Do Conditional Cash Transfers Reduce Hypertension?

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Abstract

Progresa, an anti-poverty conditional cash transfer program, has been a model for similar programs in more than 60 countries. Numerous studies have found positive impacts on schooling, the nutritional and health status of children and adolescents, and household consumption. However, the effects on the health of older adult beneficiaries have been particularly understudied. In this paper we analyze the effects of *Progresa* on middle-aged and older adult health, focusing on a high prevalence chronic condition: hypertension. Our results show that *Progresa* had significant benefits in terms of improved hypertension diagnosis and use of treatment drugs. However, we did not find significant changes in uncontrolled hypertension as measured by systolic and diastolic blood pressure biomarkers in household survey data. Thus, while cash transfer programs may facilitate financial access to healthcare visits and the ability to buy prescribed medicines, by itself the program might not improve hypertension outcomes without complementary healthcare system follow-up to ensure dosage titration and medication adherence.

Keywords: Hypertension, Conditional cash transfers, Elderly, Health, Mexico

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1. Introduction

Hypertension can be easily detected in community and primary care facilities, and effective drugs are available at a low cost for treating patients (Suchard al, 2019). However, hypertension and high blood pressure are responsible for 8.5 million related deaths worldwide (Zhou B et al., 2021), accounting for 14% of global mortality and significant morbidity (Fisher and Curfman, 2018). Thus, improving treatment access, utilization, and quality for patients with hypertension is an objective of many global, regional, and national initiatives and programs (NCD-RisC, 2021). Complementing these supply-side initiatives, demand-side social policies that improve households' economic well-being may also enhance ability to engage in care.

Mexico offers a unique opportunity to study the effect of a large social income-support program on hypertension. In 1997, Mexico introduced a conditional cash transfer (CCT) program *Progresa-Oportunidades-Prospera* (hereinafter referred to as "*Progresa*") that has been a model for similar programs in more than 60 countries (Baird et al., 2014; Fiszbein et al., 2009; Parker and Todd, 2017).[1] The program provided cash benefits conditional on regular school attendance of children and regular attendance to preventive health clinic visits of all household members. An impressive body of research on *Progresa* has documented effects on numerous outcomes related to education, health, and economic outcomes. With respect to health, a number of studies have found impacts on children's growth and nutrition, as well as impacts on maternal health and adult outcomes. (Gertler, 2004; Lagarde et al., 2009; Parker and Todd, 2017; Rivera-Hernandez et al., 2016).

However, only a few studies have examined the effects of *Progresa* on the health of older adults

[1] The original name was *Progresa*, changed to *Oportunidades* under the Fox administration, and changed again to *Prospera* under the Peña Nieto administration.

in spite of the potential for the program to impact health of the aging through mechanisms including the increase in income and the conditionality of having regular checkups to receive this income (Behrman and Parker, 2013). Barham and Rowberry (2013) found that five years after the implementation of *Progresa*, it led to an average reduction of 4% in county-level mortality rates for those over age 65, primarily because of decreases in infectious diseases and diabetes-related death. Behrman and Parker (2013) suggested that six years after, *Progresa* increased the healthcare use of older adults -50 years or older- but improved self-reported health only for women but not men.

Paradoxically, Fernald et al. (2008) found for adults 18 to 65 years old that households with larger cash transfer amounts had higher body mass index, increased prevalence of overweight and obesity, and *higher* blood pressure. However, this unexpected finding was based on isolating an income dose-response mechanism, by comparing households receiving different amounts of transfers based on variation in numbers/ages of children. The paper also reported effects of the overall program, finding that in treatment households enrolled 18 months earlier than control households, the program *reduced* hypertension. The authors speculate about several potential pathways, which are relevant to interpreting our analysis as well: while income effects may increase the demand for health care, they may also increase the demand for high energy foods, including sugary beverages, which contribute to weight gain and can thus raise hypertension. Any unintended adverse income effects on nutritional intake could be offset though by health clinic check-ups and health education sessions which were a required part of the program conditionality to receive the cash transfers. The relative effects via health care utilization versus diet could also change over time; the Fernald et al. study finding adverse hypertension effects was only among the early roll-out experimental communities studied between 1997 and 2003 and has not yet been replicated in the full population and after the full program roll-out.

Following the health economics literature, we employ the Grossman model of health demand to analyze the effects of *Progresa* on hypertension of older adults (Grossman, 1972). In this model, individuals inherit an initial stock of health that depreciates over time and can be improved through investment. *Progresa* is likely to increase investment in health through its increase in income and through the conditionality of transfers to preventive health clinic visits. Better health may be achieved through improving diet, better living conditions, and increased health care utilization, among other mechanisms. The stock of health directly enters the utility function as a good that is also an investment which makes healthier time available for market and nonmarket activities. The stock of health is cumulative through the individual's life course and depreciation is higher as the individual ages. This model predicts that *Progresa's* cash transfer and its conditionality to healthcare services will increase investment in health, increasing the likelihood of a (potentially undiagnosed) hypertension diagnosis and the take-up of treatment drugs, and eventually reducing uncontrolled hypertension among older adults.

The present paper uses nationally representative Mexican surveys from 2000 to 2018 to study whether and to what extent the scaled-up *Progresa* conditional cash transfer program improved diagnosis and treatment access and reduced uncontrolled hypertension. We focus on adults ages 50 and older, who have much higher hypertension levels than younger adults (in the Fernald et al. (2008) sample, only 14% (n=285) were ages 50 and over). We contribute to the literature by analyzing the effects of *Progresa* on hypertension diagnosis, access to treatment, and uncontrolled hypertension levels in a large nationally representative sample of older adults over a period of close to two decades. We find *Progresa* improved diagnosis and access to hypertension treatment, but we do not find statistically significant effects on uncontrolled hypertension. Our findings highlight this type of program's relevance to diagnosing and providing access to treatment, but suggest that other complementary policies may be required to modify uncontrolled hypertension. These findings are important in a country such as Mexico which already has high levels of obesity and hypertension, and in which projections indicate that without further action there will be an estimated increase of 151% in the number of individuals needing care for hypertension (Sudharsanan and Geldsetzer, 2019).

Our study is organized as follows. The context section describes the *Progresa* program in Mexico. Data and methods section presents the data and our sample, outcome variables, and covariates that we use in our research. The research design and methodology section describe our identification strategy and empirical methods. The results section presents our main findings and describes our robustness tests. Lastly, the discussion section provides the conclusion and a discussion of our findings.

2. Context

2.1. *Progresa-Oportunidades-Prospera* CCT program

Progresa began in small rural communities in 1997. Its crucial feature is conditional monetary transfers to low-income families, with the recipients of the transfers being primarily household mothers. Specifically designed to reduce the number of people living in extreme poverty, the program sought to break the intergenerational transmission of poverty by investing in education, nutrition, and health (*Progresa*, 1997). Some transfers are conditional on children attending school; others are conditional on family members visiting health clinics. Several studies have demonstrated the positive effects of this program, boosting the use of preventive services overall and improving the health of rural populations (Skoufias and McClafferty, 2000); Gutiérrez et al., 2005; Parker & Todd, 2017). In general, beneficiaries are assigned to attend their local clinic for the required preventive health clinic visits, either Ministry of Health or IMSS-Solidaridad facilities, both of which serve the population without social security benefits. [2]

By 2017, the program had served 6.6 million households (27 million individuals), representing 22.7% of the country's population. The program expanded into urban areas but remained largely rural, with two-thirds of its household beneficiaries living in communities with less than 2,500 inhabitants. The program was discontinued in December 2018. The average family in *Progresa* received MXN $800 pesos monthly (equivalent to US $90.20 at 2019 purchasing power parity (PPP)) (Parker and Todd, 2017).[3] In addition, starting in 2006 (after the initial roll-out period studied by Fernald et al. 2018) adults ages 70 and older started receiving MXN$250 pesos monthly (US$46.82 PPP)(Diario Oficial de la Federacion, 2006); by 2018, this had increased to MXN$370 pesos (US$42.17 PPP) (Diario Oficial de la Federacion, 2018). The program was means-tested, with both geographic and household-level targeting.

