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ORIGINAL ARTICLE

Smoking behavior of Mexicans: patterns by birth-cohort, gender, and education

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Abstract
Objectives Little is known about historical smoking patterns in Mexico. Policy makers must rely on imprecise predictions of human or fiscal burdens from smoking-related diseases. In this paper we document intergenerational patterns of smoking, project them for future cohorts, and discuss those patterns in the context of Mexico's impressive economic growth.
Methods We use retrospectively collected information to generate life-course smoking prevalence rates of five birth-cohorts, by gender and education. With dynamic panel data methods, we regress smoking rates on indicators of economic development.
Results Smoking is most prevalent among men and the highly educated. Smoking rates peaked in the 1980s and have since decreased, slowly on average, and fastest among the highly educated. Development significantly contributed to this decline; a 1 % increase in development is associated with an average decline in smoking prevalence of 0.02 and 0.07 percentage points for women and men, respectively.
Conclusion Mexico's development may have triggered forces that decrease smoking, such as the spread of health information. Although smoking rates are falling, projections suggest that they will be persistently high for several future generations.

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Introduction

An extensive literature studies generational patterns of smoking prevalence to assess the spread of smoking habits, the need for government intervention, or the effectiveness of existing tobacco control policies (Ahacic et al. 2008; Federico et al. 2007; Fernandez et al. 2003; Kemm 2001; Laaksonen et al. 1999; Marugame et al. 2006; Park et al. 2009; Perlman et al. 2007). This literature usefully calls attention to the role that economic development plays in the evolution of smoking patterns. Development may affect both the direction of change of total smoking prevalence and the disparities in smoking habits across socioeconomic groups. Using relatively long time-series data on smoking consumption from developed countries, Lopez et al. (1994) identified a hump-shaped pattern in the overall smoking prevalence rate as those countries developed. Starting from low levels, economic development generally increases cigarette demand and supply, but as countries grow richer health information spreads and governments use anti-smoking interventions to limit tobacco consumption. The authors observe that people in higher socioeconomic groups are more likely to smoke than those in lower socioeconomic groups in early stages of this smoking diffusion process. Over time, this pattern gradually reverses—people with more education and/or more income are less likely to smoke than are people with less education and/or less income. The authors also observe that this pattern typically emerges in later cohorts for women than for men. More importantly, they observe that the patterns in smoking prevalence are followed by similar patterns in smoking

attributable mortality a few decades later. Smoking data consistent with this model are also described in subsequent comparative studies (Cavelaars et al. 2000; Huisman and Kunst 2005; Pampel 2003).

The literature widely recognizes that different anti-smoking policy regimes are appropriate at each stage of the smoking diffusion process. It is, therefore, important to know at which stage each country is before prescribing anti-smoking policy. Mexico is one of the countries where this knowledge is less robust. Mexican health policy makers must rely on sporadic evidence from cross-sectional surveys that are not representative of the general population.

Albeit sporadic, the available studies warn that the public health costs of smoking are growing. While the rate of smoking-related mortality in Mexico is lower than the rate in both developed (CDC 1992; Tapia Conyer et al. 1995) and developing (Menezes et al. 2005) countries, Mexican mortality rates from a variety of smoking-related illnesses appear to be increasing, sometimes quite dramatically. For example, from 1970 to 1990 the mortality rate from cerebrovascular disease increased by 60 %. Over the same period, death rates due to lung cancer increased by 220 % (Tapia Conyer et al. 1995). Some of these increases may be concentrated in particular groups where smoking prevalence rates are high. Researchers using data from cross-sectional surveys of residents of Mexico City find that smoking is highly prevalent among adults of age 60 and older (Kim et al. 2007). Others find that the smoking prevalence rate is higher among the less educated women (Menezes et al. 2009) and the young (Kuri-Morales et al. 2002), especially those who live in urban areas (Kuri-Morales et al. 2006).

Clearly, this literature lacks evidence on how the smoking patterns have evolved over time by generation, gender, and education level. Consequently, it is difficult to precisely predict the prevalence of smoking-related diseases in the future and its distribution across the Mexican population. This paper aims to fill this gap. We use nationally representative data to document historical patterns of smoking for multiple birth cohorts of Mexican men and women. We relate these patterns of smoking behavior to indicators of economic development and to efforts by the Mexican government to warn residents about the risks of smoking. Finally, we discuss implications for future anti-smoking policies.

