



Do Income Supplemental Programs for Older Adults' Help Reduce Primary Caregiver Burden? Evidence from Mexico

Emma Aguila¹  · Mariana López-Ortega² · Sean Angst³

Published online: 05 June 2019

© Springer Science+Business Media, LLC, part of Springer Nature 2019

Abstract

In countries such as Mexico without formal public long-term care policies, informal care becomes the main source of support for older adults. Alternative social programs, such as supplemental income programs, for older adults could alleviate caregiver burden, especially if supplemental income were to be used for paid care or to compensate non-paid family caregivers. This work is the first to analyze the effects of a supplemental income program for older adults on primary caregiver burden. To identify how such a program might affect caregiver burden, we analyze rich panel data on 433 adults 70 years and older in two communities, one receiving a supplemental income program and the other not, in Yucatan, Mexico. Data were collected in 2008 and 2009 among treatment and control groups before and 6 months after program introduction. We employ a difference-in-differences approach. In our sample, most care is provided by non-paid female caregivers. We find that individuals in both the treatment and control groups received fewer hours of care over time. The decrease was lower for older adults who received the supplemental income, but the difference with those who did not was not statistically significant. We also observe few changes on caregiving burden; even after program introduction, more than 98% of caregivers remained unpaid and the same primary caregiver remained. Altogether, our work suggests supplemental income programs have negligible effects on caregiving, making evident the urgent need for other strategies to support non-paid caregivers who bear most of the burden for old-age care in Mexico.

Keywords Caregiver burden · Supplemental income programs · Poverty · Older adults · Mexico

Introduction

Caregiving for older adults can have long-term health and economic effects on individuals who provide the care (Folbre 2012; Heger 2014; Mendez-Luck et al. 2008, 2009; Varley and

✉ Emma Aguila
eaguilav@usc.edu

Blasco 2000). In most countries, long-term care for older adults is informally provided by unpaid family members. In addition to providing daily assistance for dependent older adults, these caregivers may provide financial support and instrumental care such as doctor visits, medical decisions, and healthcare tasks in the home (Grunfeld et al. 2004; Guzmán and Huenchuan 2005; Hellström and Hallberg 2004; La Parra 2001; Wolff et al. 2016).

Countries with a tradition of long-term care systems have included in-kind benefits, cash benefits, or a mix of these to caregivers who support individuals with disabilities and frail older adults. Cash benefits are usually known as carer's allowance. Such benefits can vary by country. In Germany, they are €100 (basic amount) or €200 per month (high amount), while in France they are an amount calculated as a function of the evaluation of a care plan and of the beneficiary's resources (Bocquaire 2016; Colombo et al. 2011). In the United States, the National Family Caregiver Support Program aims to help family members providing in-home care for frail older relatives. The program includes information, assistance in accessing services, counseling, training, supplemental services, and legal assistance. Overall, it costs roughly \$150 million each year (Feinberg and Newman 2004).

A large number of studies focusing on Europe and North America have investigated whether formal care services delivered for older adults substitute for or complement informal support (Tennstedt et al. 1993; Van Houtven and Norton 2004). Few studies, however, have considered informal care as a critical component of health-care systems, despite the fundamental role of such care in maintaining health and wellbeing for the elderly (National Academies of Sciences 2016). The burden of informal caregiving is higher in low-income settings without economic and health care support (Heger 2014). The burden of caregiving is becoming a major problem for a growing proportion of families, particularly in low- and middle-income countries (LMICs) with rapid aging and high poverty for those in old age (Colombo et al. 2011; United Nations, Department of Economic and Social Affairs, and Population Division 2015).

Currently, there are few policies to provide health and personal care services or to alleviate the burden of caregivers in LMICs (Angel et al. 2016; Gutiérrez Robledo et al. 2012). Many LMICs have introduced social protection programs that provide cash and other benefits such as staple foods, subsidized utilities, or income transfers to older adults, but these benefits have not specifically been targeted to support caregiving or caregivers (Bitran and Giedion 2003; Coady et al. 2004; Comisión Económica para América Latina (CEPAL) 2018). In Latin America, the adverse macroeconomic conditions and constant crises of the 1980s and 1990s led to reforms that aimed to increase coverage of workers by public social security systems (Martínez and Coperation 2018; Queisser, Organisation de coopération et de développement économiques, and Centre de développement 1998; Rofman et al. 2013). These reforms, however, ultimately had little impact on coverage in such systems, resulting in the later creation of supplemental income programs, including non-contributory pensions, for the wellbeing and social protection of older adults.

Supplemental income programs provide a minimum income, aimed at guaranteeing a minimum welfare or social protection floor. They are financed from general government revenues or taxes and are not connected to working history. In their initial stages, they were mostly means-tested or implemented in rural localities, with coverage, as in Mexico, becoming universal over time (Martínez and Coperation 2018; Oliveri and InterAmerican Development Bank 2016; Rofman et al. 2013). While supplemental income programs have reduced poverty and household vulnerability and promoted psychosocial wellbeing in LMICs (HelpAge International 2003; Lloyd-Sherlock and Agrawal 2014), their financial sustainability remains

a challenge. In Latin America, for example, while supplemental income programs do not yet require a high share of GDP, such programs may become more burdensome given the large proportion of workers with informal employment and lack of access to social security systems as well as an aging population with a shrinking proportion of working-age individuals able to support non-contributory pensions (Martínez and Coperation 2018; Rofman et al. 2013).

Though sustaining non-contributory pensions can be challenging, such programs, in the absence of formal, publicly financed long-term care programs, may help alleviate the burden of caregiving by substituting informal for formal caregiving, particularly if income from these programs is used to pay for care or is given to unpaid caregivers sacrificing educational, income, or other opportunities.

Caregiving and Income Security in Old Age in Mexico

Like other LMICs, Mexico lacks public formal long-term care programs that support people with disabilities, frail older adults, or their informal care-givers (Giraldo-Rodríguez et al. 2018). Indeed, any formal public health and social care services for older adults remain scarce (Gutiérrez Robledo et al. 2012). This generates increasing pressure on non-paid family caregivers who provide most care for older adults (López-Ortega 2014; Mayston et al. 2017; Pelcastre-Villafuerte et al. 2011; Robles 2001, 2005).

The Mexican social security system only covers a small percentage of older adults who worked in the formal sector, while those living in rural areas, the self-employed, and those outside the formal labor market do not have access to social security benefits in old age. As a result, only 30% of men and 12% of women 65 years and older receive social security benefits (Téllez et al. 2017). Federal and state governments in Mexico do provide supplemental income programs for older adults (Aguila et al. 2011). These originated in Mexico City in 2001 and spread to Chihuahua and Nuevo Leon in 2004, Quintana Roo in 2006, and Chiapas and Sinaloa in 2007, among others (Aguila et al. 2011). Following the introduction of these state programs, the federal government introduced a supplemental income program for adults 70 years or older in rural locations with less than 2500 inhabitants in 2007. It expanded this program over time to cover all persons 65 or older who did not receive social security retirement benefits or a state-level supplemental income program in 2013 (Aguila et al. 2016).

The federal supplemental income program for older adults has reduced poverty, improved mental health, reduced depressive symptoms, increased participation and empowerment in household spending decision making for older recipients, and increased household consumption (Galiani et al. 2016; Pestieau et al. 2010; Salinas-Rodríguez et al. 2014). In Yucatan, a monthly state-level supplemental income program for older adults has improved verbal recall and lung function, reduced anemia, increased availability of food as well as use of health-care services and ability to buy medicines (Aguila et al. 2015b), and decreased the severity of frailty for women (Aguila et al. 2018). At the same time, both federal and state supplemental income programs in Mexico have reduced private family transfers to older adults, reduced saving rates of households, and reduced paid work by recipients (Amuedo-Dorantes and Juarez 2015; Galiani et al. 2016; Juarez 2009; Juarez and Pfitze 2015).

