FUNDING GAPS FOR DISEASES CAUSED BY SMOKING IN MEXICO: A SUBNATIONAL ANALYSIS

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Funding gaps for diseases caused by tobacco in Mexico:

A subnational analysis

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November 30th, 2022

CONTENTS

1. Key messages

- *In 2020, nationwide, the **cost of treating three diseases caused by tobacco could be more than seven times the revenue** received by states from the IEPS excise tax on tobacco. In every state, the cost of treating individuals not covered by social security exceeds the amount of tobacco IEPS transferred.* ***This means that the funds from IEPS received by states are not sufficient to cover healthcare costs caused by tobacco.***

- *The **cost of treating** lung cancer (LCa), chronic obstructive pulmonary disease (COPD), and acute myocardial infarction (AMI) in Mexico in 2020 was estimated at **93.379 billion pesos**, while transfers to states from **tobacco IEPS total 12.539 billion pesos**.*

- ***Across states, health care costs** for those without social security are **3 to 12 times greater than transfers of IEPS from tobacco**.*

2. Executive summary

Tobacco use results in increased health care expenditure and lost human capital. In 2018, nearly **eight million people worldwide died from smoking-related diseases** and 9.1% of disability-adjusted life years lost can be attributed to smoking (IHME, 2022). In Latin America, it has been estimated that 8.3% of all health care expenditure can be attributed to smoking (Pichón-Riviere et al., 2016).

In Mexico, population without social security receive healthcare mainly by the states health systems. This research explores whether budgeted state **revenue from IEPS (*impuesto especial sobre producción y servicios,* "Excise Tax on Production and Services") levied on tobacco is sufficient to cover health care costs** for three diseases caused by smoking in each state under the assumption that these cover them.

In every single state, a significant fiscal gap is observed in the amount needed just to treat **three only tobacco-related diseases.** Nationally, this deficit totals over **80 billion pesos** and exists even if considering only tobacco-attributable costs. This gap would be much greater for the entirety of tobacco-related diseases.

The cost of treating just three tobacco-related diseases in 2020 totals **93.379 billion pesos** for Mexicans without social security. This is **7.4 times the amount states receive in IEPS tax levied on tobacco**.

Beyond the economic implications for the tax system, **the population lacks effective access to health care. This is not just for lack of financial means, but also because conditions like COPD and lung cancer are not included** in the catalog of services available for those not covered by any social security institution and therefore need to face out-of-pocket expenditures, with catastrophic consequences.

3. Introduction

Tobacco use results in increased health care expenditure and lost human capital. In 2018, nearly eight million people worldwide died from smoking-related diseases and 9.1% of disability-adjusted life years lost can be attributed to this risk factor (IHME, 2022). In Latin America, it has been estimated that 8.3% of all health care expenditure can be attributed to smoking (Pichón-Riviere et al., 2016).

In Mexico, population without social security, around 57.5% of total population, receive healthcare mainly by the states health systems. With the dismantling of the Seguro Popular (SP), the creation of the Institute of Health for Well-Being (INSABI) and the current transition to IMSS-Bienestar, new challenges have arisen in providing public health care services to those not covered by social security. Treatment of tobacco-related conditions like lung cancer and acute myocardial infarction (AMI) has been given reduced priority as a result of the COVID-19 health crisis. In addition, the responsibilities incumbent on each state in terms of health care expenditure are not entirely clear, priorities differ, and resources are insufficient.

In Mexico, states and municipalities receive much of their public revenue from transfers made from the Federation and its own federal revenue. These transfers are funded in part by the IEPS tax levied on tobacco products, which means that the more IEPS is collected on tobacco, the more states will receive in transfers, making it possible to develop targeted public policies.

This research aims to answer the following question: What is the difference between the amount of funding received by each state from tobacco IEPS and the amount needed to provide health care to individuals not covered by social security for three major health conditions caused by smoking?

3.1 Research objectives

This study explores whether the revenue received by states from tobacco IEPS is sufficient to cover health care costs, estimated on the basis of a standard average, for three diseases caused by smoking in each state of Mexico under the assumption that the states cover these. In addition, this study identifies the costs that are attributable to tobacco. The aim is to provide public policy makers with the tools to consider implementing an increase in tobacco tax as one available option to fund treatment for tobacco-related diseases. The exercise can then be repeated for each state in the future.

Although there are many diseases caused by tobacco, this study is focused on three tobacco-related conditions :

- Acute myocardial infarction (AMI)
- Lung cancer (LCa)
- Chronic obstructive pulmonary disease (COPD)

3.2 Structure of the report

The remainder of the study is structured as follows. Section four describes the methodology employed to estimate the costs of treating these three smoking-associated conditions. Section five presents the results. Section six offers some concluding remarks and discusses some study limitations and public policy implications.

4. Methodology

4.1 Data

Data on the revenue from IEPS on tobacco and allocated to states was obtained from the Estadísticas Oportunas website provided by the Secretariat of Finance and Public Credit (SHCP)[1].

Data sources for medical costs

The following data sources were used in this research:

- **Prevalence of LCa and COPD:** Institute for Health Metrics and Evaluation, from 2017 to 2019[2] (IHME, 2022).
- **Population attributable fraction (PAF)**: A measure of the disease burden that can be attributed to a risk factor, in this case smoking. The number of tobacco-attributable cases of LCa and COPD from 2017 to 2019 was calculated by multiplying the PAF by the total number of cases (IHME, 2022).
- **Health care costs for lung cancer, COPD, and AMI:** Costs for the Mexican Social Security Institute (IMSS) for 2016 in diagnosis-related groups (DRGs) (IMSS, 2017). The costs presented in this report are a reference value of medical and technical costs (CMTR), a standard cost that enables us to calculate budgeting scenarios to manage and operate health services. Our research employed the annual average cost given that LCa and COPD had three DRGs and AMI had six DRGs. For LCa, the unit cost published by Rascón-Pacheco et al. (2019) was also used.

[1] http://presto.hacienda.gob.mx/EstoporLayout/estadisticas.jsp

[2] The number of cases for 2020 was estimated using the prevalence for 2019 and population growth figures from CONAPO for each state.

