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Crowding out and impoverishing effect of tobacco in Mexico

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ABSTRACT

Introduction Tobacco is one of the world's largest preventable causes of premature death, accounting for more than 8 million deaths and costing the global economy US\$ 1.4 trillion each year. Smoking is a global problem with 1.3 billion people using tobacco worldwide, who will face harmful effects on health and on people's current and future financial situations and quality of life.

This article aims to be the first study to generate evidence on the effects of smoking on household expenditure and the number of people living under the poverty threshold by studying the crowding out and impoverishing effect in Mexico.

Methods Through econometric methods and maximising a household utility function we estimate the crowding out and impoverishing effect of tobacco consumption in México based on household's income and spending survey from 2020.

Results Spending on tobacco crowds out household spending on other goods and services. In Mexico, spending on tobacco results in decreased spending on essential goods and services, like education and healthcare, and increased spending on harmful goods such as alcoholic beverages. These effects are common across all income levels but are more pronounced in low-income households. When spending on tobacco increases, for example, following regular price increases made by the tobacco industry, the crowding out effect is exacerbated.

In addition, smoking has an impoverishing effect on the population. This is because some families find that their remaining income level falls below the poverty line after deducting money spent on tobacco (a concept known as secondary poverty). In Mexico, 909 132 people are left with a disposable income level below the extreme poverty line because of expenditure on tobacco and smoking-related diseases.

Conclusions Smoking affects individual health and the finances of households in Mexico, particularly those of low-income people. By increasing tobacco taxes, those who quit smoking increase their quality of life and well-being. However, those who continue to smoke and increase their tobacco spending are affected by a shift in their spending on other goods and services. The increase in tobacco taxes must be accompanied by public policies that help reduce tobacco consumption and compensate the crowding out on goods and services relevant to the development of households.

INTRODUCTION

Smoking is a global problem that affects 1.3 billion people who use tobacco products, around 80% of whom live in low or middle-income countries.¹

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ In Mexico, tobacco consumption crowds out spending on essential goods and services like education and healthcare while increases expenditure on harmful goods like alcoholic beverages.
- ⇒ Lower income households are most impacted by crowding out, as they see the greatest reduction in expenditure on healthcare and education. An increase in tobacco expenditure can have long-term impacts on the well-being of household members, especially children, when less is spent on education and healthcare. This hampers their ability to generate income in the future, increasing the likelihood they will fall into poverty.

WHAT THIS STUDY ADDS

- ⇒ To the best of our knowledge, this is the first study that provides evidence of crowding out and impoverishment effect for Mexico. Tobacco use increases extreme poverty in Mexico. About 1 million Mexicans (0.7% of total Mexican population and 6.2% of smokers)—who would not otherwise fall below the official extreme poverty line due to their income level—are unable to cover their basic needs because of spending diverted to tobacco. The aim of this study is to contribute to the evidence that tobacco consumption crowds out household spending in health or education, affecting more household income and opportunities for children and younger people.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ The evidence of this study will contribute to the discussion of the progressivity of tobacco control policies including taxes because they are effective at reducing consumption. Also, the results create arguments for trying that the additional revenue from tobacco taxes could be used to fund implementation of comprehensive tobacco control policies aimed at maximising smoking cessation and channelling more resources into the health and education sectors.

Smoking is not just a health problem; it also poses economic and social challenges.² From the perspective of economic growth and development, smoking translates into a less healthy and therefore less productive workforce, growing healthcare costs and environmental degradation.³



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While higher income individuals spend a higher amount on tobacco, low-income smokers spend a higher proportion of their income on tobacco.⁴ This reality has several implications on the distribution of household expenditure. First, lower income households are not always able to afford the cost of treating diseases caused by smoking and may therefore experience worse health outcomes. Second, tobacco expenditure distorts spending on other household expenses.