Family care in Mexico are based in a strong sense of familial obligations, but social and economic conditions are affecting traditional social norms. While most Mexicans report strong filial obligation and willingness to care for their parents, younger respondents say that they feel less able to care for older relatives than previous generations did (Aguila et al. 2018).

A disproportionate amount of older adult caregiving work falls on women—specifically spouses and daughters (Varley and Blasco 2000; Bergstrom and Heymann 2005; Mendez-Luck et al. 2008, 2009; Gutiérrez Robledo et al. 2012). In 2012, women were 63% of the caregivers for older adults (López-Ortega 2014). In addition, 78% of female caregivers were between 20 and 59 years of age—a crucial time when women may be responsible for their own dependent children as well. Support from men is typically limited to financial assistance. One study, using family-level data from Yucatan, Mexico (Angst et al. 2019), found not only that women provided significantly more care hours than men each month but also that daughters were most likely to be chosen as caregivers. Caregivers also have less education, lower rates of employment, and higher levels of co-residency with older adults than non-caregivers do. Put another way, caregivers were typically older daughters living in the same household as the oldest adults whose health required the highest amounts of caregiving time.

Study Aims

In this work, we seek to document whether receiving a supplemental income program affects levels of care provided to older adults. Specifically, we investigate whether a supplemental income program affects the number of caregiving hours older adults received from the primary caregiver as well as whether the program affected the age, gender, and number of primary caregivers for older adults with disabilities. We use rich panel data that includes data on caregivers and caregiving hours before implementation (August–November 2008) and 6 months after (July–September 2009) in treatment and control groups. We focus on total caregiving hours provided by the primary caregiver. To our knowledge, this is the first study to analyze the effects of a supplemental income program on caregiving of older adults.

We hypothesize that additional income may allow older adults to increase the number of hours of care received by paying for additional assistance. In addition, supplemental income may enable participants to switch primary caregiver burden to other family members, compensate unpaid caregivers, or contract paid care. Because life-cycle experiences and caregiving norms differ by gender, the effects of an income supplemental program may vary by the gender of the recipient. In Mexico, women have greater life expectancy and a lower probability of remarriage than men have, as demonstrated by the greater proportion of women (34% in 2012) than men (13%) who are widowed (Wong et al. 2015). As a result, spouse or partner care for women is often much less available. Furthermore, forms of reciprocity that result in care of parents provided by children may vary by gender as well due to differences in social expectations during childhood that further manifest as parents age (Gomes Da Conceicao and Montes de Oca 2013).

Material and Methods

Study Design and Participants

In this study, we analyze the effects of a supplemental income program for older adults 70 or above in the State of Yucatan, Mexico. The supplemental income program started in 2007 and was rolled out in stages with an experimental design to evaluate its impact on the well-being of older adults. The first stage included localities with less than 6500 inhabitants, the second stage was for localities with less than 20,000 inhabitants, and the third stage was for localities with

20,000 inhabitants or more. For the third stage of the program, eleven cities in the state qualified: Hunucma, Kanasin, Uman, Merida, Motul, Oxcutzcab, Progreso, Tekax, Ticul, Tizimin, and Valladolid. Among these cities, we employed a clustered randomized controlled trial design by matching pairs of towns with similar socioeconomic and demographic characteristics in the 2005 Mexican Census. By random draw, we chose Valladolid (45,868 inhabitants) and Motul (21,508 inhabitants), both in the northeastern part of the state, for our analysis. Eligible recipients in Valladolid received a state supplemental income program of MXN\$550 (US\$58.70 per month at 2014 purchasing power parity, or PPP) starting in December 2008, while those in Motul did not. The supplemental income program represented, on average, 46% of older respondents' income and 25% of household income, a significant increase in disposable income.

We identified participants for the evaluation by screening all households with adults 70 or older in both towns. After identifying all adults 70 or older in both towns, we conducted baseline surveys (W1) in Valladolid and Motul between August and November 2008 among all eligible households. We conducted a follow-up survey (W2) in July to September 2009, approximately 6 months after Valladolid began receiving the income supplement. Response rates at W1 were 94.3% in Valladolid and 96.7% in Motul; at W2, they were 85.9% in Valladolid and 85.6% in Motul. We calculated response rates using American Association for Public Opinion Research (AAPOR) guidelines (The American Association for Public Opinion Research (AAPOR) 2016). A detailed description of the study design, sampling frame, and follow-up procedures has been previously published (Aguila et al. 2014). The survey questionnaires we used were comparable to those for the Mexican Health and Aging Study (MHAS) and the U.S. Health and Retirement Study (HRS) and included a comprehensive assessment of health, disability, and socioeconomic characteristics for age-eligible respondents. The survey also included a household roster with detailed information about family members such as age, gender, education, and relationship to the elderly respondent.

We also built a separate data set containing one line of data for each family member, allowing us to track changes in caregiving across time. We carefully merged family member data by name, age, gender, and education across waves. This additional data set includes family members who live in the household and children who live outside the household, hours of informal care each provided to the elderly respondent, and monetary payment from the older adults to caregivers. In constructing this data set, we used methods similar to those used to construct the HRS family data file.

The Internal Review Board at RAND Corporation revised and approved the protocol (approval number 2008-0513-CR07) for the surveys. The study complied with U.S. and Mexican requirements and standards for conducting ethical research. An informed-consent form that followed the Helsinki Declaration II was provided to each participant (Aguila et al. 2015a).

The original sample consisted of 612 men and 710 women in the treatment town, Valladolid, and 524 men and 505 women in the control town, Motul, in W1. We first restricted our sample to older adults who responded to both waves of the survey: 521 men and 612 women in the treatment town and 430 men and 405 women in the control town. Because we were interested in caregiving for persons with disabilities, we further restricted our sample to those who in W1 reported problems with at least one Activity of Daily Living (ADL, discussed further below): 282 (54.1% of those who participated in both waves) men and 376 (61.4%) women in the treatment town and 227 (52.8%) men and 266 (65.7%) women in the control town. Finally, because we are interested in caregiving, the last part of our analysis described

below uses a more restricted sample including older respondents with an ADL limitation who reported having a primary caregiver at W1: 97 (34.4% of those with an ADL limitation at W1 and who participated in both waves) men and 164 (43.6%) women in the treatment town and 66 (29.1%) men and 106 (39.8%) women in the control town. Our working sample is 163 older men respondents and 270 older women respondents across both towns.

Functional disability has been assessed for many decades now with two main instruments: the Katz Index of Activities of Daily Living (Katz 1983) and the Lawton Instrumental Activities of Daily Living Scale (IADL) (Lawton and Brody 1969). ADLs include basic or self-care activities that involve looking after oneself and that are necessary for independent living and include activities such as bathing, toileting, getting in and out of bed; IADLs are considered to be more complex, refer to domestic life, and include activities such as preparing meals, shopping for groceries, and managing money (McDowell 2006). We focus on ADLs for two reasons. First, previous studies have shown a hierarchical process of disability where IADL disability precedes ADL disability, where individuals with ADL problems usually have more disabilities resulting in higher difficulty in their daily lives, and where ADL problems generally indicate more severe health problems than IADL limitations, resulting in a need for more caregiving (Ferrucci et al. 1998; Jagger et al. 2001; Spector et al. 1987; Verbrugge and Jette 1994; Verbrugge et al. 2004). Second, ADLs are usually more precisely reported than IADLs and, in countries such as Mexico with high gender equalities, performance of IADLs may reflect gendered expectations regarding household activities more than actual ability to perform the activity (Sheehan and Tucker-Drob 2017).

Outcomes

The dependent variables for this study were the total number of caregivers reported by each older adult with functional disability and the total number of hours of care received per week. We analyze the number of caregivers by gender, groups of age, and whether at the time of the study these caregivers were living inside or outside the household of the older adult. We ranked caregivers by the number of hours they assist older adults and identified the primary caregiver as the person who provides the most caregiving hours.

