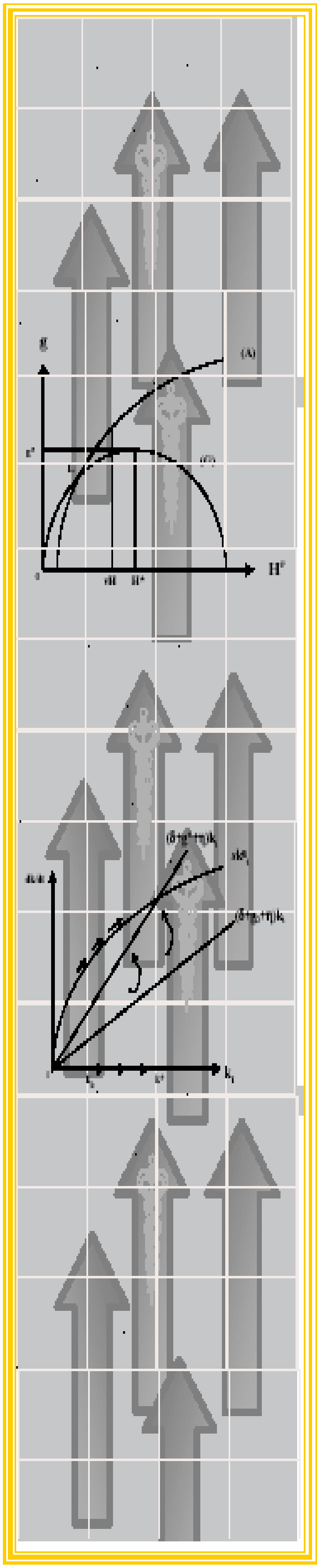

Pan American Health Organization
Regional Office of the World Health Organization
Celebrating 100 years of Health

Health, Human Capital and Economic Growth

Case Studies:

Health, Human Capital and Economic Growth in Brazil

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Area of Strategic Health Development
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HEALTH, HUMAN CAPITAL AND ECONOMIC GROWTH IN BRAZIL

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INTRODUCTION

There are databases in Brazil that allow intertemporal comparisons on the evolution of the population's nutritional status and permit an analysis of correspondence between this evolution and changes in socioeconomic characteristics of the population, as well as associating anthropometric differences (stature and weight) to distinct levels of income.

The main objective of this research is to assess the impact of nutrition and health status of the population on the human capital formation and long-term economic growth and social development in Brazil.

Height of the individual will be used as a *proxy* for human capital investment made on this individual by his family and by the government, as expressed by Fogel (2001). Population data on adults in the range of 19 to 59 years old will be used, because this is an age group on the prime of its economic activity. People older than 60 years will not be included, since the precise assessment of height in this age group is more difficult.

The source of the data analyzed in order to reach the proposed goal is the Living Standards Measurement Survey, or *Pesquisa de Padrao de Vida (PPV*), a household survey conducted between 1996 and 1997 in both the Southeast and Northeast Regions of Brazil.

Living Standards Measurement Survey (PPV)

PPV was carried out by the Brazilian Institute of Geography and Statistics (IBGE) in association with the World Bank, in order to enhance the socioeconomic statistics system. It is the Brazilian version of the LSMS. It consists of a pilot project of multitheme research to fulfill information needs which: (a) qualify and indicate the determinants of social welfare of different social groups, and (b) allow the identification of the effects of government policy in household living standards (IBGE, 1998).

The main objective of PPV is to provide adequate information to plan, follow up, and analyze economic policies and social programs in relation to their impacts on household living standards, especially among low-income populations. (IBGE, 1998).

The PPV questionnaire has been planned to supply a set of integrated informations, in order to (IBGE, 1998):

- Measure the welfare distribution and the level of poverty, mainly in geographic areas where subsistence agriculture, informal economy, and seasonal employment prevail;
- Describe the patterns of access and use of public services (education and health services, basic sanitation, etc.);
- Understand how household residents react to economic conditions and to the impacts of governmental measures; and
- Allow complex analyses of the relations among various aspects of social welfare, for example, the impact of health on employment, the influence of expenditure patterns in residents' nutritional status, etc.

PPV generates an optimum multidimensional summary of welfare factors and permits the study of the interaction of several variables associated to it due to its broad thematic approach (IBGE, 1998).

PPV includes data on age, height, weight, self-reported health status, education, and income of the population. Height was measured in a standardized manner, with barefoot individuals, by trained teams who were supplied with metallic measuring tapes graded in millimeters. Data on income represent all revenues from every member of the family.

Research Characteristics

The characteristics of the Living Standards Measurement Survey (PPV) carried out in the Southeast and Northeastern Regions of Brazil are (IBGE, 1998):

- Comprehensiveness of socioeconomic themes studied in one same household sample;
- Permanence in the field for a whole year (March 1996 through March 1997) with the purpose of capturing seasonal phenomena;

- Strict control of the application of questionnaires, data entry processing, and checking;
- Incorporating data processing as an integral part of the survey.

In order to achieve these objectives, new methodologies have been adopted with the purpose of minimizing those problems common to integrated research work (IBGE, 1998).

Questionnaire

The questionnaire collects a diversity of social and economic themes, at the household level. So as to meet the objectives of analizing both social welfare and the characteristics and determinants of poverty, themes included in the survey have been examined with the purpose of defining the minimum possible number of questions on each topic, required for evaluating life conditions. In view of the importance of evaluating social welfare, special emphasis has been given to aspects relating to household expenditure. Research comprises expenditures on housing, education, health, food consumption, goods and services, besides costs incurred by household members in activities related to industry, commerce, cattle-raising and fishing (IBGE, 1998).

