Adverse Effects of Non-Contributory Pensions on Older Adult Mortality in Mexico*

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Abstract

We study an unconditional cash transfer to alleviate rural poverty among older adults aged 70 and over. Using death records and a triple difference-in-differences research design, we find the surprising result that deaths among age-eligible populations in localities covered by the program increased by 5.4%. We show that cardiovascular disease deaths drive this result, with increases higher among older men than women. We explore mechanisms using the income and expenditure survey and a difference-in-discontinuities design. We find little evidence of significant changes in single mechanisms, albeit with limited statistical power, except for a drop in employment and wage earnings.

Keywords: Mortality, Health Policy

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1 Introduction

The economic consequences of rapid population aging have become one of the main challenges of the century.[1] According to the United Nations, 10% of the global population was aged 65 or above in 2021, and this is projected to rise to 16% by 2050 (Wilmoth et al., 2023). Among OECD countries, around 13% of people aged 66 and above are in poverty, with higher shares among low and middle-income countries (OECD, 2023). The most common policy to address older adult poverty has been to implement cash transfer programs, including non-contributory pensions.[2] Despite the large body of literature estimating the effects of income on health, less is understood about whether cash transfers are effective at improving the health of older adults. It has also been difficult to progress empirically due to the lack of credible mediators that link health outcomes with income shocks through behavioral changes.

Empirical studies of the effects of cash grants on the health and mortality of older adults have produced mixed results, with recent research indicating both positive (Jensen and Richter, 2004; Salm, 2011; Barham and Rowberry, 2013; Miglino et al., 2023) and negative effects (Snyder and Evans, 2006; Evans and Moore, 2011; Fitzpatrick and Moore, 2018; Schwandt, 2018). Despite the inconclusive findings, these studies consistently hypothesize the mediating roles of healthcare utilization, diet, and cardiovascular conditions such as hypertension and diabetes. These factors are crucial to explore, as they contribute to the leading causes of death, including heart disease and stroke, in many countries. This paper contributes to the literature by examining whether a non-contributory pension program in poor rural areas affects older adults' health outcomes.

We study Mexico's most significant pension reform in the past 20 years: the nationwide non-contributory pension program for the elderly. The program guaranteed a basic pension every two months for those aged and residentially eligible, independent of their gender, income, and whether or not they ever contributed to social security and received benefits.[3] The program is colloquially known as "70 y Más" and initially targeted individuals aged 70 or older living in rural localities. Due to the program's popularity, it gradually expanded to cover more localities and age groups and

[1] It is the inevitable result of the demographic transition—the trend towards longer lives and smaller families—that is taking place even in countries with relatively youthful populations.

[2] There is a large body of literature documenting the beneficial effects of these programs in targeting young children and mothers summarized by Bastagli et al. (2016); Millán et al. (2019).

[3] Similar to the Mexican program are the non-contributory pensions established in 2006 in Chile and 2011 in Peru; both granted a permanent cash transfer to those aged 65 and above, conditional on income. Miglino et al. (2023) find beneficial effects on mortality due to improved access to health, but Bernal et al. (2022) finds an increase in obesity and chronic disease.

began to include means-tested eligibility criteria.

Leveraging rich administrative data and the timing of the expansions of the "70 y Más" program's coverage, we evaluate the impact of this cash transfer on health outcomes of the rural population. We utilize Mexico's vital statistics records that include the age at death, place of residence, locality size of residence, and causes of death for each death. We construct and classify age-locality group cells treated or not based on locality size eligibility and age coverage during each phase of the program's expansion. We particularly focus on the first group covered (in 2007), which was also the most economically vulnerable: adults 70 and over in rural localities with fewer than 2,500 people; we also present some results for the next expansion group (in 2008), which were localities of size 2,500 to 20,000 people. Due to the small size of these localities, there are many cells with zero deaths for certain year-locality-age groups. Additionally, confidentiality restrictions limit data availability in two key ways: (i) for localities with fewer deaths, only the locality size is reported, rather than the actual locality of residence, and (ii) population denominators are not publicly available by locality and single age groups. All the limitations above prevent us from computing age-specific death rates at the locality level. As a result, the analysis relies on total death counts as the primary outcome, using a triple difference-in-difference approach with a Poisson regression model (Chen and Roth, 2024; Mullahy and Norton, 2024).

We find the surprising result that cash transfers led to a 5.5% (s.e.=1.2%) average increase in deaths among individuals aged 70 and older in the smallest rural localities that received cash transfers in 2007. The effect was smaller (2.5%) but still positive and statistically significant in the slightly larger and less vulnerable in 2008 expansion group; both these groups are compared to the localities size 30,000-100,000 that did not become eligible until 2012. This effect is driven by a 12.4% rise in deaths from causes related to cardiovascular disease (CVD). This significant increase in mortality is consistent with a small set of studies also finding that deaths may be linked to income expansions, at least in the short run (Snyder and Evans, 2006; Dobkin and Puller, 2007; Evans and Moore, 2011; Rehkopf et al., 2014). Furthermore, we also find that the increase in deaths is mostly among males, with a 5.54% higher increase in deaths above the 2.2% increase for females. The mortality effect in these small rural localities did not further vary significantly by socioeconomic status (SES), at least as proxied by the death certificate measure of whether or not the decedent was insured by the formal sector social security system (versus uninsured or covered by the *Seguro Popular* low-income insurance program that was also rolled-out during the study period and for which we control).

We explored possible mechanisms that could connect the increase in deaths to changes in indi-

vidual income and household spending and other behaviors plausibly related to the cash transfer. We pooled repeated cross-sections of the national Mexican household income and expenditure surveys between 2005 and 2010 to implement a regression discontinuity design around the cut-off age. Our regression discontinuity (RD) design compares outcomes for older adults just above and below the age-70 eligibility cutoff residing in eligible localities. The RD estimates first confirm receipt of the "70 y Más" transfer in the average amount of approximately $25 per eligible person per month (in inflation-adjusted USD, 2024). In the period just prior to the transfer, the mean monthly income among eligibles was $172, thus the cash transfer was equivalent to 15% of mean income of recipients.

We next study household spending, including expenditure on obesogenic food, which may be linked to a larger increase in deaths due to cardiovascular and circulatory disease, and which would be consistent with an increase in adult obesity and blood pressure estimated to have occurred as a result of Mexico's *Progresa* cash transfers (Fernald et al., 2008). However, we find no significant effect on household spending overall, healthcare or food spending, or on individual categories such as spending on obesogenic food, alcohol, or tobacco (although the confidence intervals are not tight enough to rule out modest effects on some of these).

We then turn to examine the available measures of labor market activity, which yield more intriguing results. Prior work has found pension programs to reduce labor market activity, although the mechanisms may vary; e.g. Gruber and Wise (1998) found that many pensions systems incentivize retirement, but by contrast "70 y Más" should be a pure income effect. A prior study of "70 y Más" though by Galiani et al. (2016) found that after one year of implementation there was a significant shift of older adults out of the formal labor market (with some substitution to informal work in family businesses) - but this was accompanied by an improvement in the one health indicator that they report, geriatric depression. In contrast, other work such as Snyder and Evans (2006) has hypothesized that an income-induced reduction in labor force participation could potentially explain certain cases of unexpected mortality increases after positive income shocks. Although we do not have measures of social isolation, we do find evidence of a large reduction in employment and wage earnings in pre-post difference-in-discontinuities (at age 70) models.

The remainder of the paper proceeds as follows: Section 2 describes the institutional background and the "70 y Más" program. Section 3 provides details on data sources and the sample construction. Section 4 presents our empirical strategy and the main results. Section 5 discusses the potential mechanisms, and in section 6, we conclude.

2 Mexico's "70 y Más" Non Contributory Pension Program

Mexico has multiple social security systems that provide pensions and health care insurance, but most exclude individuals who do not contribute to these systems (Aguila et al., 2015).[4] To address the economic vulnerability of those ineligible for social security programs, the Mexican government, through its Welfare Department, introduced two major policies in the early 2000s.[5] The first, Seguro Popular, launched in 2002, was a large-scale public health insurance program to address the lack of basic health coverage. The second, introduced in late 2007, was a non-contributory pension scheme, *Pensión para Adultos Mayores* ("70 y Más"), which is the focus of this paper. This pension program provides unconditional cash transfers to older adults. It is considered non-contributory because neither recipients nor their employers contribute to the fund during their working years. Initially, eligibility was restricted to individuals residing in villas or small cities known as *localidades*, which met a specific population size.[6]

Although "70 y Más" has been the largest program in terms of both scale and transfer amount for supporting pensioners outside the formal system, it is not the only one. Since 2001, several Mexican states and the Federal District have introduced their own state-specific non-contributory pension programs, each with varying eligibility criteria and benefit levels. According to Aguila et al. (2011), states that implemented these programs before 2007 are Mexico City (2001), Chihuahua (2004), Veracruz (2005), Nueva León (2004), and Quintana Roo (2006). Those states that implemented programs in 2007 and after are Chiapas (2007), Jalisco (2007), Yucatan (2007), Baja Norte (2008), Sonora (2009), Durango (2010), and Zacatecas (2011). Our findings are robust to removing the states with benefits before the program started. The Progresa/Oportunidades conditional cash transfer also included an old age component as a pension benefit for those older adults living in households already qualifying for benefits. However, only a small part of the receipts benefit from this program since the government avoided duplicity and instead switched only to the

[4]Social security in Mexico includes the Mexican Social Security Institute (IMSS), which provides benefits to private sector workers, covering nearly 30% of the country's population. To qualify for IMSS social security payments as of 2007, individuals must contribute to the fund for at least 1,250 weeks. The usual retirement age for these pensions is 65. Employees and employers contribute a percentage of wages, ensuring a minimum monthly pension of $178 USD (MX$1,754/month) in 2024. Other pension and health insurance systems cater to specific groups, such as the Social Security Institute for Government Workers (ISSSTE) and specialized funds for employees of the state oil enterprise, the military, and maritime services. For detailed information on social security benefits and non-contributory pension programs, see Gateway to Global Aging Data (2024b) and Gateway to Global Aging Data (2024a), respectively.

[5]Currently known as the "Secretaría del Bienestar," previously called the "Secretaría de Desarrollo Social"(SEDESOL). We use the Spanish acronym SEDESOL throughout the text, as it was the original government body that implemented the program.

[6]We will use *Localities*, the Spanish literal translation from the original name throughout the text.

"70 y Más" benefits, and thus the penetration of this program was low during the study period for this paper.

The "70 y Más" program paid a monthly cash transfer equivalent to MX$500, roughly equal to US$ 55 (2024 USD), delivered every two months as a sum of MX$ 1,000.[7] This represents 32% of the mean income of eligible recipients in the pre-period. Individuals enrolled in the pension program with a current, government-issued identification card that displayed their date of birth and address. In 2010, a monetary transfer of two months benefits was paid for a single occasion as a lump sum transfer, in case the participant of the Program dies, as long as the beneficiary has appointed a representative.

At the beginning of the program in the second half of 2007, localities with populations of 2,500 or fewer individuals were eligible to participate.[8] In 2008, the eligibility expanded to include localities with populations up to 20,000 individuals, with a further expansion to include localities with populations up to 30,000 in 2009.[9] In the program's first phase, enrollment reached about 1.1 million beneficiaries, which SEDESOL equates with near-complete take-up. SEDESOL published a similarly high take-up rate for localities eligible in 2008 (90%) (Juárez-González and Pfutze, 2014). By then, the number of beneficiaries in all eligible localities (populations $\leq$ 20,000) reached 1.7 million, covering over 40% of all people aged 70 or over in Mexico. However, when the program started to expand in 2009, the take-up rate of the program dropped significantly.[10] While the program was well-publicized for localities eligible in the first two years, it was not well-promoted for those eligible in 2009. For this reason, the localities eligible in 2009 were excluded from the analysis, representing less than 4% of the deaths in our sample during the study period.

Means testing was not introduced into the program until 2012, when it was extended to large

[7] SEDESOL partnered with he same banking organizations used to distribute payments for the Progresa/Oportunidades program. Payments were distributed in person, but recipients could receive a direct deposit in their bank account if they had one. The exact benefit delivery schedule is not fixed and often changed: participating individuals in different localities received cash on different days of the month, all across the two-month payment period. The disbursement was well-publicized by local organizations and newspapers and was available through a telephone hotline.

[8] The program completed its expansion to all localities with less than 2,500 inhabitants in late 2008, thus there may be some lag in program effects. Subsequently, it started expanding to localities up to 20,000 inhabitants (Aguila et al., 2011; Garfias and Rubio, 2010).

[9] This limit refers to the total population of a locality as specified in the 2005 census, not the size of the pension-eligible population over 70.

[10] Sedesol. Dirección General de Seguimiento (General Directorate for Monitoring). With information presented for the Account of the Federal Public Treasury, of the Responsible Unit of the Program and Rules of Operation. Quarterly reports of executed budget (`http://www.sedesol.gob.mx/en/SEDESOL/Informes`$Trimestrales_{d}elpresupuesto_{E}jercido$)|.

urban areas. However, this requirement only applied to new beneficiaries already receiving other social security payments, such as those from the IMSS or ISSSTE pension systems. In 2014, the program underwent another expansion, lowering the eligibility age from 70 to 65.

In order to study the most vulnerable expansion group, and estimate event study effects over several years of cash transfer receipt, we focus attention primarily on the 2007 expansion group in localities with a population under 2,500. We compare this group to the localities of size 30,000 – 100,000 that were untreated until 2012, allowing us to estimate effects through 2011. We also provide slightly shorter duration estimates of mortality impacts for the slightly less vulnerable group expanding in 2008, that were localities sized 2,500 – 20,000, although we are not able to study mechanisms in this group due to data limitations that do not report locality size matched to this category.

3 Data and Sample Construction

3.1 Data Sources

Mortality Data We use individual-level death registries coming from death certificates. This dataset provides us with each individual's cause of death, birth year, sex, and health insurance status (that proxies for access to formal pensions). It comprises every death in the country between 2002 and 2011, with over 3 million records. Furthermore, the records include two key identifiers to determine eligibility, the locality identifier and the population size classifier of the locality of residence. The population size is classified in 10 groups according to the number of residents at the time of the death. The first three categories allow us to identify our group of interest, 1 to 999, 1000 to 1999, and 2,000 to 2,500. In total, 17 categories group the localities according to their size. All are available from Instituto Nacional de Estadistica y Geografía (INEGI).[11]

Data quality is a crucial concern when using the vital statistics registry. Although Mexico generally maintains high-quality vital statistics (Mahapatra et al., 2007; Mikkelsen et al., 2015), records for older individuals in rural areas may be less reliable. Limited access to medical personnel, who are essential for verifying and registering deaths, can result in underreporting or misclas-

[11]The study horizon cannot extend to years before 2002 because locality identifiers were not available in publicly accessible vital statistics data until that year. These identifiers are essential for determining whether the deceased resided in localities eligible for "70 y Más."

sification of causes of death on death certificates.[12] However, the expansion of Mexico's public health insurance program, *Seguro Popular*, which continued to grow throughout the implementation of "70 y Más,", may have influenced death reporting by reducing financial barriers. This could have led to more accurate and timely documentation of deaths and their causes.[13] Previous research suggests that welfare programs can impact the accuracy of reporting (Barham and Rowberry, 2013; Bhalotra et al., 2019). Following Feeney (2018, 2017) to mitigate bias from changes in vital statistics reporting practices, we control for key indicators of reporting quality: the lag time between the date of death and its official registration, as well as whether a medical doctor certified the death. The selection of these variables is guided by previous studies utilizing vital statistics data in low- and middle-income countries, as well as World Health Organization (W.H.O.) guidelines for identifying high-quality vital statistics reporting systems (Barham and Rowberry, 2013; Organization et al., 2013).

Income and Expenditure Data We use the Mexican National Survey of Household Income and Expenditure (ENIGH) between 2005 and 2010. The survey's purpose is to provide a statistical overview of the behavior of household income and expenditure in terms of amount, source, and distribution; additionally, it provides information on the occupational and sociodemographic characteristics of the household members, as well as the characteristics of the housing unit infrastructure and household equipment. Specifically, we use detailed information on individual sources of trimestral income, such as wages, independent business earnings, and government and family transfers, among others. We also use household trimestral spending on food and health (it also includes transportation, education, and clothing). Likewise, it has detailed information on household savings and individual non-monetary sources of income. All surveys are publicly available from INEGI.

Population Data We use INEGI population counts by sex and single year of age from the 2000, 2005, and 2010 Census, broken down by locality population size eligibility and our preferred control group. We use this data to compute aggregated age-locality-eligible mortality rates. Specifically, counts are grouped by age and locality population sizes below 2,500 inhabitants, between 2,500 and below 20,000, and above 20,000 up to 29,999. Our preferred control group is all

[12] When a person dies outside a healthcare facility, the administrative process relies primarily on the family. A doctor must be called to issue an official death certificate and determine the cause of death, typically for a fee. Once the certificate is completed, a relative must visit the civil registration office to forward it to the Ministry of Health and record the vital statistics in the database.

[13] *Seguro Popular* was introduced in 2002 in select municipalities and expanded in a quasi-random manner across Mexico, reaching full municipal coverage by 2006. However, significant portions of the eligible population remained uninsured, prompting continued enrollment efforts in subsequent years.

localities above 30,000 and below 100,000 inhabitants. For completeness, we also have counts for localities above 100,000 inhabitants.[14]

Additional Controls For robustness purposes, we control for other programs and health provision in place during our study period, which could confound the result. First, we use health infrastructure administrative records between 2002 and 2011, 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. The data is publicly available and provided by the Ministry of Health (Secretaria de Salud, 2022). Second, we use administrative data on *Seguro Popular* beneficiaries to include an indicator of whether the municipality was covered or not by the low-income health insurance.[15]

3.2 Sample Construction and Descriptive Statistics

Our sample is restricted to deaths between 65 and 89 years old for the mortality data to properly capture the program's effects on ages with a similar mortality schedule around the eligibility threshold of 70 years.[16] Then, we construct cells with the counts of deaths at the locality level for every age and year. We classify each resulting cell as covered or non-covered using the locality and age eligibility by each program expansion in 2007, 2008, and 2009, based on locality size below 2,500 people, between 2,500 and 19,999, and between 20,000 and 30,000, respectively.

Our sample excludes the 2009 and 2012 expansions because i) the 2009 expansion that covered localities between 20,000 and 30,000 did not have enough take up which would not capture the full program effect and bias our result downward.[17] ii) the 2012 expansion covered all localities, including large urban localities, preventing us from a valid control group after 2012. Therefore, we established a threshold of 100,000 inhabitants for those localities that expanded in 2012, and we used localities between 30,000 and 100,000 population size as our preferred control group.[18] By doing that, we avoid comparisons to large urban centers where mortality patterns may differ from those observed in smaller, less populated regions. Therefore, the analysis will focus on deaths in those rural localities eligible in 2007. In addition, we study the localities included in 2008, which

[14] Data was provided by INEGI Microdata Lab.

[15] *Seguro Popular* started a staggered roll-out in 2002 at the municipality level.

[16] 65 is the usual retirement age in Mexico for those eligible for social security benefits.

[17] According to SEDESOL, the program covered approximately 1.03 millions of beneficiaries in its first year of expansion, it grew 80% in the following expansion in 2008, and 10% in the 2009 expansion.

[18] The results are not sensitive to this cutoff point, and we tried all non eligible localities above 30,000 inhabitants until 2012.

were above the threshold of rurality but still small (below 20,000 inhabitants), where take-up was high enough to learn from its effect; however, because the income and expenditure survey data on mechanisms does not have granular locality-size indicators for isolating this 2008 expansion group, the paper focuses primarily on the original 2007 expansion group. These 2007 expansion localities are also the most economically vulnerable, being the most rural, and hence we hypothesize that any mortality effects would be largest in this 2007 expansion group. Finally, we continue to exclude the localities eligible in 2009 because it can bias our results when using them as a control or treatment due to the low but positive take-up.

Appendix Table A.1 shows deaths in Mexico for older adults aged 65 to 89 years old between 2002 and 2011 overall and by eligibility based on population locality size. A cell is the count of deaths for a given locality and age. For instance, in Column (1), there are 0.06 deaths per locality-age group on average in localities with less than 2,500 inhabitants. In Column (3), all deaths in localities eligible in the first expansion, 2007, add up to 556,158 deaths in the study period. The Columns (5) and (6) show that the average population in the first group of covered localities is 568 inhabitants, and reached 34,184 localities, respectively. We can see how the average number of deaths per cell increases with population size, reflecting the number of zeroes present for a given age at death and a locality for the smaller group of localities. In addition, we can see that the group of localities that gained coverage in 2007 and 2008 represents a third of the deaths in the country in the study period.

Next, we analyze survey data to explore mechanisms that help us to disentangle the mortality findings. Specifically, we use the 2005, 2006, 2008, and 2010 survey waves for the income and expenditure behavior analyses, allowing us two waves before and after the "70 y Más" program started. From there, we create a harmonized cross-section panel at the individual level, restricting all adults between 60 and 80. We define three main income outcomes: individual earnings from wages, total household income, and individual "70 y Más" transfer. Expenditures are only available at the household level; thus we define total household spending, food consumption, and health spending (drugs and medical services). We also define specific groups such as cereals (grain, corn, and starches), meat and dairy (all meats), and sugar-related food (pastries, sugars, soft drinks, etc.) to test whether there are behavior changes due to the cash transfer on the consumption of obesogenic foods rich in processed carbohydrates, starches, sugars, and fats. Likewise, we define alcohol and tobacco consumption since they represent important risk factors for cardiovascular diseases and mortality. From the individual occupation and sociodemographic characteristics, we identify each household member's employment status, weekly hours worked, education attainment,

and whether it is covered by *Seguro Popular*.

We then classify each individual by whether or not the "70 y Más" program covers them. For that, we used the locality population size identifier available in the survey. However, this identifier prevents us from separately classifying household members living in localities with a population between 2,500 and 19,999 to those living in localities 20,000 and 29,999. Therefore, we cannot study the 2008 and 2009 expansion within the household survey. Notwithstanding, we can identify those living in localities with a population size between 14,999 and 100,000, which resemble part of our preferred control group.[19] We use monthly measurements for all income and expenditure monetary outcomes, and we updated them to 2024 Mexican pesos and transformed them into United States dollars.[20]

4 The Impact of the "70 y Más" Pension Program

We begin this section by presenting our empirical strategy, the main estimates of the program's effect on mortality, and robustness checks.

4.1 Empirical Strategy

The phased rollout of the program, geographic coverage, and age eligibility allows us to implement a difference-in-differences-in-differences research design. In particular, we can use the timing of coverage among different localities and age eligibility to study changes in age-locality level outcomes before and after coverage. However, due to the small size of many localities, deaths are not always observed, leading to a high number of zero counts for certain locality-age groups. Additionally, confidentiality restrictions limit data availability in two key ways: (i) for localities with fewer deaths, only the locality size is reported, rather than the actual locality of residence, and (ii) population counts are not publicly available by locality and single age groups.[21] All the limitations above prevent us from computing age-specific death rates at the locality level.

As a result, given the large number of cells with zero deaths, the analysis relies on total death

[19] Using Census data, we estimate the proportion of people above 65+ living in localities between 14,999 and 30,000 inhabitants, is 35% of the total population between 14,999 and 100,000.

[20] All yearly consumer price indexes and exchange rates used are publicly available Bank of Mexico webpage.

