.1%, increases government revenue by JD 116.5 million, reduces cigarette consumption by 53.2 million packs, lowers smoking prevalence from 35.61% to 34.77%, and averts an estimated 27,656 premature deaths. These results show that the combined excise increase is the most effective modeled option from both fiscal and public health perspectives.

The findings confirm that well-designed tobacco taxation can achieve two critical national objectives at the same time: improving public health and increasing government revenue. In Jordan, where tobacco use remains exceptionally high and cigarette affordability continues to undermine tobacco control efforts, Scenario 2 represents the most effective policy option.

It offers a practical and evidence-based pathway to reduce smoking, prevent premature mortality, protect youth, and support Jordan's commitments under the WHO Framework Convention on Tobacco Control and the MPOWER package.

Based on the model findings, the report recommends adopting **Scenario 2** as the preferred policy option, supported by regular tax adjustments for inflation and income growth, stronger enforcement against illicit trade, continuous monitoring of retail prices and industry pricing behavior, and expansion of smoking cessation support to maximize the health gains from taxation.

Table 1: Summary Table

Indicator	Status quo	Scenario 2: both taxes +15%	Difference vs status quo
Government revenue	1,256.3 M JOD	1,372.8 M JOD	+116.5 M JOD (9.3%)
Consumption	1,123.0 M packs	1,069.9 M packs	-53.2 M packs (-4.7%)
Smoking prevalence	35.61%	34.77%	-0.84 percentage points
Direct deaths averted / total deaths difference	—	27,656 direct deaths averted	43,882 fewer deaths vs status quo trajectory



1. INTRODUCTION

Tobacco use is one of the most significant public health threats globally. According to the World Health Organization (WHO), it kills more than eight million people annually, including 1.3 million non-smokers exposed to second-hand smoke (WHO, 2023). The global economic burden of tobacco—including direct medical costs, productivity losses, disability, and environmental impacts—is estimated at over USD 1.4 trillion per year (Goodchild et al., 2018). These burdens fall disproportionately on low- and middle-income countries (LMICs), which typically have higher prevalence rates, weaker health systems, and limited capacity to absorb the direct and indirect costs of tobacco use.

Jordan has one of the highest tobacco burdens both worldwide and in the Eastern Mediterranean Region. Results from the 2024 National Adult Tobacco Survey, conducted among individuals aged 15 years and older, show that more than half of the adult population uses tobacco in one or more forms, with the overall prevalence estimated at 51.6 percent. These findings suggest that tobacco use in Jordan remains a major public health concern and has risen compared to earlier national estimates (Ministry of Health, 2025). Among current tobacco users, 71.2 percent of males and 28.8 percent of females smoke, underscoring a stark gender disparity in smoking behavior. Daily tobacco use, including manufactured cigarettes, waterpipe (shisha), roll-your-own, and heated tobacco products, was reported by approximately 43 percent of adults, with an average consumption of 22 cigarettes per day among cigarette smokers. The survey further indicates early initiation, with 38.6 percent of respondents reporting smoking onset before the age of 18, highlighting the particularly strong uptake among younger cohorts. The prevalence of other tobacco and nicotine products is also notable: 14.3 percent of adults currently smoke waterpipe, 7.2 percent use electronic cigarettes, and 4.1 percent use heated tobacco products, with substantially higher use among males than females across all categories. In addition to usage patterns, the survey found that a substantial majority of smokers are addicted, as one-third smoked within five minutes of waking. Nearly 59 percent expressed a desire to quit, though only 37 percent had attempted to quit within the past year (Ministry of Health, 2025). These findings illustrate the entrenched nature of tobacco use and the high level of nicotine dependence among Jordanian adults, with major consequences for illness and death caused by noncommunicable diseases (NCDs), healthcare costs, and socioeconomic wellbeing. Encouragingly, a majority of the population supports stronger tobacco control measures, with 53 percent of respondents expressing support for increased tobacco taxes, including one-third of smokers, signaling public willingness for stronger fiscal interventions to reduce tobacco consumption (Ministry of Health, 2025).

1.1. Tobacco Taxation as a Key MPOWER Measure in Jordan

Jordan is a signatory to the WHO Framework Convention on Tobacco Control (FCTC) and has adopted elements of the WHO MPOWER package, a set of six evidence-based measures designed to reduce tobacco use: Monitor tobacco use; Protect people from smoke; Offer help to quit; Warn about harms; Enforce marketing bans; and Raise taxes.

Among these measures, increasing tobacco taxes is consistently recognized as the most effective and cost-effective intervention for reducing tobacco consumption and preventing premature mortality (WHO, 2021). Strong tobacco taxation is particularly effective in countries with high prevalence and low prices, which accurately describes Jordan.

1.2. Youth Smoking and Price Responsiveness

Youth smoking represents a major public health concern in Jordan. The Global School Health Survey reports that over 21 percent of boys aged 13-15 use cigarettes or waterpipe tobacco (GSHS, 2019). Evidence from global reviews shows that youth are significantly more responsive to price increases than adults. Meta-analyses indicate that price elasticity among young people ranges from -0.7 to -1.0 , compared with -0.3 to -0.4 among adults (Chaloupka et al., 2019).

Raising tobacco prices is one of the most effective strategies for preventing youth initiation. Evidence demonstrates that adolescents are 50–70 percent more sensitive to cigarette price changes than adults (IARC, 2011). Youth who do not initiate smoking before age 18 face dramatically lower lifetime risks of tobacco addiction and associated diseases (Pierce et al., 2017). Therefore, strong tax policy is a critical measure for protecting youth from tobacco-related harm.

1.3. Tobacco Industry Behavior and Market Dynamics

The tobacco industry often undermines tax policy through pricing strategies such as over shifting prices beyond tax increases, maintaining low-cost brand families, offering price promotions, and manipulating multi-tiered tax systems.

Jordan's historic reliance on tiered excise structures has facilitated downtrading, enabling smokers to switch to cheaper brands instead of quitting. International evidence shows that increasing specific excise taxes reduces the industry's capacity to manipulate prices and narrows the price gap between premium and budget brands (Gilmore et al., 2015; Chaloupka et al., 2020). This study's Scenario 2 reflects these best practices by strengthening both specific and tiered components.

