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# Health Conditions and Social Interactions

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# Health Conditions and Social Interaction

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# Health Conditions & Social Interactions

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August 4, 2011

**Abstract**

This paper evaluates the impact of an antipoverty program on the health condition of individuals. The program combines a cash transfer with financial incentives for positive behavior to poor families. Its main purposes are to improve the living conditions of eligible households and to promote their investment in their children through school attendance and the provision of basic health services. Since the design of the program includes information on eligible and ineligible families, it is possible to evaluate its direct effect as well as its indirect effect.

While the direct impact is measured by the effect of cash grants on eligible individuals, its indirect impact is estimated by the effect generated for the treated neighbors on their non-treated peers. The results show that eligible and ineligible individuals significantly improved their health status due to the program's interventions: the sickness incidences decreased, the sickness spell was reduced, and people seemed to be able to manage normal activities with less difficulty.

Thus anti-poverty programs, despite the fact that constitute a big weight in the public finance of a country, have an important multiplicative effect on the population. It not only generates, in the short run, an increase in the demand for health services but also changes in a positive way the behaviour of people by educating them on the importance of health and nutrition. This result will impact treated and non-treated families in the long run due to the high interaction that characterizes poor societies: families are learning from others.

JEL-Classification: C93, I12, I28, I38

**Keywords:** randomization, experimental design, social interactions.

# 1 Introduction

Despite improvements over the last few decades, health problems and child nutrition deficiency persist in developing countries. For this reason, many governments have implemented social programs that try to intervene in poor populations through cash grants. These programs can be classified into two groups. In the first group, we have conditional programs that make cash transfers contingent on some behavior, usually investments in human capital such as sending children to school or bringing them to health centers.[1] In the second group, we find unconditional programs that mostly focus on a specific age group; these programs make transfers without any limitations or conditions imposed on eligible individuals.

This paper analyses the impact of PROGRESA on health and nutrition. Serving approximately 25 million people, PROGRESA is Mexico's principal antipoverty initiative. Launched by the government in 1997, the program awards cash grants to families living in poverty. The grants are conditioned upon criteria such as preventive health check-ups and regular school attendance for children. Its main goal is to break the intergenerational transmission of poverty by increasing investment by treated families in the human capital of their children.

Related literature has studied the effect of PROGRESA on school attendance, but few documents have evaluated the impact on health and nutrition. The main findings suggest that antipoverty programs that combine education, health, and nutrition interventions can be quite successful at improving the capacity of families to pull themselves out of poverty (Behrman & Hoddinott, 2000). Health and nutrition are very important factors, not only because they directly increase an individual's welfare but because they improve a child's physical and cognitive development (Haas et al, 1996). In particular, healthier children more regularly attend school, while healthier adults with better cognitive ability are more productive and substantially increase their wages (Gertler, 2000).

Unconditional programs, which have been implemented in countries such as Ecuador and South Africa, have had positive results. In the case of Ecuador, authors have concluded that by the age of five, children who were inadequately nourished have already

[1] For more information about countries that have applied this type of program, see: Rawlings L., & Rubio G., Evaluating the Impact of Conditional Cash Transfer Programs, (2005). The World Bank Research Observer, vol. 20, no.1

fallen well behind the cognitive development of their better-nourished peers. Assuming that the disparities persist, the malnourished children will have poorer performance in school, accumulate less human capital, and make less than their peers (Paxson & Schady, 2005). In the case of South Africa, several working papers have shown that unconditional payments have bolstered early childhood nutrition. What is a general consensus among authors is that antipoverty programs that condition payments upon a specific behavior would further increase the program's effects (Kakwani & Veras, 2005).

The paper that is closest to this one is Gertler and Boyce (2001). The authors found that PROGRESA significantly increased the utilization of public health clinics for preventive care. In addition, the program lowered the number of inpatient hospitalizations and visits to private providers. Specifically, there was an important reduction in the incidence of illness, an increase in children's height, and a reduction in anemia. In the case of adults, the program significantly increased the number of kilometers they were able to walk without becoming fatigued and decreased the number of days of difficulty experienced with normal activities due to illness.

In the estimation framework, program evaluation literature use mainly a difference-in- difference estimation (Gertler, 2000; Behrman, & Sengupta & Todd, 2000); however, this method is quite complicated because the survey evaluations have changed every year: the variables before and after the program's implementation are not always the same. Other authors who use the data at the individual level apply propensity score estimation methods (Dian & Handa, 2004; Diaz & Sudhanshu, 2006). Finally, some documents work with panel data-fixed effects; however, this method tends to eliminate a large number of observations because the treatment indicator is invariant over time (Gertler, 2000; Behrman & Hoddinott, 2001).

This paper estimates PROGRESA's impact using different health outcomes. Among these, we have binary and count variables. For the first case, we estimate a logit and a probit specification. In the second case, we estimate either a Poisson or a zero-inflated negative binomial model. It is important to stress the fact that the estimation is done at the locality level and in poor and non-poor subgroups. This division, besides making the program a randomly assigned experiment, allows us to estimate the indirect effect of the program on the non-targeted population.

Regarding the data, the sample is composed of household socioeconomic surveys from rural areas in Mexico. An important aspect of this paper, in contrast to related

documents, is that it defines the global impact of PROGRESA on health and nutrition by different age groups. By desegregating the impact on groups, it is possible to eliminate the problem of misrepresentation: the results do not correspond to the average individual (Bolduc et al., 1996).

The results suggest that the direct effect of PROGRESA, measured by the impact of the treatment on the targeted population, significantly improved the health status of the population. Specifically, children are less likely to get sick, and if sick, they face shorter periods in this state. Children also increased the frequency of visits to the doctor to control height and weight. Adult individuals show fewer problems dealing with daily/moderate activities, and can walk more kilometers before becoming tired. Finally, older treated individuals exhibit greater probabilities of staying healthy.

In the same way, results of the effect of PROGRESA on the non-targeted population reveal a positive impact as well. Ineligible children show a significant increase in their frequency of visits to medical checkups. Not only children, but also young and old individuals exhibit shorter spells of sickness. Adult individuals improved their capabilities to deal with normal and difficult activities. In spite of this, the results also suggest that ineligible adults have more trouble when bathing and dressing. Finally, the spillover effect, measured by the effect of treated neighbors on the non-treated, show that ineligible children aged between 0 and 12 years, are less likely to get sick and have shorter spells of sickness. They also increased their visits to medical checkups.

The document is organized as follows. The next section gives a general view of the health situation in Mexico. It also describes background information on the PROGRESA program: the main goals, structure, and design. In the third part, the document presents data information and some descriptive statistics that explain how the sample is organized. The fourth section defines the econometric analysis. In the final section, we show the estimation results and offer a brief summary and a conclusion.

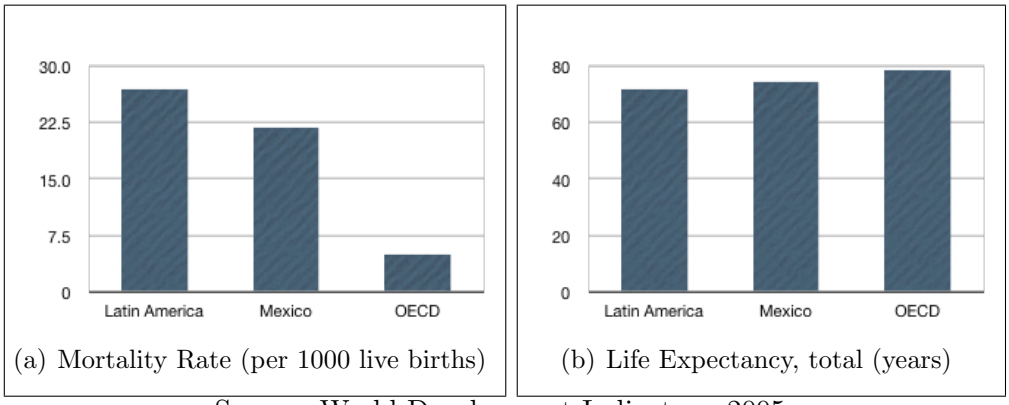
# 2 Background

This section describes health in Mexico. In addition, it provides background information about the PROGRESA: the main goals, design and coverage.

## 2.1 Health Access in Mexico

The health care system places Mexico above Latin American standards but far below OECD standards. In Figure 1, we can see that, for the year 2005, the infant mortality rate in Mexico was 22 per 1000 live births, where as, in the OECD, the rate is only 5 per 1000 live births. The average life expectancy in Mexico was 75 in 2005, while it was 80 in OECD countries. (World Bank, 2005).

Figure 1: Health Outcomes Comparison




(a) Mortality Rate (per 1000 live births) (b) Life Expectancy, total (years)

Source: World Development Indicators, 2005

Access to health services varies widely in the country. Some workers have access to superior health care services with significant pensions, while most people who work in the informal sector access either public providers or affordable private health care. In general, people employed in the public sector are covered by the national ISSSTE social security institute, which, on average, brings better-quality health care and more generous pension benefits. Finally, people who belong to unions, because of their bargaining power, can generally access better benefit packages and services (World Bank Report: Mexico 2006-2012, 2007, p.9).