Covariates

Our covariates include age, age squared, marital status (1 = married or consensual union, 0 = otherwise), total years of formal education, study wave (1 = W2, 0 = W1), whether respondent lives in the treatment community (1) or in the control community (0), and an interaction variable between W2 and the indicator for the state program (1 = program * W2, 0 = otherwise).

Statistical Analysis

Descriptive statistics include the mean number of caregivers and hours of care per week. Mean number of caregivers is also presented by gender, groups of age, and living inside or outside the household of the older adult. As a second step in the analysis, we estimated transition matrices in order to investigate the possible changes in total number of caregivers reported by gender of sample respondents. The third step of the analysis uses an Intention-to-treat (ITT) analysis within a Difference-in-differences (DID) framework to investigate the changes in caregiving hours and number of primary caregivers 6 months after the introduction of the

supplemental income program. In the third step, we restrict our sample to primary caregivers because they provide most of care. We estimated the effects of the program using DID of means. We calculated these by comparing the difference in means for the outcome of interest between treatment and control towns, before and after the income supplement was implemented and controlling for no covariates. We also computed the effects of the program with the DID regression:

$$Y_{it} = \beta_0 + \beta_1 W_t + \beta_2 T_i + \beta_3 T_i W_t + \beta_4 X_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} is the outcome of interest for individual i in wave t ; W_t is a time dummy equal to 1 at W2 and 0 at baseline or W1; T_i is a dummy equal to 1 for individuals in the treatment town (Valladolid) and 0 for those in the control town (Motul); $T_i W_t$ is the treatment and time interaction term with the coefficient β_3 measuring the causal effect of the supplemental income program; X_{it} is a vector of covariates; and ε_{it} is the error term. We conduct our analysis separately for men and women.

The main identification assumption of the DID analysis is common trends. This requires that, in the absence of treatment, the treatment and control towns follow similar trends over time (Cameron and Trivedi 2005). Other potential threats to the identification of the DID estimator are differential survey attrition and mortality in the treatment and control towns. Past studies using the same survey in Yucatan have shown that the treatment and control towns follow common trends without differential attrition or mortality (Aguila et al. 2017; Aguila et al. 2015b). We did all analyses using STATA version 13.1 software (StataCorp 2013). Standard errors are robust to heteroscedasticity and clustered at the household level. To test multiple hypotheses, we applied a Holm-Bonferroni correction (Holm 1979).

Results

Table 1 shows the descriptive characteristics of the sample respondents at baseline or W1. The mean age of respondents at baseline for both men and women in both towns was about 80 years. Most men in both locations were married or partnered and most women were not, with men in Valladolid significantly more likely to be married than those in Motul ($P = 0.006$). Educational attainment is low in both towns for both men and women, at an average of approximately 2 years of schooling. Mean number of household residents was also similar in both towns and for men and women, with around 3.7 persons per household; 6 to 8% of respondents reported living alone at the time of baseline survey. Among those without a spouse, Motul men were significantly more likely than Valladolid men to report living with other family members ($P = 0.009$) while the difference here for women was not statistically significant ($P = 0.421$).

We also show in Table 1 the number of caregiving hours received and the number of caregivers by caregiver gender, age, and whether caregivers lived in the same household as the older respondent. Across both towns, men received a slightly higher number of caregiving hours, but men and women had a comparable number of caregivers. At the same time, caregiving hours and number of caregivers were comparable for men between the towns and women between the towns. Most primary caregivers are women who live in the same household as the older respondents. The largest proportion of caregivers for older men were women 60 to 74 years old; the largest proportion of caregivers for older women were women 30 to 59 years old.

Table 1 Descriptive statistics of older adults sample respondents, number of caregivers, and caregiving hours

	Treatment (Valladolid)		Control (Motul)		Difference P value	Treatment (Valladolid)		Control (Motul)		Difference P value
	% or Mean (SD)	Men	% or Mean (SD)	Men		% or Mean (SD)	Women	% or Mean (SD)	Women	
Age	79.53 (0.80)		78.80 (0.73)		0.505	79.95 (0.57)		80.21 (0.79)		0.788
Married/Partnered	78.35		57.58		0.006	30.49		33.96		0.554
Years of education	2.33 (0.24)		2.33 (0.25)		0.889	1.94 (0.18)		1.66 (0.17)		0.269
Lives alone	6.19		7.58		0.735	6.10		8.49		0.470
Lives with spouse only	32.99		16.67		0.015	15.24		9.43		0.148
Couples with other family	43.30		39.39		0.622	15.24		23.58		0.097
Singles with other family	17.53		36.36		0.009	63.41		58.49		0.421
Household residents	3.59 (0.24)		3.74 (0.26)		0.658	3.72 (0.16)		3.93 (0.21)		0.423
Outcomes										
Caregiving hours received	75.00 (10.60)		99.24 (12.42)		0.140	67.02 (6.18)		69.48 (7.43)		0.799
Number of caregivers	1.27 (0.08)		1.33 (0.08)		0.567	1.34 (0.07)		1.21 (0.07)		0.162
Male caregivers	0.22 (0.05)		0.32 (0.07)		0.216	0.36 (0.04)		0.31 (0.06)		0.528
15–29 years old	0.07 (0.03)		0.05 (0.03)		0.534	0.04 (0.02)		0.01 (0.01)		0.072
30–44 years old	0.05 (0.03)		0.12 (0.04)		0.154	0.05 (0.02)		0.06 (0.03)		0.963
45–59 years old	0.07 (0.03)		0.12 (0.04)		0.312	0.09 (0.02)		0.05 (0.02)		0.186
60–74 years old	0.02 (0.01)		0.03 (0.02)		0.707	0.10 (0.02)		0.10 (0.03)		0.873
75 years and older	–		–		–	0.05 (0.02)		0.09 (0.03)		0.242
Lives in household	0.14 (0.04)		0.23 (0.06)		0.268	0.30 (0.04)		0.24 (0.04)		0.269
Lives outside household	0.07 (0.03)		0.09 (0.04)		0.673	0.06 (0.02)		0.08 (0.05)		0.788
Female caregivers	1.05 (0.08)		1.02 (0.08)		0.754	0.98 (0.06)		0.90 (0.05)		0.277
15–29 years old	0.12 (0.05)		0.06 (0.04)		0.331	0.13 (0.03)		0.04 (0.02)		0.006
30–44 years old	0.12 (0.04)		0.23 (0.06)		0.134	0.30 (0.04)		0.33 (0.05)		0.689
45–59 years old	0.16 (0.04)		0.29 (0.06)		0.086	0.35 (0.04)		0.33 (0.05)		0.707
60–74 years old	0.44 (0.05)		0.33 (0.06)		0.157	0.15 (0.03)		0.16 (0.04)		0.878
75 years and older	0.16 (0.04)		0.11 (0.04)		0.275	0.01 (0.01)		0.04 (0.02)		0.214
Lives in household	0.94 (0.08)		0.80 (0.08)		0.235	0.73 (0.05)		0.68 (0.05)		0.482
Lives outside household	0.11 (0.04)		0.21 (0.06)		0.144	0.25 (0.05)		0.22 (0.05)		0.623
No. observations	97		66			164		106		

SD Standard deviation

Table 2 Transition matrices for total caregivers W1/W2 (men and women respondents reporting problems with at least one ADL at W1) – percentages and number of observations

No. caregivers W1/W2	Treatment (Vallodolid)						Control (Motul)					
	Men			Women			Men			Women		
	0	1	2 or more	0	1	2 or more	0	1	2 or more	0	1	2 or more
0	94.57	4.35	1.09	90.00	8.10	1.90	93.17	6.21	0.62	85.53	10.69	3.77
	174	8	2	189	17	4	150	10	1	136	17	6
1	51.76	43.53	4.71	39.84	55.47	4.69	34.69	55.10	10.20	34.41	60.22	5.38
	44	37	4	51	71	6	17	27	5	32	56	5
2 or more	38.46	15.38	46.15	31.58	31.58	36.84	41.18	11.76	47.06	28.57	14.29	57.14
	5	2	6	12	12	14	7	2	8	4	2	8

Table 2 shows transition matrices with the number of caregivers between W1 and W2 for older men and women reporting receiving help performing ADLs at baseline for treatment and control towns. At baseline in the treatment town, 184 (65%) older men with an ADL limitation did not have a caregiver, nor did 210 (56%) such women. At baseline in the control town 161 (71%) men and 159 (60%) women with ADL limitations had no caregiver. Older women were more likely to report having problems with at least one ADL and to have at least one caregiver. Among respondents with caregivers at baseline, 85 (87%) men and 128 (77%) women in the treatment town and 49 (74%) men and 93 (87%) women in the control town had one caregiver. Most with a caregiver had only one; among those with two or more caregivers, a primary caregiver provided the majority of care hours. On average, the primary caregiver provided more than 70 h of care per week, with less than 2% of primary caregivers receiving any payment for their services (results not shown, available upon request).