2.2. Hypertension

Hypertension is a dangerous chronic condition but is largely asymptomatic. Blood pressure is recorded with systolic and diastolic measurements, the first is the force at which the heart pumps

[2] The Mexican health care system is highly fragmented including the social security systems, the federal and local governments, and private insurance. The social security systems (IMSS, ISSSTE, among others) cover mainly private sector and government workers in the formal sector. Private insurance covers 2 to 3% of the population. Ministry of Health and IMSS-Solidaridad (or IMSS Bienestar) provides services to the population without social security or other health insurance (INEGI, 2021).

[3] MXN$ are Mexican pesos. The 2019 PPP exchange rate from Mexican pesos to U.S. dollars purchasing power parity (PPP) was obtained from the Organization for Economic Co-operation and Development (OECD), 2021.

blood around the body, and the second is the resistance to the blood flow in the blood vessels. Typically measured in millimeters of mercury (mmHg), blood pressure is generally considered high above 140 mmHg systolic and 90 mmHg diastolic, although lower thresholds are sometimes used to indicate risk and increasingly elevated levels above these thresholds are even more dangerous. Uncontrolled hypertension can lead to heart attacks, strokes, and aneurysms and a shortened life expectancy (Zhou D et al., 2018).

Hypertension is an important and growing public health concern in Mexico. The country has recently experienced an increase in the share of deaths from non-communicable chronic conditions, which now represent the country's most severe public health issues. The National Health and Nutrition Survey (acronym in Spanish: ENSANUT) reported prevalence figures of 17.6% of adults ages 50 or more, of which 34.0% were unaware they had hypertension. Furthermore, among adults above 20 previously diagnosed with hypertension, 79.3% received pharmacological treatment, but only 45.6% were adequately controlled (Campos et al., 2018), and costs related to hypertensive diseases have been estimated to account for at least 14% of the total health budget (Villarreal-Ríos et al., 2002).

Hypertension-related diseases generally require life-long medication in the absence of major lifestyle changes; fortunately, anti-hypertensive drugs have been shown to be an extremely effective and highly cost-efficient treatment (Marquez-Padilla, 2021).

3. Data and Sample Construction

3.1. Data Sources

Our measure of *Progresa* exposure is constructed at the municipality-level (to avoid endogeneity concerns with individual enrollment) and derived from government administrative records on

Progresa beneficiaries. This dataset provides us with the number of households registered in each municipality for the program each year. Detailed *Progresa* administrative records are not publicly available, but we use summary enrollment data provided by the central *Progresa* administrative office for the years 1997-2018. Our main explanatory variable of interest, *Progresa* penetration, indicates the intensity of treatment of *Progresa* exposure (proportion of households in the program in each municipality and year), by imputing an annual denominator of households based on the number of households in a municipality from the national Census data for 2000, 2005, 2010, and 2020.

Our hypertension-related dependent variables are individual-level records from the nationally representative ENSANUT survey. These repeated cross-sectional surveys include questions related to self-reported hypertension diagnosis and treatment, as well as objective blood pressure measurements. The data include geographic identifiers of residence at the municipality level, allowing us to merge our *Progresa* exposure variable.[4] We analyze data from all available ENSANUT rounds during *Progresa's* existence: 2000, 2006, 2012, 2016, and 2018 rounds (comparable rounds are not available in the immediate pre-program period). The ENSANUT uses a probabilistic multistage stratified cluster sampling design with state, regional, and national representativeness for urban and rural strata of the full Mexican population. The ENSANUT

[4] Ideally, we would use pre-program municipal residence, to protect against potentially endogenous migration. However, information on previous municipal residence is not available in the ENSANUT, so we use the current municipality in which the individual resides to merge the treatment variable. To help assess the scope of potential bias, we examine migration patterns using the 2000 and 2010 Mexican Population Census, which include a question on the municipality of residence five years earlier. We estimate the proportion of individuals over 50 who were living in a different municipality in 1995 for the 2000 Census and in 2005 for the 2010 Census. In both census years, we find that only about 5 to 6 percent of individuals over 50 lived in a different municipality five years earlier, thus any bias due to endogenous migration would likely be of negligible magnitude.

surveys are publicly available from the National Institute of Public Health (INSP) and the Mexican Statistical Agency (INEGI). The surveys were conducted between October and May in 1999-2000, 2005–2006 and 2011–2012, May and October in 2016, and July and June in 2018-2019. Detailed descriptions of the ENSANUT methodology are published elsewhere (Sepúlveda et al., 2007, Olaiz-Fernandez et al., 2006, Romero-Martinez et al., 2013, Romero-Martinez et al., 2017, Romero-Martinez et al., 2019a, Romero-Martinez et al., 2019b). All participants provided informed consent prior to their participation. The INSP Ethics Review Board of Mexico approved the study protocol.

Additional municipal-level control variables were based on census, health insurance, and health care administrative data. Mexico's National Population Council (CONAPO) has derived a municipality-level marginality index from Census data as a measure of local poverty. We linearly interpolated values for years not available. The index uses the following variables: municipality density (population per square kilometer); the percentage of households with no piped water, with no electricity, with no wastewater disposal, and with a dirt floor; the percentage of the population over 14 that are illiterate; the percentage of the population over four who speak an indigenous language; the percentage of employed working in the primary sector; and the number of occupants per household.

In addition, we control for municipality-level expansion of *Seguro Popular*, a public health insurance launched in 2001 that targeted poor families without access to any health care coverage. Because *Seguro Popular* could also potentially affect health outcomes, we control for the level of *Seguro Popular* penetration to isolate potential *Seguro Popular* effects from those of

Progresa.Previous studies have varying results on the impacts of *Seguro Popular* on hypertension. For instance, Beltrán-Sánchez et. al (2015) finds that the expansion of *Seguro Popular* was related to improved screening and treatment in adults above 50, based on individual-reported insurance coverage. However, Rivera-Hernandez et. al's (2019) findings using an instrumental variables approach suggest that *Seguro Popular* has no significant effect on hypertension screenings by adults aged 50 to 75 years. We derived our *Seguro Popular* penetration variable from government administrative records on *Seguro Popular* number of beneficiaries registered in a municipality for the program each year. Individual level *Seguro Popular* administrative records are not publicly available, but we use summary enrollment data provided by the Wellbeing Ministry for the years 2001-2018.

Finally, we also use health infrastructure administrative records between 2000 and 2017, which includes the number of clinics, hospitals, mobile clinics, health brigades, medical residents, and doctors and nurses in contact with patients at the municipality level. Census data and marginality indexes are publicly available from INEGI and CONAPO, respectively (Consejo Nacional de Población (CONAPO), 2021; INEGI, 2021). Health infrastructure data is publicly available and provided by the Ministry of Health (Secretaria de Salud, 2022).[5]

3.2. Sample Construction

We pool the repeated cross-sectional ENSANUT rounds from 2000 to 2018, constructing an individual-level dataset of adults ages 50 and over. Similar to Barham and Rowberry (2013), we use the municipal level of *Progresa* penetration to identify the effects of *Progresa* on older adult

[5] Although the publicly available data only contain information on the health facilities operated by the Ministry of Health.

mortality. We link the ENSANUT panel dataset at the municipality level with the *Progresa* penetration, as well as municipality-level controls (the *Seguro Popular penetration*, marginality index and health infrastructure records from the Ministry of Health).

One complication in the municipality-level exposure is that municipality boundaries changed during this period, because some were divided into two or more, merged with another existing municipality, or switched states. Thus, to consistently define geographic areas of treatment, we recoded municipalities into a slightly smaller number of “super municipalities” that could be identified consistently over time, based on 1995 boundaries. For this purpose, we identified all municipalities in 2018 and recoded them back to the municipalities of origin in 1995. However, 67 municipalities split into two or more municipalities during this period, and others merged with other municipalities, resulting in larger geographic areas that included more than one municipality of origin in 1995. Therefore, we decided to create a unique identifier that includes all the merged or divided municipalities that overlapped with the same 1995 geographic area, named the *Super municipality identifier*. Our dataset includes the *super municipality* ID that allows us to analyze respondents across time with the original 1995 geographic area. In doing so, we avoid attenuation bias from measurement errors because of the misallocation of the treatment within a geographic area. Thus, the recoding results in a consistent panel of municipalities from 2000 to 2018 of 2,400 municipalities each year.