Tobacco taxation is grounded in economic theory as a corrective ("Pigouvian") tax designed to address negative externalities, including healthcare costs, productivity losses,

environmental harms, and family impoverishment. Inelastic demand for cigarettes makes excise taxes particularly efficient: higher taxes reduce consumption while simultaneously increasing government revenue (Sloan & Hsieh, 2017). These dual benefits are confirmed by decades of global experience.

1.4. History of Cigarette Tax Increases and Price Reforms in Jordan

Jordan has implemented several rounds of tobacco tax adjustments over the past two decades, particularly following its ratification of the FCTC in 2004. Early reforms relied on a mixed excise system combining a specific tax component with tiered elements linked to price categories. While these measures gradually increased the nominal tax burden, the structural design of the system permitted considerable variation in retail prices across brands, thereby limiting the full public health impact of tax increases. The wide availability of cheaper brands enabled smokers to switch brands rather than quit or decrease consumption.

Between 2014 and 2018, Jordan increased the main unified specific excise on cigarettes from JD 0.42 to JD 0.57 per pack, an increase of about 36 percent over four years. In January 2014, the government replaced the ad valorem cigarette excise with an additional tiered specific excise under Regulation No. 26 of 2014, ranging from JD 0.283 for cheaper packs to JD 0.938 for more expensive packs, roughly equivalent to 31–39 percent of retail price. The tiered rates were revised in 2018 under Regulation No. 3 of 2018, increasing the range to JD 0.545–1.315 per pack, or 36.6–40.5 percent of retail price. For cigarettes whose retail prices did not change between 2014 and 2018, the additional tiered excise remained nearly unchanged. For example, for a JD 1.5 pack, it remained JD 0.545, while total excise increased from JD 0.965 to JD 1.132.

According to a World Bank report, tobacco excise revenue increased from JD 375 million in 2013 to JD 554 million in 2016, largely driven by higher tobacco sales (World Bank Group, 2019). The report illustrates that, with the net-of-tax price held constant at JD 0.5 per pack, the final retail price rises from JD 1.745 in 2014 to JD 2.1 in 2018. However, inflation and real income growth partially offset these price increases, meaning cigarette affordability did not decline proportionally. WHO assessments during this period indicated that total tax as a share of the retail price rose to around 78 percent, even exceeding the international minimum benchmark. Yet this indicator alone can be misleading in settings where cigarette prices remain low in absolute terms. Even with a high tax share, tobacco products may remain affordable if the pre-tax base price is low, as was the case in Jordan. This helps explain why substantial scope remained for price segmentation and why the tax increases were not sufficient to reduce affordability as much as the higher tax share might suggest (WHO, 2023).

Further regulatory adjustments occurred in 2024 under Amended Special Tax Regulation No. 62 of 2024. This reform introduced a uniform increase of 100 fils (JD 0.10) per pack of cigarettes and established a minimum retail price of JD 1.70 per pack. Authorities emphasized compliance and price monitoring to prevent excessive retail markups beyond the authorized increase. Despite this adjustment, the overall structure of the tax system remained unchanged, and price differentials across brands persisted.

In early 2025, public speculation about additional cigarette tax increases was formally denied by the Income and Sales Tax Department, which confirmed that no new increases had been approved beyond those in the 2024 amendment. In contrast, late 2025 witnessed a significant reduction in special taxes on certain electronic cigarettes and heated tobacco products, with reductions reaching up to 70 percent for specific product categories. This policy shift generated debate regarding consistency with tobacco control objectives and highlighted ongoing tensions between fiscal policy, market regulation, and public health priorities.

In January 2026, local tobacco companies announced increases in cigarette prices ranging between 10 and 20 piastres (0.10–0.20 JOD) per pack for various cigarette products across the local market.

Overall, while Jordan has demonstrated periodic commitment to raising tobacco taxes, reforms have largely been incremental and have not fundamentally restructured the excise system toward a predominantly specific, uniform model. As a result, cigarette affordability remains relatively high, price dispersion persists, and smoking prevalence continues at exceptionally elevated levels. These historical patterns underscore the need not only for further tax increases but also for structural reform of the taxation system to maximize public health impact and revenue stability.

1.5. Current Cigarette Taxation System in Jordan

Jordan currently applies a mixed excise taxation system composed of three primary components: a specific excise tax levied as a fixed amount per pack, a tiered component linked to price categories, and a 16 percent value-added tax. Although the total tax burden exceeds 70 percent of the final retail price, the structural design of the system presents important policy challenges. Tiered systems enable smokers to shift toward lower-priced brands when taxes increase, thereby limiting reductions in consumption. The coexistence of multiple price tiers also creates opportunities for the tobacco industry to manipulate prices and strategically under- or over-shifting tax increases across product segments. International evidence and WHO technical guidance indicate that tobacco tax systems with fewer tiers and a stronger uniform specific excise component are more effective because they reduce both administrative complexity and tax dispersion across price segments. In

practical terms, a more uniform specific excise creates a stronger price floor, narrows the price gap between low-priced and premium brands, reduces smokers' ability to downtrade to cheaper products after a tax increase, and makes revenue less dependent on industry pricing strategies. The current Jordanian structure, while improved compared with earlier years, still includes a tiered component linked to price categories. This allows price dispersion to persist and may weaken the full public health effect of tax increases. Thus, the policy concern is not only the presence of multiple tiers, but also the tax and price dispersion they create, which keeps lower-priced cigarette segments available and encourages smokers to downgrade rather than quit or reduce consumption.

1.6. Rationale for Proposing Further Tax Increases

Despite previous tax adjustments, smoking prevalence in Jordan remains exceptionally high, suggesting that current cigarette price levels are still insufficient to produce meaningful reductions in tobacco use. Affordability is a key determinant of consumption. The 2024 Economics for Health Cigarette Tax Scorecard gave Jordan a score of 3 for price, 0 for affordability change, 4.5 for tax share, and 1 for tax structure, with an overall score of 2.13/5. The fact sheet also notes that Jordan's overall score rose between 2014 and 2018 but declined in 2024 because of a significant drop in the affordability-change component. This indicates that reducing cigarette affordability remains a major challenge in Jordan's tobacco tax policy (Economics for Health, 2024). More broadly, the public health importance of reducing affordability is reinforced by evidence that youth are more responsive to price changes than adults. International meta-analyses indicate that youth price elasticity is higher than adult elasticity, suggesting that higher cigarette prices can play an important role in preventing smoking initiation (Chaloupka et al., 2019).

