

# Preventive healthcare-seeking behavior among poor older adults in Mexico: the impact of *Seguro Popular*, 2000-2012

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## Abstract

**Objective.** Determine the effect of *Seguro Popular* (SP) on preventive care utilization among low-income SP beneficiaries and uninsured elders in Mexico. **Materials and methods.** Fixed-effects instrumental-variable (FE-IV) pseudo-panel estimation from three rounds of the *Mexican National Health and Nutrition Survey* (2000, 2006 and 2012). **Results.** Our findings suggest that SP has no significant effect on the use of preventive services, including screening for diabetes, hypertension, breast cancer and cervical cancer, by adults aged 50 to 75 years. **Conclusions.** Despite the evidence that suggests that SP has increased access to health insurance for the poor, inequalities in healthcare access and utilization still exist in Mexico. The Mexican government must keep working on extending health insurance coverage to vulnerable adults. Additional efforts to increase health care coverage and to support preventive care are needed to reduce persistent disparities in healthcare utilization.

**Keywords:** Public health policy; health equity; healthcare disparities; health care quality, access, and evaluation; health-care reform

## Resumen

**Objetivo.** Determinar el efecto del *Seguro Popular* (SP) en la utilización de la atención preventiva entre beneficiarios de SP de bajos ingresos y ancianos sin seguro en México. **Material y métodos.** Estimación de pseudopanel de variables instrumentales de efectos fijos (FE-IV) en tres rondas de la Encuesta Nacional de Salud y Nutrición de México (2000, 2006 y 2012). **Resultados.** El SP no tiene un efecto significativo en el uso de los servicios preventivos, incluida la detección de diabetes, hipertensión, cáncer de mama y cáncer de cuello uterino en adultos de 50 años o más. **Conclusiones.** Aún existen desigualdades en el acceso a la asistencia médica en México. El gobierno mexicano debe seguir trabajando para extender la cobertura del seguro de salud a la población más vulnerable. Se necesitan esfuerzos adicionales para aumentar la cobertura de atención médica y apoyar la atención preventiva para reducir las disparidades persistentes.

**Palabras clave:** políticas públicas de salud; equidad en salud; disparidades en atención de salud; calidad, acceso y evaluación de la atención de salud; reforma de la atención de salud

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Over a decade after the implementation of the health-care reform in Mexico, its intended impact on the coverage and healthcare utilization is still uncertain. Initial evaluations of *Seguro Popular* (Popular Health Insurance, *SP* by its Spanish acronym) showed that *SP* was reaching short-term objectives on population health and healthcare costs.<sup>1</sup> At first, at the household level, *SP* had positive impact on catastrophic health expenditures, which it reduced by approximately 6.7%.<sup>2</sup> Secondly, *SP* increased access to medical care utilization for people with diabetes and hypertension.<sup>3,4</sup> In contrast, recent studies have found that *SP* had little to no impact on diabetes and hypertension treatment and care among Mexican elders, and even produced an increase in ambulatory care sensitive hospitalizations (ACSH).<sup>5,6</sup>

Effective preventive care for older adults can reduce health care costs and reduce multimorbidity and mortality.<sup>7</sup> *SP* provides a package of services that is limited in scope and availability since patients need to be treated via the *SP* network of health facilities.<sup>8</sup> Compared to those without health insurance, people with *SP* have access to primary care, preventive screening procedures and specialty care, including routine screenings for people aged 20 or more years. In theory, low-income *SP* beneficiaries would be more likely to use preventive routine services than the uninsured. The main objective of this paper is to examine how the Mexican healthcare reform influences preventive care use among low-income older Mexicans (aged 50 to 75 years), including Pap smears, mammography/clinical examination, and diabetes and hypertension screening. We focused on these illnesses because: 1) the high rates of these conditions in Mexico are attributed to the aging of the population; 2) these conditions are major causes of death among older adults in Mexico in 2011,<sup>9</sup> and 3) there are high costs associated with the management and treatment of these conditions and related complications.<sup>10,11</sup>

This paper expands the current literature on preventive care utilization by using pseudo-panel data from Mexico to estimate the impact of *SP*. Although it has been shown that healthcare behaviors vary by ethnic groups, very little is known in regard to this topic among contemporary adults in Mexico. In an era where policy changes are implemented to improve the health of the aging population, it is imperative to critically discuss what is happening in other countries.