3.3. Outcome Variables

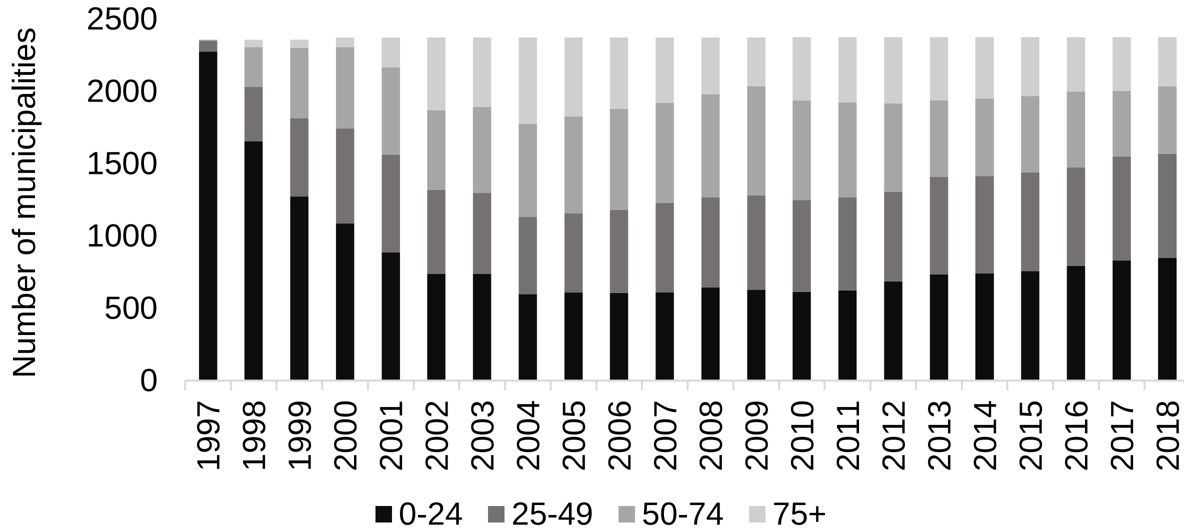
We measured hypertension-related outcomes using self-reported responses to the following questions: (i) for diagnosis, we use “Has a doctor ever told you that you have high blood pressure or hypertension?"; (ii) for treatment, "Are you currently taking medication to control high blood pressure?". Blood pressure was measured twice by a trained nurse in the dominant arm using a mercury sphygmomanometer on two different visits. The first reading was carried out after at least five minutes of seated rest. The second was taken five minutes after the first. Based on the average of the first and second readings, we define uncontrolled hypertension as having a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg. In the 2000, 2006, and 2016 waves, the ENSANUT survey attempted to measure blood pressure in all adults; in 2012 and 2018 they attempted to measure blood pressure in a random subsample of adults above the age of 20. Overall, non-response was around 5%, except in 2018, with a non-response rate of 14% and in 2006, with a non-response rate of 23% (Barquera et al., 2010; Campos-Nonato et al., 2013; Campos-Nonato et al., 2018; Campos-Nonato et al., 2019). Appendix Table A.5 shows the robustness of our findings when dropping the 2006 and 2018 survey rounds.

4. Research design and methodology

4.1. Identification strategy

As with previous studies such as Barham and Rowberry (2013), we estimate the impact of *Progresa* using municipality-level variation. Although *Progresa* was rolled-out at the finer level of localities, we follow previous literature in analyzing it at the larger municipality level, as the large number of localities changing geographic boundaries over time makes consistent geographic identification challenging when analyzing repeated cross-sectional data. We exploit the annual variation in the *Progresa* penetration, which indicates the intensity of treatment of *Progresa* exposure, differing between municipalities as a comparison to identify the program effect. We define the *Progresa* penetration across municipalities over time as the proportion of households benefiting from the program. In Figure 1, we plot the *Progresa* penetration across all municipalities over time, showing that the share of municipalities with *Progresa* penetration above 25% increases over time.

Figure 1: *Progresa* Penetration Over Time, Municipality-Level



Notes: This figure shows the trend in *Progresa* penetration for all municipalities in Mexico between 1997 and 2018. *Progresa* penetration is the ratio of households receiving *Progresa* benefits to the total number of households in a municipality. *Progresa* penetration is estimated for the following bins: 0-24%, 25-49%, 50-74%, and 75% or more.

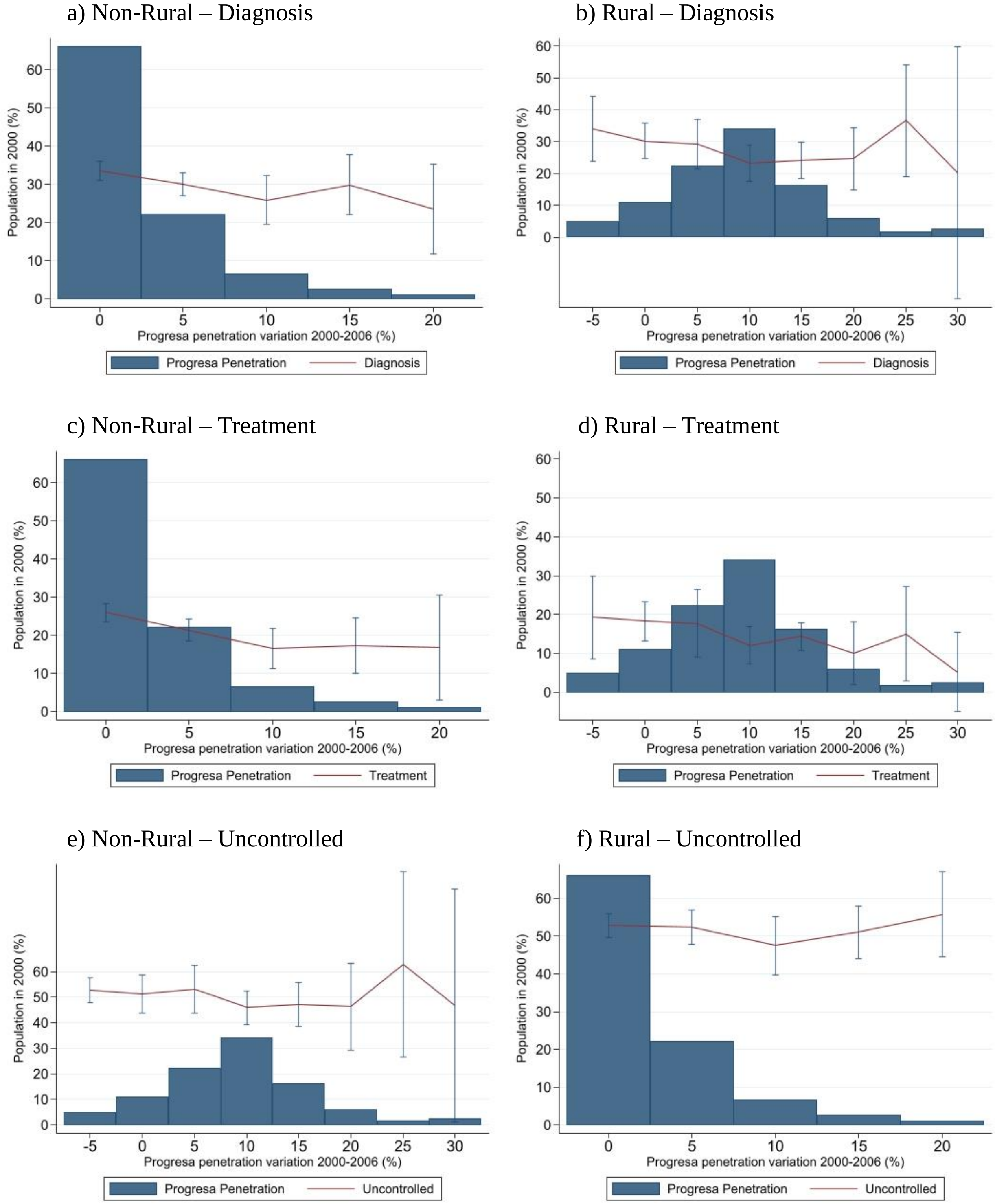
Figure 2 shows histograms of municipalities, binned by the amount of growth in *Progresa* penetration between 2000 and 2006, the period that exhibits the most variation in our sample. The left column (panels (a), (c), and (e)) presents the data for the non-rural municipalities, and the right columns (panels (b), (d), and (f)) presents the data for the rural municipalities.[6]

Overlaid on these histograms in Figure 2 are lines showing the mean of each of our key outcome variables (hypertension diagnosis, treatment, and uncontrolled hypertension) in the 2000

[6] Rural is defined as municipalities with above 50% of their population living in localities with less than 5,000 inhabitants.

