Health, Aging and Socio-Economic Conditions in Mexico

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Abstract:

We investigate the long-term effect of childhood and adult socio-economic conditions on the health of the elderly in Mexico. We utilize a panel of individuals aged 50 and above from the Mexican Health and Aging Survey to examine whether the transition from good health in 2001 to good health in 2003 is affected by the conditions under which the individual lived at the age of 10, accounting for education and income. We find that socio-economic conditions affect the health of the elderly in Mexico. Individuals with higher levels of income and from higher childhood socio-economic backgrounds are more likely to remain in good health, conditional on their health in 2001. Our paper contributes to the literature of the long-term effects of socio-economic status by considering the case of the elderly in a developing country.

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1. Introduction

With increased living standards and higher life expectancy, developing countries face a dual challenge of managing an epidemiological and a demographic transition. This combination means that chronic degenerative diseases become more prominent among these countries' aging populations. While infections such as tuberculosis continue to take their toll, disease burdens are shifting from infectious to non-communicable diseases, such as heart disease, cancer and diabetes. The elderly are thus experiencing increasing rates of chronic, in addition to communicable, diseases. Yet despite rising national incomes, poverty rates (especially among the elderly) persist in contributing to disability and mortality. Because of the resulting pressures on the health care and pension systems in these countries, understanding the determinants of the health of the aging population will provide insights on how best to alleviate the burden of diseases and to reduce both poverty and inequality.

Socio-economic status (SES) and its various components such as education and income are factors contributing to health disparities. Education and income are major determinants of health outcomes because wealthier and better educated individuals adopt healthier lifestyles and make better health choices for themselves and their families. Childhood SES are especially linked to better health outcomes in adulthood: because education affects choices made over a lifetime, childhood progress through school is likely to have long-term impacts on individuals' health. Similarly, parental incomes also have long-term consequences because poor nutrition in childhood can stack the deck against future health.

Yet the positive association between SES and health is complicated. First, the association works in both causal directions: better SES causes better health and better health causes better SES as healthier individuals have a higher earning potential. Second, unobserved factors (such as genetic predisposition) can jointly determine SES and health outcomes. Understanding how SES conditions (childhood and current) affect health will help determine whether bridging the SES disparities will improve the population's health.

Faced with this dual demographic and epidemiological transition, Mexico provides a unique setting in which to study the role of SES on elderly health outcomes. Despite recent reforms to health care and pension systems, a large segment of the aging

population is still at risk. Using the Mexican Health and Aging Survey (MHAS) panel of individuals aged 50 and above, we examine whether the transition from good health in 2001 to good health in 2003 is affected by the conditions under which the individual lived at the age of 10, accounting for other factors such as education, current income and local conditions. Our results suggest that SES characteristics, both current and during childhood, matter for long-term health. In particular, poor childhood living conditions have a significant effect over and above income and education in explaining whether elderly individuals are still in good health. Furthermore, an individual's education, particularly high school and beyond, tends to favor a better health outcome.

Our analysis builds upon the work by Palloni et al. (2003), who also look at health among the elderly in Mexico using the MHAS. While their analysis focus more specifically on particular ailments such as diabetes and obesity, our primary focus is on the channels through which SES affect general health in old age. In contrast to Palloni et al. (2003) who find little relationship between childhood SES, our results, which attempt to address identification issues by considering health transitions, find stronger effects.

Section 2 presents the conceptual framework. Section 3 describes the MHAS and the construction of the key variables for the empirical analysis. Section 4 discusses the results and the robustness of the findings. We conclude by considering policy implications.

2. Conceptual Background

Health and Socio-Economic Status

Aging is associated with an increase in morbidity and mortality and a deterioration of health. Yet, even among individuals of the same age group, the burden of aging is not spread uniformly: health outcomes differ according to SES. Higher education and income are especially considered to be determinants of better health outcomes. While the statistical correlation between health outcomes and SES is strongly positive both across and within countries (Deaton, 2008), establishing causality is challenging. For instance, the income gradient documents higher health outcomes as income grows. On the one hand, this gradient can be explained by the fact that the rich can afford better health care than the poor. On the other hand, because the healthy earn more than the ill who cannot work due to illness, the causality also works in the opposite direction. Similarly, more

educated individuals are healthier than less educated individuals because education brings an allocative efficiency, either because education makes people better decision-makers (Grossman, 1972) or because more educated people have better information about health (Kenkel, 1991). Conversely, illness may prevent ill individuals from acquiring an education.[1] Finally, health outcomes today are dependent on previous health investments and outcomes.

In addition to such reverse causation effects, the positive association between health outcomes and SES might also be partly explained by unobservable characteristics such as genetics or risk and time preferences. For instance, people who are impatient invest little in education and health, while people who are patient invest a lot in both (Farrell and Fuchs, 1982). Investment could also be a factor: because education gives them a higher income, individuals attempt to engage in healthy activities today and favor a higher probability of survival in the future so as to reap the benefits of higher income.

Health and SES are partly affected by childhood SES. The literature for developing countries suggests that parental education is a significant predictor of an individual's educational attainment (Strauss and Thomas, 1995). First, more educated parents are more knowledgeable about the benefits of an education, and so are likely to invest more highly in their children's education. Second, more educated parents have higher incomes and so are better able to afford such investments. Third, more educated parents live in regions that have access to better schools.

Recent work shows that conditions at birth or in childhood influence health outcomes later in life. Akresh and Verwimp (2006) find that civil war and crop loss at birth had an effect on height-for-age z-scores among Rwandan children. Similarly, Mancini and Yang (Forthcoming) and Almond (2006) find long-term effects of conditions prevailing *in utero* among Indonesian and US adults, respectively. The mechanism behind this relationship, summarized in Case et al. (2005), is that individuals that are born to poorer families will have lower health outcomes in childhood, thus lower educational attainment, thus lower adult health and incomes.