[21] 30% of deaths from eligible localities in 2007, below 2,500, are reported as confidential, and classified as being part of a locality with less than 1,000.

counts as the primary outcome, which recent literature encourages (Chen and Roth, 2024; Mullahy and Norton, 2024). Following Menares and Muñoz (2025) we define the outcomes of interest as the yearly counts of deaths within a locality for a given age (e.g., deaths in locality A among people 65 years old in a given year), and we fit Poisson models for counts using a log link, with a general specification given by:

$$y_{alt} = \exp\left(\beta \cdot 70yMas_{alt} + \alpha_a + \gamma_l + \delta_t + \eta_{l_e x a_{70}} + \xi_{l_e x t} + \theta_{t x age_{70}} + \Pi_{lxt}\right)\epsilon_{alt}, \tag{1}$$

where y_{alt} is the count of deaths for those aged a in locality l in year t. $70ymas_{alt}$ is an indicator that equals one from the first time a locality with deaths above 70 is covered and onward, i.e., the treatment is an absorbing state. α_a, γ_l, and δ_t are continuous age, locality, and year fixed effects, respectively. a_{70} and l_e are age and locality eligibility indicators; thus, $\eta_{l_e x a_{70}}$ represents fixed effects that control for time-invariant unobservables variables specific to localities-ages eligible and ineligible groups, $\xi_{l_e x t}$ are time-variant fixed effects that account for year-specific eligible and ineligible localities shocks common across ages, and $\theta_{t x a_{70}}$ are time-variant fixed effects that account for age-eligible shocks common across localities. We also include a vector of controls, Π_{lxt}, to account for time-variant locality characteristics, such as *Progresa* penetration, *Seguro Popular* coverage, and proxies for data quality, such as the average lag of death registration and the share of deaths certified by a medical doctor. Finally, ϵ_{alt} is the error term clustered (two-way) by age and, by eligible locality groups, the level of treatment. In this model, identification of the *causal* effect of the "70 y Más" program is predicated upon the assumption that—conditional on locality, age-specific, year aggregate shocks, time-invariant locality-age-eligible, and time-variant locality-eligible and age-eligible cell indicators—there are no unobserved factors that correlated with both the timing and eligibility of coverage and other determinants of health outcomes.

Following Chen and Roth (2024), our parameter of interest is the average proportional treatment effect on the treated.

$$\theta_{ATT\%} = \frac{E[Y_{alt}(1) - Y_{alt}(0) \mid 70yMas_{alt} = 1, Post_t = 1]}{E[Y_{alt}(0) \mid 70yMas_{alt} = 1, Post_t = 1]} \tag{2}$$

This is the percentage change in the average number of deaths for the covered group in the post-treatment period. As shown in equation (2), what is being estimated is an average level effect –increase or reduction– scaled by an average mortality level, and not a weighted average of the

percentage decline caused by the intervention.[22]

Conveniently, the $\hat{\theta}_{ATT\%}$ can be recovered from $\exp(\hat{\beta}) - 1$, where $\hat{\beta}$ is the estimate obtained from the Poisson model given by equation (1).[23] Thus, we would expect the $\hat{\theta}_{ATT\%}$ to be negative if the program led to a relative decrease in deaths among the covered locality-age group and positive otherwise. The parameter of interest in (1) is the result of the three-way interaction between an indicator for eligible localities in 2007 or 2008, an indicator for those deaths with ages above 70, and an indicator for the post period for a given group of localities.

In this case, identification of the causal effect of the program $\hat{\theta}_{ATT\%}$ is predicated upon the assumption that in the absence of treatment, the *percentage changes* in the mean would have been the same for the covered and non-covered locality and age groups.[24] As in Wooldridge (2023), this can be formalized using a "ratio" version of the parallel trends assumption, sometimes referred to as the "parallel relative trends" assumption.

$$\frac{E[Y_{alt}(0) \mid 70yMas_{alt} = 1, Post_t = 1]}{E[Y_{alt}(0) \mid 70yMas_{alt} = 1, Post_t = 0]} = \frac{E[Y_{alt}(0) \mid 70yMas_{alt} = 0, Post_t = 1]}{E[Y_{alt}(0) \mid 70yMas_{alt} = 0, Post_t = 0]} \tag{3}$$

Intuitively, it states that if the treatment had not occurred, the average percentage change in the mean outcome for the covered group would have been the same as the average percentage change in the mean outcome for the non-covered group. Under the assumption of parallel trends, we can estimate the counterfactual percentage change in the mean outcome for the covered group using the observed percentage change for the non-covered group.

To assess the plausibility of this parallel relative trends assumption, we examine the dynamic effects of "70 y Más" using event studies around the time when the locality-age group becomes covered. For the first expansion in 2007, we use 5 years before and 4 years after, i.e., $t = -5$ in 2002, and $t = 4$ in 2011. For the expansion in 2008, we use 4 periods before and 3 periods after,

[22] For example, consider the number of deaths in eligible and ineligible groups before and after treatment. The eligible group experiences 10,000 deaths before treatment and 7,500 after, while the ineligible group records 15,000 deaths before and 12,000 after. The 25% decline in the ineligible group suggests that in the absence of treatment, deaths in the eligible group would have dropped to 8,000. However, the observed post-treatment deaths in the eligible group are 7,500, representing a 6.25% reduction below this counterfactual estimate (scaled by).

[23] The Poisson quasi-maximum likelihood (QMLE) consistently estimates the population coefficient β, which satisfies $\exp(\beta) - 1 = \frac{E[Y(1)]}{E[Y(0)]} - 1 = \theta_{ATT\%}$. The parameter identified through the Poisson model is known as a rate ratio (RR). A rate ratio, sometimes called an incidence density ratio or incidence rate ratio, is the relative difference measure used to compare the incidence rates of events occurring at any given time (Dicker et al., 2006). Therefore, the interpretation of the value of a rate ratio is similar to that of the risk ratio.

[24] Since the treated and control groups might have different pre-treatment means, assuming parallel trends *in levels* could be a strong assumption, i.e., it may be unreasonable to expect that time-varying factors have equal level effects on the outcome between the group of eligible and non-eligible locality age groups.

i.e., $t = -5$ in 2003, and $t = 3$ in 2011.[25] To estimate this dynamic version of our difference-in-difference-in-differences specification, we use a leads-and-lags model in event time, with the first expansion year set to zero. Specifically, we estimate the following equation:

$$y_{alt} = \exp\left(\sum_{k=-5}^{-2} \beta_k \cdot D_{alt}^k + \sum_{k=0}^{3} \beta_k \cdot D_{alt}^k + \alpha_a + \gamma_l + \delta_t + \eta_{l\times a_{70}} + \xi_{l\times t} + \theta_{t\times age_{70}} + \Pi_{l\times t}\right) \cdot \epsilon_{alt}, \quad (4)$$

where $D_{alt}^k = 1[t = 70yMas_{al} + k]$, and $70yMas_{al}$ is the timing of coverage of a locality eligible-age group axl. In other words, D_{alt}^k is a dummy variable indicating that a locality with deaths above the age 70, al, was included in the program k periods ago (or included k periods ahead, for negative values of k). We normalize the coefficients such that $\beta_{k=-1} = 0$, i.e, treatment is re-coded in event time relative to the year before each locality age group was included in a "70 y Más" expansion. Therefore, the β_k coefficients can be interpreted as the effect of "70 y Más" coverage on the count of deaths y_{alt} for each k period relative to the year before the coverage of a locality-age group al in the "70 y Más" program.

4.2 "70 y Más" Impact on Older Adult Mortality

4.2.1 Descriptive Analyses

We begin by exploring the impact of reform on mortality using raw data. In Figure 1, we provide different mortality measurements for our sample of older adults between 65 and 89 years old. In panel (a), on the left y-axis, we plot the crude and age-adjusted mortality rate, and on the right y-axis, the share of the population between 65 and 89 years old. From there, we can see a drop in mortality rates from 39.5 to 38.5 per 1,000 deaths between 2002 and 2006, before the program started. However, mortality rates after the program started remained almost constant, exhibiting increases in 2008 and 2010, to finally decrease to 38 deaths per thousand in 2011. The trend suggests at least a deceleration in the decrease in mortality rates exhibited before the program started.[26]

[25] Unfortunately, we cannot go back because of the absence of locality identifiers in the administrative records, preventing us from using locality fixed effect to control for the unobservable characteristics in each locality. Likewise, we cannot go more than 2011 because, in 2012, the program covered all localities in the country.

[26] The pattern is the same; after adjusting for weights based on population in 2002, the mortality rate dropped to 37 in 2011. This trend aligns with the broader pattern of population aging. Specifically, in the right y-axis, we see that

To further explore this trend after the program started, in panel (b), we plot age-adjusted mortality rates for eligible and ineligible localities. The solid red and blue navy line depicts increments in mortality for older adults residing in the group of eligible localities in 2007 and 2008, meanwhile our preferred control group, those deaths occurred in localities between 30,000 and 100,000 inhabitants, exhibit a constant mortality rate for three periods after the program started (black solid line). On the contrary, localities above 100,000 inhabitants show a constant decrease in mortality rate during the study period.[27] These descriptive trends suggest an increase in mortality once the program started in the eligible localities in 2007 and 2008, compared to the constant mortality rates in those control localities that did not gain coverage in the study period. In addition, we can observe an overall decrease in localities with more than 100,000 inhabitants, which are larger and richer than rural localities.

In panels (c) and (d) of Figure 1, we zoom in on mortality trends, disaggregating by locality and age eligibility for 2007 and 2008. Additionally, we compare these trends with our preferred control group—deaths in localities with populations between 30,000 and 100,000. Age-adjusted mortality rates are plotted separately, with the left y-axis representing those age-eligible and the right y-axis representing individuals below age 70. Red lines indicate deaths in eligible localities, while black lines represent those in ineligible localities. Likewise, solid lines indicate age eligible deaths, while dashed lines represent those in age ineligible.

In panel (c), the solid red line identifying locality- and age-eligible deaths shows a constant increase in the mortality rate after the program started, with a peak in 2010 of about 45 per 1,000 deaths. Meanwhile, the black solid line, shows a constant death rate after 3 periods in the ineligible localities after the program started. On the other hand, the red dashed line indicates almost constant death rates in those below age 70 residing in eligible localities (right y-axis). The black dashed line depicts a smaller decrease in death rates for the same age group in the ineligible localities (23 in 2006 and 21.5 in 2011). This suggests that there might be an increase in death rates for the group of eligible compared to ineligible localities for those ages 70 and above, but not for those deaths aged 70 or below. A similar, but less pronounced pattern is shown in panel (d) for mortality rates in localities that gain coverage in 2008.

In Figure 1, panels (e) and (f), illustrate the change in the number of deaths in eligible and ineligible localities, both above and below age 70, relative to the year preceding each expansion.

this age group constituted 5% of the population in 2002, increasing to 6% by 2011.

[27] Mortality in those that gained coverage in 2009 also exhibits a constant decrease in mortality rates in the study period. However, its trend is not relevant for our purposes because we do not study this group nor use it as a control.

These aggregated trends capture the cumulative growth of our outcome of interest—the count of deaths—compared to the year before each expansion in 2007 and 2008, alongside our preferred control. Due to the lack of population counts for single-year age groups and the high number of localities with zero deaths for specific ages, these trends provide a visual representation of proportional changes between eligible and ineligible localities, as identified through our Poisson regression, based on our research design.

Panel (e) in Figure 1 shows that deaths among age- and locality-eligible individuals (red solid line) increased proportionally more than those among individuals below age 70 in the same localities (red dashed line). Furthermore, the growth in deaths among the eligible group exceeded that of deaths in ineligible localities for individuals above age 70 during the study period, relative to the year before the cash transfer program began. These patterns suggest that mortality among age-eligible recipients increased proportionally more compared to those who did not receive the transfer, whether they lived in covered localities but were under age 70 or resided in ineligible localities but were age-eligible. Panel (f) shows trends similar to those observed for the 2007 expansion, though with smaller differences.

Even though all deaths increased in the study period, those in the red solid lines increased proportionally more than the non-eligible group of deaths. Additionally, there is almost no increase in deaths below age 70, in eligible and ineligible localities as seen in panels (c) and (d), with a decrease of less than 1 death per 1,000 after the program started (right y-axis). At the same time, there is a steady increase in death rates in age and locality eligible, with a peak in 2010 of about 45 deaths per 1,000 population. Likewise, the overall increase in deaths in this age group may be attributed to the aging population. As seen in Figure 1, panel (a), in this period, this age group constituted 5% of the population in 2002, increasing to 6% by 2011. From there, we can see that once we adjusted by the baseline population in 2002, age-adjusted rates were lower than the crude mortality rate in the study period.

4.2.2 Regression Analyses

Although previous evidence is purely descriptive, it suggests that the "70 y Más" program could be associated with the overall increase in deaths for those age 70, especially for older adults living in rural localities targeted in 2007, and potentially on similar localities in the 2008 expansions. In Figure 2, we complement the visual assessment of the trends in the raw data plotting the point estimate of the differences in difference capturing the effect of "70 y Más" after the program started

for every single age between eligible and ineligible localities. Panel (a) shows that deaths of those below age 70 after the program started in localities eligible for the transfer in 2007 are not significantly different compared to deaths in ineligible localities. However, for people above age 70, point estimates are significant and positive between deaths in eligible and ineligible localities, which validate our design.

The previous exercises suggest that deaths aged 70 and above for those residing in eligible localities for the 2007 expansion would have increased more than those below age 70 and non-residing in eligible localities. To study this hypothesis formally —and quantify the impact—we present the results of our triple difference-in-differences research design for the 2007 and 2008 expansions separately.[28][29] Table 1 presents the estimates obtained from the model in equation (1). Our main result is presented in Column (1), which considers the count of all deaths as the dependent variable for the group that expanded in 2007 for ages between 65 and 89. Consistent with the preliminary evidence, for the group that started receiving the benefit in 2007, we find a statistically significant impact of the "70 y Más" program on mortality, with an average percent change in deaths from people above 70 living in localities that went from ineligible to eligible increasing by 5.4%.[30] This effect corresponds to the average proportional treatment effect on the treated across eligible localities and ages.

In Table 1, Columns (2) to (5), we break down the eligible ages -those aged 70 or above- into 5 year-age groups, and we estimate our model in equation (1) for each group. The results captures the effect of "70 y Más" between eligible and ineligible localities for those aged 70 to 74, 75 to 79, 80 to 84, and 85 to 89, separately. We found that all age group effects remain positive and significant, but vary according to the age groups. The less adverse effect is a 2.9% increase in deaths after the program started for those aged 70 to 74, residing in eligible localities. On the contrary, the largest adverse effect is for those aged 85 to 89, which is consistent with the increase in mortality driven mostly by age.

[28] As mentioned in section 3.2 previously, we can only study mechanisms for the 2007 expansion in the household income and expenditure survey. Therefore, we focus most of the analyses in the 2007 group of eligible rural localities, which are the main target of the program.

[29] We are not pooling 2007 and 2008 group of expansion altogether because the recent literature on two-way fixed effects estimators has shown that estimates from linear models can differ from the group's average treatment on the treated (ATT) in the presence of treatment effect heterogeneity (De Chaisemartin and d'Haultfoeuille, 2020; Callaway and Sant'Anna, 2021; Sun and Abraham, 2021). Therefore, in the absence of recent developments for heterogeneous treatment effects in non-linear models, that avoid forbidden comparison, we do all the analyses separately for the 2007 and 2008 expansions.

[30] In Appendix Table A.2, we present the results for the group that gained coverage in 2008, which for them the effect was a 2.48% increase in deaths after they started receiving the cash transfer.

The previous coefficients allow us to compute the number of additional deaths due to the cash transfer. In the localities eligible for expansion in 2007 there were 43,143 annual deaths in the period just before expansion. A 5.4% increase would be 2,329 additional deaths per year, thus a substantively significant number.

In light of research suggesting that some diseases may be more responsive to shock in income than others (Snyder and Evans, 2006; Adda et al., 2009; Ahammer et al., 2017; Aguila et al., 2024), we study the differential impact of the program on deaths (1) from causes related to cardiovascular and circulatory diseases, and (2) mortality from non-cardiovascular/non-circulatory disease-related causes. Cardiovascular and circulatory disease-related mortality includes causes of death attributable to ischemic heart disease, stroke, and diabetes, among many others.[31] Major risk factors for these diseases are obesity, weight gain, and high blood pressure. Non-circulatory/non-cardiovascular disease-related mortality includes all other causes of death, group into the following categories: infections, accidents (traffic and other types), cancers, respiratory illnesses, kidney disease and digestive illnesses, congenital disorders, violence, and a small minority of "other" causes unrelated to the cardiovascular/circulatory system. We estimate a variant of the model (1) that includes an interaction between the $70yMas_{alt}$ indicator and a variable that equals one for deaths classified as cardiovascular diseases related, as well as all other interactions with fixed effects. In Table 2, Columns (3) to (4), we present the results of the cardiovascular diseases interaction. In Column (3) specifically, we show that for those deaths residing in localities that received the benefit in 2007, there is a significant increase of 12.5% in deaths related to cardiovascular diseases compared to those non-cardiovascular.

To assess the dynamics of the impact on mortality, Figure 3, presents the event study estimates obtained from model (4) using the count of deaths as the dependent variable. The horizontal axis shows the years relative to the coverage expansion, with event time zero denoting the first year of expansion. We omit event time -1 so that all estimates are relative to the year before the expansion. Point estimates of leads and lags are plotted along with their 95% confidence intervals. Panel (a) illustrates the effect in eligible localities in the first wave of expansion in 2007 for rural localities only. The figure shows that pre-period estimates are not statistically different from zero, a result in line with our assumption of parallel relative trends. However, after three years of the programs, it is possible to identify an adverse and significant effect on deaths of more than 5%, in line with our results in Table 1, Column (1). We believe there are no significant effects immediately due to the staggered rollout of the program that started in May 2007, reaching all eligible localities

[31] For simplicity, from now on, we will use cardiovascular diseases to refer also to circulatory diseases.

by December 2008; thus, it is not unlikely to see a point estimate of 0 in the first two years. Furthermore, given the nature of the program, it is possible that the cash transfer had a cumulative detrimental effect on health that increased deaths 3 to 4 years after its first disbursement. In Panel (b), we plot the dynamics of the group of the smallest urban localities that gain access in 2008. From there, we cannot see significant effects after the program started.

Heterogeneous Effects In Table 3, Columns (1) and (2) we explore whether the program had a different impact depending on sex due to different age-specific death rates and comorbidities between males and females. In Column (1) we show that for those eligible in 2007, the program had a larger and significant adverse effect on males than females, with a 5.4% effect for males. Figure 4 illustrates event studies for females and males in the top two panels, and cardiovascular and non-cardiovascular causes of death in the lower panels. Panel (a) shows an adverse and significant effect only for males, following a similar pattern to the one we find for the entire sample. In panel (c), we also find a positive and significant effect only for cardiovascular diseases for those eligible in 2007.[32] This Figure shows consistent results with the results in Column (1) in Table 2 and Column (3) in Table 3. Our findings suggest that the adverse effect found is driven mostly because of the increase in cardiovascular mortality in males.[33] Additionally, we stratified our samples using private health insurance as a proxy for high-income older adults, and we classified the rest, those covered under *Seguro Popular* and uninsured, as low-income. In Table 3, Column (4) we see that the effect on low-income is positive, but nonsignificant, which suggests no significant difference between the high and low-income population.

Furthermore, in Appendix Figures A.3, we replicate the event studies for the Columns (2) to (5) in Table 1, but given the smaller sample sizes we are not able to detect significant effects after the "70 y Más" program.[34] Likewise, in Appendix Figure A.5 we break down the 5 year age-eligible groups by sex. Panel (b), indicates a significant increase in deaths 1 period after the "70 y Más" program started in eligible localities for those males aged 70 to 74. A similar effect is found in panel (f) for those aged 80 to 84. There are no significant effects for females in any of the different age-eligible groups, supporting our previous claims that most of the increase in mortality is led by males.[35]

[32] In Appendix Figure A.1, we plot all groups of diseases arriving at similar conclusions that most of the deaths are led by those related to cardiovascular diseases.

[33] In Appendix Figure A.2, we attempt to show event studies that combine the effect of cardiovascular disease separately for males and females, with the consequent lack of power to obtain precise estimates. However, panel (b) still supports our claim that most of the adverse effect is on males due to the increase in cardiovascular mortality.

[34] Appendix Figure A.4 does the same for those results in Appendix Table A.2.

[35] Appendix Figure A.6 does the same for those eligible in 2008.

Identification Assumptions A key assumption for the validity of our results is the absence of anticipation effects among recipients. While we find no statistically significant differences in mortality between eligible and ineligible localities before the program began, one might argue that individuals from larger localities could have relocated to smaller, eligible localities in anticipation of the program. However, data from the longitudinal Mexican Health and Aging Study suggest negligible migration during the study period.[36] Among older adults aged 61 to 66 in 2003—who would turn 70 by 2007—only 2.36% of those residing in localities with populations above 2,500 reported living in eligible localities (under 2,500 inhabitants) by 2012. This indicates no substantial migration between ineligible and eligible localities before or after the program's implementation. Expanding this analysis to adjacent birth cohorts (1932–1942), we find a similar pattern, with only 2.48% reporting residence in eligible localities by 2012. Thus, the MHAS suggest that migration in response to program eligibility was minimal and unlikely to bias our results.

Another threat to the validity of our results is that the recipients could have manipulated their age to receive the benefits before age eligibility. Likewise, it is possible that there could be misreporting in the age at death in the vital statistics. First, we believe this is not a concern because of the birth certificate requirements for enrollment. For the second, in the case of the death certificates, as mentioned in section 3.1, Mexico has a long-standing quality in vital statistics, and on top of that, we use data quality covariates to address potential misreporting. Notwithstanding, it is possible to observe age heaping at the cut-off, given that some ages at death still could be misreported. In Appendix Figure A.7 we implement a donut strategy approach to deal with potential heaping at the age of eligibility. From there, we can see when we drop those ages between 69 and 71, our results remain and follow a similar pattern of those in Figure 3.

5 Mechanisms

For the first time in Mexico, the "70 y Más" program has provided a fixed amount to older adults living in rural areas.[37] However, after its implementation, we have documented the unintended

[36]The Mexican Health and Aging Study (MHAS) is a national longitudinal study of adults 50 years and older in Mexico. The baseline survey, with national and urban/rural representation of adults born in 1951 or earlier, was conducted in 2001 with follow-up interviews in 2003, 2012, 2015, 2018, 2021 and 2024. The MHAS is partly sponsored by the National Institutes of Health/National Institute on Aging (grant number NIH R01AG018016) in the United States and the Instituto Nacional de Estadística y Geografía (INEGI) in Mexico.

[37]As previously mentioned in section 2, there were other programs implemented at the state level before 2007, but not necessarily targeting the rural areas, nor the whole nation. In Appendix Figure A.8 shows no significant differences in the trend once we removed states with benefits with other noncontributory pensions before "70 y Más" started.

effects of this cash transfer on mortality for older adults living in the eligible localities. It increased cardiovascular diseases significantly more than others in those rural localities targeted in 2007. It also has a larger effect on males than females older adults. This section investigates potential mechanisms that could explain our findings. We use household income and expenditure survey data to investigate whether the targeted individual received the benefits and then identify the main spending channels to link behavior changes.

