

# Preventive health screening utilization in older Mexicans before and after healthcare reform

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## Abstract

**Objective.** To assess changes in preventive screening utilization in older Mexicans, pre- and post-*Seguro Popular*. **Materials and methods.** Data from the Mexican Health and Aging Study (MHAS/Enasem) 2001 and 2012 were used. Logistic and ordinary least squares regression adjusted models were used to predict preventive care in 2012 by insurance status categories in 2001-2012, as the focus explanatory variable. **Results.** Participants who were uninsured in 2001 and had *Seguro Popular* in 2012 were significantly more likely to be tested for diabetes, high blood pressure and receive a tetanus shot than the continually uninsured. **Conclusions.** While disparities in preventive screening between the insured and uninsured continue to exist in Mexico, *Seguro Popular* seems to have provided better access to health services to prevent chronic and infectious diseases for the otherwise uninsured population.

Key words: health care reform; prevention; vaccination; chronic disease; Mexico

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## Resumen

**Objetivo.** Evaluar los cambios en el uso de pruebas preventivas en adultos mayores mexicanos, antes y después de haber adquirido el Seguro Popular. **Material y métodos.** Los datos utilizados provienen del Estudio Nacional de Salud y Envejecimiento en México (Enasem) 2001 y 2012. Se utilizaron modelos de regresión logística y mínimos cuadrados ordinarios, ajustados para predecir la atención preventiva en 2012, de acuerdo con el status de los seguros durante el periodo 2001-2012 como la variable explicativa de enfoque. **Resultados.** Los participantes que no tenían seguro en 2001 y tuvieron Seguro Popular en 2012 fueron significativamente más propensos a hacerse las pruebas de diabetes y de presión arterial alta, así como a recibir la vacuna contra el tétanos, que aquéllos que no tenían un seguro continuo. **Conclusiones.** Las desigualdades en la detección preventiva entre los asegurados y los no asegurados seguirán existiendo en México. El Seguro Popular parece haber proporcionado un mejor acceso a servicios de salud para prevenir enfermedades.

Palabras clave: reforma de la atención de la salud; prevención; vacunación; enfermedad crónica; México

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In 2004, Mexico took steps to reform a health system that has been historically fragmented<sup>1,2</sup> and unequipped to handle a rapidly aging population and a rising prevalence of chronic diseases.<sup>3,4</sup> Prior to the reform, healthcare access and insurance coverage was tied to the formal labor sector. This left many people in the informal market dependent upon an underfunded public system run by the *Secretaría de Salud* (Ministry of Health), private charities or having to pay out of pocket for healthcare services,<sup>5-8</sup> which created an excess economic burden of health on Mexico's poorest population.<sup>9</sup> In an effort to improve the system and make healthcare affordable and accessible to all, the Mexican government introduced the social protection of health initiative. This new model of healthcare services would emphasize protection against health risk, as well as patient and financial protection, and aimed to reach universal coverage funded by local and federal governments.<sup>9</sup>

### Seguro Popular

The financial protection component of this Mexican health initiative provides comprehensive health insurance for the uninsured under the name *Seguro Popular*. This program provides funds for essential health services and is intended to provide protection against catastrophic health expenses. Beginning in 2004, the Mexican government began gradually rolling out *Seguro Popular*, targeting the most vulnerable population first.<sup>9</sup> Expansion of this program has been largely dependent upon fund availability at both federal and state levels.

Evidence from Ensanut 2000 and 2012 indicate a substantial decline in the proportion of the adult population that continued to be uninsured in 2012, with young adults still representing the largest proportion without any coverage.<sup>10</sup> Data also suggest that there continues to be large disparities in coverage and utilization for the Mexican indigenous population: Mexico's poorest and most underserved.<sup>11</sup> Meanwhile recent findings from the Ensanut 2012 show that compared to households without insurance coverage, households with *Seguro Popular* had a reduction in out of pocket expenses in patients with hypertension or diabetes.<sup>12</sup> However, there is also evidence that there has been no significant impact by *Seguro Popular* on out of pocket medication expenses compared to the uninsured overall, regardless of health status.<sup>13</sup>