Because of the difficulties in establishing the direction of causality, we conceptualize a stylized three-period (childhood, adulthood and the "Golden Age") dynamic model of

[1] Currie and Hyson (1999) link poor health and low education.

health, drawing loosely on Strauss and Thomas (2008). Beginning with childhood, an individual's childhood health is determined by childhood SES and other individual (genetics and risk or time preferences), household and geographic characteristics. The individual invests in education during childhood, which is determined by her childhood health and SES. In adulthood, having completed her education, the individual works in the labor force and earns an income which is dependent both on her health as an adult and her education. Her adult health is a function of her childhood health, her adult SES (education and income), and other individual, household and geographic characteristics. Finally, in the "Golden Age", the individual no longer works, and her health is a function of her adulthood health and income (via either saved income or accumulated assets), her education and other individual, household and geographic characteristics.

This conceptualization describes an individual's health over her life-course. Childhood SES affects childhood health and investment in education. Childhood health and education affect adult health, and education and adult health affect adult income. Education and income, as well as adult health, determine health during the "Golden Age". The relationship between childhood SES and health among the elderly is unlikely subject to reverse causation: health in old age does not affect SES during childhood. To the extent that childhood SES is the only determinant of adult SES, adult SES shouldn't affect health in the "Golden Age" once childhood SES is accounted for.

However, in addition to operating through adult SES, the relationship between health in the "Golden Age" and childhood SES might be explained by possibly time-varying observable and/or unobservable factors: genetic predisposition or parental background could explain childhood SES and health over the life-course. Genetic predisposition may also have a time-varying component making an individual's ability to prevent and combat disease different as she ages. Such an effect allows for the possibility that SES at different periods in life might affect health in old age. [2]

[2] The life-course and pathways (Kuh and Wadsworth, 1993; Lynch et al., 1994; Marmot et al., 2001) models account for such channels.

Empirical Strategy

To assess these various relationships, we take the following strategy. We begin by considering a reduced form specification, where *H* is the probability that the individual is in good health (G):

$$\text{Prob}(H_{it} = G) = \beta_0 + \beta_1 CSES_i + X_{it}\beta_X + \eta_{it} \quad (1)$$

where *X* is a vector of control variables (such as demographic and geographic). To test whether CSES completely determines health in the "Golden Age", we augment the model in (1) by including adult SES, education (*E*) and income (*Y*):

$$\text{Prob}(H_{it} = G) = \beta_0 + \beta_1 CSES_i + \beta_2 E_i + \beta_3 Y_i + X_{it}\beta_X + \eta_{it} \quad (2)$$

If the coefficients on adult SES (education and income) are significant predictors of the probability of being in good health, then there may exist omitted factors such as genetics (unobservable in our data) and parental background (observable). Letting Ω_{obs} and Ω_{unobs} be observable and unobservable third factors, equation (2) thus becomes:

$$\text{Prob}(H_{it} = G) = \beta_0 + \beta_1 CSES_i + \beta_2 E_i + \beta_3 Y_i + X_{it}\beta_X + \beta_{obs}\Omega_{obs,it} + \beta_{unobs}\Omega_{unobs,it} + \eta_{it} \quad (3)$$

While (3) reduces some of the omitted variables bias in (2), unobservable factors, such as genetics, could still cause bias in the estimated effects of childhood SES. Furthermore, endogeneity may persist since income and adult SES of individuals are influenced by their state of health.

Because of these complications, we adopt a dynamic approach in which we investigate the transition between the reported health statuses of individuals as in Buckley et al. (2004). Using the MHAS panel, we investigate whether an individual's propensity to remain in good health is related to her income and her education level. To infer some causal effect of SES characteristics on health, we estimate the transition to a health status for a subset of individuals based on their reported health status in the first period. Conditioning on a good health state in the first period removes individuals whose income might have been adversely affected by their initial poor health. This approach also allows us to estimate the effect of childhood and adult SES on the health transition over and above what income and education may contribute in an initial health state. The probability of remaining in good health from one period to the next is thus:

$$\text{Prob}(H_{it} = G, t > 0 \,|\, H_{it-1} = G) = f(CSES_i, Y_i, E_i, X_{it}, \Omega_{obs,it}, \Omega_{unobs,it}) + \eta_i \quad (4)$$

3. Data

Mexican Health and Aging Study (MHAS)

The MHAS is a two-year panel study modeled after the U.S. Health and Retirement Study. At its baseline in 2001, it was nationally representative of Mexicans born prior to 1951 (50 and older in 2000). The survey includes information on health measures (self-reports of conditions and functional status), background (education and childhood living conditions), family demographics, and economic measures (wage and non-wage income and assets). If there were two residents born before 1951, one was randomly selected to be part of the study. Spouses or partners of sampled respondents were also included in the study. Respondents were first interviewed in 2001, with follow up interviews in 2003. A total of 15,186 interviews (1,032 by proxy) were completed in 2001 and 13,704 interviews (1,178 by proxy) in 2003. We exclude proxy interviews because several questions used in our analysis (including those used to construct our dependent and childhood SES variables) were not asked in proxy interviews. For the "full sample" (n = 8,741), we drop respondents with missing information on childhood health and SES, education, or neighborhood ladder index. Descriptive statistics are presented in Table 1, and below we describe the construction of the key dependent and independent variables.

We consider three samples. First, we include all non-missing values for each variable. Second, we restrict the sample to one which is balanced over the key variables. Third, we balance the sample over all variables, including the ones used as instruments (namely parental background variables). While the samples are different statistically (t-tests fail to reject that the means are the same in most cases), the differences are relatively small in magnitudes.