## 2.2 The Program

PROGRESA is an antipoverty program run by the Mexican government. The program relies on conditional cash grants to poor households. It was introduced in 1997 in small rural communities and has gradually expanded to urban areas. Its main purposes are

to improve the living conditions of eligible households, and promote investment by these households in the human capital of their children through school attendance and in the demand for basic health services.

The program beneficiaries receive bi-monthly cash transfers that represent about 20% of the household consumption. Due to important evidence that suggesting if the cash resources go to the mothers, larger shares of these resources are directed toward child health and nutrition, the money is granted to mothers, with some exceptions (Parker & Teruel, 2005 p. 206). In the case where the mother does not live with the family, the money is given to the person who is in charge of purchasing and preparing food and who takes care of the children's health.
The program's health component relies on four specific strategies:

**1. Cash transfers:**
Money transfers require the entire family to register at the nearest health care provider to schedule regular visits to control health and nutrition. Furthermore, the person who is receiving the money has to attend monthly lectures on health and hygiene: platicas. If a family does not fulfill one of these conditions, the cash grants are suspended. The increase in the family's income aims to result in a more frequent use of health services and an increase in food consumption. Estimates indicate that a 10% increase in income translates into a 3% to 4.5% increase in caloric availability (Technical Document Number 9 on the Evaluation of Oportunidades 2004, 2004, p.5).

**2. Participation in the *platicas*:**
Conducted by trained physicians and nurses, the meetings teach about nutrition and health topics. This training is delivered in the form of lectures to mothers. The emphasis is placed on preventive health care, including how to prevent disease through water treatment, safe food handling, and immunizations.

**3. Nutritional supplements:**
The Program not only provides daily nutritional supplements not only to mothers with infants and small children but also to children between 4 months and 2 years of age and pregnant and lactating mothers. Once a month, mothers receive six packets of supplements per eligible child. The packets provide calories, protein, vitamins, and other micro-nutrients.

**4. Growth monitoring:**
To receive nutritional supplements, growth monitoring of preschool children is required.

This control enables to parents to be aware of nutritional problems.

Table 1 summarizes the components, services and conditions of the program:

Table 1: Components of the Program

| **Components** | | **Conditions** | **Services/ monthly transference** |
|---|---|---|---|
| **Health** | Medical attention | Registration at the nearest health unit | Basic package |
| | Undernourishment prevention | Monthly visit to health unit | Nutritional supplements |
| | Education | | Informative sessions |
| **Feeding** | | Attendance at health services and informative sessions | 115[1] (household) |

[1.] Values in Mexican pesos from January-June 1999. In June 1999, the peso/dolar exchange rate = 9.4409. About 12.18 USD. (Banco de México)
**Source:** Analisis del Programa de Educacion, Salud y Alimentacion PROGRESA, RIMISP-FAO, p. 21, July 1999.

Family as well as community participation is one of the most important elements of PROGRESA. Therefore, people included in the program are asked to fulfill several requirements to continue receiving the money.

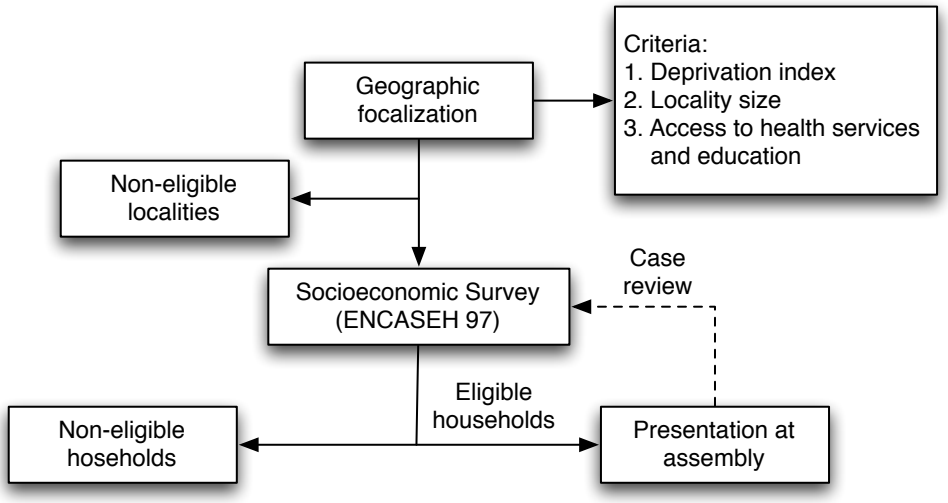
- Enroll people younger than 18 years old who have not finished basic education (primary or high school) to give them support to increase attendance rate and academic achievement.
- Enroll people up to 20 years old who have finished basic education to give them support to improve academic achievement.
- Enroll the family members in the designated medical unit.
- Attend scheduled appointments (for all family members) to receive medical services in the Health Package.
- Attend the monthly lectures on health and nutrition.

- Spend the money on goods and services that improve the health status of the family.

### 2.2.1 The design

Randomization was done at the locality level. In the first stage, a group of localities was selected that met the inclusion criteria for the program. The identification of the localities was conducted, in the first stage, by geographic focalization such that the program verified communities' deprivation and access to health services and basic school systems. The selection used a deprivation index based on social indicators.[2] The index classified the localities into five deprivation categories: very high, high, medium, low, and very low. Localities categorized to have a high or very high deprivation level had priority for inclusion in the program.[3] Once selected, each locality was randomly allocated to the intervention or control group.

Figure 2: PROGRESA: Criteria Selection




Source: General Rural Methodology Note, SEDESOL, November 2005

Stratified sampling was used for the original evaluation sample. It was conducted by locality size proportional to the number of localities. This process was implemented to generate a selection process with equal probabilities of selection for each locality

[2]The Deprivation Index was constructed from the sociodemographic data of the XI General Population and Household Census 1990 and 2000 and the 1996 Population and Household Count.

[3]For further details about the construction of the index, see The Rural Methodology Note, reference 2

size. The sample was estimated over a universe of 4546 communities to select 330 for the treated group and a universe of 1850 communities to select 191 for the control group. After some adjustments, the final sample consisted of 320 treated localities, where PROGRESA first operated, and 186 control localities, where the program began to operate after some time.

During each intervention, where the locality was identified as a potential beneficiary, the program applied a poverty criterion (ENCASEH 97) to determine which households would be eligible to become beneficiaries of the program. Once the beneficiaries were identified, the head of the family received an identification card, the unique document that gives access to the program. In the final phase, the results were presented in a public assembly to the community to seek comments and make corrections and additions.

The program has survey evaluations every six months since the baseline survey in March 1998. A number of core questions about the demographic composition of households and their socio-economic status were applied in each round of the survey. The surveys also asked about family background, schooling, health and nutritional status, health care utilization, consumption of food and non-food items, income, allocation of time of household members, and productive activities. The baseline includes information about 112319 individuals in 506 experimental communities, and about 60% corresponds to treated areas.

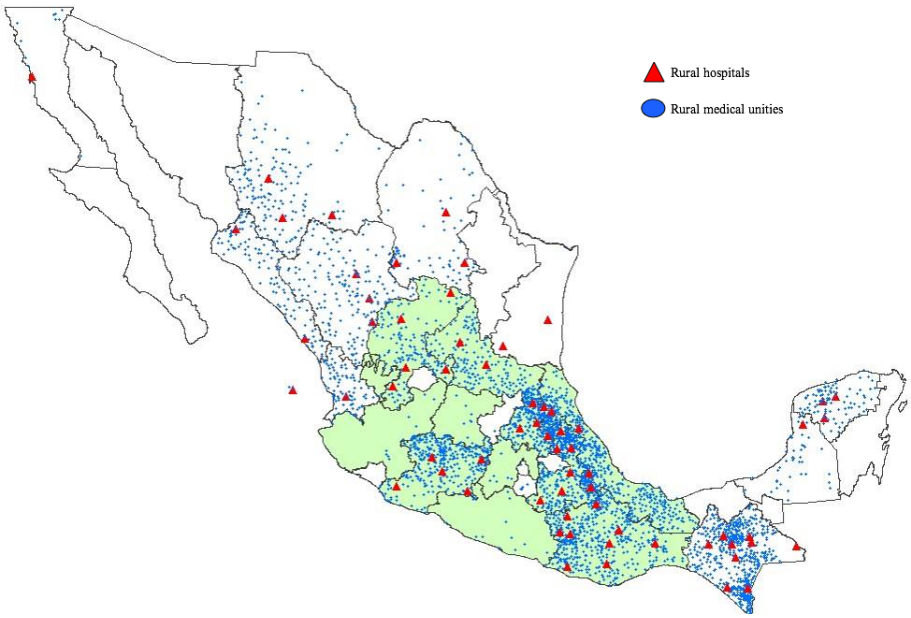
Table 2 describes the organization of each locality by beneficiary household and by their socio-economic condition. As we can see, the localities that receive PROGRESA include poor and non-poor families. In this group, only the poor families are eligible for the program and, therefore receive the bimonthly cash grants. The important thing to note is that the the poor/non-poor groups of families in the PROGRESA and in control localities have exactly the same background characteristics. Thus, before, during, and after the implementation of the program it is possible to compare the situation among the groups.

The experimental communities are located in the seven states that were among the first states to receive PROGRESA, including Veracruz, Guererro, San Luis Potosi, Hidalgo, Queretaro, Michoacan, and Puebla. Figure 1 shows the geographical localization of the beneficiary states as well as the disposable health infrastructure around the country. By January 2008, the program had around 35848 medical unities and 69 public hospitals (Lara, 2008).