Methods

Data

We use data from the 2008 Mexican National Addiction Survey (Secretaría de Salud (2008)). The 2008 survey drew a nationally representative sample of the population aged 12–65 (surveys before 2002 excluded rural residents). We exclude 9201 respondents still subject to compulsory schooling laws (those younger than 16); 65 respondents with missing smoking data; and 421 respondents whose sample weight is either zero or missing. Our analysis sample of 41,540 observations includes 23,223 women and 18,327 men.

The survey asks whether a person currently smokes, ever smoked in the past, and when a person started and (if relevant) quit smoking. Our analysis of smoking prevalence relies on these retrospective reports. Readers unfamiliar with retrospective data may have concerns about bias due to bad recall or due to the lack of information on temporary quits. We refer those readers to the literature that tests and confirms the reliability of retrospective data in general (Berney and Blane 1997; Koenig et al. 2009), and retrospective smoking data in particular (Brigham et al. 2010; Kenkel et al. 2003).

We group observations into categories by sex, education, and birth cohort. We define three education groups: those whose attained education up to sixth grade or less ("primary"), 7–9th grade ("secondary"), or ten or more years ("higher"). Our grouping is based on official enrollment rates. In 2003, 93 % of age-eligible Mexicans enrolled in the first grade of primary school, 86 % in lower secondary school, and 51 % in upper secondary school. Approximately 8 % of the population aged 18 and above in Mexico holds a bachelor's degree (Santibañez et al. 2005). Because sex-specific cell sizes are too small, we combine the two highest education groups. Sex-specific cell sizes also led us to define birth cohorts in 10-year ranges. We group members of the same sex who were of ages 16–24, 25–34, …, 55–64 in 2008, i.e., born in 1943–1952, 1953–1962, …, 1983–1992, respectively.

Finally, we use annual time-series data on per capita GDP, per capita consumer expenditures, and oil production (in barrels) to investigate how smoking prevalence in each group varies with these indicators of economic growth. Oil has figured prominently in the growth of the Mexican economy since the 1970s, when new reserves were discovered and brought into production. Our data allow us to study smoking behavior of cohorts who came of age before and after this historical change. The per capita GDP and per capita consumption data are from Barro and Ursua (2008). Our oil production data for the period 1950–1980 come from Sistema Nacional para la Consulta de las Estadísticas Históricas de México. Data for 1980–2006 are from the International Energy Statistics of the US Energy Information Administration.

Statistical analysis

With the retrospective smoking data we construct each respondent's lifetime smoking history. We code an indicator