From a fiscal perspective, tobacco taxation represents a highly efficient policy instrument. The World Bank identifies tobacco excise increases as one of the most cost-effective measures for simultaneously improving public health and strengthening domestic revenue mobilization. Given Jordan's rising healthcare expenditures associated with NCDs and broader fiscal consolidation pressures, well-designed tobacco tax increases offer a dual benefit: reducing long-term health system costs while increasing short- to medium-term government revenue.

1.7. Need for Structural Reform of the Tax System

Beyond increasing tax rates, reforming the structure of tobacco taxation is essential to maximize health and fiscal outcomes. Evidence consistently demonstrates that uniform specific excise taxes generate larger and more predictable reductions in consumption than ad valorem or tiered systems. Complex tax structures create incentives for brand substitution and price segmentation by the tobacco industry, weakening the public health

impact of tax increases. The original edition of the WHO Technical Manual on Tobacco Taxation recommends that excise taxes account for at least 70 percent of the retail price, with the majority levied as uniform specific taxes rather than ad valorem. Although Jordan's total tax burden approaches this threshold, the continued reliance on a tiered component allows for downtrading and undermines the full effectiveness of tax policy. Structural reform aimed at strengthening the specific component and narrowing price differentials would reduce opportunities for industry manipulation, enhance consumption declines, and improve revenue stability.

1.8. Alignment with International Commitments

Jordan is a Party to the WHO Framework Convention on Tobacco Control and is obligated under Article 6 to implement effective price and tax measures to reduce tobacco demand. Within the MPOWER framework, raising taxes is identified as the single most effective tobacco control intervention. Strengthening excise taxation is therefore not only a public health imperative but also a legal and policy commitment under international treaty obligations. Implementing further reforms would support Jordan's commitments to reducing NCD mortality, advancing universal health coverage, and meeting sustainable development targets related to health and well-being.

1.9. Rationale for the Present Modeling Study

This modeling study updates the cigarette tax simulation to reflect the most recent Jordanian data and current policy context (Al-Sheyab, 2024; Alyahya et al, 2025). The update uses revised demographic inputs, current tax and retail-price assumptions, updated elasticity parameters, an illicit-consumption adjustment, and improved mortality modeling to estimate the likely fiscal and public-health effects of alternative cigarette excise tax reforms. The purpose is to provide a current, policy-relevant basis for comparing tax scenarios and informing tobacco tax decisions in Jordan.

2. METHODOLOGY

This study evaluates four cigarette excise tax scenarios using updated 2024–2025 Jordanian data. It estimates the impact of a tax increase on cigarette retail prices, total consumption, government revenue, and premature deaths averted using a structured, stepwise simulation model. The methodology applied follows internationally recognized practices used by WHO, Economics for Health at Johns Hopkins University, and the Social Policy and Development Centre (SPDC), adapting their modeling approach to Jordan’s tax system, demographic structure, and available data sources.

The model follows five major steps, each relying on explicit formulas and clearly identified data sources. A summary of all variables, data sources, and detailed calculation methods is shown in Tables 2 and 3.

Step 1: Baseline Market Structure and Consumption

The baseline was constructed in a stepwise manner to make the starting values transparent. First, the adult population was calculated by applying the share of people aged 15 years and above (65.8%) to Jordan’s total 2025 population estimate of 11.937 million, giving an estimated adult population of 7.855 million. Second, the number of adult smokers was calculated by multiplying the adult population by the baseline smoking prevalence of 35.3%, resulting in approximately 2.773 million adult smokers. Third, annual cigarette consumption was estimated by multiplying the number of adult smokers by average consumption per smoker (401.5 packs per year), giving an initial baseline consumption estimate of 1,113.2 million packs. Finally, the status quo consumption estimate was adjusted for expected income growth using the income elasticity assumption, resulting in projected Year 1 status quo consumption of 1,123.0 million packs. Revenue estimates were then calculated using legal/tax-paid consumption after adjustment for illicit consumption, which is why the revenue baseline is lower than it would be if all cigarette consumption were assumed to be fully taxed.

Table 2: Key model inputs and Indicators

Variable	Updated value	Calculation / interpretation	Source note
Total population	11.937 million	Reported population input	Inputs; DOS in Jordan
Population aged 15+	7.855 million	65.8% of total population	Inputs; DOS in Jordan
Population aged 0–14	4.082 million	Total population minus age 15+ population	Inputs; DOS in Jordan
Baseline smoking prevalence	35.3%	Daily and Non-daily smokers	Inputs; Stepwise Survey (STEPS)2019
Adult smokers	2.773 million	Population aged 15+ × prevalence	Inputs; authors' calculation
Young/future smokers	1.441 million	Population aged 0–14 × prevalence assumption	Inputs; authors' calculation
Average packs/adult smoker/year	401.5	22 cigarettes/day × 365 ÷ 20	Inputs; JATS
Initial consumption	1,113.2 M packs	Adult smokers × average packs/year	Inputs; DOS/JATS calculation
Price elasticity of demand	-0.365	Consumption response to price	Inputs
Income elasticity of demand	0.327	Consumption response to income	Inputs; Ho et al.
Prevalence elasticity	-0.1825	Half of total elasticity assumption	Inputs
VAT rate	16%	Applied to tax-paid price	Inputs / Calculations

Step 2: Tax Structure and Retail Price Calculations

Retail price¹ per pack (RP) is determined by combining the net-of-tax base price (BP), excise taxes (ET), and VAT:

$$RP = BP + ET + (BP + ET) \times VAT$$

$$RP_{baseline} = 0.178 + 0.67 + (0.178 + 0.67) \times 0.16 = 1.6 \text{ JOD}$$

The formula is applied to each scenario using the relevant tax values shown in Table 3. Scenario 2 is presented below only as an illustrative example of the calculation, because it changes both the specific excise and the tiered component.

¹This model uses the first, lowest cigarette price tier as the reference price for simulation. In the baseline model, this corresponds to the lowest-tier additional excise component of JD 0.545 per pack. This tier was selected because it represents the most affordable segment of the cigarette market, which is particularly relevant for price-sensitive smokers and for assessing substitution or downtrading behavior toward lower-priced products.

$$ET_{new} = ET_{baseline} \times (1 + \text{excise increase \%})$$

For Scenarios 3 and 4, the same formula is used, but only the tax component specified for that scenario is increased.

Data Source: MoF excise schedules; retail price survey.

For more information about Cigarette tax structure and retail prices (Please see Supplementary Table S1).