- **Number of cases of AMI in INSABI/Seguro Popular:** Results Report from the System for Social Protection in Health (SPSS) by the National Commission for Social Protection in Health (CNPSS) from 2017 to 2019 (CNPSS, 2020), and for 2020 the Annual Activity Report (INSABI, 2020).
- **Population not covered by social security:** Share of the population that self-reports as registered with INSABI/Seguro Popular or IMSS-Bienestar, or as unregistered, in the National Survey of Household Income and Expenditure (ENIGH) (INEGI, 2020).
- **National Consumer Price Index (INPC).** The percentage change in the INPC for the health sector is used to adjust health care costs in the DRGs from 2016 (INEGI, 2022).

4.2 Tobacco IEPS distributed to states

IEPS on tobacco is included within federal revenue assignable to non-earmarked transfers (*recaudación federal participable,* RFP), distributed to states as follows, in accordance with the Fiscal Coordination Law (LCF) (H. Congreso de la Unión, 2018):

- 8% of total revenue from IEPS on tobacco is transferred directly.

The following transfers are made from the remaining 92%:

- 20% as part of the General Fund for Non-Earmarked Transfers (*Fondo General de Participaciones*, FGP).
- 0.136% as part of the Coastal Fund (*Fondo Litoral*). This only applies to states with a coastline[3].
- 1% as part of the Municipal Promotion Fund (*Fondo de Fomento Municipal*, FFM).
- 1.25% as part of the Oversight Fund (*Fondo de Fiscalización*).

[3] As provided by Article 2A of the LCF, 0.136% of RFP is transferred to coastal or border states provided an agreement exists with the Federation. In the years studied, Nayarit and Tabasco are the only states with a coastline that did not receive transfers from this fund.

Altogether, this gives a total of 28.6% of revenue from IEPS on tobacco transferred to states, assuming that all forms of revenue in the RFP are transferred in the percentage indicated for each of the above funds[4].

4.3 Health care costs

We estimated the cost of treating the three tobacco-attributable conditions examined in this report for those not covered by social security: the share of the population that self-reports as registered with INSABI/Seguro Popular or IMSS-Bienestar or does not report being registered with any social security subsystem or private health service.

For each condition, expenditure was calculated based on the following formula:

$$\boldsymbol{Health\ care\ expenditure}_{state\ (i),year\ (t)} = \sum_{i} Individuals\ diagnosed_{i,t} * Average\ cost\ of\ diagnosis_{i,t}$$

The adjustment for the population attributable fraction was made as follows:

$$\boldsymbol{Health\ care\ expenditure}_{state\ (i),year\ (t)} = \sum_{i} \left(Individuals\ diagnosed_{i,t} * PAF\right) * Average\ cost\ of\ diagnosis_{i,t}$$

Firstly, the number of individuals diagnosed was estimated based on the prevalence of two diseases – LCa and COPD – by state and the percentage of the population not covered by social security. Then the costs attributable to smoking were estimated under two scenarios. The first scenario employs the PAFs given by the IHME, while the second scenario uses attributable fractions estimated nationally (Pichón-Riviere et al., 2013).

No prevalence figures are available by state for AMI, so the number of cases treated by the Health Fund for Well-Being (FONSABI) was used. However, this information ceased to be comparable in 2019 and as a result, for 2019 and 2020, the number of cases treated by state

[4] The RFP is not made up only of IEPS on tobacco. It also includes VAT, income tax (ISR), and other forms of revenue. For every 100 pesos in RFP, 20 pesos (i.e. 20%) should be transferred to the General Fund for Non-Earmarked Transfers or FGP. The law does not state which source of revenue these 20 pesos should be taken from, but it is a sensible assumption that they are taken from all revenue pooled in the RFP. So if income tax (ISR) accounts for 80 pesos, VAT is 15 pesos, and tobacco IEPS is 5 pesos, we have assumed that 20% of each of these sources of revenue is transferred to make up the 20 pesos.

in 2018[5] was used, only adjusting the health care costs for inflation.

These three health conditions were selected for several reasons. AMI is strongly associated with smoking and is included in the list of diseases requiring highly specialized care (tertiary care) and covered by the Fund for Protection Against Catastrophic Expenses (FPGC), now FONSABI. Given that AMI is included in the catalog of covered conditions, the information available allows estimation of the fiscal gap. Meanwhile, smoking is the primary risk factor associated with LCa and COPD (IHME, 2022). It is possible to estimate the budget necessary to treat both diseases. Specifically, LCa has not been included on the list of specialist diseases for INSABI, and COPD has no treatment figures.

Health care costs for LCa

To estimate expenditure to treat LCa, prevalence figures for cases of tracheal, bronchus, and lung cancer from the IHME for each state are used. It should be noted that this disease is not in the catalog of services provided to patients without social security, and therefore this estimate is the amount needed to add this to the list of services included. The total cost for lung cancer includes three DRGs for respiratory neoplasms (respiratory neoplasms with MCC, respiratory neoplasms with CC, and respiratory neoplasms without CC/MCC). These costs were published by the IMSS in 2016. We also used the unit cost published by Rascón-Pacheco et al. (2019). Both unit costs were adjusted for inflation.

Health care costs for COPD

To estimate expenditure to treat COPD, prevalence figures from the IHME for each state were used. The total expenditure for this disease includes three DRGs for pulmonary disease (chronic obstructive pulmonary disease with MCC, chronic obstructive pulmonary disease with CC, and chronic obstructive pulmonary disease without CC/MCC). This cost was published by the IMSS in 2016 and was updated for inflation.

[5] Due to the nature of treatment, this means that only cases up to 64 years of age were considered.

Health care costs for AMI

The estimation of the necessary budget to treat AMI in each state takes into account the number of cases reported by the National Commission for Social Protection in Health (CNPSS) and the average cost of six DRGs for AMI (acute myocardial infarction, discharged alive with MCC; acute myocardial infarction, discharged alive with CC; acute myocardial infarction, discharged alive without CC/MCC; acute myocardial infarction, expired with MCC; acute myocardial infarction, expired with CC; and acute myocardial infarction, expired without CC/MCC). This cost was published by the IMSS in 2016 and was updated for inflation[6].

4.4 Fiscal gap: revenue vs. expenditure

This gap refers to the difference between revenue from IEPS on tobacco transferred to each state and the estimated cost of treating these three medical conditions. Lung cancer and COPD are not included in the list of covered conditions for the population without social security, so the estimate is the budget that would be needed to treat them. For AMI, treatment is restricted to patients under 65 years of age (CNPSS, 2019). The study covers the period from 2017 to 2020 and results are presented at a subnational level.