## Materials and methods

We used data from three different sources: 1) the Mexican Health and Nutrition Survey [*Encuesta Nacional de Salud y Nutrición*, Ensanut]; 2) the Mexican Census [*In-*

*stituto Nacional de Estadística y Geografía*; INEGI], and 3) the Mexican Department of Health Information (*Sistema Nacional de Información en Salud*; Sinais].

Firstly, *individual characteristics* were obtained from the Ensanut. We used repeated cross-sectional data from the 2000, 2006 and 2012 surveys. Ensanut uses a probabilistic multistage stratified cluster sampling design, is nationally representative and includes participants from all the 32 states in Mexico. The protocol of Ensanut was approved by the Research, Ethics and Bio-security committees of the National Institute of Public Health.<sup>12</sup> Our sample included 17 640 adults aged 50 to 75 years, 5 506 in 2000, 4 947 in 2006, and 7 187 in 2012, who were enrolled in *SP* or did not have any type of health insurance (the latter being a natural control group).<sup>13</sup>

In order to adjust for *local level differences, state and regional characteristics*, we obtained data from INEGI (<http://www.inegi.org.mx/est/contenidos/Proyectos/ccpv/default.aspx>) and the National Health Information System (Sinais) (<http://www.sinais.salud.gob.mx/basededatos/index.html>) (variables in table I).

## Analytic strategy

Although panel data would be preferred in this case, publicly available data were limited to pseudo-panel data constructed from repeated cross-sections from Ensanut. Pseudo-panel or repeated cross-sectional data, widely used in economics, contain information from individuals at different points in time, obtained using random sampling.<sup>14-16</sup> For instance, Ensanut collects data approximately every six years. We used the alternative approach proposed by Moffitt in 1993.<sup>17</sup> We constructed a pseudo-panel dataset at the individual level using the cross-sections from 2000, 2006 and 2012, with different older adults grouped into cohorts using the year of birth. In order to analyze the impact of insurance on preventive care, a fixed-effect instrumental variable (FEIV) estimation was conducted. Standard fixed-effect models were estimated and are available upon request from the corresponding author.

The instrumental variable used in the present study (the interaction between the logarithm of population density at the municipality level in year 2000 and a dummy for whether Ensanut was conducted in 2005-6) takes into account the fact that the intensity of the roll-out process and the penetration of *SP* over the study period were not equally distributed across different areas. As explained in other studies,<sup>6</sup> *SP* was introduced in 2002 and gradually adopted by all the states by 2005. At first, it was targeted to smaller areas in order to achieve universal coverage more quickly;<sup>18,19</sup> however, after 2006, *SP* spread to more urbanized areas.<sup>20</sup> This pattern suggests

**Table I**  
**DESCRIPTION OF VARIABLES USED IN THE ANALYSIS**

Variable	Description	Source
Preventive Care Indicators	Respondents had received preventive care screening tests in the 12 months previous to the time of the survey, including: 1) mammography or clinical exploration; 2) cervical cancer; 3) blood pressure screening, and 4) blood glucose screening	
SP Insured	The main independent variable of interest was health insurance for the poor: namely, whether participants were enrolled in SP or uninsured (those with IMSS, ISSSTE, PEMEX, private insurance were completely excluded from the datasets and the analyses)	
Age	Age measured in years	
Sex	Female versus male	
Marital status	Married compared to non-married	
Indigenous background	Yes compared to no	Ensanut
Smoking status	Coded as never-smoker versus former/current smoker	
Drinking status	Non-drinker versus former drinker/current drinker	
Education	Education has three categories: 1) non-education vs. 2) primary education vs. 3) at least secondary education	
Employment status	Employed compared to unemployed	
Household asset index	Computed based on respondents' house infrastructure and materials, as well as personal/family assets. The principal components method was used. The variable is centered at 0; therefore, those with negative values are less wealthy.	
Rural residency	Rural versus urban	
BMI	Coded as 1) underweight/normal versus 2) overweight versus 3) obese	
Number of doctors	Number of doctors per 100 000 residents	SINAIS
Number of nurses	Number of nurses per 100 000 residents	SINAIS
Number of Hospitals	Number of hospitals per 100 000 residents	
Illiteracy rate	Proportion of people aged 15 or more years who do not know how to read or write a note	INEGI
Population density	People per square kilometer	

Note: Datasets from INEGI and SINAIS were merged with Ensanut to form one dataset with individual, state and local level factors

Ensanut: Encuesta Nacional de Salud y Nutrición

IMSS: Instituto Mexicano del Seguro Social

ISSSTE: Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado

PEMEX: Petróleos Mexicanos

INEGI: Instituto Nacional de Estadística y Geografía

SINAIS: Sistema Nacional de Información en Salud

SP: Seguro Popular

BMI: body mass index

that coverage rates in densely and sparsely populated areas grew in similarity. The direct effect of log of population density was collinear with municipality fixed effects and, therefore, was not included in the model.