Step 3: Impact of Price Change on Consumption

Changes in consumption are modeled using price elasticity of demand (ε):

$$\% \Delta C = \varepsilon \times \% \Delta P$$

Where:

- ▶ Adult elasticity = -0.365
- ▶ Youth elasticity = -0.72
- ▶ Weighted elasticity = population-weighted average

Total consumption under the new price:

$$C_{new} = C_{baseline} \times (1 + \% \Delta C)$$

Example:

$$\% \Delta C = (-0.365) \times (17.4\%) = -6.4\%$$

$$C_{new} = 1229.6 \times 0.936 = 1152 \text{ million packs}$$

Data Sources: International elasticity studies for LMICs; Jordan baseline modeling framework.

Step 4: Smoking Prevalence Reduction

Changes in smoking prevalence are estimated using the prevalence elasticity of demand:

$$\Delta Prev = \varepsilon_{prev} \times \% \Delta P$$

Where:

- ▶ Prevalence elasticity = -0.18
- ▶ Baseline prevalence = 35.3%

The adjusted prevalence:

$$Prev_{new} = Prev_{baseline} + \Delta Prev$$

Data Source: JATS (Jordan Adult Tobacco Survey), WHO Global Health Observatory.

Step 5: Premature Deaths Averted

Deaths averted are calculated using WHO mortality risk estimates and reductions in the number of smokers:

$$Deaths_{averted} = (Adult\ smokers_{reduced} \times 50\%) + (Youth\ smokers_{reduced} \times 65\%)$$

Where:

- ▶ 50% = proportion of long-term smokers who die prematurely
- ▶ 65% = proportion of youth avoided deaths when quitting early

Example:

$$Deaths_{averted, scenario\ 2} = 69844.55 \times 0.5 + 31871.61 \times 0.65$$

Data Sources: WHO mortality risk parameters; Inoue-Choi et al. (2019); Jordan demographic projections.

2.1. Scenario Structure

The four scenarios model different combinations of cigarette excise tax increases:

- ▶ **Scenario 1/status quo:** no tax increase.
- ▶ **Scenario 2:** 15% increase in both the specific excise and tiered excise components.
- ▶ **Scenario 3:** 15% increase in the tiered excise component only.
- ▶ **Scenario 4:** 15% increase in the specific excise component only.

Table 3: Scenarios Structure

Scenario	Specific excise	Tier component	VAT/pack	Retail price	% change in price	Total tax burden
Status quo	JD 0.670	JD 0.545	JD 0.223	JD 1.616	0.0%	89.0%
Scenario 2: both taxes +15%	JD 0.770	JD 0.627	JD 0.252	JD 1.827	13.1%	90.3%
Scenario 3: tier +15%	JD 0.670	JD 0.627	JD 0.236	JD 1.711	5.9%	89.6%
Scenario 4: specific +15%	JD 0.770	JD 0.545	JD 0.239	JD 1.732	7.2%	89.7%

2.2. Data Sources

- ▶ Ministry of Finance retail price and revenue data
- ▶ Department of Statistics demographic projections
- ▶ WHO Global Health Observatory mortality data
- ▶ The Jordan Adult Tobacco Survey (JATS) Results
- ▶ Peer-reviewed elasticity estimates
- ▶ Epidemiological mortality risk models
- ▶ 2023 Jordan baseline model inputs

2.3. Elasticity Values

- ▶ Adult elasticity : **-0.365**
- ▶ Youth elasticity Factor : **2**

These reflect LMIC evidence demonstrating higher responsiveness to price increases.

2.4. Mortality Modelling

Premature deaths averted are based on changes in smoking prevalence and smoking intensity. Using updated mortality risk equations (Inoue-Choi et al., 2019) allows for more accurate estimation of health impact.

2.5. Illicit Trade Modelling

The illicit-trade adjustment is used to estimate revenue from the taxable, legal cigarette market rather than from total cigarette consumption. In practical terms, the model first estimates total consumption and then deducts the estimated illicit share before calculating excise and VAT revenue. The current model applies the updated illicit-consumption estimate used in the 2025 analysis (Alyahya et al, 2025). The term “dynamic” means that this adjustment is not treated as a permanent fixed value across future model updates; it can be updated when new survey, administrative, customs, or market-surveillance data become available. The model does not assume that a tax increase automatically causes illicit trade. Instead, it recognizes that the size of the illicit market depends mainly on enforcement capacity, supply-chain control, tax administration, border control, penalties, and the availability of untaxed products.

2.6. Comparison to the EMHJ Model

Table 4: Comparison Between the 2023 Jordan Baseline Model and the Updated Tobacco Tax Modeling Approach

Parameter	2023 Jordan Model	Updated 2025 Model
Baseline year	2023	2024
Prevalence	41.0%	35.3%
Age	18+	15+
Price elasticity (<i>adult</i>)	-0.365	-0.365
Illicit trade	-	22.2% (Alyahya et al, 2025)
Population data	2021 DOS	2025 DOS revised
Tax structure	Older tiered system	Revised by 2024 MoF data

Major improvements include updated elasticities, demographic data, pass-through assumptions, and improved mortality estimation techniques.

3. RESULTS

The updated Excel workbook changes the magnitude of the results compared with the earlier report because the updated scenarios use 15% tax increases and incorporate the latest illicit-consumption adjustment. All tax-increase scenarios raise revenue and reduce cigarette consumption compared with the status quo. Scenario 2 remains the strongest option across the main fiscal and public health indicators.

3.1. Fiscal and consumption outcomes

Scenario 2 generates the highest projected government revenue at JD 1,372.8 million, compared with JD 1,256.3 million under the status quo. This is an increase of JD 116.5 million (9.3%). Scenario 4 generates the second-largest revenue gain at JD 66.4 million (5.3%), followed by Scenario 3 at JD 54.4 million (4.3%).

Consumption reduction is also strongest under Scenario 2. Consumption falls by 53.2 million packs (4.7%) compared with the status quo. Scenario 4 reduces consumption by 29.3 million packs (2.6%), while Scenario 3 reduces consumption by 23.8 million packs (2.1%).

