Intra-Household Redistribution and Health Perceptions [*]

Abstract

This paper studies the formation of self-reported health perceptions taking advantage of new cash transfer programs occurred in Brazil as a policy experiment. First, we gauge the effect of changes in per capita income associated with exogenous changes in official income transfer policies to the low-income elderly population on the reported perceptions of this group health status using a difference in difference estimator. We show a distinct gain in the health conditions of the elegible group consistent with the existence of a direct income effect with a casual interpretation implied. We also use this approach to study the evolution of perceptions about access and quality of health services. The results do not show any sizeable change that could explain the self-reported health status changes observed.

Second, we show that true self-reported health status (SRHS) is higher than the health status reported by other household members. Nevertheless, the improvement of the poor elderly health evaluation observed is not affected by the identity of who answer the question.

Finally, we test altruism through the redistribution of resources within households by investigating how individual health perceptions changes are associated with the eligibility of different household members to new official income transfers. The results show an improvement of health perceptions much smaller for the indirect beneficiaries of transfers than those observed for direct beneficiaries living in the same households. This evidence has potential policy implications since increasing transfers to the elderly poor in Brazil did not seem to generate sizeable externality to other household members individual well-being levels. The fact that the elderly live in small families also diminishes the derived welfare impact from new transfers observed.

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Intra-Household Redistribution and Health Perceptions [2]

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1. Introduction

The 2007 Gallup survey shows a clear relationship between age and subjective inner health perceptions, captured by a positive answer to the following question "are you, or not, satisfied with your own health". This question may be used to highlight the stage of the individual in his or her life-cycle, as shown in Graph 1. Graph 2 shows a positive relationship between per capita household income and inner health perceptions indicators.

Graph 1: Health Perceptions and Age

Source: Microdata from the World Gallup Survey 2007

Graph 2: Health Perceptions and Per Capita PPP Income Percentiles
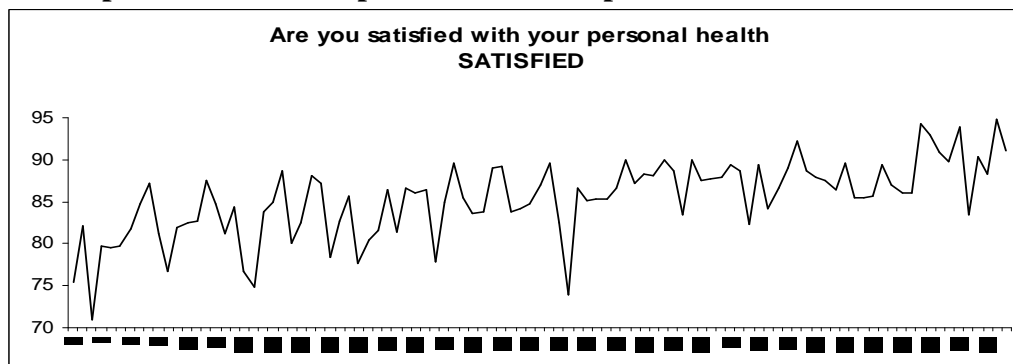
Source: Microdata from the World Gallup Survey 2007

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A partial regression coefficient confirms this impression that household income and inner health perceptions have a positive association (a significant income coefficient of 0.0008). This exercise is controlled by age and age square among other variables (see regressions in the annex). A second regression shows a similar result when one is asked to take into account his stage in the life-cycle (a significant income coefficient of 0.007). A final regression suggests an intuitive channel of income and health perceptions by possibly covering expenses associated with health shocks (a significant income coefficient of 0.007).

There are two limitations in both the analysis of the relationship between income and inner health perceptions discussed above and in most of the literature (Case and Deaton (2002 and 2006), Neri and Soares (2003)), namely: the direction of causality and the income aggregation process within household. Income levels and health status are considered related variables because an increase in income enables a greater access to assets that improve a person's health status, and because productivity and income gains are associated with an improvement in the worker's health. The second problem is associated with the very concept of per capita household income that assumes a perfect altruism through the perfect redistribution of resources within households which may, or may not, be true in practice but that does have relevant implications for the design of income policies.

The recent Brazilian experience offers favorable conditions to overcome both problems that occur when estimating the impact of income on health perceptions. A special health edition from both the 1998 and 2003 National Household Surveys (PNAD/IBGE) allows one to observe the relationship between changes in these two variables. In addition, the Brazilian government has adopted and expanded several income transfer programs targeting the poor elderly population, where health problems are deeper. The combination between the expansion of cash transfer programs to the poor elderly and the availability of surveys before and after this change in the recent Brazilian experience provides an opportunity to test the impact of objective income measures on health perceptions[3]. The fact that both types of questions on subjective health and on different income sources are implemented at the individual level allows us to test household aggregation effects, such as how an increase in one's income affects other household members well-being.

This paper takes advantage of new cash transfer programs occurred in Brazil as a policy experiment. It gauges the effect of changes in per capita income associated with exogenous changes in official income transfer policies to the low-income elderly population on the reported perceptions of this group health status using a difference in difference estimator. This paper is organized as follows: the next section provides a preliminary discussion on the theoretical literature about health determinants. The third section discusses key Brazilian institutional characteristics related to the problem at hand. The fourth section presents the empirical strategy pursued in the paper. The fifth section presents initial descriptive statistics on the formation of self-reported health perceptions in Brazil using both simple bivariate statistics and a cohort analysis. It shows that true self-reported health status is higher than the health status reported by other household members. The sixth section shows a distinct gain in the health

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[3] These transfers grew markedly during the 1997-2003 period. For instance, Benefício de Prestação Continuada (BPC) program transfers one minimum wage for the poor elderly whose per capita income limit is below ¼ minimum wage and who are above 65 years of age. Coincidentally, this is also the age limit for men to access non-contributory rural pensions worth one minimum wage per month.

conditions consistent of those benefited by exogenous income changes. We also use this approach to study the evolution of perceptions about access and quality of health services. The results do not show any sizeable change that could explain self-reported health status changes observed. Section seven tests altruism through the redistribution of resources within households by investigating how individual health perceptions changes are associated with the eligibility of different household members to new official income transfers given to the elderly poor population. The results show an improvement of health perceptions much smaller for the non direct beneficiaries of transfers than those observed for beneficiaries. This result may be relevant for policy purposes showing that the increasing transfers to the elderly poor in Brazil did not generate sizeable externality to other household members individual well-being levels. The fact that the elderly live in smaller families than others also diminishes the derived welfare impact from new transfers observed. The final two sections summarize the main results found and possible extensions.

2. Preliminary Discussion

(i) Health and Well-Being

Improving health conditions may have an impact on social welfare through three channels. First and foremost, individuals directly derive higher well-being levels from good health. The possibility of assessing the individuals' perception about their own health status is not only relevant but also feasible (and worldwide disseminated) using standard household surveys that study the determination of both objective and subjective dimensions in people's lives. Self-reported health status will play a central role in the present research. It enables, in practice, the expansion of aggregate social welfare measures to include health perceptions data, which is observed at the individual level, hence more advantageous than the household level (Deaton and Case 2002; Mason et all. 1999). This point is especially relevant in Latin America given its long established tradition of using per capita income-based poverty measures.

