Effects of income supplementation on health of the poor elderly: The case of Mexico

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We use an income supplementation experiment we designed in the state of Yucatan in Mexico for residents 70 y and older to evaluate health impacts of additional income. Two cities in the State of Yucatan, Valladolid (treatment) and Motul (control), were selected for the income supplementation experiment. Elderly residents of Valladolid were provided the equivalent of an additional $67 per month, a 44% increase in average household income. We designed a survey given to residents of both cities before and 6 mo after the income supplement about their health and other aspects of overall well-being. Both baseline and follow-up surveys collect self-reported data on health, physical functioning, and biomarkers. Anthropometric measurements for every age-eligible respondent, including height, weight, and waist circumference, were collected. We also collected lung capacity, grip strength, a series of balance tests, and a timed walk. Our results show significant health benefits associated with the additional income. Relative to the control site, there was a statistically significant improvement in lung function and an improvement in memory. These improvements are equivalent to a reduction in age of 5–10 y. Residents used their extra income to go to the doctor, buy their medications, and alleviate their hunger. The fear that this extra income could be undone by reduced transfers from other family members or unwise expenditures by the poor elderly appears to be unfounded.

health | income supplement | elderly population

Throughout most of the developed and developing world, daunting issues arise with challenges raised by population aging. Rapid increases in life expectancy alongside unprecedented declines in fertility will lead to never before seen rates of population aging (1). The "problem" of population aging is easy to state—to provide income and health security at older ages and to do so at affordable budgets.

A sharp contrast with prior European and American experience in population aging is that many countries experiencing rapid aging during the next 50 y are middle- or low-income countries, essentially growing old before they grow rich. Mexico is a good example. In 2000, 5% of the Mexican population was over 65 y old. By 2050, this fraction is projected to rise to 22%—a more than fourfold increase (2). For those over age 80, the fraction is projected to rise over the same period from 1% to 6%.

In many such countries, poverty is much more prevalent among the elderly than among younger groups, particularly for elderly without access to social security or pension benefits (3). Moreover, future economic growth favors the working young so that improvements for the elderly will depend on increases in transfers from governments or other family members. We currently do not have good estimates of effects of additional income on health and elderly well-being in these settings.

We evaluate here impacts on health and well-being of recipients of an income supplement we administered for the poor elderly in the Mexican State of Yucatan. This program was rolled out in one city using another city as the control. We target the entire city in our design to avoid the common problem of experimental pilot programs targeting those with the highest expected effects, which then often fail to scale up when rolled out to the entire community. We find that this income supplement leads to a statistically significant and quantitatively important health improvement in many dimensions including memory, low hemoglobin, and breathing. We also find this income supplement was not undone by reduced transfers from relatives and that a significant part of the extra money was spent on doctor visits and medications, and to alleviate hunger.

Methods

Study Design and Participants. The government of Yucatan was interested in providing a noncontributory pension equivalent to the one provided by the federal government program, which paid 1,000 pesos per 2 mo. The Yucatan government conducted an analysis of financial sustainability of the program and the highest pension that the government could provide was 550 pesos per month, which is equivalent to $67 USD per month at purchasing power parity (PPP) (which translates standards of living between different countries). The amount of the pension is similar to other countries in Latin America such as Colombia and Peru where in USD$ PPP the amounts were $44 and $75, respectively (4). It is of course below that of the richer countries in Europe and the United States.

This study presents the evaluation of a social policy intervention using a quasiexperimental design with rich data capturing health and well-being in old age. The income supplement program is designed for all individuals 70 y or older living in urban areas of more than 20,000 inhabitants in the State of Yucatan, Mexico. It provides a flat rate pension of 500 pesos per month, an amount equal to 31% of minimum wages in Yucatan and about 44% of average household income of elderly receiving benefits in the treatment group, representing a significant income supplement. We aimed at an amount that was large enough to be meaningful and low enough to allow for universal introduction after the experimental phase.