This IV captures the expansion process of SP in high-populated municipalities in Mexico. The instrument is defined as the interaction between the logarithm of population density at the municipality level in year 2000 and a dummy for whether Ensanut was conducted in 2005-6. A similar IV has been used in prior studies.<sup>6,21</sup> A similar variable with this interaction for 2011-12 was also explored as a potential IV. To account for temporal and spatial heterogeneity across municipalities, both municipality and year fixed effects were included.

The models of use of preventive care by *Seguro Popular* ( $SP_{imt}$ , the main independent variable) specified preventive care use by individual  $i$  at municipality  $m$  at time period  $t$  as given by the following regression equations:

$$SP_{imt} = \alpha_0 + X_{imt} \alpha_1 + \alpha_2 Z_{imt} + \gamma_1 \alpha_3 + \theta_m + e_{imt} \quad (1)$$

$$Y_{imt} = \beta_0 + X_{imt} \beta_1 + \beta_2 SP_{imt} + \gamma_1 \beta_3 + \theta_m + u_{imt} \quad (2)$$

where the dependent variable ( $Y_{imt}$ ) was a dichotomous indicator of whether the individual used preventive services for diabetes, hypertension, and/or cervical and breast cancer screenings (each outcome modeled separately). The two-stage least squares (2SLS) approach involves first regressing  $SP_{imt}$  on  $Z_{imt}$ , the instrumental

variable (interaction between log population density at the municipality level and the survey year), in order to obtain predicted values  $\widehat{SP}_{imt}$  of  $SP_{imt}$ , and regressing  $Y_{imt}$  on  $\widehat{SP}_{imt}$  to get an estimate of  $\beta_2$ , which is the main parameter of interest. In these equations  $X_{imt}$  represents a covariate vector\* (sociodemographic and health factors), and  $\gamma_t$  denotes time (year), while  $\theta_m$  and  $\varphi_m$  are municipality fixed effects capturing regional variations; finally,  $e_{imt}$  and  $u_{imt}$  are individual-level error terms. Standard errors were clustered at the municipality level.

\* The direct effect of log of population density was collinear with municipality fixed effects, and therefore was not included in the model.

For cases with missing values in SES and demographic independent variables (about 13%), the mean or median municipality value was used.

The relevance of the instrument was tested using the *F*-test of excluded instruments,<sup>22</sup> which ranged from ~10 to ~20. Then, FEIV were obtained using the Stata XTIVREG2 command.

## Results

Sample descriptive statistics by insurance status (*SP* or *uninsured*) and year of survey (2000, 2006 and 2012) can be seen in table II. The results show that the number of adults aged 50 to 75 years old insured through *SP* increased from 1 192 in 2006 to 5 037 in 2012. Yet, in

**Table II**  
**CHARACTERISTICS OF OLDER ADULTS (AGED 50 TO 75) INSURED BY SEGURO POPULAR VS. UNINSURED (N=17 640) IN MEXICO. MEXICAN HEALTH AND NUTRITION SURVEYS (2000, 2006 AND 2012)**