Information on the extent to which older Mexicans have been successfully enrolled into the *Seguro Popular* is limited. Older Mexicans are the fastest growing demographic in Mexico,<sup>14</sup> and while there are no special contingencies made for this subpopulation in the health

reform initiative, older persons are at the greatest risk for the catastrophic impact of chronic diseases and disability in Mexico.<sup>15</sup> In response to the growing poor older population not eligible for a pension due to lack of work experience in the formal labor sector, the federal government created a non-contributory pension program called *70 y más* through *Secretaría de Desarrollo Social* (Ministry for Social Development, Sedesol).<sup>16</sup> This program provides a small month cash benefit which, however, as of late has not been associated with *Seguro Popular* benefits. The older Mexican population would potentially benefit the most from *Seguro Popular* and in turn reduce substantially the cost of care for the population at greatest risk.

### Preventive healthcare

Preventive healthcare such as screenings and vaccinations are the most effective way to reduce the social and economic impact of preventable infectious and chronic diseases.<sup>17,18</sup> However, many do not receive the preventive screenings recommended for their age group and gender.<sup>19</sup> Insurance coverage is an established predictor to preventive health screening utilization, explaining race/ethnic health disparities in the United States and socioeconomic health inequality in Mexico;<sup>20-23</sup> out of pocket costs being a major factor.<sup>6</sup> Therefore, the protection against health risk aspect of the Mexican government's health initiative was intended to alleviate barriers to universal preventive healthcare utilization through improved epidemiological surveillance, health promotion, disease prevention and risk mitigation.<sup>9</sup> Actions taken through this dimension of the health initiative included the formation of a new public health organization, providing patients with a new health card based on guidelines on age and gender based preventive care recommendations, and increased funding to community health service programs.

While there is mixed support as to the effectiveness of the *Seguro Popular*, there continues to be a dearth of information on how the older Mexican population has been potentially impacted by these new initiatives. Therefore, the purpose of this current study was to evaluate two dimensions (e.g. protection against health risk and financial protection) of the Mexican government's health reform program using data from the Mexican Health and Aging Study (MHAS) collected in 2001 and 2012. To determine how the protection against health risk aspect of this health care reform has impacted preventive behaviors in older Mexicans, a comparison was made on preventive screening and vaccination behaviors in 2001 and 2012 and changes between the two time points. It was hypothesized that protection

against health risk in terms of health promotion, disease prevention and risk mitigation would be reflected in an increase in preventive health screening and vaccinations between 2001 and 2012, overall, regardless of health insurance status.

To assess the financial protection dimension of the initiative, analysis was conducted to determine temporal changes in preventive health screening, vaccinations and medical service utilization between 2001 and 2012 and by insurance status. In 2001, results from the MHAS study established that the uninsured older Mexican population were less likely to be screened for chronic disease and cancer than the insured.<sup>24</sup> If *Seguro Popular* had been successful in providing better access to preventive healthcare, then we could anticipate a significant difference between subjects with *Seguro Popular* and the uninsured in preventive health screening, vaccinations and medical service utilization in 2012 compared to 2001.

## Materials and methods

### Data

The Mexican Health and Aging Study (MHAS)<sup>25</sup> is a prospective panel study of health and aging conducted in Mexico beginning in 2001. Follow-up interviews were conducted in 2003 and 2012, with future data collection planned for 2015. For this data analysis, the baseline data from 2001 and follow-up data from 2012 were utilized. While the healthcare reform initiative began in 2004 and data is available from 2003, in order to optimize the data analysis using the full sample, the 2001 data were used. This decision was made to avoid bias that may have occurred due to attrition between 2001 and 2003. A total of 9 630 subjects were included in this analysis that had complete data on insurance status, preventive health screening, immunizations and medical service utilization.

### Variable measurement

#### *Outcome variables*

*Preventive screenings and vaccinations.* Subjects were asked whether in the past two years they had received any of the following: tetanus, influenza (2012 only), pneumonia (2012 only) vaccinations, tuberculosis test (2001 and 2012), blood sugar test (2001 and 2012), blood pressure check (2001 and 2012), cholesterol (2012), Pap smear (women 2001 and 2012), breast self-exam (women 2001 and 2012), and prostate exam (men 2001 and 2012).

*Medical service utilization (2012).* Three measures were used to determine medical service utilization in the MHAS sample: number of outpatient medical visits in the past year, and if they had consulted a pharmacist in the past year.