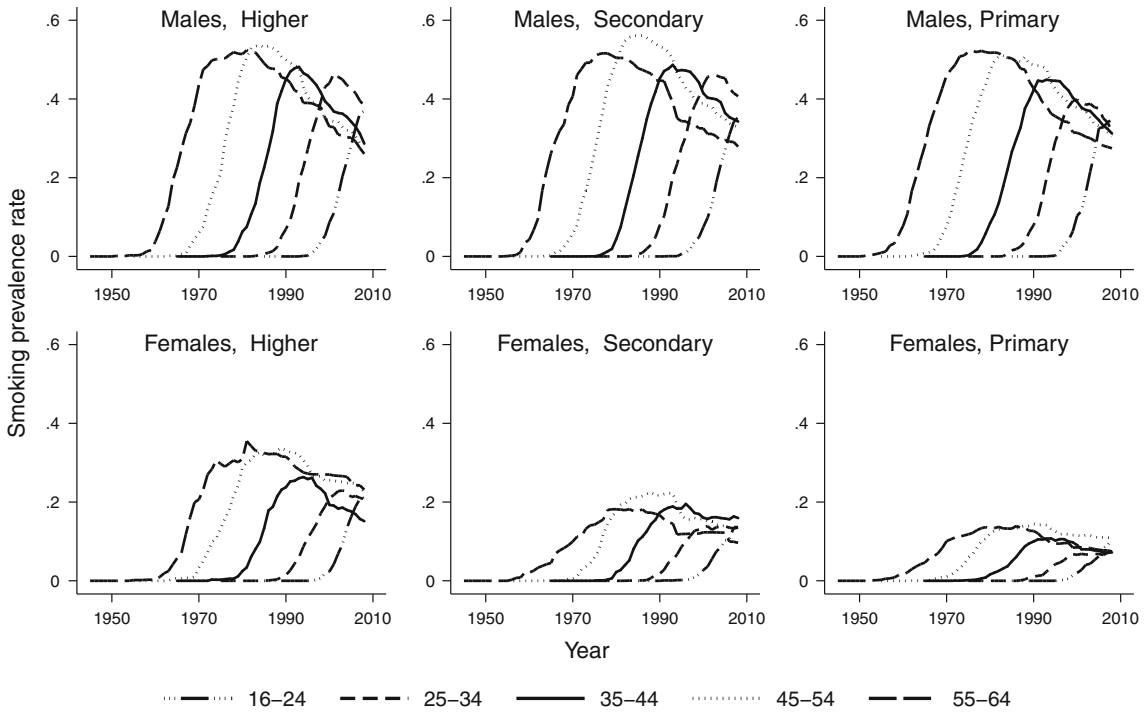

Fig. 1 Smoking prevalence rates by birth-cohort, gender, and education (Mexico, 1950–2008)

for every year between birth and interview that equals one if a respondent smokes and zero otherwise. We assume that people who smoked did so continuously from the age s/he started until the age s/he quit (ex-smokers) or the year of the survey (current smokers). For each sex, education, and cohort group we compute smoking prevalence rates over the life-course as the mean smoking status in each year (weighted by sampling weights). We also adjust these rates for differences in mortality rates of smokers and non-smokers using cause, age, and sex-specific mortality data and the algorithm described in Christopoulou et al. (2011). The adjustment does not change smoking rates by much except for the oldest male cohort (for whom it increases the peak rate by one percentage point). We formally test whether mean smoking prevalence rates differ across groups using the Pearson test of independence for binary variables.

To estimate how smoking prevalence varies with economic development, we regress the group-specific smoking prevalence rate in each year on the economic development measure for that year. Because our dependent variable has both a cross-sectional (cohort) and a time (year) dimension, we control for unobserved cohort-specific heterogeneity and persistence in smoking behavior over time (e.g., due to addiction to nicotine). To do this, we estimate the model using the difference generalized method of moments (Arellano and Bond 1991). This method purges cross-sectional variation by taking first-differences, and captures persistence effects with a lagged dependent variable (instrumented by earlier lagged values of the variable). We also report results from instrument validity tests.

We estimate our models in two stages. In the first stage, we run separate regressions for each gender and education group. This exercise allows us to explore how smoking, socioeconomic characteristics, and economic development covary in Mexico. To provide more insights, we next test whether there is a structural break in the relationship between smoking prevalence and our covariates. To do so, we first pool together sex-education-cohort samples to form sex-cohort samples. We then use every year t from 1960 to 2000 as a threshold to repeatedly break each sample in two periods. In every case the first period runs from 1950 to year t. The second period runs from year $t + 1$ to 2006. We do not allow t to range from 1950 to 1959 or from 2001 to 2006 because those years result in samples that are too small. Finally, we run our models on the sub-samples defined by each of these 41 threshold years and, for each model, we apply the Chow (1960) test for a structural break. For every year t, the Chow-test F statistic essentially tests whether the coefficients on the development variables statistically differ between the periods. Our structural-break test identifies periods and even specific years when the association between development and smoking prevalence changed in direction or magnitude.

While our estimation method accounts for all time-invariant cohort-specific heterogeneity that influences smoking, we lack the data to account for the role played by

Table 1 Sample sizes, peak prevalence, and tests of differences in peak prevalence by education level (Mexico, 1950–2008)