The second channel is that better health increases the individual functioning of a given society, which increases individual income-generating potential and leads to a reduction in standard poverty measures. Earnings premiums derived from lower depreciation of human capital and the higher utilization and accumulation of human capital can be assessed to help design capital-enhancing policies to alleviate income based poverty and social welfare. Or, more generally, health conditions affect the way people function in a given society. One way of assessing health-related dynamics is to ask people whether they have been "ill" in bed (hence not at work or school) over a certain timeframe, e.g. the last thirty days. Many health-related surveys collect data on "activities of daily living" (ADLs) or "instrumental activities of daily living" (IADLs). The ADL questions concern activities that are central to people's daily functioning, such as the ability to feed, clothe, bathe oneself. IADL questions, in turn, involve activities such as the ability to walk for a few kilometers, carry a heavy load, fetch water, catch a bus, manage money, or sweep a floor.

The third main channel through which health affects well-being is by improving the individuals' ability to deal with adverse health shocks by improving health-related financial instruments such as health insurance. The role played by the welfare-enhancing property of any asset through time depends on how important these shocks are and how developed capital markets are (i.e., asset, credit and insurance segments and specific health-related instruments). Therefore, the assessment of this last effect requires an analysis of institutions that constrain individual financial behavior, the

dynamic properties of the individuals' health processes and an ex-post assessment of the effective impacts of health shocks on the individuals' financial conditions. Conceptually speaking, the first effect enters directly the welfare function (possibly in a non additive fashion) while the last two enter the (inter-temporally perceived) budget constraint.

(ii) Perceived Health in the Life-Cycle

The health literature often uses the life cycle as a natural framework of analysis (Grossman 1992; Becker, Philipson ans Soares 2006; House et all. 1990). One should, in principle, study health-specific inner issues related to health perceptions at particular phases of the life cycle. For example, the intermediary phase of the life cycle comprehends the adult working period where less health can reduce productivity and increase absenteeism (Neri and Soares 2005). The literature shows that individual lifetime health is specially affected by the patterns of physical and intellectual growth observed in the childhood period[4]. Besides, it is not a novelty that the bulk of health problems observed in any given society occurs in the last phase of the life cycle, among the elderly. The elderly health status is at large determined by specific public policies (i.e. the state provision of health services) as well as working and educational decisions adopted in the past. The fact that the elderly population is also most likely out of the labor force inhibits endogenous problems between income and health that are central to this paper.

3. Institutional Background

Today, Brazil is the country in the Latin American region that transfers more income to the elderly relative to its GDP (OCDE 2005, Camarano and Pasinato 2007, Neri et all.1999). Note that this happens before the country has completed its demographic transition. The expansion during the last 15 years of non-contributory programs to the low-income elderly population explains a substantial part of this movement. Our calculations based on Brazilian national household surveys between 1992 and 2006 show that the elderly (60 and above) population's share in income increased from 7.9% to 9.96%. This same age group share of the individual income mass rose from 13.34% to 17.64% while their share of the per capita income mass rose from 10.8% to 14.51%.

Brazil is still facing significant changes in its age groups structure, in view of the changes in the population's aging process resulting in a relative increase in the number of elderly – which can be a result of low fertility and/or mortality of the elderly. According to Carvalho & Garcia 2003, this shift is elucidated by the decrease in fertility, contrary to what common sense could suppose, that tends to explain it by a decrease in mortality rates. Increases of 300% in the elderly population are expected in developing countries in the next years.

In Brazil, another point is the increase in longevity, i.e. the number of years that an individual a generation will be expected to live. According to 2006 IBGE data, life expectancy of the Brazilian population reached 71.2 years in 2000, as opposed to 62.2 years in 1980, which means that an individual aged above 60 years in 2000 could expect to live 21.1 years longer on average, and in the 1980s, a person with the same age

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[4] Various papers studied the relation between height and weight with and other objective such as the quality of access to food, water and sanitation (Alves and Belluzo 2005; Kassouf 1994; Neri et all. 2002). The relationship between school attendance and health can have relevant long run effects. The PNAD 2004 education supplement for Brazil points health as the main motivations for enrolled students to miss more than 15% of their classes: 57% for those between 0 to 17 years of age and 59% for those between 7 and 14 years of age.

would expect to live 17.7 years longer on average. In short, these two events contribute to the relative as well as to the absolute increases in the Brazilian elderly population.

In general, these changes were directly or indirectly affected by social policies strongly adopted in the past in the field of public health and social policy. Among the main policies, the universal coverage of both social security benefits and the public health service provision are important as a result of the 1988 Constitution – which extended the entitlement to these benefits (insurance, social assistance and public health services) to encompass other shares of the population, including non-tax payers. There are many works that indicated the socio-economic impacts of the income transfer on the elderly after the new Constitution was promulgated (Delgado & Cardoso 2004; Beltrão & Pinheiro 2004). The majority of them refers to changes in the income of the most senior subgroup, once this income became very important to the Brazilian population's income.

There were also impacts on poverty, especially, in the rural environments where many family members still depend on the elderly income and share his/her asset increases. This fact has changed the role of the elderly within the family giving them more autonomy, that is, breaking with the old stigma according to which they were very dependent on others. Today's elderly, on the contrary, are in many cases the main providers to the family, a status that grants them greater acknowledgement within the family and before society in general. According to Camarano et al. 2004 the increase in the rates of elderly as heads of households and the reduction in the proportion of those still living with relatives suggest a decrease in the elderly dependency.

Our computations using Brazilian national household surveys show that the elderly (60 and above) population share in income increased from 7.9% to 9.96% between 1992 and 2006. This same age group share in individual income mass rose from 13.3% to 17,6% while their share on per capita income mass rose from 10.8% to 14.5%.Individual and per capita income of the elderly increased more than any other age group during this period. Data from the 2003 Family Budget Survey (IBGE) show that the family members consider the elderly living standard better than for other age groups in what concerns most of the observed aspects. Around 13% of the people aged above 60 admitted that the quantity of food normally consumed by the family is not sufficient, while among the younger group, from 10 to 19 years old, this number may reach 19%. In terms of housing, 55% of the elderly consider their housing conditions good, while this number reaches 45% among individuals aged between 10 and 19 years.

Apart from granting greater autonomy to the elderly, income may have a crucial role in the individual's health. By using 1998 PNAD's data, Lima-Costa et. al (2003) have related social inequality, based on the head of the household's income, to the health conditions of the family members – suggesting a more unequal access to health in favor of those with greater income. They conclude that poorer elderly present worse health conditions, worse physical status and lower use of health services.

