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Health Insurance and the Aging:

Evidence from the Seguro Popular program in Mexico.

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Introduction

Social security in Mexico has historically provided health benefits to only a fraction of the population in Mexico, those participating in the formal sector. Those without social security coverage or private coverage have typically relied on the Secretary of Health health institutions and out of pocket expenditures to cover health events. To address this lack of basic health coverage among the majority of the Mexican population, the Mexican government began the health insurance program Seguro Popular as a pilot in 2002, transitioning to a formal program in 2003. Since then, the Seguro Popular has expanded at an impressive rate, this health insurance program now covers approximately 51 million individuals, nearly half of the population of Mexico and is nearing its goal of covering nearly all of the population without formal sector health insurance. Services covered include a package of mainly primary and secondary interventions managed and delivered at the state level, although the services and interventions covered have increased overtime.

Over the span of a decade then, a large fraction of Mexico's population has transitioned from being uninsured to being covered by the Seguro Popular health insurance program. This paper analyzes the impact of the Seguro Popular on utilization of services and health status of the aging population in Mexico. While several previous studies have analyzed the short term (1-2 years) impacts of the Seguro Popular program, our study is one of the first to estimate the health impacts of the Program a decade after program implementation. Our study also innovates by analyzing the impacts of the program on the aging population, whereas previous studies have mainly focused on working age adults and children. For the empirical analysis, we use the

Mexican Health and Aging Survey, a longitudinal survey of the population age 50 and over with rounds over the period 2001 to 2012.

Previous Literature

The number of previous studies of the effects of the Seguro Popular program has begun to increase. Several previous studies of the Seguro Popular program have documented an increase in the use of health services (Sosa-Rubí et al. 2009; Harris and Sosa-Rubí, 2009, Barros 2008) and a reduction in the probability of catastrophic health expenditures (Grogger et al. 2012, Galarraga et al. 2008, Barros 2008).

With respect to impacts on health status, there is less evidence and this evidence is more mixed. Barros, 2008 using the 2000 and 2006 round of the Mexican National Health Survey finds no impact of Seguro Popular on health outcomes. His empirical strategy relies on variation in coverage across states over time and between eligible and ineligible individuals.

Knox, 2008 uses the longitudinal evaluation surveys from the urban Oportunidades conditional cash transfer program (2002-2004) to study the health impacts of the program. She uses difference in difference methods to study the impacts for those who choose to affiliate versus those who did not. While her evidence suggests that the Seguro Popular program increases health care utilization, Knox does not find any impacts on reported health outcomes.

Bleich et al 2007 study the impact of the program for treatment of hypertension using propensity score matching methods and what database. The authors report that individuals with hypertension are 50% more likely to be receiving treatment with Seguro Popular coverage than without. The effect of doctor and nursing supply on coverage of antihypertensive treatment was

not significant but there was a significant interaction between Seguro Popular insurance and the supply of health professionals. In particular, impacts of Seguro Popular were greater in areas with a higher supply of health professionals.

Sosa-Rubi et al. 2009 analyze the impact of the Seguro Popular on access to health resources, treatment and blood glucose control among poor adults with diabetes using the cross-sectional 2006 National Mexican Health Survey. They use propensity score matching to compare individuals with and without the Seguro Popular and find that those enrolled in the Seguro Popular were more likely to report having had regular blood glucose control tests. However, while there was a higher likelihood of beneficiaries with diabetes being in control, the difference between beneficiaries and non-beneficiaries was not significant.

In summary, available studies suggest significant positive impacts of the Seguro Popular program on increasing the utilization of care measured by clinic and doctor visits, and a reduction in catastrophic health expenditures. The few studies examining impacts on health status do not in general show significant results. However, a couple of studies are beginning to suggest that the program does impact for sick individuals the likelihood of their being in treatment for their disease/illness particularly in the cases of hypertension and diabetes. Over the longer period, one would expect these impacts on being in treatment to significantly impact health status. Our study, which spans a decade after the Seguro Popular program, provides an opportunity to estimate the medium to long term effects of the Seguro Popular on a diversity of health indicators and outcomes.

We close this section by mentioning that one finding supported by several studies is that Seguro Popular impacts appear to be larger in areas where there is a greater supply of health professionals/services (Bleich et al. 2007, Grogger, 2011). We will also test this hypothesis using information on available health services in the community of residence.

Program Description: Seguro Popular

The Seguro Popular is part of the Social Health Protection System (SPSS) that provides health coverage to individuals who are not affiliated to any social health institution such as IMSS (Mexican Social Security Institute) and ISSSTE (Social Security for Government Workers). The program is voluntary and public and covers 284 interventions as well as more than 1500 illnesses. The list of covered illnesses/procedures is published in a catalog by the Secretary of Health, (Catálogo universal de servicios de salud or CAUSES). The Seguro Popular began as a pilot in 2002 and was formally created on May 15, 2003.

The requisites to enroll in the Seguro Popular are: 1- be a resident of Mexico; 2- not be entitled to any other social security program; 3- have a Clave Unica de Registro de Poblacion or a birth certificate; 4- be able to pay the corresponding fee (see table below); 5- and attend one of the affiliated modules. To apply, the individual must attend to the nearest registration center (Módulo de Afiliación y Orientación), where a socioeconomic evaluation is realized. The following table shows the annual fees per family to the Seguro Popular according to their socio-economic background. Coverage is also available on an individual level basis, at half the family level fee.

Seguro Popular beneficiaries are assigned to a health center that provides medical care or redirects to another center for further treatment. Any other health center will provide health care in the case of an emergency or if the individual is not near the preassigned center. The following table shows how the affiliation to Seguro Popular has increased since it began.

Data

Our main data source is the Mexican Health and Aging Survey (MHAS). The Mexican Health and Aging Study (MHAS) is a prospective study of aging that includes a national sample of Mexicans aged 50 and older. The study uses protocols and survey instruments that are highly comparable to the U.S. Health and Retirement Study (HRS), and is funded by the National Institute on Aging/National Institutes of Health (NIA/NIH).

The baseline survey in 2001 was a national representative survey in Mexico of individuals born prior to 1951. Follow-up visits to the same individuals were conducted in 2003 and 2012. The sample for the MHAS baseline was selected from residents of both rural and urban areas, from the National Employment Survey (Encuesta Nacional de Empleo, ENE), carried out by the INEGI (Instituto Nacional de Estadística y Geografía) in Mexico; 11,000 households with at least one age-eligible resident were selected to be part of the MHAS baseline sample. The selected person and their spouse (regardless of age) were recruited to be part of the longitudinal study. The baseline survey was completed in the summer of 2001 with a sample size of 15,186 respondents. A direct interview was sought with each individual, and proxy interviews obtained when poor health or temporary absence precluded a direct interview. A follow-up survey was carried out in the summer of 2003; all age-eligible subjects from the 2001 wave were targeted even if they had moved. If the subject had died, an interview was conducted with an informed

respondent. New spouses of respondents from 2001 were interviewed and included in the 2003 follow-up study for a total of 14,250 interviews including 546 on deceased persons that were completed by next-of-kin interviews. A third wave survey was completed in 2012. During the 2012 survey 18,465 interviews were completed including 2,742 on deceased persons that were completed by a next-of-kin. Response/follow-up rates for 2001, 2003 and 2012 were 91.8%, 93.3% and 88.1%, respectively.

The MHAS provides excellent information on health expenditures, health facility utilization and health status, including biometric indicators and mortality. In particular, the MHAS includes detailed information on self-reported health and symptoms of illness, health care utilization in the different sub-systems of health in Mexico, life-style behaviors, depression, cognitive health and biomarkers including measurement of blood pressure, glucose, height and weight. The MHAS also provides a number of economic variables, including a labor history, all income sources, assets and wealth. The first round of the survey was carried out before the Seguro Popular program began and thus provides a convenient baseline for our analysis.