Gender and cohort (age in 2008)	Primary		Secondary		Higher		Primary vs. secondary		Secondary vs. higher		Primary vs. higher	
	Obs	Peak prev.	Obs	Peak prev.	Obs	Peak prev.	Diff in peak prev.	X^2	Diff in peak prev.	X^2	Diff in peak prev.	X^2
Males												
16–24	645	0.35	1,951	0.35	2,428	0.37	−0.01	0.1	−0.02	1.2	−0.02	1.1
25–34	1,133	0.40	1,315	0.46	1,461	0.46	−0.06	10.0*	0.00	0.1	−0.07	12.0*
35–44	1,359	0.45	1,235	0.49	1,228	0.48	−0.04	3.9*	0.01	0.1	−0.03	2.9
45–54	1,357	0.51	561	0.56	735	0.54	−0.05	4.5*	0.02	0.8	−0.03	1.5
55–64	1,285	0.52	247	0.52	289	0.52	0.01	0.0	−0.01	0.0	0.00	0.0
Females												
16–24	935	0.11	2,189	0.14	2,696	0.21	−0.03	5.7*	−0.08	47.5*	−0.11	52.8*
25–34	1,834	0.07	1,931	0.14	1,783	0.23	−0.07	43.5*	−0.09	52.5*	−0.16	176.4*
35–44	2,117	0.11	1,681	0.20	1,448	0.26	−0.09	58.7*	−0.07	21.2*	−0.16	150.3*
45–54	2,228	0.14	684	0.23	680	0.34	−0.08	25.5*	−0.11	22.1*	−0.19	130.7*
55–64	1,951	0.14	295	0.18	300	0.35	−0.04	3.8*	−0.17	23.3*	−0.22	90.4*

Individuals in the 16–24 cohort who are still at school are assigned in the highest education category. 47 % of the youngest cohort belongs to this category. The remaining individuals are out of school; 47 % have completed lower secondary education, and 15 % have completed primary education

X^2 is the Pearson test statistic

* Indicates significance at 5 %

time-varying factors such as the flow of information about the health risks of smoking, cigarette prices, taxes, and other tobacco control policies. Long time series on these variables are not available. Our regressions control for these factors to the extent that they are correlated with economic growth. Thus, our estimated coefficients capture the total effect of all variables that are correlated with the development measures and that affect whether and how much people smoke.

Results

Figure 1 depicts the life-course smoking trajectories for each cohort, gender, and level of education. Table 1 reports the corresponding peak prevalence rates and significance tests for the differences in peak rates across education levels within sex and cohort. They reveal several interesting patterns. First, women always smoke less than men. This difference is largest in the primary education category where the peak rate of women is generally less than a third of the peak rate for men. Further, in all cohorts of women, the least educated Mexican women smoke less than better educated Mexican women. The prevalence gap is higher between women with secondary and higher education than that between women with primary and secondary education, but the differences are always statistically significant. For men one observes a similar education gradient—less educated men smoke less than more educated men—but it is much less pronounced and largely limited to the lowest two education levels. Indeed, even among these two groups, the peak prevalence rates of the youngest and oldest men do not statistically differ.

Further, Table 1 shows that peak prevalence is typically highest and similar in value in the two oldest cohorts (age 55–64 and 45–54 in 2008) and generally falls in successive cohorts. The rate of this inter-generational decrease is generally faster for men than women. To further explore these changes, we compute the difference in the peak prevalence rate of adjacent cohorts in each sex-education group, thus generating four differences for each group. Next, we compute the mean of these four differences for each sex-education group. The resulting numbers tell us how much peak smoking rates changed within education level for men/women of successive cohorts. The average percentage point change from cohort-to-cohort peak was −4.3, −4.3, and −3.8 for men and −0.75, −1, and −3.5 for women with primary, secondary, and higher education levels, respectively. The percentage point change was smaller for women in part because they smoked less. Thus, although smoking is most prevalent among the highly educated women, it also decreased fastest across generations of the highly educated. By contrast, smoking prevalence of males decreased fastest across generations of the less educated.

Using the average cross-cohort decline we can project what the peak smoking rate would be for future cohorts, assuming that all else is equal. We plot the projections in Fig. 2. We find that, at the current average rates of decline, the smoking rate of women with higher education would

fall below the rate of women with primary education only after nine more cohorts are born (i.e., women born over 2083–2092). The rate for higher educated women would fall below that of women with secondary education after six cohorts are born (women born over 2033–2042). Even up to that time Mexican men will still be smoking more than Mexican women. Absent other changes, these projections imply that socioeconomic differentials in smoking habits will remain relatively unchanged for at least the next five birth-cohorts.