Characteristics and determinants of poverty are measured for a series of income indicators. For those in the formal labor market there have been included detailed questions on salary, bonus, compensation and benefits, as much on their main job as on a second job. At the household level, the investigation covers net income derived from entrepreneurship on part of its members, from financial investments and from other sources of income, such as transfers, pensions, lottery gains, etc.. Since characterizing quality of life and identifying levels of poverty in a population go beyond the economic analysis, the questionnaire investigates housing conditions, demographic trends (migration, fertility, birth history), access to health and educational services, nutrition, anthropometry, and life conditions. It is by means of availability of more detailed socioeconomic data that it is expected to attain the analyses of the interrelations among these variables, viewing a more accurate definition of social inequalities, of poverty and its determinants (IBGE, 1998).

The research questionnaire was applied twice at different dates in the same household allowing a two-week interval in-between both visits. This procedure had the purpose of:

1. guaranteeing a stricter quality control on the information regarding household members expenditures (the person interviewed was requested to make a note of all expenses incurred during the two week interval between visits);
2. clearing doubts and/or blanks detected on the first part of the questionnaire by checking mechanisms;
3. and finally, reducing the period of time spent at each interview (IBGE, 1998). (IBGE, 1998).

Sampling Aspects

1.Sample Planning

The PPV sample design was discussed with World Bank officials while sample size has been determined by the budget available. In accordance to its pilot-research configuration, it was decided that it would encompass only the Southeast and Northeastern Regions of Brazil, taking into consideration 10 geographic strata, namely: Fortaleza, Recife, and Salvador Metropolitan areas; the remaining urban areas of the Northeast; the remaining rural areas of the Northeast; Belo Horizonte, Rio de Janeiro, and Sao Paulo Metropolitan areas; the remaining urban areas of the Southeast; and the remaining rural areas of the Southeast (IBGE, 1998).

As in other household surveys conducted by IBGE, choice has been made for a two-stage selection design, with stratification of primary units and random selection of second-stage units. The primary unit is the 1991 Demographic Census geographic base sector, and the second-stage unit is the household. A 480-household sample size was determined for each geographic stratum. In urban areas, on each geographic stratum it was established that 60 would be the number of sectors to be selected and 8 households per sector. In rural areas it has been fixed in 30 the number of sectors and in 16 the number of households to be selected per sector, as a result of difficulties of access to these sectors considering that an increased number would imply cost increase. (IBGE, 1998).

The size of the sample was defended by World Bank officials based on their past experience in countries where this particular type of survey was conducted, due to the need to produce quick information that furnish variation and trend indicators in aggregated levels (IBGE, 1998).

2. Definition on Statistical Strata

As previously pointed out, the sector is the primary sample unit, the household being the secondary unit and the investigation unit. Stratification of sampling primary units has been defined in two separate stages: the first one taking into consideration the geographical division of interest, which resulted in the definition of 10 geographical strata; for each geographical stratum a second stratification has been defined based on statistical criteria, taking into account the information regarding the chief household member average montly income, a variable that has been investigated during the 1991 Demographic Census which surveyed all households in the country (IBGE, 1998).

3. Allocation of sample within income strata

The household sample ultimate size has been determined based on available financial resources. As a result, the sample-size of sectors and the number of households to be selected per sector have also been fixed, namely (IBGE, 1998):

- 60 sectors and 8 households per sector in urban geographical strata and metropolitan areas (geographical strata 1,2,3,4,6,7,8, and 9);
- 30 sectors and 16 households per sector, in rural geographical strata (geographical strata 5 and 10).

Prior to allocation per income strata, the total sample in the 10 geographical strata consisted of 540 sectors and 4.800 households. Based on the number of permanentely occupied private households, obtained from the 1991 Census (IBGE, 1998), a proportional allocation has been utilized (IBGE, 1998).

THEORETICAL BACKGROUND

Economic development textbooks define economic growth as growth in income per capita, and economic development as a process that implies transformations in social structure, such as education, health, nutrition, access to housing and sanitation that, on their turn, imply growth in per capita income.

The previous investment in human capital, by the definition of human capital in itself, has an important impact on the economic development of a country. One of the forms of investment in human capital is the expenditure in education. A number of studies in developing countries have shown that there is an important relationship between education and heatlh of the next generation – measured in terms of life expectancy; the mechanism by which this relationship is revealed resides in improvements in infant and child survival rates (Caldwell, 1986);

Cochrane, Leslie and O´Hara, 1982; D´Souza and Bhuiya, 1982; and Le Vine, 1987, (quoted by McMahon, p.82). The hypothesis is that the knowledge and increased earnings potential gained through education enable parents to provide a healthier environment for their families, although the mechanisms by which this occurs are still unclear (Le Vine, 1987, Eisemon, 1988, referred by McMahon, p. 83). The regressions run by McMahon show that infant mortality rates are dependent on female gross enrollment rates, lagged 20 years (McMahon, p. 84).

Becker assumes a different position. On his paper with Nigel Tomes (see Becker and Tomes, 1986), i.e. "Human Capital and the Rise and Fall of Families", he is interested in developing a model of the transmission of earnings, assets, and consumption from parents to descendants. Becker and Tomes depart from a simple model of the relation between the parents' and children's incomes

$$I_{t+1} = \alpha + b\, I_t + \varepsilon_{t+1} \quad (1)$$

where I_t is the income of the parents, I_{t+1} is the income of children, α and b are constants and the stochastic forces affecting the income of the children ε_{t+1} are assumed to be independent of the income of parents[4] .