In the treatment town, 52% of men with one caregiver at W1 had none in W2 and 38% of those with two or more caregivers had none at W2. Among women in the treatment town, 40% of those with one caregiver at W1 had none at W2 and 32% with two or more caregivers at W1 had none at W2. In the control town, 35% of men with one caregiver and 41% with two or more had none by W2; among women, 34% with a caregiver at W1 and 29% with two or more caregivers had none at W2. This is explained by disability being a dynamic process (Johnson and Wolinsky 1993; Wunderlich et al. 2002). Individuals may have periods of recovery, better functional ability, and may not require further help with daily activities. Alternatively, they may go from not having help to needing it, as seen in the numbers without caregivers at W1 who had them at W2.

Table 3 shows, for older men, the estimates of the impact of the program on number of caregiving hours provided by the primary caregiver, number of primary caregivers by age group, and number of caregivers living inside or outside the respondent's household. Table 4 shows these same estimates for older women. The first two columns in Tables 3 and 4 show the average caregiving hours received and number of caregivers at baseline for the treatment and control towns. The third and fifth columns show the difference between W2 and W1 for the treatment and control towns.

In Table 3, we can observe that 6 months after the introduction of the supplemental income program there were no statistically significant effects on average caregiving hours received by

Table 3 Effects on primary caregiver W2 - W1 (men respondent)

	Treatment (Valladolid) W1		Control (Motul) W1		Treatment (Valladolid) W2-W1		Control (Motul) W2-W1		DID of Means			DID Regressions				
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Diff. (SE)	P	Diff. (SE)	P	Diff. (SE)	P	HB	b	b (se)	P	HB	
Caregiving hours received	77.05 (10.19)	79.73 (11.11)	-5.91 (10.52)	0.576	-26.02 (10.07)	0.011	20.12 (14.56)	0.169	20.29	(20.97)	0.336					
Number of caregivers																
Male caregivers	0.14 (0.04)	0.24 (0.05)	-0.07 (0.03)	0.006	-0.14 (0.03)	0.000	0.06 (0.04)	0.131	0.07	(0.06)	0.277					
15-29 years old	0.02 (0.01)	0.02 (0.02)	-0.02 (0.01)	0.045	-0.02 (0.01)	0.158	-0.01 (0.01)	0.712	-0.01	(0.02)	0.802					
30-44 years old	0.04 (0.02)	0.12 (0.04)	0.00 (0.01)	1.000	0.06 (0.03)	0.020	0.06 (0.03)	0.042	0.06	(0.04)	0.147					
45-59 years old	0.06 (0.02)	0.09 (0.04)	-0.03 (0.02)	0.109	-0.05 (0.02)	0.014	0.01 (0.03)	0.583	0.01	(0.04)	0.694					
60-74 years old	0.02 (0.01)	0.02 (0.02)	-0.02 (0.01)	0.045	-0.02 (0.01)	0.158	-0.01 (0.01)	0.712	-0.01	(0.02)	0.806					
75 years and older	-	-	-	-	-	-	-	-	-	-	-					
Lives in household	0.08 (0.03)	0.17 (0.05)	-0.03 (0.02)	0.109	-0.12 (0.03)	0.000	0.09 (0.03)	0.009	0.09	(0.05)	0.065					
Lives outside household	0.06 (0.02)	0.08 (0.03)	-0.04 (0.02)	0.021	-0.02 (0.02)	0.416	-0.03 (0.03)	0.310	-0.03	(0.04)	0.492					
Female caregivers	0.86 (0.04)	0.76 (0.05)	-0.42 (0.04)	0.000	-0.23 (0.05)	0.000	-0.20 (0.06)	0.001	-0.20	(0.08)	0.020					
15-29 years old	0.06 (0.02)	0.02 (0.02)	-0.04 (0.01)	0.004	0.00 (0.00)	0.000	-0.04 (0.01)	0.004	-0.04	(0.02)	0.050					
30-44 years old	0.07 (0.03)	0.12 (0.04)	-0.05 (0.02)	0.007	-0.05 (0.03)	0.158	-0.01 (0.04)	0.870	-0.01	(0.05)	0.911					
45-59 years old	0.12 (0.03)	0.23 (0.05)	0.00 (0.02)	1.000	-0.06 (0.03)	0.074	0.06 (0.04)	0.138	0.06	(0.06)	0.292					
60-74 years old	0.44 (0.05)	0.32 (0.06)	-0.26 (0.03)	0.000	-0.12 (0.03)	0.000	-0.14 (0.04)	0.002	-0.14	(0.06)	0.026					
75 years and older	0.15 (0.04)	0.08 (0.03)	-0.07 (0.02)	0.001	0.00 (0.02)	1.000	-0.07 (0.03)	0.018	-0.07	(0.04)	0.099					
Lives in household	0.79 (0.04)	0.64 (0.06)	-0.41 (0.04)	0.000	-0.18 (0.04)	0.000	-0.23 (0.05)	0.000	-0.23	(0.08)	0.004					
Lives outside household	0.06 (0.02)	0.12 (0.04)	-0.01 (0.02)	0.528	-0.05 (0.03)	0.109	0.04 (0.03)	0.282	0.04	(0.05)	0.447					
No. observations	97	66														

DID difference-in-differences, P p value, HB Holm-Bonferroni correction; ††p < .05 after HB correction

Table 4 Effects on primary caregiver w2 - W1 (women respondent)