ENSANUT data, shown by degree of subsequent *Progresa* penetration in the next six years. The identifying assumption in our models is that the trends in hypertension-related outcomes across municipalities with different intensities of treatment between surveys would have been the same in the absence of the program. This could be checked with pre-program trend data if possible, but we are not aware of any municipal-level hypertension data available before the 2000 ENSANUT. Thus instead, Figure 2 serves to at least show the extent to which outcomes were balanced in 2000 by level of subsequent program expansion. We include 95% confidence intervals around the outcomes to account for the different sample size across bins of *Progresa* penetration. Bins with little population, also reflected by wider confidence intervals, have little impact on our weighted regression results presented below, thus we focus interpretation of these figures on comparison of those bins with substantial mass. All Panels shows that these outcomes were slightly worse at baseline in areas with higher penetration, although overall balanced across the portion of the histogram containing most of the mass of the data. In Appendix Figure A.1 we show that this also holds when we look across bins of *Progresa* penetration between 2006 and 2018.

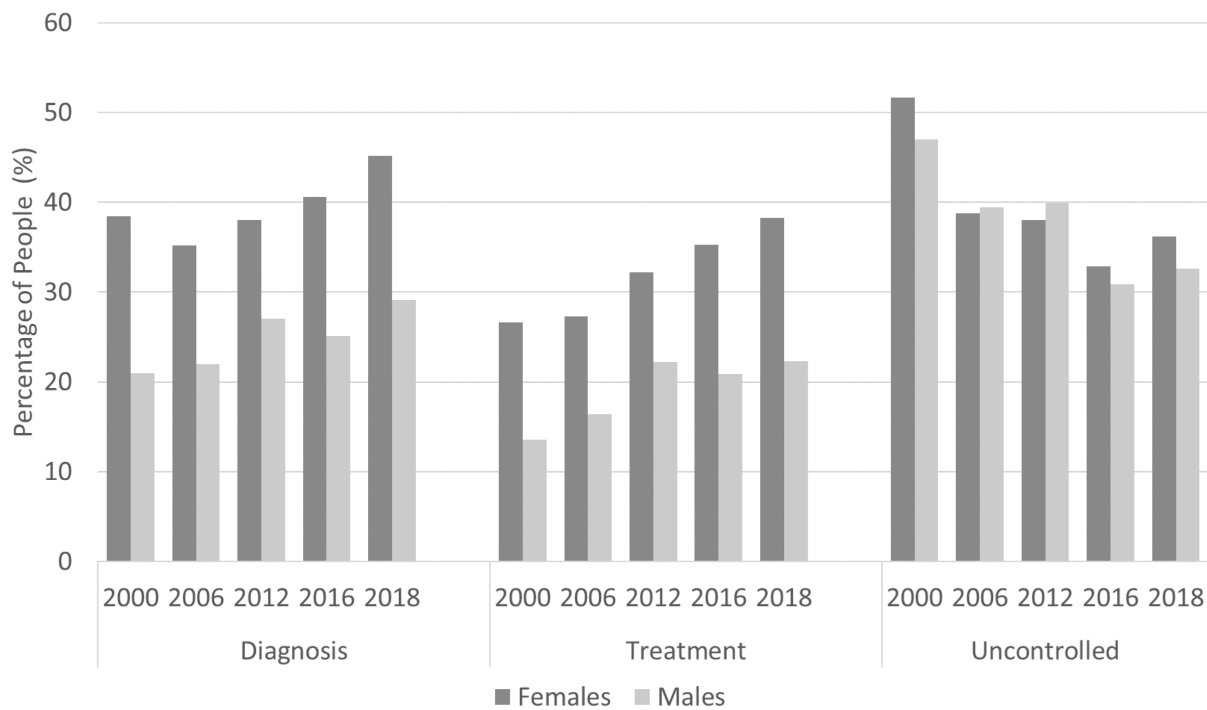
Figure 2: Hypertension related outcomes across municipality bins of variation in *Progresa* penetration between 2000 and 2006



Notes: This figure depicts the average of the hypertension related outcomes in 2000, across bins of *Progresa* penetration variation. It uses the absolute difference in the municipality-level *Progresa* penetration between 2000 and 2006. We measure hypertension diagnosis and treatment using self-reported response to the following questions: “Has a doctor told you that you have high blood pressure or hypertension?”, and “Are you currently taking meds to control high blood pressure?”, respectively. We define hypertension uncontrolled as having a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg. Systolic and Diastolic blood pressures are average between 1st and 2nd measurement. All hypertension outcomes use survey sample weights. Rural is defined as municipalities with above 50% of their population living in localities with less than 5,000 inhabitants in 1995. We dropped bins of municipalities with less than 1% of the population.

In Figure 3, we plot our outcomes of interest across the survey years, by sex. There we can see that the share of people diagnosed with hypertension by a medical doctor increased by about 8 percentage points between 2000 and 2018 for males and females, although males were diagnosed proportionally more than females. In the case of treatment, we see an increase for males and females, but females seek treatment more than males in the period. Finally, there is a decrease in the share of people having blood pressure measurements in the hypertensive range.

Figure 3: Respondents with Hypertension Diagnosed, Treated and Uncontrolled from the ENSANUT Survey Years



Notes: This figure shows the percentage of respondents with hypertension-related outcomes for each year of the survey by sex. We measure hypertension diagnosis and treatment using self-reported response to the following questions: "Has a doctor told you that you have high blood pressure or hypertension?", and "Are you currently taking meds to control high blood pressure?", respectively. We define hypertension uncontrolled as having a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg. Systolic and Diastolic blood pressures are average between 1st and 2nd measurement. All estimates are weighted using ENSANUT survey sample weights.

4.2. Empirical model

We implement a generalized difference-in-differences (DiD) linear probability model controlling for the municipality and survey year fixed effects, where the person-level average treatment effect is estimated using the following equation:

$$HTA_{imt} = \alpha_t + \delta_m + \beta_0 Progresa_{mt} + \gamma X_{mt} + \rho Z_i + \epsilon_{imt}, \tag{1}$$

where HTA_{imt} is the respondent hypertension-related outcome for a person i in municipality m in time t, and $Progresa_{mt}$ is the continuous municipality-level penetration of treatment, and α_t are survey year fixed effects to control for general time trends common to all municipalities. δ_m, are municipality fixed effects, included to capture time-invariant municipality-level unobservables.[7] X_{mt} is a vector of municipality controls including the current *Seguro Popular* penetration, marginality index, total number of hospitals, medical residents, health brigades, nurses, and doctors. Z_i are individual controls such as sex, age, and education level.[8] Standard errors are clustered at the municipality level to account for intracluster correlation. All models employ sample weights available in each of the ENSANUT surveys.