[4] Acc. Becker and Tomes, p. 344.

The second hypothesis is that the endowments of a family are inherited from their parents, but these are only partially inherited. Beker and Tomes say this is "a plausible generalization to cultural endowments of what is known about the inheritance of genetic traits, and children with well-endowed parents tend also to have above-average endowments, though smaller, relatively to the mean, than their parents', whereas children with poorly endowed parents tend also to have below-average endowments, but larger, relatively to the mean, than their parents''[5]. This relation is expressed In terms of an equation as

$$E^i_t = \alpha_t + h E^i_{t-1} + \upsilon^i_t ,$$

where E^i_t is the endowment of the *i*th family in the *t*th generation, h is the degree of *inheritability* of these endowments, and υ^i_t measures *unsystematic* components of luck in the transmission process.[6]

Having specified relationships for the transmission of income and of endowments from one generation to the other, the authors elaborate on the relation between earnings and human capital. They assume that adult earnings depend on human capital formed in childhood and market luck (L) :

$$Y_t = \gamma (T_t, f_t) H + L,,$$

where Y_t stands for earnings, and the earnings of one unit of human capital γ is determined by equilibrium in factor markets, technological knowledge (T_t,) and the ratio of the amount of human capital to nonhuman capital $f_{t.}$

This equation allows for the transformation of investments in human capital during childhood in earnings received during adulthood. So the authors say that parents pass their endowments on to their children and also influence their adult earnings by expenditures made on their skills, health, learning motivation, "credentials" and many other characteristics. Part of these expenditures is made by the children's parents and part by the state, and they are not only determined by the abilities of the children.

Therefore, Becker and Tomes are interested in the intergenerational mobility and they assume that cultural and genetic endowments are automatically transmitted

[5] ~Becker and Tomes, p 347
[6] Becker and Tomes, p. 347

from parents to children. The intergenerational mobility of earnings depends on the inheritability of endowments, and the transmission from endowments to earnings would be equal to one if parents could readily borrow to finance the optimal investment in their children..(Becker and Tomes p. 372).

The study by Becker and Tomes is theoretical. They have not conducted any estimates of their own, probably due to the difficulty in obtaining data. But they have examined about a dozen empirical studies relating the earnings, income, and assets of parents and children (page 373)). They observe that the point estimates for most of the studies indicate that a 10 percent increase in parents' earnings (or income) increases the children's earnings by less than 2 percent (p. 366). They also concluded that: - "Almost all earnings advantages and disadvantages of ancestors are wiped out in three generations. Poverty would not seem to be a "culture" that persists for several generations " (Becker and Tomes, p. 373).

The analysis by Becker and Tomes gives interesting insights, but it does have a shortfall. It does not elaborate on what measure or measures of investment in human capital ought to be taken (like expenditures in health and in education), how they should be combined. Also it does not elaborate on the mechanism by which inheritance of endowments and human capital results in inheritance of a given income level.

In this sense a leap forward was given by Fogel (1992, 1994) who linked aggregate movements in adult height to long-run changes in standards of living, including income, mortality, and morbidity (Strauss and Duncan, 1998, p. 768). The big insight Fogel had the use of height, and variations in height, as measures of previous investments in human capital. The logic of this statement will be elaborated later on, but now it should be said that this was an important breakthrough. Fogel suggested a simple yet precise way of measuring past investments in human capital by its outcome. If the family and the state had invested in the child, he/she would have grown, if this investment was not made the child hasn't grown.

Based on the case made by Fogel, Strauss and Thomas (1998) observed that:

- √ the income generating capacity of the poorest could be enhanced by some health sector investment (p.767),
- √ there are “correlations between health and labor outcomes”,
- √ “health varies over the life course and is the outcome of behavioral choices both during childhood and in later life” (p. 768)
- √ comparing the evolution of the stature of men and women in four countries, the United States (1910 to 1950s), Brazil (1910 to 1950s), the Ivory Coast (1920 to 1970s) and VietNam (1920 to 1970s) the authors concluded that “while the secular increases in height are sizable in all four countries, the gaps in height between them are even larger” (p. 770)

To isolate cross-section variations, they focused on the 1950 birth cohort and studied variations in changes in adult stature within a country to understand how the benefits of growth have been distributed within the population (p. 771). Turning to data at the household level, they concluded that health (measured by height) and productivity are correlated at the individual level (p. 772)

The authors concluded that “... in recent years, substantiall progress has been made in documenting the existence of a causal impact of health on wages and productivity in low-income settings using both experimental and non-experimental methods....” and that “health has a larger return at very low levels of health and (perhaps) in jobs requiring more strength. With eoonomic development these types of jobs will shrink, and one might expect the labor market impact of improved health to decline, especially relative to the impact of education and skill acquisition.”

Results of several researches conducted by Monteiro and cols.(1993) with data surveyed in the National Study of Family Expenditures, or *Estudo Nacional de Despesa Familiar (ENDEF*), and the National Research on Health and Nutrition, or *Pesquisa Nacional de Saude e Nutricao (PNSN*), showed that :

- There was an increase in height of young adults (21-22 years of age), when we compare persons born in 1966-1968 to those born in 1951-53. The increase was of 1.3 cm for males and 1.0 cm for females;
- There was an increase in height of children (7 years of age ± 12 months), comparing children born in 1981-1983 to those born in 1966-68. The increase was of 3.6 cm for males and 3.7 cm for females;
- Height of Brazilian young adults and children was below heights presented in the NCHS/WHO standard, but the deficit is being reduced. It was reduced in 15% for young adults, both male and female, born between 1951/1953 and 1966/1968; and it was reduced in 50% for children, both male and female, born between 1966-1968 and 1982-1983.