Another factor that has been indicated as a determinant of longevity is work, as unemployment has been associated with worst health conditions, morbidity and psychiatric problems (Blanc et al, 1994). On the other side, improvements in health conditions also enable a longer employment period, that is, healthy elderly people may work for longer. Giatt & Barreto 2003 have shown that functional health, which indicates greater physical autonomy and mobility, is one important factor foreseeing the permanent active life of the elderly. Based on the 1998 PNAD, more than one quarter of the elderly in the Brazilian metropolitan areas worked, a considerable figure in comparison to other countries. According to the authors, although, Brazil has not followed the world trend as, peculiarly, the social security system does not require the

pensioner to withdraw from the job market, encouraging thus his/her permanence in employment.

Apart from the 1988 Federal Constitution, other more recent social policies have caused changes in the lives of elderly Brazilian citizens. Among these policies, we highlight (i) the reduction of the minimum age for entitlement in 1998 to the Continued Contribution Benefits (*Benefício de Prestação Continuada (BPC) - Lei Orgânica de Assistência Social (LOAS)*)[5], from 70 to 67 years of age and, more recently, to 65, (ii)the Elderly National Health Policy in 1999 introducing preventive measures and multidisciplinary care with a greater active participation in the Family Health Program (PSF), and (iii) the Elderly Statute in 2003, which establishes social rights and promotes equity between the elderly and the remaining members of the population in different fields increasing their self-esteem and their sense of citizenship. . Besides, In 1998 an income policy was adopted to give higher real adjustments to the floor of social security payments (one minimum wage) that coincides with BPC and non contributory rural social security benefits. In other words, we are talking about considerable income flows whose influence on subjective health indicators can be measured.

In what concerns income transfers, according to Camarano & Pasinato 2004, following the reduction in the minimum age for the BPC eligibility in 1998, the number of beneficiaries increased 253% between 1997 and 1999 and 648% between 1997 and 2003. If we consider the BPC and the elderly monthly income for life, we observe that the number of payments benefits rises 72.9% between 1997 and 2003. Apart from an increase in the number of assistance benefits, there has been a real increase in the minimum wage deflated by the INPC, an inflation index that informs the calculation of social security benefits, of 22,3% between 1997 and 2003. According to the evolution of the real value of all benefits together, there was a 44.4% increase in the same period. As the adjustment policies of the social security benefits since 1998 have differentiated benefits payments that are equal to the minimum floor allowed by the Brazilian 1988 Constitution, the effect of the increase of the number of beneficiaries observed rose cumulatively.

In this case, it is also expected that such policies will have impacts on the life conditions and health of the elderly in general and of low income people, in particular. The 1998 and 2003 special supplements of the National Household Survey (PNAD /IBGE) allow us to identify the impacts of these policies, working as an evaluation tool, as they bring special supplements assessing and comparing the needs and use of health services. To be clearer, their data enable us to assess their situation before and after the effects of the expansion and/or creation of the above-mentioned new programs.

4. Empirical Exercises

(i) Data Issues

The special supplements of the National Household Survey (PNAD) from the IBGE for 1998 and 2003 containing questions on access to health services, physical mobility, morbidity, chronic diseases (back, arthritis, cancer, diabetes, asthma, heart diseases, kidney problems, depression, TB, cirrhosis), some aspects about functional capacity (bed-rest, difficulty to perform daily activities, etc.) and general self-reported health assessment, which allow us to study the determinants of health perceptions in combination with the rest of the PNAD standard questionnaire. In particular it will

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[5] BRASIL, LOAS - Lei Orgânica da Assistência Social, n° 8742 of 12/1993, DOU of 12/93, Brazil, Senado Federal.

provide the means to explore these policy experiments in order to test casual relations between individual income and subjective health components using a difference in difference estimator. It allows as well to analyze how measured perceptions concerning the agents' health and the health service's conditions are formed by investigating which are the main determinants contributing to the perception about one's health condition with samples that are much larger than the Gallup's or the Latinbarometer's ones.

Among the PNAD variables that indicate the need for health care, two have been chosen: "good or very good evaluation of the health status" and "bed rest in the last two weeks". We avoided using self-referred morbidity variables because these data can underestimate the prevalence of chronic diseases, due to memory problems or lack of a diagnosis (Lima-Costa et. al. 2003). Access to health services was based on the existence of health insurance ("has health insurance") while the demand for hospital care was assessed according to the following question "has sought medical care in the two weeks prior the survey".

We strive in the present paper to emphasize the variable concerning health self-evaluation, as well as those concerning functional capacity – although the literature attributes great significance to the latter when assessing the conditions of elderly life. This choice is based on the fact that health self-evaluation refers to features that extrapolate the meaning of health in the strict sense, but gains importance when assessing the individual's welfare. Although it does not qualify as an exam about the presence of physical or mental diseases, the interviewee considers many subjective variables (anxiety, ill-feeling, self-control, etc.) when assessing his/her own health status. For this reason, observing these results as an adjusted scale of welfare is not a too strong hypothesis, bearing in mind the components that each individual consider in their self-evaluation.

(ii) Empirical Strategy

With respect to the empirical strategy, we will start by doing multivariate exercises relating various income proxies and health perceptions for a given cohort across time.

The strategies for identifying the effect of income on health consist of comparing the health status of eligible and non-eligible people, that is, the health of lower-income elderly inhabitants before and after the creation or the expansion of income transfer programs. We will use estimates of differences-in-differences based on logistic regressions applied to cohort data to test if there is a distinctive gain in the health status of the lower-income elderly population eligible to the programs that have been increased.

The article has two methodological phases. Firstly, the proportion of selected health variables in 1998 and 2003 is compared, according to the individual's age. For instance, the proportion of individuals aged between 61 to 65 years of age, whose self-evaluation of their health is good or very good. In this case, detaching the probabilities of identifying good health states from the previous levels may indirectly indicate changes in the behavioral pattern in the welfare level of a certain age group – what may hint at the effects of the already mentioned policies, if they occur in the elderly group.

We will illustrate here the proposed empirical methodology with the main experiment and this framework will be adapted to other experiments explored in the project. We will start by comparing the relative improvement in health as a result of the government's income transfer programs to the perceived health status of urban beneficiaries and non-beneficiaries, between 1998 and 2003, through a difference-in-difference method applied to a multinomial ordered logit of people's perceived health

status. Our sample is divided in 4 groups: treatment group before the intervention (low-income elderly in 1998), treatment group after the interventions (low-income elderly in 2003), control group before the intervention and control group after the intervention. In order to (i) overcome the reinforcing aspects between income and health, which biases the impact estimates of the first variable on the second one, and (ii) to assess the impact of the creation and/or expansion of the income transfer programs to the low-income elderly on their health, we have created a dummy that represents individuals above 65 years of age with an income lower than half a minimum age – without considering the income transfer benefits. The interactive effect between this dummy "aged over 65 years old and less than ½ a minimum wage" for the year 2003 provides us with an estimate of the difference-in-difference between those eligible or not to the changes on health in extreme points in the concerned period. Mathematically, we could represent the difference-in-difference method with the following equation:

$$\mathbf{g3} = (\mathbf{\overline{Y}}_{03,id>65\_<1/4 \text{ mw}} - \mathbf{\overline{Y}}_{03 \text{ control g.}}) - (\mathbf{\overline{Y}}_{-98, id>65\_1/4 mw} - \mathbf{\overline{Y}}_{98, \text{ control g.}})$$

where each $\overline{Y}$ represents the proportion of each variable for each year and group, as the underlined number represents the sample period (1998, for before the change and 2003, for after the change) and the letter represents to which group the data belongs ($_{age>65\_<1/4 \text{ minimum wage}}$, for the treatment group and $_{other}$ for the control group). And g3 will be our estimate from difference-in-difference. Upon obtaining g3 we determine the impact of the natural experimental on the variable we would like to explain.