Table 2: PROGRESA Structure

| **PROGRESA Localites** | **Control Localities** |
|---|---|
| poor families: receive money | poor families |
| non-poor families | non-poor familiess |

Figure 3: Mexico Map: Location of the Experimental Communities (PROGRESA)




Source: Unidad IMSS-Oportunidades, SISPA, January-December 2007

# 3 Descriptive Statistics

The data corresponds to rural areas in Mexico. It contains information for about 125028 individuals interviewed in 1997 (baseline), 1998, 1999, 2000, 2003, and 2007. In total, it contains 451494 observations. The data is divided between control and treatment groups; within each group, people are categorized as poor (eligible) and non-poor (ineligible).

Table 3 describes PROGRESA's coverage. The participation of poor people in the program increased each year. In 1997 (baseline), almost 37% of individuals categorized as poor received the treatment; by 2000, this share had become 49.4%. Since 2003 all eligible individuals have boceme a part of the program, thus there is no information regarding the poor and non-poor share.

Table 3: PROGRESA Composition

| | **Baseline** | | **1998** | | **1999** | | **2000** | |
|---|---|---|---|---|---|---|---|---|
| Receive treatment[1] | Yes | No | Yes | No | Yes | No | Yes | No |
| Non-poor | 24.68 | 16.47 | 24.21 | 16.14 | 11.52 | 7.980 | 11.17 | 7.521 |
| Poor | 36.75 | 22.10 | 37.24 | 22.41 | 46.61 | 31.90 | 49.38 | 31.93 |
| N | 125449 | | 130279 | | 115889 | | 130476 | |

[1.] Values are percentages with respect to the total number of individuals (N). Source: PROGRESA Evaluation Data

Table 4 details the main variables of the baseline survey (ENCASEH 97). The summary statistics describe the socio-economic characteristics of the sample. Each variable is divided into the treated and control groups, as well as eligibility condition. Additionally, the table reports a t-test on the mean differences between groups (treated-control). the results suggest that the randomization worked almost perfectly in the sample.

In looking closely at the data, it is possible to get an idea of the sample's composition and social background. In the case of age, the sample is divided into five groups: baby (0-5 years), child (5-12 years), young (12-18 years), adult (18-65 years), and old individuals (older than 65 years). This division conforms to the survey composition: different questions were asked of different people depending on their age. Additionally, when analyzing health outcomes, it is important to make distinctions because a per-

Table 4: Descriptive Statistics: Baseline (ENCASEH 1997)

| **Variable** | **Eligible = poor** | | | **Ineligible = non-poor** | | |
|---|---|---|---|---|---|---|
| Receive treatment | Yes | No | Diff.[1] (abs.z-Value) | Yes | No | Diff.[1] (abs.z-Value) |
| Baby | 0.206 | 0.206 | 0.000 (0.935) | 0.103 | 0.103 | 0.000 (0.956) |
| Child | 0.245 | 0.246 | -0.001 (0.732) | 0.142 | 0.139 | 0.004 (0.243) |
| Young | 0.143 | 0.142 | 0.001 (0.863) | 0.162 | 0.167 | -0.003 (0.319) |
| Adult | 0.378 | 0.376 | 0.002 (0.638) | 0.518 | 0.519 | -0.002 (0.717) |
| Old | 0.028 | 0.030 | -0.001 (0.297) | 0.075 | 0.073 | 0.001 (0.540) |
| Male | 0.500 | 0.500 | 0.000 (0.523) | 0.512 | 0.508 | 0.004 (0.431) |
| Parents Ed.: Primary school[2] | 0.246 | 0.229 | 0.017 (0.077) | 0.189 | 0.177 | 0.011 (0.199) |
| Actual schooling | 0.378 | 0.375 | 0.003 (0.369) | 0.246 | 0.240 | 0.007 (0.100) |
| Completed grade 5[3] | 0.094 | 0.093 | 0.001 (0.844) | 0.066 | 0.066 | 0.000 (0.864) |
| Completed grade 6[3] | 0.254 | 0.248 | 0.006 (0.909) | 0.262 | 0.264 | 0.002 (0.748) |
| Secondary school[3] | 0.030 | 0.027 | 0.002 (0.192) | 0.031 | 0.029 | 0.001 (0.525) |
| Health disabilities[4] | 0.062 | 0.063 | -0.001 (0.652) | 0.052 | 0.056 | -0.004 (0.123) |
| Employment[5] | 0.229 | 0.232 | -0.002 (0.450) | 0.365 | 0.359 | 0.006 (0.169) |
| Income[6] | 36.01 | 34.44 | 1.572 (0.107) | 49.28 | 51.06 | -1.78 (0.286) |
| Mothers' age at first job | 16.50 | 15.58 | 0.919 (0.126) | 17.332 | 17.679 | -0.347 (0.585) |
| running water | 0.175 | 0.176 | -0.001 (0.734) | 0.377 | 0.366 | 0.011 (0.525) |
| Wall: asbestos | 0.001 | 0.001 | 0.000 (0.096) | 0.002 | 0.001 | 0.001 (0.339) |
| Wall: metal | 0.001 | 0.001 | 0.000 (0.690) | 0.001 | 0.001 | 0.000 (0.777) |

[1.] Difference between the treated and control groups.
[2.] Refers to parents that completed primary school.
[3.] Refers to individuals that have finished that grade.
[4.] Blind, mute, deaf, mentally and physically disabled people.
[5.] Individuals that engaged in a productive paid activity the week before the survey.
[6.] Reported income on a daily basis.

son's health status depends on various characteristics conditioned on age.

In checking the data, it is possible to see that the eligible group contains an important percentage of young people (0-18 years), almost 60%, while the ineligible group contains a lot of people of middle age (18-65 years). In contrast, both groups contain a similar ratio of men and women.

In the case of education, parents in the eligible group mainly attended primary school. On the other hand, the attendance level at secondary school is higher for the non-poor group. The variable "'Actual schooling"' shows important difference between groups: poor people attend school more regularly than their peers in the non-poor group do.

A potential indicator of health status is defined by the variable "'health disabilities"', which indicates whether an individual has physical problems such as blindness, deafness, or the loss of a limb. The statistics show that the control and treated groups present very similar values. On average, 6.2% of the poor sample suffer one of the mentioned disabilities. This indicator is a bit lower for the second group: about 5%.

The labor conditions among the eligible and ineligible groups vary considerably. While in the first group, only 23% of the individuals able to work reported being emplyed in in the ineligible group, this rate increases to 36%. Furthermore, the non-poor group, on average, earns 15 pesos more than people in the poor group.

Finally, a number of variables describing "social background" are reported. The results suggest important differences between groups. In the poor sample, only 17.5% of the households have access to running water, while, in the second group, this variable is 37%. Finally, two variables define the wall characteristics of the houses, but the results suggest that there are not a lot of people living in houses with this type of structure: asbestos, metal.

Table 5 shows evidence of the effect of PROGRESA on health outcomes in different years. For sickness incidence, the values show that people who do not receive the treatment are sick more frequently than people who receive the cash transfer. Furthermore, this impact is not significant in the first year of the program (1998), but in later years, the effect becomes stronger and statistically significant. An important fact is that the results show a greater impact on the non-poor group than on the poor group. Additionally, people who belong to the treated group seem to stay sick for shorter periods in comparison to people who do not receive the program. In this case, however, the impact is greater for the eligible group.

Weight control improved for the eligible group. Although these results are not surprising given that people were entitled to regular health checks and control if they receive PROGRESA, it is important to point out that that people receiving cash transfers and belonging to the poor group, significantly increased the number of visits to the doctor to check the health and nutrition of their child; hence, the program is accomplishing its main goals, at least in the beginning.

Table 5: Descriptive Evidence of the Effect of Cash Subsidies on Health Outcomes

| **Variable** | **Eligible = poor** | | | **Ineligible = non-poor** | | |
|---|---|---|---|---|---|---|
| Receive treatment | Yes | No | Diff.[1] (abs.z-Value) | Yes | No | Diff.[1] (abs.z-Value) |
| Sickness incidence in 1998[2] | 0.109 | 0.113 | -0.004 (0.059) | 0.126 | 0.114 | 0.012 (0.000) |
| Sickness incidence in 1999[2] | 0.188 | 0.192 | -0.005 (0.080) | 0.133 | 0.145 | -0.012 (0.001) |
| Sickness incidence in 2000[2] | 0.203 | 0.211 | -0.008 (0.002) | 0.264 | 0.290 | -0.027 (0.000) |
| Sickness spell in 1998[3] | 7.231 | 7.627 | 0.415 (0.002) | 9.655 | 9.269 | 0.386 (0.035) |
| Sickness spell in 1999[3] | 9.429 | 10.14 | -0.707 (0.007) | 10.94 | 11.56 | 0.623 (0.269) |
| Sickness spell in 2000[3] | 9.874 | 10.75 | -0.879 (0.006) | 11.48 | 11.83 | -0.356 (0.586) |
| Weight control in 1998[4] | 0.868 | 0.782 | -0.087 (0.000) | 0.797 | 0.846 | -0.049 (0.000) |
| Weight control in 1999[4] | 0.932 | 0.917 | 0.015 (0.026) | 0.911 | 0.912 | -0.001 (0.515) |
| Weight control in 2000[4] | 0.923 | 0.920 | 0.003 (0.447) | 0.869 | 0.891 | -0.021 (0.171) |
| Weight control (times) in 1998[5] | 4.123 | 4.178 | -0.055 (0.000) | 3.798 | 3.649 | 0.149 (0.572) |
| Weight control (times) in 1999[6] | 3.526 | 3.112 | 0.413 (0.000) | 3.235 | 3.181 | 0.128 (0.253) |
| Weight control (times) in 2000[6] | 4.795 | 4.568 | 0.227 (0.561) | 4.041 | 4.096 | -0.055 (0.686) |

[1.] Difference between the treated and control groups.
[2.] Percentage of people who reported a sickness incidence during the previous 4 weeks.
[3.] Days people reported being sick.
[4.] Children younger than 5 years old who in the last six months had their weight were controlled.
[5.] Number of times that children were weight-controlled in the previous year.
[6.] Number of times that children were weight-controlled in the previous 6 months.