*Insurance status.* Insurance status was measured using the 2001 and 2012 data. Subjects were asked in 2001 if they had the right to medical attention in Instituto Mexicano del Seguro Social (IMSS), Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE), Petróleos Mexicanos (Pemex)/*Defensa* (Army)/*Marina* (Navy), private or other. In addition, subjects who did not report having the right to medical attention were asked to confirm that they did not have any right to medical services at any institution. In 2012, subjects were asked if they had the right to medical attention in IMSS, ISSSTE, Pemex/*Defensa*/*Marina*, private, other and were also asked if they had the right to medical attention with *Seguro Popular*. A categorical variable was created from the 2001 and 2012 insurance status. The six categories were: 1) Insured in 2001 and 2012; 2) Insured in 2001 and uninsured in 2012; 3) Uninsured in 2001 and uninsured in 2012; 4) Insured in 2001 and *Seguro Popular* in 2012; 5) Uninsured in 2001 and Insured in 2012, and 6) Uninsured in 2001 and *Seguro Popular* in 2012.

#### *Covariates*

Demographic covariates included age in 2001, sex, years of education in 2001, marital status (never married, married/cohabitating, separated/divorced, widowed) in 2001. Self-reported doctor diagnosed conditions were measured, such as hypertension (yes/no), diabetes (yes/no), past heart attack (yes/no) and cancer (yes/no), all measured in 2001.

#### *Analysis plan*

Descriptive statistics were generated by insurance status for demographic characteristics, preventive screening and vaccinations, and medical service utilization. Chi-square and Anova tests were used to evaluate significant differences between insurance status categories. In all tests of significance, being insured in 2001 and 2012 was used as the reference category. Adjusted logistic regression and ordinary least squares (OLS) models were conducted to predict insurance status by demographic characteristics at baseline. Regression models were adjusted for, using population weights calculated for the 2012 sample. All analysis was conducted using Stata SE 2012. The study was approved by the Institutional Review Boards or Ethics Committees of the University

of Texas Medical Branch in the United States, and the *Instituto Nacional de Estadística y Geografía* (INEGI) and the *Instituto Nacional de Salud Pública* (INSP) in Mexico.

## Results

Table I presents demographic characteristics by insurance status in 2012 for the MHAS sample. Significance testing was conducted using insured in 2001 and 2012 as the reference category. Overall, the majority of the sample had insurance in 2001 and 2012 (51.3%), followed by uninsured in 2001 but with *Seguro Popular* in 2012 (21.1%), uninsured in 2001 and 2012 (9.0%), insured in 2001-*Seguro Popular* in 2012 (6.5%) and insured in 2001 but uninsured in 2012 (2.3%). Participants who were insured both years were only significantly different in average age from subjects who were insured in 2001 and uninsured in 2012 (58.0 years vs. 57.4,  $p < .001$ ). The uninsured in 2001 and 2012 had on average a lower proportion of females than the insured in 2001 and 2012 (45.6 vs. 38.8%,  $p < .001$ ), lower average years of education (3.2 vs. 6.0,  $p < .001$ ) and a lower proportion were married (56.1 vs. 61.8%,  $p < .001$ ). Similarly, participants who were uninsured in 2001 and had *Seguro Popular* in 2012 tended to be married (65.7 vs. 61.8%,  $p < .001$ ), but with a lower level of education (2.5 vs. 6.0,  $p < .001$ ). Similar associations were observed for the insured in 2001 and uninsured in 2012 and the uninsured in 2001 and insured in 2012 in terms of years of education;

however the uninsured in 2001 and insured in 2012 were significantly different from the reference group in the proportion that were female (55.9 and 61.2%,  $p < .01$ ).