	Treatment (Valladolid) W1		Control (Motul) W1		Treatment (Valladolid) W2-W1		Control (Motul) W2-W1		DID of means			DID regressions			
	Mean (SE)		Mean (SE)		Diff. (SE)	P	Diff. (SE)	P	Diff. (SE)	P	HB	b	b (se)	P	HB
Caregiving hours received	66.63 (6.53)		69.40 (8.51)		-4.78 (5.97)	0.425	-24.95 (6.96)	0.000	20.17 (9.17)	0.029	20.29	(13.31)	0.129		
Number of caregivers															
Male caregivers	0.24 (0.03)		0.24 (0.04)		-0.11 (0.02)	0.000	-0.13 (0.03)	0.000	0.02 (0.03)	0.514	0.02	(0.05)	0.700		
15-29 years old	0.02 (0.01)		0.01 (0.01)		-0.02 (0.01)	0.014	-0.01 (0.01)	0.158	-0.01 (0.01)	0.374	-0.01	(0.01)	0.545		
30-44 years old	0.04 (0.01)		0.03 (0.02)		-0.03 (0.01)	0.001	-0.03 (0.01)	0.014	0.00 (0.01)	0.883	0.00	(0.02)	0.930		
45-59 years old	0.05 (0.02)		0.03 (0.02)		-0.01 (0.01)	0.318	0.00 (0.01)	1.000	-0.01 (0.02)	0.430	-0.01	(0.02)	0.592		
60-74 years old	0.07 (0.02)		0.08 (0.03)		-0.02 (0.01)	0.045	-0.06 (0.02)	0.003	0.03 (0.02)	0.146	0.03	(0.03)	0.334		
75 years and older	0.05 (0.02)		0.08 (0.03)		-0.01 (0.01)	0.249	-0.04 (0.01)	0.004	0.03 (0.02)	0.130	0.02	(0.02)	0.344		
Lives in household	0.21 (0.03)		0.21 (0.04)		-0.08 (0.02)	0.000	-0.11 (0.02)	0.000	0.03 (0.03)	0.268	0.03	(0.04)	0.491		
Lives outside household	0.04 (0.01)		0.03 (0.02)		-0.03 (0.01)	0.001	-0.02 (0.01)	0.158	-0.01 (0.02)	0.478	-0.01	(0.02)	0.628		
Female caregivers	0.76 (0.03)		0.76 (0.04)		-0.27 (0.03)	0.000	-0.21 (0.04)	0.000	-0.07 (0.05)	0.163	-0.06	(0.07)	0.355		
15-29 years old	0.07 (0.02)		0.03 (0.02)		-0.02 (0.01)	0.103	0.00 (0.01)	1.000	-0.02 (0.02)	0.167	-0.02	(0.03)	0.337		
30-44 years old	0.25 (0.03)		0.27 (0.04)		-0.11 (0.02)	0.000	-0.09 (0.03)	0.002	-0.02 (0.04)	0.687	-0.01	(0.05)	0.793		
45-59 years old	0.29 (0.04)		0.31 (0.05)		-0.11 (0.02)	0.000	-0.09 (0.02)	0.000	-0.02 (0.03)	0.641	-0.01	(0.05)	0.761		
60-74 years old	0.12 (0.03)		0.12 (0.03)		-0.02 (0.02)	0.131	-0.03 (0.02)	0.109	0.00 (0.02)	0.870	0.01	(0.03)	0.877		
75 years and older	0.01 (0.01)		0.03 (0.02)		0.00 (0.00)	0.000	0.01 (0.01)	0.158	-0.01 (0.01)	0.158	-0.01	(0.01)	0.348		
Lives in household	0.58 (0.04)		0.61 (0.05)		-0.23 (0.03)	0.000	-0.14 (0.04)	0.000	-0.08 (0.05)	0.072	-0.08	(0.07)	0.233		
Lives outside household	0.18 (0.03)		0.15 (0.03)		-0.05 (0.02)	0.026	-0.07 (0.03)	0.016	0.02 (0.03)	0.621	0.02	(0.05)	0.733		
No. observations	164		106												

DID difference-in-differences, P p value, HB Holm-Bonferroni correction; ††p < .05 after HB correction

older men. This is true both when comparing DID of means (seventh to ninth columns in Table 3) and controlling for covariates using DID regressions (last four columns). Table 3 shows a larger decline in caregiving hours received for the control group (−26.0 h per week) than for the treatment group (−5.9 h per week). The average number of female caregivers in the treatment relative to the control group, declined by 0.2 or 23.2%, and we observe this decline specifically for female caregivers 60 to 74 years old who live in the same household as the older men respondents. However, these effects are not statistically significant after applying the Hold-Bonferroni correction for multiple hypotheses testing using DID regressions.

Similarly, Table 4 shows no statistically significant changes in hours given to older women in DID regressions after controlling for covariates. We observe a similar trend for older women as for men of declining caregiving hours for the treatment group by 4.7 h per week and 24.9 for the control. We find no statistically significant effects in the number of male and female caregivers for older women respondents. We also observe no changes in payments from older men and women for primary caregiver services.

Discussion

Social care, defined as support provided to perform activities of daily living, is a fundamental part of older adult caregiving. Worldwide, social care is mostly provided by informal or non-paid caregivers, usually close relatives, even in countries with sound long-term care policies that provide institutional arrangements or social care services. In Mexico, the absence of formal social care services has left family members with the main responsibility for care, particularly for disabled and older adults.

Our findings provide a general picture of the effects of a supplemental income program on informal care for older adults in two cities of southeast Mexico. After introduction of the program, hours of care received decreased, albeit less in the treatment town than in the control town. The decrease in hours of care received can be explained by disability being a dynamic process, with different stages as individuals age (Johnson and Wolinsky 1993; Wunderlich et al. 2002). Even though the decline in hours of care is lower for the treatment group, the overall effect of the program is not statistically significant. For men, we observe small changes in number of primary caregivers by age group of those providing support, but the results are not statistically significant after correcting for multiple hypotheses testing. For women, no significant changes were observed in either specification.

There are few studies that have examined the impact of supplemental income programs on caregiving decisions. While there has been research regarding the crowd-out effects of public transfer payments on familial transfers to older adults, there has been little research regarding the effect of actual care provision. Similar previous evaluations featuring transfers roughly equivalent to those in Yucatan (i.e., between roughly US\$80 and US\$100) (Chuang 2012; Jensen 2004; Kim 2012) exhibited a partial crowding-out effect of private transfers but revealed no significant change to living arrangements. The present study fills a gap in research by documenting the impact of a supplemental income program on caregiving hours and changes on the burden of primary caregivers.

Our results support past studies that find most caregiving responsibility falls on one individual—even after an increase in household resources that could possibly shift caregiving responsibilities to others. We found more than 98% of caregivers are unpaid, and this situation did not change after the introduction of the income supplement. We do not find

evidence consistent with our hypotheses that additional income may allow older adults to increase the number of hours of care or shift the burden of giving care to others. Previous studies using the same data have found that older adults spend the supplemental income on food, health care services, and medicines (Aguila et al. 2015b). These studies show that even when supplemental income programs are treated as social support programs, they may alleviate some economic or financial pressures of the older adult or at the household level, but do not alleviate primary caregiver burden nor lead to payments to caregivers for their services.

It has become apparent in many countries that the current reliance on non-paid informal care support for older adult is no longer sustainable. The same is true for Mexico as a result of increases in the demand for caregiving due to a rapidly aging population and a decrease in the supply of caregivers, particularly as women push back against gendered norms that burden them with the bulk of care responsibilities. Given that care hours are heavily dependent on older adult health and disability or dependency status, there is an urgent need to increase program interventions that prevent or delay the incidence of chronic diseases and that allow older adults to maintain their functional abilities and independence, reducing and delaying the need for care. Increasing the income of older adults through supplemental income programs has been shown to improve mental health, performance at memory-related cognition tasks, and health outcomes related to diagnosis, as well as to increase use of health care but has had no effects on physical health (Aguila et al. 2015b; Galiani et al. 2016; Lloyd-Sherlock and Agrawal 2014; Schwarzer and Querino 2002). Future research using longer longitudinal datasets should assess the effects of these programs on physical health. Such research may find these programs indirectly impact caregiving responsibilities by improving physical health and thereby reducing the need for care.

Limitations and Implications

Our findings show that supplemental income programs do not substantially reduce the burden of primary caregivers for older men and women. This may be because once the decision to become a caregiver or to assign a caregiver within the pool of potential caregivers is made, there are no changes even when more resources become available. The choice of caregiver may be influenced by the heavy moral or social obligation related to the decision to start and continue providing care (Giraldo-Rodríguez et al. 2018).

A limitation in this study is that we cannot analyze the motives for older adults and family members when choosing the primary caregiver. Another limitation is that we analyze the effects only 6 months after the introduction of a supplemental income program. Further research is needed to understand longer-term effects of such program on the health of older adults and their indirect effects on caregiving needs. Regarding our data, the fact that caregiving hours were reported by older adults rather than by the caregiver directly also presents a limitation to the study. Moreover, the survey collected self-reported data for the total number of caregiving hours received during a given time period rather than using a diary to collect data on hours of care. Finally, our specific location could be seen as a limitation to our work. Nevertheless, we consider our findings externally valid and able to be extrapolated to other parts of Mexico and other LMICs that have strong familial obligations but lack formal long-term care systems.