Given limited household budgets, spending money on tobacco can mean less money is available for food, education, healthcare and other goods and services essential for human development. This displacement of spending is known as the crowding out effect. Areas in which the crowding out effect of tobacco expenditure has been studied include but are not limited to education, food, healthcare, housing, clothing, transportation and entertainment.⁵

The opportunity cost of smoking is very high for the lowest income households, since, in general, Mexican households spend more in food and transportation.⁶ So, it results in families spending less on children's education, opting for less nutritious food, and otherwise negatively impacts the health of household members.¹

To illustrate the latter, in a study that analysed the crowding out effect in 40 low and middle-income countries—including countries in Latin America—it was found that an increase in tobacco expenditure crowds out spending on education and healthcare, but there was no consistent relationship with food spending.⁷ A study focusing specifically on Chile found comparable results: with an increase in tobacco expenditure there was a crowding out effect on health, care and education spending.⁸

When spending on education is compromised by tobacco consumption, it is the children of the household who are most heavily affected, as this reduces their future income potential while establishing a long-term intergenerational gap.¹

With respect to health spending, there is a two-way effect. In one hand, smoking is associated with higher levels of spending on healthcare in the long run because of the health conditions caused by tobacco. In the short run, with more tobacco spending there is a drop in disposable income which can make it harder to treat medical issues for the smoker and for the rest of the family. Therefore, the direction and magnitude of the crowding out effect on healthcare depends on the magnitude of both effects.

As a greater share of disposable income is spent on tobacco, households find their ability to meet their basic needs diminished. This creates a vicious cycle that drives people deeper into poverty in what is known as an impoverishing effect.⁹ This impoverishing effect primarily affects households already living in poverty, with insufficient income to meet their basic needs, and households that do have the necessary basic resources but are pushed into secondary poverty due to their tobacco-related spending.

There are four ways in which smoking can directly affect a household's state of poverty.

1. Purchase of tobacco: money spent on tobacco reduces the amount of family disposable income for other basic goods and services.
2. Treatment of smoking-related morbidity: medical expenses associated with diseases caused by smoking—both for active smokers and passive smokers (people who do not smoke themselves but breathe in other people's cigarette smoke, or secondhand smoke¹⁰)—reduce the amount of household income available.

3. Indirect costs: health problems resulting from tobacco use lead to indirect costs through lost productivity and working days lost due to smoking-related illness.¹¹
4. Smoking-related mortality: diseases caused by smoking often cause premature death, reducing future income and thus directly affecting the well-being and development of other household members.

Few studies have estimated the crowding out and impoverishing effects of tobacco in Latin American countries. For example, for Colombia the budget for tobacco expending doubled for poorer households.¹² Also in Colombia, the tobacco tax hike reduces the number of smokers (from 4.51 million to 3.45 million smokers) and smoking intensity, resulting in a drop in the number of cigarettes smoked in Colombia (from 332.3 million to 215.5 million of 20-stick packs). Even though this result can relate to impoverishing effect, it is not a direct analysis. Evidence is available from countries in other regions. Like in India, it is estimated that tobacco expenditure increases urban poverty by 0.72% and rural poverty by 1.5%. Similarly, out-of-pocket expenses due to diseases caused by smoking increase urban and rural poverty in India by 0.07% and 0.09%, respectively.¹³ This translates into an increase of 15 million people in India living under the poverty threshold.⁹ In Bangladesh, it is estimated that 10.5 million people who suffer from malnutrition could eat an adequate diet if no money were spent on tobacco, saving the lives of 350 children a day.¹⁴

The importance of implementing measures to reduce tobacco consumption lies in the fact that smoking does not only have an impact on health. Tobacco expenditure also crowds out spending on goods and services like healthcare and education, and it impoverishes people whose income would otherwise be just above the poverty line.

Study objectives

This report aims to generate evidence on the effects of smoking on household expenditure and the number of people living under the poverty threshold. This is achieved by estimating the crowding out effect by income group and the impoverishing effect of tobacco use in Mexico for year 2020.