Table 1 shows summary statistics by ENSANUT wave for the main explanatory variable of interest and each of the controls used in our regressions. "*Progresa* current" is the penetration for the year

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[7] To the extent that non-eligibles (non-poor in a municipality) benefit from the improved supply of healthcare services or the health education program, the program effects may be over-estimated. Bobonis and Finan (2002) found no evidence of health spillover effects on the non-eligibles in *Progresa* localities using the *Progresa* randomized evaluation database.

[8] We define *Seguro Popular* penetration as the number of beneficiaries over the total population in each municipality.

of the survey. In line with Figure 1, we can see that most of the aggregate time series variation comes from the increase between 2000 and 2006, and between 2016 and 2018.

Table 1: Weighted Independent Variables

	2000	2006	2012	2016	2018
Program (Municipality)					
Progresa current	0.117	0.197	0.191	0.194	0.271
Progresa lead	0.144	0.193	0.189	0.191	0.271
Seguro Popular current	0	0.148	0.450	0.451	0.521
Demographics (Individual)					
Sex (1 = female)	0.523	0.539	0.527	0.525	0.553
Age	62.414	62.884	62.454	62.118	63.649
No education	0.247	0.216	0.172	0.168	0.188
Some primary	0.393	0.352	0.292	0.254	0.3
Primary	0.167	0.202	0.204	0.215	0.217
Secondary	0.068	0.086	0.14	0.165	0.154
High School	0.02	0.062	0.078	0.082	0.066
Higher education	0.104	0.081	0.114	0.116	0.074
Infrastructure (Municipality)					
Hospitals	1.371	1.666	1.726	1.854	1.131
Health Brigades	0.227	0.252	0.053	0.04	0.022
Medical Residents	41.754	48.55	49.533	58.507	25.888
Doctors	226.767	201.233	263.216	298.347	159.463
Nurses	311.127	399.509	515.187	592.948	323.443
Poverty (Municipality)					
Marginality Index	-1.076	-1.084	-1.075	-1.001	-0.581

Note: Demographics are individual-level controls. Program, health infrastructure, and Poverty (marginality index) are measured at the municipality level. The infrastructure variables are unavailable for 2018 thus we substitute 2017 values in 2018 (model sensitivity to dropping 2018 observations is explored in appendix table A.5).

Our parameter of interest β_0 captures the intervention effect if the *Progresa* penetration (proportion of households covered by *Progresa*) increases from zero to one (i.e., 0% to 100% of households in a municipality that become *Progresa* beneficiaries). The estimate of the treatment effect will be unbiased if unobserved time-varying municipality characteristics are not correlated with the treatment variable. For the denominator, we linearly interpolated the number of households using the Census data to match the survey's years, thus we also assume that any endogenous migration is small enough to be ignorable.[9,10] The average *Progresa* penetration for municipalities in 2000, the first year of the ENSANUT was 12% and reached 27% by 2018.

5. *Progresa* impact on hypertension related outcomes

5.1. Main Results

From 2000 to 2018, more older adults reported that physicians diagnosed their hypertension, and treated it with anti-hypertensive medications. Table 2 presents the generalized difference-in-differences regression effects of *Progresa* on hypertension-related outcomes for those aged 50 and older. Panel A presents the effect of the program on the probability of diagnosis, Panel B and C show the program's effect on hypertension treatment and uncontrolled hypertension, respectively. The first column for each outcome shows the municipality-year fixed effects model with no further municipality controls; the second and third columns show robustness checks, with the second column being our preferred model.

Panel A and B, Column (1) in Table 2 show a positive and statistically significant point estimate of the *Progresa* penetration at the 1% level on the probability of being diagnosed and receiving hypertension treatment. For example, a ten-percentage point (i.e., within sample) expansion in

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[9] Linear interpolation of the household data will not be an accurate estimation if there are sizable migration flows of older adults that are correlated with *Progresa*. Given the short duration of the analysis, and that migration of older adults is low, any measurement error should be minimized. In addition, Stecklov et al. (2005) demonstrated that for people under age 60, *Progresa* had no effect on domestic migration.

[10] 2% of the municipalities have a *Progresa* penetration slightly greater than one. These are mostly municipalities in which all localities in the municipality participated in the program. The ratio may be greater than one due to measurement error arising from the linear interpolation of the household counts, resulting in a smaller number of households than the actual household beneficiaries. Results are not sensitive to top-coding this observations.

Progresa raised diagnosis by 2.3 percentage points and treatment by 2.9 percentage points of hypertension for people aged 50 and older. In 2018, *Progresa* coverage reached an average of 27%, so the average municipality program effect represents an increase of approximately 10% in the probability of being diagnosed relative to the 2000 level.[11] Panel C, column (1) shows a statistically significant effect of *Progresa* increasing the probability of having uncontrolled hypertension at the 10% level, although the confidence intervals are fairly large [-0.029, 0.432].[12]

[11] Percentage of people diagnosed in 2000 * Coefficient * *Progresa* penetration in 2018. i.e., 0.304*1.233*0.271 = 0.1015

[12] The sample size for uncontrolled hypertension differs from diagnosis and hypertension treatment sample, because for the 2012 survey, blood pressures measurements were a random sample of adults. We tested weather this subsample led to different results on the diagnosis and treatment outcomes. We restricted our diagnosis and hypertension treatment samples to the uncontrolled hypertension sample and results remain qualitatively and quantitatively unchanged. The point estimate of the effect of *Progresa* on the probability of diagnosis decrease to 0.1989, and it significant at 10%, but within the original confidence interval [-0.022, 0.420]. While for the effect on the probability of being treated, decreases to 0.2883, and is still significant at 1%.

Table 2: *Progresa* Program Effect on the Probability of Hypertension Related Outcomes

	(1)	(2)	(3)
A: Diagnosis			
Progresa penetration	0.2330***	0.3002***	0.5015***
	(0.08974)	(0.09305)	(0.17271)
Progresa lead (t+1)			-0.2755
			(0.20591)
Observations	53,377	52,761	52,761
B: Treatment			
Progresa penetration	0.2996***	0.3454***	0.5156***
	(0.07747)	(0.08567)	(0.17350)
Progresa lead (t+1)			-0.2330
			(0.20510)
Observations	53,377	52,761	52,761
C: Uncontrolled			
Progresa penetration	0.2016*	0.1112	-0.1681
	(0.11729)	(0.12894)	(0.22041)
Progresa lead (t+1)			0.3793
			(0.24661)
Observations	37,824	37,335	37,335
Municipality-level Controls	No	Yes	Yes
Municipality and Year F.E's	Yes	Yes	Yes

Notes: This table shows the results obtained from estimating the generalized difference-in-differences presented in equation (1) using linear probability regressions. We measured hypertension diagnosis and treatment using self-reported response to the following questions: "Has a doctor told you that you have high blood pressure or hypertension?", and "Are you currently taking meds to control high blood pressure?", respectively. We define hypertension uncontrolled as having a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg. Systolic and Diastolic blood pressures are average between 1st and 2nd measurement. All regressions use survey sample weights and control for individual demographic characteristics: age, sex, and education level and survey year fixed effects. Standard errors are clustered at the municipality level. *Progresa* penetration captures the intervention effect on hypertension related outcomes, i.e., the effect when 0% of households in a municipality are *Progresa* beneficiaries goes up to 100%. For example, a ten-percentage point expansion in *Progresa* raised diagnosis by 2.3 percentage points and treatment by 3 percentage points for people aged 50 and older. *Progresa* lead is a falsification test, whether future expansions in the program are related to current outcomes. Municipality level stands for time-varying characteristics controlling for variables that are likely correlated with poverty, such as the *Seguro Popular* penetration, marginality index and healthcare infrastructure. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

5.2 Subgroup results: sex and rurality

Table 3, columns (1) and (2) show our results by sex, and column (3) test for difference between sexes. While for diagnosis we only find statistically significant effects in males, we do not find evidence of significant differences between males and females, for diagnosis nor treatment. Even though all monetary grants are given to the female household head it does not seem that females benefit more than males regarding hypertension-related outcomes – or at least we do not have sufficient power to detect any such differences.