Many countries have introduced such plans, including Argentina, Bolivia, Brazil, Bangladesh, Chile, Namibia, Nepal, South Africa, and Zambia (5, 6). In none of these was an evaluation conducted where some households by design received a benefit and others did not.

Towns in Yucatan with less than 20,000 inhabitants were already covered by a federal program so this program was designed for towns with more than

Significance

Effects of income support on well-being and health of the poor elderly especially in low-income country settings is uncertain as experiments that increase incomes and evaluate their impacts on health among the elderly population are almost nonexistent around the world. In our experiment in the Mexican state of Yucatan, we find strong evidence that income supplements for the poor elderly in low- and middle-income settings can have significant health benefits even in the short run. Additional experiments should be conducted around the world as our experience indicates that these experiments are operationally feasible.

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that number of residents. Yucatan has 11 towns that are larger than 20,000 inhabitants, including the capital Merida, which has 777,615 inhabitants. The government of Yucatan chose the northeastern part of the state due to its proximity to Merida, which made it easier to operate the program. The Government of Yucatan made the decision in 2008 to implement the program in Valladolid as the first treatment city, where all residents age 70 and older are eligible to receive the noncontributory pension benefit. RAND and the government of Yucatan chose the locality of Motul as a control group for evaluation purposes because they were most similar. Valladolid was assigned to treatment and Motul to control. The study was double blind because the interviewers did not know which town would receive the Social Security pension during the baseline interview.

Before announcement and program implementation, we designed and conducted a baseline survey of elderly adults age 70 or older living in these two towns. We first carried out a complete listing of all households in selected communities and screened them to identify households with age-eligible adults, thereby creating a sampling frame for the study. We used five data collection teams consisting of one field supervisor and six or seven trained interviewers. Baseline interviews took place in August and September 2008 with follow-ups 6 mo later. Local staff working for the evaluation project interviewed participants in their homes in either Spanish or Mayan, the two local languages. The response rate at baseline in Valladolid was 91.4% and 95.2% in Motul. Response rates are computed using the American Association for Public Opinion Research guidelines for coding the final disposition of all cases and for calculating nonresponse rates (7). The response rate reported is RR2, which is defined as the number of complete interviews (including proxy interviews) divided by the number of interviews (complete plus partial) plus the number of noninterviews (refusal and break-off plus noncontacts plus others) plus all cases of unknown eligibility.

Eligible adults in the treatment town, Valladolid, started receiving income benefits in December 2008. The follow-up surveys in Motul and Valladolid were conducted in June and July 2009. The response in the follow-up survey was 87.9% in Valladolid and 81.9% in Motul.

From the original sample interviewed at baseline in Valladolid of 1,339 individuals, 69 persons died, 19 changed address, 30 could not be contacted, and 66 refused to be interviewed between baseline and follow-up. The baseline sample size in Motul was 1,135 respondents. Between baseline and follow-up 64 persons died, 17 changed address, 35 could not be contacted, and 101 refused to be interviewed.

We report here results from baseline and follow-up surveys in these communities. At the start of the experiment, federal social security pensions were only given to elderly in towns smaller than 20,000 inhabitants. Unexpectedly, the federal government started providing pensions in some towns with more than 20,000 inhabitants. Motul was one of these towns, Valladolid was not. The receipt of the federal benefits was only just starting during the follow-up interview phase. The result was that some of the control households had just received their first federal pension at the time of the interview, whereas others had not. We have excluded the households that did receive the federal pension at the time of follow-up from the comparison. If we include them, results hardly change, most likely because the federal pension was too recent to have much of an impact already.

Survey instruments collected detailed community, household, and individual-level data at baseline (before the program was announced or implemented) with the first follow-up interview in treatment and control groups approximately 6 mo after the treatment group receives the intervention. Both baseline and follow-up surveys conduct memory tests (immediate and delayed recall), anthropometric measurements, and biomarkers. Hemoglobin levels were not originally measured at baseline. We obtained hemoglobin levels 3 mo after the intervention had started and in the follow-up survey 6 mo after the intervention.