METHODOLOGY

The methodology described in this section is based on the 2019 Tobacconomics product, 'Using Household Expenditure Surveys for Research in the Economics of Tobacco Control. A Tobacconomics Toolkit'.⁵

Crowding out

The theory behind estimating the crowding out effect is that a household would maximise the following utility function:

$$\text{Max } U = U(q_1, \dots, q_n, Y; a) \text{ s.t. } \sum_{i=1}^{n-1} p_i q_i = M \ \& \ q_n = \bar{q}_n \quad (1)$$

where q_i is the quantity of good i , p_i is the price of good i , \bar{q}_n denotes a household's demand for tobacco, Y is the total expenditure and $M = Y - p_n \cdot \bar{q}_n$, where p_n is the price of tobacco. Solving for $n-1$ yields the following demand function, conditional on the consumption of good n , in this case tobacco:

$$q_i = g^i(p_1, \dots, p_{n-1}, M; \bar{q}_n; h \ \forall i \neq n) \quad (2)$$

In equation 2, the demand function of any good (q_i) is conditional on the prices of all commodities except the conditioning good (q_n), total remaining expenditure (M) after deducting expenditure on the conditional good, the quantity of the conditional good (\bar{q}_n) and a vector of household characteristics (h). Therefore, an increase in expenditure on tobacco caused by an

increase in taxes may influence expenditure on other goods and services. The crowding out effect refers to this estimated variation in the consumption of various products and services caused by an increase in tobacco expenditure.

Specification of the econometric model

Given that price information is not available for the different commodity groups, Engel curves are used for the econometric specification. The conditional Engel curve takes the following form for good i and household j :

$$w_{ij} = \alpha_{1i} + \alpha_{2i} p_{nj} \bar{q}_{nj} + \delta'_{ij} h_j + \beta_{1i} \ln M_j + \beta_{2i} (\ln M_j)^2 + \mu_{ij} \quad (3)$$

where $w_{ij} = p_{ij} q_{ij} / M_j$ is the budget share allocated by household j to commodity group i out of the remaining budget (M_j) after deducting expenditure on tobacco, $p_{nj} \bar{q}_{nj}$ is expenditure on tobacco, h is a vector of household characteristics that enables preference heterogeneity, $\ln M$ and $\ln M^2$ are the natural logarithms of M and M^2 , which is the expenditure after deducting expenditure on tobacco, and μ_{ij} is the random error term.

The variables $p_{nj} \bar{q}_{nj}$ and $\ln M$ are probably endogenous due to the simultaneity involved, which will cause a correlation with the random error term. If this is the case, an estimation using the ordinary least squares (OLS) method would yield biased results. Therefore, one of the following three estimation methods must be used:

1. Equation-by-equation instrumental variables estimation (2SLS (Two-Stage Least Square)).
2. Instrumental variable system estimation (3SLS (Three-Stage Least Square)).
3. GMM (General Methods of Moments) 3SLS estimation.

To decide which is the most appropriate method, first it is necessary to test whether the endogenous variables are truly endogenous to reject an OLS estimation. Once this is confirmed, the validity of the instruments must be tested. The estimators are consistent only under the assumption that there is a valid instrument that satisfies both inclusion and exclusion restrictions. Next, a heteroscedasticity test must be conducted. If the heteroscedasticity test finds that errors are independent and identically distributed, a traditional 3SLS estimation is appropriate. Otherwise, a GMM 3SLS estimation is needed to obtain efficient parameter estimates. According to Wooldridge,¹⁵ a GMM 3SLS estimation is never worse than traditional 3SLS, so it is better to employ a GMM 3SLS estimation regardless of the results of the heteroscedasticity test.

Annual household expenditures on 10 goods are considered in the crowding out analysis:

- ▶ Food at home: food and non-alcoholic beverages consumed at home.
- ▶ Food away from home: food consumed outside the home.
- ▶ Education.
- ▶ Housing: includes rent, property tax, water and electricity, cleaning and communication services like the internet and television.
- ▶ Clothing: clothes and footwear.
- ▶ Entertainment: expenditure on leisure activities.
- ▶ Transport: expenditure on public transport, intercity transport and car maintenance.
- ▶ Durable goods: purchase of automobiles and household goods.
- ▶ Healthcare.
- ▶ Alcoholic beverages.

The following control and instrumental variables are used:

- ▶ Natural logarithm of total household expenditure, excluding expenditure on tobacco ($\ln M$).