Informal unpaid caregivers face increasing pressure in Mexico (López-Ortega 2014; Robles 2001, 2005). Local and federal government should prioritize social care for older adults and

allocate resources to create strategies to support them. This is especially relevant in a context of rapid aging and possible unmet needs given the decreased availability of care from children. Several measures could be adopted in order provide much needed care to persons with disabilities and frail older adults, in parallel to programs that support caregivers.

National and local authorities could pair with civil society organizations to provide daycare for people with disabilities and older adults, increasing the supply of services that currently cater mostly to the independent and highly functional. Public programs should also identify caregivers with high or intense care responsibilities as well as their personal and caregiving needs and expectations. Public programs could support these individuals by providing services such as respite care and care breaks, among other alternatives. Policy and decision makers must recognize that caregivers are vulnerable. Too frequently they have to quit their formal education, reduce their working hours, stop working, or switch to the informal market in order to have flexible working hours (Chari et al. 2015; Colombo et al. 2011; Giraldo-Rodríguez et al., 2018; Ruiz and Teresa 2015). Such sacrifices have implications for their personal development and health and wellbeing (Colombo et al. 2011; e Iria Vázquez 2015; García-Calvente et al. 2004; Huenchuan and Rodríguez Velázquez 2015; Robles 2001, 2005).

More broadly, we highlight two priorities for policymakers. First, policymakers should consider including disability care as a constitutional right and creating a National Care System, including long-term care services, which identifies and supports those in greatest need and gradually increase their coverage. Second, legislation and national programs should continue to seek full inclusion of older adults and people with disabilities in formal education, employment, and mobility (Ley de los Derechos de las Personas Adultas Mayores 2001 2015; Ley General para la Inclusión de las Personas con Discapacidad 2011). While these population groups are gaining access to health services and more inclusive support, current policy does not yet contemplate supporting their full-range of care needs nor the consequences of this gap that informal caregivers must often shoulder.

Acknowledgements We thank the staff in Yucatan—supervisors, directors, coordinators, interviewers, programmers, and administrators—who made the project possible. We also thank Jorge Peniche for his excellent research assistance.

Funding This research was supported by funding from the State of Yucatan and by Grants R01AG035008, P01AG022481, and R21AG033312 from the National Institute on Aging and the RAND Center for the Study of Aging (P30AG012815 from NIA).

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

References

- Aguila, E., Diaz, C., Fu, M. M., Kapteyn, A., & Pierson, A. (2011). Living longer in Mexico: Income security and health : executive summary. Retrieved from <https://www.rand.org/pubs/monographs/MG1179z1.html>.
- Aguila, E., Kapteyn, A., Robles, R., Vargas, O., & Weidmer, B. A. (2014). A noncontributory pension program for older persons in Yucatan, Mexico [Product Page]. Retrieved June 6, 2016, from http://www.rand.org/pubs/technical_reports/TR1288z1.html.

- Aguila, E., Cervera, M. D., Martinez, H., & Weidmer, B. A. (2015a). Developing and testing informed-consent methods in a study of the elderly in Mexico [Product Page]. Retrieved from http://www.rand.org/pubs/technical_reports/TR1288z8.html.
- Aguila, E., Kapteyn, A., & Smith, J. P. (2015b). Effects of income supplementation on health of the poor elderly: The case of Mexico. *Proceedings of the National Academy of Sciences*, *112*(1), 70–75. <https://doi.org/10.1073/pnas.1414453112>.
- Aguila, E., Mejia, N., Perez-Arce, F., Ramírez, E., & Rivera Illingworth, A. (2016). Costs of extending the noncontributory pension program for elderly: The Mexican case. *Journal of Aging and Social Policy*, *28*(4), 325–343. <https://doi.org/10.1080/08959420.2016.1158384>.
- Aguila, E., Kapteyn, A., & Perez-Arce, F. (2017). Consumption smoothing and frequency of benefit payments of cash transfer programs. *American Economic Review*, *107*(5), 430–435. <https://doi.org/10.1257/aer.p20171147>.
- Aguila, E., López-Ortega, M., & Gutierrez-Robledo, L. M. (2018). Non-contributory pension programs and frailty of older adults: Evidence from Mexico. Mimeo. University of Southern California. (Mimeo).
- Amuedo-Dorantes, C., & Juarez, L. (2015). Old-age government transfers and the crowding out of private gifts: the 70 and above program for the rural elderly in Mexico. *Southern Economic Journal*, *81*(3), 782–802. <https://doi.org/10.4284/0038-4038-2013.055>.
- Angel, J. L., Vega, W., & López-Ortega, M. (2016). Aging in Mexico: Population trends and emerging issues. *The Gerontologist*, gnw136. <https://doi.org/10.1093/geront/gnw136>.
- Angst, S., Aguila, E., & López-Ortega, M. (2019). Determinants of informal care supply for older adults in Yucatan, Mexico. In W. A. Vega, J. L. Angel, L. M. F. Gutiérrez Robledo, & K. S. Markides (Eds.), *Contextualizing health and aging in the Americas* (pp. 337–358). https://doi.org/10.1007/978-3-030-00584-9_16.
- Bergstrom, C. A., & Heymann, S. J. (2005). Impact of gender disparities in family carework on women's life chances in Chiapas. *Mexico*, *36*.
- Bitran, R., & Giedion, U. (2003). *Waivers and exemptions for health services in developing countries* (No. 33359; pp. 1–2). Retrieved from The World Bank website: <http://documentos.bancomundial.org/curated/es/2003/01/6246381/waivers-exemptions-health-services-developing-countries>.
- Bocquaire, E. (2016). Long-term care coverage in Europe. Long-Term Care News, 41 (5), 11–14. Society of Actuaries. <https://www.soa.org/globalassets/assets/Library/Newsletters/Long-Term-Care/2016/may/ltc-2016-iss-41.pdf>
- Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: Methods and applications*. Retrieved from <http://www.books24x7.com/marc.asp?bookid=12069>.
- Chari, A. V., Engberg, J., Ray, K. N., & Mehrotra, A. (2015). The opportunity costs of informal elder-care in the United States: new estimates from the American time use survey. *Health Services Research*, *50*(3), 871–882. <https://doi.org/10.1111/1475-6773.12238>.
- Chuang, J. C.-C. (2012). Do social allowance transfers crowd out private transfers? An analysis of responses among elderly households in Taiwan. *International Journal of Social Welfare*, *21*(2), 194–202. <https://doi.org/10.1111/j.1468-2397.2011.00788.x>.
- Coady, D., Grosh, M. E., & Hoddinott, J. (2004). *Targeting of transfers in developing countries: Review of lessons and experience*. (No. 30230; pp. 1–320). The World Bank. Retrieved from The World Bank website: <http://documents.worldbank.org/curated/en/464231468779449856/Targeting-of-transfers-in-developing-countries-rview-of-lessons-and-experience>.
- Colombo, F., Llana-Nozal, A., Mercier, J., & Tjadens, F. (2011). Help wanted?: Providing and paying for Long-Term Care. (OECD Health Policy Studies, OECD Publishing). Paris: OEDCD. <https://doi.org/10.1787/9789264097759-en>.
- Comisión Económica para América Latina (CEPAL). (2018). Base de datos de programas de protección social no contributiva en América Latina y el Caribe. Retrieved October 14, 2018 from <https://dds.cepal.org/bpsnc/ptc>.
- e Iria Vázquez, P. M. (2015). Cuidar cuesta: Un análisis del cuidado desde la perspectiva de género [Text]. <https://doi.org/10.5477/cis/reis.151.83>.
- Feinberg, L. F., & Newman, S. L. (2004). A study of 10 states since passage of the National Family Caregiver Support Program: policies, perceptions, and program development. *The Gerontologist*, *44*(6), 760–769. <https://doi.org/10.1093/geront/44.6.760>.
- Ferrucci, L., Guralnik, J. M., Cecchi, F., Marchionni, N., Salani, B., Kasper, J., Celli, R., Giardini, S., Heikkinen, E., Jylha, M., & Baroni, A. (1998). Constant hierarchic patterns of physical functioning across seven populations in five countries. *The Gerontologist*, *38*(3), 286–294. <https://doi.org/10.1093/geront/38.3.286>.
- Folbre, N. (Ed.). (2012). *For love and money: Care provision in the United States*. New York: Russell Sage Foundation.
- Galiani, S., Gertler, P., & Bando, R. (2016). Non-contributory pensions. *Labour Economics*, *38*, 47–58. <https://doi.org/10.1016/j.labeco.2015.11.003>.
- García-Calvente, M. d. M., Mateo-Rodríguez, I., & Maroto-Navarro, G. (2004). El impacto de cuidar en la salud y la calidad de vida de las mujeres. *Gaceta Sanitaria*, *18*(5), 83–92.