In addition to analyzing the full population in these localities, in the appendix we present further models subsetting the most vulnerable population in the ENIGH survey, based on household head's educational attainment. While health insurance coverage could serve as a proxy, as it did in the mortality records, this information is only available for employed individuals in survey waves conducted before the program's implementation. Consequently, it does not provide a consistent identifier across surveys.[38] In Figure A.9, we evaluate the health insurance coverage relative to educational attainment as an alternative proxy. We also compare two thresholds of educational attainment: individuals with incomplete primary education (panel a) and those whose highest education is completed primary or less. Panel (a) demonstrates that individuals with incomplete primary education exhibit patterns similar to those without health insurance coverage, supporting its use as a comparable measure of socioeconomic status across surveys. Furthermore, this finding validates using health insurance as a proxy in the mortality records and its consistency with the household head's educational attainment as a socioeconomic indicator in the ENIGH survey.

5.1 Empirical Strategy

To estimate the causal effect of the cash transfer, we leverage the requirement that older adults must be age 70 or older and living in eligible localities to receive the benefits. Therefore, individuals who are just above the age threshold should be, on average, otherwise identical to those below age 70. This structure facilitates a regression-discontinuity (RD) design estimating the intent-to-treat (ITT) effect of "70 y Más" on older adults outcomes.

Our preferred RD specification is a local linear model, following Gelman and Imbens (2019), with age at eligibility (the running variable) centered around 70.[39]

[38] In the mortality records, low-income populations were proxied by those without health insurance or those recently covered by *Seguro Popular*, due to the lack of other socioeconomic indicators.

[39] For simplicity, we still present our preferred specification using age 70 as the cut-off for the discontinuity, but we drop them in our analyses.

$$y_{it} = \alpha + \beta \cdot \mathbb{1}(age_i \geq 70) + \gamma \cdot (age_i - 70) + \delta \cdot \mathbb{1}(age_i \geq 70) \cdot (age_i - 70) + \theta_t + \epsilon_{it}, \quad (5)$$

where y_{it} is one of several outcomes of interest for the individual or household i in year t. Since we observe each individual age reported in the survey, the term $\mathbb{1}(age_i \geq 70)$ is an indicator for an individual i being other than 70. However, given that we have income at the individual level, and expenditure at the household level, we use the maximum age of a member within the household for all expenditure outcomes, thus our running variable depends on the outcome. The parameter of interest is β, which measures the jump in the regression function at the discontinuity. θ_t is the year of the survey fixed effect, and ϵ_{it} is the error term clustered at the household level. We use survey weights and drop each outcome outlier upper 1%. The fourth term of equation (5) allow for different slopes of the regression function on either side of the cut off.

To better understand the dynamics of the income shock, we first estimate separate RD models before and after the cash transfer, and also between the eligible and ineligible localities samples. We then compare the eligible and ineligible localities in the post period to estimate a difference-in-discontinuities model via the following specification:

$$\begin{aligned} y_{it} = {} & \beta_0 + \beta_1 \cdot \mathbb{1}(age_i \geq 70) \cdot \mathbb{1}(EligibleLocality_i) + \beta_2 \cdot \mathbb{1}(age_i \geq 70) \\ & + \beta_3 \cdot (age_i - 70) \cdot \mathbb{1}(EligibleLocality_i) + \beta_4 \cdot (age_i - 70) \\ & + \beta_5 \cdot \mathbb{1}(age_i \geq 70) \cdot (age_i - 70) \cdot \mathbb{1}(EligibleLocality_i) + \beta_6 \cdot \mathbb{1}(age_i \geq 70) \cdot (age_i - 70) \\ & + \theta_t + \mathbb{1}(EligibleLocality_i) + \epsilon_{it}, \end{aligned} \quad (6)$$

where *EligibileLocality* is an indicator for an individual or household i living in the eligible localities. By setting *EligibileLocality* equal to zero, the equation collapses to equation (5) for the ineligible sample. The key parameter of interest in the specification is β_1, which measures the difference in the outcome discontinuities between the eligible and ineligible samples. The terms in the third line of equation (6) allow for different slopes of the regression function on either side of the cut off and for these slopes to differ between the two samples.[40]

[40] See Grembi et al. (2016) for a formal analysis of D-RD models and Deshpande (2016), Malamud et al. (2023), Masuda and Shigeoka (2023), and Hyman et al. (2024) for recent examples.

The key identifying assumption of the RD is that the potential outcomes are smooth at the age-70 cutoff in the absence of the treatment. We perform checks to validate the research design. First, we test for balance in baseline covariates at the discontinuity by replacing y_{it} in equations (5) with household size, and labor market characteristics such as labor force participation and earnings at baseline. Second, we verify that the density of the age distribution is smooth at the discontinuity. However, since the age eligibility comes from one respondent in the household, there could be misreporting of household members' ages. As we observe age heaping at ages 60, 65, 70, and 75 (Figure A.10), we exclude older adults who reported age 70. Even though age heaping is due to misreporting, older adults must use birth certificates to claim the benefits. They thus cannot manipulate their date of birth to influence cash transfer eligibility.[41]

5.2 The "70 y Más" Program Impact on Work, Income and Household Expenditure

To illustrate the variation identifying our estimates, we present scatterplots from estimating equation (5) for a various outcomes. We depicted them in four separate panels, to show the effects before and after the program started, and between eligible and ineligible localities. We start by validating our research design, showing in Figures A.11 to A.12, panels (a) and (c) that outcomes are nearly balanced in both the eligible and ineligible samples at baseline (before the program started). In particular, there were no significant jumps above and below the number of household members, no difference in the low-income health insurance coverage. The nonsignificant jump in household size is important, so we can use it to transform our outcomes to per capita household spending. Additionally, the almost no difference in coverage of *Seguro Popular* before and after, and between eligible and ineligible for those above and below age 70, ensures that the findings are not driven by different coverage after "70 y Más".

Then, we use the ENIGH Survey to study the effects of the "70 y Más" cash transfer. The panel (d) in Figure 5 shows a clear first stage for "70 y Más" cash transfer, which exhibits a jump at age 70 from 0 to about 40 USD after the program started in eligible localities, which validates the use of ENIGH to study household spending behavior. In Appendix Figure A.14, we show the food spending per capita, which does not exhibit a visual jump in panel (d), but compared to panel

[41] These can also be thought of as a donut RD; thus, the assumption is that the potential outcomes would have evolved smoothly through the excluded donut -age 70- without eligibility. The RD estimate, therefore, compares the jump between the projected estimate immediately to the left of the discontinuity to the regression function immediately to the right. As robustness to using a donut, we kept those age 70 and found nearly identical results.

(b), those ineligible show a decrease in food consumption, which suggests a possible protective effect of the transfer.[42] Given that most deaths in the smaller and poorer localities that expanded in 2007 were due to cardiovascular and circulatory diseases, we explore if it is possible to link food spending to obesogenic foods. Appendix Figures A.15 to A.17 show scatter plots results for the three groups of obesogenic foods, i) meats and dairy, ii) sugar, fats, and soft drinks, and iii) cereals and starches. All Figures show possible positive differences between panels (d) and (c), which could align with an increase in obesogenic food spending in older adults aged 70 or above living in eligible localities.

In Appendix Figures A.18 and A.19, we also explore the potential negative effects that tobacco and alcohol spending could have had on mortality; however, we do not see visual effects between eligible and ineligible localities. Likewise, we explore whether health-related spending could explain our findings. In Appendix Figures A.20 and A.22, we study health spending related outcomes, such as household and per capita health spending, which comprises medication and medical services. We do not observe visual discontinuity for household and per capita health spending at age 70, nor between eligible and ineligible localities. When looking at medication and medical services separately, we arrive at similar conclusions, thus there are not detectable decreases in health spending that could have led to the worsening of health outcomes.

To test whether all of the visual differences described before are significant, we estimate the difference in discontinuities model in equation (6). We estimate RD-D models separately between eligible and ineligible and before and after. Table 4 and 5 - 6 show the individual and household level outcomes results, respectively.[43] In each table, Panel A shows the results of our RD-D model between eligible and ineligible, and panel B shows the difference in discontinuities before and after the program started. Table 4, Columns (2) and (3) show the effect for earnings from work and income from any source, both show negative and insignificant effects at age 70 for eligible localities, and after the program started for those aged 70 or above. Table 6, Columns (2) to (4) show the smaller but positive effects on obesogenic foods we visually observed previously but the effects are small and insignificant. It is important to note that there is limited power in many of our comparisons though; e.g., 95% confidence interval cannot rule out modest sized changes in food expenditure categories. Furthermore, since the household survey measures expenditure at the

[42] In Appendix Figure A.13, we use the original outcome for the total household spending on food, arriving at similar conclusions as the per capita using a uniform distribution of members in the household. It could be the case of weighting based on members' age within the household.

[43] In Appendix Tables A.6 and A.7 - A.8 we show the same results for the most vulnerable population in the ENIGH Survey.

household level only, we cannot yet rule out that an increase in obesogenic food may be linked with the increase in deaths.

Despite this power limitation, we do by contrast find intriguing evidence of potential large impacts of the cash transfers on labor market activity. Figures 6 to 9 present the RD results for wage earnings, labor force participation, and hours worked, and Table 4 presents the summary RD-D estimated effects. Visually, Figure 6 suggests a strong decrease in wage earnings in the post period for those over age 70, compared to the pre-period. Figure 7 similarly suggests a decrease in labor force participation. It is notable though that in the pre-period the ineligible (larger) localities exhibited substantially lower labor force participation at older ages than did the eligible localities, indicating that ineligible communities may be a poor comparison group, thus arguably the pre-post RD-D is the more reliable comparison. Indeed, Tables 4 and 5 show substantially different results for the two different RD-D comparisons presented; if the stronger comparison is the pre-post model in the lower panels, then that would indicate large impacts on labor market activity. In terms of individually-measured outcomes in Table 4, employment is estimated to decrease 19.6 percentage points (s.e.=8.7) at age 70 in the post-period relative to the pre-period, on a mean of 49%. Individual and household earnings also significantly decline, although there is no significant change in overall income (capturing both the drop in wage earnings but also the increase due to the cash transfer and possible informal household business work).

6 Conclusion

We analyze the effects of a large cash transfer program on adult health and mortality outcomes vis-a-vis a non-contributory pension targeting the poor in Mexico. Contrary to the limited evidence from similar programs in other low- and middle-income settings published recently, we find an increase in mortality of 5.4%. We find that deaths from cardiovascular diseases had a larger percentage increase than non-cardiovascular deaths for the smallest localities covered in 2007. Most of this increase in deaths is among males.

While the evidence presented is among the first to document such unintended adverse effects in low-income settings, their relevance extends beyond Mexico to other countries as well. As experimentation with cash transfer policies becomes more common, these results offer valuable insights. Although the findings focus on pension programs, they could possibly apply to other cash-based welfare policies, such as universal basic income. The need to develop tools to mitigate these ad-

verse effects to achieve meaningful long-term gains should be considered when similar policies are implemented. Further research understanding potential mechanisms, potentially related to reducing labor force participation, would be of great value.

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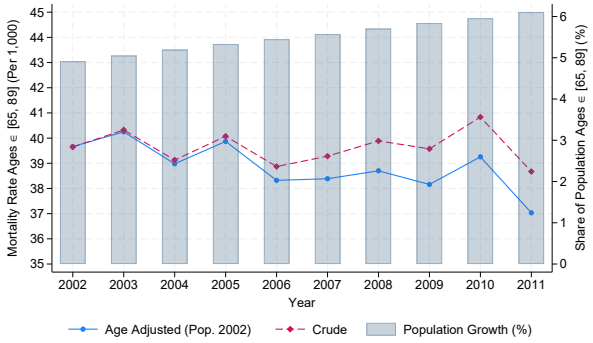
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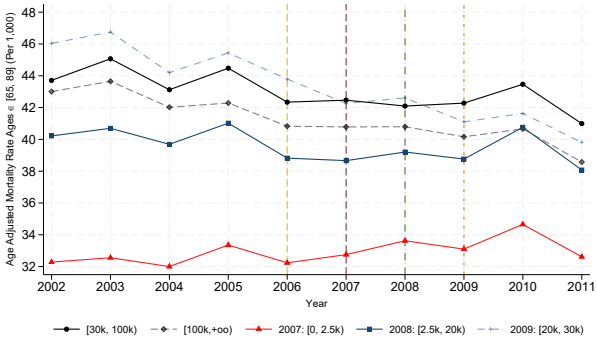
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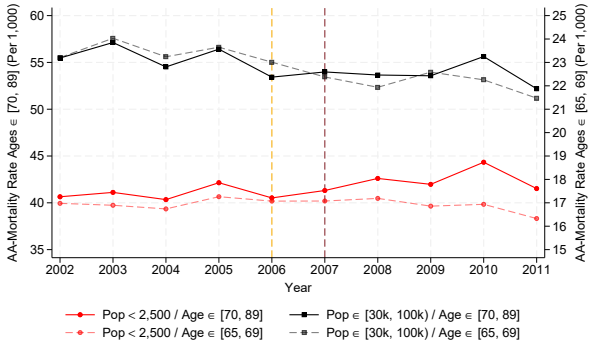
Figure 1: Mortality Rate and Deaths by Expansion Group



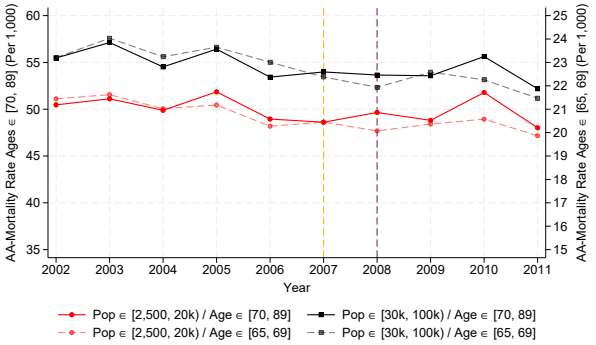
(a) Mortality Rate



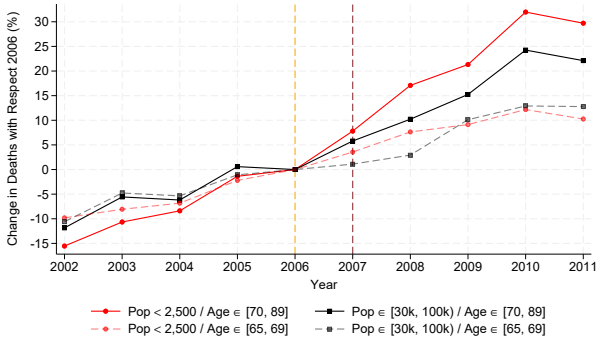
(b) Mortality Rate by Locality Eligibility



(c) Mortality Rate by Eligibility in 2007



(d) Mortality Rate by Eligibility in 2008



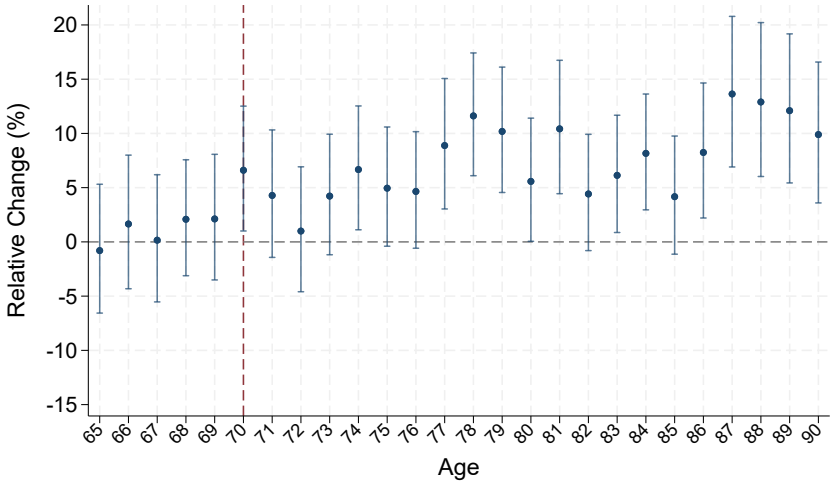
(e) Growth in Deaths by Eligibility in 2007



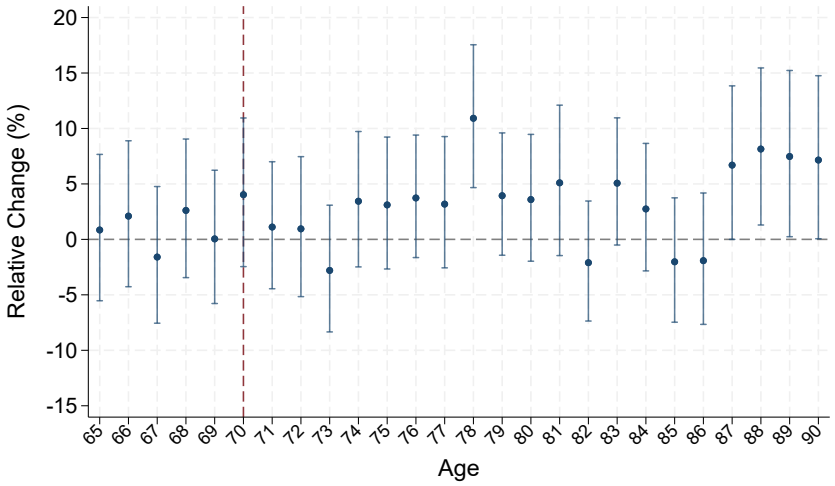
(f) Growth in Deaths by Eligibility in 2008

Notes: This figure uses raw data to show different mortality measurements for older adults aged 65 to 89 between 2002 and 2011. Panel (a): crude and age-adjusted mortality rates (age-adjusting to the 2002 baseline population). Panel (b): age-adjusted mortality rates by locality population size groups (in thousands). Panels (c) and (d): age-adjusted mortality rates above and below 70 years old for the eligible localities by each "70 y Más" expansion and comparison group. Panels (e) and (f) show the growth in deaths above and below 70 years old for the localities covered by each "70 y Más" expansion and comparison group. All changes are calculated with respect to the year before each expansion. The population data is derived from interpolated counts based on the 2000, 2005, and 2010 Census. The vertical solid yellow line represents one year before the expansion.

Figure 2: "70 y Más" Impact on Deaths by Age



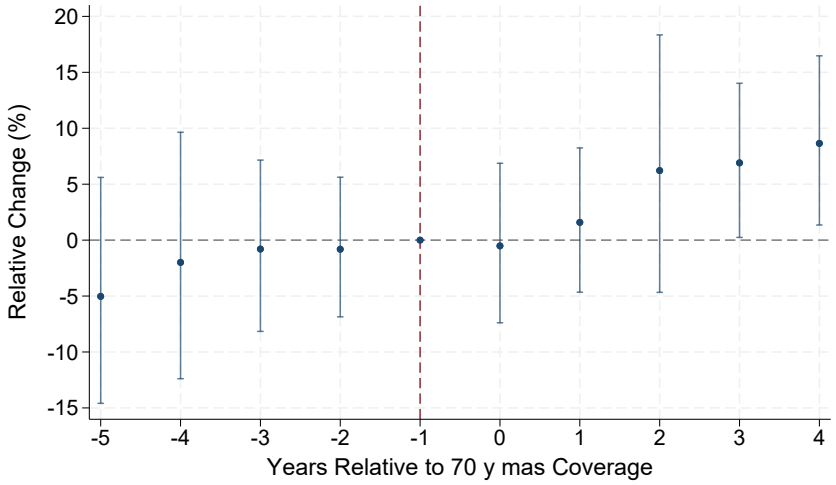
(a) 2007



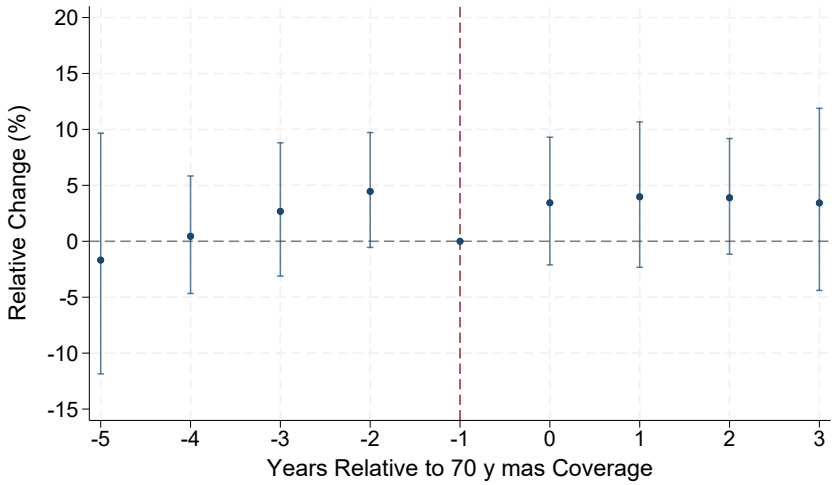
(b) 2008

Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences (pre-post in expansion vs comparison localities) at every age using the count of deaths as the dependent variable in a Poisson regression. All regressions control for the locality, year-fixed effects, and year-locality eligibility. Standard errors are clustered at the level of treatment: locality. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level.

Figure 3: Event Studies: "70 y Más" Impact on Deaths by Expansion Group



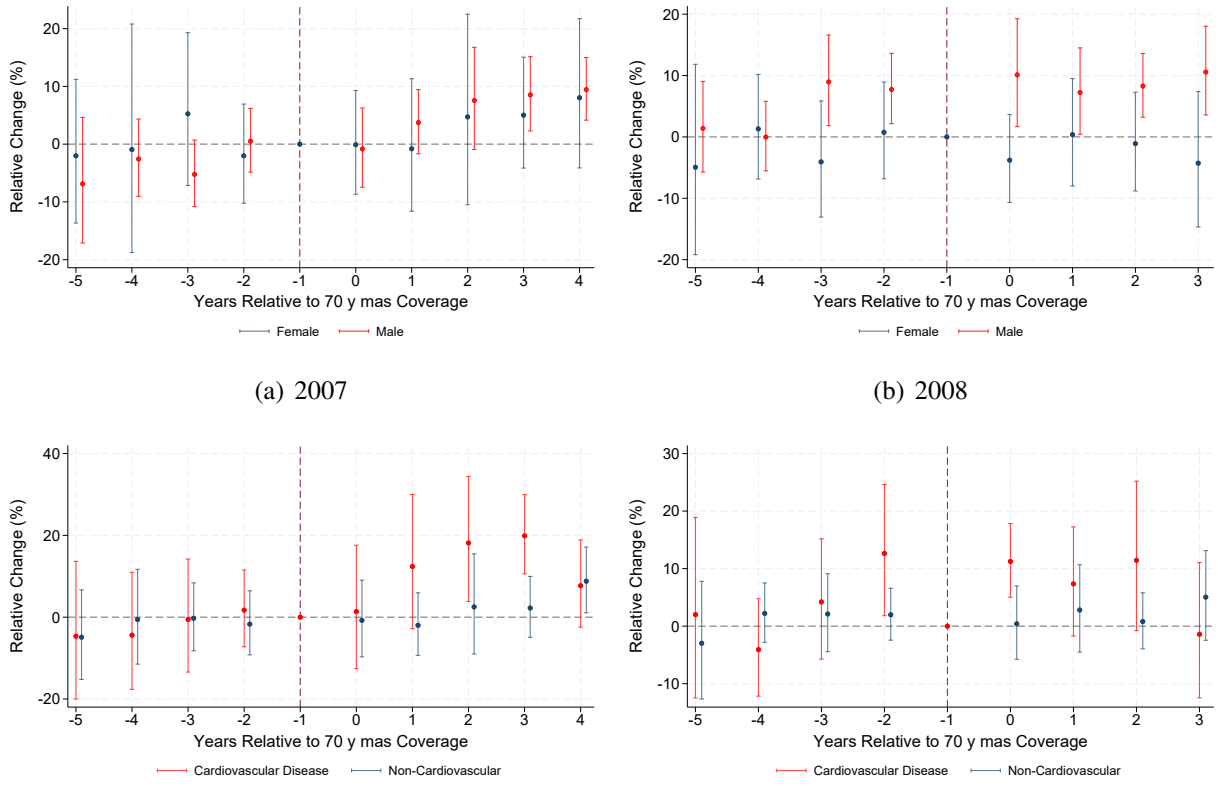
(a) 2007



(b) 2008

Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. All regressions control for the locality, age, and year fixed effects, as well as locality-age eligibility, year-locality eligibility, and year-age eligibility fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before a locality-age group started to be eligible by the "70 y Más" program. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level.