To the MHAS, we merge information on health facilities. Several institutions in the Mexican government gather data at the community level, which can be linked to household-survey data using the community-level identifiers generally used by the INEGI (Instituto Nacional de Estadística, Geografía e Informática) in Mexico. We link pre-program information from the 2000 Mexican Census of Population and Dwellings and the Directory of Public Health Sector Facilities 2002, provided by the Mexican Ministry of Health. The Census information includes community level statistics on total population, education levels, disabilities, dwelling characteristics among others. The Mexican health sector information includes number of

facilities, and number of physical and human resources available in those facilities such as beds, operating room, physicians, and nurses. The file contains constructed variables for the total in the community as well as disaggregated by institution: IMSS, ISSSTE, and Secretaría de Salud[1]. Not all households in MHAS/ENASEM 2001 have public health sector facilities in their community, but they may have services available in neighboring communities. The variables included in the file represent the services available in the community of residence or in a neighboring community if services were unavailable in the community of residence. This information is very useful for our paper for two main reasons. First, this information provides additional pre-program variables with which to carry out the empirical analysis. Second, the health sector information allows us to test if impacts of the Seguro Popular program are different depending on availability of health services in the area of residence.

Graphs 1a and 1b present data on coverage by health insurance among the different providers in Mexico 2001 and 2012, by gender. Graph 1a shows that almost half of the population aged 50 (49.3% of men and 45.1% of women) in 2001 reports having no health insurance. About 40% of women and 35% of men are affiliated to IMSS (the Mexican Social Security Institute) and about 10% of men and women are affiliated to ISSSTE (the social security institution for government workers). By 2012, there are drastic changes in the health insurance status for this same population, interviewed 11 years later. Only about 17% of men and 14% of women report having no health insurance. The Seguro Popular is clearly the main factor increasing the coverage of this population, with about 30% of both men and women reporting affiliation to the Seguro

[1] The data for the total was calculated by adding the resources reported for: IMSS, ISSSTE, PEMEX, Marina, Defensa, and Secretaría de Salud. The disaggregated numbers by institution are included only for IMSS, ISSSTE, and Secretaría de Salud for confidentiality reasons. This is because the number of resources for PEMEX, Defensa, and Marina are quite limited across the country.

Popular in 2012. Proportions affiliated to IMSS and ISSSTE remain similar over this period. This analysis confirms that a substantial proportion of the population aged 50 and over without health insurance in 2001 had in fact obtained health insurance by 2012, due to the Seguro Popular program.

Figure 2 divides, by urban and rural residence, the population into four groups, those with any form of health insurance in both 2001 and 2012, those only with health insurance in 2001, those only with health insurance in 2012 and those without health insurance in both years. Figure 2 makes clear that the largest increases in health insurance coverage between 2001 and 2012 occurred for the rural population. For the urban population, 72 percent report having coverage in both years versus only 35 percent for the rural population. The population without coverage in 2001 and with coverage in 2012 is 20 percent for urban areas and 46 percent for rural areas. Thus, we may expect impacts of the Seguro Popular program to be stronger in rural areas than in urban areas. On the other hand, there are fewer and more limited health facilities in rural areas and several previous studies have indicated stronger effects of the Seguro Popular program in areas with greater health facilities.

Methodology

To identify the impact of the Seguro Popular program for the main analysis on health indicators, we carry out difference in difference propensity score matching using before and after program information on health indicators (2001 and 2012) and self-reported information on participation

in the Seguro Popular program. [2] We use individual-level difference in difference matching estimators that take into account differences in observed characteristics between the beneficiary and non-beneficiary samples (Heckman et al. 1998). The approach is analogous to the standard regression estimator but does not impose functional form restrictions in estimating the conditional expectation of the outcome variable and reweights the observations according to the weighting functions implied by the matching estimators.

The propensity score matching estimators have two stages. In the first stage, the propensity score is estimated using a logistic model and a set X consisting of pre-program (2001) individual level, household-level and locality level characteristics. The second stage uses nearest-neighbor matching and local-linear regressions to construct matched no-treatment outcomes for each treated individual. The difference-in-difference estimators have the advantage over after-program difference estimators of allowing for selectivity into the program to be based on unobserved fixed attributes (analogous to fixed effects). We use local linear matching and bootstrapping to calculate standard errors for the main estimates presented here as well as nearest neighbor matching (with 2 and 5 neighbors). In all cases, the matching estimates are matched to the propensity score with exact matching done on age and gender. Results are presented by rural and urban areas.

Individual level information on participation in Seguro Popular is collected only in 2012. The Seguro Popular program began in 2002, but individual or household level information on participation in Seguro Popular is not available in the MHAS prior to 2012. This implies that we

[2] In this first draft we do not include the MHAS round carried out in 2003 but this could be done to compare impacts in the very short run after program implementation to the medium term impacts we carry out here.

do not know how long current beneficiaries have been receiving Seguro Popular or whether current non-beneficiaries were Seguro Popular beneficiaries at some point prior to 2012. It also implies that for those leaving the sample by 2012 (either because of mortality or being lost to follow up for other reasons) we have no individual level information on whether or not they received Seguro Popular.

To judge the reliability of self-reported information on Seguro Popular participation, we carried out an exercise comparing the number of Seguro Popular beneficiaries in the weighted MHAS data with the actual numbers of beneficiaries in 2012 according to administrative data. Table 3 shows the results of this exercise by age group and gender. This exercise shows that Seguro Popular receipt is quite comparable in the MHAS and in the administrative data for the population 50 to 65. For the population over 65, the numbers of beneficiaries are somewhat lower in the MHAS, on the order of about 16% less, than according to administrative information. This is perhaps suggestive of a greater recall bias for the older population.

We now turn to the topic of attrition. In addition to the possible extent of attrition in the MHAS, an additional concern in our case is potential selective attrition with respect to program participation. However, because of the over 50 population that is the focus of MHAS, a main source of attrition is mortality. In fact, this immediately motivates an important Program question, e.g. are there impacts of the Seguro Popular program on mortality. The fact that there is substantial mortality in the MHAS over the sample period potentially allows us to study this important question. Of the 15,186 individuals in the baseline 2001 MHAS round, 3242 had passed away by 2012 or 21.4% of the original sample. Another 2308 or 15.2% of the original

sample are lost to follow-up. The main reasons for being lost to follow-up include empty household/subject was unable to be located and refusal to answer.

We cannot use the difference in difference methods described above to analyze the impacts of the Seguro Popular on mortality or the probability of attritting of the sample because we have no information on Seguro Popular participation for the population who had passed away by 2013. Thus to identify the impact of the Seguro Popular on mortality and attrition we use an alternative strategy and use state level information on the proportion of individuals in a state who are covered by the Program to estimate regression models of the following form:

$$Y_{ist}=a + BS_{st} + CX_{ist} + e_{ist}$$

where Y_{ist} is the impact indicator of interest for individual i in state s in time t, S_{st} represents the proportion of individuals in state s in time t covered by the Seguro Popular program, X_{ist} are control variables and e_{ist} is the error term. The model then relates the proportion covered in a state to the probability of mortality over the panel period. The information on individuals affiliated derives from administrative records on the Seguro Popular which were provided by the Mexican National Commission on Social Protection in Health and the population numbers used to construct proportions from state level census data from the Mexican Statistical Institute (INEGI).[3]

[3] Censuses are carried out in 2000, 2005 and 2010. INEGI constructs population figures in between years by using a geometric model to extrapolate between years. Note that the National Population Council provides its own population series, adjusting for possible under-reporting of adjusts census numbers. Results using either the INEGI series or the CONAPO series are extremely similar.