	Year 2000 (Pre-SP)		Year 2006		Year 2012		
	Uninsured (n=5506)	Uninsured ± (n=3755)	SP Insured (n=1192)	p-value	Uninsured ± (n=2150)	SP Insured (n=5037)	p-value
Age	59.75 (7.15)	60.18 (7.44)	60.25 (7.46)	0.7570	59.66 (7.25)	60.06 (7.23)	0.0340
Female	0.63 (0.48)	0.55 (0.50)	0.60 (0.49)	0.0028	0.47 (0.50)	0.55 (0.50)	<.0001
Married	0.54 (0.50)	0.55 (0.50)	0.58 (0.49)	0.0808	0.45 (0.50)	0.55 (0.50)	<.0001
Indigenous background	0.13 (0.34)	0.13 (0.34)	0.13 (0.34)	0.9631	0.11 (0.32)	0.18 (0.39)	<.0001
No education	0.09 (0.24)	0.29 (0.45)	0.30 (0.46)	0.2554	0.22 (0.41)	0.26 (0.44)	0.0003
Elementary education	0.79 (0.35)	0.59 (0.49)	0.63 (0.48)	0.0124	0.54 (0.50)	0.61 (0.49)	<.0001
Employed	0.40 (0.49)	0.42 (0.49)	0.37 (0.48)	0.0020	0.54 (0.50)	0.45 (0.50)	<.0001
Family assets	-0.94(2.43)	-0.61 (1.48)	-0.93 (1.49)	<.0001	-0.57 (2.11)	-1.10 (1.87)	<.0001
BMI_1	0.36 (0.47)	0.40 (0.49)	0.39 (0.48)	0.4290	0.39 (0.41)	0.39 (0.45)	0.6145
BMI_2	0.30 (0.45)	0.32 (0.46)	0.35 (0.47)	0.0207	0.35 (0.41)	0.34 (0.43)	0.4909
Smoker	0.33 (0.47)	0.26 (0.44)	0.27 (0.44)	0.8027	0.39 (0.48)	0.33 (0.47)	<.0001
Drinker	0.80 (0.84)	0.72 (0.87)	0.65 (0.85)	0.0194	1.16 (0.80)	1.06 (0.80)	<.0001
Physicians	55.90 (19.33)	63.04 (19.12)	73.85 (25.36)	<.0001	80.51 (25.51)	85.90 (27.36)	<.0001
Nurses	73.72 (24.51)	79.02 (23.04)	93.82 (31.22)	<.0001	103.11 (32.92)	109.37 (35.34)	<.0001
Hospitals	14.43(6.06)	14.81 (6.40)	15.31 (6.32)	0.0194	14.95 (7.19)	16.49 (7.34)	<.0001
Illiteracy	0.08 (0.06)	0.07 (0.06)	0.08 (0.05)	0.1397	0.06 (0.07)	0.08 (0.06)	<.0001
Rural	0.55 (0.50)	0.60 (0.49)	0.46 (0.50)	<.0001	0.66 (0.47)	0.46 (0.50)	<.0001

Notes: The table presents mean values and standard deviations in parentheses for all participants aged 50 to 75 years

SP= *Seguro Popular*. SP, was launched in 2001; therefore, the 2000 survey does not have an SP column and serves as a "pre-treatment" observation. ± The comparison groups in 2006 and 2012 are the uninsured (76% in 2006 and 30% in 2012 from this sample); that is, those without any private, IMSS, ISSSTE, PEMEX, SEDENA, or any other type of health insurance

Physicians, nurses and hospitals are per 100 000 people

BMI\_1=Body mass index overweight (>25 kg/m<sup>2</sup>)

BMI\_2=Body mass index obese (>30 kg/m<sup>2</sup>)

Family asset index based on the following assets: household infrastructure, household materials and assets. This is a proxy for household's wealth. It was calculated using principal components analysis. This measure is centered at 0, and negative values indicate lower household wealth

BMI: body mass index

IMSS: *Instituto Mexicano del Seguro Social*

ISSSTE: *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado*

PEMEX: *Petróleos Mexicanos*

SEDENA: *Secretaría de la Defensa Nacional*

2012 there were 2 150 older people (30%) who were still uninsured. Although the most significant differences for this sample can be found in 2012, there were a few differences in both 2006 and 2012 between those with *SP* and those without health insurance. *SP* beneficiaries were more likely to be females and have primary education. For both years, *SP* enrollees were less likely to be employed, had fewer family assets, and were more likely to reside in rural areas (these differences were significant at  $p \leq .05$ ).

Table III presents a summary of those who performed screening tests by year of survey and insurance status. Overall, it appears that the number of people performing preventive screening for diabetes, hypertension, cervical and breast cancer has increased. There were significant differences between the uninsured and *SP* enrollees for most screening rates in 2006 and 2012, except for breast cancer screening, for which the rates differed only in 2006.

Table IV<sup>23-25</sup> compares the results from the FEIV estimations. We found that the main variable of interest *SP insurance* has no significant effect in the utilization of screening tests. Contrary to what one would expect based on evidence from other countries,<sup>26,27</sup> *SP* beneficiaries were not significantly different from those without health insurance.

## Discussion

This is the first study that used pseudo-panel data fixed-effects and instrumental-variables fixed-effects models to evaluate the impact of the *SP* program on preventive screening among older Mexican adults. In the initial results, *SP* appeared to be headed in the right direction in closing the gap in health care coverage for the poor. Descriptive statistics for 2012 showed that a higher percentage of older adults enrolled in *SP* were poor, unemployed and less educated. In addition, FE showed significant effects for *SP* (results not shown). Nevertheless, once a correction for endogeneity was implemented using a valid and relevant instrumental variable, the FEIV showed no difference for those with *SP* or the uninsured.