[6] Consistent data is available up to 2020. In 2021 there is a drop in the number of cases, so the same proportions were used as in 2020. In other words, we took the number of cases with respect to the total population of the state and used this same proportion to produce an estimate for 2021. No data is available for 2022.

5. Results

In Mexico, close to 16% of the population smokes: 25% of men and 8% of women (CIEP, 2022). Evidence has shown that smoking is one of the leading risk factors for cardiovascular and respiratory disease (WHO, 2022). Nationwide, it is estimated that 12,885 people have lung cancer and 2,822,000 people suffer from COPD[7]. The average unit cost to treat these conditions ranges from 56,069 pesos to 328,366 pesos[8] (see **Table *1***).

In 2020, the total cost of treatment for LCa, COPD, and AMI for patients not covered by social security is estimated at 93.379 billion pesos[9], or 6.4 times the amount of revenue from IEPS on tobacco transferred to states in the same year (see **Table *1***).

Prevalence estimates among the population with no social security coverage were calculated using the state prevalence of the three health conditions and the percentage of the population not covered by social security, which in 2020 ranged from 33.1% (Coahuila) to 86% (Chiapas).

The population attributable fraction for tobacco was then applied to the case estimation for the population without social security coverage. Two information sources were used to obtain the number of tobacco-attributable cases of these three conditions, and the same unit cost was used for each condition. For the first scenario, which uses data from the IHME

[7] No national prevalence data is available for AMI. However, in 2018, the Fund for Protection Against Catastrophic Expenses (FPGC) treated 1,165 cases of AMI.

[8] Unit costs are obtained from the DRGs for each condition. DRGs are a system used to classify and group clinical diagnoses and medical and surgical inpatient care. We use a reference value of medical and technical costs (CMTR), which is the average cost of a hospital stay for a given year.

[9] This estimate uses the average unit cost for LCa published by Rascón-Pachecho et al. (2019). If we base our estimate on the unit cost of health care for the DRGs for LCa given by the IMSS, this figure stands at 91.989 billion pesos, which remains 6.3 times greater than the amount of transferable revenue from IEPS on tobacco.

(2022), the attributable medical cost comes to 33.518 billion pesos[10], or 1.7 times the amount of IEPS on tobacco transferred. However, 97.4% of this cost is associated with COPD and only the remaining 2.6% is for LCa. The IHME has no information on the attributable fraction for AMI.

The second scenario employs the smoking-attributable percentage calculated by Pichón-Riviere et al. (2013), yielding a treatment cost of 58.047 billion pesos[11]. In contrast to the first scenario, an attributable fraction is available for all three health conditions. In this scenario, 97.0% of the total estimated cost is for COPD, 2.9% is for LCa, and 0.1% for AMI. The total cost of treatment is highest for COPD due to the far higher estimated number of prevalent cases, despite a lower unit cost of 56,069 pesos.

[10] This estimate uses the average unit cost for LCa published by Rascón-Pacheco et al. (2019). If the estimate is based on the unit cost for health care for the DRGs for LCa given by the IMSS, this figure stands at 32.992 billion pesos, which remains 1.6 times greater than the amount of transferable revenue from IEPS on tobacco.

[11] Similarly, this estimate uses the average unit cost for LCa published by Rascón-Pacheco et al. (2019). If we base our estimate on the unit cost of health care for the DRGs for LCa given by the IMSS, this figure reaches 57.033 billion pesos.

Table 1. Health care costs for diseases caused by tobacco, 2020.

Disease	Prevalent cases (General population)	Prevalent cases (Population without SS)	Unit cost (2020 pesos MXN = 100)	Total cost, population without SS (millions of pesos)	Attributable costs, population without SS (Scenario 1, millions of pesos)	Attributable costs, population without SS (Scenario 2, millions of pesos)	IEPS revenue transferred to states (millions of pesos)
LCa	12,885	7,067	131,743	931	353	680	
LCa*[12]			328,366	2,320	879	1,694	
COPD	2,822,189	1,619,478	56,069	90,802	32,639	56,297	
AMI		1,165	185,930	257		56	
Total	**-**	**1,627,709**	**-**	**93,379**	**33,518**	**58,047**	**12,539**

Note: Scenario 1 employs the PAF by state given by the IHME. **Scenario 2** uses the national PAF**. The IHME has no information on the attributable fraction for AMI.**

Source: Authors' calculations based on data from CNPSS (2020), IHME (2022), INEGI (2020), and INSABI (2020)**.**

[12] The treatment cost for CaPu* is the cost calculated by Rascón-Pacheco et al. (2019), adjusted for inflation.

5.1 Estimation of treatment costs: a subnational analysis

State estimation for LCa

Nationwide, in 2020, it was estimated that 12,939 people have LCa[13]; 17.8% of these patients are in the State of Mexico and Mexico City, where there are 1,253 and 1,046 cases, respectively. At the other end of the scale, Campeche and Tlaxcala each report fewer than 100 cases. To estimate the number of lung cancer patients without social security coverage, we used the percentage of the population without social security in each state, which ranged from 33.1% (Coahuila) to 86.0% (Chiapas). For example, there are an estimated 332 people living with lung cancer in Chiapas, of whom it was estimated that 285 were not covered by social security.

The tobacco-attributable fraction was applied to this estimated population. Among the different states, this fraction ranges from 0.182 (Tabasco) to 0.499 (Mexico City), meaning that in Tabasco, 18.2% of cases of lung cancer are attributable to tobacco. **Figure *1*** shows the prevalence of lung cancer in each state among the general population, including a subset for the population without social security and a further subset for patients without social security whose cancer is estimated to be attributable to tobacco. This procedure was also carried out using the tobacco-attributable percentage of 73% for all states, as calculated by Pichón-Riviere et al. (2013).