Dependent Variables – Health Outcomes

Our primary health measure is self-reported quality of health, based on the question "Would you say your health is excellent, very good, good, fair, or poor?" We define a binary indicator of "good health" that equals 1 if the response is "excellent", "very good",

or "good", and 0 otherwise. [3] This standard measure of health status is often used in predicting health outcomes such as health care utilization and mortality (e.g. Buckley et al. (2004) and Roy and Chaudhuri (2008)). Yet, self-reported health measures are prone to measurement error (Baker et al., 2004). Grimard, Laszlo and Lim (2007) analyse the supplementary health information contained in the MHAS by comparing this measure of health to more objective, albeit self-reported, indicators of actual ailments. While the problem of measurement error cannot be entirely eliminated, the paper suggests that the results in this analysis are not driven by the subjectivity and measurement issues in the health measure.

Taking the balanced sample (B), Table 1 shows that only roughly one third of individuals report being in good health in 2003. This contrasts with a slightly higher rate of 37% in 2001. We attribute this difference to the fact that respondents have aged by two years between rounds and consequently report somewhat worse health. Figure 1 shows the probability of being in good health by age (in 2001). Apart from the high age ranges which are very noisy because of the low frequency of observations above age 90, the patterns are consistent with intuition: the probability of being in good health declines with age, and the lower 2003 values reflect the general deterioration to the health of individuals who have aged by 2 years.

We focus on transitions from good health in 2001 to good health in 2003. Table 2 provides a transition matrix from the data on the self-reported quality of health variable. Summing across the main diagonal (Panel B), we see that about 50.7% of respondents report no change in their health status. In other words, about 49.3% of respondents report a change in quality of health status from one year to next. Summing over the cells below the main diagonal, we find that 20.9% report an improvement in the quality of health while summing over the cells above the main diagonal suggest that 28.5% report a worsening of quality of health. For our constructed binary measure of good health, we find persistence in health status for 70.6% of respondents, while 12.2% respond being in better health in 2003 than in 2001 and 17.1% in worse health (Panel C). These numbers differ from those in Panel B because we aggregate among "Excellent", "Very Good" and

[3] Grimard, Laszlo and Lim (2007) compare this to a more stringent definition of "good health" as "excellent" or "very good". The analysis finds a stronger correlation between the former definition ("excellent", "very good", or "good") and several self-reported chronic conditions.

"Good" versus "Fair" and "Poor" – as a result, we expect more persistence in this measure. However, the patterns are similar: the majority of respondents report persistence in self-reported health, followed by respondents reporting worse health and finally respondents reporting better health.[4]

Main independent variables – Childhood SES, education and income.

We construct measures of childhood economic conditions from questions pertaining to the household when the individual was a child. The survey asked respondents to about clothing, crowding, hunger and access to a toilet when they were 10 years old. The survey also asked about the individual's father's (or guardian's) occupation at that time and both parents' education. Because recall and measurement error are possible, we include dummies in the analysis based on the degree to which respondents needed help to answer the questions in this section (as noted by the interviewers).

Descriptive statistics for these measures are found at the bottom of Table 1. Only 28% of respondents reported living in a residence with a toilet inside the home at age 10, 31% reported going to bed hungry, 78% wore shoes regularly and 21% reported that at least one household member would sleep in the same room that was used for cooking. Only 13.7% of respondents had mothers who have completed primary, while 17% had fathers who did. Most (56%) of the respondents had fathers who were engaged in agriculture (which is consistent with the fact that only 41% of parental residences were in primarily urban areas), 14% in construction and the remainder had fathers engaged in more white collar types of activities such as business, services or office jobs. The general pattern revealed by these childhood SES variables is that a large proportion of respondents likely come from a relatively poor background.

The predominance of self-employment earnings in a country like Mexico implies that income may be poorly reported and measured. There are also some mature individuals who are retired and who may be pensioners. Furthermore, health outcomes may be more responsive to permanent income than to current (or transitory) income. Because of these

[4] The 2003 wave also asked respondents to compare their health in 2003 to their health in 2001. 53.0% of respondents reported that their health was "more or less the same", 35.9% reported "somewhat" or "much" worse and 11.1% reported "somewhat" or "much" better. These patterns in health transitions follow closely those reported in table 3 using the 2001 and 2003 survey questions.

concerns, and since the effect of income on health is expected to be of a more cumulative nature, we utilize the log of 2001 "per capita assets" to approximate income. The MHAS reports household assets, which are constructed from the self-reported values and debt associated with real estate, businesses, capital assets, vehicles, and other. Missing values for each component were imputed by the MHAS using a multiple imputation multivariate regression technique. Per capita assets are derived by dividing household assets by this variable. Log per capita household assets is roughly 11.66 on average, corresponding to average per capita household assets valued at 255,981 Mexican Pesos.

We measure education using years of completed schooling. Since more years of schooling does not necessarily equate with more education (if for instance individuals repeat grades), and due to possible measurement error in years of education, we also consider the highest level of schooling attained. The average respondent only has 4.7 years of schooling. This low educational attainment is reflected in the proportions of individuals having never gone to school (21.9%), who have completed at most primary school (55.1%), who have completed at most secondary school (16.2%) and who have some post-secondary education (6.8%). These trends reflect that these individuals were of school age when Mexico was still a relatively poor country and where access to schools was not as pervasive as it is today. In addition, we observe a significant amount of variation in the levels of schooling attained.

Figure 2 depicts how education is correlated with health outcomes. The more educated the individual, the higher the probability that she is in good health (with the exception of more than 17 years of education, which is noisy because of the low frequency of observations at this range). This increase is monotonic (except for 13 years of schooling, which is an outlier). The probabilities are higher in 2001 than in 2003, regardless of years of education, because individuals have aged by 2 years and so are more likely to have switched from being in good health to being in bad health.