Table 5: Projected fiscal and consumption outcomes

Scenario	Revenue (M JOD)	Change vs status quo	% revenue change	Consumption (M packs)	Change vs status quo	% consumption change
Status quo	1,256.3	—	—	1,123.0	—	—
Scenario 2: both taxes +15%	1,372.8	+116.5	9.3%	1,069.9	-53.2	-4.7%
Scenario 3: tier +15%	1,310.7	+54.4	4.3%	1,099.2	-23.8	-2.1%
Scenario 4: specific +15%	1,322.7	+66.4	5.3%	1,093.7	-29.3	-2.6%

3.2. Smoking prevalence, smokers, and premature deaths

Under the status quo trajectory, smoking prevalence reaches 35.61%. Scenario 2 reduces prevalence to 34.77%, a decline of 0.84 percentage points. Scenario 3 reduces prevalence to 35.23%, while Scenario 4 reduces it to 35.15%.

Compared with the status quo trajectory, Scenario 2 results in approximately 66,203 fewer adult smokers and 68,819 fewer future/youth smokers. The Summary Table reports a direct modelled reduction of 27,656 premature deaths under Scenario 2. When projected total deaths are compared directly with the status quo trajectory, Scenario 2 is associated with

43,882 fewer premature deaths. New total deaths declined in all scenarios compared to the status quo, where scenario 2 showed the best results compared with others.

Table 6: Smoking prevalence, smokers, and mortality outcomes

Scenario	Prevalence	New Adult smokers	New Future smokers	Avg packs/ smoker/ year	Direct deaths averted*	New Total deaths	Deaths fewer vs status quo
Status quo	35.61%	2,797,135	1,466,553	401.5	—	2,123,106.7	—
Scenario 2: both taxes +15%	34.77%	2,730,932	1,397,735	391.8	27,656	2,079,224.85	43,882
Scenario 3: tier +15%	35.23%	2,767,439	1,435,684	397.2	3,457	2,103,423.08	19,684
Scenario 4: specific +15%	35.15%	2,760,628	1,428,604	396.2	7,972	2,098,908.49	24,198

* Direct deaths averted are taken from the Summary Table row “Fewer total deaths (deaths averted)” and converted to positive values for reporting. The final column compares projected total deaths with the status quo trajectory from the Working-Health sheet.

3.3. Detailed revenue components

The revenue projections show that all tax-increase scenarios generate higher government revenue compared with the status quo. Under the status quo, total revenue is estimated at JD 1,256.3 million, including JD 1,061.6 million from excise taxes and JD 194.7 million from VAT. Scenario 2, which increases both the specific excise and tier components by 15%, produces the highest fiscal return, raising total revenue to JD 1,372.8 million, an increase of JD 116.5 million compared with the status quo. Scenario 4, which increases only the specific excise tax by 15%, ranks second with total revenue of JD 1,322.7 million, followed by Scenario 3, which increases only the tier component by 15%, generating JD 1,310.7 million. Overall, the results indicate that increasing both tax components together provide the strongest revenue gain, while single-component increases produce more moderate fiscal improvements.

Table 7: Projected Government Revenue by Tax Component Under Alternative Cigarette Tax Scenarios (Million JD)

Scenario	Specific excise revenue	Tier revenue	Total excise revenue	VAT revenue	Total revenue
Status quo	585.4	476.2	1,061.6	194.7	1,256.3
Scenario 2: both taxes +15%	641.3	521.7	1,163.0	209.8	1,372.8
Scenario 3: tier +15%	573.0	536.0	1,109.0	201.8	1,310.7
Scenario 4: specific +15%	655.6	463.8	1,119.4	203.3	1,322.7

Detailed fiscal and public health projections for each modeled tax scenario are presented in Supplementary Table S2. Overall, the supplementary results show that Scenario 2 produces the strongest combined impact, generating the highest revenue gain while achieving the largest reductions in cigarette consumption, smoking prevalence, and projected premature deaths.

4. DISCUSSION

The updated model confirms that cigarette taxation remains a highly relevant policy instrument for Jordan, offering simultaneous public health and fiscal benefits. In the context of exceptionally high tobacco use, persistent affordability, and a growing non-communicable disease burden, the findings strengthen the case for further excise reform. Importantly, the revised estimates are more conservative than earlier modeling because they apply a 15% tax-increase assumption and adjust revenue projections for illicit cigarette consumption.

Across the modeled options, the combined increase in both the specific and tiered excise components emerges as the most balanced short-term policy option. Its stronger performance reflects the larger effect on the final retail price, which is the key mechanism through which taxation influences smoking behavior. This is particularly important for price-sensitive groups, including young people and lower-income smokers, and reinforces the need to design tobacco tax policy around the actual consumer price rather than changes in individual tax components alone.

The comparison between single-component reforms also conveys an important policy message. Increasing the specific excise component appears more effective than increasing the tiered component alone, because specific taxes are generally better suited to narrowing price gaps and reducing opportunities for downtrading to cheaper brands. However, neither single-component option performs as strongly as the combined approach. This suggests that Jordan may benefit from a phased strategy: adopting a combined increase in the short term while gradually moving toward a simpler, more uniform structure with greater reliance on specific excise taxation.

Overall, the results should be interpreted not only as evidence for increasing tobacco taxes, but also as support for improving the structure and implementation of the tax system. A well-designed reform would combine higher excise rates with measures to reduce affordability, limit industry pricing strategies, strengthen enforcement, and protect revenue gains. These issues are discussed in more detail in the following sections, including illicit consumption, public health implications, fiscal implications, and longer-term tax-structure reform.

4.1. Illicit consumption and enforcement

The updated model refines the treatment of illicit cigarette consumption when estimating government revenue. Because illicit consumption reduces the taxable base, the revenue estimates are more conservative than estimates that assume all cigarette consumption is

legal and fully taxed. Even with this adjustment, all tax-increase scenarios generate higher total revenue than the status quo, and Scenario 2 remains the strongest option.

It is important to emphasize that the model does not assume that tax increases automatically cause illicit trade. Illicit tobacco markets are influenced by multiple factors, including tax administration capacity, border control, supply-chain monitoring, enforcement, penalties, corruption risks, and the availability of untaxed products through informal retail channels. Therefore, the presence of illicit consumption should not be interpreted as an argument against tax increases. Rather, it highlights the need to implement tax reform together with stronger enforcement and market-control measures.

The policy implication is that Jordan should accompany any tobacco tax increase with practical measures to protect the revenue base. These include strengthening tax stamps or digital track-and-trace systems, improving coordination among tax, customs, and inspection authorities, increasing penalties for large-scale illicit trade, monitoring retail prices, and conducting regular market surveillance to identify untaxed or under-taxed products. Stronger enforcement would increase the effectiveness of tax policy by ensuring that tax increases are reflected in legal retail prices and by reducing opportunities for consumers to shift toward illicit products.