Table II presents the proportion of participants who received screening or vaccination in 2001 and 2012 by insurance status in 2012. In most cases, participants who had insurance in both 2001 and 2012 were significantly different that all other insurance categories in the proportion that had been screened for chronic disease, cancer, and received vaccinations in 2001 and 2012. The few exceptions were for participants who were insured in 2001 and had *Seguro Popular* in 2012, the uninsured in 2001, but insured in 2012 and the uninsured in 2001, but had *Seguro Popular* in 2012. There were no significant differences between the insured in 2001 with *Seguro Popular* in 2012 from the referent in tetanus vaccination in 2001, flu in 2012 and pneumonia in 2012. In addition, the insured in 2001, with *Seguro Popular* in 2012 were not significantly different from the reference group in being tested for diabetes or hypertension in 2012. The uninsured in 2001, insured in 2012 were not significantly different from the reference group in receiving a tuberculosis test in 2012 and, for women, a Pap smear in 2012. Finally, participants who were uninsured in 2001 and had *Seguro Popular* in 2012 were not significantly different than the referent in the proportion receiving a flu vaccination in 2012.

Medical service utilization by insurance status is also presented in table II. Similar to vaccinations and

**Table I**  
**DEMOGRAPHIC CHARACTERISTICS BY INSURANCE STATUS.\* MEXICO, MHAS,<sup>25</sup> 2001-2012**

	Insured 2001, 2012	Insured 2001, uninsured 2012	Uninsured 2001, uninsured 2012	Insured 2001, <i>Seguro Popular</i> 2012	Uninsured 2001, insured 2012	Uninsured 2001, <i>Seguro Popular</i> 2012
Totals	4 937 (51.3)	224 (2.3)	866 (9.0)	622 (6.5)	948 (9.8)	2 033 (21.1)
Age in 2001 (mean± SD)	58.0 (8.6)	57.4 (9.5) <sup>§</sup>	59.3 (9.8)	57.6 (9.0)	56.7 (8.7)	57.9 (9.6)
Sex (n (%))						
Male	1 915 (38.8)	80 (35.7)	395 (45.6) <sup>§</sup>	220 (35.4)	418 (44.1) <sup>‡</sup>	830 (40.8)
Female	3 022 (61.2)	144 (64.3)	471 (54.4)	402 (64.6)	530 (55.9)	1 203 (59.2)
Years of education in 2001 (mean ± SD)	6.0 (5.3)	4.5 (4.3) <sup>§</sup>	3.2 (5.0) <sup>§</sup>	3.6 (5.1) <sup>§</sup>	4.8 (4.2) <sup>§</sup>	2.5 (3.5) <sup>§</sup>
Marital status 2001 (n (%))						
Never married	169 (3.4)	14 (6.2) <sup>§</sup>	70 (8.1) <sup>§</sup>	21 (3.4)	28 (2.9) <sup>‡</sup>	90 (4.4) <sup>§</sup>
Married/cohabitating	3 050 (61.8)	117 (52.2)	486 (56.1)	373 (60.0)	626 (66.0)	1 336 (65.7)
Separated/divorced	336 (6.8)	28 (12.5)	78 (9.0)	59 (9.5)	79 (8.3)	125 (6.2)
Widowed	1 382 (28.0)	65 (29.0)	232 (26.8)	169 (27.2)	215 (22.7)	482 (23.7)

\* Reference category insured 2001, insured 2012

<sup>‡</sup>  $p < .01$

<sup>§</sup>  $p < .001$

**Table II**  
**PREVENTIVE HEALTH BEHAVIORS AND MEDICAL SERVICE UTILIZATION OVER PAST TWO YEARS IN 2001 AND 2012 BY INSURANCE STATUS IN 2012.\* MEXICO, MHAS<sup>25</sup>**