Table 3: *Progresa* Program Effect on the Probability of Hypertension Related Outcomes by Sex

	(1) Females	(2) Males	(3) Female-Male Difference
A: Diagnosis			
Progresa penetration	0.2303	0.3913***	
	(0.14683)	(0.13687)	
*Progresa**Female			-0.1610
			(0.21732)
Observations	30,608	22,153	52,761
B: Treatment			
Progresa penetration	0.3632***	0.3094**	
	(0.12365)	(0.12752)	
*Progresa**Female			0.0537
			(0.18095)
Observations	30,608	22,153	52,761
C: Uncontrolled			
Progresa penetration	0.1337	0.0931	
	(0.15998)	(0.20180)	
*Progresa**Female			0.0405
			(0.24373)
Observations	22,340	14,995	37,335

Municipality-level Controls	Yes	Yes	Yes
Municipality and Year F.E's	Yes	Yes	Yes

Notes: This table shows results obtained from estimating the generalized difference-in-differences presented in equation (1) using linear probability regressions separately for females and males, and a fully interacted model for females. We measured hypertension diagnosis using self-reported response: "Has a doctor told you that you have high blood pressure or hypertension?". We measured hypertension treatment using: "Are you currently taking meds to control high blood pressure?". We define hypertension uncontrolled as having a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg. Systolic and Diastolic blood pressures are average between 1st and 2nd measurement. All regressions use survey sample weights and control for individual demographic characteristics: age, sex, and education level. Standard errors are clustered at the municipality level. *Progresa* penetration captures the intervention effect on hypertension related outcomes, i.e., the effect when 0% of households in a municipality are *Progresa* beneficiaries goes up to 100%. *Progresa**Female is the interaction between *Progresa* penetration and dummy variable for females, and it tests for differences between females and males (in a model fully interacted by sex). Municipality level stands for time-varying characteristics controlling for variables that are likely correlated with poverty, such as *Seguro Popular* penetration, the marginality index and healthcare infrastructure. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

In addition, in Table 4 we present our main results paralleling model (2) of Table 2, now stratified by rural and non-rural. For hypertension diagnosis, we find a larger point estimate in non-rural areas, but the difference between the rural and non-rural effects sizes is not statistically significant. For treatment we find an economically and statistically larger effect in non-rural areas, with a small and insignificant effect in rural areas. There is no effect on uncontrolled hypertension in either area, with statistically similar null effects in both. While being careful not to over-interpret these mechanisms underlying these rural versus non-rural models, they are consistent with the hypothesis that in this setting access to care is not sufficiently good in rural areas, thus limiting the impact of *Progresa* on hypertension treatment (noting that we classified rural municipalities as those with above 50% of their population living in localities with less than 5,000 inhabitants in 1995). This potential complementarity between *Progesa* and access to care would be valuable to further explore in future work.

Table 4: *Progresa* Program Effect on the Probability of Hypertension Related Outcomes by Non-Rural and Rural classification

	(1) Non-Rural (NR)	(2) Rural (R)	(3) NR - R Difference
A: Diagnosis			
Progresa penetration	0.5184*** (0.16626)	0.2147* (0.12322)	
*Progresa**Rural			-0.3037 (0.20685)
Observations	33,825	18,936	52761
B: Treatment			
Progresa penetration	0.6567*** (0.15543)	0.0586 (0.10739)	
*Progresa**Rural			-0.5981*** (0.18891)
Observations	33,825	18,936	52761
C: Uncontrolled			
Progresa penetration	-0.0906 (0.24099)	0.0351 (0.14503)	
*Progresa**Rural			0.1257 (0.28161)
Observations	23,537	13,798	37335
Municipality-level Controls	Yes	Yes	Yes
Municipality and Year F.E's	Yes	Yes	Yes

Notes: This table shows the results obtained from estimating the generalized difference-in-differences presented in equation (1) using linear probability regressions. We measured hypertension diagnosis using self-reported response: "Has a doctor told you that you have high blood pressure or hypertension?". We measured hypertension treatment using: "Are you currently taking meds to control high blood pressure?". We define hypertension uncontrolled as having a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg. Systolic and Diastolic blood pressures are average between 1st and 2nd measurement. Rural stands for those municipalities with at least 50% of its population living in a rural area in 1995. All regressions use survey sample weights and control for control for individual demographic characteristics: age, sex, and education level and survey year fixed effects. Standard errors are clustered at the municipality level. *Progresa* penetration captures the intervention effect on hypertension related outcomes, i.e., the effect when 0% of households in a municipality are *Progresa* beneficiaries goes up to 100%. For example, a ten-percentage point expansion in *Progresa* raised diagnosis by 2.3 percentage points and treatment by 3 percentage points for people aged 50 and older. Municipality level stands for time-varying characteristics controlling for variables that are likely correlated with poverty, such as the Seguro Popular penetration, marginality index and healthcare infrastructure. Significance levels: *** p<0.01, ** p<0.05, * p<0. 1.

5.3 Robustness checks

This section explores various threats to the validity of the estimates. We test whether the point estimates are sensitive to the inclusion of time-varying municipality characteristics in column (2) of Table 2 by controlling for variables that are likely correlated with poverty, such as current *Seguro Popular* penetration, the marginality index and healthcare infrastructure.

There is some evidence that the supply of healthcare services increased to ensure that the quality of services did not deteriorate with the increase in healthcare service utilization resulting from the program (Bautista- Arredondo et al., 2006) and that beneficiaries could therefore meet the health conditions. Healthcare expanded in both treatment and comparison municipalities; however, if the healthcare expansion timing was correlated with *Progresa* expansion, this might impact our model interpretation. We see though in Table 2, column (2) that the point estimates on the *Progresa* penetration remain statistically significant and change only modestly relative to standard errors, providing evidence that the measured changes in the healthcare supply are not driving the results. In addition, the similarity in results with and without observable time-varying characteristics provides some confidence that differences in the time-varying observables are not biasing the results. As indicated above, however, we only have publicly-available healthcare supply variables at the municipality-level for the infrastructure operated by the Ministry of Health. The other major operator of health infrastructure in the country is the social security IMSS system, which the *Progresa*-eligible population generally is ineligible to use. In rural areas the separate IMSS-Solidaridad system does provide access to *Progresa* beneficiaries, and had expanded access in the years leading up to *Progresa* implementation; however, based on national-level data there was generally little growth in that system in our data years after 2000 (El Consejo Técnico del Instituto

Mexicano del Seguro Social, 2014), although we do not have the municipality-level data to formally test effects of controlling for IMSS-Solidaridad.

$$HTA_{i,t,m} = \alpha_t + \delta_m + \beta_0 Progresa_{m,t} + \beta_1 Progresa_{m,t+1} + \epsilon_{m,t,i}, \qquad (2)$$

Second, we perform a placebo check to test whether future expansions in the program are related to current outcomes. Thus, we lead by one year the *Progresa* penetration variable as a falsification test captured by β_1 in equation (2). If our identification assumptions hold, β_1 should be insignificant and including this control should have no effect on the current *Progresa* coefficient β_0. Reassuringly, the lead coefficient on the treatment variable in column (3) of Table 2 is not significantly different from zero, while the current *Progresa* penetration variable is still positive and significant, although the substantial confidence intervals on the lead coefficient indicate that this is not a high-powered test (likely because of the correlation between the lead and the current *Progresa* variables). A formal test of parallel outcome trends in the pre-*Progresa* years would provide an even better test of our model, particularly given that *Progresa* targeted earlier roll-outs in higher poverty places, but unfortunately we are not aware of any municipality-level data on our outcome variables prior to 2000. Given this lack of pre-program data, it is useful to note again the general balance in year 2000 outcome levels across bins of subsequent *Progresa* penetration growth (Figure 2), and that our main results in Table 2 are not sensitive to controlling for time-varying municipality-level characteristics such as poverty (the Census-derived municipality "marginality index").

Appendix Table A.1 shows the same specifications as in Table 2, but results are unweighted. While our unweighted point estimates are smaller in magnitude than the weighted estimates, they are broadly similar. Thus, we do not find evidence that our results are driven by the ENSANUT survey weights; in any case, we consider the weighted estimates preferable for results interpretation.