$$Y = g0 + g1*d2 + g2*dB + g3*d2*dB + other\ controls$$

Where Y represents the variable under study, which can be, for example, *"a five point scale of the self-reported health evaluation",* Although this will be the main variable analysed, we will test other endogenous variable related to perceived health conditions.. The coefficient g1 measures the difference in the impacts experienced by the two groups before and after the intervention, that is, it captures the trends in the observed variable between 1998 and 2003. The coefficient g2 captures the relative impact of being in the treatment group vis-à-vis being in the control group on the studied variable in the two periods, which have been considered jointly. The coefficient g3, in turn, captures the ex-post impact on the treatment group, which have not been captured either by the time variables, or the treatment group on the chosen endogenous variable. Therefore, g3 captures exactly the expected value of the intervention on the observed variable. Although we show estimates that are not controlled for comparison purposes – which is equivalent to withdrawing the last regression term above – it is interesting to take into consideration other relevant factors in the regression in order to isolate the effect of other policy variables, which may be promoting changes in the observed variable. This is achieved by inserting control variables in the regression, thus avoiding that other variables effects produce some bias in the estimate, while also precising the pure effect of the natural experiment on the perceived health variable. To form the vector of control variables, we have selected the following socio-economic variables: sex, age, income, age squared, ethnic group (white and non-white), years of schooling (0, 1 to 4 years, 4 to 8, 8 to 12 ,over12), migration (migrants and non-migrants), and Federation Unit, as well as variables that are mostly associated to health policies, such as: access to sanitation infrastructure and access to health services. Finally, we will control the health perception question for whether the ansewres are self-reported or reported by another household member.

5. Preliminary Descriptive Statistics on Health Perceptions

(i) Bivariate Analysis

The data demonstrates that among all age groups, the elderly aged over 65 years old had the best improvements in health indicators between 1998 and 2003. We could synthesize these results through various bivariate statistics, namely:

i) The proportion of elderly who have a good or very good self-evaluation of health increases from 36.5% to 40.8%, while for non-elderly, from 81.8% to 81.3%.

ii) The proportion of the elderly who were in bed rest in the last 15 days decreases from 10.4% to 9.3%, while non-elderly remained almost the same, from 3.5% to 3,7%.

iii) The proportion of the elderly with private health insurance grows from 6.1% to 29.7%, while it remained relatively stable for the non-elderly (24.3% to 24.2%).

iv) The proportion of the elderly who have sought health care in the last 15 days goes from 26.1% to 29.7%, while the non-elderly goes from 12.4% to 13.8%. This is an ambiguous element because it depends both on the supply of and demand for health care, a function of the person's health. As this increase in the demand for health care happens in a context of improved health indicators and access to health insurance, it is consistent with the relative income gains of the elderly – which will be detailed next.

(ii) Descriptive Statistics on Self-Reported Health Perceptions

At this stage, we decided to implement additional graphic and bivariate using the full range of self-reported health perceptions making a distinction between who answers the health question, namely: i) true self-reported health status (SRHS), ii) the health status reported by other household members and iii) the combination of the two samples.

The average self-reported health status tends to be bigger than when it is reported by other person, specially another household member and does not change across time. For example, in 2003 the average self-evaluation was 3.8, against 4.1 when it is implemented by other household member. The former group of true self-reports is around 38% of the whole sample while the latter represents 58% of the answers provided.

Graphs below present some of the changes in self-reported health status across elderly and non elderly subgroups of the population for true health self-reports and the full sample of reports. Although the average levels change somewhat, the qualitative results of improvement of the elderly health evaluation and the deterioration of the non elderly group is not affected by the identity of who answer the health status question.

Graph 3: Average Reported Health Status

Graph 4: Self-Reported Health Status
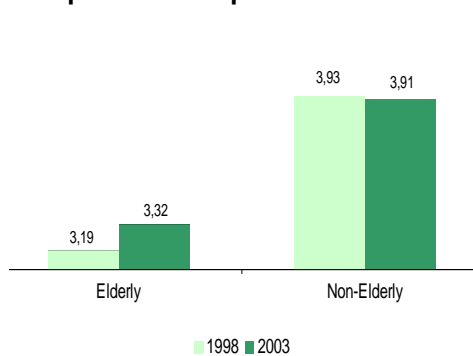
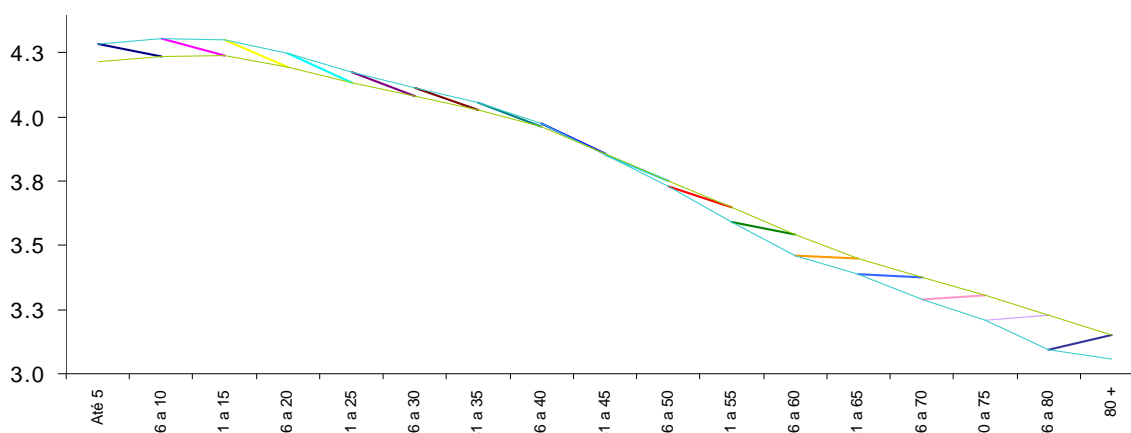Source: PNAD 1998-2003/IBGE microdata

(iii) Changes by cohort

A more dynamic evaluation is to consider the same events by birth period as in a cohort analysis. This analysis' main limitation is that its data are imperfect substitutes of the longitudinal data, as they do not provide information about the same individuals through time. Actually, data concerns different individuals with some identical features, such as birth date and place, and others, such as an individual who is the head of the household in the present decade, but who was not necessarily the head in the previous decades. Mortality differences among social groups can also be a problem here.