The survey is comparable to the Mexican Health and Aging Study (MHAS) and the Health and Retirement Survey (HRS). Anthropometric measurements for every age-eligible respondent, including height, weight, and waist circumference were collected. We also collected lung capacity and grip strength. Where appropriate, respondents were asked for continuous answers (say monetary quantities). If the respondent was unable to answer, unfolding brackets were used to reduce numbers of missing responses and to improve the accuracy of the answers (8). This mimics current practice in the Health and Retirement Survey in the United States. The institutional review board approved the research project and the data-safeguarding procedures. Participants provided written informed consent separately for the self-reported questionnaire and measurement of biomarkers.

Table 1 compares salient characteristics of treatment and control samples at baseline alongside *P* values of a test of differences between means at the two sites. The average age of our samples is about 78 y with no statistically significant difference between sites. Slightly less than half the respondents are male, with slightly more men in Motul. The marital status distributions of the cities are very similar and not statistically different. About one-half of the sample in both cities is married and about 40% are widowed.

Table 1. Descriptive statistics baseline first phase

Variable	Treatment town (Valladolid)	Control town (Motul)	*T* test, *P* value
Mean age	77.6	78.0	0.27
Male, %	0.46	0.48	0.37
Marital status, %			
Couple	0.54	0.50	0.16
Widowed	0.38	0.41	0.17
Others	0.09	0.09	0.80
Mean years of education	1.77	1.77	0.94
Speaks Maya, %	0.77	0.80	0.07
Read and write a message in Spanish, %	0.55	0.63	0.00
Living alone, %	0.13	0.14	0.73
Mean no. of household residents	3.44	3.47	0.78
Work for pay, %	16.5	14.8	0.36
Mean household monthly income	1,357	1,193	0.27
No. of observations	1,146	510	

Average education is 1.77 y of schooling in both the treatment and control town, whereas 8% more of its residents can read and write a message in Spanish in Motul compared with Valladolid. Living arrangements are not significantly different between the sites. The fraction of respondents living alone and mean number of residents in each household are about the same in Valladolid and Motul. Despite their age, a significant fraction (above one in six) of respondents in both treatment and control sites still work for pay, a fraction not significantly different between the two sites. Similarly, monthly household incomes are about the same in both sites. The *P* values in the final column indicate that these baseline attributes are not significantly different in baseline and control towns with the exception of reading and writing a message in Spanish.

Outcome Measures. Because of problems with self-reports in low-income, low-education settings of older populations, we rely here on objective measures of health outcomes. The objective health measures are hemoglobin level (indicator for low when grams per deciliter < 13.5 for men and grams per deciliter < 12 for women); immediate and delayed recall using the number of words recalled from a list of eight nouns (e.g., mouse, house, cat, etc.) read to the respondent and then asking the respondent to recall as many words immediately after reading the list and 5 min after; the highest peak expiratory flow measurement from three readings taken 30 s apart; and the highest grip strength taken for each hand using a hand dynamometer. The choice of health markers is partly based on the most common chronic health conditions among the elderly that are related to nutrition or that could benefit from medical care. We also selected biomarkers to match those available in the international set of HRS surveys around the world.

Statistical Analysis. There are three types of statistical analyses reported here. The first examines mean differences in outcomes between follow-up and baseline in the treatment city minus mean differences between follow-up and baseline in the control city. We call this Diff-in-Diff. Diff-in-Diff assumes that there are no important differences between treatment and control sites that interact with outcomes we are measuring. Although Table 1 indicates that attributes of the population aged 70 and over in the two sites are quite similar, there are some differences.

In our second parametric procedure labeled treatment effects regression with covariates, we include a set of possibly relevant individual attributes based on Table 1. These attributes include a quadratic in age, sex (male = 1), speaks Mayan, reads and writes Spanish, lives alone, household size, education, and married, divorced or separated, or widowed. These models also control for wave and the treatment site of Valladolid plus an interaction of wave 2 with Valladolid. The estimated coefficient of the last variable gives us the regression equivalent of the Diff-in-Diff results.