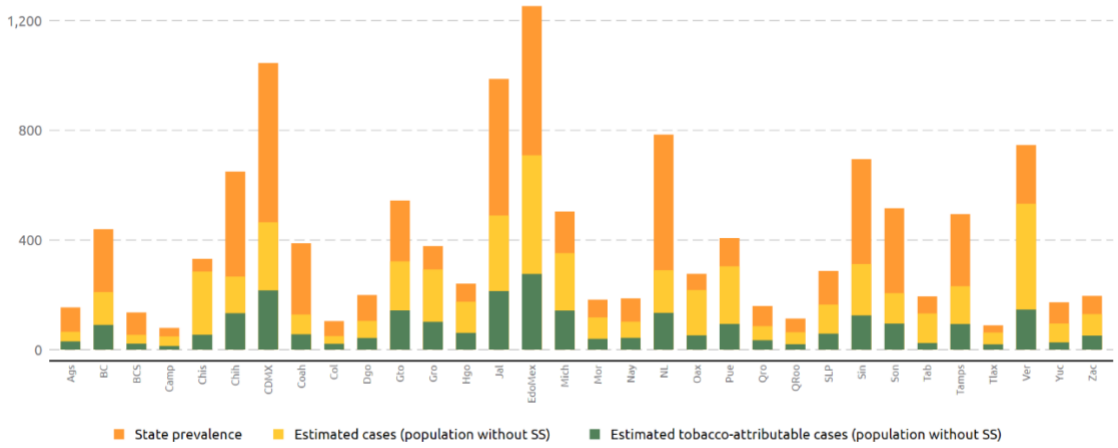
In 2020, **the total cost of treatment for LCa for individuals without social security, based on the DRGs in the IMSS, amounts to 931 million pesos**, an increase of 189 million pesos with respect to 2017, due to a 14.2% increase in the unit cost and a 9.8% increase in the number of individuals. **If the calculation is based on the unit cost estimated by Rascón-Pacheco et al. (2019), the total cost for 2020**

[13] National prevalence data from the IHME yields a nationwide total of 12,885 individuals with lung cancer. However, adding together the number of patients in each state gives a total of 12,939, so national data is given based on the aggregate of the number of individuals in each state.

totals 2.32 billion pesos (Table *2*).

Meanwhile, **treating tobacco-related cases costs between 353 million and 879 million pesos**. In 2020, there were a total of 2,676 cases attributable to smoking among the population not covered by social security, which represents 37.9% of all cases in this population subset. The period from 2017 to 2018 saw an increase of 189 cases of lung cancer attributable to tobacco. By applying the attributable fraction of 73% to the total number of cases among the population without social security, this represents a medical cost of between 680 million and 1.694 billion pesos.

Figure 1. Prevalent cases of lung cancer by state, 2020



Source: IHME (2022) and INEGI (2020).

Table 2. Estimations of cases and treatment costs of lung cancer

	Disaggregation	2017	2018	2019	2020
Prevalence	Estimated cases (pop. without SS)	6,436	6,407	6,799	7,067
	Estimated cases (PAF1 - IHME)	2,512	2,447	2,572	2,676
	Estimated cases (PAF2 - Pichón-Riviere et al., 2013)	4,698	4,677	4,963	5,159
Cost of DRGs in the IMSS	Average unit cost (pesos)	115,314	121,031	125,937	131,743
	Total cost (pop. without SS) (millions of pesos)	742	775	856	931
	Total cost PAF1 (millions of pesos)	290	296	324	353
	Total cost PAF2 (millions of pesos)	542	566	625	680

Cost given by Rascón-Pacheco et al. (2019)	Average unit cost (pesos)	287,396	301,657	313,895	328,366
	Total cost (pop. without SS) (millions of pesos)	1,850	1,933	2,134	2,320
	Total cost PAF1 (millions of pesos)	722	738	807	879
	Total cost PAF2 (millions of pesos)	1,350	1,411	1,558	1,694

Source: IHME (2022), INEGI (2020), Rascón-Pacheco et al. (2019).

State estimation for COPD

Nationwide, in 2020, an estimated 2,826,430 people have COPD[14]; 37.0% of these are in the State of Mexico, Mexico City, Jalisco, and Veracruz. Meanwhile, Baja California Sur and Colima report 13,000 and 17,000 cases, respectively. The number of individuals without social security who have COPD was estimated following the same procedure as with lung cancer.

The tobacco-attributable fraction was applied to this estimated population. Among the different states, this fraction ranges from 0.1858 (Tabasco) to 0.5093 (Chihuahua). ***Figure 3*** shows the prevalent cases of COPD in each state among the population without social security, with a subset for the estimated number of cases attributable to tobacco. This procedure was also carried out using the tobacco-attributable percentage of 62% for all states, as calculated by Pichón-Riviere et al. (2013).

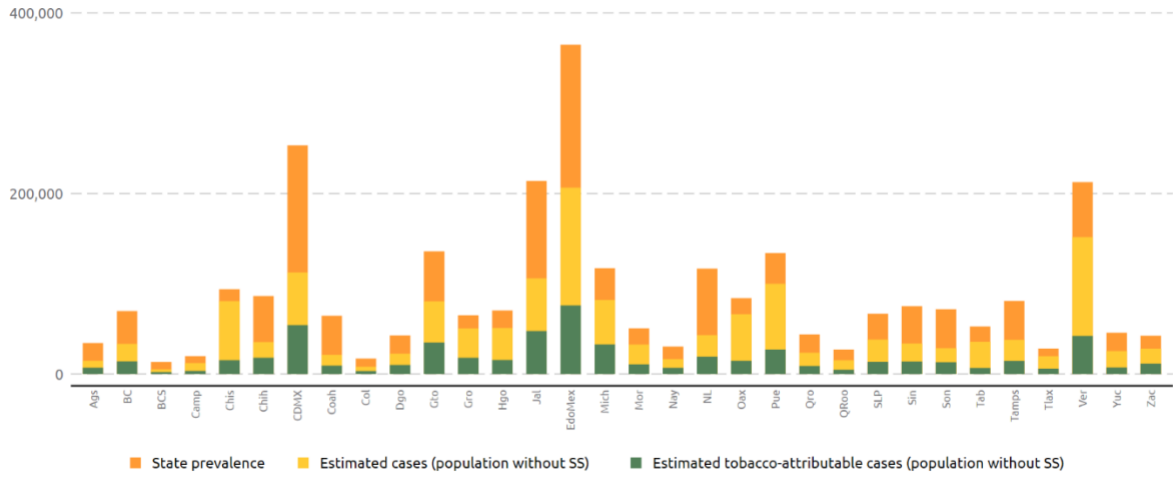
In 2020, **the total cost of treatment of COPD for individuals without social security, based on the DRGs in the IMSS, amounts to 90.802 billion pesos**, an increase of 15.172 billion pesos with respect to 2017, due to a 14.2% increase in the unit cost and a 5.1% increase in the number of individuals (***Table 4***).