Contrary to the comparison between specific age groups status in 1998 and 2003, the cohort analysis assesses the changes occurred among individuals from the same generation. It means to compare the average self-reported health status of individuals who, for instance, have reported bed-rest in 1998 when they were 56 to 60 years old, with the number of people who also reported that in 2003 and who were 61 to 65 years old. In graph 1, firstly, we observe a significant decrease in the average self-reported evaluation of health as we move along the age distribution, what would suggest the natural effect of the aging process that is associated to the accumulation of degenerative chronic problems. Another point is the slight distance between the two curves from 40 years of age, with a slower decrease in 2003, suggesting an improvement in the life cycle of the welfare level for these two age groups. Despite this improvement, individuals of an advanced age belonging to the same generation tend to, in general, have a less optimistic assessment about their own health status, as there are negative trends in the features that represent the cohorts, reflecting the effect of aging on the health of individuals. For instance, around 45% of individuals aged between 61 and 65 years old consider their own health status good or very good in 1998, while in 2003, among those aged between 66 and 70 years of age, this fraction reachs 44%. The main point here is that for the population in the same age group between 66 to 70 years old, a positive assessment of their health was 40% in 1998.

In addition, the relative improvement of average self-reported health evaluation of the elderly between 1998 (green line) and 2003 (blue line), detailed in the graphs below, is not affected by who answers the questions about health.

Graph 5: Perceived Health Status

Graph 6: Perceived Health Status
Self reported
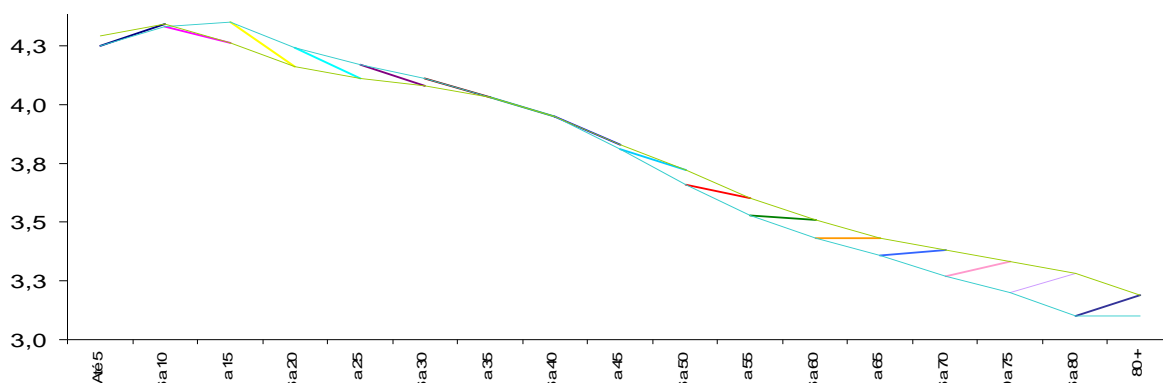
Source: PNAD 1998-2003/IBGE microdata

The overal trend according to which health indicators worsen as a result of the ageing process is reduced when indicators are analyzed per age groups and are not much affected by whom provide the answers. The general conclusion is that the perceived health has improved for the elderly population and worsened for the younger individuals.

Graph 7: Reported Health Status
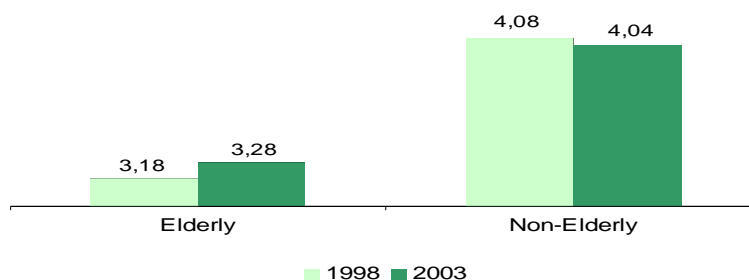
Source: PNAD 1998-2003/IBGE microdata

6. The Determination of SRHS

(i) Differences-in-differences of SRHS

As we move to multivariate exercises using the full range of self-reported health status we use multinomial logistic ordered models. We also run models on the perceptions on the quality of access to health services in order to take into account changes in the supply of health services on inner perception indicators. We did not include perceptions on the quality of services as explanatory variable in order to avoid endogeneity problems led by personal traits in individual answers. Both of these sections will be merged in the next version of the report.

We concentrate here on the analysis of the difference-in-difference estimator and related variables for the average health perceptions in three different samples: i) true self-reported health status, ii) reported by other household members and iii) the sum of the two samples. Overall, we concentrate on the first true self-reports, and note that the results do not change qualitatively across these three different samples. Furthermore, the results are also consistent with the ones found in the health literature. Briefly, the best health status is found in educated, native men, who live in rural areas with access to

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sanitation. In spatial terms, we observe that the dummy variables of most states are significant, the best health estimate being found in the state of Rio de Janeiro for all regressions. The last result indicates that, once controlled for the variables, there is no difference between the health conditions of the white and non-white. Variable with respect to access to public and private health insurance are positively related with SRHS. The identity of those who answer the questionnaire shows that the true self-reported health status is worst than that reported by others. Before assessing the variables of the difference in difference, it is worth remembering that linear and quadratic terms relating to per capita income were introduced, indicating a positive effect of the first and negative for the second, although they change decreasingly, as captured by the quadratic terms, all being meaningful. In this sense, the variables of the treatment group relating to the income transfer policies targeting low-income elderly (above 65 years old with per capita household income less than 1/4 minimum wage) are already controlled by the more general relations associated to the income variable.

In the difference in difference analysis, we approach the following variables: definition of the treatment group relating to age and income, variable year and in particular the interaction between these two variables.

Table 1:

Self-Reported Health Status (1 to 5) - Elegibility Criteria - Per capita Household Income below 1/4 Minimum Wage

Multinomial Ordered Logit			A) Self-Reported		B) Reported by Other Household member		C) Reported - Total Sample (A+B)	
			Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Eligibility	Elderly Poor		**-1,1343**	0,0063	**-2,0308**	0,0072	**-1,5906**	0,0047
Eligibility	Other case		0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Year	2003		**-0,0967**	0,0004	**-0,1386**	0,0003	**-0,1325**	0,0002
Year	1998		0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Elderly Poor	2003	**0,4447**	0,0091	**0,2460**	0,0104	**0,4202**	0,0068
Eligibility*Year	Elderly Poor	1998	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Other case	2003	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Other case	1998	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

Obs: Controled by: Income, Square income, Access to Health insurance, Access to sewage, Gender, Race, Migration, City size and State

Source: PNAD 1998-2003/IBGE microdata

The eligibility group formed by the poor elderly presents inferior health in all samples. In addition, we observer a deterioration of health perceptions across time. Last, and most importantly, there is a marked differential improvement of the eligibility group which prevents us from rejecting in a casual sense the hypothesis that income increases imply health perceptions improvements. This effect is smaller in the sample of external reports of one's health.