We also re-estimated the main models in Table 2 after dropping those municipalities that never experienced a *Progresa* expansion, as they may provide less valid counterfactuals due to their differences that caused them to not receive *Progresa*. There were only four such municipalities though, thus point estimates are very similar.[13]

Moreover, in Table A.2, we undertake a falsification exercise employing education as our outcome. While the ENSANUT has a number of different health outcomes, all of these might plausibly be affected by the program, e.g., self-reported health, chronic diseases, infections, utilization etc. Therefore, we explore education as an outcome determined long before the start of *Progresa*. In Table A.2 we repeat the specifications from Table 2, and as expected we do not find any effect of *Progresa* on adults' education in our samples.

Appendix Tables A.3 and A.4, further investigate our results on uncontrolled hypertension by using continuous blood pressure measurements as the outcome of interest. Again, we find no evidence that *Progresa* impacts blood pressure, based on the average of the first and second readings of systolic and diastolic measurements.

Finally, Table A.5 includes further sensitivity analyses. Because of the high proportion of missing values in 2006 for measured blood pressure, in column (2) we show results excluding 2006 data; the results are similar to our main results in Table 2 (reproduced in column 2). In addition, because

[13] The estimates corresponding to column 1 of Table 2 are 0.2331 (0.08974) for treatment, 0.2996 (0.07746) for diagnosis, and 0.2016 (0.11729) for uncontrolled.

healthcare infrastructure variables are not available in 2018, in column (3) we show results excluding 2018 data; again, the point estimates on the treatment variable excluding 2018 are similar to those in Table 2, column (2).

One additional hypothesized source of bias could be selective mortality. If *Progresa* lowers mortality, and this effect is concentrated among higher risk individuals, then the program could avoid culling from the population those with higher hypertension levels, thus potentially leading to an underestimate of the true effect on uncontrolled hypertension. Barham and Rowberry (2013) found that the initial roll-out of Progresa from 1997-2000 lowered older adult mortality by 4%, which though significant, by itself would be unlikely to substantially change our results. Further work is needed though to estimate ongoing mortality effects, and to model the likely impact of selective mortality on other outcomes such as hypertension.

6. Discussion

The study found that the *Progresa* program improves hypertension diagnosis and treatment among older adults. The program provided cash transfers to low-income families, which may have facilitated better healthcare access and increased treatment for hypertension through helping to pay transportation, clinic fees, and medicine costs. Health care information visits required as part of the program's conditionality requirements could have also contributed to these effects. It is notable though that the estimated benefits are concentrated among residents in non-rural areas; further work would be valuable to understand potential complementarity with geographic access to care.

However, these improvements in utilization did not result in statistically significantly improved hypertension levels. It is important to note though that the confidence intervals are wide enough that they cannot rule out potentially meaningful improvements in hypertension, although our preferred model (Table 2, column 2) can rule out all but tiny *adverse* effects on hypertension. Thus, our findings do not support Fernald et al. *adverse* hypertension effects estimated from their cash dose-response models. To the extent that the effects on hypertension were null, it is unknown if this is due to factors such as insufficient medication/dosage titration, or perhaps low medication adherence; future work on these mechanisms would be of interest (Campos-Nonato et al, 2018).

Income support programs in low-income settings have the potential to substantially improve healthcare access and prevention among older adults, including for high-priority conditions such as hypertension (Berhman and Parker, 2013). However, it is essential to note that improved access alone may not ensure improved health outcomes. Further work is needed to ensure that improved access is complemented by effective treatment and management of hypertension.

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Appendix

Table A.1: *Progresa* Program Effect on the Probability of Hypertension Related Outcomes - Unweighted

	(1)	(2)	(3)
A: Diagnosis			
Progresa penetration	0.1294**	0.1152*	0.2620***
	(0.06362)	(0.06692)	(0.12976)
Progresa lead (t+1)			-0.1910
			(0.14399)
Observations	53,377	52,761	52,761
B: Treatment			
Progresa penetration	0.1900***	0.1677***	0.3046***
	(0.05632)	(0.06013)	(0.10351)
Progresa lead (t+1)			-0.1781
			(0.11462)
Observations	53,377	52,761	52,761
C: Uncontrolled			
Progresa penetration	0.1033	0.0548	0.0557
	(0.08072)	(0.08459)	(0.15885)
Progresa lead (t+1)			-0.0012
			(0.18613)
Observations	37,824	37,335	37,335
Municipality-level Controls	No	Yes	Yes
Municipality and Year F.E's	Yes	Yes	Yes

Notes: This table shows the results obtained from estimating the generalized difference-in-differences presented in equation (1) using linear probability regressions. We measured hypertension diagnosis using self-reported response: "Has a doctor told you that you have high blood pressure or hypertension?". We measured hypertension treatment using: "Are you currently taking meds to control high blood pressure?". We define hypertension uncontrolled as having a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg. Systolic and Diastolic blood pressures are average between 1st and 2nd measurement. All regressions control for individual demographic characteristics: age, sex, and education level and survey year fixed effects. Standard errors are clustered at the municipality level. *Progresa* penetration captures the intervention effect on hypertension related outcomes, i.e., the effect when 0% of households in a municipality are *Progresa* beneficiaries goes up to 100%. For example, a ten-percentage point expansion in *Progresa* raised diagnosis by 2.3 percentage points and treatment by 3 percentage points for people aged 50 and older. *Progresa* lead is a falsification test, whether future expansions in the program are related to current outcomes. Municipality level stands for time-varying characteristics controlling for variables that are likely correlated with poverty, such as the *Seguro Popular* penetration, marginality index and healthcare infrastructure. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table A.2: *Progresa* Program Effect on Years of Education

	(1) Hypertension Diagnosis and Treatment Samples	(2) Hypertension Uncontrolled Sample
Progresa penetration	-1.2979	-.0563
	(1.26327)	(1.4847)
Municipality-level Controls	No	No
Municipality and Year F.E's	Yes	Yes
Observations	52761	37335

Notes: This table shows the results obtained from estimating the generalized difference-in-differences presented in equation (1) using linear regressions. The outcome of interest is years of education, using the samples from regressions in Table 2 Panel A and B, and Table 2 Panel C, respectively. All regressions use survey sample weights and control for individual demographic characteristics: age, sex, and survey year fixed effects. Standard errors are clustered at the municipality level. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table A.3: *Progresa* Program Effect on Continuous Systolic Blood Pressure

	(1) All	(2) All	(3) All	(4) Females	(5) Females	(6) Females	(7) Males	(8) Males	(9) Males
Progresa penetration	4.3554 (4.76984)	1.2540 (5.13858)	-8.8198 (9.15302)	7.0057 (6.53348)	3.8643 (6.46796)	-9.9751 (11.74801)	-0.5286 (5.79565)	-3.3094 (6.74271)	-12.3628 (14.01794)
Progresa lead (t+1)			13.6798 (10.53955)			18.6542 (14.40490)			12.4289 (15.39045)
Municipality-level Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Municipality and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37,957	37,462	37,462	22,714	22,417	22,417	15,243	15,045	15,045

Notes: This table shows the results obtained from estimating the generalized difference-in-differences presented in equation (1) using linear probability regressions for the gender-pooled results, and separately for females and males. All regressions use survey sample weights and control for individual demographic characteristics: age, sex, and education level and survey year fixed effects. Standard errors are clustered at the municipality level. *Progresa* penetration captures the intervention effect on hypertension related outcomes, i.e., the effect when 0% of households in a municipality are *Progresa* beneficiaries goes up to 100%. *Progresa* lead is a falsification test, whether future expansions in the program are related to current outcomes. Municipality level stands for time-varying characteristics controlling for variables that are likely correlated with poverty, such as the *Seguro Popular* penetration, marginality index and healthcare infrastructure. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table A.4: *Progresa* Program Effect on Continuous Diastolic Blood Pressure