Our results are consistent with other researchers who have discussed poor impact of *SP* on population health due to organizational and structural issues in *SP*.<sup>28-30</sup> The federal and state governments have faced challenges when implementing *SP*—such as limited institutional capacity and information systems to oversee productivity and quality—; these may be reflected in the perceived quality of care and impact healthcare utilization.<sup>31</sup> *SP* enrollees have reported dissatisfaction with their care because of the long distances they must

**Table III**  
**PREVENTIVE CARE (SCREENING TESTS) BY YEAR OF SURVEY AND INSURANCE STATUS FOR OLDER ADULTS (AGED 50 TO 75) INSURED BY SEGURO POPULAR VS. UNINSURED (N=17 640) IN MEXICO. MEXICAN HEALTH AND NUTRITION SURVEYS (2000, 2006 AND 2012)**

	Year 2000 (Pre-SP)	Year 2006			Year 2012		
	Uninsured	Uninsured ±	SP Insured	p-value	Uninsured ±	SP Insured	p-value
Screening test							
Diabetes N=16 163	n=5360 0.13 (0.34)	n=3755 0.24 (0.42)	n=1192 0.30 (0.46)	<.0001	n=1831 0.22 (0.41)	n=4025 0.34 (0.47)	<.0001
Hypertension N=15 534	n=5360 0.18 (0.38)	n=3755 0.24 (0.43)	n=1192 0.33 (0.47)	<.0001	n=1666 0.24 (0.43)	n=3561 0.38 (0.48)	<.0001
Cervical cancer N=9 079	n=3396 0.23 (0.42)	n=2064 0.33 (0.47)	n=714 0.49 (0.48)	<.0001	n=676 0.36 (0.48)	n=2229 0.46 (0.50)	<.0001
Breast cancer N=6 593	n=3394 0.05 (0.22)	n=2064 0.13 (0.33)	n=714 0.18 (0.39)	0.0003	n=89 0.43 (0.50)	n=332 0.52 (0.50)	0.1275

Notes: The table presents mean values and standard deviations in parentheses for all participants aged 50 to 75 years

SP= Seguro Popular. SP was launched in 2001; therefore, the survey carried out in 2000 does not have an SP column and serves as a "pre-treatment" observation.  
± The comparison groups in 2006 and 2012 are the uninsured (76% in 2006, and 30% in 2012 from this sample); that is, those without any private, IMSS, ISSSTE, PEMEX, SEDENA, or any other type of health insurance

IMSS: Instituto Mexicano del Seguro Social

ISSSTE: Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado

PEMEX: Petróleos Mexicanos

SEDENA: Secretaría de la Defensa Nacional

**Table IV**  
**PREVENTIVE CARE FOR OLDER ADULTS (AGED 50 TO 75) INSURED BY SEGURO POPULAR VS. UNINSURED**  
**IN MEXICO. MEXICAN HEALTH AND NUTRITION SURVEYS (2000, 2006 AND 2012);**  
**RESULTS FROM FIXED-EFFECTS INSTRUMENTAL-VARIABLE PSEUDO-PANEL ESTIMATION**