Another measure of adult SES is "neighborhood ladder index". It is based on the question asking respondents to rank from 1 to 10 their influence in neighbourhood decision-making. In addition to being an alternative proxy to SES, there is scientific evidence that relative rank can impact health by leading to both physical and physiological stressors (Marmot et al.,1997).

The descriptive statistics also include a number of demographic characteristics. The average respondent is about 61 years of age, almost equally likely to be female than male, is currently married or in a consensual union in roughly 70% of cases and is most likely (almost 60%) living in a large urban area (location has more than 100,000 inhabitants). Only 16% reside in more rural locations with less than 2,500 inhabitants. This is significantly less than the 25% of Mexicans who live in rural areas according to the UN.[5]

Unfortunately, the MHAS public release files do not include controls for current and childhood geographic location. While geographic location may be important determinants of health, our empirical approach minimizes the degree to which this lack of information leads to bias. First, we do observe whether the individual currently resides in a large city or in a rural environment, so control for the degree of urbanization. Second, by analysing the transition from one state of good health to another, akin to an individual fixed effects approach, we reduce any omitted variable bias from not observing location.

4. Results

We begin by describing the determinants of good health in 2001 (Table 3) and in 2003 (Table 4). In both years, the effect of education on good health is strongly statistically significant. In the full sample, one additional year leads to a 1.7 percentage point increase in the probability of being in good health in 2001 and 1.4 percentage points in 2003. These effects are more pronounced among men and urban dwellers: we can thus infer the education-health gradient is steeper for urban males. This result should be interpreted with caution. First, the persistence of general health outcomes over the life-cycle may cause an upwards simultaneity bias in the effect of education on health. Second, the higher gradient among males and in urban areas suggests that education's effect on health is picking up income's effect. Thus, we expect a higher correlation between male urban education and health because their permanent incomes are higher and so are able to afford improvements in health care over their lifetimes. The lack of an effect on women might reflect differential mortality (Strauss et al., 1993): women tend to

[5] This discrepancy is due to the MHAS's over-sampling of high out-migration states. Weighting the means using the appropriate expansion factors yields a result much closer to the 25% reported by the UN. All of our empirical analysis will thus use expansion-factor weights.

suffer from more chronic illnesses than men, at any age, and tend to live longer than men. Age matters more for men because their health deteriorates faster than women's.

Per capita assets only matter for good health in the 2003 urban sample: urban individuals from wealthier households are more likely to report being in good health. This confirms the income-health gradient. Surprisingly, it is insignificant in all other samples. The insignificance of the results might be explained by measurement error.

In Table 5, we repeat the analysis for the main sample using levels of schooling instead of years of schooling. We confirm that good health is increasing in education and the effect of education is increasing monotonically in levels. Those who have completed only primary schooling have the same health outcomes as those that do not have any schooling, while the effects become positively significant and increasing in magnitude as the individual's educational level rises.

We now turn to the transition from good health in 2001 to health outcomes in 2003. Table 6 provides these results, for the full sample, of equation (1) estimated by probit, OLS and 2SLS. The first two columns, not correcting for endogeneity of schooling suggest that increasing education by 1 year increases the probability of good health in 2003, conditional good health in 2001, by 1.5%. Education is the strongest current SES variable predicting good health. The last two columns repeat the same analysis using schooling levels rather than years of schooling. Post-secondary education is the main driver of education's effect on health. Age is weakly negatively correlated with the transition from good health in 2001 to good health in 2003.

We are not overly concerned with the endogeneity of income (or assets) and education on health in 2003. Specifically, we already condition for health in 2001 so that the effects of health on education or income should already be accounted for. These results pertain to education or income (assets) effects on the changes in health status. However, this methodology does not necessarily rule out the problem that education is measured with error. On the one hand, table 6 already investigates this possibility by looking at the level of schooling instead of years of schooling (which is likely measured with less error), but to the extent that this does not entirely eliminate the problem, we also appeal to instrumental variables techniques.

Since the probit and OLS results are very similar in terms of magnitudes, signs and significance levels, we opt for correcting for the endogeneity of education using 2SLS (results in the third column of table 6). The instruments that we use for education are parental background information (whether the mother and father have completed primary schooling, whether the parental residence was primarily urban, and the father's occupation). These are good predictors of education because, as in Strauss and Thomas (1995), a child's education is positively affected by parental education and resources. In fact, the first stage results (unreported here but available from the authors) suggest that the joint significance of the excluded instruments has an F-test statistic of 20.9 (significant at 1%), suggesting that weak instruments are not a problem. Indeed, whether the mother or the father has completed primary and whether the parental residence was primarily urban are very strong (positive) predictors of an individuals' schooling levels, as is the father's occupation in the event that it was an office job.[6] The 2SLS results confirm education's positive effect on good health in 2003 conditional on good health in 2001. The effect is weaker in significance, though larger in magnitude.

Childhood SES is a strong predictor of continued good health: going to bed hungry before age 10 is strongly negatively related to being in good health in 2003 conditional on being in good health in 2001. The first stage confirms that educational attainment is largely determined by parental resources and thus childhood SES (especially whether the residence had a toilet inside the house or if the individual generally went to bed hungry by age 10, results not shown here). Yet, the fact that health is still affected by childhood conditions at age 10 when controlling for education suggests that these variables have an effect on health beyond their effect on education. These results imply that improving SES of children have very long-term and broad-ranging implications in terms of their human capital outcomes in late life.

[6] Card (1999) argues that parental background variables are bad instruments for education in earnings equations because they also affect childhood SES. Thus, it parental background may have an effect above and beyond education on current health. However, our data do not provide us with better instruments. Buckley et al. (2004) confronted the same problem with their data and for this reason opted for the transition approach that we co-opt here. Because of the possibility of poor instruments, we do not repeat the 2SLS analysis for the regressions that utilize the levels of schooling.