Note that for the rest of the analysis of the impacts of the Seguro Popular on health (except for mortality) we restrict analysis to those in the sample who were alive and interviewed in 2012, 63.4% of the original sample. Those re-interviewed are likely to be a selected sample of those in the original 2001 baseline, given the importance of mortality as an explanation of attrition, those followed up may be more likely to be younger and healthier in 2001 than those who left the sample. In addition, however, there may be differential selection by Seguro Popular participation. If the Seguro Popular program does reduce mortality then the remaining MHAS sample interviewed in 2012 is likely to contain on average less healthy Seguro Popular beneficiaries than this sample would have contained in the absence of the program. This has the potential for leading to the under-estimation of program impacts on health. Thus the analysis on the impact on Seguro Popular on mortality and attrition from the MHAS is important both from the perspective of potentially identifying program impacts on mortality and for assessing the extent to which the other program impacts on health may be under-estimated.

Results:

Mortality and attrition:

We begin first with the analysis of program effects on mortality and attrition; Table 4 shows the impact of the Seguro Popular program on the probability of attriting from the sample by 2012. We also separate the probability of attriting into two sources, mortality and lost to follow up for other reasons e.g. migration or refusal to answer. For each variable we provide two alternative specifications, in the first including in addition to the proportion of beneficiaries in the state of residence we add only basic individual controls of age, gender, education level and indigenous

status and durable goods at the household level. For the second specification we additionally add in a number of pre-program health indicators. In general, the results do not vary by the set of included controls.

With the idea that mortality if it is affected by the program might take time to achieve such an effect and that mortality might occur at any point between the baseline 2001 round and the follow up 2012 round, we measure the impact of the Seguro Popular program by using administrative information on Seguro Popular receipt from the first five years of the program (2002, 2003, 2004, 2005 and 2006) to capture the impact of the program on attrition. Altering the years or alternative specifications (for instance overall yearly growth rate in beneficiaries) does not substantially alter the results. A more refined analysis might be carried out using municipal level information on beneficiaries of Seguro Popular rather than state level; we have obtained municipal level information for some years and hope to explore this in a subsequent exercise.

Table 4 presents the results for this analysis. Overall, the results do not support that the Seguro Popular program has reduced mortality, the proportion of beneficiaries in one's state do not have significant effects on the probability of passing away over the course of the panel or on the overall probability of being lost to follow up in the MHAS. These initial results are somewhat disappointing although we hope to re-examine this question using more disaggregated municipal level information. The results do however suggest that the subsequent analysis carried out in this paper, which restricts attention to those individuals in the sample in both 2001 and 2012, are not likely to be biased by differential attrition due to program participation.

Impacts of Seguro Popular on health.

We now turn to the principal results of the program on health outcomes. We study the impacts of Seguro Popular on three types of health indicators. In the first set, we study the impacts of Seguro Popular on health utilization, considering doctor visits, dentist visits and hospitalization. The second visit considers a set of indicators of preventive health, including having had several diagnostic tests including a test for hypertension, a test for diabetes, a gynecological exam for women and a prostate cancer test for men. Finally we consider several treatment indicators for those with chronic diseases. In particular for the population with hypertension, we estimate the impact of the Seguro Popular program on receiving treatment for this disease and for the population with diabetes we estimate the impact of following dietary guidelines and of taking insulin. We carry out results by urban and rural areas.

We begin first by comparing the pre-program characteristics of Seguro Popular beneficiaries and non-beneficiaries. The MHAS is an excellent source for doing this comparison as we have detailed characteristics on health of its sample in 2001, the year before the Seguro Popular program started. We might expect adverse selection in program participation with say less healthy individuals choosing to participate compared with healthier individuals. Given differential in enrollment costs by income level and that the uninsured are likely to be poorer, we would also expect that poorer individuals would be more likely to participate. Note that if these hypotheses are correct, OLS estimates would be likely to underestimate impacts as the Seguro

Popular participation variable would capture poorer health in addition to program participation if differences in health in the absence of the program were not completely controlled for.

Table 5 provides some insights into the type of population receiving Seguro Popular in terms of its health characteristics by comparing both for rural and urban areas Seguro Popular beneficiaries with non-beneficiaries and testing for significant differences. While this is only descriptive analysis (although note that the distribution of age is similar for Seguro Popular beneficiaries both in rural and urban areas), the Table shows that in terms of utilization, Seguro Popular beneficiaries pre-program area have lower utilization both in urban and rural areas for doctor and dentist visits and similar utilization with respect to hospital visits. With respect to diagnostic tests in the past two years with respect to non-beneficiaries, the Table suggests that Seguro Popular beneficiaries are significantly less likely to have had diagnostic tests. However, the population reporting having hypertension or diabetes in rural areas does not differ by program status. In urban areas, Seguro Popular beneficiaries are less likely to have hypertension or diabetes. With respect to being in treatment conditional on having hypertension or diabetes, the Table suggests that Seguro Popular beneficiaries are generally slightly less likely to be in treatment than non-beneficiaries in rural areas and have similar rates of treatment in urban areas. Overall then, this initial descriptive analysis suggests that the Seguro Popular population is less likely to use services and receive preventative care but have similar levels of illness.

We now estimate propensity scores for the probability of participating in the Seguro Popular program. Graphs 3a and 3b compare the distribution of estimated propensity scores for beneficiaries and non-beneficiaries in rural areas and Graphs 4a and 4b do the same in urban

areas. Appendix Table 1 reports the results of the propensity score estimation and shows that overall Seguro Popular beneficiaries look poorer in terms of education levels housing characteristics and durable goods. With regard to pre-program health status, there are however few significant differences in pre-program health among beneficiaries.

The distribution of estimated propensity scores is somewhat different between Seguro Popular beneficiaries both in rural and urban areas. While common support exists in general, there are for the upper part of the distribution of propensity scores for beneficiaries in rural areas (e.g. greater than 0.6), few corresponding cases in that range of non-beneficiaries. We carry out results in rural areas with all observations and also restricting analysis to those with propensity scores less than 0.7. Similarly in the case of urban areas, we carry out estimations with all observations and also restricting to those with propensity scores less than 0.25.

Tables 6 and 7 present the main difference in difference matching results. Beginning with Table 6 in rural areas, the results are suggestive of significant positive impacts of Seguro Popular on utilization, in particular on doctor's visits. The estimates imply an increase of seeing a doctor in the previous year of 4 percentage points; 72 percent of non-beneficiaries report seeing a doctor in the previous year. One matching estimate also suggests that the Seguro Popular reduces the probability of having a hospitalization, although the other estimates show no significant impact. The results also suggest there is a strong and positive effect of the Seguro Popular program on having had diagnostic tests. For three of the four tests studied (hypertension, glucose/diabetes, and gynecological exam), the Seguro Popular program has a positive and strong effect on increasing the probability of these preventive health tests. These effects are quite large, ranging

from increases in 8 to 10 percentage points. However, conditional on reporting the presence of a chronic disease, the estimates show insignificant impacts on the probability of being in treatment. These results are similar independent of the matching method used.

With respect to urban areas, the estimates overall show lower and less prevalent impacts of the program. In fact, of all of the health indicator studied, the only generally significant impacts of the program in urban areas are on utilization indicators. These show similar impacts as in rural areas, with participation in the program associated with an increase in 4 percentages points in the probability of seeing a doctor over the past year. For no other variables are there significant effects of the Program with the exception in one specification showing that the Seguro Popular has an increase in the probability of hospitalization. Without exception, the rest of the results show insignificant impacts of the program in urban areas.