- Giraldo-Rodríguez, L., Guevara-Jaramillo, N., Agudelo-Botero, M., Mino-León, D., & López-Ortega, M. (2018). Qualitative exploration of the experiences of informal care-givers for dependent older adults in Mexico City. *Ageing & Society*, 1–20. <https://doi.org/10.1017/S0144686X18000478>.
- Gomes Da Conceicao, C., & Montes de Oca, V. (2013). Ageing in Mexico: Families, informal care and reciprocity. In *Living longer: ageing, development and social protection*. Retrieved from https://nls.idls.org.uk/welcome.html?ark:/81055/vdc_100044862319.0x000001.
- Grunfeld, E., Coyle, D., Whelan, T., Clinch, J., Reyno, L., Earle, C. C., et al. (2004). Family caregiver burden: Results of a longitudinal study of breast cancer patients and their principal caregivers. *CMAJ: Canadian Medical Association Journal = Journal de l'Association Médicale Canadienne*, 170(12), 1795–1801.
- Gutiérrez Robledo, L. M., López-Ortega, M., & Arango Lopera, V. E. (2012). The State of Elder Care in Mexico. *Current Translational Geriatrics and Experimental Gerontology Reports*, 1(4), 183–189. <https://doi.org/10.1007/s13670-012-0028-z>.
- Guzmán, J. M., & Huenchuan, S. (2005). Políticas hacia las familias con adultos mayores: el desafío del derecho al cuidado en la edad avanzada. *Reunión de Expertos. Santiago de Chile: CELADE-CEPAL*.
- Heger, D. (2014). *Work and Well-Being of Informal Caregivers in Europe* (No. 512). Retrieved from RWI - Leibniz-Institut für Wirtschaftsforschung, Ruhr-University Bochum, TU Dortmund University, University of Duisburg-Essen website: <https://ideas.repec.org/p/zbw/rwirep/512.html>.
- Hellström, Y., & Hallberg, I. R. (2004). Determinants and characteristics of help provision for elderly people living at home and in relation to quality of life. *Scandinavian Journal of Caring Sciences*, 18(4), 387–395. <https://doi.org/10.1111/j.1471-6712.2004.00291.x>.
- HelpAge International, University of Manchester, & Institute for Development Policy and Management. (2003). Non-contributory pensions and poverty prevention: a comparative study of Brazil and South Africa. Manchester, UK; London, UK: Institute of Development and Policy Management; HelpAge International. Retrieved from <https://www.helpage.org/silo/files/noncontributory-pensions-and-poverty-prevention-a-comparative-study-of-brazil-and-southafrica-.pdf>
- Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics*, 6(2), 65–70.
- Huenchuan, S., & Rodríguez Velázquez, R. I. (2015). *Necesidades de cuidado de las personas mayores en la Ciudad de México: diagnóstico y lineamientos de política*. Retrieved September 14, 2018, from <https://repositorio.cepal.org/handle/11362/38879>.
- Jagger, C., Arthur, A. J., Spiers, N. A., & Clarke, M. (2001). Patterns of onset of disability in activities of daily living with age. *Journal of the American Geriatrics Society*, 49(4), 404–409.
- Jensen, R. T. (2004). Do private transfers 'displace' the benefits of public transfers? Evidence from South Africa. *Journal of Public Economics*, 88(1–2), 89–112. [https://doi.org/10.1016/S0047-2727\(02\)00085-3](https://doi.org/10.1016/S0047-2727(02)00085-3).
- Johnson, R. J., & Wolinsky, F. D. (1993). The structure of health status among older adults: disease, disability, functional limitation, and perceived health. *Journal of Health and Social Behavior*, 34(2), 105–121.
- Juarez, L. (2009). Crowding out of private support to the elderly: Evidence from a demogrant in Mexico. *Journal of Public Economics*, 93(3–4), 454–463. <https://doi.org/10.1016/j.jpubeco.2008.10.002>.
- Juarez, L., & Pfütz, T. (2015). The effects of a noncontributory pension program on labor force participation: the case of 70 y Más in Mexico. *Economic Development and Cultural Change*, 63(4), 685–713. <https://doi.org/10.1086/681668>.
- Katz, S. (1983). Assessing self-maintenance: activities of daily living, mobility, and instrumental activities of daily living. *Journal of the American Geriatrics Society*, 31(12), 721–727.
- Kim, E. H.-W. (2012). *Public support, family support, and life satisfaction of the elderly: Evidence from a new government old-age pension in Korea*. Retrieved August 18, 2018 from https://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/5571/Kim_duke_0066D_11385.pdf?sequence=1.
- La Parra, D. (2001). Contribución de las mujeres y los hogares más pobres a la producción de cuidados de salud informales. *Gaceta Sanitaria*, 15(6), 498–505. [https://doi.org/10.1016/S0213-9111\(01\)71612-3](https://doi.org/10.1016/S0213-9111(01)71612-3).
- Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: self-maintaining and instrumental activities of daily living. *The Gerontologist*, 9(3 Part 1), 179–186. https://doi.org/10.1093/geront/9.3_Part_1.179.
- Ley de los Derechos de las Personas Adultas Mayores 2001. (2015). *Diario Oficial de la Federación del 25 junio 2002*. 29.
- Ley General para la Inclusión de las Personas con Discapacidad. (2011). *Diario Oficial de la Federación del 30 de mayo de 2011. Última reforma publicada DOF 17-12-2015*. 29.
- Lloyd-Sherlock, P., & Agrawal, S. (2014). Pensions and the health of older people in South Africa: is there an effect? *The Journal of Development Studies*, 50(11), 1570–1586. <https://doi.org/10.1080/00220388.2014.936399>.
- López-Ortega, M. (2014). The family household and informal old age care in Mexico: a research note. *International Journal of Sociology of the Family*, 40(2).
- López-Ortega, M., & Gutiérrez Robledo, L. M. (Eds.). (2015). Percepciones y valores en torno a los cuidados de las personas adultas mayores. In Luis Miguel Gutiérrez Robledo and Liliana Giraldo (coord.) *Realidades y*