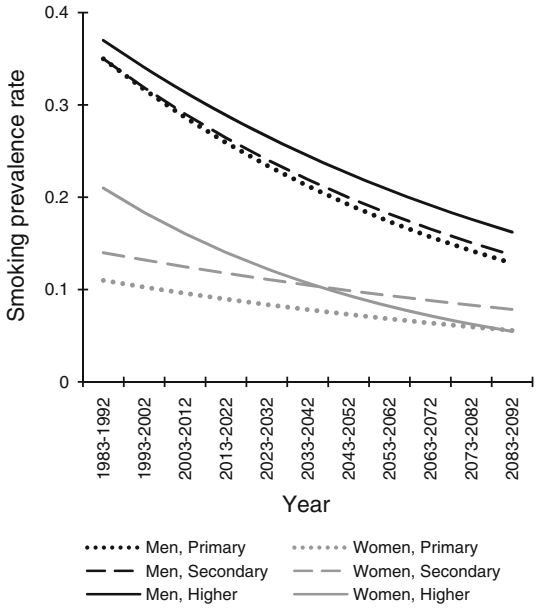

Fig. 2 Projections of peak smoking prevalence to future cohorts by gender and education level (Mexico, projections based on years 1950–2008)

In Table 2, we report the results of the dynamic panel regression of smoking prevalence by gender and education on the economic indicators (plotted in Fig. 3). In all cases the lagged dependent variable absorbs most of the variation in the data; its coefficient is always higher than 0.9, suggesting that smoking in each cohort largely persists from 1 year to the next. However, smoking prevalence also varies strongly with the economic indicators. All three measures yield similar results. We find that economic growth is negatively associated with smoking prevalence, but that the association differs for men and women and by education category. A 1 % increase in economic growth is associated with an average decline in the smoking prevalence rate of about 0.02 percentage points for women and 0.07 percentage points for men. Further, while smoking among more highly educated men falls slightly more with development than it does among less educated men (differences are not statistically significant), the responsiveness of women is significantly higher in the secondary and higher education categories than the primary.

Figure 4 plots the *F* statistic from the Chow test we described above. We plot the *F* statistic for each of the 41

Table 2 Difference generalized methods of moments regressions of smoking prevalence by sex and education (Mexico, 1950–2006)

	Men			Women		
	Primary	Secondary	Higher	Primary	Secondary	Higher
A. Regressions on GDP per capita						
Lagged prev.	0.945 [0.019]*	0.975 [0.033]*	0.942 [0.037]*	0.963 [0.058]*	0.959 [0.051]*	0.915 [0.063]*
GDP	−0.086 [0.038]*	−0.093 [0.025]*	−0.095 [0.029]*	−0.012 [0.006]	−0.049 [0.007]*	−0.036 [0.009]*
Hansen test	4.98 (0.083)	3.44 (0.179)	4.46 (0.108)	4.41 (0.110)	3.93 (0.140)	3.76 (0.152)
B. Regressions on volume of oil production						
Lagged prev.	0.950 [0.035]*	0.977 [0.028]*	0.969 [0.034]*	0.991 [0.041]*	0.971 [0.082]*	0.958 [0.054]*
Oil production	−0.020 [0.010]*	−0.022 [0.012]	−0.023 [0.007]*	−0.003 [0.001]*	−0.012 [0.005]*	−0.009 [0.001]*
Hansen test	4.3 (0.117)	3.73 (0.155)	3.23 (0.199)	2.73 (0.255)	3.73 (0.155)	3.56 (0.169)
C. Regressions on consumer expenditure per capita						
Lagged prev.	0.928 [0.021]*	0.964 [0.040]*	0.926 [0.037]*	0.959 [0.065]*	0.940 [0.039]*	0.902 [0.061]*
Consumption	−0.083 [0.023]*	−0.088 [0.020]*	−0.090 [0.021]*	−0.011 [0.006]	−0.048 [0.010]*	−0.029 [0.007]*
Hansen test	4.96 (0.084)	3.72 (0.156)	4.51 (0.105)	4.36 (0.113)	3.88 (0.144)	3.78 (0.151)

Each column in each panel represents a separate regression. Windmeijer-corrected standard errors are in brackets, probability values are in parentheses. All independent variables are in natural logs. The sample size is always 200 (five cohorts and 40 year-observations per cohort on average). Instruments for the lagged dependent variable are lags 4–6 for men and lags 3–5 for women. In all cases, we have collapsed the instruments to avoid over-fitting (i.e., we have allowed one instrument per lag distance, rather than one instrument per time period and lag distance). Thus, the number of instruments is equal to four in each regression. The Hansen statistic tests the null that instruments are valid. We confirmed instrument exogeneity by autocorrelation tests of the order four and three for men and women, respectively, and difference-in-Hansen tests for the exogeneity of the independent variables (results not shown)