5. Robustness

We now check for the robustness of the results found in section 4 by using the alternative constructed health measure. Recall that our preferred health measure rates an individual as being in good health if she responds "Excellent", "Very Good" or "Good" in the quality of health question and in bad health if she responds to "Fair" or "Poor". An alternative measure of good health considers only "Excellent" and "Very Good" responses to the quality of health variable as indicating bad health rather than good health. In unreported regressions (available from the authors upon request), we find very similar results as reported in table 6. Specifically, education still has a very strong positive effect on continued good health between 2001 and 2003. However, the magnitude of the effect is about twice what it was in Table 6 (roughly an additional year of schooling leads to a 3.3 percentage point increase in the probability of being in good health in 2003, without instrumenting for education), possibly reflecting the different (and much smaller) sample size.

6. Conclusions

Using recent panel data from Mexico, we find that childhood and adult SES are important determinants of health among the elderly. Conditions at age 10 (such as going to bed hungry) have long-lasting effects on health since they influence the transition from good health in 2001 to good health in 2003. Because childhood conditions may affect adult SES, our analysis controls for income and education. The fact that childhood SES explain health transitions while controlling for adult SES suggest that policies targeting adult outcomes alone will only partly compensate for the ill effects of childhood poverty on long-term health outcomes.

Our approach minimizes problems associated with missing information from the survey. Specifically, the public release files of the MHAS do not include geographic information on current or childhood residence, which may be important factors in explaining health outcomes. While we are unable to completely control for such factors, our transition approach reduces the degree to which this lack of information might contribute to bias in our results (as it is similar to employing individual fixed effects). In addition, the measures of health in the survey are self-reported, which we know from

other countries are measured with substantial error (Baker et al., 2004). While we do not claim that our results would remain unchanged if we had objective information on an individual's health, robustness checks which exploit supplementary information from the survey support our use of subjective measures of health status.

Our results contribute to the body of evidence that childhood circumstances have long-term health consequences (e.g. Case et al. (2005) for the UK). Because childhood SES have such long-term implications for health, even controlling for adult SES such as education and income, our results lend empirical support to both the life-course and pathways models.

From a policy perspective, the channels through which childhood SES affect long-term health are secondary. The primary issue for policy-makers is that these conditions do indeed affect health outcomes over individuals' lifetimes. Our results suggest that policies affecting childhood conditions targeting the health and well-being of children will also affect elderly outcomes over a longer horizon. In other words, conditional cash transfer programs such as Oportunidades are well placed to have longer term impacts than those primarily intended by the program designers. In addition to improving childhood welfare and thus adult SES such as education and income, early childhood interventions can contribute to breaking the lifelong cycle of poverty by even impacting health in old age. It will be interesting to see whether this is true as the first cohort affected by Oportunidades enter the "Golden Age" in about forty years.

While it may take time to measure the effects of such interventions on long-term health, our results nonetheless provide policy makers with additional short-term tools to improve the health of the elderly. Because of their low SES, the elderly would stand to gain from improvements in access to health care programs. In particular, policy makers can target poor, rural, and uneducated elderly individuals. However, instituting programs here might be more difficult. First, De Janvry (2005) and OECD (2006) point out that the existing programs for elderly (social security, pensions, health services) in Mexico appear to be regressive, allocated to those with relatively high SES conditions. Second, some elderly receive help via informal family arrangements (Wong and Parker, 1999; Lopez-Ortega, 2007). Any program introduced by policy makers should consider the implications that it might have on such informal arrangements.

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Table 1 - Descriptive Statistics

	A. Unbalanced Sample				B. Full Balanced Sample			C. Reduced Sample		
Variable	Obs	Mean	Min	Max	Obs	Mean	t-test Diff (B-A)	Obs	Mean	t-test Diff (C-A)
Good Health in 2003	8738	0.331	0	1	8219	0.335	2.502***	6969	0.337	2.279**
Good Health in 2001	8737	0.374	0	1	8219	0.378	2.699***	6969	0.386	4.634***
Years of education	8741	4.665	0	19	8219	4.744	6.763***	6969	4.877	9.045***
		(4.376)				(4.412)			(4.504)	
Highest level of education attained"										
None	8741	0.224	0	1	8219	0.219	-4.781***	6969	0.215	-4.128***
Primary	8741	0.551	0	1	8219	0.551	-0.031	6969	0.542	-3.290***
Secondary	8741	0.159	0	1	8219	0.162	2.724***	6969	0.169	4.805***
Post-secondary	8741	0.066	0	1	8219	0.068	4.238***	6969	0.074	6.482***
Log per capita assets	8224	11.660	2.708	16.318	8219	11.660	0.048	6969	11.659	-0.118
		(1.462)				(1.462)			(1.465)	
Neighborhood ladder index	8741	5.917	1	10	8219	5.936	2.361***	6969	5.975	3.712***
		(2.865)				(2.856)			(2.867)	
Female	8741	0.545	0	1	8219	0.534	-7.867***	6969	0.533	-4.666***
Age	8741	61.306	50	104	8219	61.033	-11.699***	6969	60.808	-10.637***
		(8.752)				(8.544)			(8.463)	
Married or in consensual union in 2001	8741	0.705	0	1	8219	0.727	18.353***	6969	0.732	11.232***
Married or in consensual union in 2003	8741	0.681	0	1	8219	0.703	18.375***	6969	0.711	12.257***
Location population:										
100,000+	8741	0.603	0	1	8219	0.598	-3.985***	6969	0.587	-5.952***
15,000 - 99,999	8741	0.148	0	1	8219	0.149	1.412*	6969	0.152	2.379***
2,500 - 14,999	8741	0.089	0	1	8219	0.091	1.526*	6969	0.095	3.857***
- 2,500	8741	0.160	0	1	8219	0.162	2.763***	6969	0.165	2.630***
Before age 10:										
Residence had toilet inside house	8741	0.286	0	1	8219	0.286	0.036	6969	0.282	-1.648**
Generally go to bed hungry	8741	0.318	0	1	8219	0.316	-1.572*	6969	0.314	-1.557*
Wore shoes regularly	8741	0.778	0	1	8219	0.779	0.865	6969	0.778	0.327
Slept in same room used for cooking	8741	0.209	0	1	8219	0.208	-0.960	6969	0.209	0.012
Parental residence primarily urban	8685	0.412	0	1	8169	0.412	-0.310	6969	0.410	-0.978
Mom completed primary	7986	0.134	0	1	7528	0.137	2.617***	6969	0.139	3.116***
Dad completed primary	7789	0.168	0	1	7349	0.170	1.451*	6969	0.170	1.087
Dad's occupation:										
Agriculture	8561	0.566	0	1	8056	0.566	0.058	6969	0.573	2.883***
Construction	8561	0.141	0	1	8056	0.140	-0.401	6969	0.140	-0.503
Services	8561	0.099	0	1	8056	0.098	-1.522*	6969	0.100	-1.498*
Business	8561	0.075	0	1	8056	0.076	0.530	6969	0.077	1.326
Office	8561	0.031	0	1	8056	0.031	-0.577	6969	0.033	1.729**
Other	8561	0.056	0	1	8056	0.056	0.816	6969	0.057	0.911