- expectativas frente a la nueva vejez: Encuesta Nacional de Envejecimiento (Primera edición, pp. 113–133). México, D.F.: Instituto de Investigaciones Jurídicas, Universidad Nacional Autónoma de México.
- Martínez, R., & Cooper, G. A. for I (2018). *Institutional frameworks for social policy in Latin America and the Caribbean*. Retrieved October 18, 2018 from <https://repositorio.cepal.org/handle/11362/44170>.
- Mayston, R., Lloyd-Sherlock, P., Gallardo, S., Wang, H., Huang, Y., Montes de Oca, V., Ezeah, P., Guerra, M., Sosa, A. L., Liu, Z., Uwakwe, R., Guerchet, M. M., & Prince, M. (2017). A journey without maps—understanding the costs of caring for dependent older people in Nigeria, China, Mexico and Peru. *PLoS One*, 12(8), e0182360. <https://doi.org/10.1371/journal.pone.0182360>.
- McDowell, I. (2006). *Measuring Health: A guide to rating scales and questionnaires*. 3rd ed. Oxford; New York: Oxford University Press.
- Mendez-Luck, C. A., Kennedy, D. P., & Wallace, S. P. (2008). Concepts of burden in giving care to older relatives: a study of female caregivers in a Mexico City neighborhood. *Journal of Cross-Cultural Gerontology*, 23(3), 265–282. <https://doi.org/10.1007/s10823-008-9058-6>.
- Mendez-Luck, C. A., Kennedy, D. P., & Wallace, S. P. (2009). Guardians of health: the dimensions of elder caregiving among women in a Mexico City neighborhood. *Social Science & Medicine*, 68(2), 228–234. <https://doi.org/10.1016/j.socscimed.2008.10.026>.
- National Academies of Sciences, E., and Medicine. (2016). *Families caring for an aging America*. Washington, DC: U.S.: National Academies Press.
- Oliveri, M. L., & InterAmerican Development Bank. (2016). Pensiones sociales y pobreza en América Latina. *Apuntes: Revista de Ciencias Sociales*, 43(78), 121–157. <https://doi.org/10.21678/apuntes.78.848>.
- Pelcastre-Villafuerte, B. E., Treviño-Siller, S., González-Vázquez, T., & Márquez-Serrano, M. (2011). Social support and living conditions in poor elderly people in urban Mexico. *Cadernos de Saúde Pública*, 27(3), 460–470. <https://doi.org/10.1590/S0102-311X2011000300007>.
- Pestieau, P., Ali, R., & Dethier, J.-J. (2010). Universal minimum old age pensions: impact on poverty and fiscal cost in 18 Latin American countries (No. WPS5292; pp. 1–46). Retrieved August 18, 2018 from The World Bank website: <http://documents.worldbank.org/curated/en/397501468299147949/Universal-minimum-old-age-pensions-impact-on-poverty-and-fiscal-cost-in-18-Latin-American-countries>.
- Queisser, M., & Organisation de coopération et de développement économiques, & Centre de développement. (1998). *La réforme des systèmes de retraite en Amérique latine*. Retrieved from <http://new.sourceocde.org/9264163611>.
- Robles, L. S. (2001). El fenómeno de las cuidadoras: un efecto invisible del envejecimiento. *Estudios Demográficos y Urbanos*, 16(3 (48)), 561–584.
- Robles, L. S. (2005). La relación cuidado y envejecimiento: entre la sobrevivencia y la devaluación social. *Papeles de Población*, 11(45), 49–69.
- Rofman, R., Apella, I., & Veza, E. (2013). Más allá de las pensiones contributivas: catorce experiencias en América Latina (No. 82724; pp. 1–500). The World Bank. Retrieved from The World Bank website: <http://documentos.bancomundial.org/curated/es/624841468047055585/Mas-alla-de-las-pensionescontributivas-catorce-experiencias-en-América-Latina>
- Ruiz, B., & Teresa, M. (2015). *El Coste de Cuidar desde una Perspectiva de Género: Proceso Emocional de Personas Cuidadoras de Familiares Dependientes*. Retrieved September 18, 2018, from <https://idus.us.es/xmlui/handle/11441/30858>.
- Salinas-Rodríguez, A., Manrique-Espinoza, B., Moreno-Tamayo, K., Torres-Pereda, P., De la Cruz-Góngora, V., Ángeles-Tagliaferro, G., & Téllez-Rojo Solís, M. M. (2014). *Impact Evaluation of the Non-Contributory Social Pension Program 70 y más in Mexico*. 3ie Impact Evaluation Report 5. Retrieved October 1, 2018 from International Initiative for Impact Evaluation (3ie) website: http://www.3ieimpact.org/media/filer_public/2014/04/07/ie_5-mexico_social_pension_0304_top_3.pdf.
- Schwarzer, H., & Querino, A. C. (2002). *Non-contributory pensions in Brazil: The impact on poverty reduction*. Retrieved September 18, 2018 from <http://public.eblib.com/choice/publicfullrecord.aspx?p=359468>.
- Sheehan, C. M., & Tucker-Drob, E. M. (2017). Gendered expectations distort male-female differences in instrumental activities of daily living in later adulthood. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 74, 715–723. <https://doi.org/10.1093/geronb/gbw209>.
- Spector, W. D., Katz, S., Murphy, J. B., & Fulton, J. P. (1987). The hierarchical relationship between activities of daily living and instrumental activities of daily living. *Journal of Chronic Diseases*, 40(6), 481–489. [https://doi.org/10.1016/0021-9681\(87\)90004-X](https://doi.org/10.1016/0021-9681(87)90004-X).
- StataCorp. (2013). *Stata statistical software: Release 13*. College Station: StataCorp LP.
- Téllez, Muradás M dela C, & Aguilar, L. (2017). Características sociodemográficas del envejecimiento de la población mexicana a través de un enfoque prospectivo. In *Vejez y pensiones en México* (Asociación Mexicana de Administradoras de Fondos para el Retiro, ac Secretaría de Gobernación/Secretaría General del Consejo Nacional de Población, pp. 45–76).

- Tennstedt, S. L., Crawford, S. L., & McKinlay, J. B. (1993). Is family care on the decline? A longitudinal investigation of the substitution of formal long-term care services for informal care. *The Milbank Quarterly*, 71(4), 601–624.
- The American Association for Public Opinion Research (AAPOR). (2016). *Standard definitions: Final dispositions of case codes and outcome rates for surveys* (9th edition). AAPOR. Retrieved from https://www.aapor.org/AAPOR_Main/media/publications/Standard-Definitions20169theditionfinal.pdf.
- United Nations, Department of Economic and Social Affairs, & Population Division. (2015). *World Population Ageing 2015* (No. ST/ESA/SER.A/390). Retrieved from http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf.
- Van Houtven, C. H., & Norton, E. C. (2004). Informal care and health care use of older adults. *Journal of Health Economics*, 23(6), 1159–1180. <https://doi.org/10.1016/j.jhealeco.2004.04.008>.
- Varley, A., & Blasco, M. (2000). Intact or in tatters? Family care of older women and men in urban Mexico. *Gender and Development*, 8(2), 47–55. <https://doi.org/10.1080/741923623>.
- Verbrugge, L. M., & Jette, A. M. (1994). The disablement process. *Social Science & Medicine* (1982), 38(1), 1–14.
- Verbrugge, L. M., Yang, L.-S., & Juarez, L. (2004). Severity, timing, and structure of disability. *Sozial- Und Preventivmedizin*, 49(2), 110–121.
- Wolff, J. L., Spillman, B. C., Freedman, V. A., & Kasper, J. D. (2016). A national profile of family and unpaid caregivers who assist older adults with health care activities. *JAMA Internal Medicine*, 176(3), 372–379. <https://doi.org/10.1001/jamainternmed.2015.7664>.
- Wong, R., Michaels-Obregon, A., & Palloni, A. (2015). Cohort profile: the Mexican health and aging study (MHAS). *International Journal of Epidemiology*, 46, e2. <https://doi.org/10.1093/ije/dyu263>.
- Wunderlich, G. S., Rice, D. P., & Amado, N. L., & Research, I. of M. (US) and N. R. C. (US) C. to R. the S. S. A. D. D. P (2002). *A work disability monitoring system*. Retrieved October 2, 2018 from <https://www.ncbi.nlm.nih.gov/books/NBK220733/>.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Affiliations

Emma Aguila¹ · Mariana López-Ortega² · Sean Angst³

¹ Sol Price School of Public Policy, University of Southern California, 650 Childs Way, RGL Hall 226, Los Angeles, CA 90089, USA

² Research Department, National Institute of Geriatrics, National Institutes of Health, Mexico City, Mexico

³ Sol Price School of Public Policy, University of Southern California, Los Angeles, CA, USA