	Breast cancer	Cervical cancer	Diabetes	Hypertension
SP enrollee	-0.31 (0.359)	-0.21 (0.352)	-0.29 (0.216)	-0.24 (0.220)
Age	-0.00* (0.001)	-0.01* (0.001)	0.00‡ (0.000)	0.00 (0.001)
Female	N/A	N/A	0.10* (0.015)	0.09* (0.015)
Married	0.01 (0.009)	0.04§ (0.011)	0.03§ (0.011)	0.03‡ (0.012)
Indigenous background	0.02 (0.023)	-0.02 (0.026)	-0.01 (0.015)	-0.02 (0.017)
No education	0.02 (0.025)	0.02 (0.025)	-0.02 (0.021)	-0.03 (0.020)
Elementary education	0.01 (0.019)	0.02 (0.022)	-0.01 (0.019)	-0.01 (0.018)
Employed	-0.00 (0.012)	-0.01 (0.015)	-0.02‡ (0.009)	-0.02‡ (0.009)
Family assets	0.00 (0.003)	0.00 (0.005)	0.00 (0.003)	0.00 (0.003)
BMI_1	0.00 (0.012)	0.01 (0.015)	0.02‡ (0.009)	0.01 (0.010)
BMI_2	0.04§ (0.015)	0.03 (0.017)	0.05* (0.010)	0.03§ (0.010)
Smoker	-0.00 (0.011)	0.00 (0.014)	0.02‡ (0.009)	0.01 (0.010)
Drinker	-0.01 (0.006)	0.00 (0.008)	0.01 (0.005)	0.02* (0.005)
Physicians	-0.00 (0.004)	0.00 (0.002)	0.00 (0.002)	-0.00 (0.002)
Nurses	0.00‡ (0.001)	0.00 (0.001)	0.00 (0.001)	0.00 (0.001)
Hospitals	-0.02 (0.014)	-0.02 (0.010)	-0.01 (0.006)	-0.00 (0.007)
Illiteracy	0.29 (0.171)	0.03 (0.229)	-0.02 (0.135)	-0.07 (0.147)
Rural	-0.02 (0.018)	-0.08* (0.025)	-0.04‡ (0.017)	-0.03 (0.017)
Log Pop Density‡ 2012	0.03 (0.021)	-0.01 (0.011)	-0.01 (0.007)	-0.01 (0.009)
2006	0.16‡ (0.073)	0.17‡ (0.082)	0.18* (0.049)	0.14§ (0.050)
2012	0.45‡ (0.183)	0.37 (0.240)	0.35‡ (0.152)	0.35‡ (0.161)
Observations	6478	8992	16134	15506
ID number	645	854	948	947

Notes: Robust standard errors in parentheses

\*  $p < 0.001$

‡  $p < 0.05$

§  $p < 0.01$

Authors' analysis of the 2000, 2006 and 2012 Mexican Health and Nutrition Surveys, the Mexican Census and the Mexican Department of Health Information. ENSA 2000 was created as part of the System for National Health Surveys conducted during the last months of 1999 and the first three of 2000, with households sampled from the 32 states.<sup>23</sup> Similarly, Ensanut 2006 and 2012 were implemented from October 2005 through May 2006, and from October 2011 through May 2012, respectively<sup>24,25</sup>

The table presents results from a fixed-effects instrumental variables model with pseudo-panel data at the state level, using the cross-sections from 2000, 2006 and 2012, constructed from individuals described in tables I and II  
F-test of excluded instrument(s) in the IV first stage regression

travel to get to the clinics, the long waiting times to see a physician; the short duration of visits, the lack of bedside manner; and the short supply of medicines.<sup>32,33</sup> Older *SP* beneficiaries may not want to deal with these issues and delay seeking healthcare.

The current study has some limitations. Firstly, we used pseudo-panel data since longitudinal data are not available. However, we used a well-established approach proposed by Moffit.<sup>17</sup> Secondly, Ensanut participants reported healthcare utilization measures and may have introduced recall bias. Furthermore, the questionnaire asked participants about their insurance status at the time of the survey, but healthcare utilization patterns referred to the previous year. Thirdly, due to the nature of the Ensanut, we were not able to separate mammograms from clinical examinations; instead, a composite measure was used. Finally, cervical and breast cancer screening guidelines have changed since 2000 and are continuously being updated worldwide,<sup>34</sup> Mexico has undergone similar changes.<sup>35</sup> However, in our search to assess the impact of *SP* across years, we were only able to compare screening utilization in the past 12 months of the survey. This limits our ability to accurately report the utilization of services.

Despite the limitations, the methods used are sufficiently strong, and we found that preventive care for older low-income adults in Mexico did not differ between the *SP*-insured and the uninsured. These results have policy implications beyond Mexico. Although, *SP* may have made some progress in improving health care access and reducing out-of-pocket expenditures, effective access of health care and health care utilization remains a major issue.<sup>36</sup> *SP* has achieved nearly universal health care coverage in Mexico; yet, as shown in this sample, there are still people who have no insurance. Furthermore, preventive services utilization is lower and not significantly different from that of older adults without health insurance. Additional efforts are needed to increase insurance coverage and healthcare quality, as well as to decrease healthcare disparities among older adults with a low income.

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*Declaration of conflict of interests.* The authors declare that they have no conflict of interests.