Retail price monitoring is also essential. Tobacco companies may respond to tax increases through under-shifting, over-shifting, discounting, or selective price changes across brand segments. In a tiered or mixed tax system, these pricing strategies can weaken the health impact of taxation by preserving cheaper options for price-sensitive smokers. Monitoring prices across brands and price categories would help policymakers identify whether the tax increase is being passed on to consumers as intended and whether additional regulatory action is needed to reduce price manipulation.

4.2. Public health implications

The public health benefits of tobacco taxation are clearest under Scenario 2. Under this scenario, total cigarette consumption falls by 4.7%, smoking prevalence declines by 0.84 percentage points compared with the status quo trajectory, and average annual consumption per smoker declines by 9.7 packs. These changes are meaningful at the population level because even modest percentage reductions translate into large absolute reductions when applied to millions of smokers and more than one billion cigarette packs consumed annually.

Scenario 2 also produces the strongest projected mortality benefit, with 43,882 fewer premature deaths compared with the status quo trajectory. This is a major finding because it demonstrates that tobacco taxation is not only a fiscal instrument but also a life-saving

public health intervention. Reductions in smoking prevalence and intensity are expected to reduce future deaths from cardiovascular disease, stroke, chronic respiratory disease, and cancers linked to tobacco use. The benefits are likely to accumulate over time, particularly if tax increases are sustained, indexed to outpace inflation and real income growth, and combined with cessation support.

The reduction in average packs per smoker is also important. Tobacco tax models often focus on quitting and prevalence reduction, but reduced smoking intensity among continuing smokers also contributes to health gains. While complete cessation provides the greatest benefit, lower cigarette consumption can reduce exposure to tobacco toxins and may increase motivation for future quitting. Therefore, a tax policy that reduces both the number of smokers and the intensity of smoking among continuing smokers has broader public health value.

Youth protection is another major implication. Young people are generally more responsive to price increases than adults because they have lower disposable income and are more sensitive to changes in affordability. By producing the largest retail-price increase, Scenario 2 is expected to have the strongest effect on preventing smoking initiation among adolescents and young adults. This is especially important in Jordan, where early initiation remains a concern and long-term nicotine dependence often begins before adulthood. Preventing initiation among young people can produce lifelong health benefits and reduce future healthcare costs.

4.3. Fiscal implications

The fiscal results demonstrate that tobacco tax increases can strengthen government revenue even when consumption declines. This reflects the inelastic nature of cigarette demand: although higher prices reduce consumption, the percentage reduction in consumption is smaller than the percentage increase in tax per pack. As a result, total revenue increases. Under Scenario 2, total revenue increases by JD 116.5 million, equivalent to 9.3% above the status quo. This additional revenue could provide important fiscal space for health priorities, including non-communicable disease prevention, smoking cessation services, health promotion, and enforcement against illicit trade.

The results also show that the composition of revenue matters. Scenario 2 increases specific excise revenue, tier revenue, total excise revenue, and VAT revenue. This broad-based improvement reflects the larger overall price and tax effect of the combined reform. By contrast, single-component increases generate smaller gains and may create greater opportunities for substitution across price segments. Therefore, from a fiscal perspective, Scenario 2 offers the most balanced approach because it increases revenue while also supporting stronger public health outcomes.

In the Jordanian context, tobacco tax revenue should not be viewed only as a general fiscal source. Because tobacco use contributes substantially to healthcare costs, productivity losses, and premature mortality, additional revenue from tobacco taxation can help offset some of the social and economic costs caused by smoking. Allocating part of the additional revenue to tobacco control, cessation, enforcement, and treatment of tobacco-related diseases would further strengthen the policy's public value and increase public acceptability.

4.4. Implications for tax structure reform

The results support the need to strengthen Jordan's tobacco tax structure, not merely increase tax rates. A mixed system with tiered components can allow price gaps between cheaper and more expensive products to persist. When price gaps remain wide, smokers may respond to tax increases by switching to cheaper brands rather than quitting or reducing consumption. This behavior, often called downtrading, weakens the public health impact of tax policy.

Scenario 4's stronger performance compared with Scenario 3 suggests that the specific excise component is particularly important. Specific taxes are easier to administer, more predictable as a revenue source, and more effective in reducing price differences across brands. However, the superior performance of Scenario 2 indicates that a combined increase is currently the most effective short-term option. In the longer term, Jordan could consider simplifying the structure and increasing the relative weight of the specific component to reduce opportunities for tax avoidance, price manipulation, and brand substitution.

Indexation is also critical. If tobacco taxes are not regularly adjusted for inflation and real income growth, cigarettes typically become more affordable over time even when nominal tax rates remain unchanged. This is especially important in Jordan, where affordability has been identified as a continuing challenge. Regular tax adjustments would help ensure that the real price of cigarettes increases over time and that the public health impact of taxation is not eroded by inflation or rising incomes.

4.5. Equity considerations

Tobacco taxation has important equity implications. Although tobacco taxes are sometimes criticized because lower-income smokers spend a larger share of income on tobacco, the health benefits of reduced smoking are typically greatest among lower-income groups. Lower-income smokers are usually more price responsive, meaning they are more likely to reduce consumption or quit when prices rise. As a result, tobacco tax increases can reduce future health inequalities by preventing tobacco-related illness and reducing household spending on cigarettes among the most economically vulnerable.

In Jordan, where household economic pressures are significant, reducing tobacco consumption can free income for essential needs such as food, education, transportation, and healthcare. This is especially relevant for low-income households in which tobacco spending may compete with other basic expenditures. To maximize equity benefits, tax increases should be accompanied by accessible cessation services, targeted public communication, and support for vulnerable groups who want to quit.

4.6. Policy interpretation

The model results provide strong support for adopting Scenario 2 as the preferred policy option. Scenario 2 is the best-performing option from both a fiscal and public health perspective: it generates the highest government revenue, produces the largest reduction in cigarette consumption, lowers smoking prevalence the most, and averts the greatest number of premature deaths. This makes Scenario 2 the most effective and defensible option for Jordan's tobacco tax reform.