Figure 4: Event Studies: "70 y Más" Impact on Deaths by Sex and CVD Cause

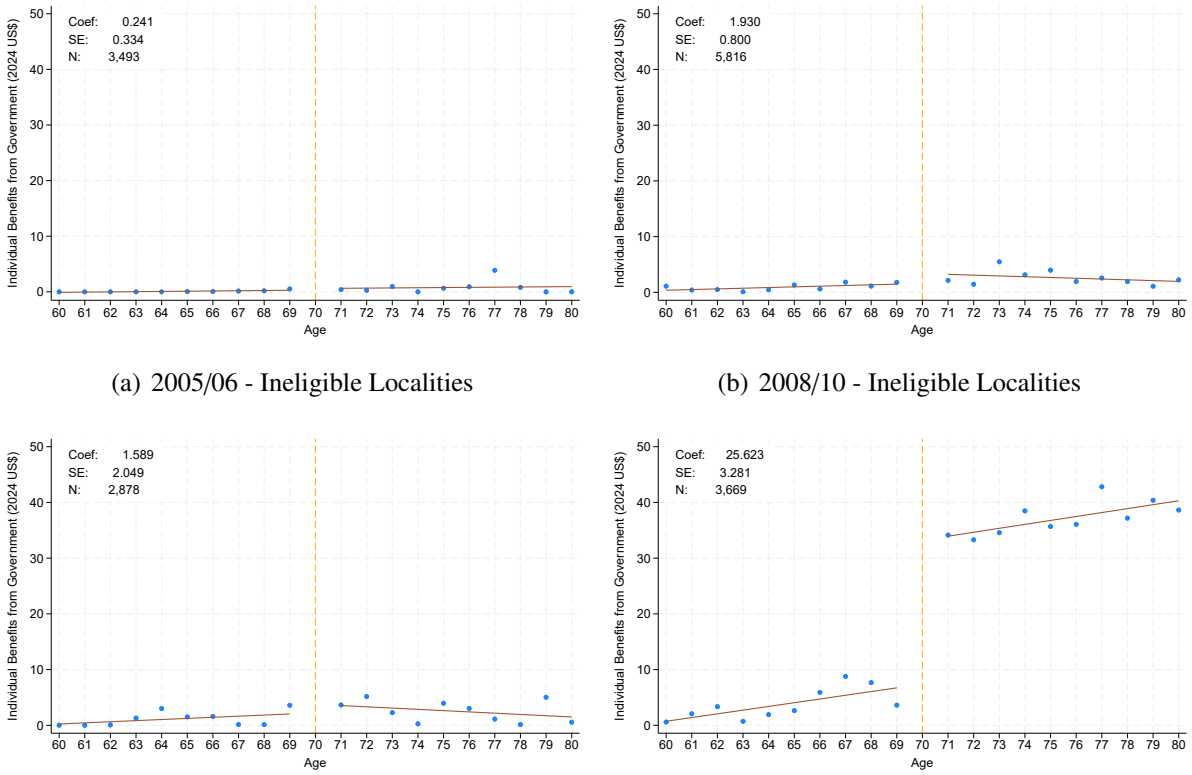


(a) 2007 (b) 2008

(c) 2007 (d) 2008

Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. Panels (a) and (b) show the results separated for females and males for each expansion. Panels (c) and (d) show the results for cardiovascular and circulatory, and non-cardiovascular and circulatory diseases separately. All regressions control for the locality, age, and year fixed effects, as well as locality-age eligibility, year-locality eligibility, and year-age eligibility fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before a locality-age group started to be eligible by the "70 y Más" program. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level.

Figure 5: RD Scatterplot for Amount of "70 y Más" Transfer Received



(a) 2005/06 - Ineligible Localities

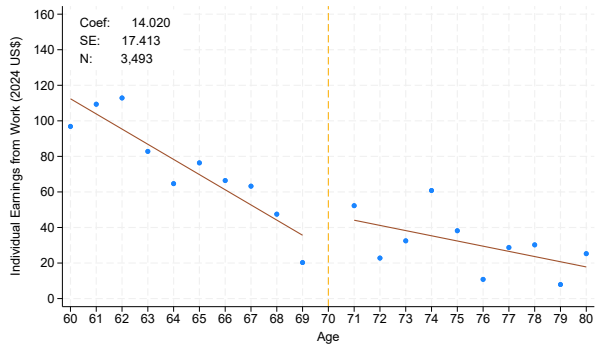
(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

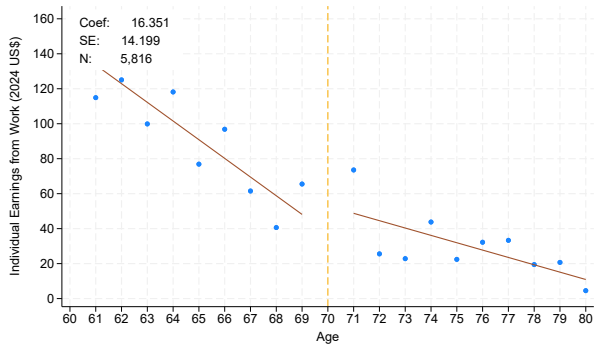
(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for the amount of the "70 y Más" cash transfer reported received, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. All regressions are estimated at the individual level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

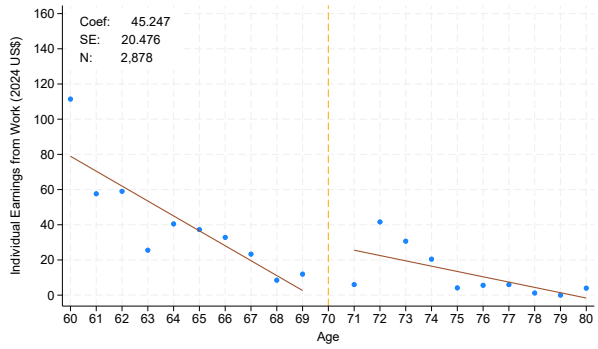
Figure 6: RD Scatterplot for Individual Earnings



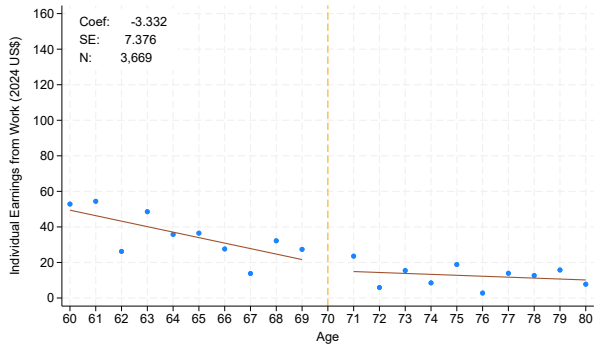
(a) 2005/06 - Ineligible Localities



(b) 2008 - Ineligible Localities



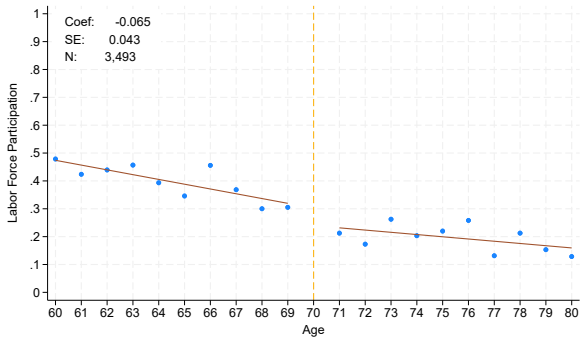
(c) 2005/06 - Eligible Localities



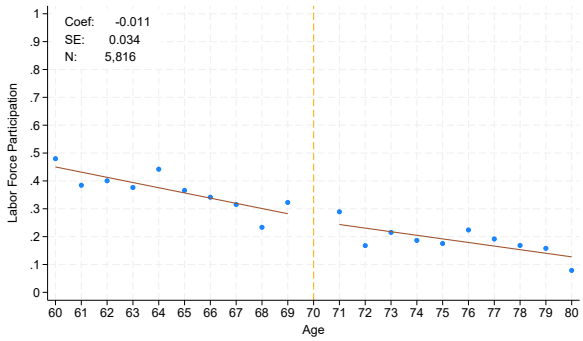
(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for individual wage earnings, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the individual age. All regressions are estimated at the individual level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

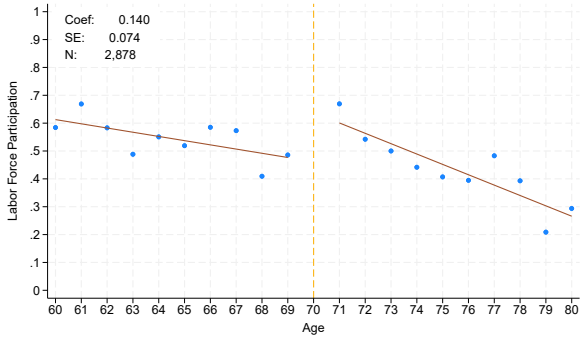
Figure 7: RD Scatterplot for Labor Force Participation



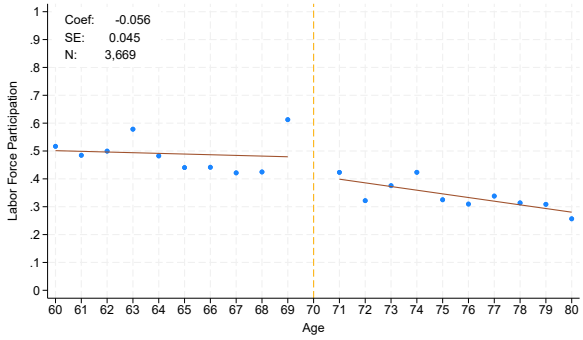
(a) 2005/06 - Ineligible Localities



(b) 2008/10 - Ineligible Localities



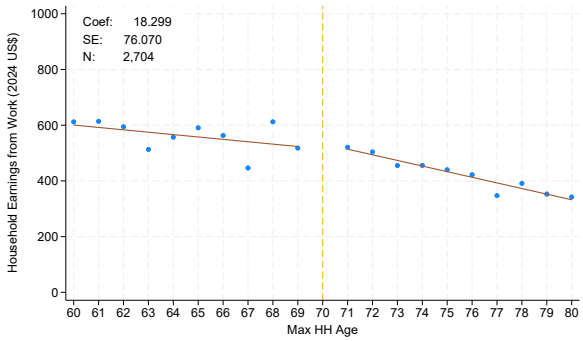
(c) 2005/06 - Eligible Localities



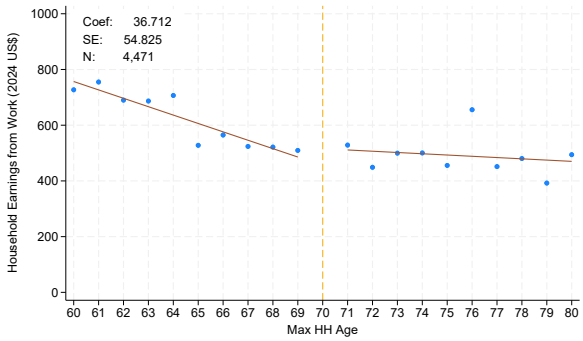
(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for labor force participation, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. All regressions are estimated at the individual level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

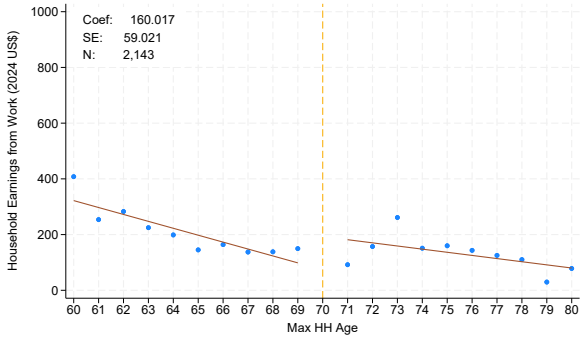
Figure 8: RD Scatterplot for Household Earnings



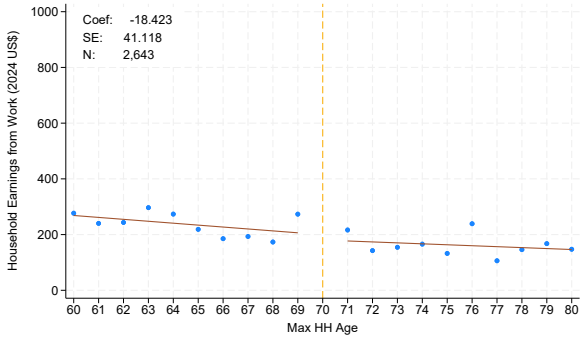
(a) 2005/06 - Ineligible Localities



(b) 2008/10 - Ineligible Localities



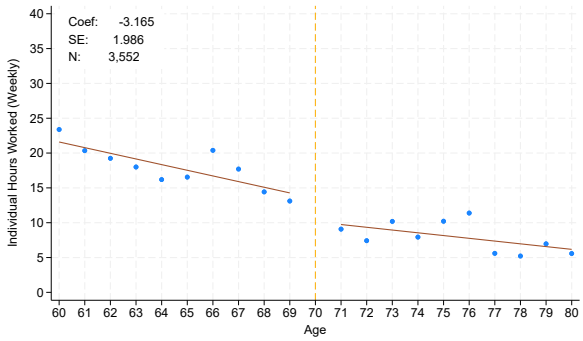
(c) 2005/06 - Eligible Localities



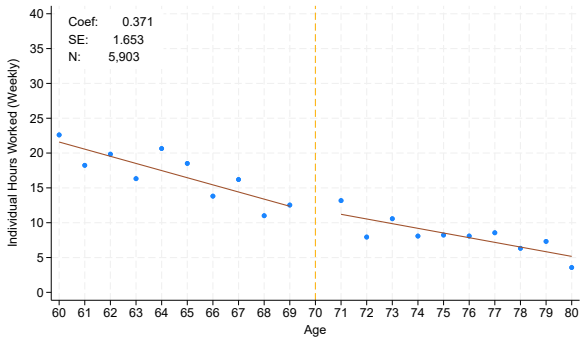
(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for total household earnings, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

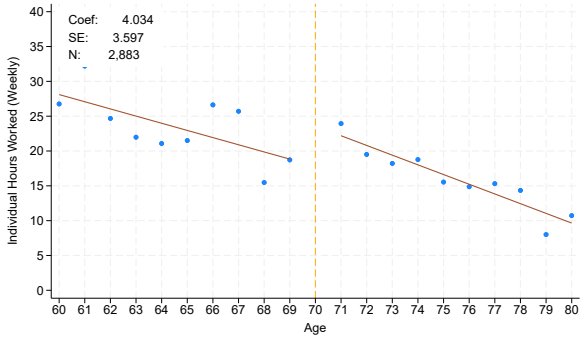
Figure 9: RD Scatterplot for Hours Worked Weekly



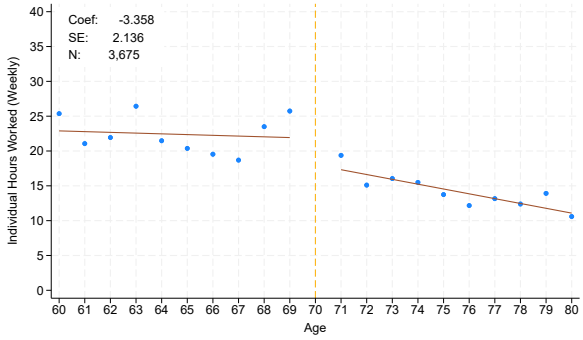
(a) 2005/06 - Ineligible Localities



(b) 2008/10 - Ineligible Localities



(c) 2005/06 - Eligible Localities



(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for individual hours worked, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is individual age. All regressions are estimated at the individual level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Table 1: "70 y Más" DDD Impact on Deaths for the 2007 Eligible Localities

	Main	By Age Groups			
	65-69 vs. 70-89	65-69 vs. 70-74	65-69 vs. 75-79	65-69 vs. 80-84	65-69 vs. 85-89
	(1)	(2)	(3)	(4)	(5)
After 70 y Más	0.0540***	0.0292**	0.0620***	0.0375***	0.0888***
	(0.0119)	(0.0144)	(0.0173)	(0.0141)	(0.0223)
No. Deaths	703,775	273,458	285,586	283,591	269,048
No. Deaths Eligibles	500,198	193,105	202,691	202,280	196,507
No. Deaths Ineligibles	203,577	80,353	82,895	81,311	72,541
No. Deaths Eligibles (year before coverage)	43,143	10,336	11,894	11,553	9,360
No. Localities	33,041	27,952	28,261	28,115	28,128
No. Locality-Age cells (obs.)	7,602,690	2,656,255	2,685,610	2,671,740	2,812,800
No. Locality-Age Eligible cells (obs.)	7,561,940	2,639,955	2,669,310	2,655,440	2,796,500
No. Locality-Age Ineligible cells (obs.)	40,750	16,300	16,300	16,300	16,300
No. Locality-Age non-zero cells (obs.)	438,436	170,594	177,986	177,741	174,123
Locality Controls	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Locality FE	Y	Y	Y	Y	Y
Age FE	Y	Y	Y	Y	Y
Year x Age Eligible FE	Y	Y	Y	Y	Y
Year x Locality Eligible FE	Y	Y	Y	Y	Y
Age Eli. x Locality Eli. FE	Y	Y	Y	Y	Y

Notes: This table shows the results obtained from estimating a Poisson difference-in-differences-in-differences regression using the count of deaths as the dependent variable. Standard errors are clustered at the level of treatment: locality-age. The reported coefficient corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect post-treatment for those groups in eligible localities above 70 years of age relative to deaths in non-eligible localities. Standard errors are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level. Number of Deaths Eligible corresponds to those deaths reported as residing in eligible localities above or equal to age 70, a year before the coverage. ***p<0.01,**p<0.05,*p<0.1

Table 2: "70 y Más" DDD Impact on Cardiovascular Deaths

	Main		Diseases Interaction	
	2007	2008	2007	2008
	(1)	(2)	(3)	(4)
After 70 y Más	0.0540***	0.0248**	0.0202	0.0162
	(0.0119)	(0.0114)	(0.0136)	(0.0134)
After 70 y Más				
× Cardiovascular Cause of Death			0.1246***	0.0249
			(0.0281)	(0.0290)
No. Deaths	703,775	567,693	703,775	567,693
No. Deaths Eligibles	500,198	364,116	500,198	364,116
No. Deaths Ineligibles	203,577	203,577	203,577	203,577
No. Deaths Eligibles (year before coverage)	43,143	31,942	43,143	31,942
No. Localities	33,041	2,788	33,041	2,788
No. Locality-Age cells (obs.)	7,602,690	644,500	13,129,400	1,283,250
No. Locality-Age Eligible cells (obs.)	7,561,940	603,750	13,047,900	1,201,750
No. Locality-Age Ineligible cells (obs.)	40,750	40,750	81,500	81,500
No. Locality-Age non-zero cells (obs.)	438,436	234,279	856,595	468,430
Locality Controls	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Locality FE	Y	Y	Y	Y
Age FE	Y	Y	Y	Y
Year x Age Eligible FE	Y	Y	Y	Y
Year x Locality Eligible FE	Y	Y	Y	Y
Age Eli. x Locality Eli. FE	Y	Y	Y	Y

Notes: This table shows the results obtained from estimating a Poisson difference-in-differences-in-differences regression using the count of deaths as the dependent variable. Standard errors are clustered at the level of treatment: locality-age. The reported coefficient corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect post-treatment for those groups in eligible localities above 70 years of age relative to deaths in non-eligible localities. Standard errors are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level. ***p<0.01,**p<0.05,*p<0.1

Table 3: "70 y Más" DDD Impact on Deaths by Sex and Socioeconomic Status (SES)

	Sex Interaction		SES Interaction	
	2007	2008	2007	2008
	(1)	(2)	(3)	(4)
After 70 y Más	0.0223	-0.0080	0.0669***	0.0071
	(0.0165)	(0.0173)	(0.0177)	(0.0115)
After 70 y Más				
× Male	0.0546***	0.0611**		
	(0.0177)	(0.0266)		
After 70 y Más				
× Low-SES			0.0323	0.0479**
			(0.0289)	(0.0196)
No. Deaths	703,775	567,693	618,935	515,699
No. Deaths Eligibles	500,198	364,116	429,891	326,655
No. Deaths Ineligibles	203,577	203,577	189,044	189,044
No. Deaths Eligibles (year before coverage)	43,143	31,942	34,332	26,798
No. Localities	33,041	2,788	31,991	2,788
No. Locality-Age cells (obs.)	13,506,600	1,284,860	11,394,260	1,273,340
No. Locality-Age Eligible cells (obs.)	13,425,100	1,203,360	11,313,010	1,192,090
No. Locality-Age Ineligible cells (obs.)	81,500	81,500	81,500	81,250
No. Locality-Age non-zero cells (obs.)	864,248	468,517	802,957	466,686
Locality Controls	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Locality FE	Y	Y	Y	Y
Age FE	Y	Y	Y	Y
Year x Age Eligible FE	Y	Y	Y	Y
Year x Locality Eligible FE	Y	Y	Y	Y
Age Eli. x Locality Eli. FE	Y	Y	Y	Y

Notes: This table shows the results obtained from estimating a Poisson difference-in-differences-in-differences regression using the count of deaths as the dependent variable. Standard errors are clustered at the level of treatment: locality-age. The reported coefficient corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect post-treatment for those groups in eligible localities above 70 years of age relative to deaths in non-eligible localities. Standard errors are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level. We use health insurance coverage to proxy socioeconomic status. We define those without health insurance and *Seguro Popular* as low income, and those privately insured as high income. ***p<0.01,**p<0.05,*p<0.1

Table 4: Difference in Discontinuities Results for Individual Outcomes

	70 y Mas	Earnings	Income	Employment	Hours Worked	Hours Worked (if >0)	Seguro Popular
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A:							
Eligible-Ineligible Localities							
*1(Age ≥ 70) * Eligible*	23.6508***	-19.8100	58.4770	-0.0444	-3.7297	-5.4701	0.0497
	(3.3642)	(16.0287)	(42.1170)	(0.0562)	(2.7038)	(4.1749)	(0.0525)
R-squared	0.2778	0.0602	0.0543	0.0537	0.0505	0.0221	0.1738
Mean Dep. Var	7.66	58.88	258.65	0.37	16.66	41.34	0.24
Observations	9,485	9,485	9,494	9,485	9,578	3,860	9,485
Panel B:							
Pre-Post Treatment							
*1(Age ≥ 70) * Post*	24.0347***	-48.5790**	-22.5154	-0.1963**	-7.3926*	3.6066	0.1032
	(3.8688)	(21.7616)	(52.3903)	(0.0867)	(4.1828)	(5.0095)	(0.0886)
R-squared	0.2805	0.0406	0.0130	0.0310	0.0341	0.0191	0.0852
Mean Dep. Var	9.75	28.11	154.12	0.49	21.11	40.27	0.41
Observations	6,547	6,547	6,531	6,547	6,558	3,438	5,034
Weights	Y	Y	Y	Y	Y	Y	Y
Year of Survey FE	Y	Y	Y	Y	Y	Y	Y