	Insured 2001, 2012	Insured 2001, uninsured 2012	Uninsured 2001, uninsured 2012	Insured 2001, Seguro Popular 2012	Uninsured 2001, insured 2012	Uninsured 2001, Seguro Popular 2012
<b>Vaccinations [n (%)]</b>						
Tetanus vaccine						
2012	2 698 (59.7)	86 (44.1) <sup>#</sup>	312 (41.7) <sup>#</sup>	376 (66.2) <sup>§</sup>	483 (55.7) <sup>‡</sup>	1 136 (63.2) <sup>§</sup>
2001	2 702 (57.1)	109 (51.2)	326 (40.2) <sup>#</sup>	359 (60.5)	373 (41.3) <sup>§</sup>	946 (50.0) <sup>#</sup>
Flu vaccination 2012	3 077 (68.1)	94 (48.2) <sup>#</sup>	334 (44.7) <sup>#</sup>	396 (69.7)	547 (63.0) <sup>§</sup>	1 178 (65.6)
Pneumonia vaccination 2012	1 858 (41.1)	43 (22.0) <sup>#</sup>	148 (19.8) <sup>#</sup>	228 (40.1)	283 (32.6) <sup>#</sup>	562 (31.3) <sup>#</sup>
<b>Chronic disease and tuberculosis [n (%)]</b>						
Cholesterol check						
2012	3 622 (80.2)	108 (55.4) <sup>#</sup>	323 (43.2) <sup>#</sup>	424 (74.6) <sup>§</sup>	655 (75.5) <sup>§</sup>	1 101 (61.3) <sup>#</sup>
Tuberculosis test						
2012	1 230 (27.2)	40 (20.5) <sup>‡</sup>	99 (13.2) <sup>#</sup>	188 (33.1) <sup>§</sup>	236 (27.2)	392 (21.8) <sup>#</sup>
2001	1 359 (28.7)	37 (17.4) <sup>#</sup>	94 (11.6) <sup>#</sup>	141 (23.8) <sup>‡</sup>	147 (16.3) <sup>#</sup>	253 (13.4) <sup>#</sup>
Diabetes test						
2012	3 849 (85.2)	137 (70.3) <sup>#</sup>	418 (55.9) <sup>#</sup>	468 (82.4)	716 (82.5) <sup>‡</sup>	1 363 (75.9) <sup>#</sup>
2001	3 527 (74.6)	128 (60.9) <sup>#</sup>	307 (37.8) <sup>#</sup>	407 (68.6) <sup>§</sup>	483 (53.5) <sup>#</sup>	879 (46.5) <sup>#</sup>
Blood pressure						
2012	3 967 (87.8)	138 (70.8) <sup>#</sup>	449 (60.0) <sup>#</sup>	494 (86.9)	716 (80.3) <sup>#</sup>	1 442 (80.3) <sup>#</sup>
2001	3 836 (81.1)	137 (64.3) <sup>#</sup>	428 (52.8) <sup>#</sup>	451 (76.0) <sup>§</sup>	568 (62.9) <sup>#</sup>	1 120 (59.3) <sup>#</sup>
<b>Cancer screening [n (%)]</b>						
Women						
Pap smear						
2012	1 822 (65.5)	70 (55.1) <sup>‡</sup>	165 (40.6) <sup>#</sup>	264 (71.2) <sup>‡</sup>	324 (66.3)	663 (61.7) <sup>‡</sup>
2001	2 212 (75.6)	82 (61.6) <sup>#</sup>	187 (41.7) <sup>#</sup>	270 (70.7) <sup>‡</sup>	315 (62.0) <sup>#</sup>	641 (55.4) <sup>#</sup>
Breast self-exam						
2012	1 785 (64.2)	58 (45.7) <sup>§</sup>	139 (34.2) <sup>#</sup>	212 (57.1) <sup>§</sup>	290 (59.3) <sup>‡</sup>	510 (47.4) <sup>#</sup>
2001	1 440 (49.2)	46 (34.6) <sup>#</sup>	107 (23.9) <sup>#</sup>	146 (38.2) <sup>#</sup>	175 (34.4) <sup>#</sup>	306 (26.4) <sup>#</sup>
Men						
Prostate cancer screening						
2012	773 (44.5)	19 (27.9) <sup>§</sup>	70 (20.5) <sup>#</sup>	73 (37.1) <sup>‡</sup>	135 (35.6) <sup>§</sup>	188 (26.1) <sup>#</sup>
2001	359 (19.9)	17 (21.2)	27 (7.4) <sup>#</sup>	32 (15.2)	47 (11.9) <sup>#</sup>	57 (7.8) <sup>#</sup>
In last year how many medical visits (mean ± SD)	7.3 (7.5)	3.2 (5.9) <sup>#</sup>	2.6 (4.5) <sup>#</sup>	6.7 (6.7) <sup>#</sup>	6.2 (6.6) <sup>§</sup>	5.2 (7.7) <sup>#</sup>
Consulted a pharmacist in past year (n (%))	542 (10.9)	46 (20.5) <sup>#</sup>	148 (17.1) <sup>#</sup>	96 (15.4) <sup>#</sup>	118 (12.4)	284 (13.9) <sup>#</sup>