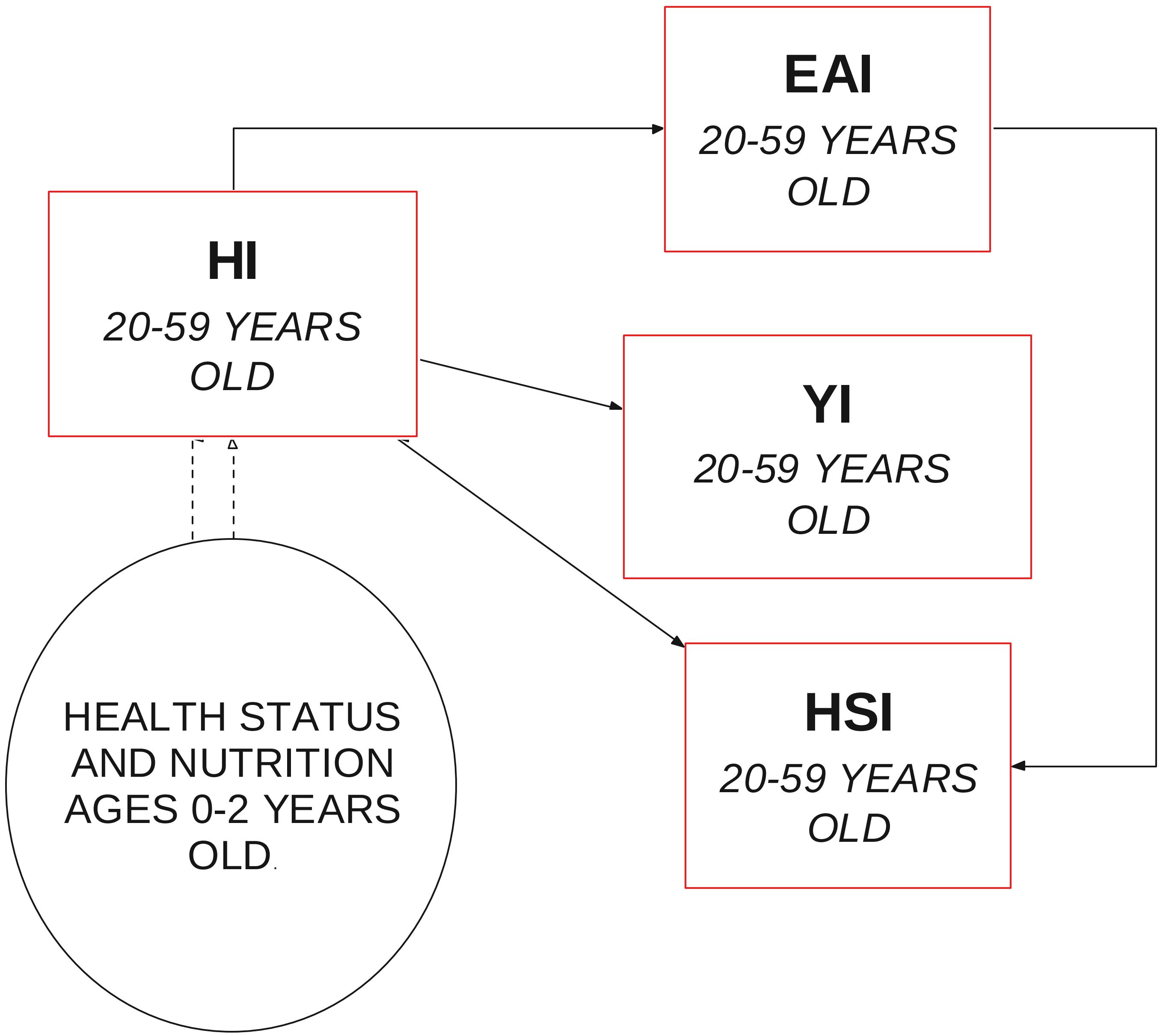
Methodology

Methodological lines to be followed in the research are the ones developed by Fogel (2001) and Barro (1996).

We chose identifying the impact of human capital investment at two priviledged points in time, as our main line of analysis: during childhood, involving investments in individuals in terms of health and nutrition; and during school age, involving investments on their formal education.

Our survey population, in relation to this main line, consists of all adults between 20 and 59 years of age who were studied by the PPV. For indicator of the investment in human capital during childhood, made either by the family and/or by the state (per lines of Fogel 2001), we used the final height reached by the individual, a measurement which, in societies such as that of Brazil, reflects outstandingly well the prevailing health and nutrition status of the individual during the first two years of his/her life. As for investments on formal education, we applied the number of school years of the individual as indicator. The outcome indicators regarding health and nutrition investments during childhood applied here, were the education attained by the individual, the income (productivity) he/she earns from work, and the overall status of health (self-referred scale). As for the outcome indicators on the formal education of the individual, we applied the income earned from work and health status. These relations are expressed on Diagram 1, as follows:

DIAGRAM 1
IMPACT OF INVESTMENT IN HUMAN CAPITAL ON SCHOO ACHIEVEMENT, PRODUCTIVITY AND HEALTH STATUS.