- ▶ Square of the variable above ($\ln M^2$).
- ▶ Number of household members ($hsize$).
- ▶ Average number of years of education in the household ($meanedu$).
- ▶ Maximum number of years of education of a household member ($maxedu$).
- ▶ Proportion of individuals under 12 years of age in the household ($pminors$).
- ▶ Variables representing socioeconomic groups ($sd1$, $sd2$, $sd3$, $sd4$), with $sd1$ representing the lowest socioeconomic level. These variables correspond to the variable socioeconomic status that National Institute of Statistics and Geography (INEGI) computed for the household income and spending survey.

Household classification is made according to certain socioeconomic characteristics of the members, physical characteristics and equipment with 24 indicators built with information from the 2010 Population and Housing Census. This stratification was carried out by means of multivariate statistical methods.⁵

The variable pq represents the total preallocated expenditure on tobacco and gives an indication of the extent of the crowding out effect.

Impoverishing effect

For estimating the impoverishing effect, first we simulate 45% increase in tobacco price and use the elasticities by income group estimated for Mexico by Centro de Investigación Económica y Presupuestaria (CIEP) in 2019.¹⁶ This increase in tobacco prices is a simulation, which means it is not happening or proposed.

With the information of how people change their tobacco consumption due to an increase in price, we use the head count ratio (HCR) to measure the poverty in Mexico. HCR is defined as the proportion of the population living below the national poverty line (NPL). This measure is useful when working with household survey data, as it allows for calculation of consumption per capita, which can be compared against the NPL.

HCR is calculated using the following equation:

$$P_0 = \frac{1}{N} \sum_{i=1}^N I(x_i \leq z) \quad (4)$$

where P_0 is the HCR, $I(\cdot)$ is an indicator function that takes the value of 1 if its argument is true and 0 otherwise, z is the NPL and x is per capita consumption. Using weights obtained from the National Survey of Household Income and Expenditure (ENIGH), P_0 multiplied by N gives the total number of people living in poverty in the country.

Excess poverty attributed to forgone income due to purchasing tobacco can be estimated with the following equation:

$$P_1 = \frac{1}{N} \sum_{i=1}^N I([x_i - t_i] \leq z) \quad (5)$$

where t is the per capita tobacco expenditure in the same time period. Using the two equations above, $(P_1 - P_0)$ multiplied by N is the excess number of people impoverished by tobacco expenditure.

To calculate the total effect of tobacco consumption on poverty, it is also necessary to include expenses from treating tobacco-related morbidity. This can be done using the following equation:

$$P_2 = \frac{1}{N} \sum_{i=1}^N I([x_i - t_i - h_i] \leq z) \quad (6)$$

where h is the per capita expenditure on healthcare attributable to active or passive smoking in the same time period. The additional number of people impoverished by tobacco use and expenditure on medical treatment related to passive smoking is obtained by multiplying N by $(P_2 - P_1)$. Similarly, $(P_2 - P_0)$ multiplied by N gives the total excess of people impoverished after accounting for forgone income due to spending on tobacco and associated healthcare costs.

The per capita expenditure on healthcare attributable to active or passive smoking (variable h) can be estimated with the following equation:

$$h_i = \left(\frac{\text{exphealth}_i}{\text{hsize}_i} \right) \times (\text{SAF}_{\text{tob}} + \text{SAF}_{\text{SHS}}) \quad (7)$$

where exphealth is household expenditure on healthcare and hsize is household size. Both of these variables can be obtained from the household survey data. SAF_{tob} and SAF_{SHS} are the fractions of healthcare expenditure attributable to tobacco consumption and passive smoking (secondhand smoke), respectively. Household surveys do not provide this information, so these last two parameters are taken from Palacios and Reynales-Shigematsu.¹⁷

One of the main flaws of a measure like HCR is that it does not consider the degree of poverty and will not change if impoverished people become poorer still. This can be addressed using a measure called the ‘poverty gap’, which assigns greater weight to an individual in aggregate poverty the poorer he or she is, and it can be calculated using the following equation:

$$P_G = \frac{1}{N} \sum_{i=1}^N \left(1 - \frac{x_i}{z} \right) I(x_i \leq z) \quad (8)$$

where P_G is the sum of all the shortfalls divided by the population and expressed as a ratio of the poverty line itself. $P_G * z * N$ gives the total amount by which the poor are below the poverty line. Comparing the number of people below the poverty line before and after considering spending on tobacco and associated healthcare provides a measure of the degree to which tobacco use impoverishes people by pushing them into secondary poverty.