\* Reference category insured 2001, insured 2012

‡ p<.05

§ p<.01

# p<.001

chronic disease screening, participants with insurance were significantly different from the other categories in the number of times they had seen a medical professional in the past year. Those with insurance had the highest number of visits to a medical doctor in the

past year (7.3), followed by insured in 2001 with *Seguro Popular* in 2012 (6.7), uninsured in 2001, but insured in 2012 (6.2), uninsured in 2001 with *Seguro Popular* in 2012 (5.2), insured in 2001 but uninsured in 2012 (3.2), and uninsured at both time points (2.6). Finally, the insured

in 2001 and uninsured in 2012 (20.5%) had the highest proportion of people who consulted a pharmacist, followed by the uninsured in 2001 and 2012 (17.1%), the insured in 2001 with *Seguro Popular* in 2012 (15.4%), the uninsured in 2001 with *Seguro Popular* in 2012 (13.9%), the uninsured in 2001 but insured in 2012 (12.4%), and the insured in 2001 and 2012 (10.9%). Only the uninsured in 2001 but insured in 2012 were significantly different from the reference category.

Table III presents logistic and OLS regression analysis results for preventive screening utilization and medical service use by insurance category. All models were adjusted for the covariates in table I and self-reported doctor diagnosed diabetes, hypertension, past heart attack and cancer. The uninsured in 2001 and 2012 were

significantly different from the insured in 2001 and 2012 in vaccinations, chronic disease and tuberculosis screening, cancer screening and medical service utilization. In all cases the uninsured in 2001 and 2012 were less likely to be vaccinated, screened or received medical services than the insured in 2001 and 2012. Similarly, those groups who were insured in 2001 and uninsured in 2012 were significantly less likely to receive vaccinations of any kind, to have their cholesterol checked in the past two years (OR= .354,  $p<.01$ ), or to conduct a breast self-exam for women (OR= .372,  $p<.01$ ). They also had fewer medical visits ( $\beta = -4.08$ ,  $p<.001$ ), but more pharmacist consultations ( $\beta = 2.18$ ,  $p<.05$ ) than those insured in 2001 and 2012. The participants who were insured in 2001 and had *Seguro Popular* in 2012 were significantly

**Table III**  
**LOGISTIC AND ORDINARY LEAST SQUARES (OLS) REGRESSION RESULTS**  
**FOR PREVENTIVE HEALTH BEHAVIORS AND MEDICAL SERVICE UTILIZATION OVER PAST TWO YEARS**  
**BY INSURANCE STATUS IN 2012.\* MEXICO, MHAS<sup>25</sup>**

	Uninsured 2001, 2012	Insured 2001, uninsured 2012	Insured 2001, <i>Seguro Popular</i> 2012	Uninsured 2001, insured 2012	Uninsured 2001, <i>Seguro Popular</i> 2012
<b>Vaccinations (OR)</b>					
Tetanus vaccine 2012	0.567 <sup>#</sup>	0.433 <sup>‡</sup>	1.40	0.925	1.26
Flu vaccination 2012	0.447 <sup>#</sup>	0.374 <sup>§</sup>	1.38	1.09	1.04
Pneumonia vaccination 2012	0.347 <sup>#</sup>	0.376 <sup>§</sup>	1.31	0.905	0.717 <sup>§</sup>
<b>Chronic disease and tuberculosis (OR)</b>					
Cholesterol check	0.201 <sup>#</sup>	0.354 <sup>§</sup>	0.670	0.638 <sup>‡</sup>	0.384 <sup>#</sup>
Tuberculosis test	0.413 <sup>#</sup>	0.528	1.48	1.09	0.780
Diabetes test	0.209 <sup>#</sup>	0.712	0.770	1.02	0.605 <sup>§</sup>
Blood pressure	0.285 <sup>#</sup>	0.524	1.05	0.791	0.692
<b>Cancer screening (OR)</b>					
Women					
Pap smear	0.378 <sup>#</sup>	0.604	0.845	0.771	0.850
Breast self-exam	0.329 <sup>#</sup>	0.372 <sup>§</sup>	0.507 <sup>§</sup>	0.652	0.506 <sup>#</sup>
Men					
Prostate cancer screening	0.313 <sup>#</sup>	0.400	0.825	0.605 <sup>‡</sup>	0.491 <sup>#</sup>
<b>Medical service utilization</b>					
In last year how many medical visits $\beta$	-3.87 <sup>#</sup>	-4.08 <sup>#</sup>	-1.26 <sup>§</sup>	-1.33 <sup>#</sup>	-2.15 <sup>#</sup>
Consulted a pharmacist in past year (OR)	1.85 <sup>§</sup>	2.18 <sup>§</sup>	1.38	1.30	1.26