Notes: ***, **, * significant at 1%, 5% and 10% respectively. Standard deviations in brackets.

Table 2 - Transition in quality of health status from 2001 to 2003

Panel A - Frequencies

		Quality of health in 2003					
		Excellent	Very good	Good	Fair	Poor	Total
Quality of health in 2001	Excellent	21	16	69	32	7	145
	Very Good	14	43	165	89	10	321
	Good	49	116	1,005	895	159	2,224
	Fair	20	57	643	1,992	541	3,253
	Poor	1	8	123	428	466	1,026
	Total	105	240	2,005	3,436	1,183	6,969

Panel B - Percentages

		Quality of health in 2003					
		Excellent	Very good	Good	Fair	Poor	Total
Quality of health in 2001	Excellent	0.3	0.2	1.0	0.5	0.1	2.1
	Very Good	0.2	0.6	2.4	1.3	0.1	4.6
	Good	0.7	1.7	14.4	12.8	2.3	31.9
	Fair	0.3	0.8	9.2	28.6	7.8	46.7
	Poor	0.0	0.1	1.8	6.1	6.7	14.7
	Total	1.5	3.4	28.8	49.3	17.0	100.0

Panel C - Percentages

		Constructed Health Measure in 2003		
		Good	Bad	Total
Constructed Health Measure in 2001	Good	21.5	17.1	38.6
	Bad	12.2	49.2	61.4
	Total	33.7	66.3	100.0

Table 3 - Good Health in 2001 (Probit Marginal Effects)

	All Individuals	Males	Females	Urban	Less Urban
Years of education	0.017	0.018	0.017	0.022	0.016
	(0.003)***	(0.004)***	(0.004)***	(0.004)***	(0.006)***
Female	-0.09			-0.056	-0.109
	(0.020)***			(0.028)**	(0.028)***
Age	-0.037	-0.052	-0.023	-0.06	-0.014
	(0.015)**	(0.023)**	(0.019)	(0.021)***	(0.020)
Age squared (/1,000)	0.261	0.362	0.164	0.441	0.080
	(0.114)**	(0.176)**	(0.147)	(0.164)***	(0.154)
Married in 2001	0.001	-0.013	0.012	0.008	0.003
	(0.028)	(0.045)	(0.032)	(0.034)	(0.043)
Log per capita assets	0.004	0.001	0.007	0.003	0.007
	(0.008)	(0.011)	(0.010)	(0.010)	(0.012)
Neighborhood ladder index	0.01	0.008	0.01	0.013	0.005
	(0.004)***	(0.005)	(0.005)**	(0.005)***	(0.005)
Before age 10:					
Residence had toilet inside house	0.057	0.029	0.070	0.065	0.086
	(0.027)**	(0.041)	(0.035)**	(0.031)**	(0.058)
Generally go to bed hungry	-0.033	-0.034	-0.029	-0.02	-0.042
	(0.027)	(0.035)	(0.039)	(0.037)	(0.036)
Wore shoes regularly	-0.036	0.025	-0.092	-0.044	-0.018
	(0.029)	(0.036)	(0.042)**	(0.039)	(0.037)
Slept in same room used for cooking	-0.006	0.02	-0.042	0.008	-0.024
	(0.028)	(0.037)	(0.038)	(0.042)	(0.035)
Location dummies	Y	Y	Y	N	N
Control for quality of answer	Y	Y	Y	Y	Y
Observations	8219	3826	4393	5496	2723
Chi-Squared statistic for joint significance of the CSES variables	7.70	2.61	9.69**	5.41	5.35
pseudo R-squared	0.0639	0.0599	0.0658	0.0617	0.0434
Wald Chi-Squared	175.00***	99.07***	98.19***	104.39***	51.14***

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4 - Good Health in 2003 (Probit Marginal Effects)