# 4 Identification Framework

The topic of treatment evaluations concerns measuring the impact of interventions on outcomes of interest. A measure of causal impact is the average difference in the outcomes of the treated and non-treated (control) groups. Within a framework of a potential outcome model, which assumes that every individual in the population is potentially exposed to the treatment, the outcomes of the different groups form a basis for treatment evaluation.

With $D \in [0, 1]$ being the variable defining whether a person lives in a village that receives PROGRESA, and $H_{1i}$ and $H_{0i}$ being the outcomes if an individual receives or not the treatment respectively, we have:

$$H_i = \begin{cases} H_{1i} & \text{if } D_i = 1 \\ H_{0i} & \text{if } D_i = 0 \end{cases}$$

Receiving and not receiving the treatment are mutually exclusive states: for any given individual, only one of the measures is available. The effect of the cause $D$ on the health status of individual $i$ is measured by: $(H_{1i} - H_{0i})$. The average causal effect of $D_i = 1$, relative to $D_i = 0$, is measured by the average treatment effect (ATE):

$$ATE = E[H|D = 1] - E[H|D = 0]$$

where the expectations are with respect to the probability distribution over the target population.

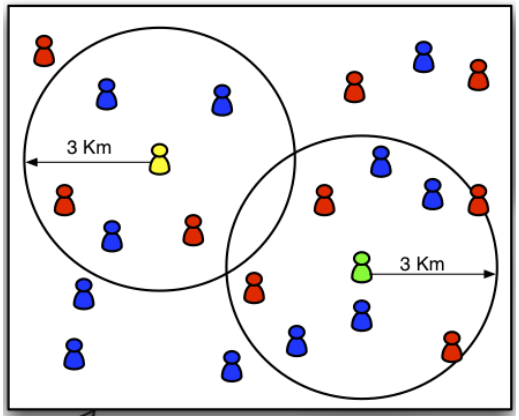
The descriptive evidence presented in section 3 shows that the randomization process that assigned individuals to the control and treatment groups was successfully implemented in PROGRESA. The random assignment implies that individuals exposed to the treatment are chosen randomly, so the treatment assignment does not depend on the outcome and is uncorrelated with the attributes of the treated subjects.

Due to comparability issues among the questions and structure, this paper includes data from two surveys: ENCEL99 and ENCEL00. Thus, the evaluation format allows the estimation of PROGRESA's impact on different age groups using, as explained, several health outcomes.

Let $H_{iv}$ denote the individual health outcome per village and age group measured in 1999 and 2000. Let $P_i = 1$ if the individual lives in a household classified as poor, and

$P_i = 0$ otherwise. The variable $Pn_{ig}$ corresponds to the percentage of poor (=eligible) neighbors per village. Including this variable in the analysis allows us to determine the impact of the treated neighbors on their non-treated peers. It is obvious that not everybody is related or socialize with everybody in the PROGRESA villages. Therefore, to calculate this variable, we use the geographical references of each family. By determining each household localization, it is possible to establish the number of treated and non-treated neighbors to whom each household member might be related based on two conditions: age and closeness. Thus, the indirect impact of PROGRESA is measured by treated individuals interacting with their non-treated peers who might engage in the same activity: attending school, working in a specific area, and living in the same neighbourhood. The next figure explains how the model incorporate the measure of the spillover effect.

Figure 4: PROGRESA: Interations within villages




Let $D_v = 1$ if the individual lives in a village that receives PROGRESA and $D_v = 0$ otherwise. $X_i$ contains background characteristic variables such as gender, maximum level of education in the family, state where the household is located, work status, and dummy variables for the different years in the sample.

$$H_{iv} = \varphi_0 + \varphi_1 D_v + \varphi_2 Pn_{ig} + \varphi_3 (Pn_{ig} * D_v) + \sum_i \gamma_i X_i + \mu_i$$

where $E(\mu_i | D_{iv}) = 0$ by virtue of the randomized assignment of PROGRESA to villages when estimating this model in the sub-groups of the non-poor and the poor. In this context, $\varphi_1$ defines the direct effect of the program, while $\varphi_2$ and $\varphi_3$ measure the

spillover effect when the last equation is estimated for the non-poor (=ineligible).

$H_{iv}$ takes different values defining each group's health status. For babies and children, the dependent variable corresponds to sickness incidence, sickness spell, specific illness faced by children, and weight control. For young individuals, people between 12 and 18 years old, $H_{iv}$ defines whether an individual had difficulty with normal activities during the previous four weeks and sickness incidences. Finally, for adult and older individuals, $H_{iv}$ defines whether individuals can deal with normal, hard, and moderate activities: the number of km that people can walk before getting tired, sickness incidence, and their capacity to dress and bathe themselves.

If $H_{iv} \in [0, 1]$, this paper uses probit and logit specifications in addition to a standard OLS estimation. When $H_{iv}$ is a count variable, such as the number of days that an individual reported being sick, this document estimates a negative binomial model.[4]. This type of model is applicable when a Poisson estimation is inappropriate due to over-dispersion (which is the general behavior of the explained variables). In a poisson distribution the mean and variance are equal. If the variance is greater than the mean, the distribution is said to display over-dispersion.

A zero-inflated negative binomial regression generates two separate models and then combines them. First, a logit model is generated for the "'certain zero"' cases, predicting whether or not an individual would be in this group. Then, a negative binomial model is generated predicting the counts for those individuals who are not certain zeros.

[4]The negative binomial distribution is given by:

$$Pr[y|x] = \frac{\Gamma(y + \alpha^{-1})}{y!\Gamma(\alpha^{-1})}(\frac{\alpha^{-1}}{\alpha^{-1} + \lambda})^{\alpha^{-1}}(\frac{\lambda}{\alpha^{-1} + \lambda})^{y}$$

In the context of count regression models, the negative binomial distribution can be thought of as a Poisson distribution with unobserved heterogeneity which, in turn, can be conceptualized as a mixture of two probability distributions, poisson and gamma.

When the count variables have an excessive number of zeros, the model that best fits the distribution of these variables is a zero-inflated Negative Binomial. This specification supplements a count density with a binary process. If the binary process takes a value 0, with probability $f_1(0)$, $H_{it} = 0$. If the binary process takes a value of 1, with a probability of $f_1(1)$, $H_{it} = 0, 1, 2....$ This definition lets zero counts occur in two ways: as a realization of the binary process and as a realization of the count process.The density for this specification can be defined as:

$$g(y) = \begin{cases} f_1(0) + (1 - f_1(0))f_2(0) & \text{if } H_{it} = 0 \\ (1 - f_1(0))f_2(y) & \text{if } H_{it} \geq 1 \end{cases}$$

# 5 Estimation Results

Table 6 and 7 summarize the estimation results of the direct and indirect effect for each of the health outcomes. The data included in the estimations corresponds to the 1999 and 2000 surveys. The table is divided into eligibility conditions (poor and non-poor) and age groups. In the Appendix, each estimated equation is reported, including all the covariates.

## 5.1 Direct Effect of PROGRESA

In general the variable, "treatment" has a positive effect on the health outcomes in the analysis. In fact, both groups, ineligible and eligible, seem to improve their health status due to the cash grants. In spite of the fact that few of the results are statistically significant, the significant ones show an important impact. It is important to stress the fact that the main variables enforced by the program such as sickness incidence and weight and height control, improved considerably among children.

Specifically, for babies, children, and young individuals, the program reduces their sickness spell length in addition to lowering the possibility that they will become ill. In fact, sickness such as cough, fever, and respiratory problems are less frequent among PROGRESA kids. Moreover, children immersed in the program increased their frequency of height and weight control.

PROGRESA has a significant impact on adult individuals, and there is no significant effect registered for older individuals, results consistent with related literature. In the case of adults, the program not only improved their capabilities to deal with normal, simple, and hard activities but also enabled them to walk at least 2 km before getting tired. Finally, adult individuals who received the treatment show decreased probabilities of getting sick.