\* Reference category insured 2001, insured 2012; models adjusted for age, sex, education, marital status, past diagnosis of high blood pressure, diabetes, cancer, and heart attack

‡  $p<0.05$

§  $p<.01$

#  $p<.001$

OR: Odds Ratio from the logistic regression analysis

$\beta$ : coefficient from the OLS regression

less likely to perform breast self-exams (OR=.507,  $p<.01$ ) and visited a medical professional on average less ( $\square=-1.26$ ,  $p<.01$ ) than the insured at 2001 and 2012. The uninsured in 2001 and insured in 2012 were significantly less likely to have their cholesterol screened (OR=.638,  $p<.01$ ) or to be screened for prostate cancer (OR=.605,  $p<.05$ ). Finally, participants who were uninsured in 2001 and had *Seguro Popular* in 2012 were significantly less likely to have had a pneumonia vaccination (OR=.717,  $p<.01$ ), to have been screened for high cholesterol (OR=.384,  $p<.001$ ), tested for diabetes (OR=.605,  $p<.01$ ), performed a breast self-exam in women (OR=.506,  $p<.001$ ), or prostate exam in men (OR=.491,  $p<.001$ ) and visit a medical professional less ( $\square=-2.15$ ,  $p<.001$ ). Those who had *Seguro Popular* in 2012, regardless of their status in 2001, were significantly more likely to be screened for cholesterol, diabetes, high blood pressure and tuberculosis than participants uninsured in 2001 and 2012.

In terms of cancer screening, both men and women with insurance were significantly more likely to have been screened for reproductive organ cancer in the past two years than the uninsured in 2001 and 2012 (Pap OR=2.7,  $p<.001$ , breast self-exam OR=3.2,  $p<.001$ , prostate OR=3.3,  $p<.001$ ). The uninsured in 2001 and insured in 2012 group were also statistically more likely for women to have had a Pap test (OR=2.1,  $p<.05$ ), breast self-exam (OR=2.0,  $p<.05$ ), and, for men, prostate exam (OR=2.0,  $p<.05$ ). Those insured in 2001 with *Seguro Popular* in 2012 were only significantly different for women to have had a Pap test (OR=2.3,  $p<.01$ ), and for men prostate (OR=2.7,  $p<.01$ ). The group that were uninsured in 2001 with *Seguro Popular* in 2012 were only significantly more likely for women to have had a Pap test (OR=2.3,  $p<.001$ ). The insured in 2001 and uninsured in 2012 were not significantly different than the uninsured in 2001 and 2012 in any of the cancer screening categories. Finally, all insurance groups except those that were insured in 2001 and uninsured in 2012 had significantly more visits to a medical doctor in the past year, but only those insured in 2001 and 2012 were significantly less likely to have visited a pharmacist in the past year.

## Discussion

The purpose of this study was to determine the effect of the health initiative set by the Mexican government on two dimensions: protection against health risk and financial protection through changes in preventive screening, vaccinations, and medical service utilization between 2001 and 2012 and by insurance status using the MHAS data. *Seguro Popular* was launched in 2004 to provide essential health services and protect against catastrophic health expenditures in the uninsured

population of Mexico. The anticipated end point of this program was to reduce the health disparity that exists between those employed in the formal labor market and the uninsured due to informal labor market participation or unemployment.<sup>4</sup> Findings from this study indicate that more than half of MHAS participants who were uninsured in 2001 had *Seguro Popular*. Additionally, from these data, trends suggest that there was a greater proportion of older Mexicans receiving preventive screenings and vaccinations than 11 years earlier. The findings from this study also show that in most cases participants who were uninsured in 2001 but had *Seguro Popular* in 2012, compared to those uninsured at both time points, had better preventive screening and vaccinations, and better medical service utilization. In addition, their preventive screening, vaccination and medical service utilization was close to patterns observed in the insured population. However, disparities continue to exist.