:CONTROL VARIABLES: AGE | AREA | REGION

:

VARIABLES: **HI,height of individual *i*, measured in centimeters;**
EAI, school achievement of individual *i*, measured in years of schooling;
YI, income of individual *i*, in reais;
HSI, health status of individual *i*,self reported;
AGE, measured in months;
AREA, rural or urban;
REGION: NORTHEAST OR SOUTHEAST

Additionally, and on a second line of analysis, we have been pursueing the study of the intergenerational transmission of investments in health, nutrition and education. In the present case, we studied household units formed by father and mother in the age group of 20 through 59, and their children between 2 and 7 years old or 15 through 21 years old.

Investments in human capital whose transmissibility we are in a position to investigate, are investments made on nutrition and health during the first two years of a child's life, reflected by the height attained by this individual as he or she reaches adulthood (Hi), and investments made on education reflected by the schooling attained by the same individual (EAi).

In order to investigate the transmissibility of these investments, we have studied households consisting of father, mother, and the couple's children.

The direct transmission of the investments on nutrition and health from parents to child cannot be investigated in view of the impossibility of controlling the genetic fraction of height transmission. We may, however, study the transmission of these investments on nutrition and health made by the parents, in terms of their investments in the child's education.

As to investments made in the parents' education, we may investigate their transmission in the form of investments made in their children's education, and more, in the children's health and nutrition.

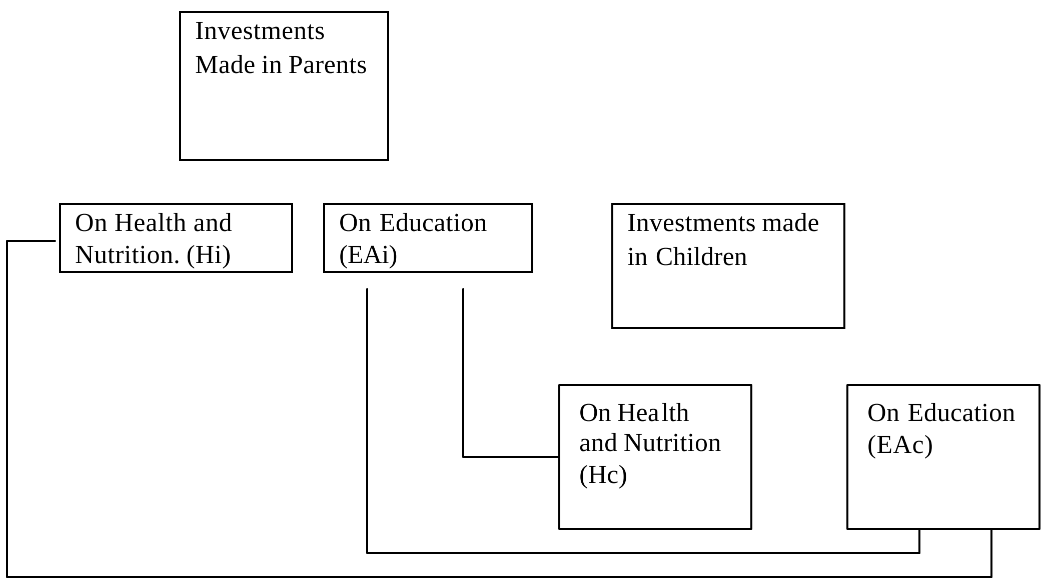
Whatever the case, we must control the family per capita income. The income control enables us to affirm that, in face of the significant regression coefficients on terms representing investment, those investments made in nutrition and health or in education are transmitted independently from the family income, i.e. individuals of identical income but on whom more investments in education were made (either by parents' or by state) are more likely to invest more in the education (or on nutrition) of their children than those individuals on whom less investments in education have been made.

Area and region control represent an additional control of other variable potentials of confusion, such as differentiated offer of services, that is to say, one may say individuals of the same income level and living in one same region, etc., etc., etc.

The child's age control might in this case not be required and we could perhaps suppress it at a later stage, but it does not hurt to include it, though.

DIAGRAM 2

TRANSMISSION BETWEEN GENERATIONS OF THE INVESTMENT IN HUMAN CAPITAL



Variables.

The variables utilized in this study, which are part of the PPV survey, have the definitions expressed below.

- √ Height (measured in centimeters), an indicator of the individual's linear growth and indirectly of health conditions and nutritional status during childhood and adolescence;
- √ Self-reported health status (scaled from 1 to 5, being 1 excellent health status (HS), 2 very good HS, 3 good HS, 4 regular HS and 5 bad HS) intends to investigate deeply the individual's health history, even if based on subjective perception of the individual about his/her

own health. However, based on additional data present in PPV questionnaire that registered presence of chronic and/or acute illness, self-reported health status could be validated as a consistent variable to measure an individual's actual health conditions. Graphic 2 presented in item 12 (p.61) shows that individuals with poorer self-reported health status tend to report much more often chronic and/or acute diseases than individuals with better self-reported status. 7.

- √ Data on income represent total income from working activities only (measured in units of Brazilian currency : real), excluding financial and other non-productive sources of profits.
- √ Age of the individual was measured in months;
- √ Educational attainment is expressed in years of schooling
- √ Region, refers to the two regions of Brazil in which the survey was conducted, Northeast – comprising the states of Maranhão, Piaui, Cear[a, Rio Grande do Norte, Paraíba, Paernambuco, Alagoas, Sergipe and Bahia, and the Territory of Fernando de Noronha,and Southeast comprising the states of Rio de Janeiro, São Paulo, Minas Gerais and Espirito Santo.
- √ The variable area refers to urban and rural areas;
- √ Gender, of course refers to the sex of the individual, male or female.