## References

- Gakidou E, Lozano R, González-Pier E, Abbott-Klafter J, Barofsky JT, Bryson-Cahn C, et al. Assessing the effect of the 2001-06 Mexican health reform: an interim report card. *Lancet*. 2006;368(9550):192035. [https://doi.org/10.1016/S0140-6736\(06\)69568-8](https://doi.org/10.1016/S0140-6736(06)69568-8)
- Sosa-Rubí SG, Salinas-Rodríguez A, Galárraga O. Impacto del Seguro Popular en el gasto catastrófico y de bolsillo en el México rural y urbano, 2005-2008. *Salud Publica Mex*. 2011;53:425-35.
- Bleich SN, Cutler DM, Adams AS, Lozano R, Murray CJL. Impact of insurance and supply of health professionals on coverage of treatment for hypertension in Mexico: population based study. *BMJ*. 2007;335:875. <https://doi.org/10.1136/bmj.39350.617616.BE>
- Sosa-Rubí SG, Galárraga O, Lopez-Ridaura R. Diabetes treatment and control: the effect of public health insurance for the poor in Mexico. *Bull World Health Organ*. 2009;87:512-9. <https://doi.org/10.2471/BLT.08.053256>
- Lugo-Palacios DG, Cairns J. Using ambulatory care sensitive hospitalisations to analyse the effectiveness of primary care services in Mexico. *Soc Sci Med*. 2015;144:59-68. <https://doi.org/10.1016/j.socscimed.2015.09.010>
- Rivera-Hernandez M, Rahman M, Mor V, Galarraga O. The impact of social health insurance on diabetes and hypertension process indicators among older adults in Mexico. *Health Serv Res*. 2016;51:1323-46. <https://doi.org/10.1111/1475-6773.12404>
- Chapin R. *Social policy for effective practice: A strengths approach*. New York: Routledge, 2014.
- Secretaría de Salud. Seguro Popular [web page]. 2016 [cited 2016 Sept 20]. Available from: <https://www.gob.mx/salud/seguropopular>
- Instituto Nacional de Estadística y Geografía. Estadísticas vitales. Serie boletín de estadísticas continuas, demográficas y sociales. Aguascalientes: INEGI, 2013 [cited 2013 Oct 28]. Available from: <http://www3.inegi.org.mx/sistemas/biblioteca/detalle.aspx?c=11137&upc=702825047429&s=est&tg=82&f=2&pf=Ench&ef=00&cl=0>
- Barquera S, Campos-Nonato I, Aguilar-Salinas C, López-Ridaura R, Arredondo A, Rivera-Dommarco J. Diabetes in Mexico: cost and management of diabetes and its complications and challenges for health policy. *BMJ Glob Health*. 2013;9:3. <https://doi.org/10.1186/1744-8603-9-3>
- Servín-Magaña R. Hipertensión sale cara: atenderla cuesta 6,536 mdd. *El Financiero*, 2013 May 21 [cited 2017 Dec 29]. Available from: <http://www.elfinanciero.com.mx/archivo/hipertension-sale-cara-atenderla-cuesta-536-mdd.html>
- Gutiérrez JP, Rivera-Dommarco J, Shamah-Levy T, Villalpando-Hernández S, Franco A, Cuevas-Nasu L, et al. Encuesta Nacional de Salud y Nutrición 2012. Resultados nacionales. Cuernavaca, México: Instituto Nacional de Salud Pública, 2012.
- Craig P, Cooper C, Gunnell D, Haw S, Lawson K, Macintyre S, et al. Using natural experiments to evaluate population health interventions: new MRC guidance. *J Epidemiol Community Health*. 2012;66(12):1182-6. <https://doi.org/10.1136/jech-2011-200375>
- Beck N. Time-series-cross-section data. *Stat Neerl*. 2001;55(2):111-33. <https://doi.org/10.1111/1467-9574.00161>
- Meyer BD. Natural and quasi-experiments in economics. *J Bus Econ Stat*. 1995;13(2):151-61. <https://doi.org/10.1080/07350015.1995.10524589>
- Verbeek M. Pseudo panel data. In: Mátyás L, Sevestre P (eds). *The econometrics of panel data*. Dordrecht: Springer, 1993:280-92.
- Moffitt R. Identification and estimation of dynamic models with a time series of repeated cross-sections. *J Econom*. 1993;59(1-2):99-123. [https://doi.org/10.1016/0304-4076\(93\)90041-3](https://doi.org/10.1016/0304-4076(93)90041-3)
- Bosch M, Campos-Vázquez RM. The trade-offs of welfare policies in labor markets with informal jobs: The case of the 'Seguro Popular'