## 5.2 Indirect Effect of PROGRESA: Spillover Results

An interesting fact about PROGRESA is that it seems to have a major impact on people who do not receive the cash grants (=ineligible). This result is explained by the interactions that these families have with people receiving the treatment (=eligible). Not surprisingly, the ineligible age group that show the greatest improvement in health

Table 6: Marginal Probabilities: Impact of PROGRESA on Health

| **Age group** | **Variable** | **OLS** | | **Logit** | | **Probit** | |
|---|---|---|---|---|---|---|---|
| | | **Non-Poor** | **Poor** | **Non-Poor** | **Poor** | **Non-Poor** | **Poor** |
| **Babies** | Sickness incidence | 0.108* | -0.065* | 0.113* | -0.058* | 0.129* | -0.060* |
| | | (0.05) | (0.03) | (0.05) | (0.03) | (0.05) | (0.03) |
| | Days sick | 0.019 | -0.019 | 0.522 | -0.373 | | |
| | | (0.07) | (0.06) | 0.435 | 0.189 | | |
| | Sickness: diahrrea | -0.057 | -0.007 | -0.095 | -0.008 | -0.092 | -0.012 |
| | | (0.12) | (0.06) | (0.13) | (0.07) | (0.13) | (0.07) |
| | Sickness: fever | -0.490 | -0.490* | -0.267 | -0.261* | -0.268 | -0.255* |
| | | (0.41) | (0.23) | (0.24) | (0.13) | (0.23) | (0.12) |
| | Sickness: cough | 0.656** | 0.279** | 0.196** | 0.074** | 0.205** | 0.080** |
| | | (0.22) | (0.10) | (0.07) | (0.03) | (0.07) | (0.03) |
| | Sickness: respiratory prob. | -0.169 | -0.062 | -0.038 | -0.010 | -0.039 | -0.008 |
| | | (0.18) | (0.08) | (0.04) | (0.01) | (0.04) | (0.01) |
| | Sickness: other | 0.445** | 0.193* | 0.075* | 0.024* | 0.082** | 0.026* |
| | | (0.17) | (0.08) | (0.03) | (0.01) | (0.03) | (0.01) |
| | Control height & weight | -0.119 | 0.051 | -0.114 | 0.047 | -0.122 | 0.044 |
| | | (0.07) | (0.04) | (0.06) | (0.04) | (0.07) | (0.04) |
| | Control weight (number times) | 0.434 | -0.183 | 0.302 | -0.141 | | |
| | | (0.40) | (0.25) | (0.371) | (0.228) | | |
| **Children** | Sickness incidence | 0.017 | -0.013 | 0.026 | -0.010 | 0.031 | -0.008 |
| | | (0.05) | (0.02) | (0.03) | (0.02) | (0.04) | (0.02) |
| | Days sick | 0.015 | -0.014 | | | | |
| | | (0.04) | (0.02) | | | | |
| **Young** | Sickness incidence | 0.015 | -0.014 | 0.001 | -0.012 | 0.001 | -0.016 |
| | | (0.04) | (0.02) | (0.03) | (0.02) | (0.03) | (0.02) |
| | Days sjck | 0.015 | -0.014 | | | | |
| | | (0.04) | (0.02) | | | | |

Table 7: Marginal Probabilities: Impact of PROGRESA on Health

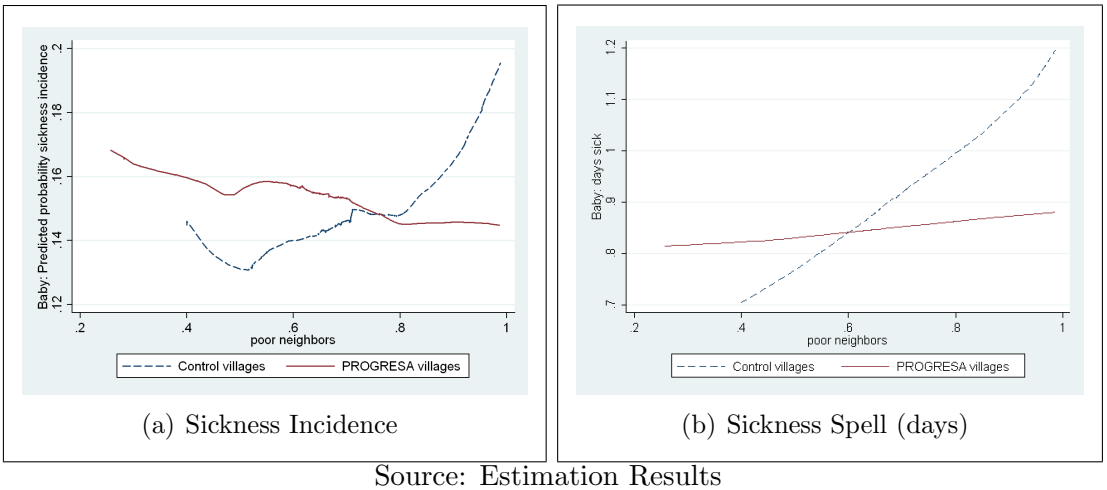
| **Age group** | **Variable** | **OLS** | | **Logit** | | **Probit** | |
|---|---|---|---|---|---|---|---|
| | | **No Pobre** | **Pobre** | **No Pobre** | **Pobre** | **No Pobre** | **Pobre** |
| **Adultos** | Problem: normal act. | -0.043* | -0.003 | -0.031 | -0.003 | -0.037 | -0.004 |
| | | (0.02) | (0.01) | (0.02) | (0.01) | (0.02) | (0.01) |
| | Problem: hard act. | 0.029 | -0.004 | 0.025 | -0.002 | 0.025 | -0.002 |
| | | (0.03) | (0.02) | (0.03) | (0.02) | (0.03) | (0.02) |
| | Problem: moderate act. | 0.037 | 0.009 | 0.033 | 0.011 | 0.031 | 0.010 |
| | | (0.03) | (0.02) | (0.03) | (0.01) | (0.03) | (0.02) |
| | Problem: simple act. | -0.036 | -0.005 | -0.029 | -0.006 | -0.029 | -0.009 |
| | | (0.02) | (0.01) | (0.02) | (0.01) | (0.02) | (0.01) |
| | Problem: walk | -0.034 | -0.004 | -0.029 | -0.006 | -0.028 | -0.007 |
| | | (0.02) | (0.01) | (0.02) | (0.01) | (0.02) | (0.01) |
| | Problem: dress | -0.057** | -0.002 | -0.035* | -0.002 | -0.048** | -0.004 |
| | | (0.02) | (0.01) | (0.01) | (0.01) | (0.02) | (0.01) |
| | Days sick | -0.406* | -0.161 | | | | |
| | | (0.17) | (0.10) | | | | |
| | No. km able to walk | -0.705 | 0.743*** | | | | |
| | | (0.37) | (0.22) | | | | |
| **Ancianos** | Problem: normal act. | -0.046 | 0.011 | -0.043 | 0.010 | -0.042 | 0.010 |
| | | (0.06) | (0.05) | (0.06) | (0.05) | (0.06) | (0.05) |
| | Problem: hard act. | 0.019 | -0.019 | 0.023 | -0.017 | 0.026 | -0.011 |
| | | (0.07) | (0.06) | (0.08) | (0.06) | (0.08) | (0.06) |
| | Problem: moderate act. | 0.059 | -0.018 | 0.065 | -0.017 | 0.069 | -0.012 |
| | | (0.07) | (0.06) | (0.08) | (0.06) | (0.08) | (0.06) |
| | Problem: simple act. | 0.098 | -0.014 | 0.105 | -0.014 | 0.103 | -0.012 |
| | | (0.08) | (0.06) | (0.08) | (0.06) | (0.08) | (0.06) |
| | Problem: walk | 0.012 | -0.020 | 0.016 | -0.017 | 0.015 | -0.013 |
| | | (0.07) | (0.06) | (0.08) | (0.06) | (0.08) | (0.06) |
| | Problem: dress | -0.084*** | -0.012 | -0.015* | -0.005 | -0.017* | -0.004 |
| | | (0.02) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| | Days sick | -1.090 | -0.516 | | | | |
| | | (1.04) | (0.10) | | | | |
| | No. Km able to walk | 0.995 | -0.574 | | | | |
| | | (0.94) | (0.83) | | | | |

due to this situation is children between 0 and 12 years of age.

Specifically, children decrease not only their probabilities of getting sick but also their sickness spell. Figures 4-7 show in a detailed way the evolution of the main responsive variables for children. The graphs are constructed using an Epanechnikov-Kernel regression of the impact on health outcomes for children who are not eligible for cash transfers on the eligible fraction in their peer group (other children in the same village). The figures show that health conditions improve for ineligible individuals as the number of treated poor neighbors increases and compare the results with the same environment the the non-PROGRESA villages. Ineligible individuals living in treated villages who have neighbors that receive PROGRESA tend to have a lower probability of getting sick. Similarly, they decrease the number of days sick, and in the case of cough, they are less likely to get this type of illness.

For adults, the variables that have improved are their capacity to deal with normal activities: ineligible individuals living in treated villas have considerably decreased their problems when dealing with normal activities as the number of treated neighbors has increased. This last characteristic is shared with their capabilities to deal with hard activities, bathe and dress themselves, and walk a certain number of kilometers.