Finally, we take advantage of community level information on health services in the geographical area of the respondent to test how impacts may vary by access to services. We carry out in this initial exploration a simple test where we divide the sample according to the median of number of doctors per capita and carry out the analysis for the population with less than the median access to doctors (per-capita) and those with more than the median access to doctors. This analysis we carry out for rural areas only, where we hypothesize limitations of availability of services are likely to be greater.

Table 8 presents the main results. The results generally support the hypothesis of greater impacts on health indicators in areas where residents have access to more services. Beginning with

impacts on health when rural residences live in areas with lower than median access to doctors, Table 8 shows there are no significant impacts of the Program on utilization of services for this population. There are however significant and positive impacts on the probability of undergoing diagnostic/preventive tests including for hypertension, diabetes and gynecological exam. These impacts are again quite large, increasing the probability of these preventive tests in about 10 percentage points. There are no significant impacts on treatment, conditional on reporting hypertension or diabetes.

Turning now to the population with greater than median access to health services as measured by higher doctors per-capita, the results show significant impacts on nearly all of the health indicators studied here. In particular there are significant and positive effects on all of the utilization variables studied on the order of increases in 5 or 6 percentages points of the probability of using health services (doctor, dentist or hospitalization). There are also statistically significant positive impacts on the probability of diagnostic tests of hypertension, diabetes and having a gynecological exam. Finally with respect to our indicators of treatment, conditional on chronic illness, which have in general not shown significant impacts in the prior analysis of this paper, the Program does appear to show some positive and significant impact of Seguro Popular for this population. For the population with diabetes, the Program significantly increases the probability of using insulin in 13 percentage points and the probability of being in treatment for hypertension in 7 percentage points.

Conclusions and directions for future research:.

Using the longitudinal Mexican Health and Aging Survey over the period 2001 to 2012, this paper has estimated impacts of the Mexican health insurance program Seguro Popular on a diversity of health impact indicators including mortality, utilization, diagnostic/preventive tests and treatment, conditional on being ill for the population 50 and older. We have carried out before and after program difference in difference matching using information on Seguro Popular receipt. For the case of the impact of the Seguro Popular on mortality over the panel period, we have exploited variation in the proportion of beneficiaries across states, deriving from differences in when geographic areas were incorporated into the Program due to the unavailability of information on Seguro Popular participation for the population leaving the sample between 2001 and 2012. These impacts did not show significant effects of the Program on mortality (or on attrition of the panel) after a decade. However, state level variation in the proportion of beneficiaries is perhaps too weak to pick up impacts of the Program and we plan to further explore this topic using municipal level variation in program beneficiaries.

Our descriptive analysis over the panel demonstrated the largest increase in the population with health insurance over the period occurred in rural areas where most individuals with Seguro Popular in 2012 had reported not having any health insurance in 2001. As expected we have found much greater and prevalent effects of the Program on health indicators of the rural population. Significant positive impacts were found on utilization and diagnostic/preventive tests with substantively large effects, where health insurance was much less prevalent prior to the Program. In urban areas, the only observed effects were on utilization.

Finally, we analyzed how program impacts in rural areas may vary by the availability of health services. Our evidence strongly hints at important differences in the impacts of the Seguro Popular in rural areas by the availability of services. For the population with lower access to health services as measured by per-capita doctors, the program has no impact on utilization although there are impacts on receiving diagnostic tests. For the population with greater access to health services, there are larger and more prevalent effects on health utilization and diagnostic tests. Importantly, the only population where we found significant effects of being in treatment, conditional on having a chronic illness was this population, the rural population with greater than median access to services.

Table 1: Seguro Popular annual fees, published 2012	
Income Decile	Family fee (MN)
I	0.00
II	0.00
III	0-00
IV	0.00
V	2,074.97
VI	2,833.56
VII	3,647.93
VIII	5,650.38
IX	7,518.97
X	11,378.86

Table 2: Growth in the Seguro Popular program		
Year	Affiliated families	Affiliated individuals
2002*	295,513	1,094,236
2003*	613,938	2,224,411
2004	1,563,572	5,318,289
2005	3,555,977	11,404,861
2006	5,100,000	15,672,374
2007	7,307,173	21,176,914
2008	9,146,013	27,176,914
2009	10,514,325	31,132,949
2010	15,760,805	43,518,719
2011	19,811,349	51,823,314
2012		52,908,011

Table 3: Comparison of Seguro Popular Enrollment Reported in the Mexican Health and Aging Study (MHAS) (2012) with Estimates from Seguro Popular among Older Mexican Adults (Age 51+)

	Enrolled Population (Seguro Popular Estimates†)			*Enrolled Population (MHAS Estimates‡)*		
Age Group	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
51-60	1,704,585	2,014,639	3,719,224	1,587,190	2,029,923	3,617,113
61-65	578,045	665,665	1,243,710	701,120	686,474	1,387,594
66+	1,363,062	1,592,508	2,955,570	1,168,372	1,299,388	2,467,760
All (51+)	3,645,692	4,272,812	7,918,504	3,456,682	4,015,785	7,472,467

Note: † Estimates of the enrolled population from Seguro Popular are obtained from http://www.seguro-popular.salud.gob.mx and come from 2012. ‡ Estimates of the enrolled population from the MHAS are from 2012 and weighted using individual level population weights.

Table 4: Mortality and Attrition in the MHAS 2001-2012: Impacts of the Seguro Popular Program

	Not found in 2012		Died before 2012		All attritors in 2012	
2002 Pct of INEGI Pop Enrolled in SP	-0.204	-0.276	-0.034	-0.073	-0.239	-0.35
	[0.288]	[0.299]	[0.304]	[0.313]	[0.377]	[0.391]
2003 Pct of INEGI Pop Enrolled in SP	0.137	0.2	0.046	0.073	0.183	0.273
	[0.185]	[0.192]	[0.195]	[0.201]	[0.242]	[0.251]
2004 Pct of INEGI Pop Enrolled in SP	-0.188	-0.274	-0.002	-0.038	-0.191	-0.312
	[0.130]	[0.135]**	[0.137]	[0.141]	[0.170]	[0.177]*
2005 Pct of INEGI Pop Enrolled in SP	-0.065	0.026	-0.062	-0.065	-0.128	-0.039
	[0.117]	[0.122]	[0.124]	[0.128]	[0.153]	[0.160]
2006 Pct of INEGI Pop Enrolled in SP	0.08	0.044	0.03	0.042	0.11	0.086
	[0.095]	[0.099]	[0.100]	[0.104]	[0.124]	[0.130]
Age	-0.002	-0.002	0.015	0.014	0.013	0.013
	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Gender (female=1)	0.001	0.007	-0.033	-0.044	-0.032	-0.037
	[0.006]	[0.006]	[0.006]***	[0.007]***	[0.008]***	[0.008]***
Years of schooling	0.011	0.01	-0.003	-0.001	0.009	0.009
	[0.001]***	[0.001]***	[0.001]***	[0.001]	[0.001]***	[0.001]***
Speaks indigenous language	0.017	0.021	-0.009	-0.002	0.008	0.018
	[0.012]	[0.013]	[0.012]	[0.013]	[0.015]	[0.017]
Water in household	-0.006	-0.005	-0.006	-0.002	-0.012	-0.006
	[0.004]	[0.005]	[0.005]	[0.005]	[0.006]**	[0.006]
Radio	-0.007	-0.004	0.009	0	0.001	-0.004
	[0.009]	[0.009]	[0.009]	[0.010]	[0.012]	[0.012]
Television	0.012	0.01	-0.01	-0.006	0.003	0.004
	[0.011]	[0.012]	[0.012]	[0.013]	[0.014]	[0.016]
Refrigerator	-0.005	-0.001	-0.004	-0.002	-0.009	-0.003
	[0.010]	[0.010]	[0.010]	[0.011]	[0.013]	[0.014]
Washing machine	0.017	0.015	-0.005	0.001	0.012	0.016
	[0.008]**	[0.008]*	[0.008]	[0.009]	[0.010]	[0.011]
Telephone	0.003	0.004	0.013	0.015	0.017	0.019
	[0.007]	[0.007]	[0.007]*	[0.007]**	[0.009]*	[0.009]**
Water heater	-0.021	-0.02	0.021	0.023	0.001	0.003
	[0.007]***	[0.007]***	[0.007]***	[0.008]***	[0.009]	[0.010]
Self-reported poor or very poor health		-0.022		0.027		0.005
		[0.007]***		[0.007]***		[0.009]
Reports hypertension		-0.008		0.022		0.013
		[0.007]		[0.007]***		[0.008]
Reports diabetes		0		0.164		0.164
		[0.009]		[0.009]***		[0.011]***
Reports having had heart attack		-0.018		0.094		0.076
		[0.017]		[0.018]***		[0.023]***
Serious health problem before age 10		-0.006		0.004		-0.002
		[0.004]		[0.004]		[0.005]
Height		0		0		0