- program in Mexico. *Am Econ J Econ Policy*. 2014;6:71-99. <https://doi.org/10.1257/pol.6.4.71>
19. Díaz-Cayeros A, Estévez F, Magaloni B. Buying-off the poor: Effects of targeted benefits in the 2006 presidential race. In: Conference on the Mexico 2006 Panel Study. Boston, MA: Harvard University, 2006.
20. Secretaría de Salud. Sistema de Protección Social en Salud. Elementos conceptuales, financieros y operativos. Ciudad de México: SSA, 2013.
21. Rahman M, Zinn JS, Mor V. The Impact of hospital-based skilled nursing facility closures on rehospitalizations. *Health Serv Res*. 2013;48:499-518. <https://doi.org/10.1111/1475-6773.12001>
22. Wooldridge JM. *Econometric analysis of cross section and panel data*. Cambridge, Massachusetts: MIT Press, 2010.
23. Sepúlveda J, Tapia-Conyer R, Velásquez O, Valdespino JL, Olaiz-Fernández G, Kuri P, et al. Diseño y metodología de la Encuesta Nacional de Salud 2000. *Salud Publica Mex* 2007;49:s427-32.
24. Romero-Martínez M, Shamah-Levy T, Franco-Núñez A, Villalpando S, Cuevas-Nasu L, Gutiérrez JP, Rivera-Dommarco JA. Encuesta Nacional de Salud y Nutrición 2012: diseño y cobertura. *Salud Publica Mex*. 2013;55(suppl 2):S332-40. <https://doi.org/10.21149/spm.v55s2.5132>
25. Olaiz GR, Rivera-Dommarco J, Shamah-Levy T, Rojas R, Villalpando-Hernández S, Hernández-Avila M, Sepúlveda-Amor J. Encuesta Nacional de Salud y Nutrición 2006. Cuernavaca, México: Instituto Nacional de Salud Pública, 2006. Available from: <https://ensanut.insp.mx/informes/ensanut2006.pdf>
26. Mills A. Health care systems in low- and middle-income countries. *N Engl J Med*. 2014;370:552-7. <https://doi.org/10.1056/NEJMr1110897>
27. Vargas-Bustamante A, Chen J, Rodriguez HP, Rizzo JA, Ortega AN. Use of preventive care services among Latino subgroups. *Am J Prev Med*. 2010;38:610-9. <https://doi.org/10.1016/j.amepre.2010.01.029>
28. Gómez-Dantés O, Reich MR, Garrido-Latorre F. Political Economy of Pursuing the Expansion of Social Protection in Health in Mexico. *Health Syst Reform*. 2015;1(3):207-16. <https://doi.org/10.1080/23288604.2015.1054547>
29. Hernández-Ibarra LE, Mercado-Martínez FJ. Estudio cualitativo sobre la atención médica a los enfermos crónicos en el Seguro Popular. *Salud Publica Mex*. 2013;55:179-84. <https://doi.org/10.1590/S0036-36342013000200009>
30. Laurell AC. The Mexican popular health insurance: Myths and realities. *Int J Health Serv*. 2015;45(1):105-25.
31. Nigenda G, Wirtz VJ, González-Robledo LM, Reich MR. Evaluating the implementation of Mexico's health reform: The case of Seguro Popular. *Health Syst Reform*. 2015;1(3):217-28. <https://doi.org/10.1080/23288604.2015.1031336>
32. Santos-Padrón H, Mier y Terán-Suárez J, Martínez-Hernández CM, Aguilar-Barojas S. Satisfacción por surtimiento de recetas de usuarios y no usuarios del Seguro Popular en Tabasco. *Salud Tab*. 2005;11(1-2):327-32.
33. Cruz-Martínez A. Esperas de hasta tres horas para una consulta del Seguro Popular. *La Jornada*, 2015 Jun 5 [cited 2016 March 8]. Available from: <http://www.jornada.unam.mx/2015/06/08/sociedad/044n1soc>
34. American Cancer Society American Cancer Society Guidelines for the Early Detection of Cancer. Atlanta, USA: American Cancer Society, c2017-2018. [about 8 screens] [cited 2017 Dec 30]. Available from: <https://www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html>
35. Secretaría de Salud. Modificación a la Norma Oficial Mexicana NOM-014-SSA2-1994, Para la prevención, detección, diagnóstico, tratamiento, control y vigilancia epidemiológica del cáncer cérvico uterino. México: Diario Oficial de la Federación, 2007. Available from: <http://www.salud.gob.mx/unidades/cdi/nom/m014ssa294.pdf>
36. Barofsky J. Estimating the impact of health insurance in developing nations: Evidence from Mexico's Seguro Popular. Cambridge, MA: Harvard School of Public Health, 2011.