	All Individuals	Males	Females	Urban	Less Urban
Years of education	0.014	0.017	0.011	0.019	0.005
	(0.003)***	(0.004)***	(0.004)**	(0.003)***	-0.005
Female	-0.061			-0.077	-0.051
	(0.020)***			(0.027)***	(0.027)*
Age	-0.043	-0.065	-0.024	-0.074	-0.018
	(0.015)***	(0.022)***	-0.02	(0.021)***	-0.02
Age squared (/1,000)	0.289	0.454	0.151	0.556	0.081
	(0.117)**	(0.172)***	-0.153	(0.157)***	-0.149
Married in 2001	0.023	0.018	0.025	0.009	0.043
	-0.054	-0.083	-0.068	-0.075	-0.075
Married in 2003	-0.041	-0.005	-0.051	-0.061	-0.026
	-0.055	-0.083	-0.068	-0.075	-0.078
Log per capita assets	0.012	0.009	0.013	0.021	0.008
	-0.008	-0.01	-0.01	(0.010)**	-0.011
Neighborhood ladder index	0.007	0.007	0.006	0.013	0.001
	(0.003)*	-0.005	-0.005	(0.005)***	-0.005
Before age 10:					
Residence had toilet inside house	0.002	-0.017	0.014	0.007	-0.033
	-0.024	-0.037	-0.033	-0.03	-0.042
Generally go to bed hungry	-0.076	-0.071	-0.081	-0.093	-0.067
	(0.025)***	(0.032)**	(0.035)**	(0.038)**	(0.031)**
Wore shoes regularly	-0.008	0.019	-0.034	0.01	-0.008
	-0.028	-0.034	-0.04	-0.038	-0.034
Slept in same room used for cooking	-0.003	0.019	-0.027	-0.004	-0.006
	-0.026	-0.034	-0.037	-0.042	-0.031
Location dummies	Y	Y	Y	N	N
Control for quality of answer	Y	Y	Y	Y	Y
Observations	8219	3826	4393	5496	2723
Chi-Squared statistic for joint significance of the CSES variables	10.48**	5.74	6.68	9.40*	5.05
pseudo R-squared	0.0484	0.0569	0.0455	0.0731	0.0283
Wald Chi-Squared	128.95***	93.52***	60.31***	125.05***	35.73***

See notes from Table 4.

Table 5 - Good Health - Using Schooling Levels (Probit Marginal Effects)

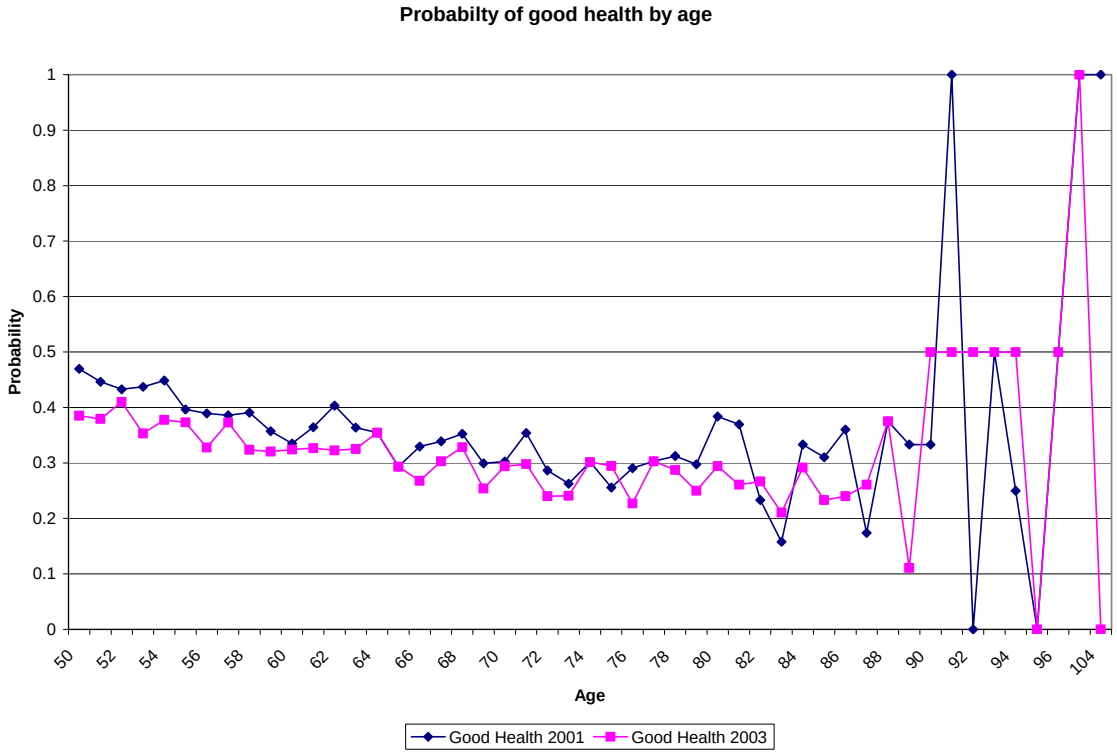
	2001	2003
Highest level of education attained:		
Primary	0.002	-0.006
	(0.027)	(0.027)
Secondary	0.107	0.111
	(0.042)**	(0.042)***
Some college	0.269	0.238
	(0.054)***	(0.060)***
Female	-0.097	-0.064
	(0.020)***	(0.019)***
Age	-0.039	-0.043
	(0.015)***	(0.015)***
Age squared (/1,000)	0.269	0.288
	(0.113)**	(0.116)**
Married in 2001	0.002	-0.013
	(0.028)	(0.026)
Log per capita assets	0.006	0.013
	(0.008)	(0.008)
Neighborhood ladder index	0.010	0.007
	(0.004)***	(0.003)*
Before age 10:		
Residence had toilet inside house	0.062	-0.001
	(0.028)**	(0.025)
Generally go to bed hungry	-0.038	-0.079
	(0.027)	(0.025)***
Wore shoes regularly	-0.027	0.000
	(0.028)	(0.027)
Slept in same room used for cooking	-0.008	-0.004
	(0.028)	(0.026)
Location dummies	Y	Y
Control for quality of answer	Y	Y
Observations	8219	8219
pseudo R-squared	0.0634	0.0505
Wald Chi-Squared for regression	173.10***	131.25***