		[0.000]**		[0.000]		[0.000]
Constant	0.214	0.207	-0.665	-0.693	-0.451	-0.485
	[0.036]***	[0.039]***	[0.038]***	[0.041]***	[0.047]***	[0.051]***
Observations	14811	13328	14811	13328	14811	13328
R-squared	0.03	0.03	0.18	0.2	0.09	0.1

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

All control variables are from 2001 (pre-program) MHAS round.

Table 5: Pre-program differences in health: Seguro Popular beneficiaries and non-beneficiaries
By rural and urban areas

Variable		Rural		Sig dif.	Urban		Sig. dif.
		SP	**no SP**	**t test***	**SP**	**no SP**	**t test***
Saw doctor in the past year	mean	0.582	0.665	t = 4.4153	0.564	0.601	t = 2.3998
	sd	0.018	0.007	p = 0.0000	0.012	0.010	p = 0.0164
Saw dentist in the past year	mean	0.251	0.325	t = 4.4037	0.158	0.214	t = 4.6711
	sd	0.015	0.007	p = 0.0000	0.008	0.008	p = 0.0000
Went to hospital in past year	mean	0.077	0.083	t = 0.5856	0.067	0.069	t = 0.2672
	sd	0.009	0.004	p = 0.5583	0.006	0.005	p = 0.7894
Test for diabetes in past 2 years	mean	0.598	0.704	t = 5.5479	0.485	0.600	t = 7.2074
	sd	0.018	0.007	p = 0.0000	0.012	0.010	p = 0.0000
Test for hypertension in past 2 years	mean	0.699	0.778	t = 4.4299	0.608	0.690	t = 5.3337
	sd	0.017	0.006	p = 0.0000	0.012	0.010	p = 0.0000
Has hypertension	mean	0.365	0.369	t = 0.2324	0.327	0.357	t = 2.0147
	sd	0.017	0.007	p = 0.8163	0.011	0.010	p = 0.0440
Has diabetes	mean	0.140	0.128	t = -0.8766	0.092	0.112	t = 2.0950
	sd	0.013	0.005	p = 0.3809	0.007	0.007	p = 0.0362
Gynecological exam past 2 years	mean	0.675	0.745	t = 3.0794	0.564	0.629	t = 3.1846
	sd	0.021	0.008	p = 0.0022	0.015	0.014	p = 0.0015
Prostate exam past 2 years	mean	0.131	0.199	t = 2.8861	0.084	0.128	t = 2.8038
	sd	0.021	0.010	p = 0.0041	0.011	0.011	p = 0.0051
In treatment for hypertension	mean	0.634	0.723	t = 2.8824	0.601	0.641	t = 1.4728
	sd	0.029	0.011	p = 0.0042	0.020	0.017	p = 0.1411
On diet as treatment for diabetes	mean	0.598	0.627	t = 0.5519	0.656	0.661	t = 0.1120
	sd	0.049	0.021	p = 0.5819	0.039	0.030	p = 0.9109
Taking insulin as treatment for diabetes	mean	0.056	0.087	t = 1.2397	0.056	0.063	t = 0.3088
	sd	0.022	0.012	p = 0.2168	0.018	0.015	p = 0.7576

*2-sided t test with unequal variances

Table 6 Estimated impacts of *Seguro Popular* on health in the MHAS in rural areas.[a]
Men and women aged 50 and over, pre-program. Difference in difference matching 2001-2012.

Indicator	**Non-benef level 2012**	**Impact (Standard error) by type of matching/number of neighbors**		
		Local linear	**Nearest neighbor**	**Nearest neighbor**
Utilization and preventive care			2 neighbors	5 neighbors
Saw a doctor in past year	0.72	0.044* (0.028)	0.047* (0.026)	0.035 (0.025)
Saw a dentist in past year	0.24	0.001 (0.016)	-0.005 (0.024)	0.009 (0.022)
Hospitalized in past year	0.14	-0.005 (0.030)	-0.018 (0.018)	-0.028* (0.017)
Diabetes test past 2 years	0.74	0.107*** (0.032)	0.080*** (0.028)	0.088*** (0.026)
Hypertension test past 2 years	0.78	0.073*** (0.021)	0.084*** (0.026)	0.077*** (0.024)
Gynecological exam past 2 years (women only)	0.57	0.053 (0.042)	0.103*** (0.0237)	0.108*** (0.034)
Prostate cancer test past 2 years (men only)	0.33	-0.027 (0.029)	-0.037 (0.037)	-0.038 (0.036)
Receiving treatment[b]				
(Conditional) probability of being in treatment for hypertension.	0.39	0.084 (0.063)	0.057 (0.041)	0.055 (0.037)
(Conditional) probability of following diet for diabetes.		-0.056 (0.053)	-0.043 (0.093)	-0.088 (0.085)
(Conditional) probability of taking insulin for diabetes.	0.28	-0.062 (0.066)	0.053 (0.064)	0.028 (0.059)

[a]All estimates are difference in difference estimators using information from 2001 and 2012.
[b]Conditional probability of treatment, conditional on reporting having disease.
†$p < .10$; *$p < .05$; **$p < .01$***$p < .001$

Table 7 Estimated impacts of *Seguro Popular* on health in the MHAS in urban areas.[a]
Men and women aged 50 and over, pre-program. Difference in difference matching 2001-2012.