Figure 5: Spillover Effect: Babies

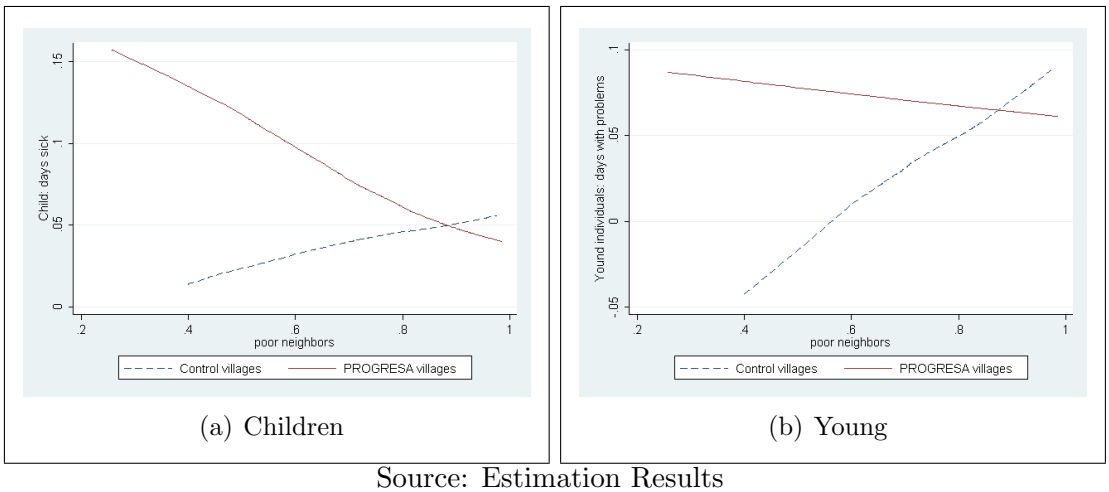



(a) Sickness Incidence

(b) Sickness Spell (days)

Source: Estimation Results

Figure 6: Spillover Effect: Sickness Spell

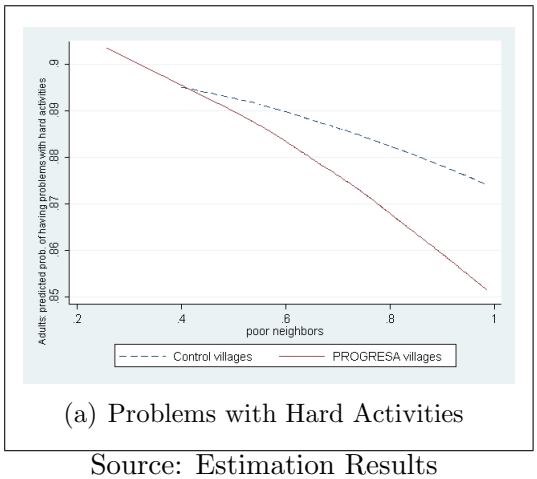



(a) Children

(b) Young

Source: Estimation Results

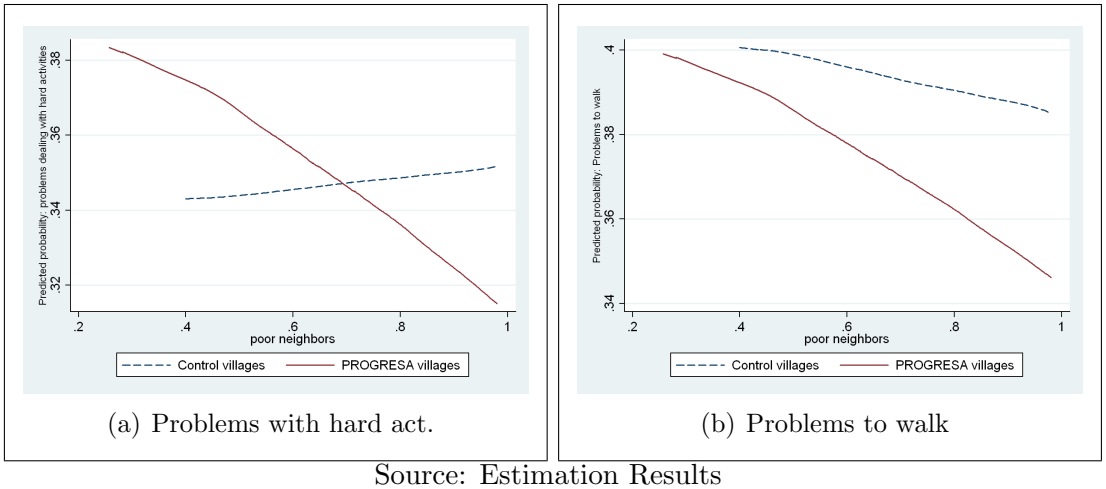
Figure 7: Spillover Effect: Adult Individuals




(a) Problems with Hard Activities

Source: Estimation Results

Figure 8: Spillover Effect: Old Individuals




(a) Problems with hard act.

(b) Problems to walk

Source: Estimation Results

# 6 Summary and Conclusions

This document addresses the impact of an anti poverty program on several health outcomes. The program combines a traditional cash transfer with financial incentives for families to invest in the human capital of children: nutrition, health, and education. To receive the cash transfers, families are required to participate in growth monitoring and nutrition supplement programs, as well as to regularly attend education programs about health and hygiene. The next table summarizes the significant effects presented by the estimation results to gain a clearer view of the program's impact.

As we can see, the direct effect of the program has a major impact on the enforced variables for the 14 targeted population with respect to sickness incidence and health checkups. In general, treated individuals exhibit better health status based on their sickness frequency as well as their sickness spell. Moreover, people receiving PROGRESA are more likely to deal with simple/moderate and strong activities. Finally, adult individuals and older individuals living in villages receiving the treatment not only seem to be able to walk more km. on average, but also feel that their capacity to walk at least 2 km. before getting tired has improved.

Regarding the spillover effect, the results are surprisingly large. People who live in treated villages but are ineligible for the program improve their health status, measured in their probabilities of being sick, the number of days that sickness spell lasts,

Table 8: Direct Effect of PROGRESA

| | **Non-Poor** | **Poor** |
|---|---|---|
| **Babies** | • Lower sickness incidence: diarrhea, fever, respiratory problems<br>• Higher incidence of sickness: cough<br>• Less frequency of controlling height and weight | • Lower sickness incidence: diarrhea, fever, respiratory problems<br>• Higher incidence of sickness: cough<br>• Higher frequency controlling height and weight |
| **Children** | • Higher probability of getting sick<br>• More days sick | • Lower probability of getting sick<br>• Less days sick |
| **Young** | • Lower probability of getting sick | • Lower probability of getting sick |
| **Adults** | • Fewer problems dealing with normal, simple, and daily activities; walking<br>• Fewer days sick | • Fewer problems dealing hard activities.<br>• Less days sick<br>• On average is able to walk more km. |
| **Old** | • Fewer problems dealing with normal, simple, and daily activities; walking<br>• Fewer days sick<br>• On average able to walk more km. | • Fewer problems dealing with normal, simple, and daily activities; walking<br>• Less days sick |

Table 9: Indirect Effect of PROGRESA

| | **Non-Poor** | **Poor** |
|---|---|---|
| **Babies** | • Lower sickness incidence: cough and other illness<br>• Fewer days sick<br>• Higher frequency of controlling height and weight | • Lower sickness incidence: cough and other illness<br>• Less days sick<br>• Higher frequency of controlling height and weight |
| **Children** | • Less days sick | • Lower probability of getting sick |
| **Young** | • Lower probability to get sick | • Less days sick |
| **Adults** | | • Fewer problems dealing with normal, simple and daily activities |
| **Old** | | • Fewer problems dealing with daily activities |

and their capacity to deal with different daily activities. We attribute this result to the social interactions generated by the structure of the program.

Although PROGRESA benefits both eligible (=poor) and ineligible (=non-poor) individuals, we can say that, globally, the impact is stronger in poor families. The effects vary over age groups, being more significant for children (0-5 years old) and adult individuals (19-65 years old). In contrast, those people who seem to be less affected or have almost no benefits are young (6-18) and old (older 65 years) individuals. This result might occur because young individuals are generally healthier, so they are less exposed to diseases, while old individuals are more often exposed because of declining health.

The results presented correspond to the evaluation data of the PROGRESA program. It is important to note that there might be a problem in the data collection because one person in each family provides information. Therefore, in most cases, their answers are just beliefs instead of affirmations. In spite of this, the results show that PROGRESA seems to have achieved most of its goals, and, in general, the health condition of treated individuals has improved.