Overall, the difference between true self-reported health status (SRHS), the health status reported by other household members and the combination of the two samples shows that the income impact brought about by the eligibility criteria to new

income transfers to the poor elderly is higher in the SRHS than in the case of perceptions provided by other household members.

(ii) SRHS Robustness tests

We carry then some robusteness checks using alternative income measures, such as FGV own indigence line and also illiteracy[6]. This is worth doing not only to test the robustness of the results to different specifications given the discontinuity associated with binary poverty criteria, but also because there was ther differentiated expansion of social transfers using less stringent conditions than a ¼ minimum wage. The results present the same qualitative results discussed above. The difference-in-difference estimator presents somewhat smaller effects on these alternative poverty measures with respect to the true elegibility criteria associated with elderly poor income transfers.
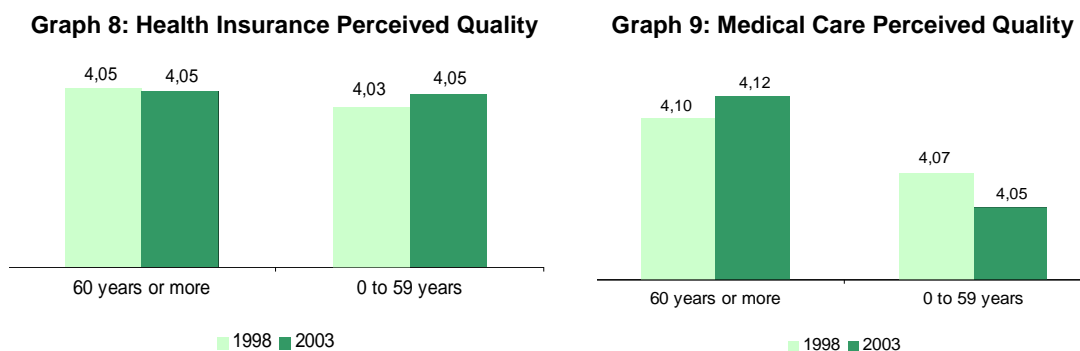
Table 2:

Self-Reported Health Status (1 to 5)
Multinomial Ordered Logit
Self-Reported

			Per capita Household Income below:					
			1/4 Minimum Wage		CPS Poverty Line		Illiterate	
			Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Eligibility	Elderly Poor		**-1,1343**	0,0063	**-1,2260**	0,0027	**-1,3147**	0,0014
Eligibility	Other case		0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Year	2003		**-0,0967**	0,0004	**-0,1033**	0,0004	**-0,1051**	0,0004
Year	1998		0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Elderly Poor	2003	**0,4447**	0,0091	**0,4261**	0,0044	**0,3409**	0,0020
Eligibility*Year	Elderly Poor	1998	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Other case	2003	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Other case	1998	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

Obs: Controled by Income, Square income, Access to Health insurance, Access to sewage, Gender, Race, Migration, City size and State

Source: PNAD 1998-2003/IBGE microdata

(iii) Supply Side of Health Services

We also run models on the perceptions on the quality of access to health services in order to indirectly take into account changes in the supply of health services on inner perception indicators. The results do not show any sizeable change that could explain SRHS changes observed.

Graph 8: Health Insurance Perceived Quality   **Graph 9: Medical Care Perceived Quality**

Source: processing PNAD 1998-2003/IBGE microdata

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[6] The FGV line is quite close to other legibility criteria used in Vale Gas program launched in the end of 2000.

Table 3:

Quality of Health Services (1 to 5) - Elegibility Criteria - Per capita Household Income below 1/4 Minimum Wage					
Multinomial Ordered Logit		A) Medical Care Perceived Quality		B) Health Insurance Perceived Quality	
Self-Reported			Standard		Standard
		Estimate	Error	Estimate	Error
Eligibility	Elderly Poor	**0,9023**	0,0205	**0,7313**	0,0199
Eligibility	Other case	0,0000	0,0000	0,0000	0,0000
Year	2003	**-0,0107**	0,0010	**0,0005**	0,0008
Year	1998	0,0000	0,0000	0,0000	0,0000
Eligibility*Year Elderly Poor	2003	**-0,7596**	0,0281	**-0,6858**	0,0234
Eligibility*Year Elderly Poor	1998	0,0000	0,0000	0,0000	0,0000
Eligibility*Year Other case	2003	0,0000	0,0000	0,0000	0,0000
Eligibility*Year Other case	1998	0,0000	0,0000	0,0000	0,0000

Obs: Controled by: Income, Square income, Access to Health insurance, Access to sewage, Gender, Race, Migration, City size and and State

Source: PNAD 1998-2003/IBGE microdata

7. Testing Intra Household Redistribution

(i) Concepts

The fact that both income and health are considered in PNAD at the individual level, not just al household level, allows us to test empirically the impact of changes of individual as well as family level income transfers on perceived health changes, according to the model below:

$$U_I = Y_{I/L}^{(1-\theta)} . Y_{F/L}^{\theta}$$

U_I - Individual Utility Function;

$Y_{I/L}$ - Individual Income (deducting intra-family transfers);

$Y_{F/L}$ - Family Income (adding intra-family transfers);.

θ - altruism degree within the household.

Exogenous income changes promoted by the Brazilian Federal Government will provide a way to indirectly test the level of altruism within the household by using the same structure of the empirical models above plus two interactive terms if the individual himself is elegible for the new income transfer introduced between the initial and the final moments and if someone in his family living in the same household is eligible for this policy. If there is perfect altruism among living members within the same household the coefficient that should matter is this last indicator.

Through the same approach carried out before and by using the same methodology of differences and diferences, we will be able to estimate the impact of increasing individual transfers on the perceived health of other household members which may be called the "breadwinner's effect on health perceptions". Besides testing the effects of the identity of the breadwinner in the household on an individual's perceived health, we also test the impacts according to the identity of whom reports individual health perceptions. We plan in the future to test if the gender of the income transfer's beneficiary affects the perceived health outcomes of other household members.

(ii) Differences-in-differences of individual SRHS

We use similar multivariate exercises to the ones implemented detailing more the Dif-in-difestimator in order to incorporate altruism within households. Overall the results show that there is an improvement in the true SRHS of poor non elderly individuals living with individuals eligible to official income transfers (the elderly poor) with respect to those poor non elderly that do not live with eligible individuals. The other point to be noticed is that this external effect is smaller in magnitude than the one observed for the ones who receive themselves direct official income transfers. The estimated coefficient is less than one third than in those that receive directly the income transfers. The other columns, related to other samples defined by the identity of the questionnaire respondent, we get bigger differences between individuals that receive and those that do not receive the direct transfers. In the least relevant case of the health status reported by other household member there is no statistical difference between those who do not live with eligible individuals and those who live with them but are not the direct beneficiaries of these transfers.