Notes: This table shows the results obtained from estimating a difference-in-discontinuities regression using individual level outcomes as the dependent variable. Panel A shows the difference in discontinuities after the "70 y Más" program started between eligible and ineligible localities. Panel B shows the difference in discontinuities estimates before and after the program started in eligible localities. 70 y Más is the self-reported amount of cash transfer received. Hours Worked (if >0) only includes non-zero hours worked. Income includes wages from job, wages from business, and secondary jobs, wages from previous months, all transfers (private and government, including "70 y Más"), income from business and property, and other income not from work. Means are weighted using survey weights. Standard errors are clustered at the household level. The period of analysis before the program started is 2005 and 2006 surveys, and after the program started is the 2008 and 2010 surveys. All regressions use survey weights and year of survey fixed effects. Observations across columns differ because we drop the upper 1% outliers for each outcome of interest. ***p<0.01,**p<0.05,*p<0.1

Table 5: Difference in Discontinuities Results for Household Outcomes

	70 y Más	Earnings	Income	Spending	Food Spending	Health Expenditure	No. Members
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A:							
Eligible-Ineligible Localities							
*1(Age ≥ 70) * Eligible*	24.5206***	-57.7741	8.8159	29.4890	-3.3598	-4.1823	0.0244
	(4.5468)	(68.6134)	(95.2923)	(69.2047)	(18.8038)	(4.3492)	(0.3285)
R-squared	0.2862	0.1067	0.1089	0.1187	0.0770	0.0067	0.0115
Mean Dep. Var	10.68	439.21	779.33	569.11	206.75	14.11	3.62
Observations	7,114	7,114	7,119	7,110	7,114	7,117	7,086
Panel B:							
Pre-Post Treatment							
*1(Age ≥ 70) * Post*	28.1801***	-178.4401**	-203.9393*	-53.4949	-31.6341	-8.4809	-0.3170
	(6.1413)	(71.9280)	(112.9989)	(64.6342)	(19.9950)	(13.2100)	(0.4731)
R-squared	0.2690	0.0328	0.0237	0.0214	0.0336	0.0206	0.0202
Mean Dep. Var	14.02	180.60	429.09	340.46	139.67	14.33	3.68
Observations	4,786	4,786	4,784	4,780	4,783	4,762	4,784
Weights	Y	Y	Y	Y	Y	Y	Y
Year of Survey FE	Y	Y	Y	Y	Y	Y	Y

Notes: This table shows the results obtained from estimating a difference-in-discontinuities regression using household level outcomes as the dependent variable. In the household-level models, the running variable is defined based on the age of the oldest household member. Panel A shows the difference in discontinuities after the "70 y Más" program started between eligible and ineligible localities. Panel B shows the difference in discontinuities estimates before and after the program started in eligible localities. 70 y Más is the self-reported amount of cash transfer received. Hours Worked (if >0) only includes non-zeroe hours worked. Income includes wages from job, wages from business, and secondary jobs, wages from previous months, all transfers (private and government, including "70 y Más"), income from business and property, and other income not from work. Means are weighted using survey weights. Standard errors are clustered at the household level. The period of analysis before the program started is 2005 and 2006 surveys, and after the program started is the 2008 and 2010 surveys. All regressions use survey weights and year of survey fixed effects. Observations across columns differ because we drop the upper 1% outliers for each outcome of interest. ***p<0.01,**p<0.05,*p<0.1

Table 6: Difference in Discontinuities Results for Household Outcomes (Cont'd)

	Food Spending PC	Meat and Dairy PC	Sugar and Fat PC	Cereals PC	Alcohol	Tobacco	Medical Services PC	Drugs/Medicine PC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A:								
Eligible-Ineligible Localities								
*1(Age ≥ 70) * Eligible*	2.6488	0.9514	0.9754	-1.8301	-3.7597	-2.3978*	-1.6002	0.4217
	(7.4979)	(2.8545)	(1.1692)	(1.3631)	(3.7487)	(1.2620)	(1.2975)	(0.7893)
R-squared	0.0550	0.0562	0.0060	0.0066	0.0004	0.0066	0.0051	0.0025
Mean Dep. Var	69.74	22.61	7.25	11.59	2.83	1.69	2.10	2.23
Observations	7,114	7,044	7,036	7,042	7,111	7,111	7,106	7,121
Panel B:								
Pre-Post Treatment								
*1(Age ≥ 70) * Post*	-7.1429	-0.6899	0.0329	-2.5427	-4.5996	-1.8423	-3.9154	1.6072
	(7.2110)	(3.2914)	(1.3265)	(1.6894)	(4.1550)	(1.3779)	(3.5089)	(1.6263)
R-squared	0.0198	0.0104	0.0112	0.0236	0.0007	0.0041	0.0158	0.0192
Mean Dep. Var	47.18	14.18	6.05	9.50	3.08	1.20	2.36	2.56
Observations	4,783	4,746	4,723	4,700	4,758	4,758	4,755	4,768
Weights	Y	Y	Y	Y	Y	Y	Y	Y
Year of Survey FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table shows the results obtained from estimating a difference-in-discontinuities regression using household level outcomes as the dependent variable. In the household-level models, the running variable is defined based on the age of the oldest household member. Panel A shows the difference in discontinuities after the "70 y Más" program started between eligible and ineligible localities. Panel B shows the difference in discontinuities estimates before and after the program started in eligible localities. 70 y Más is the self-reported amount of cash transfer received. Hours Worked (if >0) only includes non-zeroe hours worked. Income includes wages from job, wages from business, and secondary jobs, wages from previous months, all transfers (private and government, including "70 y Más"), income from business and property, and other income not from work. Means are weighted using survey weights. Standard errors are clustered at the household level. The period of analysis before the program started is 2005 and 2006 surveys, and after the program started is the 2008 and 2010 surveys. All regressions use survey weights and year of survey fixed effects. Observations across columns differ because we drop the upper 1% outliers for each outcome of interest. ***p<0.01,**p<0.05,*p<0.1

Appendix

Adverse Effects of Non-Contributory Pensions on Older Adult Mortality in Mexico

Felipe Menares, William H. Dow, Emma Aguila, Susan Parker, Jorge Peniche and Soomin Ryu

List of Figures

A.1 Event Studies: "70 y Más" Impact on Deaths by Diseases 47
A.2 Event Studies: "70 y Más" Impact on CVD and Non-CVD Deaths by Sex 48
A.3 Event Studies: "70 y Más" Impact on Deaths by Age Ranges for the 2007 Expansion 49
A.4 Event Studies: "70 y Más" Impact on Deaths by Age Ranges for the 2008 Expansion 50
A.5 Event Studies: "70 y Más" Impact on Deaths by Age Ranges and Sex for the 2007 Expansion 51
A.6 Event Studies: "70 y Más" Impact on Deaths by Age Ranges and Sex for the 2008 Expansion 52
A.7 Event Studies: "70 y Más" Impact on Deaths by Expansion (Donut Approach - Dropping Ages 69 and 70) 53
A.8 Event Studies: "70 y Más" Impact on Deaths Removing NPP States Before 2007 by Expansion 54
A.9 Household Income by Insurance Coverage and Education Attainment in 2008 . . . 55
A.10 Age Distribution by Household and Individual Across ENIGH Surveys 55
A.11 RD Scatterplot for Household Size by Eligibility and Period 56
A.12 RD Scatterplot for Seguro Popular (Health Insurance Coverage for Low-Income People) 57
A.13 RD Scatterplot for Total Household Food Spending 58
A.14 RD Scatterplot for Food Spending Per Capita 59
A.15 RD Scatterplot for Meat & Dairy Spending Per Capita 60
A.16 RD Scatterplot for Sugar, Fat, and Soft Drink Spending Per Capita 61

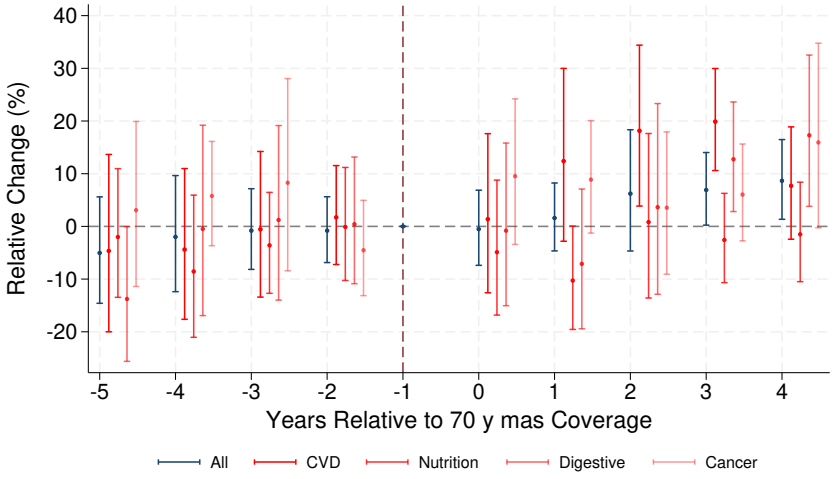
A.17 RD Scatterplot for Cereals Spending Per Capita 62
A.18 RD Scatterplot for Household Alcohol Spending 63
A.19 RD Scatterplot for Household Tobacco Spending 64
A.20 RD Scatterplot for Total Household Health Expenditure 65
A.21 RD Scatterplot for Drugs (Prescribed and Over the Counter) Per Capita 66
A.22 RD Scatterplot for Medical Services (Inpatient and Outpatient) Per Capita 67

List of Tables

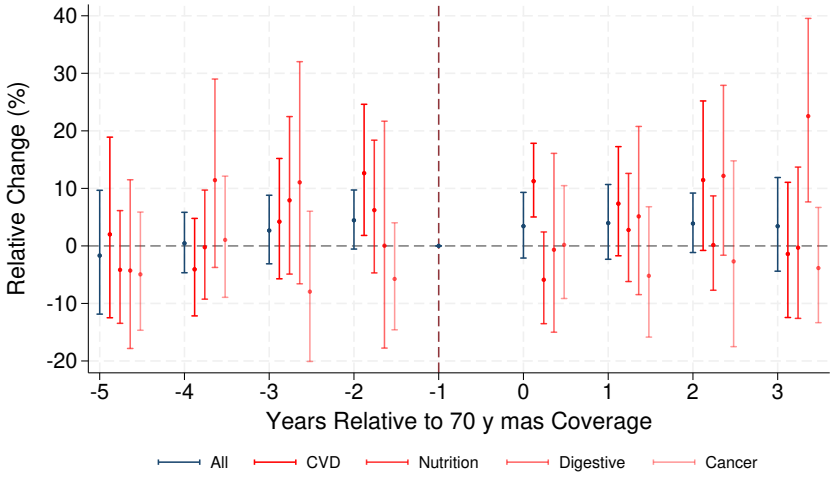
A.1 Descriptive Statistics by Eligibility (Expansion in Coverage) (2002-2011) 68
A.2 "70 y Más" Impact on Deaths for the 2008 Eligible Localities 69
A.3 ENIGH Individual Statistics by Locality Eligibility and Pre-Post "70 y Más" 70
A.4 ENIGH Household Statistics by Locality Eligibility and Pre-Post "70 y Más" . . . 71
A.5 ENIGH Household Statistics by Locality Eligibility and Pre-Post "70 y Más" (Cont'd) 72
A.6 Difference in Discontinuities Results for Individual Outcomes in Low Educated Population 73
A.7 Difference in Discontinuities Results for Household Outcomes in Low Educated Population 74
A.8 Difference in Discontinuities Results for Household Outcomes in Low Educated Population (Cont'd) 75

Appendix A: Additional Figures and Tables

Figure A.1: Event Studies: "70 y Más" Impact on Deaths by Diseases



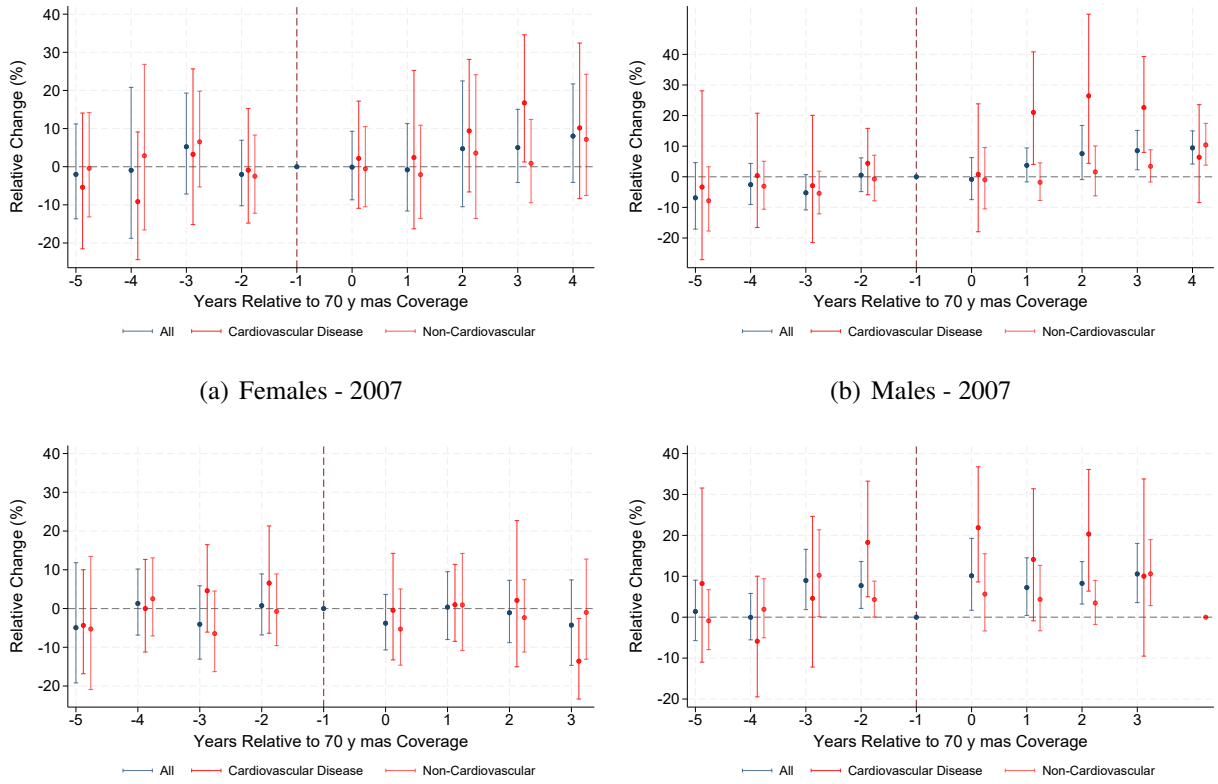
(a) 2007



(b) 2008

Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. All regressions control for the locality, age, and year fixed effects, as well as locality-age eligibility, year-locality eligibility, and year-age eligibility fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before a locality-age group started to be eligible by the "70 y Más" program. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level.

Figure A.2: Event Studies: "70 y Más" Impact on CVD and Non-CVD Deaths by Sex



(a) Females - 2007

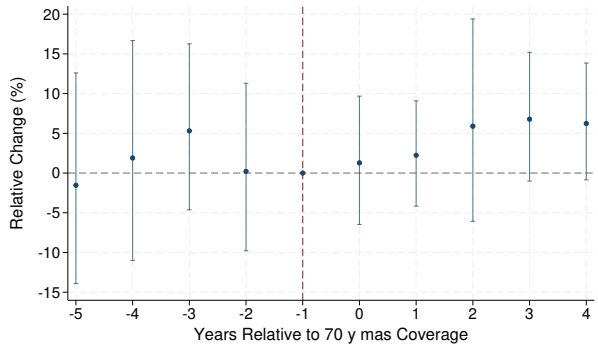
(b) Males - 2007

(c) Females - 2008

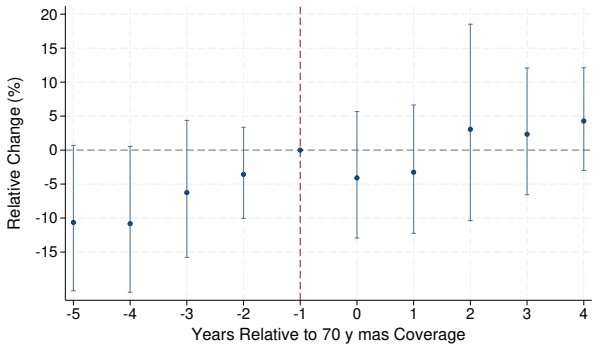
(d) Males - 2008

Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. All regressions control for locality, age, and year-fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before a locality-age group started to be eligible by the "70 y Más" program. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. We restrict our sample only to those without health care insurance. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level.

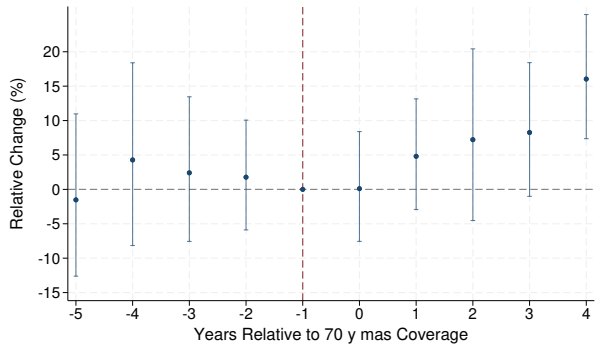
Figure A.3: Event Studies: "70 y Más" Impact on Deaths by Age Ranges for the 2007 Expansion



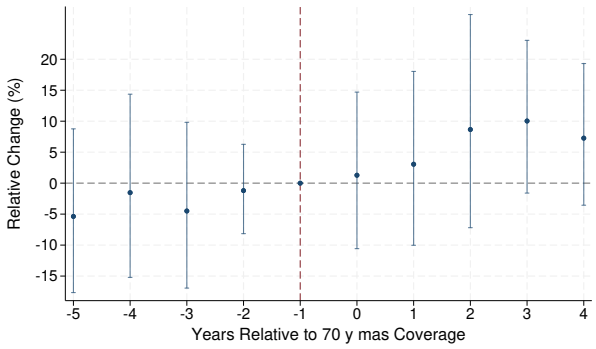
(a) 65 - 69 vs 70 - 74



(b) 65 - 69 vs 75 - 79



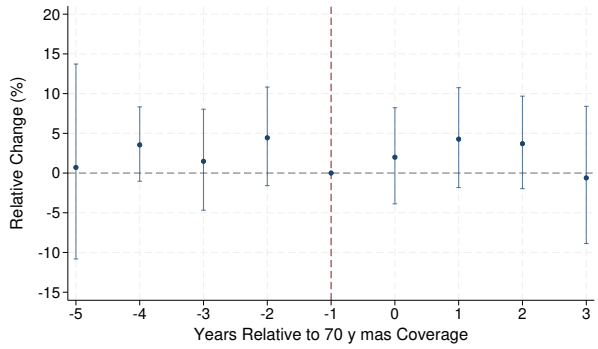
(c) 65 - 69 vs 80 - 84



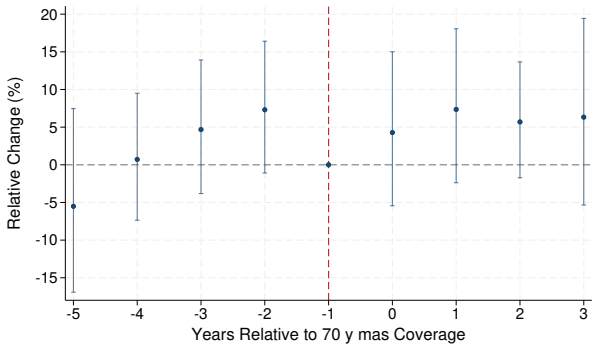
(d) 65 - 69 vs 85 - 89

Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. All regressions control for the locality, age, and year fixed effects, as well as locality-age eligibility, year-locality eligibility, and year-age eligibility fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before a locality-age group started to be eligible by the "70 y Más" program. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level.

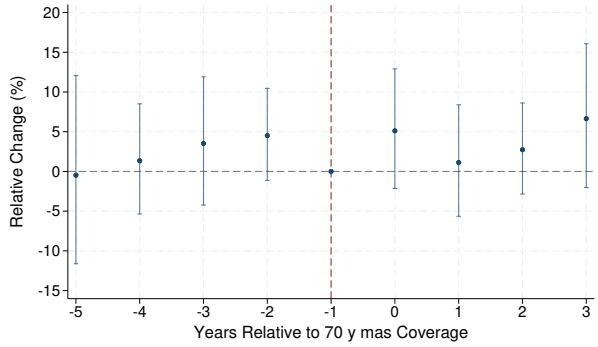
Figure A.4: Event Studies: "70 y Más" Impact on Deaths by Age Ranges for the 2008 Expansion



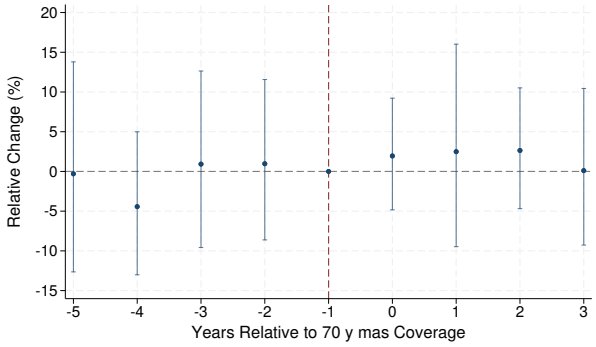
(a) 65 - 69 vs 70 - 74



(b) 65 - 69 vs 75 - 79



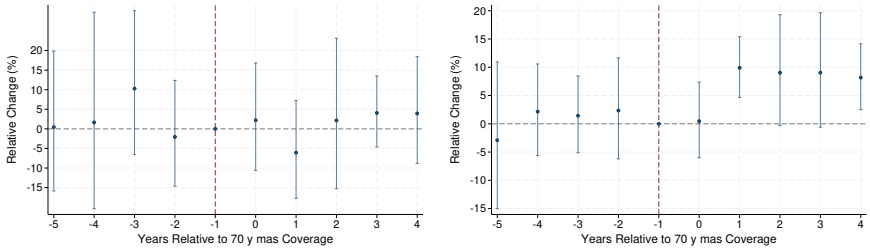
(c) 65 - 69 vs 80 - 84



(d) 65 - 69 vs 85 - 89

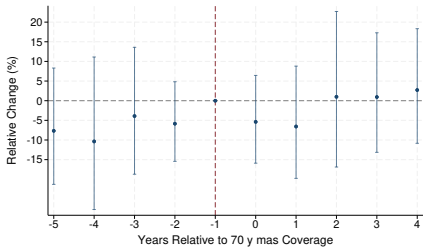
Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. All regressions control for the locality, age, and year fixed effects, as well as locality-age eligibility, year-locality eligibility, and year-age eligibility fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before a locality-age group started to be eligible by the "70 y Más" program. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level.