Data

The main source of data is ENIGH for the year 2020, conducted by the INEGI.⁶ This survey contains information on the social, economic and population composition of Mexican households and was administered to 105 483 homes using probabilistic sampling design,¹⁸ which represents 106 846 households.

The impoverishing effect is calculated using the urban extreme poverty line in December 2020, as published by the National Council for the Evaluation of Social Development Policy, equivalent to MXN1713.89 (Mexican peso) per person per month, or MXN20 566.68 per year. For the purposes of this analysis, households are classified as living in extreme poverty if their total annual monetary income is below the poverty line.¹⁹

The percentage used for medical expenses attributable to tobacco is 0.093 (9.3%), which is the average share of healthcare expenditure spent on tobacco-related diseases, obtained from Palacios and Reynales-Shigematsu.¹⁷ This percentage includes costs covered by the public health system and costs borne by households. However, this parameter may vary between households depending on coverage by public and private medical insurance. For the lowest income households that do not have social security benefits, the value of this parameter can be expected to be greater, while for households with access to social security, this value may be lower. Ignoring the value of this parameter due to access to social security and insurance benefits is a limitation of this study. However, given that the value used is considered a minimum, the impoverishing effect of tobacco expenditure on lower income households with no access to social security may be even greater.

RESULTS

Table 1 shows the average total annual expenditure for households with smokers and households without smokers, as well as the expenditure allocated to each variable.

Households reporting tobacco consumption are further divided by level of income.

Smoking households allocate, on average, a greater proportion of total expenditure to alcoholic beverages, non-basic food

Table 1 Descriptive statistics

Variable	Non-smoking households		Smoking households		
	Total	Total	Low income (MXN)	Middle income	High income
Total expenditure (MXN)	111 844	136 639	95 119	118 418	171 301
Resource allocation (% of total expenditure)					
Tobacco	–	5.2%	4.8%	5.0%	5.5%
Food at home	39.3%	34.1%	43.4%	36.5%	27.6%
Food away from home	3.6%	5.0%	2.7%	4.3%	6.7%
Healthcare	10.6%	8.9%	9.7%	9.4%	8.2%
Alcoholic beverages	0.3%	1.8%	1.2%	1.6%	2.2%
Education	3.4%	2.5%	2.3%	2.4%	2.7%
Entertainment	1.6%	1.8%	1.6%	1.7%	2.0%
Housing	22.6%	21.0%	19.7%	21.4%	21.4%
Clothing	2.9%	3.3%	3.1%	3.2%	3.4%
Transport	10.3%	9.7%	8.4%	9.6%	10.5%
Durable goods	1.9%	2.4%	1.3%	2.1%	3.3%
Other	3.3%	4.2%	1.7%	2.9%	6.4%
Individuals per household	3.6	3.4	4.6	3.7	2.5
Male/female	0.9	1.1	1.1	1.2	1.1

All differences are significant, except clothing. This is shown in online supplemental appendix I. Source: Prepared by Centro de Investigación Económica y Presupuestaria (CIEP) with data from National Survey of Household Income and Expenditure (ENIGH) 2020.⁶

Table 2 Results of the crowding out analysis

Variable	Total	Low income	Middle income	High income
Food at home	0.000094***	0.000214***	0.000001	0.000014
Food away from home	0.000017**	0.000038*	0.000024**	0.000027**
Healthcare	-0.000105***	-0.000115***	-0.000066***	-0.000086***
Alcoholic beverages	0.000022***	0.000032***	0.000021***	0.000021***
Education	-0.000102***	-0.000179***	-0.000129***	-0.000099***
Entertainment	0.000007**	0.000024**	0.000004	0.000003
Housing	-0.000089***	-0.000223***	-0.000046***	-0.000029*
Clothing	-0.000004	0.000016	-0.000006	-0.000013**
Transport	0.000141***	0.000143***	0.000132***	0.000138***
Durable goods	0.000021***	0.000043**	0.000034***	0.000019*
Other	-0.000001	0.000007	0.000031***	0.000005

*P<0.1, **p<0.05, ***p<0.01.