Meanwhile, **the cost of treating tobacco-related cases stands at 32.639 billion pesos**. In 2020, there were a total of 582,134 cases attributable to smoking among the population not covered by social security, which represents 35.9% of all cases in

[14] National prevalence data from the IHME yields a total of 2,822,189 individuals with COPD. However, adding together the number of patients in each state gives a total of 2,826,430, so national data is given based on the aggregate of the number of individuals in each state.

this population subset. The period from 2017 to 2018 saw an increase of 10,577 cases of COPD attributable to tobacco. Similarly, by applying the tobacco-attributable percentage calculated by Pichón-Riviere et al. (2013), the cost of treatment amounts to 56.297 billion pesos.

Figure 2. Prevalent cases of COPD by state, 2020



Source: IHME (2022) and INEGI (2020).

Table 3. Estimations of cases and treatment costs of COPD

	Disaggregation	2017	2018	2019	2020
Prevalence	Estimated cases (pop. without SS)	1,541,048	1,508,155	1,561,178	1,619,478
	Estimated cases (PAF1 – IHME)	571,558	548,355	560,886	582,134
	Estimated cases (PAF2 - Pichón-Riviere et al., 2013)	955,450	935,056	967,931	1,004,360
Cost of DRGs in the IMSS	Average unit cost (pesos)	49,077	51,510	53,597	56,069
	Total cost (pop. without SS) (millions of pesos)	75,629	77,685	83,675	90,802
	Total cost PAF1 (millions of pesos)	28,050	28,246	30,062	32,639
	Total cost PAF2 (millions of pesos)	46,890	48,165	51,879	56,297

Source: Authors' calculations based on data from IHME (2022) and INEGI (2020).

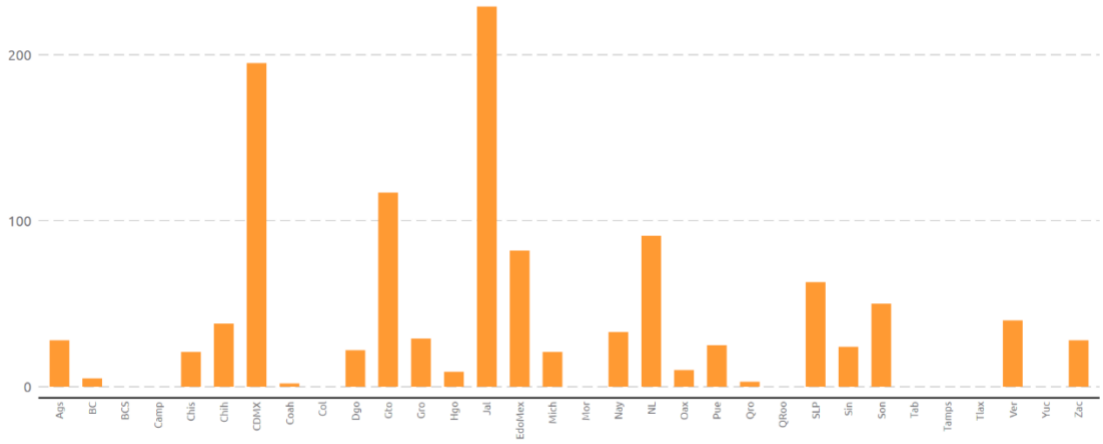
State estimation for AMI

The treatment costs for AMI in 2020 were calculated based on cases covered by the Fund for Protection Against Catastrophic Expenses (FPGC) in 2018, as only the budget allocated for AMI was reported. A total of 1,165 cases were reported, of which 19.7% are in Jalisco (229 cases), while Coahuila, Querétaro, and Baja California reported just 2, 3, and 5 cases, respectively. No cases were reported to have been covered by the fund in the states of Baja California Sur, Campeche, Colima, Morelos, Quintana Roo, Tabasco, Tamaulipas, Tlaxcala, and Yucatán (see **Figure *3***).

In 2020, **256.7 million pesos were needed to treat these cases: 202.4 million pesos more than was allocated, equivalent to 918 cases of AMI going untreated**. Applying the tobacco-attributable fraction of 22%, calculated by Pichón-Riviere et al. (2013), gives a total of 256 tobacco-attributable cases representing a cost of 56 million pesos.

In 2019, 21.4 million pesos were transferred to treat 185 cases, 15.9% of the number of cases treated in 2018 (see ***Table 4***). Treating the same number of cases as in 2018 would have required 245.2 million pesos, that is, 223.9 million pesos more than was allocated. The decrease in cases treated in 2019 can be explained by the fact that the number of validated cases for all conditions covered by the FPGC fell by 22,113 with respect to 2018. In addition, in 2019, resources were still being allocated to cover cases treated in 2017 and 2018; the total outlay for 2019 represented 62.2% of all validated funds (CNPSS, 2020).

Figure 3. Estimation of cases of AMI treated by the FPGC/FONSABI, 2020



Source: CNPSS (2020), INEGI (2020), and INSABI (2020).

Table 4. Estimations of cases and treatment costs of AMI

		2017	2018	2019	2020
Average unit cost (pesos)		192,754	202,311	210,510	220,216
Reported	Cases	997	1,165	185	-
	Costs (millions of pesos)	77.3	97.9	21.4	54.3
Estimated	Cases	997	1,165	1,165	1,165
	Costs (millions of pesos)	192.2	235.7	245.2	256.55

Fuente: CNPSS (2020), INEGI (2020), and INSABI (2020).

5.2 Fiscal gap

The Secretariat of Finance and Public Credit (SHCP) reports how much is transferred to each state from each of the funds listed in section 4.2 on its "Estadísticas Oportunas de Finanzas Públicas" website (SHCP, 2022).