GDP gross domestic product

* Indicates significance at 5 %

threshold years t that run from 1960 to 2000. We also show the critical value of the F statistics for a p value of 0.01 (to be conservative). For any point above the critical value, there is less than a 0.01 probability that the given value would occur randomly. For women, we find no evidence of a structural break in smoking participation in any period. For men, we find consistent evidence of a structural break associated with 1981. When we define the threshold year to be lower or equal to 1980, we find that the association between smoking by men and our covariates does not significantly change in the prior and subsequent periods. However, when the threshold year is 1981 or higher, we find strong evidence that estimated associations differed in the periods before and after. For all measures of development, we find the strongest evidence of a structural break (i.e., the biggest F statistic) when we use 1985 as the threshold year.

Table 3 presents selected regression results for men. The first column pools all years together. In the following columns we test whether coefficients estimated on data before 1981 (column two) differ from coefficients estimated on data after 1980 (column three). We also test whether coefficients estimated on data before 1985 (column four) differ from coefficients estimated on data after 1984 (column five). We present results for these groupings because 1981 is the first year that the F statistic for the test was statistically significant with $p < 0.01$ and 1985 was the year the F statistic was largest in absolute value. The estimates from the pooled sample confirm those in Table 2, showing that economic development is negatively correlated with smoking prevalence. However, when we separately examine periods before and after 1981, we find that this association only arises after 1981. We find the same result when we separately examine periods before and after 1985. The coefficient on the oil production is an exception; it appears negative and statistically significant in both periods, but it is ten times higher in value after 1985 than before.

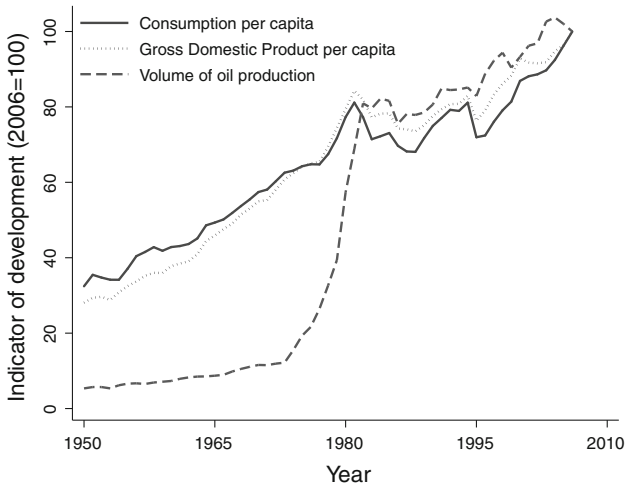

Fig. 3 Indicators of economic development in Mexico, 1950–2006

Discussion

Our results provide insights into the process of smoking diffusion in Mexico and its driving forces. We find that Mexican men and women who reached adulthood in the 1960s (age 55–64 in 2008) smoked at the same or lower rate as those who reached adulthood in the 1970s (age 45–54 in 2008). It follows that between 1950 and 1970 cigarette use was increasing in Mexico. The popularity of smoking started falling across generations with the cohort who grew up in the 1980s; that is, around the end of the oil boom. This descriptive evidence allows us to put the evolution of smoking in Mexico into international context. Relative to other countries, the peak of smoking prevalence among Mexican men and women occurred relatively late and was moderate in value (56 and 35 %, respectively). For