However, tax reform should not be implemented in isolation. To maximize impact, it should be part of a comprehensive tobacco control strategy that includes cessation support, enforcement of smoke-free policies, large graphic warning labels, restrictions on tobacco marketing, public awareness campaigns, and strong monitoring of industry behavior. Taxation is one of the most powerful tobacco control tools, but evidence shows that its effectiveness increases even more when combined with other measures that reduce demand and support quitting.

4.7. Limitations of the modeling analysis

As with all modeling studies, the findings should be interpreted in light of several limitations. First, the results depend on the quality and accuracy of the input data, including population estimates, smoking prevalence, consumption levels, tax structure, illicit consumption assumptions, and elasticity values. Second, the model estimates projected changes based on expected behavioral responses; actual market responses may differ depending on industry pricing strategies, enforcement capacity, consumer behavior, and macroeconomic conditions. Third, illicit consumption is included in the revenue adjustment, but the future behavior of illicit markets is difficult to predict precisely. Fourth, the health impact estimates depend on assumptions about changes in smoking prevalence, consumption intensity, and the relationship between smoking reduction and premature mortality. All said, these assumptions and estimates are drawn directly from decades of research examining tobacco-related challenges similar to Jordan's.

Despite these limitations, the model provides a useful and policy-relevant estimate of the likely direction and magnitude of fiscal and public health effects. The consistency of results across scenarios strengthens the conclusion that cigarette tax increases would benefit

Jordan, and that a combined increase in both specific and tiered excise components would produce the strongest overall impact.

Overall, the updated analysis confirms that tobacco taxation remains one of the most effective policy tools available to Jordan for reducing tobacco use and improving public health while also increasing government revenue. Scenario 2 stands out as the preferred option because it produces the largest price increase, the greatest reduction in cigarette consumption, the strongest decline in smoking prevalence, the highest number of premature deaths averted, and the largest fiscal gain. The findings support a policy direction that combines immediate tax increases with longer-term structural reform, stronger enforcement, routine price monitoring, inflation and real income growth indexation, and investment in cessation services. This combined approach would help Jordan reduce the health and economic burden of tobacco while strengthening its alignment with national and international tobacco control commitments.

5. CONCLUSION

The updated modeling analysis supports Scenario 2: increasing both the specific excise and the tier component by 15%, resulting in a specific excise of JD 0.7705 and a tier component of JD 0.62675 per pack. This option generates the strongest combined fiscal and health results in the updated workbook: revenue increases by JD 116.5 million (9.3%), consumption decreases by 53.2 million packs (4.7%), and the direct modelled deaths-averted estimate is 27,656 premature deaths.

Scenario 2 therefore offers the most robust policy case because it improves revenue performance while simultaneously reducing smoking prevalence, cigarette consumption, and premature mortality. The findings support a combined tax-increase strategy accompanied by stronger enforcement and annual model updating.

6. RECOMMENDATIONS

1. Adopt Scenario 2 as the preferred fiscal option by increasing both the specific excise and tier component by 15%, according to the updated model values.
2. Index the specific excise component to outpace the combination of inflation and real income growth so that cigarettes become less affordable over time rather than simply maintaining the nominal tax burden.
3. Move gradually toward a simpler and more uniform specific excise structure to reduce price gaps, limit downtrading, and make revenue projections more predictable.
4. Strengthen enforcement against illicit cigarette supply using tax-stamp controls, supply-chain monitoring, retailer inspection, penalties for untaxed products, and regional cooperation.
5. Monitor retail prices after any tax reform to assess industry pass-through, over-shifting, under-shifting, and potential substitution toward cheaper products or alternative nicotine products.
6. Update the model annually using new population, price, consumption, illicit-market, and tax-revenue data. Future updates should separate tax-paid consumption from illicit consumption whenever reliable data is available.



REFERENCES

- Al-Sheyab, N. A., Khader, Y., Alyahya, M. S., Sweis, N., & Mirza, M. (2024). Comparative analysis of the impact of cigarette taxation on consumption, revenue and mortality in Jordan. *Eastern Mediterranean Health Journal*, 30(11), 788-797.
- Alyahya, M., Al-Sheyab, N. & Khader, Y. (2025). An analysis of the tobacco illicit market in Jordan: A household survey. *Tobacco Induced Diseases*, 23(1), A362.
- Blecher, E. & Ross, H. (2019). Tobacco Taxation: A cornerstone of tobacco control. *Tobacconomics Working Paper*.
- Chaloupka, F.J. et al. (2019). Effectiveness of tax and price policies in tobacco control. *Nicotine & Tobacco Research*, 22(1), 67–77.
- Chaloupka, F.J., Kostova, D. & Shang, C. (2020). Cigarette pricing and tax policy in the presence of illicit trade. *Tobacco Control*, 29(2), 215–223.
- Economics For Health (2024). Economics for Health Cigarette Tax Scorecard, Jordan Fact Sheet. <https://www.economicsforhealth.org/files/research/1074/jordan-factsheet.pdf>
- Fuchs, A. & Meneses, F. (2017). Are tobacco taxes regressive? *World Bank Policy Research Working Paper*.
- Gilmore, A. et al. (2015). Tobacco industry manipulation of prices. *BMJ*, 350:h930.
- Goodchild, M., Nargis, N. & Tursan d’Espaignet, E. (2018). Global economic cost of smoking. *Tobacco Control*, 27(1), 58–64.
- IARC (2011). *Effectiveness of price and tax policies for tobacco control*. IARC Handbook Volume 14.
- Inoue-Choi, M. et al. (2019). Reduced cigarette smoking and mortality risk. *JAMA Network Open*, 2(5), e194034.
- Joossens, L. & Raw, M. (2012). Illicit tobacco trade: global problem, global solutions. *WHO FCTC Secretariat*.
- Ministry of Health Jordan (2021). National NCD Surveillance Report.
- Ministry of Health (2025) . Results of The Jordanian Adult Tobacco Survey (JATS).

- Nargis, N. et al. (2021). Price elasticity of tobacco demand in LMICs. *BMJ Global Health*, 6:e004676.
- Pierce, J.P. et al. (2017). Initiation of tobacco use during youth and addiction. *American Journal of Public Health*, 107(2), 275–281.
- Ross, H. (2015). Understanding illicit trade. *Tobacco Control*, 24(e2), e142–e146.
- van Walbeek, C. & Filby, S. (2020). Taxation and revenue impact of tobacco tax reforms. *South African Medical Journal*, 110(9), 53–60.
- Verguet, S. et al. (2015). Taxation and NCD mortality impact. *The Lancet*, 385, 239–252.
- WHO (2021), WHO Technical Manual on Tobacco Taxation.
- WHO (2022), Global Adult Tobacco Survey: Jordan.
- WHO (2023), Global Tobacco Epidemic Report.
- World Bank (2019). *The economic cost of tobacco in Jordan*.
- World Bank Group. (2019). *Jordan: Overview of Tobacco Use, Tobacco Control Legislation, and Taxation*. World Bank.