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# 7 Appendix

Table 10: Baby 1: Health Status

| | OLS | | Logit | | Probit | |
|---|---|---|---|---|---|---|
| | Ineligible | Eligible | Ineligible | Eligible | Ineligible | Eligible |
| **Sickness incidence** | | | | | | |
| treatment | 0.001 | -0.008 | -0.002 | -0.054 | -0.002 | -0.029 |
| | (0.02) | (0.01) | (0.10) | (0.04) | (0.06) | (0.02) |
| poor share | -0.156** | -0.133*** | -0.849** | -0.874*** | -0.484** | -0.497*** |
| | (0.06) | (0.02) | (0.32) | (0.13) | (0.19) | (0.07) |
| N | 2434 | 20192 | 2434 | 20192 | 2434 | 20192 |
| **Diharrea** | | | | | | |
| treatment | -0.003 | 0.000 | -0.102 | -0.003 | -0.043 | -0.006 |
| | (0.01) | (0.00) | (0.30) | (0.13) | (0.13) | (0.05) |
| poor share | 0.042 | -0.005 | 1.554 | -0.315 | 0.713 | -0.094 |
| | (0.03) | (0.01) | (0.98) | (0.45) | (0.41) | (0.18) |
| N | 1902 | 16839 | 1902 | 16839 | 1902 | 16839 |
| **Fever** | | | | | | |
| treatment | -0.001 | -0.003 | 0.011 | -0.021 | -0.003 | -0.006 |
| | (0.03) | (0.01) | (0.16) | (0.06) | (0.08) | (0.03) |
| poor share | 0.066 | -0.069* | 0.379 | -0.482* | 0.207 | -0.240* |
| | (0.09) | (0.03) | (0.50) | (0.20) | (0.26) | (0.10) |
| N | 2048 | 17934 | 2048 | 17934 | 2048 | 17934 |
| **Cough** | | | | | | |
| treatment | 0.052 | -0.004 | 0.133 | -0.014 | 0.069 | -0.009 |
| | (0.04) | (0.01) | (0.14) | (0.05) | (0.07) | (0.03) |
| poor share | -0.563*** | -0.300*** | -1.665*** | -1.089*** | -0.887*** | -0.571*** |
| | (0.15) | (0.05) | (0.44) | (0.17) | (0.24) | (0.09) |
| N | 2125 | 18279 | 2125 | 18279 | 2125 | 18279 |
| **Respiratory problems** | | | | | | |
| treatment | -0.048 | 0.002 | -0.300 | 0.020 | -0.128 | 0.016 |
| | (0.04) | (0.01) | (0.24) | (0.10) | (0.11) | (0.04) |
| poor share | -0.210 | -0.191*** | -1.389 | -1.681*** | -0.618 | -0.734*** |
| | (0.12) | (0.04) | (0.78) | (0.32) | (0.36) | (0.14) |
| N | 1932 | 17040 | 1932 | 17040 | 1932 | 17040 |
| **Other sickness** | | | | | | |
| treatment | -0.053 | -0.007 | -0.472 | -0.108 | -0.216 | -0.049 |
| | (0.03) | (0.01) | (0.32) | (0.14) | (0.13) | (0.06) |
| poor share | -0.141 | -0.175*** | -1.262 | -2.372*** | -0.599 | -0.942*** |
| | (0.12) | (0.03) | (1.07) | (0.43) | (0.45) | (0.18) |
| N | 1894 | 16795 | 1894 | 16795 | 1894 | 16795 |
| **Weight control** | | | | | | |
| treatment | -0.022 | 0.019*** | -0.426 | 0.394*** | -0.206 | 0.179*** |
| | (0.01) | (0.01) | (0.26) | (0.10) | (0.12) | (0.05) |
| poor share | 0.094* | -0.007 | 1.740* | -0.140 | 0.852* | -0.082 |
| N | 1212 | 8365 | 1212 | 8365 | 1212 | 8365 |
| family's heal work | Yes | Yes | Yes | Yes | Yes | Yes |
| status | Yes | Yes | Yes | Yes | Yes | Yes |
| state effects | Yes | Yes | Yes | Yes | Yes | Yes |
| year effects | Yes | Yes | Yes | Yes | Yes | Yes |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Var.=1 if baby was sick during the last 4 weeks; 0 otherwise

Table 11: Adult 1: Health Status

| | OLS | | Logit | | Probit | |
|---|---|---|---|---|---|---|
| | Ineligible | Eligible | Ineligible | Eligible | Ineligible | Eligible |
| **Normal activities** | | | | | | |
| treatment | -0.011* | -0.003 | -0.106* | -0.044 | -0.061* | -0.023 |
| | (0.01) | (0.00) | (0.05) | (0.03) | (0.03) | (0.02) |
| poor share | 0.008 | -0.009 | 0.090 | -0.092 | 0.050 | -0.046 |
| | (0.02) | (0.01) | (0.16) | (0.10) | (0.09) | (0.05) |
| N | 16309 | 58932 | 16309 | 58932 | 16309 | 58932 |
| **Hard activities** | | | | | | |
| treatment | -0.014* | 0.003 | -0.134* | 0.033 | -0.074** | 0.016 |
| | (0.01) | (0.00) | (0.05) | (0.03) | (0.03) | (0.02) |
| poor share | -0.039* | -0.011 | -0.375* | -0.149 | -0.201* | -0.071 |
| | (0.02) | (0.01) | (0.17) | (0.11) | (0.09) | (0.06) |
| N | 14763 | 54936 | 14763 | 54936 | 14763 | 54936 |
| **Moderate activities** | | | | | | |
| treatment | -0.003 | 0.006** | -0.030 | 0.081* | -0.018 | 0.040* |
| | (0.01) | (0.00) | (0.05) | (0.03) | (0.03) | (0.02) |
| poor share | -0.033 | -0.006 | -0.331 | -0.079 | -0.177 | -0.038 |
| | (0.02) | (0.01) | (0.17) | (0.11) | (0.09) | (0.06) |
| N | 14760 | 54923 | 14760 | 54923 | 14760 | 54923 |
| **Simple activities** | | | | | | |
| treatment | 0.015*** | 0.001 | 0.227*** | 0.026 | 0.116*** | 0.012 |
| | (0.00) | (0.00) | (0.06) | (0.04) | (0.03) | (0.02) |
| poor share | 0.025 | 0.009 | 0.349 | 0.199 | 0.166 | 0.089 |
| | (0.01) | (0.01) | (0.21) | (0.14) | (0.10) | (0.07) |
| N | 14749 | 54915 | 14749 | 54915 | 14749 | 54915 |
| **Walk more than 2 km before getting tired** | | | | | | |
| treatment | 0.008 | -0.003 | 0.096 | -0.042 | 0.050 | -0.020 |
| | (0.00) | (0.00) | (0.06) | (0.04) | (0.03) | (0.02) |
| poor share | 0.038* | 0.021** | 0.445* | 0.352** | 0.224* | 0.167** |
| | (0.02) | (0.01) | (0.19) | (0.13) | (0.10) | (0.06) |
| N | 14726 | 54794 | 14726 | 54794 | 14726 | 54794 |
| **Bath and dress** | | | | | | |
| treatment | 0.005* | 0.001 | 0.291* | 0.072 | 0.125* | 0.032 |
| | (0.00) | (0.00) | (0.13) | (0.07) | (0.05) | (0.03) |
| poor share | 0.018* | 0.004 | 0.943* | 0.282 | 0.371* | 0.105 |
| | (0.01) | (0.00) | (0.42) | (0.26) | (0.17) | (0.10) |
| N | 14729 | 54826 | 14729 | 54826 | 14729 | 54826 |
| **Number of km a person can walk** | | | | | | |
| treatment | -0.003 | 0.121** | | | | |
| | (0.10) | (0.04) | | | | |
| poor share | 0.109 | 0.390* | | | | |
| | (0.32) | (0.15) | | | | |
| family's head work | Yes | Yes | Yes | Yes | Yes | Yes |
| status | Yes | Yes | Yes | Yes | Yes | Yes |
| state effects | Yes | Yes | Yes | Yes | Yes | Yes |
| year effects | Yes | Yes | Yes | Yes | Yes | Yes |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Var.=1 if baby was sick during the last 4 weeks; 0 otherwise

Table 12: Old 1: Health Status

| | OLS | | Logit | | Probit | |
|---|---|---|---|---|---|---|
| | Ineligible | Eligible | Ineligible | Eligible | Ineligible | Eligible |
| **Normal activities** | | | | | | |
| treatment | 0.015 | -0.017 | 0.092 | -0.099 | 0.050 | -0.057 |
| | (0.02) | (0.01) | (0.12) | (0.07) | (0.07) | (0.04) |
| poor share | 0.093 | 0.015 | 0.591 | 0.088 | 0.330 | 0.042 |
| | (0.07) | (0.04) | (0.41) | (0.24) | (0.24) | (0.14) |
| N | 1806 | 5495 | 1806 | 5495 | 1806 | 5495 |
| **Hard activities** | | | | | | |
| treatment | -0.022 | 0.006 | -0.099 | 0.027 | -0.063 | 0.019 |
| | (0.02) | (0.01) | (0.11) | (0.06) | (0.07) | (0.04) |
| poor share | -0.073 | -0.041 | -0.337 | -0.203 | -0.207 | -0.137 |
| | (0.08) | (0.05) | (0.36) | (0.23) | (0.22) | (0.14) |
| N | 1729 | 5158 | 1729 | 5158 | 1729 | 5158 |
| **Moderate activities** | | | | | | |
| treatment | -0.003 | 0.006** | -0.030 | 0.081* | -0.018 | treatment |
| -0.023 | 0.013 | -0.102 | 0.064 | -0.063 | 0.041 | |
| | (0.02) | (0.01) | (0.11) | (0.06) | (0.07) | (0.04) |
| poor share | -0.124 | -0.108* | -0.572 | -0.518* | -0.351 | -0.326* |
| | (0.08) | (0.05) | (0.36) | (0.23) | (0.22) | (0.14) |
| N | 1728 | 5155 | 1728 | 5155 | 1728 | 5155 |
| **Simple activities** | | | | | | |
| treatment | 0.027 | -0.002 | 0.111 | -0.007 | 0.070 | -0.005 |
| | (0.02) | (0.01) | (0.10) | (0.06) | (0.06) | (0.04) |
| poor share | 0.170* | 0.055 | 0.722* | 0.235 | 0.448* | 0.151 |
| | (0.08) | (0.05) | (0.35) | (0.21) | (0.22) | (0.13) |
| N | 1725 | 5146 | 1725 | 5146 | 1725 | 5146 |
| **Walk more than 2 km before getting tired** | | | | | | |
| treatment | 0.044 | -0.005 | 0.194 | -0.024 | 0.120 | -0.015 |
| | (0.02) | (0.01) | (0.11) | (0.06) | (0.06) | (0.04) |
| poor share | 0.108 | 0.035 | 0.479 | 0.168 | 0.290 | 0.120 |
| | (0.08) | (0.05) | (0.36) | (0.22) | (0.22) | (0.14) |
| N | 1724 | 5133 | 1724 | 5133 | 1724 | 5133 |
| **Bath and dress** | | | | | | |
| treatment | 0.003 | 0.000 | -0.069 | -0.035 | -0.035 | -0.015 |
| | (0.00) | (0.00) | (0.11) | (0.06) | (0.05) | (0.03) |
| poor share | 0.000 | -0.002 | -0.901* | -0.327 | -0.378* | -0.148 |
| | (0.01) | (0.01) | (0.40) | (0.22) | (0.16) | (0.09) |
| N | 16452.000 | 59966.000 | 16452.000 | 59966.000 | 16452.000 | 59966.000 |
| **Number of km a person can walk** | | | | | | |
| treatment | -0.138 | 0.313 | | | | |
| | (0.33) | (0.20) | | | | |
| poor share | 1.718 | -1.412 | | | | |
| | (1.11) | (0.73) | | | | |
| family's head work | Yes | Yes | Yes | Yes | Yes | Yes |
| status | Yes | Yes | Yes | Yes | Yes | Yes |
| state effects | Yes | Yes | Yes | Yes | Yes | Yes |
| year effects | Yes | Yes | Yes | Yes | Yes | Yes |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Var.=1 if baby was sick during the last 4 weeks; 0 otherwise