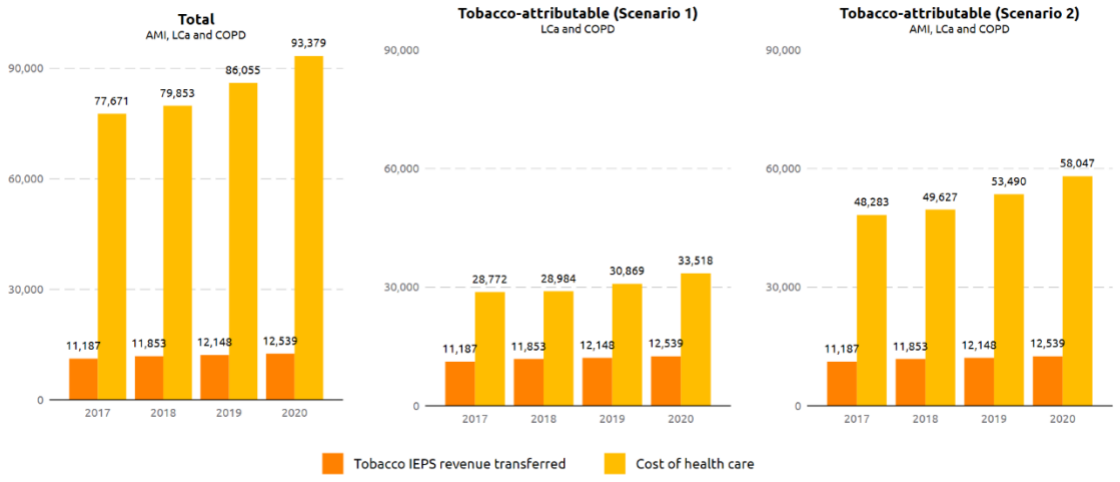
By way of example, if 100 pesos are paid into the General Fund for Non-Earmarked Transfers (FGP) in 2020 and it is reported that 1 peso was distributed to Aguascalientes in 2020, that is, 1% of the total of the FGP, it is assumed that the same

proportion of tobacco IEPS was distributed through the FGP to Aguascalientes. This same exercise is repeated for every state and for each of the funds listed earlier, giving an estimate of the amount of tobacco IEPS distributed to each state (**Table *1***).

Tobacco IEPS revenue transferred to the states is insufficient to cover the costs of treating the cases of the three major diseases considered among the population not covered by social security, nor health care costs attributable to tobacco (

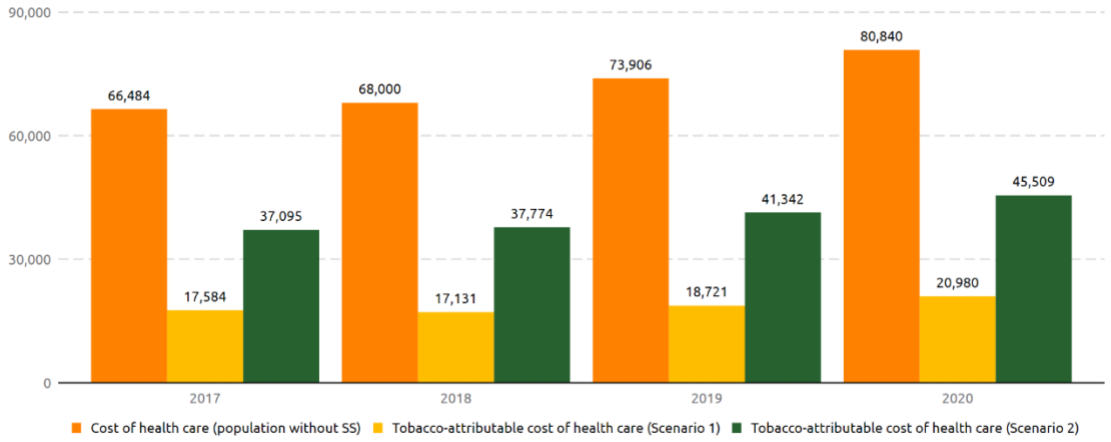
Figure *4*). However, when the cost of COPD, which accounts for over 97% of the total estimated cost, is excluded, tobacco IEPS revenue transferred is greater than the cost of treating AMI and LCa in all three estimates.

Figure 4. *Revenue from IEPS on tobacco and health care costs (millions of pesos, 2020=100).*



Source: Authors' calculations based on data from IHME (2022), INEGI (2020), Rascón-Pacheco et al. (2019), and SHCP (2022).

Figure *5*. Fiscal gap: revenue-cost of health care in different scenarios

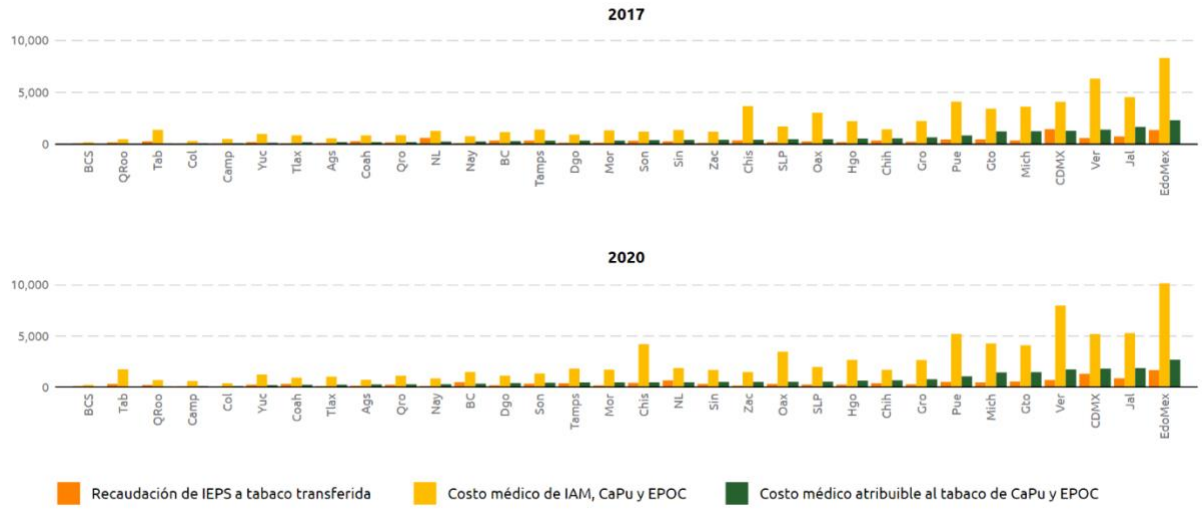


Source: IHME (2022), INEGI (2020), Rascón-Pacheco et al. (2019), and SHCP (2022).

From 2017 to 2020, this gap widened by 14.357 billion pesos, rising from 66.484 billion to 80.84 billion pesos. Meanwhile, the gap for the cost of health care attributable to tobacco increased by 3.395 billion pesos – from 17.584 billion to 20.98 billion pesos in 2020 – in scenario 1, which takes into account LCa and COPD. Similarly, under scenario 2, which considers the cost of AMI, LCa, and COPD using the smoking-attributable percentage calculated by Pichón-Riviere et al. (2013), the gap increased by 8.414 billion pesos, from 37.095 billion pesos in 2017 to 45.509 billion pesos in 2020 (Figure 5).