There is some evidence to suggest that there is still a lack of awareness that *Seguro Popular* exists,<sup>26</sup> despite advertising efforts by the Mexican government. This may be particularly the case in remote areas of Mexico, where information regarding health care coverage through *Seguro Popular* may be limited. For example, Biosca and Brown,<sup>26</sup> using Sedesol data found that parents who had participated in the *Oportunidades* cash transfer program for the lowest socioeconomic groups in Mexico were more aware of *Seguro Popular* than those who had not. Additionally, *Seguro Popular* is limited in the comprehensiveness of its coverage or in the availability of services and resources to meet the demand of the new patients.<sup>27</sup> Periodic assessments are made based on needs of patients and economic resources allotted to the program by the federal government to expand upon or create new services and benefits.<sup>9</sup> Since the roll out of *Seguro Popular* has been gradual and impacted by available funding from both the federal and state governments, the impact on preventive health screenings, vaccinations and medical service utilization may not be fully realized for Mexico's older adult population for years to come.

Findings from this study reveal that most subjects (regardless of insurance coverage) have been screened for diabetes and cardiovascular disease, but the minority has been screened for cancer, vaccinated against tetanus, influenza or pneumonia, or have been recently screened for tuberculosis. These findings provide positive and negative implications for public health efforts and the dimension of protection against health risk in the health care reform efforts in Mexico. One barrier that still exists is the imbalance between demand and resources for prevention.<sup>28</sup> For example mammography equipment

is not readily available in all parts of Mexico<sup>28</sup> and remote areas of the country still lack sufficient outpatient and inpatient services.<sup>29</sup> The Mexican government has focused on chronic disease prevention through various programs,<sup>30</sup> like *Prevenims*;<sup>31,2</sup> however, less focus has been placed on infectious disease prevention, such as the one required for influenza or pneumonia.<sup>32</sup> The global community has observed an emergence of multi-drug resistant tuberculosis along the U.S.-Mexico border region to which the poorer and low SES populations have been particularly susceptible.<sup>33</sup> The H1N1 pandemic of 2009 has provided a glimpse of the potential lethality of an influenza outbreak in a population that is under-immune. In fact, this outbreak delayed the rolling out of parts of the universal health coverage plan due to financial constraints.<sup>9</sup> Therefore, while there appears to be some success in health promotion and disease prevention in Mexico, efforts may need to expand to include infectious diseases and cancer interventions.

In this study the uninsured in 2012 had the worse preventive screening, vaccinations, and medical service utilization, regardless of their insurance status in 2001. It may be that there are subpopulations in Mexico that are on the margin, going in and out of the formal labor market and not benefitting from the health initiatives set by the Mexican government. Such populations may include the indigenous people and those who live in the most remote areas of the country.<sup>11</sup> Efforts have already been made to improve awareness of program eligibility,<sup>26</sup> but additional resources may need to be allocated to improve medical services that are available in these underserved areas.<sup>11</sup> This last group may need special consideration by the government as universal healthcare efforts continue and accommodation may need to be made to provide the same level of care as that for the continuously insured and the population that now qualifies for *Seguro Popular*.

There are limitations to this study that must be acknowledged. First, analysis was conducted using two rounds of data and therefore long-term patterns of preventive screening and medical utilization have not been established by this study. Additionally, in this study we did not look at the relationship between insurance status and health outcomes. Finally, the decision to use baseline data instead of 2003 data may impact the interpretation of its findings, since the healthcare initiative began in 2004. Using 2003 data might have provided a better 'snap-shot' of the status quo just before the policies were implemented.

This study provides a picture of healthcare access trends before and after a major policy change in Mexico. Findings suggest that the healthcare reform initiatives by the government may have improved access to in-

surance coverage through the *Seguro Popular* program. Also, there appears to be better utilization, preventive screening and health services for those who are not employed in the formal labor sector. These trends are positive; however, universal coverage for the older Mexican population may not be wholly realized until the program is at its full capacity through funding and public education on service availability, and age-appropriate health screenings reach all parts of Mexico.

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