Figure A.5: Event Studies: "70 y Más" Impact on Deaths by Age Ranges and Sex for the 2007 Expansion

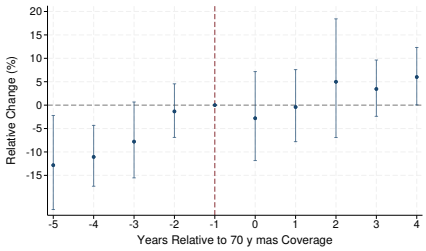


(a) Female / 65-69 vs 70-74

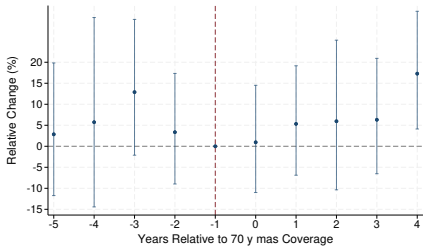
(b) Male / 65-69 vs 70-74



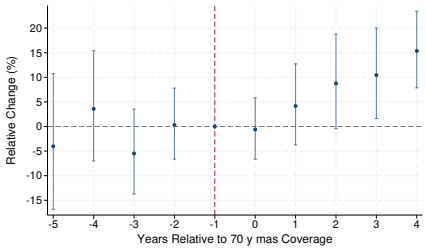
(c) Female / 65-69 vs 75-79



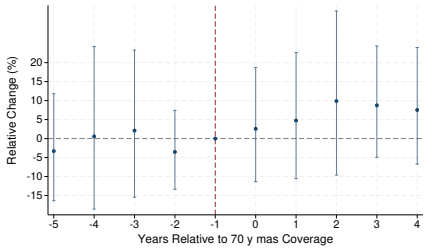
(d) Male / 65-69 vs 75-79



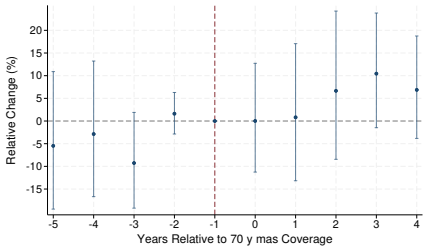
(e) Female / 65-69 vs 80-84



(f) Male / 65-69 vs 80-84



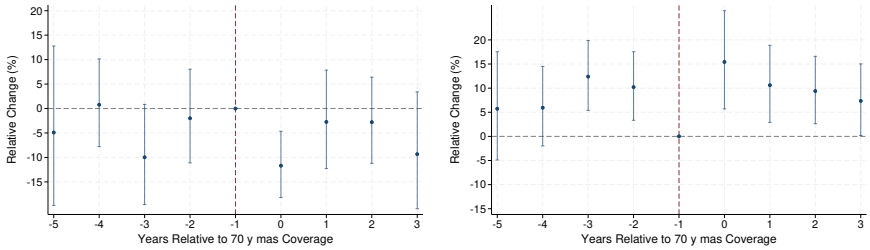
(g) Female / 65-69 vs 85-89



(h) Male / 65-69 vs 85-89

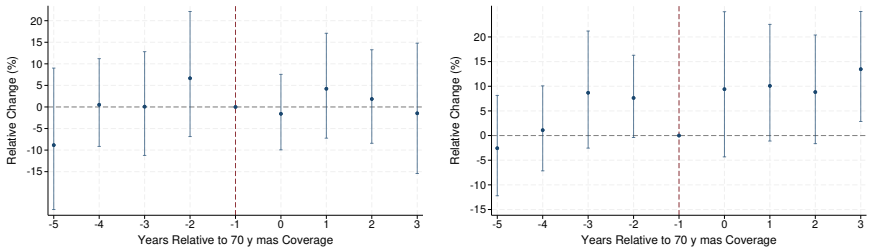
Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. All regressions control for the locality, age, and year fixed effects, as well as locality-age eligibility, year-locality eligibility, and year-age eligibility fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before each group of diseases started to be covered. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level.

Figure A.6: Event Studies: "70 y Más" Impact on Deaths by Age Ranges and Sex for the 2008 Expansion



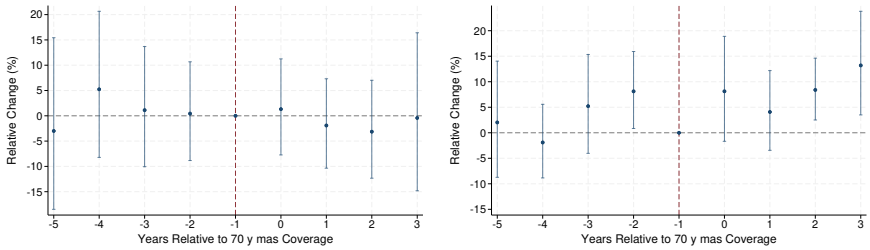
(a) Female / 65-69 vs 70-74

(b) Male / 65-69 vs 70-74



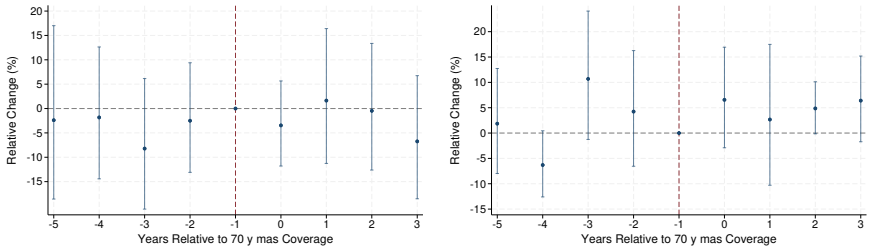
(c) Female / 65-69 vs 75-79

(d) Male / 65-69 vs 75-79



(e) Female / 65-69 vs 80-84

(f) Male / 65-69 vs 80-84

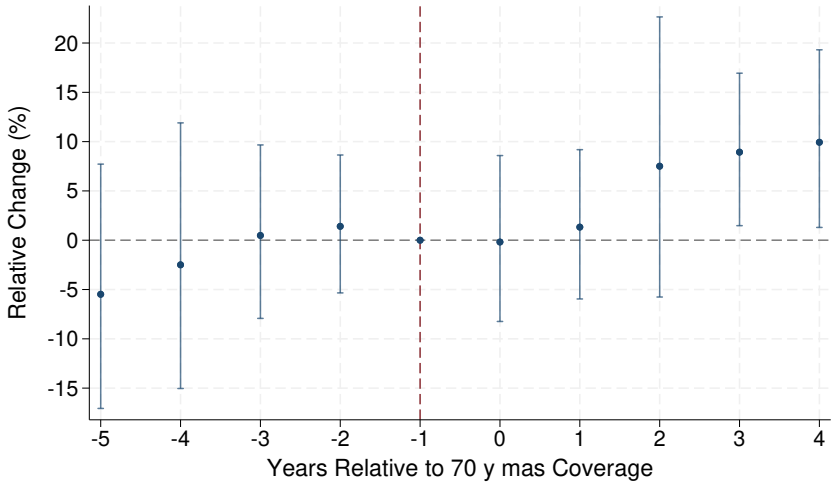


(g) Female / 65-69 vs 85-89

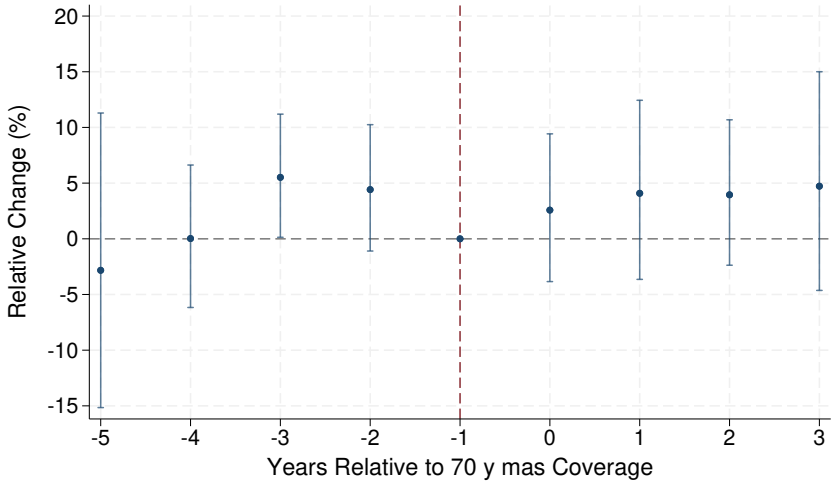
(h) Male / 65-69 vs 85-89

Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. All regressions control for the locality, age, and year fixed effects, as well as locality-age eligibility, year-locality eligibility, and year-age eligibility fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before a locality-age group started to be eligible by the "70 y Más" program. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level.

Figure A.7: Event Studies: "70 y Más" Impact on Deaths by Expansion (Donut Approach - Dropping Ages 69 and 70)



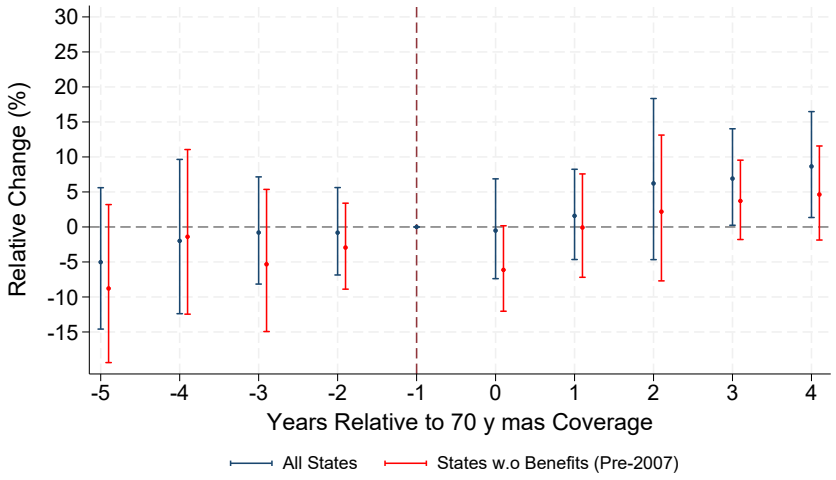
(a) 2007



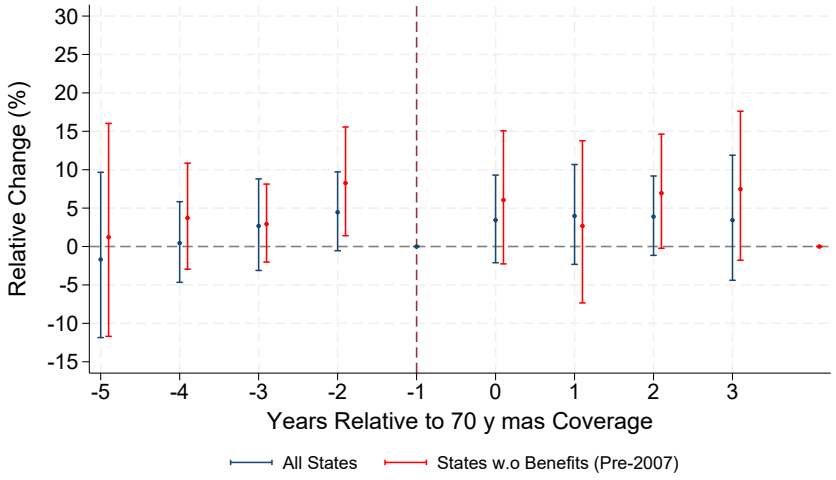
(b) 2008

Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. All regressions control for the locality, age, and year fixed effects, as well as locality-age eligibility, year-locality eligibility, and year-age eligibility fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before a locality-age group started to be eligible by the "70 y Más" program. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level. We define those without health insurance and *Seguro Popular* as low income.

Figure A.8: Event Studies: "70 y Más" Impact on Deaths Removing NPP States Before 2007 by Expansion



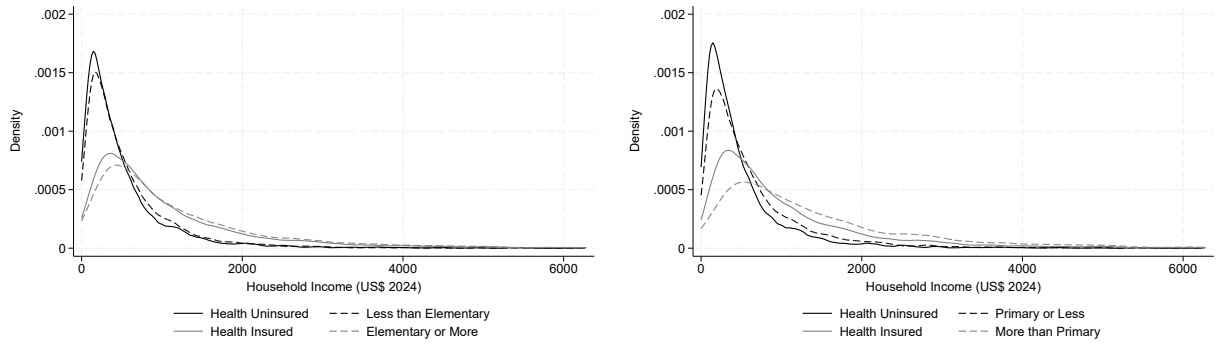
(a) 2007



(b) 2008

Notes: This figure shows the results obtained from estimating the dynamic difference-in-differences-in-differences using the count of deaths as the dependent variable in a Poisson regression. All regressions control for the locality, age, and year fixed effects, as well as locality-age eligibility, year-locality eligibility, and year-age eligibility fixed effects. Standard errors are clustered at the level of treatment: locality-age. The relative change reported in the y-axis corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect in each period relative to one year before a locality-age group started to be eligible by the "70 y Más" program. 95% confidence intervals for $\hat{\theta}_{ATT\%}$ are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level. Regressions are weighted using the total interpolated yearly population at the locality level.

Figure A.9: Household Income by Insurance Coverage and Education Attainment in 2008

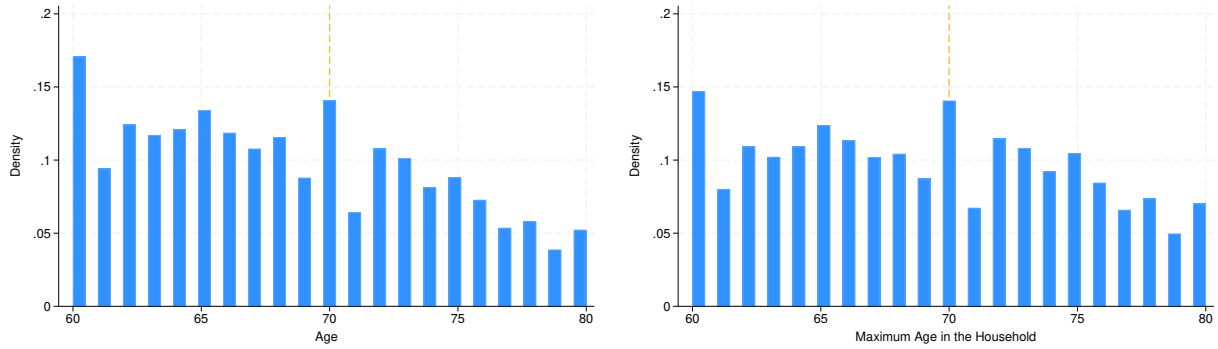


(a) Less than Elementary

(b) Elementary or Less

Notes: This figure plots the total household income density by education attainment and health insurance coverage. In panel (a), we define the education attainment threshold as those with less than elementary school. In panel (b), we show those with complete elementary or less. We define those without health insurance coverage as those neither making social security contributions (such as in IMSS) nor with any other health insurance coverage. We use household head education attainment as a proxy of household education.

Figure A.10: Age Distribution by Household and Individual Across ENIGH Surveys

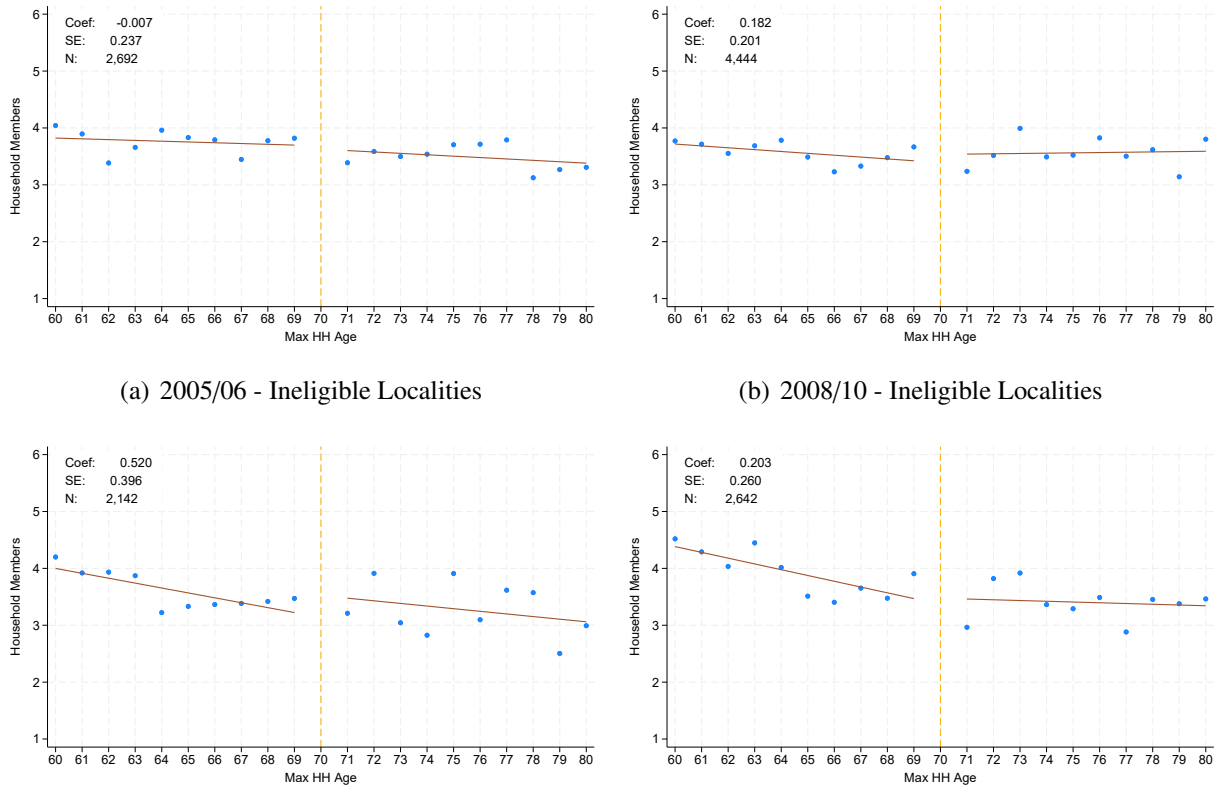


(a) Individuals

(b) Household

Notes: This figure plots the distribution of individual ages in the ENIGH surveys in order to visualize age heaping.

Figure A.11: RD Scatterplot for Household Size by Eligibility and Period



(a) 2005/06 - Ineligible Localities

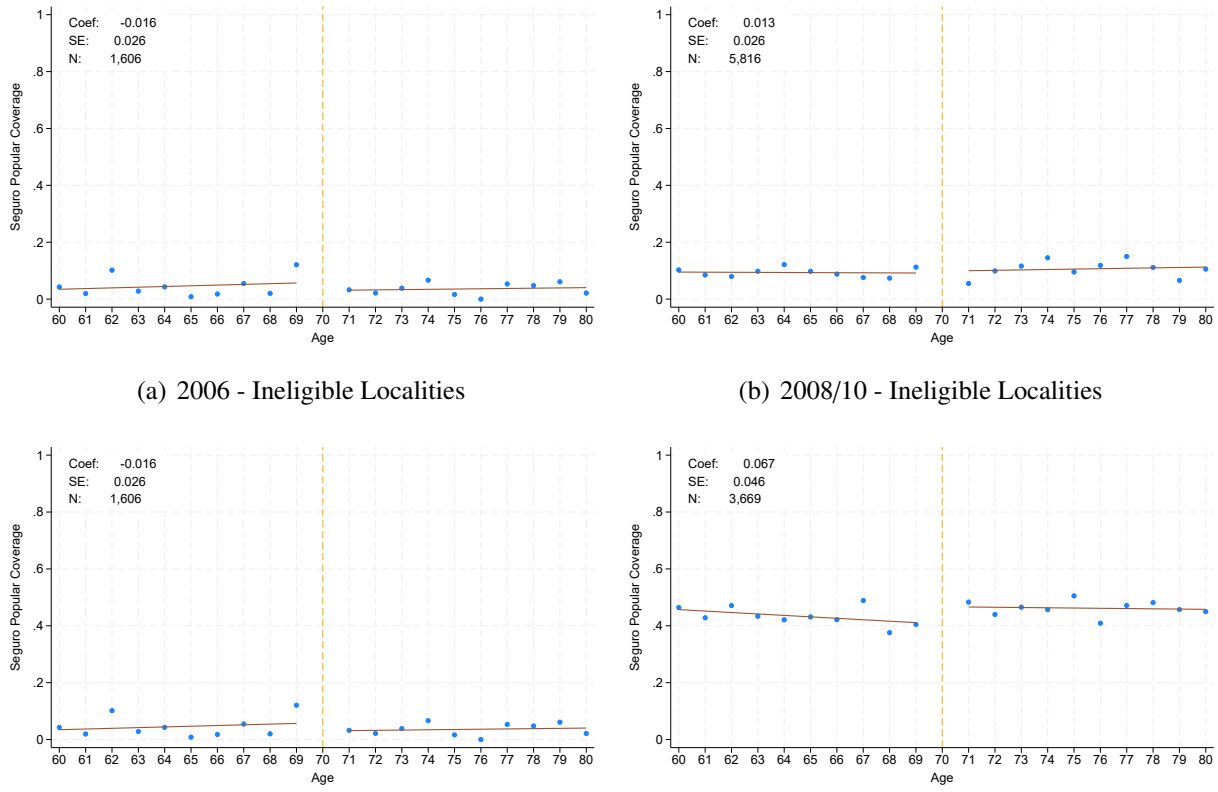
(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for the number of household members, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Figure A.12: RD Scatterplot for Seguro Popular (Health Insurance Coverage for Low-Income People)