Table 4:

Self-Reported Health Status (1 to 5) - Elegibility Criteria - Per capita Household Income below 1/4 Minimum Wage

Multinomial Ordered Logit			A) Self-Reported		B) Reported by Other Household member		C) Reported - Total Sample (A+B)	
			Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Eligibility	Elderly Poor		**-1,4063**	0.0064	**-2,2004**	0,0072	**-1,8174**	0.0047
Eligibility	Non Elderly Poor but lives with elderly poor		**-0.2516**	0.0057	**-0,2285**	0,0036	**-0.2431**	0.0030
Eligibility	Other case		**-0.3115**	0.0010	**-0,2035**	0,0007	**-0.2680**	0.0005
Eligibility	Non Elderly Poor doesn't live with elderly poor		0.0000	0.0000	0,0000	0,0000	0.0000	0.0000
Year	2003		**-0.2042**	0.0012	**-0,2751**	0,0008	**-0.2696**	0.0007
Year	1998		0.0000	0.0000	0,0000	0,0000	0.0000	0.0000
Eligibility*Year	Elderly Poor	2003	**0.5458**	0.0091	**0,3803**	0,0104	**0.5517**	0.0069
Eligibility*Year	Elderly Poor	1998	0.0000	0.0000	0,0000	0,0000	0.0000	0.0000
Eligibility*Year	Non Elderly Poor but lives with elderly poor	2003	**0.1499**	0.0083	**-0,0312**	0,0053	**0.0090**	0.0044
Eligibility*Year	Non Elderly Poor but lives with elderly poor	1998	0.0000	0.0000	0,0000	0,0000	0.0000	0.0000
Eligibility*Year	Other case	2003	**0.1151**	0.0013	**0,1547**	0,0009	**0.1520**	0.0007
Eligibility*Year	Other case	1998	0.0000	0.0000	0,0000	0,0000	0.0000	0.0000
Eligibility*Year	Non Elderly Poor doesn't live with elderly poor	2003	0.0000	0.0000	0,0000	0,0000	0.0000	0.0000
Eligibility*Year	Non Elderly Poor doesn't live with elderly poor	1998	0.0000	0.0000	0,0000	0,0000	0.0000	0.0000

Obs: Controled by: Income, Square income, Access to Health insurance, Access to sewage, Gender, Race, Migration, City size and State

Source: PNAD 1998-2003/IBGE microdata

(iii) Robustness

Once again we perform test for robustness of the results to different elegibility specifications using FGV indigence line and also illiteracy. The results present the same qualitative results discussed above. The difference-in-difference estimator presents somewhat greater differences between the individuals that receive directly the transfers and those that do not although live with those that receive it.

Table 5:

Self-Reported Health Status (1 to 5) - Self-Reported

Multinomial Ordered Logit

			1/4 Minimum Wage		CPS Poverty Line		Illiterate	
			Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Eligibility	Elderly Poor		**-1,4063**	0.0064	**-1,4525**	0.0027	**-1,1837**	0,0016
Eligibility	Non Elderly Poor but lives with elderly poor		**-0.2516**	0.0057	**-0.2941**	0.0026	**-0,4931**	0,0027
Eligibility	Other case		**-0.3115**	0.0010	**-0.3202**	0.0007	**0,2279**	0,0010
Eligibility	Non Elderly Poor doesn't live with elderly poor		0.0000	0.0000	0.0000	0.0000	0,0000	0,0000
Year	2003		**-0.2042**	0.0012	**-0.1849**	0.0008	**-0,0522**	0,0013
Year	1998		0.0000	0.0000	0.0000	0.0000	0,0000	0,0000
Eligibility*Year	Elderly Poor	2003	**0.5458**	0.0091	**0.5034**	0.0045	**0,2886**	0,0024
Eligibility*Year	Elderly Poor	1998	0.0000	0.0000	0.0000	0.0000	0,0000	0,0000
Eligibility*Year	Non Elderly Poor but lives with elderly poor	2003	**0.1499**	0.0083	**0.0982**	0.0040	**0,0384**	0,0040
Eligibility*Year	Non Elderly Poor but lives with elderly poor	1998	0.0000	0.0000	0.0000	0.0000	0,0000	0,0000
Eligibility*Year	Other case	2003	**0.1151**	0.0013	**0.0973**	0.0009	**-0,0591**	0,0014
Eligibility*Year	Other case	1998	0.0000	0.0000	0.0000	0.0000	0,0000	0,0000
Eligibility*Year	Non Elderly Poor doesn't live with elderly poor	2003	0.0000	0.0000	0.0000	0.0000	0,0000	0,0000
Eligibility*Year	Non Elderly Poor doesn't live with elderly poor	1998	0.0000	0.0000	0.0000	0.0000	0,0000	0,0000

Obs: Controled by: Income, Square income, Access to Health insurance, Access to sewage, Gender, Race, Migration, City size and State

Source: PNAD 1998-2003/IBGE microdata

(iv) Supply Side of Health Services

We also run models on the perceptions on the quality of access to health services in order to indirectly take into account changes in the supply of health services on inner perception indicators as our indicator of income redistribution within households. The results applied to subjective evaluations of medical assistant and health insurance show that in both cases we do not reject the hypothesis that the access quality of the elderly poor object of new social benefits to health services worsened between 1998 and 2003. The result for those who live with eligible people is mixed. There is a positive coefficient for medical care perceived quality and a negative one for health insurance quality. Nevertheless, the evidence here supports the idea that health perception improvements for the elderly poor are not associated with improvements in the quality of the supply of health services.

Table 6:

Q u a l i t y o f H e a l t h S e r v i c e s (1 t o 5) -
E l e g i b i l i t y C r i t e r i a - P e r c a p i t a H o u s e h o l d I n c o m e b e l o w 1/4 M i n i m u m W a g e

Multinomial Ordered Logit *Self-Reported*			A) Medical Care Perceived Quality		B) Health Insurance	
			Estimate	Standard Error	Estimate	Standard Error
Eligibility	Elderly Poor		**0,9347**	0,0207	**0,6636**	0,0203
Eligibility	Non Elderly Poor but		**0,3249**	0,0149	**-0,4382**	0,0272
Eligibility	Other case		**0,0372**	0,0028	**-0,0693**	0,0043
Eligibility	Non Elderly Poor doesn't		0,0000	0,0000	0,0000	0,0000
Year	2003		**-0,1834**	0,0035	**0,0094**	0,0059
Year	1998		0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Elderly Poor	2003	**-0,5869**	0,0283	**-0,6949**	0,0241
Eligibility*Year	Elderly Poor	1998	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Non Elderly Poor but	2003	**0,5633**	0,0226	**-0,4247**	0,0355
Eligibility*Year	Non Elderly Poor but	1998	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Other case	2003	**0,1882**	0,0036	**-0,0088**	0,0059
Eligibility*Year	Other case	1998	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Non Elderly Poor doesn't	2003	0,0000	0,0000	0,0000	0,0000
Eligibility*Year	Non Elderly Poor doesn't	1998	0,0000	0,0000	0,0000	0,0000

Obs: Controled by: Income, Square income, Access to Health insurance, Access to sewage, Gender, Race, Migration, City size and State

Source: PNAD 1998-2003/IBGE microdata

In sum, we further refined the impact measures dividing the non elderly poor into two groups: Those living with and without poor elderly in the same household. The idea here was to test the breadwinner's altruism within the household. The results show that the health perception effect is much smaller for the non-direct beneficiaries of transfers and sometimes null. This is perhaps relevant for policy purposes since it is expected that increasing transfers to the elderly poor in Brazil will generate a sizeable externality to other household members individual welfare level.