	(1) All	(2) All	(3) All	(4) Females	(5) Females	(6) Females	(7) Males	(8) Males	(9) Males
Progresa penetration	0.5533	-1.9951	-15.5373**	5.4854	3.7341	-11.0521	-6.5660	-9.3561**	-21.2484**
	(3.39468)	(3.68269)	(7.50665)	(4.61819)	(4.87886)	(9.75669)	(4.32822)	(4.55555)	(8.55209)
Progresa lead (t+1)			18.3958**			19.9367*			16.3422*
			(8.06503)			(10.41250)			(9.65987)
Municipality-level Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Municipality and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	380,18	37,527	37,527	22,773	22,477	22,477	15,245	15,050	15,050

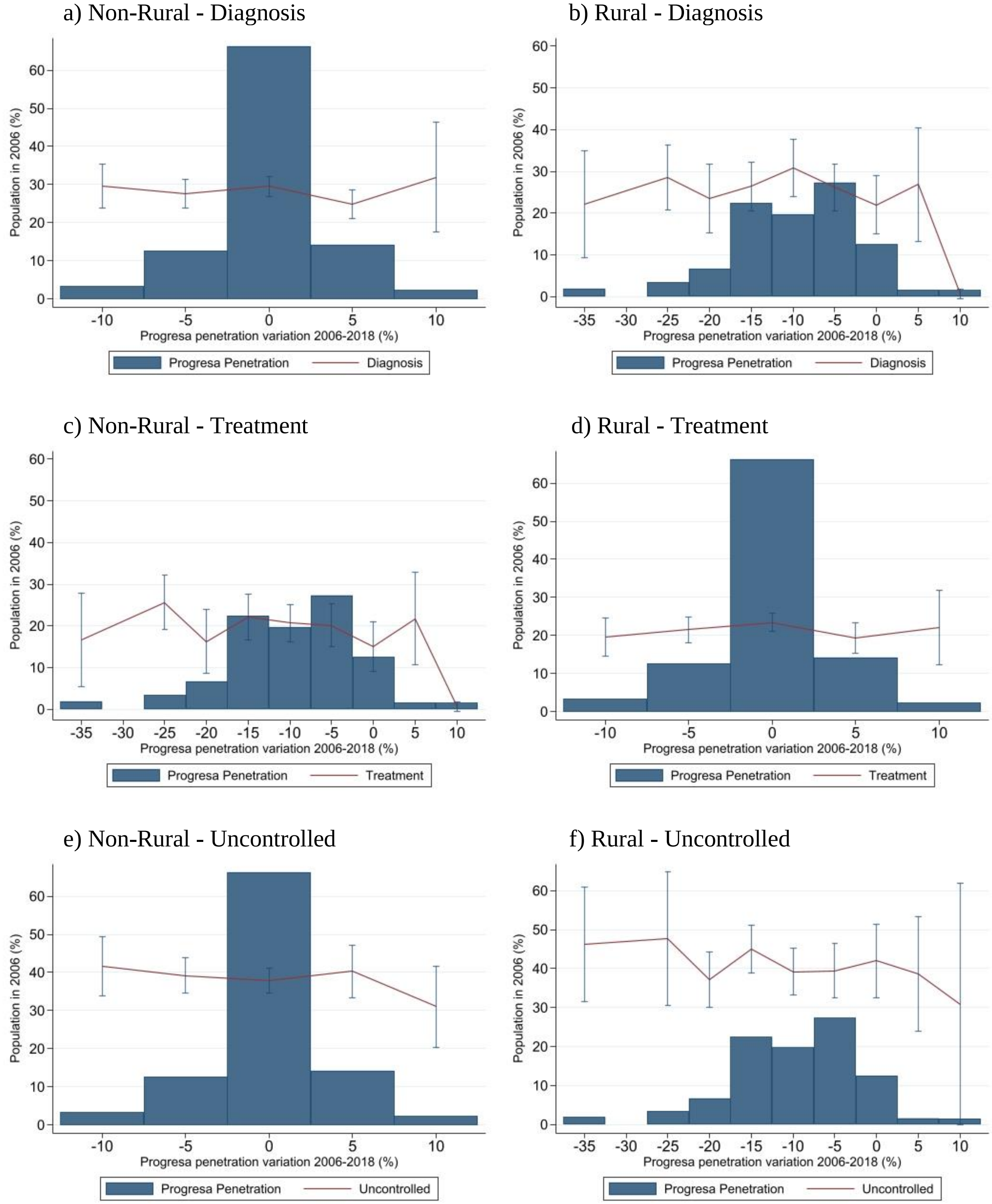
Notes: This table shows the results obtained from estimating the generalized difference-in-differences presented in equation (1) using linear probability regressions for the gender-pooled results, and separately for females and males. All regressions use survey sample weights and control for individual demographic characteristics: age, sex, and education level and survey year fixed effects. Standard errors are clustered at the municipality level. *Progresa* penetration captures the intervention effect on hypertension related outcomes, i.e., the effect when 0% of households in a municipality are *Progresa* beneficiaries goes up to 100%. *Progresa* lead is a falsification test, whether future expansions in the program are related to current outcomes. Municipality level stands for time-varying characteristics controlling for variables that are likely correlated with poverty, such as the *Seguro Popular* penetration, marginality index and healthcare infrastructure. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table A.5: *Progresa* Program Effect on the Probability of Hypertension Related Outcomes – Sensitivity to Excluding Years With Higher Missing Data Rates

	(1) Full Sample	(3) Excluding 2006	(5) Excluding 2018
A: Diagnosis			
Progresa penetration	0.3002***	0.3701***	0.2520***
	(0.09305)	(0.13276)	(0.10688)
Observations	52,761	39,666	43,105
B: Treatment			
Progresa penetration	0.3454***	0.3536***	0.3976***
	(0.08567)	(0.12824)	(0.09714)
Observations	52,761	39,666	43,105
C: Uncontrolled			
Progresa penetration	0.1112	0.0104	0.1291
	(0.12894)	(0.17483)	(0.17127)
Observations	37,335	27,427	29,269
Municipality-level Controls	Yes	Yes	Yes
Municipality and Year F.E's	Yes	Yes	Yes

Notes: This table shows the results obtained from estimating the generalized difference-in-differences presented in equation (1) using linear probability regressions. We tested whether excluding the 2006 or 2018 survey round would influence the findings due to the missingness on blood pressure measurement and to the absence of health infrastructure variables, respectively. We measured hypertension diagnosis using self-reported response: "Has a doctor told you that you have high blood pressure or hypertension?". We measured hypertension treatment using: "Are you currently taking meds to control high blood pressure?". We define hypertension uncontrolled as having a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg. Systolic and Diastolic blood pressures are average between 1st and 2nd measurement. All regressions control for individual demographic characteristics: age, sex, and education level and survey year fixed effects. Standard errors are clustered at the municipality level. *Progresa* penetration captures the intervention effect on hypertension related outcomes, i.e., the effect when 0% of households in a municipality are *Progresa* beneficiaries goes up to 100%. For example, a ten-percentage point expansion in *Progresa* raised diagnosis by 2.3 percentage points and treatment by 3 percentage points for people aged 50 and older. Municipality level stands for time-varying characteristics controlling for variables that are likely correlated with poverty, such as the *Seguro Popular* penetration, marginality index and healthcare infrastructure. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Figure A.1: Hypertension related outcomes across municipality bins of variation in *Progresa* penetration between 2006 and 2018



Notes: This figure depicts the average of the hypertension related outcomes in 2006, across bins of *Progresa* penetration variation. It uses the absolute difference in the municipality-level *Progresa* penetration between 2006 and 2018. We measure hypertension diagnosis and treatment using self-reported response to the following questions: “Has a doctor told you that you have high blood pressure or hypertension?”, and “Are you currently taking meds to control high blood pressure?”, respectively. We define hypertension uncontrolled as having a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg. Systolic and Diastolic blood pressures are average between 1st and 2nd measurement. All hypertension outcomes use survey sample weights. Rural is defined as municipalities with above 50% of their population living in localities with less than 5,000 inhabitants in 1995. We dropped bins of municipalities with less than 1% of the population.