Table 2. Difference-in-differences of the means for food availability, and economic outcomes

Variable	Treatment baseline	Treatment follow-up	Difference treatment	Control baseline	Control follow-up	Difference control	Diff-in-Diff of means	*P* value	Holm critical value by group	Holm critical values, all outcomes combined
Food availability										
Often run out of food last 3 mo, never–always (1–4)	1.559	1.370	−0.189	1.446	1.429	−0.017	−0.172	0.001	0.017	0.003
Often hungry, never–always (1–4)	1.408	1.168	−0.239	1.275	1.154	−0.121	−0.118	0.001	0.025	0.003
Not eat all day, never–always (1–4)	1.253	1.065	−0.188	1.140	1.100	−0.040	−0.148	0.000	0.050	0.003
Income										
Household monthly income, pesos	1,357	1,754	397	1,193	1,304	110	286.	0.067	0.050	0.017
Satisfied with family household income, very dissatisfied–very satisfied (1–5)	3.42	3.67	0.248	3.49	3.60	0.103	0.144	0.024	0.013	0.007
Work for pay last month, yes–no (1–0)	0.165	0.121	−0.045	0.148	0.148	0.000	−0.045	0.016	0.010	0.006
Monthly family transfers, pesos	298	242	−55.8	154	251	96.9	−153	0.031	0.017	0.008
Activities you cannot do due to the lack of money, yes–no (1–0)	0.408	0.238	−0.170	0.265	0.162	−0.103	−0.066	0.063	0.025	0.013
No. of observations	1,146	1,146		510	510					

The third nonparametric statistical procedure is propensity score matching (PSM) (9, 10). PSM is a matching technique that attempts to estimate treatment effects taking into account confounding attributes that may affect receiving the treatment. PSM essentially creates from the control group a statistical twin in the treatment group. We use the same set of variables for PSM as used in the treatment effects regressions. As is well known, none of these procedures takes into account unobservable differences between treatment and control sites that may interact with outcomes of interest. However, by considering different approaches, we can gauge robustness of results with respect to different statistical approaches.

Results

We next describe results obtained from Diff-in-Diff estimates. We separate our summary into three parts based on outcomes analyzed—those that relate to economic outcomes, those relating to health care utilization, and those relating to objective health status.

Differences in Economic Outcomes. Table 2 presents our main findings on the income supplement for nonhealth status outcomes. These are separated into food availability and income outcomes. For each outcome, the format of Table 2 in its first six columns lists first for treatment group and then for control group baseline and follow-up values and differences between follow-up and baseline values. The columns headed "Diff-in-Diff of means" and the column "*P* value" in Table 2 are key to evaluation of the income supplementation experiment. These columns present differences from follow-up and baseline between treatment and control sites and the *P* values of the Diff-in-Diff. Because we are in fact testing a considerable number of null hypotheses jointly, we also present critical values using the Holm–Bonferroni correction (11). This procedure adjusts critical levels to account for the fact that when testing a large number of hypotheses there is a greater chance of finding a test statistic that is "significant." The next-to-last column provides critical values if we apply the Holm–Bonferroni adjustment within each group, whereas the last column presents critical values if we consider all outcomes in Tables 2 and 3 jointly. In most cases, the Holm–Bonferroni correction does not affect conclusions about statistical significance. In cases where the corrections make a difference, we will note it in *Discussion*.

Regarding food availability, we find that a significantly lower fraction of treatment respondents reported that they ran out of food in the last 3 mo compared with respondents in the control town. Similarly, the frequency of often being hungry and not eating all day also decreased significantly in in treatment town compared with the control town.