Models

1. Relationship Between an Individual's Health Status and Height

The first step is to examine the relation between an individuals' height (H) and self-reported health status (HS), that informs how good a predictor of the health status height really is :

$$HSi = f\ (Hi)$$

[7] See Graphic 2, item 12.

Where H stands for height, HS is the self-reported health status, i stands for the individual.

2. Relations Among Health Status, Height, and Educational Attainment of an Individual

The second step is to examine the Relations among health status (HS), height (H) and educational attainment (EA) of an individual i. In mathematical terms :

$$HSi = f\ (Hi,\ EAi)$$

Where the symbols have already been defined.

The basic idea is that height measures the environment in which the individual has grown during his first five years and, therefore, measures investment in human capital made on the particular individual in the first stages of life. Educational attainment is a measure of the investment in human capital made in this individual after his/her infancy until his adulthood. The analysis measures the contribution of the human capital investment during infancy and from infancy to adulthood, to health status.

3. Relations Among Health Status, Height, Educational Attainment, and Income of an Individual

The third step is to examine the relations in health status (HS), height (H), educational attainment (EA) and income (Y) of an individual i. In mathematical terms :

$$HSi = f\ (Hi,\ EAi,\ Yi)$$

Where the symbols have already been defined.

4. Relationship Between an Individual's Educational Attainment and Height

The fourth step is to examine the relation between educational attainment (EA) and height (H) of an individual i. In mathematical terms :

$$EAi = f(Hi)$$

Where the symbols have already been defined.

5. Relationship Between an Individual's Income and Height

The fifth step is to examine the relation between height (H) and income received by the individual (Y) :

$$Yi = f(Hi)$$

The model analyzes how good a predictor of income height is.

6. Relations among Income, Height, and Educational Attainment of an Individual

The next step is to examine the relation between height (H), educational attainment (EA) and income received by the individual (Y) :

$$Yi = f(Hi, EAi)$$

The model analyzes how good predictors of income height and educational attainment are.

7. Towards a More Generalized Model

The last step in the first phase of the study is to examine the relationship between that individual's income (Y), height (H), educational attainment (EA), and health status (HS).

$$Yi = f\ (Hi,\ EAi,\ HSi)$$

This model shows the following important determinants of an indivivual´s income:

(a) the human capital investment this individual benefited from as a child (H);
(b) the human capital investment this individual benefited from from infancy to adulthood (EA);
(c) his/her present health status (HS).

8. Intergenerational Transmission of Human Capital

The second phase of the study consists in estimating a group of regressions based on models which allow the analysis of the main mechanisms that determine intergenerational transmission of human capital.

$$EAc = f\ (Hi)\quad (1)$$
$$Hc = f\ (EAi)\quad (2)$$
$$EAc = f\ (EAi)\ (3)$$

Where Hc and EAc are, respectively, the height and the educational attainment of a child c, and the variables Hi and EAi are the parents' variables already defined.

The log of per capita income, age of the child, area and region were used as control variables.

The group of equations indicates the impact of the human capital investment :

- √ On the investment made in the development of the child's human capital (Hc) in the two first years and
- √ On the investment made in the formation of human capital of the child (EAc) during adolescence.

Data Selection

PPV data were analyzed, after data selection, through regression estimates in software EViews (Quantitative Micro Software, 1994-1998). Criteria of data selection to run the regressions were the following :

- √ Data from individuals without height information were excluded from the sample (1,737 data excluded);
- √ Data from individuals under 19 years-old (228 months) or 60 and above 60 years old (720 months) and those with no age information, were excluded from the sample (8,779 data excluded);
- √ Data from individuals with *Z*-score lower than -5 or higher than +5 were excluded (13 data excluded).

Sample size after first data selection was 8,880 individuals (4,012 male and 4,868 female individuals). Regressions which included data on individuals' total income from working activities had sample size of 5,539 individuals (3,218 male and 2,321 female individuals), since only data from individuals who reported being engaged in recent working activities that provide income should be relevant to the analysis. Criteria of second data selection to run the regressions including the variable total labor income were the following :

- Data from individuals without total labor income information were excluded from the sample (199 data excluded);
- Data from individuals with no information about work, neither in the last 7 days nor in the last 12 months were excluded from the sample (726 data excluded);

- Data from individuals who reported not being engaged in working activities, neither in the last 7 days nor in the last 12 months were excluded from the sample (1,608 data excluded);
- Data from individuals who reported being engaged in working activities in the last 12 months, but did not work in the last 7 days prior the interview, were excluded from the sample, since all these individuals reported total labor income equal to zero (591 data excluded);
  - Data from individuals who reported not being engaged in working activities in the last 7 days and presented missing information about work in the last 12 months were excluded from the sample, because it would be difficult to determine if the total labor income reported was obtained sporadically or on a steady basis, and during which period (217 data excluded).

Intergenerational data were selected according to the following criteria :

- Data from 2 to 7 years-old children were selected to run the regressions which presented child's height as a dependent variable (1,211 data);
- Data from 15 to 21 years-old children were selected to run the regressions which presented child's educational attainment as a dependent variable (901 data);
- Data from both parents of the selected children were combined as average. The average of father's and mother's values was associated to their corresponding child as a single variable.

RESULTS

Results are presented for each model described in the preceding methodology section. Regressions were run for the total sample and for both male and female individuals, in order to detect any differences according to gender. However, regressions showed similar coefficients for almost every variable considered in the models, indicating consistent results in the three regressions [8] for the total population, male and female. Gender was included as a control variable only in the regressions run for the total sample.