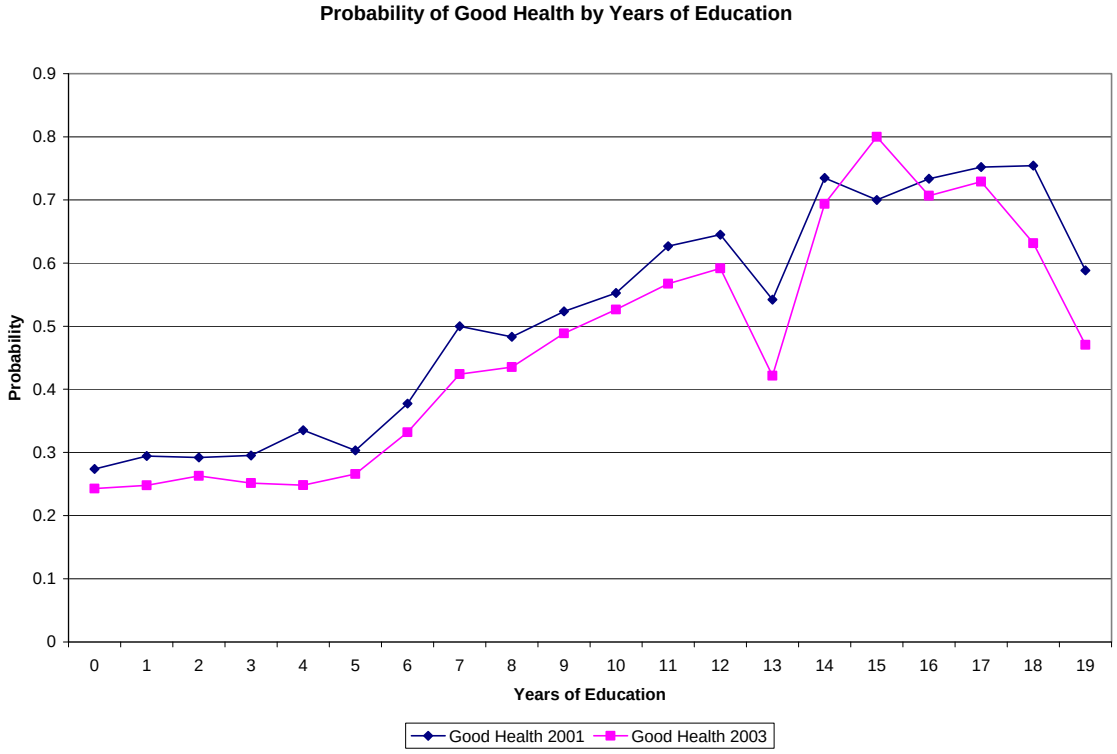
See notes from Table 4.

Table 6 - From Good Health in 2001 to Good Health in 2003

Dependent Variable: Good health in 2003	Probit MFX	OLS	2SLS	Probit MFX	OLS
Years of education	0.015	0.014	0.021		
	(0.005)***	(0.005)***	(0.011)*		
Highest level of education attained:					
Primary				-0.027	-0.025
				(0.047)	(0.044)
Secondary				0.053	0.053
				(0.066)	(0.063)
Some college				0.186	0.176
				(0.079)**	(0.078)**
Female	-0.015	-0.014	-0.016	-0.022	-0.021
	(0.036)	(0.034)	(0.038)	(0.036)	(0.034)
Age	-0.044	-0.042	-0.036	-0.044	-0.043
	(0.025)*	(0.023)*	(0.027)	(0.024)*	(0.022)*
Aage squared	0.307	0.293	0.244	0.303	0.293
	(0.197)	(0.184)	(0.221)	(0.191)	(0.179)
Married in 2001	-0.005	-0.007	-0.038	0.000	-0.002
	(0.101)	(0.098)	(0.108)	(0.099)	(0.096)
Married in 2003	-0.105	-0.098	-0.091	-0.108	-0.101
	(0.099)	(0.098)	(0.109)	(0.098)	(0.096)
Log per capita assets	0.020	0.019	0.018	0.022	0.021
	(0.012)	(0.012)*	(0.013)	(0.012)*	(0.012)*
Neighborhood ladder index	0.006	0.006	0.005	0.007	0.006
	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)
Before age 10:					
Residence had toilet inside house	-0.052	-0.049	-0.088	-0.048	-0.046
	(0.042)	(0.040)	(0.045)*	(0.041)	(0.039)
Generally go to bed hungry	-0.116	-0.112	-0.106	-0.122	-0.118
	(0.045)***	(0.043)***	(0.046)**	(0.045)***	(0.043)***
Wore shoes regularly	-0.018	-0.016	-0.031	-0.003	-0.002
	(0.047)	(0.045)	(0.048)	(0.046)	(0.044)
Slept in same room used for cooking	-0.052	-0.050	-0.048	-0.050	-0.048
	(0.047)	(0.045)	(0.047)	(0.046)	(0.044)
Constant		1.833	1.663		1.868
		(0.716)**	(0.840)**		(0.699)***
Location dummies	Y	Y	Y	Y	Y
Control for quality of answer	Y	Y	Y	Y	Y
Observations	3105	3105	2690	3105	3105
R-squared [pseudo R-squared]	[0.0528]	0.0708	0.0742	[0.0536]	0.0717
F-test [Wald Chi-Squared] for regression	[61.25***]	4.64***	4.13***	[61.09***]	4.19***
Test of Excluded Instruments			20.90***		
Hansen's J Over-identification test (p-value)			0.4673		

See notes from Table 4.


Probabilty of good health by age
Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 104
Age
Good Health 2001
Good Health 2003


Probability of Good Health by Years of Education
Probability
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0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Years of Education
Good Health 2001
Good Health 2003