Indicator	**Non-benef level 2012**	**Impact (Standard error) by type of matching/number of neighbors**		
		Local linear	**Nearest neighbor**	**Nearest neighbor**
Utilization and preventive care			2 neighbors	5 neighbors
Saw a doctor in past year	0.78	0.040* (0.021)	0.041* (0.026)	0.046* (0.024)
Saw a dentist in past year	0.35	-0.023 (0.001)	-0.009 (0.027)	-0.004 (0.025)
Hospitalized in past year	0.14	0.007 (0.014)	0.030* (0.019)	0.008 (0.017)
Diabetes test past 2 years	0.83	0.036 (0.024)	0.035 (0.027)	0.016 (0.024)
Hypertension test past 2 years	0.85	0.007 (0.017)	0.014 (0.025)	-0.007 (0.023)
Gynecological exam past 2 years (women only)	0.66	0.030 (0.027)	0.033 (0.034)	0.031 (0.031)
Prostate cancer test past 2 years (men only)	0.43	0.015 (0.036)	-0.010 (0.043)	-0.040 (0.042)
Receiving treatment[b]				
(Conditional) probability of being in treatment for hypertension.	0.36	0.031 (0.034)	0.040 (0.038)	0.022 (0.034)
(Conditional) probability of following diet for diabetes.		0.005 (0.067)	0.006 (0.078)	-0.010 (0.070)
(Conditional) probability of taking insulin for diabetes.	0.32	0.008 (0.056)	0.047 (0.055)	0.034 (0.051)

[a]All estimates are difference in difference estimators using information from 2001 and 2012.
[b]Conditional probability of treatment, conditional on reporting having disease.
†$p < .10$; *$p < .05$; **$p < .01$***$p < .001$

Table 8 Estimated impacts of *Seguro Popular* on health in the MHAS in rural areas.[a]

Men and women aged 50 and over, pre-program. Difference in difference matching 2001-2012.

By above or below median access to health services

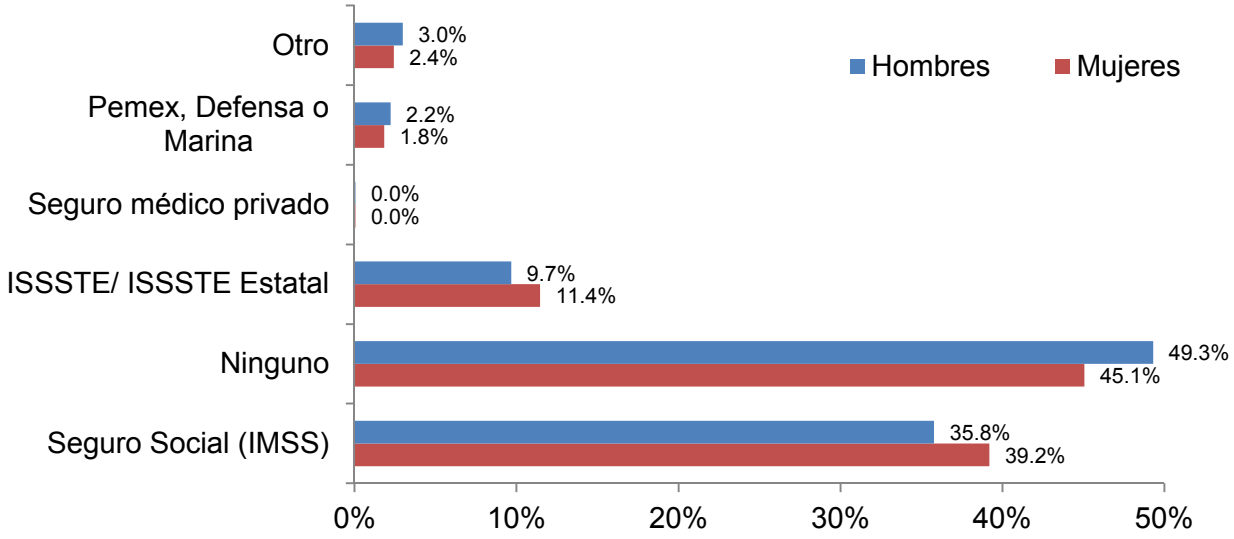
Indicator	**Impact (Standard error) by type of matching/number of neighbors**			
	Rural population with less than median access to health services		**Rural population with more than median access to health services**	
Utilization and preventive care	Non-benef level 2012	2 neighbors	Non-benef level 2012	2 neighbors
Saw a doctor in past year	0.72	0.017 (0.040)	0.78	0.055* (0.032)
Saw a dentist in past year	0.26	-0.049 (0.033)	0.33	0.056* (0.033)
Hospitalized in past year	0.12	0.011 (0.026)	0.14	0.061** (0.026)
Diabetes test past 2 years	0.74	0.116*** (0.040)	0.83	0.098*** (0.039)
Hypertension test past 2 years	0.79	0.067* (0.038)	0.85	0.086*** (0.036)
Gynecological exam past 2 years (women only)	0.57	0.091* (0.053)	0.66	0.154*** (0.052)
Prostate cancer test past 2 years (men only)	0.32	0.034 (0.054)	0.43	-0.030 (0.052)
Receiving treatment[b]				
(Conditional) probability of being in treatment for hypertension.		0.012 (0.057)		0.078 (0.055)
(Conditional) probability of following diet for diabetes.		-0.005 (0.133)		-0.154 (0.156)
(Conditional) probability of taking insulin for diabetes.		0.090 (0.098)		0.133* (0.079)

[a]All estimates are difference in difference estimators using information from 2001 and 2012.

[b]Conditional probability of treatment, conditional on reporting having disease.

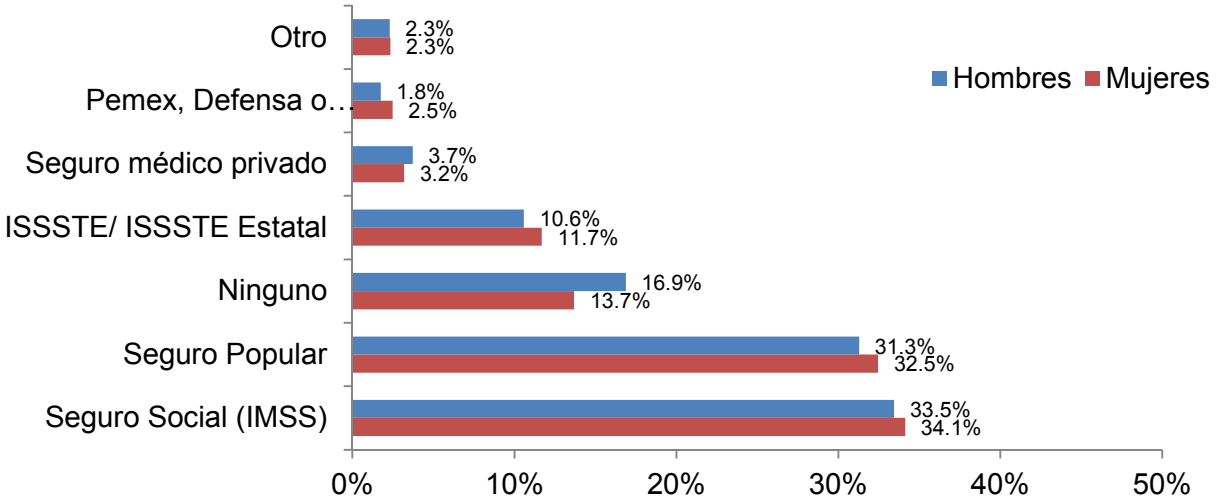
†$p < .10$; *$p < .05$; **$p < .01$***$p < .001$

Figure 1a: Population aged 50 and over by type of health insurance, 2001.



Source: Mexican Health and Aging Survey.

Figure 1b: Population aged 50 and over by type of health insurance, 2012.



Source: Mexican Health and Aging Survey.

Figure 2: Health insurance for MHAS individuals interviewed in 2001 and 2012.