Correlation and covariance matrices to analyze relations among height, health status, educational attainment, age, age squared, and income were built. Additional regressions were made to verify the connection between height and age (see Annex:Item 10;Graphic 1), as well as among self-reported health status and presence of chronic and/or acute diseases (see Annex: Item 11; Graphic 2), in order to validate the use of self-reported health status data as a consistent health status variable, modelling the subjectivity underlying the self-evaluation registered on the PPV database.

Regressions which included self-reported health status as dependent variable were run with method ordered logit in order to fulfill the requirements of self-reported health status as a discrete variable with cardinal classification. In the analysis of the results of all the regressions where HS (Health Status) is present as an independent or dependent variable, bear in mind that caution should be exercised in interpreting the results. The scale of Health Status is a negative one, it is scaled from 1 to 5, being 1 the best and 5 the worst; therefore when health stauts is regressed against another variable, if the independent variable has a negative coefficient this means that an increase in that variable reduces the scale of the health status, therefore improving it.

1. Relation Between an Individual's Health Status and Height

Dependent variable: Self-reported health status (HS) (scaled from 1 to 5, being 1 the best and 5 the worst).

Independent variables : Height (H) as proxy for human capital investiment made in the individual during childhood.

Control Variables:

1. Age (I);

[8] In the text we present the results for the total population. Details of the EViews regression results for male and female individuals are presented in the Annex.

2. Age Squared (I^2) :
3. Gender (S) : Dummy variable equal to 0 for male and 1 for female;
4. Area (A) : Dummy variable equal to 0 for urban area and 1 for rural area;
5. Region (R) : Dummy variable equal to 0 for Northeastern Brazil and 1 for Southeastern Brazil.[9]

TOTAL SAMPLE (8880 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:22
Sample: 1 8880
Included observations: 8880
Number of ordered indicator values: 5
Convergence achieved after 13 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.019429	0.002772	-7.009928	0.0000
I	-0.002301	0.001057	-2.175873	0.0296
I2	6.40E-06	1.17E-06	5.462658	0.0000
S	0.156509	0.050556	3.095780	0.0020
A	0.588521	0.046269	12.71962	0.0000
R	-0.312519	0.039613	-7.889284	0.0000
Limit Points				
LIMIT_2:C(7)	-4.582186	0.525069	-8.726827	0.0000
LIMIT_3:C(8)	-3.266340	0.524194	-6.231170	0.0000
LIMIT_4:C(9)	-1.397594	0.523226	-2.671109	0.0076
LIMIT_5:C(10)	0.897133	0.525244	1.708029	0.0876

Akaike info criterion	2.726684	Schwarz criterion	2.734670
Log likelihood	-12096.48	Hannan-Quinn criter.	2.729403
Restr. log likelihood	-12586.30	Avg. log likelihood	-1.362216
LR statistic (6 df)	979.6543	LR index (Pseudo-R2)	0.038917
Probability(LR stat)	0.000000		

[9] For all the regressions run, the dummy varialbles always were set as: Gender (S) : 0 for male and 1 for female; Area (A) : 0 for urban and 1 for rural; Region (R) : equal to 0 for Northeast and 1 for Southeast

Height presented a negative impact on the level of self-reported status, leading to the conclusion that tall individuals have slightly better health status than short ones. Probability of having worse health status was significantly higher for individuals living in rural areas. Individuals living the richest region (the Southeast) presented a significantly higher probability of having better health status than the ones living in the poorest region of Brazil (the Northeast). Female individuals had a slightly higher probability of worse health status. Age influenced negatively on the scale of self-reported health status and age squared influenced positively, that is, younger individuals have a higher probability of having better health status and older individuals had a slightly higher probability of having worse health status. Age squared was introduced to eliminate any residual influence of age in health status, including non-linear impacts.

2. Relations Among Health Status, Height, and Educational Attainment of an Individual

Dependent variable : Self-reported health status (HS).

Independent variables : Height (H) as proxy for human capital investiment made in the individual at childhood and educational attainment (EA) as proxy for human capital investiment made in the individual from childhood to adulthood.

Control Variables: Age (I); Age Squared (I^2); Gender (S); Area (A);Region (R)

HS = f (H, EA)

TOTAL SAMPLE (8.880 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:23
Sample: 1 8880
Included observations: 8880
Number of ordered indicator values: 5
Convergence achieved after 14 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.007281	0.002858	-2.547294	0.0109
EA	-0.091030	0.004990	-18.24115	0.0000
I	-0.001171	0.001062	-1.102290	0.2703
I2	4.79E-06	1.18E-06	4.069255	0.0000
S	0.307708	0.051426	5.983543	0.0000
A	0.279831	0.049353	5.669963	0.0000
R	-0.299990	0.039754	-7.546201	0.0000
Limit Points				
LIMIT_2:C(8)	-3.035609	0.533217	-5.693013	0.0000
LIMIT_3:C(9)	-1.690995	0.532637	-3.174762	0.0015
LIMIT_4:C(10)	0.226423	0.532372	0.425309	0.6706
LIMIT_5:C(11)	2.552264	0.534733	4.772973	0.0000

Akaike info criterion	2.688953	Schwarz criterion	2.697737
Log likelihood	-11927.95	Hannan-Quinn criter.	2.691944
Restr. log likelihood	-12586.30	Avg. log likelihood	-1.343238
LR statistic (7 df)	1316.706	LR index (Pseudo-R2)	0.052307
Probability(LR stat)	0.000000		

Height and educational attainment presented, respectively, a negative impact on the level of self-reported health status. Human capital investiment made in the individual from childhood to adulthood, evaluated by educational attainment and human capital investiment made in the individual during childhood, measured by his/her height impact on the health status.