8. A summary of the results and policy implications

The recent Brazilian case presents privileged conditions to overcome the endogenous problem in the estimation of the impact of income on health. The existence of a special health supplement in the 1998 and 2003 PNAD/IBGE allows the analysis of the the relation between changes in the two variables. Complementarily, the country has adopted and increased in the last years a series of income transfer programs on a national scale targeting the low income elderly population, as well as the creation and expansion of programs such as Continued Benefit - Benefício de Prestação Continuada (BPC), rural pension, readjustment of the social security benefits, which from 1998 on has granted distinct readjustments to the benefits pertaining to the elderly, where the health question is key – all of which consist of a special laboratory to identify the effects of these income gains. The strategy used in the identification of these effects of

income on health was to compare the health status of eligible and non-eligible people before and after the expansion of the income transfer programs. We have used a difference in difference estimator, with and without controls, based on logistic regressions. The central result of the paper is the existence of a distinct grain in the health conditions of the low-income elderly population, which is consistent with the existence of an income effect, as the causality between this factor and the health indicators.

A second conclusion is that, when analyzing the age evolution of the general health indicators such as the subjective self-evaluation of the health status and the frequency of bed rest, we note absolute improvements in the more advanced age groups. Furthermore, when we follow the trajectory of these indicators per generation, we observe a greater stability of the general health indicators used for the cohorts above 60 years old – where we would expect a decrease as a result of the aging process.

In terms of public policies, these exercises suggest an impact of the new programs on the health variables of older individuals. The elderly group diminished its need for health care, increasing the proportion and chances of individuals self-assessing their health status as good, and reducing those who have been in bed rest in the last two weeks. Certainly, not only income was one of the channels to improve the health status of low income elderly people, but also the National Policy of the Elderly Health, which brought results in terms of assistance and prevention. It is important to note that the indicator of health perception has been robust to assess the health status of the elderly, because it tells consistently about the survival period of this population. (Helmer et. al. 1990, Lima-Costa, 2003).

There have also been improvements in the access to health care for the low-income elderly population. The fact is that, with or without needing it, the person can consume health services, as having health insurance may induce the unnecessary use of health care services (tests, medical procedures, appointments). Perhaps this can explain the increase observed in the proportion and chances of the demand for health services in the elderly group in 2003, once there has been a reduction in the need for health care in this age group in the same year. Another point is that the effective consumption of health service does not necessarily translate into demand for health, once there are factors that limit its access (distance, waiting periods, time, private costs of the treatment).

Summing it up, we observed that, between 1998 and 2003, the low income elderly group, subject to exogenous income increases as a result of transfer, have reduced their need for health medical care, but have increased their demand for health care – which can be a reflection of the greater access to health insurance and some measures from the National Policy for the Elderly Health, that have improved access to services such as the expansion of the Family Health Program. The elderly have greater difficulty in their functional capacity hindering their transportation to obtain care in a hospital or a surgery – which makes it very important to have home care or more specifically a family doctor.

Moreover, the elderly not only use more medical care than the rest of the population, but they also need more costly medical interventions and of a more complex technological nature as their diseases may be multiple and chronic, demanding continuous medical follow-up (Veras, 2003). An early diagnosis and preventive measures would reduce the procedure costs, which is advocated by the National Policy for the Elderly Health.

In short, our results suggest that there is an indirect impact of the income transfer programs on the health variables, but they do not mention their cost/benefit relation vis-

à-vis those of other public programs such as sanitation, education and health. In any case, the low income elderly group diminished their need for health care in relative terms to other groups in 1998 and 2003, increasing the chances of individuals self-assessing their health as good and their access to private health insurance, while also reducing the proportion of those who had bed rest in the last two weeks.

When we further refined the impact measures dividing the non elderly poor into two groups, those with and those without poor elderly living in the same household, testing for altruism within the household emanating from the direct beneficiaries of new income policies. The results show that the health perception effect is much smaller for the non direct beneficiaries of transfers and sometimes it is null. This maybe relevant for policy purposes since people expected that the increasing transfer to the elderly poor in Brazil will generate a sizeable externality to other household members individual welfare level. The fact that the elderly live in smaller families than others would also diminish the impact of this breadwinner effect (*efeito arrimo de família*) . For instance, there were 3.23 HH members in families with people over 60 years of age against 4.98 in the total sample of families in 2003.

9. Extensions

(i) Education versus Income and Health Perception Premium - Beyond the pragmatism of income transfer programs, the greater educational level of the population has impacts on other elements in the individual life, such as fertility, criminality and illness, among other determinants of health. In these cases, education potentially affects variables of interest through the direct and indirect effect it has on the function of greater generated income. We take, for example, the comparison between self-perceived data on individual health conditions. Health improves proportionally to an individual's income and education. But what is more important: schooling or income? We will compare them by using the models that estimated the direct effect of education (i.e. maintaining income constant) and the direct effect of income (i.e. maintaining education constant) on perceived improvements in health.

(ii) Non-Contributory rural pensions and Gender - We plan as well to test variants of the model for rural areas, taking advantage of the variation in the entitlement age to a non-contributory rural pension between women (minimum: 55 years old) and men (minimum: 60 years old). We will pay special attention to the gender variable, by estimating pooled as well as separate models for males and females (Case 2002).

(iii) Impact of the creation of the SUS on the Perceived Access to Health Services - The other experiment we will perform is about the impact of the creation of the Unified Health System (*Sistema Único de Saúde* -SUS) by the Brazilian Federal Constitution of 1988 on the quantity and quality of access to health services perceived by individuals. The introduction of SUS is probably the main change in the Brazilian Public Health Policy in the last decades and its effects can be measured comparing PNAD 1998 and 2003 special health supplement with PNAD 1981 on access, use, motivations and perceived quality, which are the items strictly comparable across these PNADs. Since the system's coverage became universal it generated higher impact on the poorest segments of the Brazilian population. We will apply a difference-in-difference estimator similar to those between 1981 and 1998 for the low educated people (i.e. a fixed characteristic for the adults), controlled by other characteristics. We will perform the comparison using same age groups. Standard bi-variate analysis concerning the evolution of access to health services and perceived quality will be applied across cohorts during the 22 year period between PNADs 1981, 1998 and 2003.

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