Because this experiment is an income supplement, it is unsurprising that income rose in the treatment site relative to control site. Household income increased by about 397 pesos in Valladolid in 6 mo while changing by only 110 pesos in the control town of Motul. Because some households had two people in Valladolid who were aged 70 and over, they would have received two income supplements. The percentage of such households in Valladolid was 29 so that average household level income supplement was about 700 pesos. Because this is larger than actual observed increase of 286 pesos relative to Motul, this indicates that there was some leakage of the income supplement from receiving households. One way in which household income was influenced is the reduction in labor supply by benefit recipients (see below).

Compared with the control site, individuals in the treatment site reported higher levels of satisfaction with their income. This extra income apparently leads to a series of other financial changes for these elderly households—those in treatment reduced their participation in the labor market and received fewer financial transfers from relatives compared with those in the control site. Finally, our results indicate that fewer elderly in the treatment site report that there are activities that they used to do but cannot now do because of lack of money. Not all of these effects are significant judged by the reported *P* values. When applying the Holm–Bonferroni critical values, the income effects lose significance at the 5% level, although a number of effects are still close to significant.

Table 3. Difference-in-differences of the means for health care utilization and health outcomes

Variable	Treatment baseline	Treatment follow-up	Difference treatment	Control baseline	Control follow-up	Difference control	Diff-in-Diff of means	*P* value	Holm critical value by group	Holm critical values, all outcomes combined
Health care utilization										
Visited doctor, yes–no (1–0)	0.415	0.524	0.109	0.456	0.473	0.018	0.092	0.006	0.017	0.005
No. of doctor visits	1.077	1.281	0.204	1.183	1.095	−0.089	0.293	0.011	0.025	0.006
Serious health problem but did not go to doctor, yes–no (1–0)	0.172	0.081	−0.091	0.126	0.079	−0.047	−0.044	0.058	0.050	0.010
OOP expenses paid by relatives, yes–no (1–0)	0.269	0.149	−0.120	0.160	0.164	0.004	−0.124	0.000	0.007	0.003
OOP expenses paid by elderly, yes–no (1–0)	0.169	0.239	0.070	0.207	0.191	−0.016	0.086	0.002	0.008	0.004
Bought no medicines because are too expensive, yes–no (1–0)	0.240	0.125	−0.115	0.177	0.142	−0.035	−0.080	0.002	0.013	0.004
Health outcomes										
Hemoglobin level is low	0.537	0.505	−0.033	0.542	0.565	0.022	−0.055	0.078	0.025	0.025
Immediate recall, no. of words	2.772	3.056	0.284	2.772	2.639	−0.134	0.418	0.000	0.010	0.003
Delayed recall, no. of words	2.652	3.382	0.729	2.759	2.568	−0.191	0.920	0.000	0.013	0.003
Maximum peak expiratory flow, L/min	233	265	32.1	249	262	13.1	19.1	0.002	0.017	0.004
Maximum grip strength, kg	22.9	22.4	−0.487	21.8	21.2	−0.674	0.187	0.557	0.050	0.050
No. of observations	1,146	1,146		510	510					

P value is the significance level of the test of the null hypothesis that the difference in the differences in prior column is zero.

Differences in Health Care Utilization and Health Outcomes. Using the same format as Table 2, Table 3 displays for key health outcomes levels at baseline and follow-up for treatment and control groups. Once again, we list the difference in difference between the observed changes over time between the treatment and control group alongside the *P* value associated with this Diff-in-Diff estimate.

We find evidence that both the fraction of treatment respondents who visited a doctor and the number of doctor visits rose relative to the control site. These effects are statistically significant according to the conventional *P* values and also if we apply the Holm–Bonferroni corrections to this group of outcomes. If we apply the Holm–Bonferroni outcomes to all outcomes in Tables 2 and 3, then the changes are no longer significant at the 5% level, although the *P* values are close to the critical levels. Consistent with additional resources available, the treated reported that it was less likely if they had a serious health problem to not go to the doctor, but this difference is not statistically significant at the 5% level. The amount of money transfers the elderly received from their relatives fell and their relatives were less likely to pay for out-of-pocket (OOP) medical expenses. Instead, the elderly were more likely to pay for their own OOP medical expenses. Fewer treatment respondents reported that they did not buy medicines because they were too expensive.