(a) 2006 - Ineligible Localities

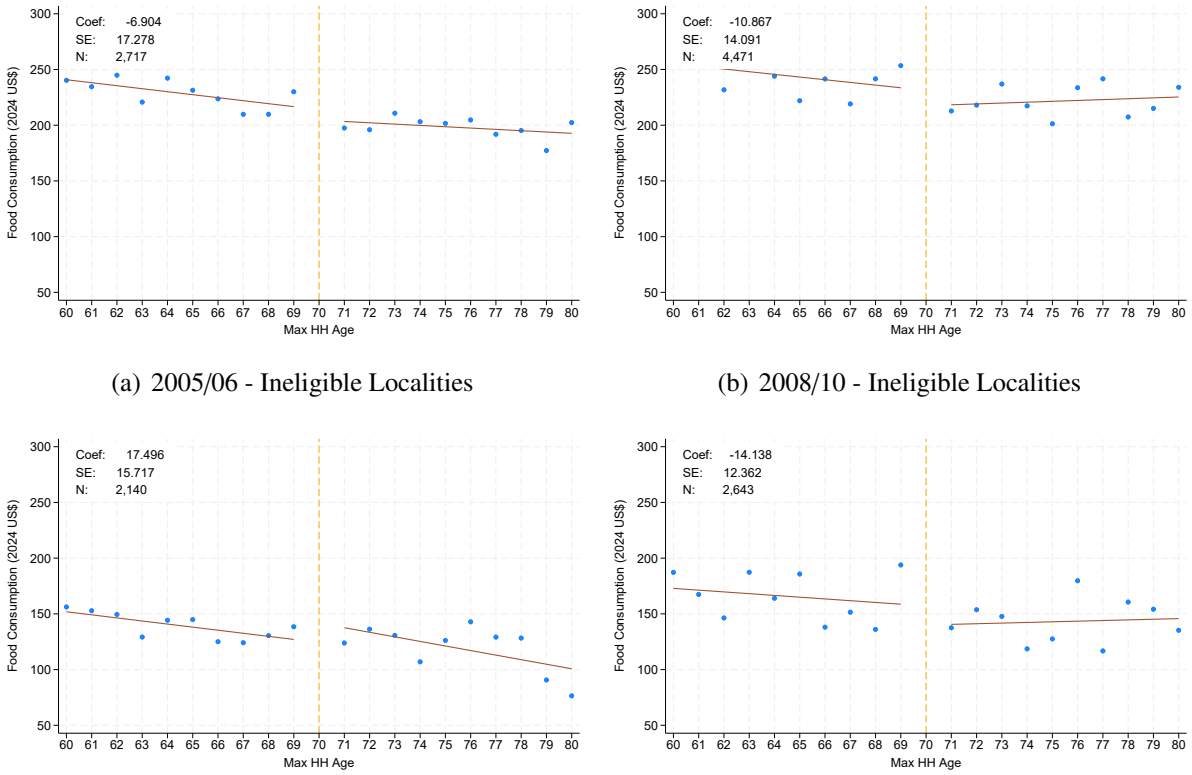
(b) 2008/10 - Ineligible Localities

(c) 2006 - Eligible Localities

(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for health insurance coverage in the low-income insurance program, *Seguro Popular*, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey wave 2006 represents the pre-program period, while waves 2008 and 2010 were pooled for the post-program period (The 2005 wave did not have the question). The running variable is the individual age. All regressions are estimated at the individual level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Figure A.13: RD Scatterplot for Total Household Food Spending



(a) 2005/06 - Ineligible Localities

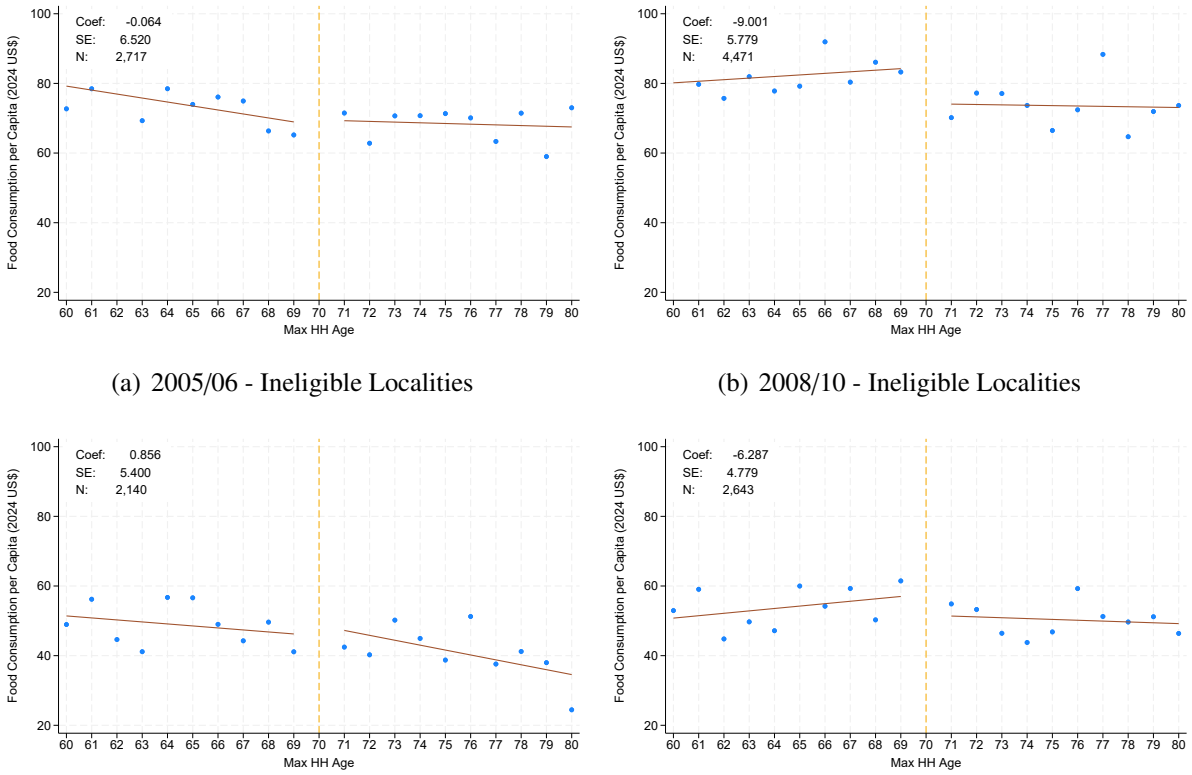
(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for total household food spending, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Figure A.14: RD Scatterplot for Food Spending Per Capita



(a) 2005/06 - Ineligible Localities

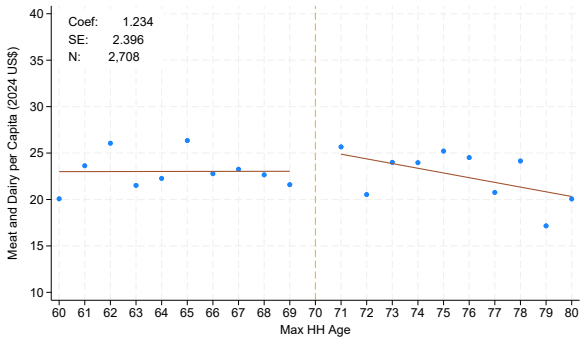
(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

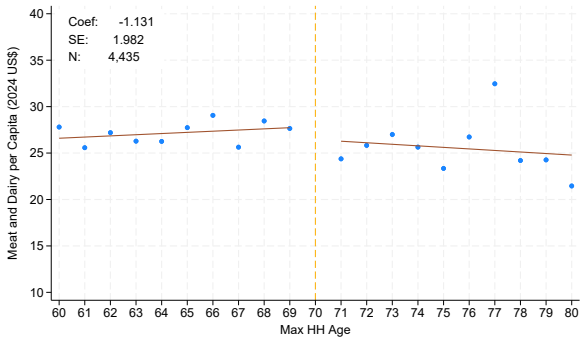
(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for food consumption per capita, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

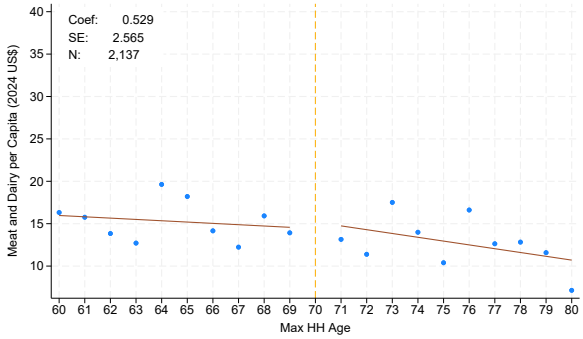
Figure A.15: RD Scatterplot for Meat & Dairy Spending Per Capita



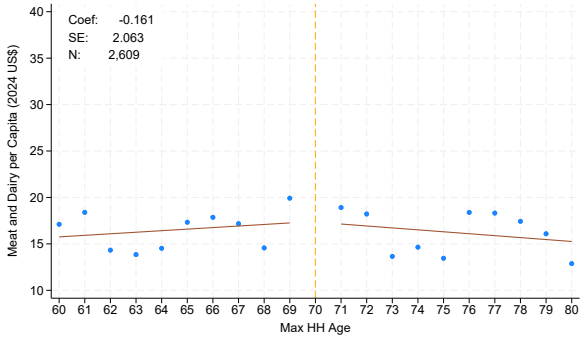
(a) 2005/06 - Ineligible Localities



(b) 2008/10 - Ineligible Localities



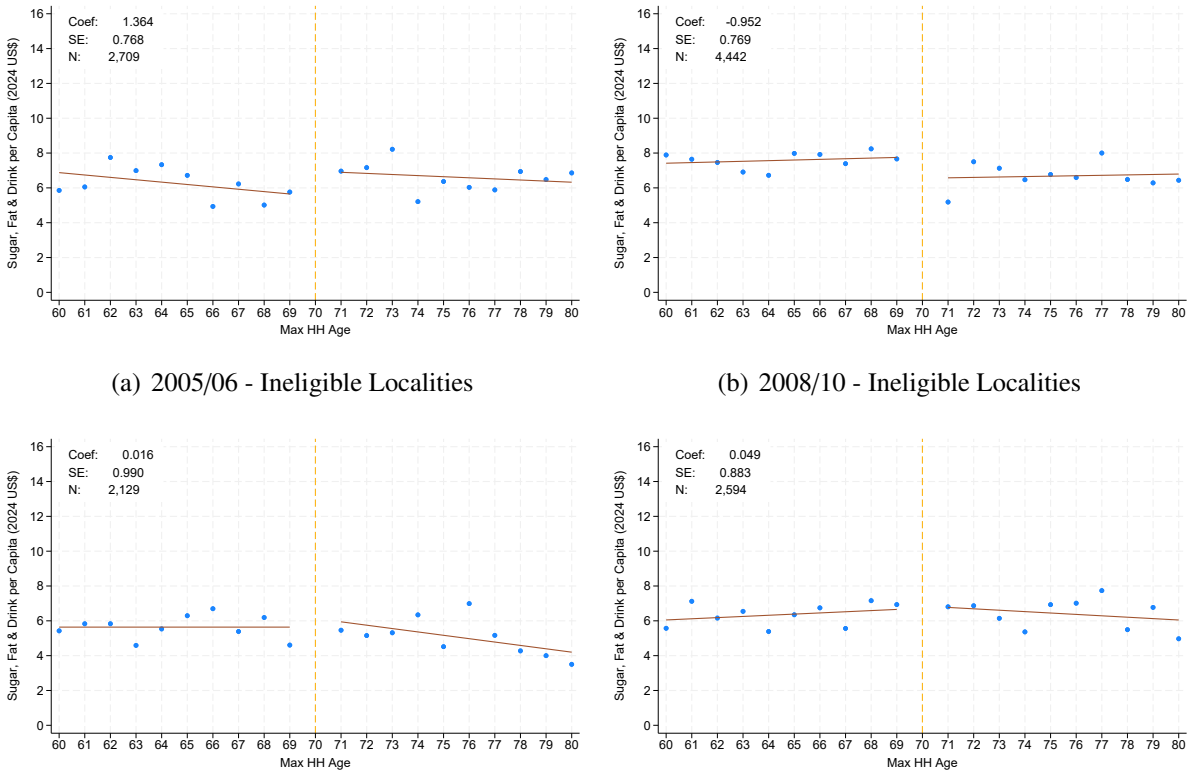
(c) 2005/06 - Eligible Localities



(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for meat and dairy spending per capita, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Figure A.16: RD Scatterplot for Sugar, Fat, and Soft Drink Spending Per Capita



(a) 2005/06 - Ineligible Localities

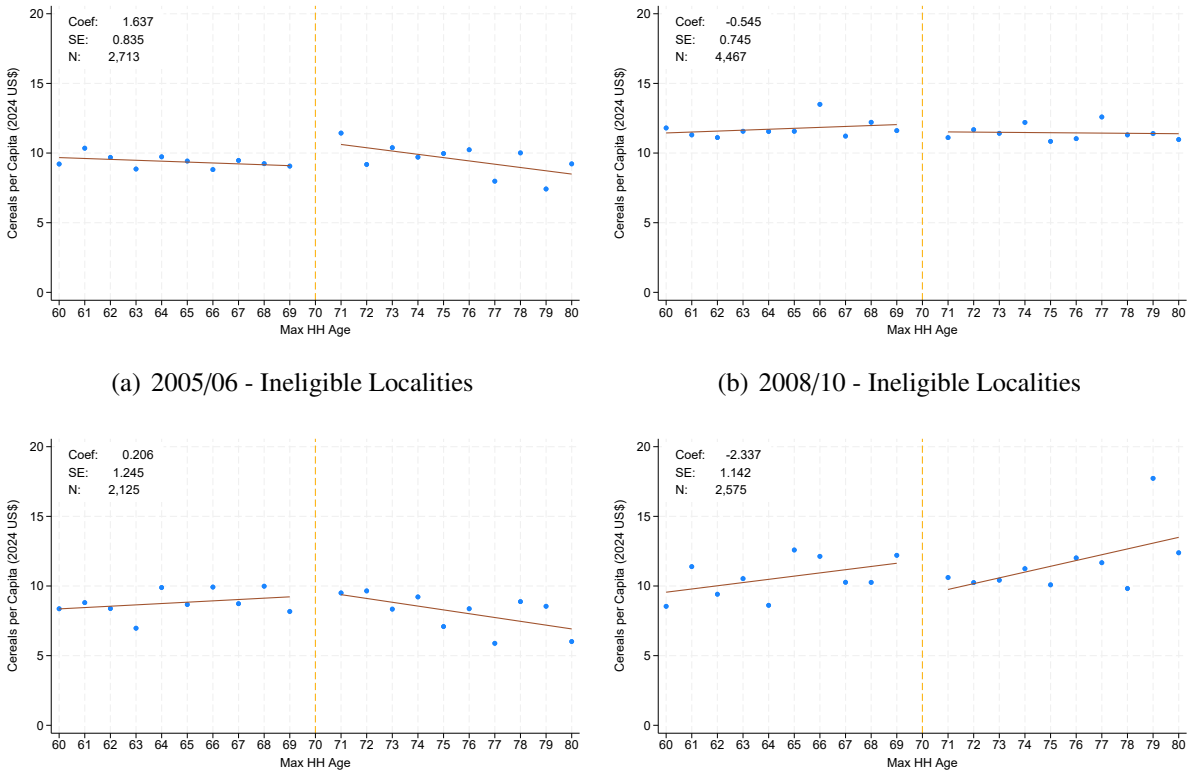
(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for sugar, fat, and soft drinks spending per capita, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Figure A.17: RD Scatterplot for Cereals Spending Per Capita



(a) 2005/06 - Ineligible Localities

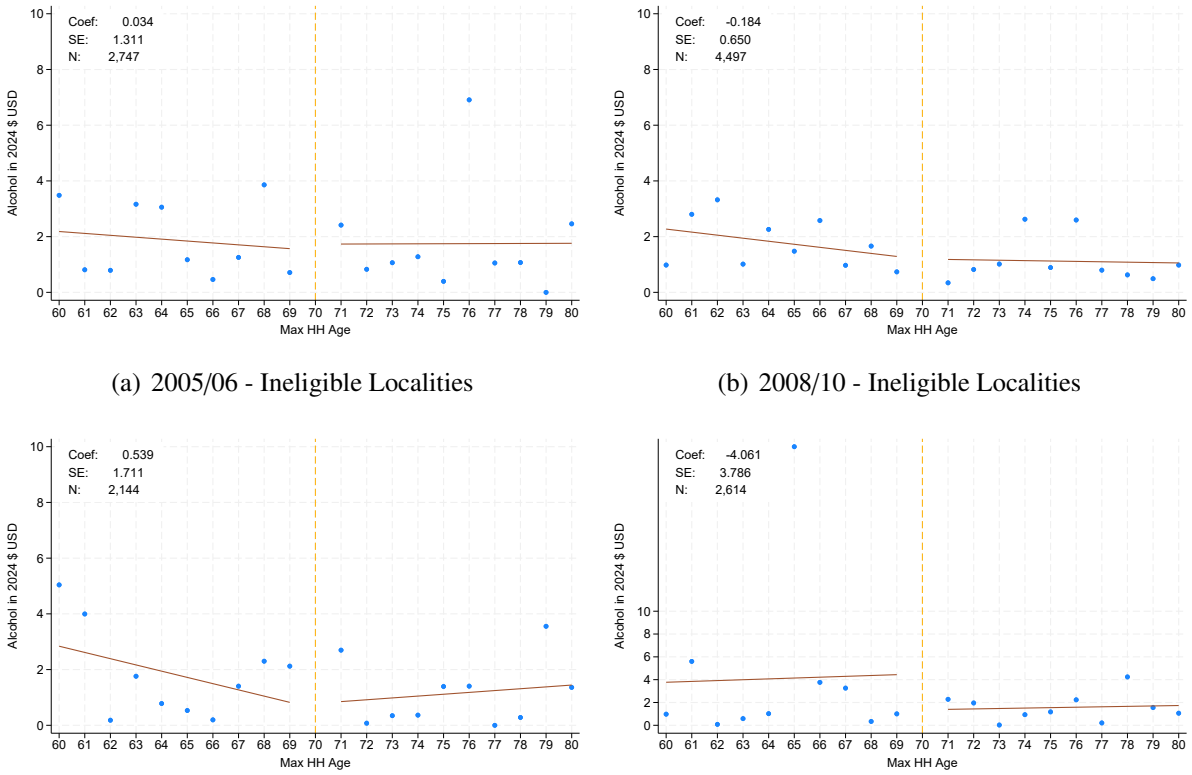
(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

(d) 2008/2010 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for cereals spending per capita, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Figure A.18: RD Scatterplot for Household Alcohol Spending



(a) 2005/06 - Ineligible Localities

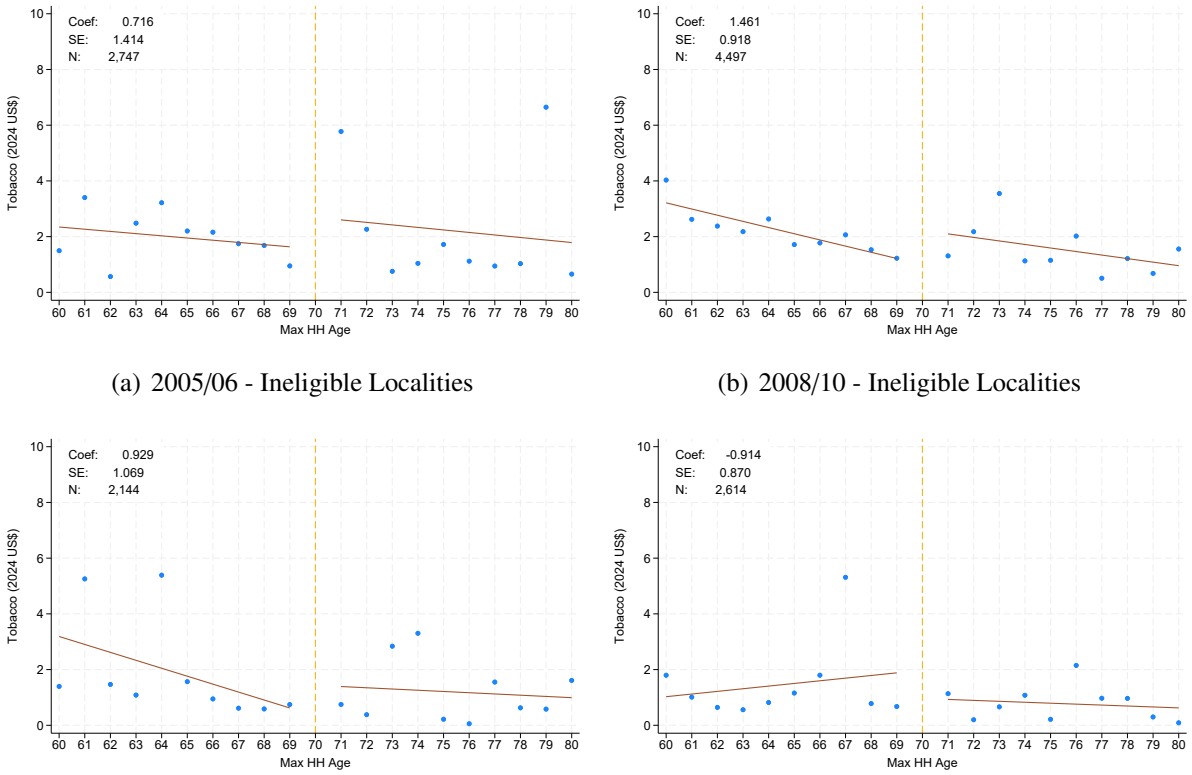
(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for household alcohol spending, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Figure A.19: RD Scatterplot for Household Tobacco Spending



(a) 2005/06 - Ineligible Localities

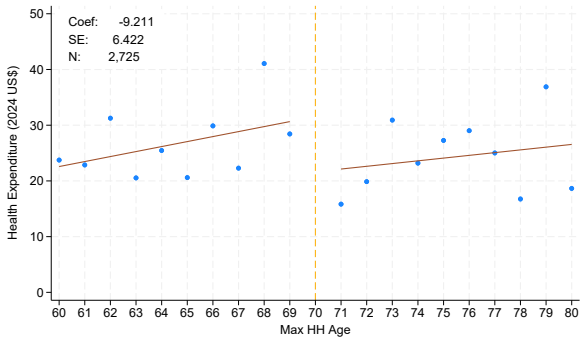
(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

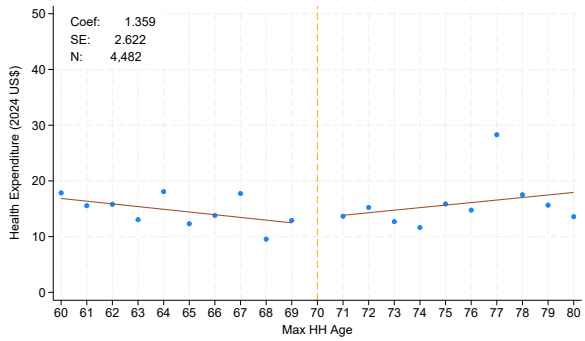
(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for total household tobacco spending, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

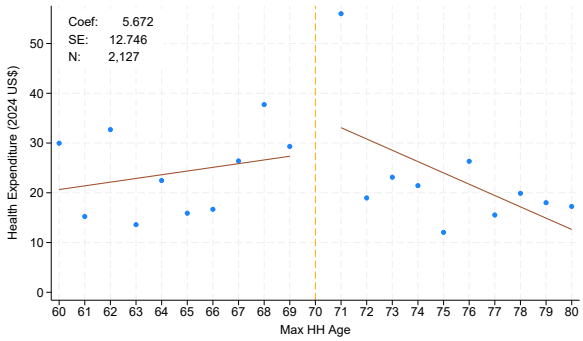
Figure A.20: RD Scatterplot for Total Household Health Expenditure