Table 13: Baby: Weight Control Frequency

| | OLS | | Zero-Inflated/Poisson | |
|---|---|---|---|---|
| | Ineligible | Eligible | Ineligible | Eligible |
| treatment | 0.207** | 0.240*** | 0.094* | 0.108*** |
| | (0.08) | (0.03) | (0.04) | (0.02) |
| poor share | 0.195 | 0.093 | 0.106 | 0.046 |
| | (0.26) | (0.11) | (0.14) | (0.05) |
| r2 | 0.785 | 0.784 | | |
| F | 350.410 | 2434.378 | | |
| N | 1164 | 8071 | 1164 | 8071 |
| family's head work | Yes | Yes | Yes | Yes |
| status | Yes | Yes | Yes | Yes |
| state effects | Yes | Yes | Yes | Yes |
| year effects | Yes | Yes | Yes | Yes |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Var.= number of days a baby was sick

Table 14: Sickness Incidence

| | OLS | | Logit | | Probit | |
|---|---|---|---|---|---|---|
| | Ineligible | Eligible | Ineligible | Eligible | Ineligible | Eligible |
| **Children** | | | | | | |
| treatment | 0.019* | -0.002 | 0.370* | -0.061 | 0.186* | -0.024 |
| | (0.01) | (0.00) | (0.16) | (0.06) | (0.08) | (0.03) |
| poor share | 0.014 | -0.012 | 0.203 | -0.361 | 0.062 | -0.175 |
| | (0.03) | (0.01) | (0.49) | (0.22) | (0.24) | (0.10) |
| parents work | -0.027* | -0.021*** | -0.460* | -0.509*** | -0.229* | -0.226*** |
| | (0.01) | (0.00) | (0.20) | (0.10) | (0.11) | (0.05) |
| r2 | 0.113 | 0.044 | | | | |
| F | 36.412 | 123.762 | | | | |
| N | 3443.000 | 32420.000 | 3443.000 | 32420.000 | 3443.000 | 32420.000 |
| **Young** | | | | | | |
| treatment | -0.024** | -0.004 | -0.308** | -0.051 | -0.160** | -0.027 |
| | (0.01) | (0.00) | (0.11) | (0.05) | (0.06) | (0.03) |
| poor share | 0.030 | 0.027* | 0.352 | 0.369* | 0.181 | 0.175 |
| | (0.03) | (0.01) | (0.38) | (0.17) | (0.20) | (0.09) |
| parents work | -0.017 | -0.024*** | -0.181 | -0.289*** | -0.099 | -0.152*** |
| | (0.01) | (0.01) | (0.15) | (0.07) | (0.08) | (0.04) |
| r2 | 0.168 | 0.156 | | | | |
| F | 73.966 | 370.971 | | | | |
| N | 4421.000 | 24137.000 | 4421.000 | 24137.000 | 4421.000 | 24137.000 |
| status | Yes | Yes | Yes | Yes | Yes | Yes |
| state effects | Yes | Yes | Yes | Yes | Yes | Yes |
| year effects | Yes | Yes | Yes | Yes | Yes | Yes |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15: Sickness Spell: Days reported as sick

| | OLS | | Zero-Inflated | |
|---|---|---|---|---|
| | Ineligible | Eligible | Ineligible | Eligible |
| **Baby** | | | | |
| treatment | -0.194 | -0.036 | -0.163* | -0.001 |
| | (0.15) | (0.04) | (0.07) | (0.03) |
| poor share | -1.299** | -1.106*** | -0.157 | -0.375*** |
| | (0.50) | (0.14) | (0.23) | (0.10) |
| **inflate** | | | | |
| treatment | | | 0.006 | 0.076 |
| | | | (0.10) | (0.04) |
| poor share | | | 1.006** | 1.124*** |
| | | | (0.31) | (0.13) |
| **lnalpha** | | | | |
| cons | | | -0.710*** | -0.995*** |
| | | | (0.10) | (0.05) |
| N | 2409 | 19912 | 2409 | 19912 |
| **Children** | | | | |
| treatment | 0.052 | -0.001 | 0.243 | -0.254 |
| | (0.03) | (0.01) | (0.42) | (0.26) |
| poor share | -0.185 | 0.037 | -1.553 | 1.506 |
| | (0.10) | (0.04) | (1.11) | (0.85) |
| **inflate** | | | | |
| treatment | | | -0.522 | -1.838 |
| | | | (0.36) | (1.09) |
| poor share | | | -0.935 | 18.118 |
| | | | (1.00) | (10.45) |
| **lnalpha** | | | | |
| cons | | | -0.519 | 5.695*** |
| | | | (0.48) | (0.11) |
| N | 3303 | 31834 | 3303 | 31834 |
| **Young** | | | | |
| treatment | 0.043 | 0.020 | -0.613 | 0.545 |
| | (0.04) | (0.01) | (0.46) | (0.29) |
| poor share | 0.099 | -0.054 | -1.022 | -1.142 |
| | (0.12) | (0.05) | (1.03) | (1.13) |
| parents work | -0.026 | -0.013 | 1.110* | -0.359 |
| | (0.05) | (0.02) | (0.55) | (0.40) |
| **inflate** | | | | |
| treatment | | | -0.764 | -0.071 |
| | | | (0.47) | (0.19) |
| poor share | | | -1.407 | 0.814 |
| | | | (1.35) | (0.60) |
| cons | | | 6.477*** | 4.184*** |
| | | | (1.07) | (0.50) |
| **lnalpha** | | | d | |
| cons | | | -0.996* | 0.486 |
| | | | (0.44) | (0.28) |
| N | 4060.000 | 22154.000 | 4060.000 | 22154.000 |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Var.= number of days a baby was sick

Table 16: Sickness Spell: Days reported as sick

| | OLS | | Zero-Inflated | |
|---|---|---|---|---|
| | Ineligible | Eligible | Ineligible | Eligible |
| **Adult** | | | | |
| treatment | -0.037 | 0.001 | -0.024 | 0.026 |
| | (0.05) | (0.02) | (0.13) | (0.07) |
| poor share | 0.045 | 0.159* | 0.052 | 0.686** |
| | (0.15) | (0.07) | (0.40) | (0.26) |
| **inflate** | | | | |
| treatment | | | 0.141 | 0.068 |
| | | | (0.11) | (0.06) |
| poor share | | | -0.017 | -0.235 |
| | | | (0.35) | (0.22) |
| **lnalpha** | | | | |
| cons | | | 0.179 | 0.217** |
| | | | (0.13) | (0.08) |
| N | 14781 | 55003 | 14781 | 55003 |
| **Old** | | | | |
| treatment | -0.333 | -0.416* | -0.116 | -0.064 |
| | (0.35) | (0.20) | (0.14) | (0.07) |
| poor share | 2.186 | 0.402 | 0.482 | -0.049 |
| | (1.17) | (0.73) | (0.45) | (0.29) |
| **inflate** | | | | |
| treatment | | | 0.107 | 0.255** |
| | | | (0.16) | (0.09) |
| poor share | | | -0.454 | -0.474 |
| | | | (0.53) | (0.31) |
| **lnalpha** | | | | |
| cons | | | -0.391** | -0.347*** |
| | | | (0.14) | (0.08) |
| N | 1725.000 | 5169.000 | 1725.000 | 5169.000 |
| family's head work | Yes | Yes | Yes | Yes |
| status | Yes | Yes | Yes | Yes |
| state effects | Yes | Yes | Yes | Yes |
| year effects | Yes | Yes | Yes | Yes |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Var.= number of days a baby was sick