The evidence in Table 3 supports the view that income supplementation improved health of older Mexicans living in Yucatan who received the income supplement. Relative to the control site, there was a statistically significant improvement in both immediate and delayed recall in the treatment site as well as an improvement in lung function as objectively measured by peak flow. The presence of low hemoglobin levels commonly associated with fatigue especially in low-income settings fell more in the treatment site. This effect is marginally significant according to the conventional *P* value, but not significant when we apply the Holm–Bonferroni correction. As noted before, hemoglobin was only measured 3 mo after baseline, so the Diff-in-Diff is based on a period of only 3 mo. Conceivably, most of the effect of the income supplement was in the first 3 mo, which our measurement would not pick up. Not surprisingly given the short duration of the experiment, we find no effects on height or body mass index. The differences in changes in grip strength between treatment and control site are also not significant and in effect quite small.

To put the size of the effects in perspective, we have carried out a simple exercise. Using the baseline data for both treatment and control towns, we regress health conditions on age and age squared. For peak flow, immediate and delayed recall, we find a marked decrease with age. Next, we consider a 78-y-old individual (78 is the average age in the sample). If this individual's health improves as a result of the intervention, how much younger would this individual have to be to enjoy the same level of health without the intervention. We find that the improvement in immediate recall is the same as if the individual were about 5.5 y younger. For delayed recall, the improvement is equivalent to being 12.4 y younger. For peak flow, the improvement is equivalent with being 7 y younger. These are all very sizeable effects.

Comparisons of Alternative Statistical Methods. An important issue concerns how robust these Diff-in-Diff estimates are to observable differences that exist between treatment and control cities. With this in mind, we present in Table 4 side-by-side estimates of treatment effects from our three alternative statistical models—Diff-in-Diff, regression-based models, and propensity score-matching method. As is readily apparent, the three statistical procedures yield extremely similar estimates. Our results are also robust to alternative statistical models such as Probits, ordered Probits, and Tobits when appropriate. Apparently, observable differences between the elderly residents of Valladolid and Motul do not appear to be affecting our estimates of the effects of the income supplement. We conducted an attrition analysis comparing the characteristics in Table 1 of respondents to baseline and follow-up surveys with those that responded at baseline for treatment and control towns. We found no statistically significant

Table 4. Difference-in-differences using parametric and nonparametric methods

Variable, verbal scale (numeric codes)	Diff-in-Diff of means	Diff-in-Diff regressions	Diff-in-Diff propensity score matching
Health care utilization			
Visited doctor, yes–no (1–0)	0.092	0.088	0.085
	(0.033)***	(0.037)**	(0.036)***
No. of doctor visits	0.293	0.290	0.256
	(0.116)**	(0.136)**	(0.126)**
Serious health problem but did not go to doctor, yes–no (1–0)	−0.044	−0.044	−0.040
	(0.023)*	(0.024)*	(0.025)*
OOP expenses paid by relatives, yes–no (1–0)	−0.124	−0.131	−0.100
	(0.026)***	(0.029)***	(0.027)***
OOP expenses paid by elderly, yes–no (1–0)	0.086	0.088	0.075
	(0.028)***	(0.030)***	(0.032)***
Bought no medicines because are too expensive, yes–no (1–0)	−0.080	−0.075	−0.070
	(0.026)***	(0.028)***	(0.027)***
Food availability			
Often run out of food last 3 mo, never–always (1–4)	−0.172	−0.168	−0.159
	(0.050)***	(0.056)***	(0.057)***
Often hungry, never–always (1–4)	−0.118	−0.107	−0.123
	(0.037)***	(0.042)***	(0.039)***
Not eat all day, never–always (1–4)	−0.148	−0.137	−0.151
	(0.027)***	(0.031)***	(0.031)***
Health outcomes			
Hemoglobin level, low, g/dL < 13.5, men, and g/dL < 12, women (1–0)	−0.055	−0.051	−0.050
	(0.031)*	(0.038)	(0.035)*
Immediate recall, no. of words	0.418	0.430	0.370
	(0.116)***	(0.123)***	(0.126)***
Delayed recall, no. of words	0.920	0.885	0.903
	(0.151)***	(0.155)***	(0.178)***
Maximum peak expiratory flow, L/min	19.056	17.571	17.056
	(6.261)***	(7.740)**	(6.663)***
Maximum grip strength, kg	0.187	0.159	0.093
	(0.319)	(0.460)	(0.362)
Income			
Household monthly income, pesos	286	245	211
	(156)*	(236)	(161)**
Satisfied with family household income, very dissatisfied–very satisfied (1–5)	0.144	0.102	0.130
	(0.064)**	(0.065)	(0.070)**
Work for pay last month, yes–no (1–0)	−0.045	−0.045	−0.041
	(0.018)**	(0.025)*	(0.019)**
Monthly family transfers, pesos	−152	−159	−201
	(70.9)**	(81.3)*	(82.8)***
Activities you cannot do due to the lack of money, yes–no (1–0)	−0.066	−0.047	−0.076
	(0.035)*	(0.037)	(0.041)**
No. of observations	3,312	3,312	3,312