Source: Prepared by Centro de Investigación Económica y Presupuestaria (CIEP) with data from National Survey of Household Income and Expenditure (ENIGH) 2020.⁶ The full results can be found in online supplemental appendix II.

items, entertainment, clothing, durable goods and other items while spending a lower share on basic food, healthcare, education, housing and transport.

Notably, a comparison of smoking households by income level shows that the only variables to which low-income households allocate a greater proportion of expenditure than high-income households are food at home and healthcare. Furthermore, The data from ENIGH show that low-income households are larger, with an average of 4.6 members compared with 2.5 for high-income households.¹⁶

Crowding out

The results of the crowding out analysis are shown in table 2. A negative sign indicates that additional tobacco expenditure reduces spending on that particular good or service, whereas a positive sign indicates the opposite effect. The numbers are so small because they refer to percentage points. For example, increasing tobacco spending by one peso will crowd out the share of the remaining budget for food at home by 0.000094 percentage points.

At the population level, most variables are significant, with the exception of clothing and other items. The results show that an increase in tobacco expenditure increases spending on food at home, food away from home, alcoholic beverages, entertainment, transport and durable goods. By contrast, more spending on tobacco means less spending on healthcare, education, housing, clothing and other items.

Most variables are also significant by income group, except for food at home and entertainment for middle and high-income groups, clothing for low and middle-income groups and other expenses for low and high-income groups.

Even though the coefficients tend to be greater for low-income households, the increase in expenditure on food at home and entertainment is only significant for the lowest income group (see online supplemental appendix I). This means that everything else held constant, an increase in tobacco expenditure by the same amount across all households would result in greater increases in expenditure on food at home and entertainment among lower income households, but no significant differences would be observed in expenditure for the remaining groups. There is a significant difference in expenditure on housing between low-income and high-income smoking households, as poorer smoking households will reduce their spending on housing to a greater extent than high-income smoking households. In sum,

changes in tobacco expenditure distort to a greater extent the allocation of resources to food at home, entertainment and housing among lower income households.

The reductions in expenditure on healthcare and education occur in the same proportion for different income groups, the differences among them are not significant, which means that the crowding out effect is the same for all households no matter which socioeconomic status they have. The same happens with alcoholic beverages, as tobacco expenditure increases, spending on alcohol rises by the same proportion for all households.

In monetary terms, we observe in figure 1 the changes as a percentage of household income, by kinds of spending at home, while tobacco spending increases by one peso. So, keeping spending on tobacco decreases spending on education by 5% on average for all households.

Impoverishing effect

Table 3 shows the annual tobacco expenditure by households before and after a simulated increase in the price of cigarette packs from 58.1 pesos to 81.3 pesos to illustrate the impoverishing effect of tobacco consumption. We assume that the price increase is due to a price increase by the tobacco industry.

Elasticity is greater in low-income households in absolute value, which means that an increase in price would decrease their tobacco expenditure increases in a greater extent than other households.

Since tobacco's demand is inelastic, rising prices increases spending on tobacco by smoking households, crowding out spending on health and education, especially in low-income households. This implies a risk to future earning capacity due to their lower investment in education and health.

The results of the impoverishing effect of smoking are shown in table 4.

Table 4 shows that the number of individuals whose total expenditure lies below the extreme poverty line increases by 909 132 when tobacco expenditure and expenditure on smoking-related healthcare are subtracted. These are people on the border of the extreme poverty line, whose expenditure falls under this line after subtracting their spending on tobacco. One limitation of this analysis is that it only considers the additional costs incurred by smoking, with no distinction made between out-of-pocket expenses and health insurance coverage. It is recommended that future studies incorporate the level of health coverage for households with different income levels.



Figure 1 Displacement of spending in smoking households due to tobacco expenditure (% change in household income). Source: Prepared by Centro de Investigación Económica y Presupuestaria (CIEP) with information from National Survey of Household Income and Expenditure (ENIGH) 2020.⁶

CONCLUSION

This study is the first evidence of the crowding out and the impoverishment effects in Mexico. What the literature shows is that spending on tobacco crowds out household spending on other goods and services. In Mexico, spending on tobacco results in decreased spending on essential goods and services, like education and healthcare, and increased spending on harmful goods such as alcoholic beverages. These effects are common across all income levels but are more pronounced in low-income households. When spending on tobacco increases, for example, following regular price increases made by the tobacco industry, the crowding out effect is exacerbated.