STATISTICAL ANNEXURE

Table S-1: Cigarette tax structure and retail prices

Variable	Input value	Calculation / interpretation	Data source
EXCISE TAX			
Specific excise tax per pack	JD 0.670	Fixed specific excise per cigarette pack	Tax Department / MoF data
Tiered excise component per pack	JD 0.545	Tiered excise component applied to the selected reference price tier	Tax Department / MoF data
VAT rate	16.0%	Applied to the pre-VAT price	Tax Department / MoF data
RETAIL PRICE CALCULATION			
Net-of-tax base price	JD 0.178	Given base price	Model assumption / market data
Pre-VAT price	JD 1.393	$0.178 + 0.670 + 0.545$	Authors' calculation
VAT per pack	JD 0.223	$16\% \times 1.393 = 0.22288$	Authors' calculation
Retail price per pack	JD 1.616	$1.393 + 0.22288 = 1.61588$	Authors' calculation
BASELINE AGGREGATE VALUES			
Baseline total consumption	1,113.2 million packs	Prevalence $\times$ population aged 15+ $\times$ average packs per smoker	Authors' calculation
Status quo Year 1 consumption after income effect	1,123.0 million packs	Baseline consumption adjusted for income effect	Authors' calculation
Baseline excise revenue adjusted for illicit consumption	JD 1,052.3 million	Specific + tier excise revenue adjusted for illicit consumption	Authors' calculation
Baseline VAT revenue adjusted for illicit consumption	JD 193.0 million	VAT revenue adjusted for illicit consumption	Authors' calculation
Baseline total tax revenue adjusted for illicit consumption	JD 1,245.3 million	Excise + VAT revenue	Authors' calculation

(...Contd.)

Table S-1: Cigarette tax structure and retail prices (...Contd.)

Variable	Input value	Calculation / interpretation	Data source
MACROECONOMIC ASSUMPTIONS			
Expected income growth	2.70%	Reported assumption	DOS 2025
Expected population growth	1.40%	Reported assumption	DOS 2025
Expected inflation rate	2.50%	Reported assumption	DOS 2025
Elasticities			
Price elasticity of demand, adults	-0.365	Consumption response to price change	Updated model assumption; Ho et al.
Youth elasticity	-0.720	Youth price responsiveness	Updated model assumption
Income elasticity of demand	0.327	Consumption response to income growth	Ho et al.
Price elasticity of smoking prevalence	-0.1825	Approximately half of total price elasticity	Standard modeling assumption
MORTALITY ASSUMPTIONS			
Percentage of smokers who die prematurely	50.0%	Long-term smoking-attributable premature mortality assumption	Jha et al.; U.S. Surgeon General Reports
Percentage of premature deaths prevented by quitting or not starting	65.0%	Mortality reduction assumption	Jha et al.; U.S. Surgeon General Reports

Table S-2: Projected fiscal and health outcomes under different tax policy scenarios

Variable	Status quo	Scenario 2: both taxes +15%	Scenario 3: tier +15%	Scenario 4: specific excise +15%
TAX STRUCTURE AND PRICE				
Specific excise tax per pack	0.670	0.771	0.670	0.771
Tiered excise component per pack	0.545	0.627	0.627	0.545
VAT per pack	0.223	0.252	0.236	0.239
Net-of-tax base price	0.178	0.178	0.178	0.178
Retail price per pack	1.616	1.827	1.711	1.732
Excise tax burden	75.2%	76.5%	75.8%	75.9%
Total tax burden	89.0%	90.3%	89.6%	89.7%
% change in price	0.0%	13.1%	5.9%	7.2%
CONSUMPTION IMPACT				
% change in consumption due to price	0.0%	-4.8%	-2.1%	-2.6%
% change in consumption due to income	0.9%	0.9%	0.9%	0.9%
New consumption, million packs	1,123.0	1,069.9	1,099.2	1,093.7
Change in consumption, million packs	—	-53.2	-23.8	-29.3
% change in consumption	—	-4.7%	-2.1%	-2.6%
REVENUE IMPACT, MILLION JOD				
Specific excise revenue	585.4	641.3	573.0	655.6
Tier revenue	476.2	521.7	536.0	463.8
Total excise revenue	1,061.6	1,163.0	1,109.0	1,119.4
VAT revenue	194.7	209.8	201.8	203.3
Total revenue	1,256.3	1,372.8	1,310.7	1,322.7
Change in total revenue	—	+116.5	+54.4	+66.4
% change in total revenue	—	+9.3%	+4.3%	+5.3%
SMOKING PREVALENCE IMPACT				
Change in prevalence due to price and income	+0.88%	-1.50%	-0.19%	-0.43%
Change in prevalence, percentage points	+0.31	-0.53	-0.07	-0.15
<i>(...Contd.)</i>				

Table S-2: Projected fiscal and health outcomes under different tax policy scenarios (...Contd.)

Variable	Status quo	Scenario 2: both taxes +15%	Scenario 3: tier +15%	Scenario 4: specific excise +15%
New prevalence rate	35.61%	34.77%	35.23%	35.15%
Adult smokers				
Change in adult smokers	+24,480	-41,723	-5,216	-12,027
New adult smokers	2,797,135	2,730,932	2,767,439	2,760,628
Annual packs per smoker				
New average packs per adult smoker per year	401.5	391.8	397.2	396.2
Change in average packs per adult smoker per year	0.0	-9.7	-4.3	-5.3
% change in average packs per adult smoker per year	0.0%	-2.4%	-1.1%	-1.3%
FUTURE/YOUTH SMOKERS				
Change in future/youth smokers	+25,447	-43,371	-5,422	-12,502
New future/youth smokers	1,466,553	1,397,735	1,435,684	1,428,604
PREMATURE MORTALITY IMPACT				
Change in adult premature deaths	+7,956	-13,560	-1,695	-3,909
Change in youth premature deaths	+8,270	-14,096	-1,762	-4,063
Total change in premature deaths	+16,226	-27,656	-3,457	-7,972