***Statistically significant at 1% level; **at 5% level; *at 10% level.

differences between treatment and control towns. We analyzed changes in living arrangements between baseline and follow-up, but we did not find statistically significant effects.

Discussion

The experimental design of this income supplement program offers unique opportunities to study effects of income changes on many outcomes. One such outcome of great interest is health. Establishing causal links between income and health is notoriously difficult. Although it is likely that causality runs both ways and that socioeconomic status and health are likely influenced by common factors, assessing the strength of each source of correlation is challenging because of a lack of experiments (natural or otherwise) (12). This is especially so in low-income settings for the elderly with little access to even rudimentary health care. One advantage of our income supplement experiment is that, because it was given to all residents of the treatment site, it comes closer to implementations of a true social security program.

Our results indicate that this income supplement led to a positive effect on many health dimensions that are especially malleable in the short run. We find a statistically significant reduction in low hemoglobin levels even within a 3-mo time period. With these basic health improvements, cognitive abilities also

start to improve. Using the decrease in health outcomes with age as a metric shows that these effects are substantial, equivalent with being 5–10 y younger without the intervention.

In the short term, the income supplement had a positive effect in the elderly population by improving food availability, increasing amounts of money spent on food, and reducing labor force participation for those over 70 y old. We find that individuals spend their cash transfer on food, visits to the doctor, and buying medicines. More individuals report paying for their own OOP health expenses, and a lower proportion report relatives paying for their OOP health expenses. The speed of these short-run positive health benefits may be specific to a population that lives close to economic subsistence and often forgoes spending on basic everyday health needs such as dealing with medications. It may also be related to the advanced age of individuals in our sample who have many current health problems that need to be dealt with but were not before the income supplement.

One often-expressed concern in supplementing income for the elderly, especially in developing countries where there are very close ties both emotional and financial between the elderly and other family members, is that there will be significant leakages in the income supplement back to other family members who may reduce their transfers to the elderly. We do find that the amount of transfers from other family members significantly declined over time in the treatment group compared with the control site. However, this relative decline was only 201 pesos compared with relative income increase of about 720 pesos from the income supplement alone per household. Thus, most of the income supplement remained with the targeted elderly population. On a more positive note, this also means that close relatives of the recipients also benefitted from the income supplement.

Another concern with income supplementation programs especially for poor elderly is that the extra money will not be well spent. Clearly, part of the extra money was spent on medical needs (in terms of doctor visits and the purchase of medicines) and for food to alleviate hunger in a population where hunger is commonplace, with beneficial effects on overall health.

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