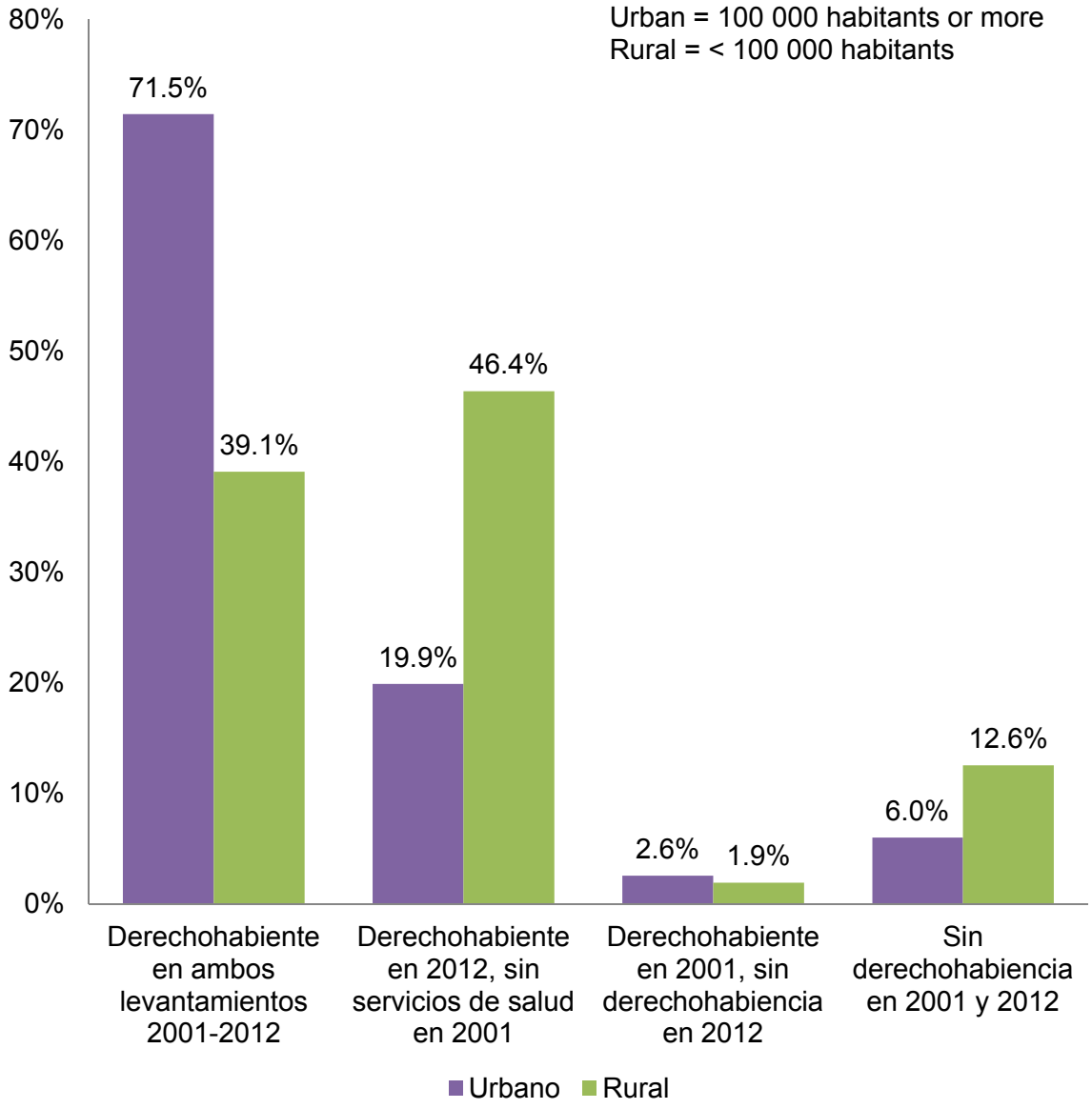


Figura 3a. Seguro Popular beneficiarias: Rural

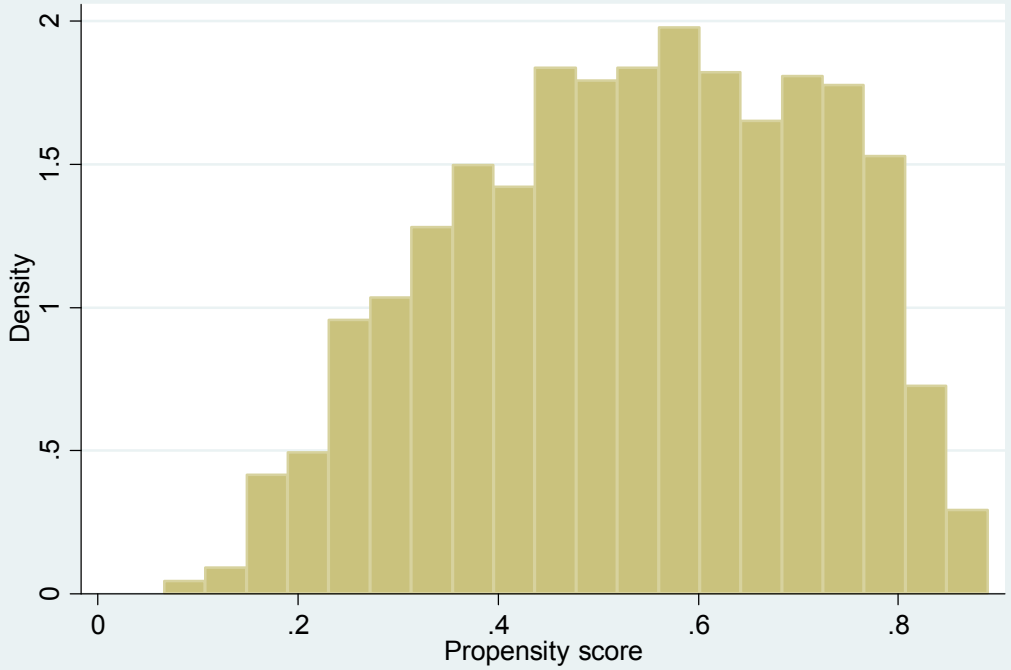


Figura 3b. Seguro Popular non-beneficiaries: Rural

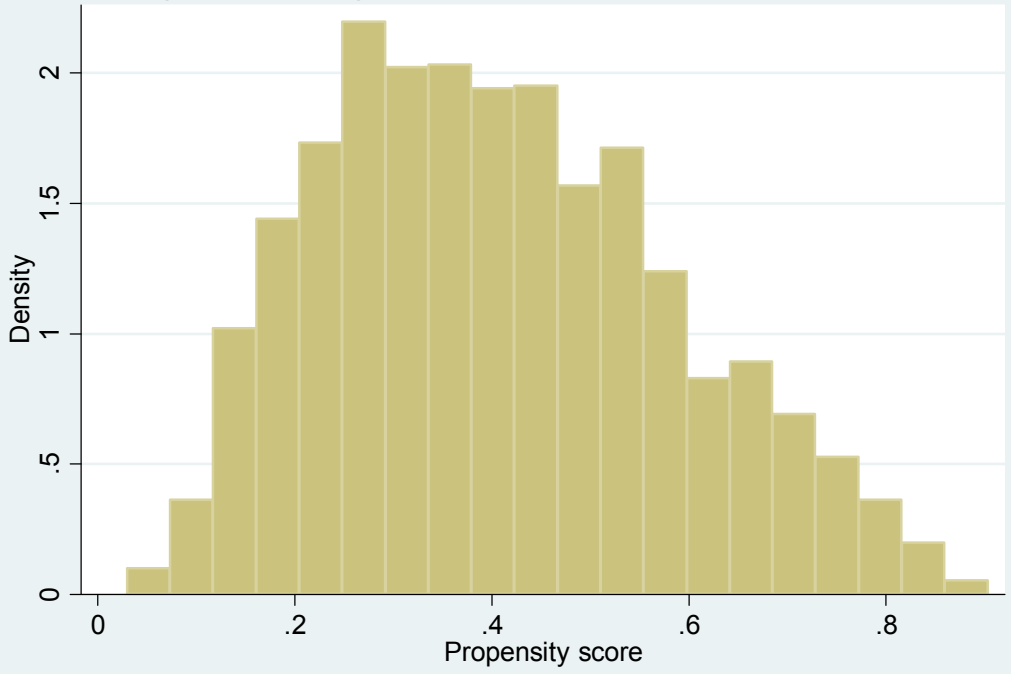


Figura 4a. Seguro Popular beneficiarias: Urban

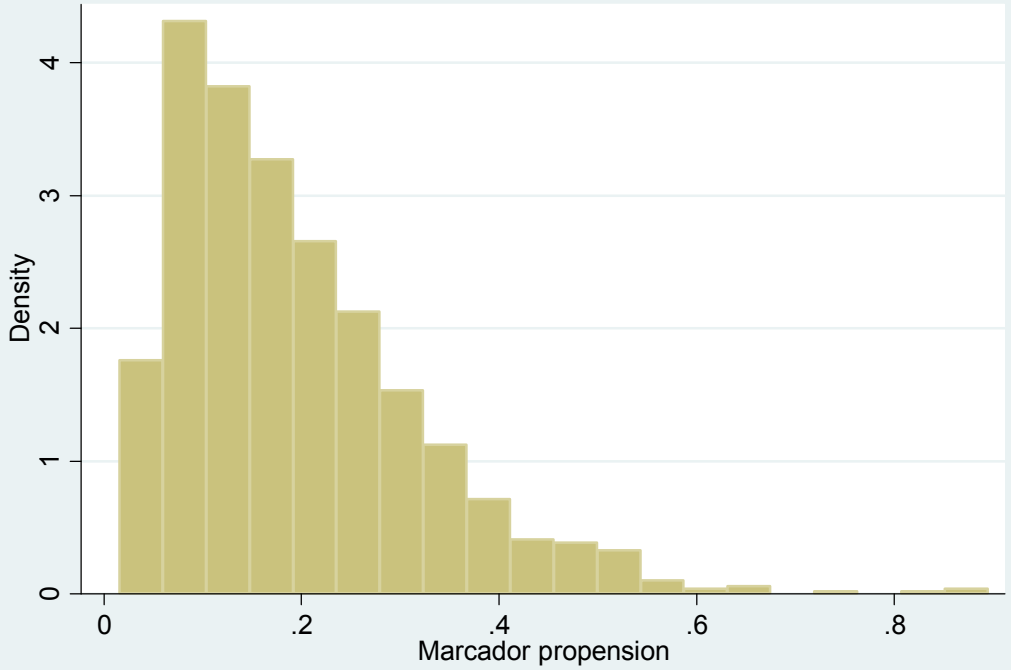
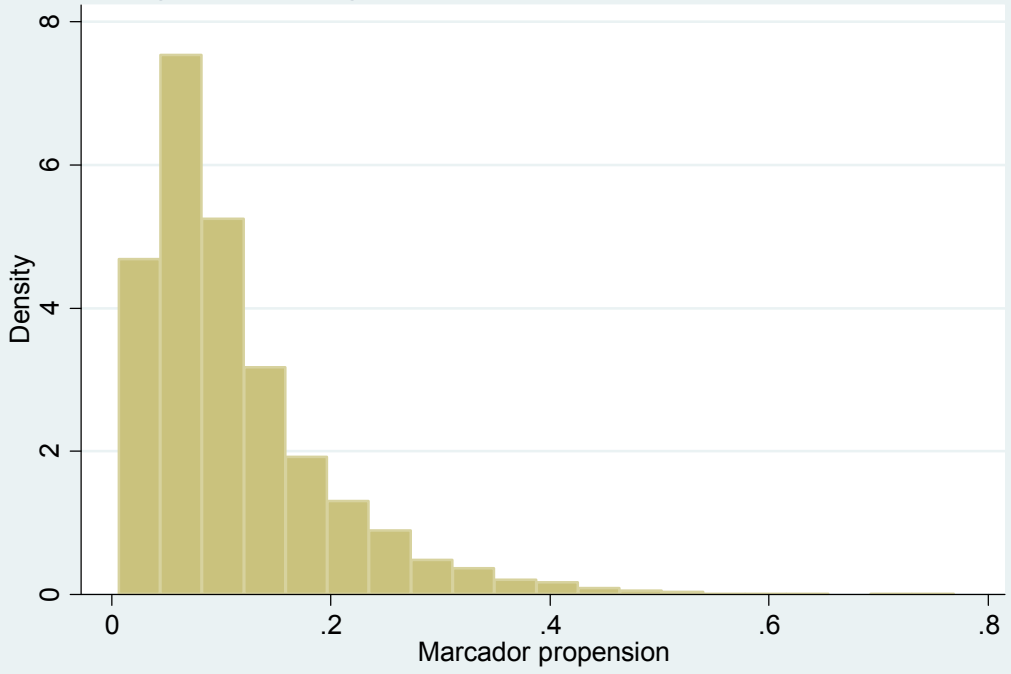


Figura 4b. Seguro Popular non-beneficiaries: Urban



Appendix Table 1: Propensity score estimation: Probability of participating in the Seguro Popular MHAS, preprogram indicators

	Participating in Seguro Popular	
	Rural	Urban
Age	-0.023	-0.022
	[0.005]***	[0.005]***
Gender (women=1)	0.036	0.044
	[0.090]	[0.085]
Years of education	-0.081	-0.091
	[0.016]***	[0.012]***
Indigenous language	0.055	0.056
	[0.197]	[0.187]
Piped water in household	-0.058	-0.05
	[0.038]	[0.058]
Radio	0.078	0.063
	[0.123]	[0.117]
Television	-0.245	-0.004
	[0.145]*	[0.230]
Refrigerator	-0.324	-0.038
	[0.113]***	[0.132]
Washing machine	-0.131	-0.669
	[0.102]	[0.093]***
Telephone	0.458	0.308
	[0.108]***	[0.073]***
Water heater	-0.206	-0.399
	[0.113]*	[0.092]***
Self-reported health poor or very poor	0.085	0.093