In addition, smoking has an impoverishing effect on the population. This is because some families find that their remaining income level falls below the poverty line after deducting money spent on tobacco (a concept known as secondary poverty). In Mexico, 909 132 people are left with a disposable income level below the extreme poverty line because of expenditure on tobacco and smoking-related diseases.

Smoking affects individual health and the finances of households in Mexico, particularly those of low-income people. Almost 1 million people in Mexico lack the necessary resources to maintain a level of expenditure above the extreme poverty

line as a direct result of tobacco expenditure and the cost of healthcare to treat medical conditions associated with smoking. This means that smoking deprives 0.7% of Mexicans of the disposable income necessary to meet their basic food and non-food needs.

The crowding out effect is especially relevant for lower income households, which have fewer resources to finance their spending, and their tobacco consumption puts their present and future well-being at risk. Tobacco control policies that effectively reduce the prevalence and consumption of tobacco allow to the release of resources that families can use in the consumption of other goods and services, improving their quality of life. If they decide to invest more in health, education and housing, they will potentially benefit themselves in the long run.^{20 21}

The benefits of increasing the price of cigarettes through taxes cannot be denied, since this reduces consumption and health expenses from diseases related to tobacco, for example.¹⁶

By increasing tobacco taxes, those who quit smoking increase their quality of life and well-being.¹⁶ However, those who continue to smoke and increase their tobacco spending are affected by a shift in their spending on other goods and services as mentioned at the beginning of this study. For these reasons, the increase in tobacco taxes must be accompanied by public policies that help reduce tobacco consumption and compensate for the crowding out of goods and services relevant to the development of every household in the country. The additional revenue could finance public policies focused on reducing crowding out effect through prevention and smoking cessation programmes.

When tobacco use reduces families' spending on education and health, the ability of children from the poorest households to generate higher incomes in the future is jeopardised, increasing the likelihood that they will remain in poverty.²² To face these problems, public policies focused on reducing consumption and spending on tobacco in households—with a main focus on the population with fewer resources—are necessary to reduce the harmful effects of tobacco consumption on health and to reduce the crowding out and impoverishing effects related to tobacco

Table 3 Expenditure on tobacco by income level

Variable	Low income	Middle income	High income
Elasticity	-0.587	-0.542	-0.466
Change in sales (%)	-23.5	-21.6	-18.6
Annual expenditure on tobacco (MXN)	3563	4490	6227
Annual expenditure on tobacco after tax increase (MXN)	3817	4924	7092
Difference (MXN)	277	411	760

Source: Prepared by Centro de Investigación Económica y Presupuestaria (CIEP) with data from National Survey of Household Income and Expenditure (ENIGH) 2020,⁶ CIEP 2019¹⁶ and CIEP 2020.²⁰ MXN, Mexican peso.

Table 4 Results of the impoverishing effect analysis

	Individuals	Change
Individuals below the poverty line	50 208 947	N/A
Individuals below the poverty line, accounting for tobacco expenditure	50 376 097	167 150
Individuals below the poverty line, accounting for medical expenses attributable to tobacco	50 947 564	738 617
Individuals below the poverty line, combined effect	51 118 079	909 132

Source: Prepared by Centro de Investigación Económica y Presupuestaria (CIEP) with data from National Survey of Household Income and Expenditure (ENIGH) 2020⁶ and National Council for the Evaluation of Social Development Policy (CONEVAL).¹⁹
N/A, not available.

use. In this sense, tobacco control policies, including rising taxes, are progressive measures.^{11 16 17}

Tobacco control policies succeed in reducing tobacco consumption. Reductions in tobacco spending free up income that households can use on health, housing and education. Fiscal measures are effective in reducing the prevalence and consumption of tobacco, and allow generating additional revenue that can finance the implementation of comprehensive tobacco control policies aimed at cessation, as well as the health and education sectors.

Contributors AGG and AMS wrote, performed the computations and developed the theory and model equally in this paper. AMS is the author responsible as the guarantor.

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