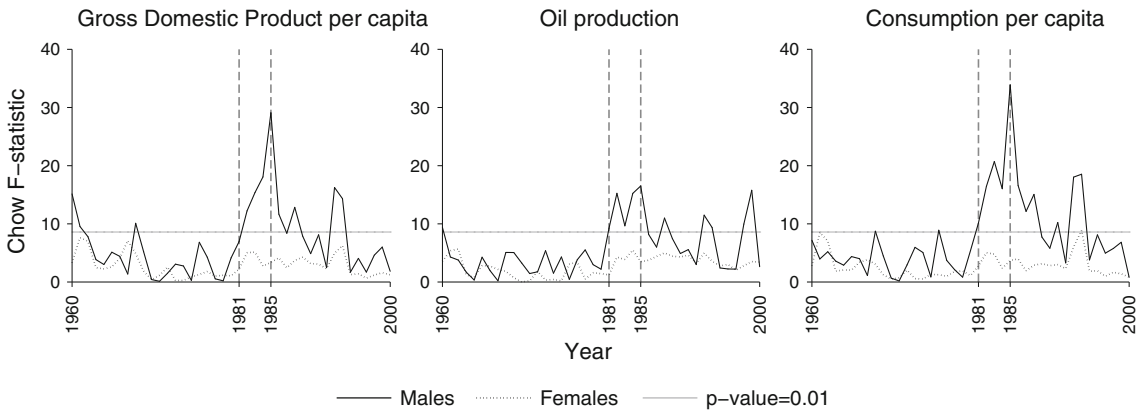

Fig. 4 Chow-test F statistic for structural break in smoking prevalence by model, year, and sex (Mexico, 1960–2000)

Table 3 Difference generalized methods of moments regressions of smoking prevalence by time period (Mexico, 1950–2006, men only)

	All years	Before 1986	After 1985	Before 1981	After 1980
A. Regressions on GDP per capita					
Lagged prev.	0.937 [0.015]*	0.941 [0.023]*	0.897 [0.045]*	0.953 [0.015]*	0.888 [0.038]*
GDP	−0.089 [0.016]*	−0.006 [0.010]	−0.100 [0.028]*	−0.001 [0.018]	−0.116 [0.024]*
Hansen test	13.9 (0.128)	8.5 (0.490)	14.4 (0.109)	9.0 (0.435)	14.1 (0.119)
B. Regressions on volume of oil production					
Lagged prev.	0.940 [0.019]*	0.961 [0.010]*	0.910 [0.024]*	0.972 [0.020]*	0.912 [0.018]*
Oil production	−0.025 [0.006]*	−0.008 [0.003]*	−0.080 [0.023]*	−0.008 [0.004]	−0.061 [0.013]*
Hansen test	13.6 (0.137)	10.1 (0.341)	14.0 (0.124)	10.4 (0.324)	13.5 (0.142)
C. Regressions on consumer expenditure per capita					
Lagged prev.	0.923 [0.017]*	0.937 [0.024]*	0.904 [0.043]*	0.957 [0.014]*	0.892 [0.037]*
Consumption	−0.084 [0.012]*	−0.004 [0.010]	−0.076 [0.021]*	−0.009 [0.017]	−0.086 [0.020]*
Hansen test	14.2 (0.114)	8.5 (0.489)	14.5 (0.107)	9.4 (0.396)	14.1 (0.119)
Observations/cohorts	600/15	288/12	312/15	228/12	372/15

Instruments for the lagged dependent variable are lags 3–12. We have collapsed the instruments to avoid over-fitting; thus the number of instruments is equal to 11 in each regression. Cohorts are education-specific (five cohorts in each of the three education levels makes a total of 15 cohorts). All other information, as for Table 2

GDP gross domestic product

* Indicates significance at 5 %

example, smoking prevalence in Spain (a country with similar cultural heritage) reached its highest peak at over 70 % for men who reached adulthood in the 1940s and at over 40 % for women who reached adulthood in the 1970s (i.e., after the end of the Franco regime). Prevalence in the US and the UK attained its highest peak for cohorts that reached adulthood in the 1950s and 1960s and exceeded 60 % for men and 40 % for women. For the same cohorts of men in Russia (a country whose 2005 per capita GDP was $10,000 versus $12,219 in Mexico) smoking prevalence exceeds 75 %. However, Russian women, like women in most developing countries, smoked significantly less than Mexican women (Christopoulou et al. 2011; Lillard et al. 2010).

Second, we find that smoking is relatively more prevalent among better educated Mexicans, especially better educated women. Moreover, while for men the intergenerational change in peak prevalence is roughly equal across education levels, for women it is significantly larger in the higher education category. Our estimates of the responsiveness of smoking prevalence to economic development also show similar patterns, i.e., they increase across education levels, only slightly for men but significantly for women. These differences across education levels hint that health information affects smoking patterns in Mexico. It is plausible that highly educated people adjust their behavior more when they get information about the health risks of smoking. The differences between genders are consistent with the widely accepted notion that the smoking habits of women lag behind those of men by several decades.