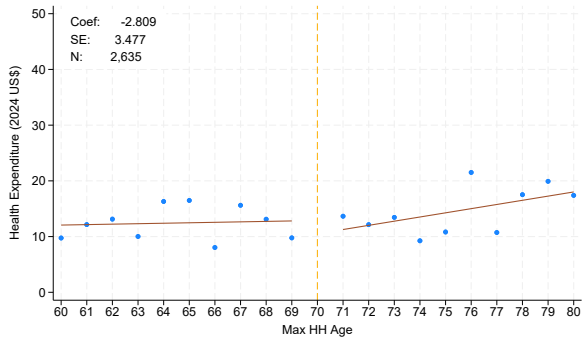
(a) 2005/06 - Ineligible Localities



(b) 2008/10 - Ineligible Localities



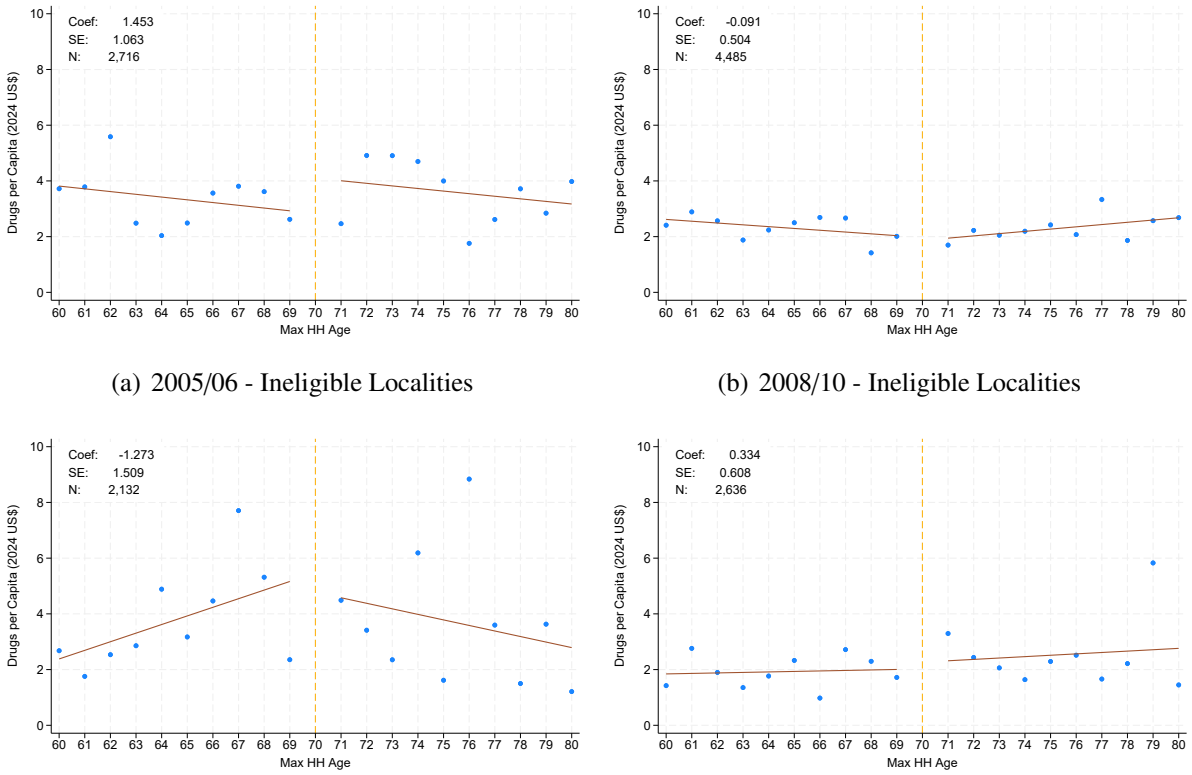
(c) 2005/06 - Eligible Localities



(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for total household health spending, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Figure A.21: RD Scatterplot for Drugs (Prescribed and Over the Counter) Per Capita



(a) 2005/06 - Ineligible Localities

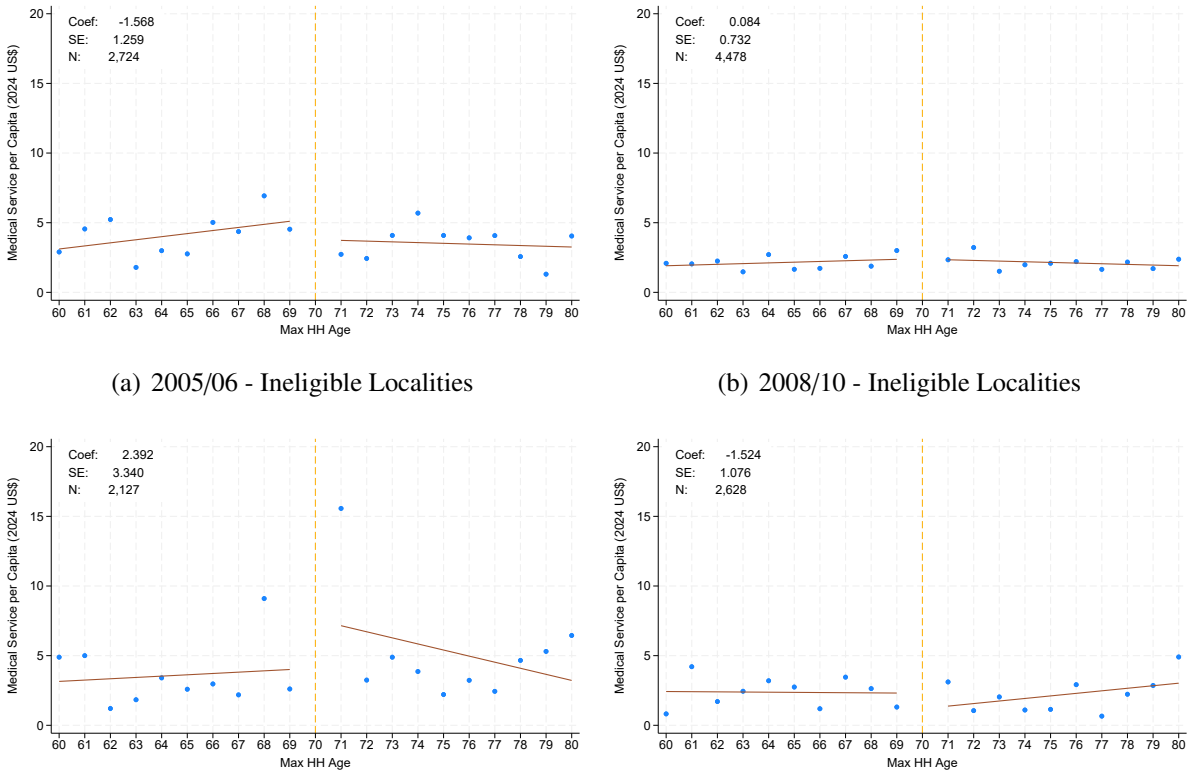
(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for drugs spending per capita, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Figure A.22: RD Scatterplot for Medical Services (Inpatient and Outpatient) Per Capita



(a) 2005/06 - Ineligible Localities

(b) 2008/10 - Ineligible Localities

(c) 2005/06 - Eligible Localities

(d) 2008/10 - Eligible Localities

Notes: This figure visually shows the regression discontinuity results for medical services spending per capita, disaggregated by eligible and ineligible localities, as well as by periods before and after the program's implementation. Eligibility is defined for individuals residing in localities with fewer than 2,500 inhabitants that expanded in 2007, while ineligible localities include those with populations between 14,999 and 100,000 that did not fully expand during the study period. Survey waves from 2005 and 2006 were pooled to represent the pre-program period, while waves 2008 and 2010 were pooled for the post-program period. The running variable is the maximum age within the household. All regressions are estimated at the household level, controlling for year-of-survey fixed effects. Standard errors are clustered at the household level.

Table A.1: Descriptive Statistics by Eligibility (Expansion in Coverage) (2002-2011)

	Deaths				Population	Localities
	Mean by Cell		Total		Mean	Total
Population Size Eligibility (Year of Expansion)	All	Low Income	All	Low Income	All	All
	(1)	(2)	(3)	(4)	(5)	(6)
0 to 2,499 (2007)	0.06	0.04	556,158	339,874	568	34,184
2,500 to 19,999 (2008)	0.60	0.30	390,489	196,455	6,167	2,629
20,000 to 29,999 (2009)	2.61	1.13	82,274	35,587	25,827	126
30,000 to 100,000 (2012)	5.00	1.80	203,577	73,180	57,056	163
100,000+ (2012)	38.81	9.03	1,096,520	255,139	436,153	113
Total	0.24	0.09	2,329,018	900,235	2,750	37,845

Notes: This table describes the sample of deaths in terms of the locality population size eligibility for deaths between 65 and 89 years old. We include the year of expansion of the program in parenthesis (2007, 2008, 2009, and 2012). Columns (1) and (2) show the average number of cells for a locality, for all deaths and those classified as low-income. Columns (3) and (4) show the total count of deaths. Column (5) is the average population size of the locality. We use health insurance coverage to proxy socioeconomic status. We define those without health insurance and *Seguro Popular* as low income, and those privately insured as high income.

Table A.2: "70 y Más" Impact on Deaths for the 2008 Eligible Localities

	Main	By Age Groups			
	65-69 vs. 70-89	65-69 vs. 70-74	65-69 vs. 75-79	65-69 vs. 80-84	65-69 vs. 85-89
	(1)	(2)	(3)	(4)	(5)
After 70 y Más	0.0248**	0.0030	0.0448***	0.0206	0.0232
	(0.0114)	(0.0148)	(0.0133)	(0.0171)	(0.0236)
No. Deaths	567,693	220,970	229,999	227,753	205,714
No. Deaths Eligibles	364,116	140,617	147,104	146,442	133,173
No. Deaths Ineligibles	203,577	80,353	82,895	81,311	72,541
No. Deaths Eligibles (year before coverage)	31,942	7,885	8,545	8,470	7,042
No. Localities	2,788	2,783	2,776	2,772	2,774
No. Locality-Age cells (obs.)	644,500	265,200	264,535	264,155	264,345
No. Locality-Age Eligible cells (obs.)	603,750	248,900	248,235	247,855	248,045
No. Locality-Age Ineligible cells (obs.)	40,750	16,300	16,300	16,300	16,300
No. Locality-Age non-zero cells (obs.)	234,279	92,565	95,426	95,134	88,893
Locality Controls	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Locality FE	Y	Y	Y	Y	Y
Age FE	Y	Y	Y	Y	Y
Year x Age Eligible FE	Y	Y	Y	Y	Y
Year x Locality Eligible FE	Y	Y	Y	Y	Y
Age Eli. x Locality Eli. FE	Y	Y	Y	Y	Y

This table shows the results obtained from estimating a Poisson difference-in-differences-in-differences regression using the count of deaths as the dependent variable. Standard errors are clustered at the level of treatment: locality-age. The reported coefficient corresponds to percent changes by subtracting 1 from the rate ratio, i.e., $\hat{\theta}_{ATT\%} = exp(\hat{\beta}) - 1$. Each estimate captures the effect post-treatment for those groups in eligible localities above 70 years of age relative to deaths in non-eligible localities. Standard errors are computed using the delta method for univariate transformations on the coefficient estimated from the Poisson regression. The period of analysis is from 2002 to 2011. All regressions control for locality-level time-varying covariates: Percentage of deaths medically certified, Lag of death registration. Also includes municipality level covariates of health infrastructure and *Seguro Popular* eligibility at the municipality level. Columns (2) to (5) disaggregate results by 5-year age groups among the age-eligibles. Number of deaths in Columns (2) to (5) does not add up to Column (3), because it uses the same group of controls, which corresponds to deaths in non-eligible localities. Number of Deaths Eligible corresponds to those deaths reported as residing in eligible localities above or equal to age 70, a year before the coverage. ***p<0.01,**p<0.05,*p<0.1

Table A.3: ENIGH Individual Statistics by Locality Eligibility and Pre-Post "70 y Más"

	All	Eligible		Ineligible	
	Overall	Pre	Post	Pre	Post
	(1)	(2)	(3)	(4)	(5)
70 y Más					
Mean	4.11	1.59	15.65	0.27	1.50
N	15,856	2,878	3,669	3,493	5,816
Earnings from work					
Mean	56.38	37.27	27.66	64.43	79.37
N	15,856	2,878	3,669	3,493	5,816
Income					
Mean	258.10	172.35	160.87	317.36	321.78
N	15,863	2,865	3,666	3,504	5,828
Employment					
Mean	0.39	0.52	0.44	0.34	0.32
N	15,856	2,878	3,669	3,493	5,816
Hours Worked					
Mean	17.19	21.55	19.57	15.33	14.64
N	16,013	2,883	3,675	3,552	5,903
Hours Worked (if >0)					
Mean	41.06	39.86	39.95	41.92	42.39
N	6,803	1,626	1,812	1,317	2,048
Seguro Popular					
Mean	0.19	0.19	0.45	0.04	0.10
N	12,456	1,365	3,669	1,606	5,816

Notes: This table describes the sample of the income and expenditures survey at the individual level. 70 y Más is the self-reported amount of cash transfer received. Hours Worked (if>0) only includes non-zero hours worked. Income includes wages from job, wages from business, and secondary jobs, wages from previous months, all transfers (private and government, including "70 y Más"), income from business and property, and other income not from work. Means are weighted using survey weights. Eligible and Ineligible stands for those individuals residing in eligible and ineligible localities for the 2007 expansion, respectively. Pre and Post stands for Surveys before and after the program started. Pre years are 2005 and 2006, and Post are the 2008 and 2010.

Table A.4: ENIGH Household Statistics by Locality Eligibility and Pre-Post "70 y Más"

	All	Eligible		Ineligible	
	Overall	Pre	Post	Pre	Post
	(1)	(2)	(3)	(4)	(5)
70 y Más					
Mean	5.91	3.05	22.49	0.37	2.18
N	11,961	2,143	2,643	2,704	4,471
Earnings from Work					
Mean	415.87	196.58	206.56	519.82	584.19
N	11,961	2,143	2,643	2,704	4,471
Income					
Mean	772.21	458.92	450.20	986.90	971.85
N	11,972	2,140	2,644	2,713	4,475
Spending					
Mean	589.65	368.14	367.20	756.63	714.96
N	11,961	2,136	2,644	2,715	4,466
Food Spending					
Mean	195.94	133.84	156.50	219.13	236.84
N	11,971	2,140	2,643	2,717	4,471
Food Spending PC					
Mean	65.47	46.28	51.99	72.51	78.99
N	11,971	2,140	2,643	2,717	4,471
Meat and Dairy PC					
Mean	21.16	14.48	16.22	22.98	26.53
N	11,889	2,137	2,609	2,708	4,435
Sugar and Fat PC					
Mean	6.52	5.49	6.34	6.44	7.28
N	11,874	2,129	2,594	2,709	4,442

Notes: This table describes the sample of the income and expenditures survey at the household level. 70 y Más is the self-reported amount of cash transfer received. Hours Worked (if>0) only includes non-zero hours worked. Income includes wages from job, wages from business, and secondary jobs, wages from previous months, all transfers (private and government, including "70 y Más"), income from business and property, and other income not from work. Means are weighted using survey weights. Eligible and Ineligible stands for those individuals residing in eligible and ineligible localities for the 2007 expansion, respectively. Pre and Post stands for Surveys before and after the program started. Pre years are 2005 and 2006, and Post are the 2008 and 2010.

Table A.5: ENIGH Household Statistics by Locality Eligibility and Pre-Post "70 y Más" (Cont'd)

	All	Eligible		Ineligible	
	Overall	Pre	Post	Pre	Post
	(1)	(2)	(3)	(4)	(5)
Cereals PC					
Mean	10.28	8.56	10.80	9.49	11.62
N	11,880	2,125	2,575	2,713	4,467
Alcohol					
Mean	1.93	1.52	3.00	1.91	1.56
N	12,002	2,144	2,614	2,747	4,497
Tobacco					
Mean	1.81	1.61	1.15	2.04	2.12
N	12,002	2,144	2,614	2,747	4,497
Health Spending					
Mean	19.07	22.82	13.12	25.55	15.14
N	11,969	2,127	2,635	2,725	4,482
Medical Services PC					
Mean	2.94	3.88	2.20	3.81	2.13
N	11,957	2,127	2,628	2,724	4,478
Drugs PC					
Mean	2.85	3.63	2.07	3.51	2.33
N	11,969	2,132	2,636	2,716	4,485
No. Members					
Mean	3.63	3.53	3.73	3.68	3.59
N	11,920	2,142	2,642	2,692	4,444

Notes: This table describes the sample of the income and expenditures survey at the household level. 70 y Más is the self-reported amount of cash transfer received. Hours Worked (if>0) only includes non-zero hours worked. Income includes wages from job, wages from business, and secondary jobs, wages from previous months, all transfers (private and government, including "70 y Más"), income from business and property, and other income not from work. Means are weighted using survey weights. Eligible and Ineligible stands for those individuals residing in eligible and ineligible localities for the 2007 expansion, respectively. Pre and Post stands for Surveys before and after the program started. Pre years are 2005 and 2006, and Post are the 2008 and 2010.

Table A.6: Difference in Discontinuities Results for Individual Outcomes in Low Educated Population

	70 y Mas	Earnings	Income	Employment	Hours Worked	Hours Worked (if >0)	Seguro Popular
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A:							
Eligible-Ineligible Localities							
*1(Age ≥ 70) * Eligible*	25.4177***	-31.2080*	29.8612	-0.0439	-1.6030	1.1603	0.0545
	(3.8656)	(15.9263)	(47.3429)	(0.0723)	(3.6022)	(5.3018)	(0.0649)
R-squared	0.2800	0.0389	0.0051	0.0400	0.0388	0.0174	0.1423
Mean Dep. Var	11.16	37.82	160.34	0.40	17.81	40.51	0.33
Observations	5,265	5,265	5,258	5,265	5,265	2,315	5,265
Panel B:							
Pre-Post Treatment							
*1(Age ≥ 70) * Post*	24.7923***	-34.7089**	-1.8084	-0.1264	-4.1742	4.6964	0.0185
	(4.3049)	(17.3128)	(48.4147)	(0.0952)	(4.7268)	(5.4409)	(0.1001)
R-squared	0.2747	0.0192	0.0054	0.0273	0.0301	0.0178	0.0967
Mean Dep. Var	10.33	23.80	136.55	0.50	21.41	40.17	0.42
Observations	5,398	5,398	5,389	5,398	5,398	2,877	4,138
Weights	Y	Y	Y	Y	Y	Y	Y
Year of Survey FE	Y	Y	Y	Y	Y	Y	Y

Notes: This table shows the results obtained from estimating a difference-in-discontinuities regression using individual level outcomes as the dependent variable. Panel A shows the difference in discontinuities after the "70 y Más" program started between eligible and ineligible localities. Panel B shows the difference in discontinuities estimates before and after the program started in eligible localities. 70 y Más is the self-reported amount of cash transfer received. Hours Worked (if > 0) only includes non-zero hours worked. Income includes wages from job, wages from business, and secondary jobs, wages from previous months, all transfers (private and government, including "70 y Más"), income from business and property, and other income not from work. Means are weighted using survey weights. Standard errors are clustered at the household level. The period of analysis before the program started is 2005 and 2006 surveys, and after the program started is the 2008 and 2010 surveys. All regressions use survey weights and year of survey fixed effects. Observations across columns differ because we drop the upper 1% outliers for each outcome of interest. ***p<0.01,**p<0.05,*p<0.1

Table A.7: Difference in Discontinuities Results for Household Outcomes in Low Educated Population

	70 y Más	Earnings	Income	Spending	Food Spending	Health Expenditure	No. Members
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A:							
Eligible-Ineligible Localities							
*1(Age ≥ 70) * Eligible*	25.6116***	-23.5496	3.4902	-40.6224	-11.3550	-0.8862	-0.1486
	(5.2880)	(81.1700)	(109.3677)	(75.6583)	(22.3942)	(4.8471)	(0.4428)
R-squared	0.2780	0.1027	0.0696	0.0751	0.0554	0.0073	0.0276
Mean Dep. Var	15.93	288.76	513.23	395.09	167.17	10.82	3.63
Observations	3,837	3,837	3,839	3,836	3,834	3,825	3,842
Panel B:							
Pre-Post Treatment							
*1(Age ≥ 70) * Post*	29.9402***	-139.5415**	-99.6986	-70.0545	-23.2142	-4.2889	-0.4251
	(7.1358)	(56.8744)	(88.4254)	(63.1559)	(19.4544)	(14.1302)	(0.5169)
R-squared	0.2611	0.0269	0.0133	0.0192	0.0385	0.0256	0.0387
Mean Dep. Var	15.01	150.21	366.59	299.95	129.25	13.04	3.60
Observations	3,892	3,892	3,891	3,891	3,890	3,875	3,893
Weights	Y	Y	Y	Y	Y	Y	Y
Year of Survey FE	Y	Y	Y	Y	Y	Y	Y

Notes: This table shows the results obtained from estimating a difference-in-discontinuities regression using household level outcomes as the dependent variable. In the household-level models, the running variable is defined based on the age of the oldest household member. Panel A shows the difference in discontinuities after the "70 y Más" program started between eligible and ineligible localities. Panel B shows the difference in discontinuities estimates before and after the program started in eligible localities. 70 y Más is the self-reported amount of cash transfer received. Hours Worked (if>0) only includes non-zero hours worked. Income includes wages from a job, wages from a business, and secondary jobs, wages from previous months, all transfers (private and government, including "70 y Más"), income from a business and property, and other income not from work. Means are weighted using survey weights. Standard errors are clustered at the household level. The period of analysis before the program started is 2005 and 2006 surveys, and after the program started is the 2008 and 2010 surveys. All regressions use survey weights and year of survey fixed effects. Observations across columns differ because we drop the upper 1% outliers for each outcome of interest. ***p<0.01,**p<0.05,*p<0.1

Table A.8: Difference in Discontinuities Results for Household Outcomes in Low Educated Population (Cont'd)

	Food Spending PC	Meat and Dairy PC	Sugar and Fat PC	Cereals PC	Alcohol	Tobacco	Medical Services PC	Drugs/Medicine PC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A:								
Eligible-Ineligible Localities								
*1(Age ≥ 70) * Eligible*	4.9212	2.4430	0.8828	-2.3350	-5.8058	-1.3297	-1.5012	0.8493
	(7.4418)	(3.3485)	(1.3352)	(1.5668)	(4.8051)	(1.3404)	(1.3135)	(0.8754)
R-squared	0.0270	0.0404	0.0040	0.0097	0.0006	0.0034	0.0074	0.0050
Mean Dep. Var	55.27	17.72	6.63	11.18	3.46	1.39	1.58	1.80
Observations	3,834	3,785	3,772	3,758	3,796	3,796	3,818	3,825
Panel B:								
Pre-Post Treatment								
*1(Age ≥ 70) * Post*	-0.7515	2.9067	1.4324	-2.1885	-3.9211	-1.0859	-4.9895	2.4113
	(7.1154)	(3.3967)	(1.4633)	(1.8381)	(5.0452)	(1.2995)	(3.5182)	(1.8431)
R-squared	0.0191	0.0128	0.0159	0.0275	0.0007	0.0035	0.0221	0.0250
Mean Dep. Var	44.00	12.87	5.95	9.39	3.34	1.18	2.18	2.40
Observations	3,890	3,851	3,833	3,815	3,860	3,860	3,871	3,875
Weights	Y	Y	Y	Y	Y	Y	Y	Y
Year of Survey FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table shows the results obtained from estimating a difference-in-discontinuities regression using household level outcomes as the dependent variable. In the household-level models, the running variable is defined based on the age of the oldest household member. Panel A shows the difference in discontinuities after the "70 y Más" program started between eligible and ineligible localities. Panel B shows the difference in discontinuities estimates before and after the program started in eligible localities. 70 y Más captures the transfer associated to the non-contributory pension program. Hours Worked (if>0) only includes non-zero hours worked. Income includes wages from job, wages from business, and secondary jobs, wages from previous months, all transfers (private and government, including "70 y Más"), income from business and property, and other income not from work. Means are weighted using survey weights. Standard errors are clustered at the household level. The period of analysis before the program started is 2005 and 2006 surveys, and after the program started is the 2008 and 2010 surveys. All regressions use survey weights and year of survey fixed effects. Observations across columns differ because we drop the upper 1% outliers for each outcome of interest. ***p<0.01,**p<0.05,*p<0.1