Figure **6** shows the aggregate costs of health care for these three conditions, and the revenue transferred by state.

Figure *6*. Health care costs and revenue from IEPS on tobacco by state (millions of pesos)



Source: IHME (2022), INEGI (2020), Rascón-Pacheco et al. (2019), and SHCP (2022).

Table 5. *Funding gap results by state, 2020 (millions of pesos)*

Estimation of health care costs for diseases caused by smoking, 2020 (millions of pesos)

State	AMI	LCa	COPD	Total cost	Transfers from tobacco IEPS	Gap (Total cost - transfers from tobacco IEPS)
Aguascalientes	6.17	21.49	818.57	846.23	143.92	702.30
Baja California	1.10	69.13	1,873.23	1943.46	473.30	1470.16
Baja California Sur		17.66	298.45	316.11	104.31	211.80
Campeche		15.99	678.60	694.59	88.52	606.08
Chiapas	4.62	93.70	4,526.64	4624.96	418.46	4206.50
Chihuahua	8.37	87.48	1,987.31	2083.16	389.47	1693.68
Mexico City (CDMX)	42.94	152.51	6,308.47	6503.92	1303.82	5200.10
Coahuila	0.44	42.15	1,198.11	1240.70	318.08	922.62
Colima		16.35	456.40	472.76	81.33	391.43
Durango	4.84	34.47	1,262.94	1302.26	176.04	1126.22
Guanajuato	25.77	105.82	4,513.34	4644.92	545.79	4099.14
Guerrero	6.39	96.20	2,831.91	2934.49	278.58	2655.92
Hidalgo	1.98	57.31	2,861.33	2920.62	249.75	2670.87
Jalisco	50.43	160.79	5,947.32	6158.54	869.27	5289.27
State of Mexico (EdoMex)	18.06	232.89	11,578.41	11829.35	1669.02	10160.33
Michoacán	4.62	115.65	4,599.64	4719.91	449.29	4270.62
Morelos		38.74	1,834.49	1873.22	165.73	1707.49
Nayarit	7.27	33.59	931.65	972.51	115.01	857.49
Nuevo León	20.04	95.06	2,417.71	2532.80	661.58	1871.22
Oaxaca	2.20	71.53	3,713.22	3786.95	317.38	3469.57
Puebla	5.51	99.82	5,606.64	5711.96	499.76	5212.20
Querétaro	0.66	28.16	1,326.43	1355.25	233.73	1121.52
Quintana Roo		20.93	857.34	878.26	199.52	678.74
San Luis Potosí	13.87	54.08	2,144.58	2212.54	245.73	1966.81
Sinaloa	5.29	102.49	1,890.97	1998.75	315.87	1682.88
Sonora	11.01	67.60	1,604.05	1682.66	343.63	1339.03
Tabasco		43.42	2,003.53	2046.94	313.19	1733.76
Tamaulipas		76.13	2,130.06	2206.18	389.51	1816.67
Tlaxcala		20.52	1,105.79	1126.30	108.38	1017.92
Veracruz	8.81	174.75	8,502.60	8686.16	688.59	7997.56
Yucatán		31.48	1,423.15	1454.63	231.11	1223.52
Zacatecas	6.17	42.54	1,568.91	1617.61	150.85	1466.77
NATIONAL TOTAL	**256.55**	**2,320.41**	**90,801.76**	**93,378.72**	**12,538.53**	**80,840.19**

6. Discussion and conclusions

This study provides estimates of the **healthcare costs by three major diseases caused by smoking in the scenario that the states cover these and compares these results to the funds that the states receive from taxes on tobacco. In every state there is a fiscal gap with respect to the amount needed to cover the cost of health care** incurred by three **diseases caused by tobacco**.

For 2020, nationwide, the estimated that the cost of health care for three smoking-related conditions comes to **93.379 billion pesos** for all affected individuals with no social security coverage. Considering various scenarios with different standardized costs and attributable fractions based on official sources and academic publications, the funds transferred to the states are not sufficient to cover the publicly paid treatments even if considering only the tobacco-attributable costs. Nationally, this gap reaches over **80 billion pesos**. This is based on the assumption that individuals with these conditions are diagnosed and treated in line with standards and at the costs estimated by the IMSS for each state. The fiscal gap would be greater still if treatment for all smoking-related conditions is considered.

From 2017 to 2020, **the gap between the costs of health care and revenue from IEPS on tobacco products by state has widened**. In other words, the difference between the cost of health care due to AMI, COPD, and lung cancer and the revenue that states receive from IEPS levied on tobacco products has become greater. This is explained by the increasing burden of disease, but importantly because the excise tax is low in Mexico and there is room for increasing it. If the excise tax on tobacco products increases, the amount of revenue transferred to the States would be larger.

In 2020, nationally, this would put the **cost of treating** three smoking-related conditions – LCa, COPD, and AMI – at **7.4 times the amount transferred to states from IEPS levied on tobacco** (Table 5).

At a subnational level, in 2020, the lowest gap between the cost of health care and state transfers of tobacco IEPS was estimated in **Baja California Sur**, where health care costs equal 316 million pesos and transfers 104 million pesos, making **costs three times the amount received by the state from IEPS on tobacco**. By contrast, the greatest difference was estimated in **Veracruz**, where **health care costs are twelve times higher than the amount of tobacco IEPS received, since is the third state with the highest number of COPD cases.**

A previous calculation by the Institute for Clinical Effectiveness and Health Policy (IECS) estimated the direct smoking-attributable cost in Mexico at 75.569 billion pesos in 2015. This amount includes estimations for **seven smoking-related conditions** for the population aged over 35, calculated using a mathematical and probabilistic model (IECS, 2014). Although this estimation is below the one estimated by this study, it considers only a group of the population and with incidence and cost data from 2015. The estimations here include total population and updated cost.

Beyond the economic implications for the fiscal system, **the population lacks effective access to these health services. This is not just for want of financial means, but also because conditions like COPD and lung cancer are not included** in the catalog of services available for those not registered with any social security institution. Care is however made available for AMI for those aged under 65. This causes that an important share of the population without social security incurs in out-of-pocket expenditures.

Funding and including diseases that require highly specialized care, like lung cancer, **have been rendered more difficult with the launch of IMSS-Bienestar**, a decentralized public entity responsible for making health care universal, and by the fact that **this body is funded by resources from FONSABI**.