Third, we find that the peak of smoking prevalence in our sample coincided with the oil boom. This finding suggests that the boom may have triggered a switch in the relative impact of the four main factors that affect smoking participation as a country develops. That is, the switch from the dominance of the positive effects of higher disposable income and cigarette supply towards the dominance of the negative effects of health information and anti-smoking intervention. We formally explored this possibility by testing for a structural break in the smoking prevalence over time. For women, we find no evidence of switch. For men, we find that while economic development was not significantly associated with smoking prevalence before the 1980s, a strong negative and statistically significant association developed thereafter, and the differences are largest when one uses 1985 to define the two periods. We read this result for males to suggest that before the 1980s development brought about countervailing forces—higher demand and supply of cigarettes and more information on the health risks of smoking—and these factors canceled each other's influence on smoking prevalence. After the early 1980s, factors that reduce demand for cigarettes began to dominate over factors that increase demand for cigarettes.

Interestingly, Mexico's central government did not officially try to limit smoking until 1984. Thus, we conjecture that mostly private information on smoking health risks flowed to Mexico during this period, probably from abroad. Researchers published the first scientific evidence of the health consequences of smoking in the early 1950s (Doll and Hill 1950), and two decades later relevant evidence was

published in Spanish (OMS 1975). In the meantime, official reports from the US and UK governments communicated these health consequences to the wider public (RCPL 1962; USDHEW 1964). Because popular consumer magazines published articles about these findings, it is likely that some of this information flowed into Mexico.

From the early 1980s Mexico experienced several changes in its socioeconomic landscape, including the worst recession since the 1930s. The switch in the association between smoking and development was clearly determined by the combination of such factors. However, because of its timing, the enactment of anti-smoking intervention in 1985 stands out as one of the key correlates of the structural break.

In its 1984 General Health Law, the Mexican government officially proclaimed addiction to drugs, alcohol, and smoking as a general health problem. In 1986, the Health Ministry created the National Council Against Addictions (Moreno Garcia and Cantu Martinez 2002). However, the government maintained tobacco control policies that were "industry-friendly" until the late 1990s. Coincidentally or not, from 1972 to 1990, a government-owned agency (Tabamex) held a statutory monopoly over the industrial and commercial production of tobacco (Stebbins 1994). Since then the government has passed stronger regulations. In 2001 the Health Ministry began a series of measures, but by 2004 those efforts proved controversial. Observers discovered that the tobacco industry secured mild tobacco control measures by agreeing to contribute a fund for people without health insurance (Avila et al. 2006; Samet et al. 2006; Sebrie and Glantz 2006). In May 2008 the Mexican government passed the General Law for Tobacco Control. Among other things, the law bans smoking in indoor public places; levies fines on retailers who sell cigarettes to minors; and increases cigarette taxes to an average of between 160 and 180 % of the wholesale price.

Our results on the gender difference in the structural test calls for future research to explore whether Mexican men are more exposed or more responsive to information than Mexican women. Both are likely scenarios because men are relatively more educated (Santibañez et al. 2005), and because, as the main bread winners of the family, men may be more risk-averse and may receive more influences from outside the household. Such evidence would explain our finding that, although Mexican women have increasingly smoked less as their country has developed economically (especially among more educated groups), the rate of decrease has not changed significantly since national tobacco control efforts began.

Our findings are policy-relevant. All aforementioned patterns, both in the differences in smoking by gender and education, and in the effect of development on smoking, have been identified by Lopez et al. (1994) to indicate a transition from the second to the third stage of the smoking diffusion process. This means that, although smoking prevalence has reached its peak and is now falling, the peak of the smoking-attributable mortality is soon to come, as there is normally a three- to four-decade lag between the two. The fact that death rates due to smoking have been relatively low so far in Mexico may have led policy makers to underestimate the health hazards of smoking. The evidence we present suggest that the "lost decades" of little anti-smoking intervention during which smoking prevalence was increasing will come at a cost, as death-rates will soon increase.

Finally, although smoking rates are falling, unless new factors cause the rate of change to accelerate, the current patterns in smoking may persist for several more generations. The 2008 law, currently in effect, potentially represents such new factors. This law aims to prevent initiation and establishes smoke-free public places. To further increase the rate of decline in smoking rates, Mexico's legislators should also tackle the persistent component of smoking prevalence, i.e., they need to encourage cessation among addicted smokers and pursue smoke-free workplaces. Particular effort should be made to convey information on the health risks of smoking to women and less educated Mexicans.

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