	[0.092]	[0.086]
Reports having hypertension	-0.022	-0.096
	[0.090]	[0.084]
Reports having diabetes	-0.04	0.02
	[0.136]	[0.117]
Reports has had heart attack	-0.017	0.266
	[0.278]	[0.236]
Serious health problem before age 10	0.04	-0.037
	[0.053]	[0.051]
Height	0	0
	[0.000]	[0.000]
Community characteristics		
Population (tot.)	-0.27	-0.123
	[0.091]***	[0.038]***
Pop. 5-+ speak indigenous language (proportion)	0.051	-0.202

	[0.042]	[0.192]
Pop. 5-+ catholic religion (proportion)	0.068	-0.068
	[0.033]**	[0.067]
Pop. 15-+ without education or only kinder(proportion)	-0.126	0.066
	[0.059]**	[0.246]
Pop. 12-+ employed (proportion)	-0.212	-0.147
	[0.050]***	[0.123]
Tot. dwellings with good floor materials (proportion)	0.013	-0.057
	[0.034]	[0.125]
Tot. dwellings with gas stove (proportion)	-0.111	-0.249
	[0.026]***	[0.126]**
Tot. dwellings with sewage and running water (proportion)	0.021	0.044
	[0.020]	[0.048]
Constant	2.529	4.74
	[0.756]***	[1.615]***
	2828	5638
Observations	2830	5652
	4089	9047

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

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