Under the Federal Revenue Law 2023 (LIF 2023), **excess funds in FONSABI** should be transferred to support IMSS-Bienestar in providing universal health coverage to the

population. This represents around 46 billion pesos as of the third quarter of 2022 (SHCP, 2022) and risks jeopardizing funds allocated to highly specialized treatment and the inclusion of conditions **not yet listed in the catalog, like lung cancer or COPD**. The decentralized public entity IMSS-Bienestar will be run in accordance with state-specific agreements.

Highly specialized, tertiary level care is not included in the express care plan for those without social security in the Strategic Health Program for Well-Being published on September 7th in the Official Gazette of the Federation (H. Congreso de la Unión, Acuerdo por el que se emite el Programa Estratégico de Salud para el Bienestar, 2022).

An urgent discussion is needed to align the **priorities of the health sector with the Mexican fiscal system.** Fundamental to this discussion should be the **generation and integration of sources of sustainable funding to support** those with reduced access to health services. Increasing the low excise taxes on tobacco can fill the fiscal gap by increasing the revenue transfer to the states.

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8. Appendix

Table 6 *Health care costs by medical condition*

CDM description	Type of DRG	Condition	DRG code	DRG description	Unit cost 2016
Diseases and disorders of the respiratory system	Medical DRG	LCa	180	Respiratory neoplasms with MCC	222,745
			181	Respiratory neoplasms with CC	62,072
			182	Respiratory neoplasms without CC/MCC	48,879
		COPD	190	Chronic obstructive pulmonary disease with MCC	50,621
			191	Chronic obstructive pulmonary disease with CC	49,230
			192	Chronic obstructive pulmonary disease without CC/MCC	42,167
		AMI	280	Acute myocardial infarction, discharged alive with MCC	161,610
			281	Acute myocardial infarction, discharged alive with CC	181,344
			282	Acute myocardial infarction, discharged alive without CC/MCC	136,500
			283	Acute myocardial infarction, discharged dead with MCC	238,737
			284	Acute myocardial infarction, discharged dead with CC	251,042
			285	Acute myocardial infarction, discharged dead without CC/MCC	146,348

Table 7 *Smoking-attributable fraction*

Condition	Attributable fraction given by Pichón-Riviere et al. (2013)
AMI	0.22
LCa	0.73
COPD	0.62

Table 8 *Smoking-attributable fraction given by the IHME (2022)*

State	LCa				COPD			
	2017	2018	2019	2020	2017	2018	2019	2020
Aguascalientes	0.46167	0.459578	0.460897	0.460897	0.481554	0.4781	0.477022	0.477022
Baja California	0.43684	0.432421	0.428967	0.428967	0.427965	0.422839	0.419044	0.419044
Baja California Sur	0.414772	0.411678	0.406339	0.406339	0.42113	0.419798	0.415775	0.415775
Campeche	0.296429	0.28579	0.281944	0.281944	0.28995	0.281126	0.276821	0.276821

Chiapas	0.202118	0.193899	0.189028	0.189028	0.199434	0.193488	0.189741	0.189741
Chihuahua	0.505295	0.499034	0.499623	0.499623	0.514989	0.510185	0.509294	0.509294
Mexico City (CDMX)	0.481933	0.47086	0.466034	0.466034	0.499328	0.48896	0.481972	0.481972
Coahuila	0.450517	0.439031	0.435831	0.435831	0.444792	0.436224	0.432886	0.432886
Colima	0.434366	0.434662	0.432364	0.432364	0.406156	0.403732	0.399199	0.399199
Durango	0.423772	0.413322	0.409419	0.409419	0.460627	0.451363	0.446465	0.446465
Guanajuato	0.44923	0.447162	0.444333	0.444333	0.440457	0.437516	0.43394	0.43394
Guerrero	0.356935	0.349765	0.346701	0.346701	0.365193	0.358648	0.356309	0.356309
Hidalgo	0.358828	0.351101	0.348858	0.348858	0.310915	0.307145	0.305579	0.305579
Jalisco	0.449897	0.44027	0.435662	0.435662	0.463205	0.454471	0.448475	0.448475
State of Mexico (EdoMex)	0.404081	0.393739	0.389344	0.389344	0.379676	0.372323	0.368307	0.368307
Michoacán	0.41032	0.408	0.405438	0.405438	0.40606	0.403489	0.399582	0.399582
Morelos	0.341227	0.334453	0.332682	0.332682	0.338505	0.333738	0.330662	0.330662
Nayarit	0.433543	0.426396	0.423351	0.423351	0.420049	0.414325	0.410738	0.410738
Nuevo León	0.478849	0.469766	0.464968	0.464968	0.459571	0.452203	0.446508	0.446508
Oaxaca	0.255411	0.246068	0.240104	0.240104	0.230087	0.223983	0.219676	0.219676
Puebla	0.326448	0.315217	0.308018	0.308018	0.285433	0.277885	0.272302	0.272302
Querétaro	0.417174	0.40591	0.403673	0.403673	0.379103	0.373762	0.37255	0.37255
Quintana Roo	0.319923	0.315291	0.31576	0.31576	0.315681	0.312057	0.310847	0.310847
San Luis Potosí	0.365877	0.35986	0.356312	0.356312	0.364961	0.359734	0.355418	0.355418
Sinaloa	0.413785	0.403996	0.400287	0.400287	0.424555	0.416479	0.411427	0.411427
Sonora	0.475061	0.466811	0.462674	0.462674	0.472067	0.464206	0.458267	0.458267
Tabasco	0.193755	0.185502	0.181863	0.181863	0.196302	0.18941	0.185801	0.185801
Tamaulipas	0.414494	0.407184	0.403133	0.403133	0.392746	0.385023	0.379311	0.379311
Tlaxcala	0.325891	0.315237	0.314034	0.314034	0.305756	0.299296	0.298695	0.298695
Veracruz	0.288528	0.279477	0.274499	0.274499	0.2897	0.282344	0.277879	0.277879
Yucatán	0.289483	0.281865	0.278322	0.278322	0.294154	0.288416	0.284444	0.284444
Zacatecas	0.408679	0.400858	0.396993	0.396993	0.420014	0.412789	0.407411	0.407411
National total	**0.403202**	**0.395403**	**0.391788**	**0.391788**	**0.387428**	**0.380831**	**0.376632**	**0.376632**

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