Women living in both regions and individuals living in the poorest region of Brazil (the Northeast) had significantly higher probability of having worse health status. Individuals living in rural areas had higher probability of having worse health status than individuals living in urban areas.

3. Relations Among an Individual´s Health Status, Height and Educational Attainment, and Family Per Capita Income.

Dependent variable : Self-reported health status (HS).

Independent variables : Height (H) as proxy for human capital investiment made in the individual at childhood, educational attainment (EA) as proxy for human capital investiment made in the individual from childhood to adulthood and income (Y) as proxy for the individual's access to health services.

Control Variables: Age (I); Age Squared (I^2); Gender (S); Area (A);Region (R)

HS = f (H, EA, Y)

<u>TOTAL SAMPLE (5.539 DATA)</u>

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:52
Sample: 1 5539
Included observations: 5539
Number of ordered indicator values: 5
Convergence achieved after 14 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.006740	0.003632	-1.855515	0.0635
EA	-0.067951	0.006513	-10.43349	0.0000
LY1	-0.096880	0.015153	-6.393499	0.0000
I	-0.000959	0.001429	-0.671185	0.5021
I2	4.52E-06	1.59E-06	2.850057	0.0044
S	0.252801	0.066123	3.823157	0.0001
A	0.205512	0.065295	3.147423	0.0016
R	-0.268396	0.051264	-5.235538	0.0000
Limit Points				
LIMIT_2:C(9)	-3.270790	0.680200	-4.808570	0.0000
LIMIT_3:C(10)	-1.918388	0.679358	-2.823824	0.0047
LIMIT_4:C(11)	0.089419	0.678881	0.131716	0.8952
LIMIT_5:C(12)	2.624867	0.683953	3.837786	0.0001

Akaike info criterion	2.645974	Schwarz criterion	2.660315
Log likelihood	-7316.025	Hannan-Quinn criter.	2.650974
Restr. log likelihood	-7694.178	Avg. log likelihood	-1.320821
LR statistic (8 df)	756.3063	LR index (Pseudo-R2)	0.049148
Probability(LR stat)	0.000000		

Height, educational attainment and income presented negative impacts on the level of self-reported status and have, as a result, a significant effect on health status. However, the probability of the coefficient of height not being significantly different from zero is 6%, approximately. In other words, human capital investiment made in the individual from childhood until adulthood and the individual's possibility of access to health services have positive impacts on health status.

Women from the Southeast and the Northeast and individuals of both genders living in the Northeast, the poorest region of Brazil, and individuals living in rural areas presented a probability of having worse health status.

4. Relation Between an Individual's Educational Attainment and Height

Dependent variable : Educational Attainment (EA).

Independent variables : Height (H) as proxy for human capital investiment made in the individual at childhood.

Control variavles: Control Variables: Age (I); Age Squared (I^2); Gender (S); Area (A);Region (R)

EA = f (H)

TOTAL SAMPLE (8.880 DATA)

Dependent Variable: EA
Method: Least Squares
Date: 05/06/03 Time: 15:05
Sample: 1 8880
Included observations: 8880
White Heteroskedasticity-Consistent Standard Errors & Covariance
EA=C(1)+C(2)*H+C(3)*I+C(4)*I2+C(5)*S+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-18.44322	1.128757	-16.33941	0.0000
C(2)	0.139143	0.005971	23.30308	0.0000
C(3)	0.013410	0.002174	6.169070	0.0000
C(4)	-1.96E-05	2.43E-06	-8.073317	0.0000
C(5)	1.653861	0.106674	15.50388	0.0000
C(6)	-3.529442	0.087781	-40.20732	0.0000
C(7)	0.234359	0.085120	2.753274	0.0059

R-squared	0.222791	Mean dependent var	6.263964
Adjusted R-squared	0.222266	S.D. dependent var	4.458431
S.E. of regression	3.931856	Akaike info criterion	5.576888
Sum squared resid	137172.1	Schwarz criterion	5.582478
Log likelihood	-24754.38	F-statistic	423.9164
Durbin-Watson stat	1.606646	Prob(F-statistic)	0.000000

Height presented a significantly positive impact on the dependent variable educational attainment, meaning that individuals who received from their parents higher investments in human capital formation in the first two years of their lives have more probability of getting a higher education than individuals who received lower investments then.

The point elasticity , calculated for the average values of height (163.3845 cm) and educational attaiment (6.26 years of study), was 3.62930, meaning that, at this point, an increase of 1% in height implied an increase of 3.6% in educational attainment.

5. Relation Between an Individual's Income and Height

Dependent variable : Income (Y).

Independent variables : Height (H) as proxy for human capital investiment made in the individual during childhood.

Control Variables: Control Variables: Age (I); Age Squared (I^2); Gender (S); Area (A);Region (R)

Y = f (H)
TOTAL SAMPLE (5.539 DATA)

Dependent Variable: LY1
Method: Least Squares
Date: 05/06/03 Time: 15:07
Sample: 1 5539
Included observations: 5539
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)+C(2)*H+C(3)*I+C(4)*I2+C(5)*S+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-2.923044	0.631399	-4.629474	0.0000
C(2)	0.032478	0.003354	9.683379	0.0000
C(3)	0.014134	0.001404	10.07010	0.0000
C(4)	-1.43E-05	1.58E-06	-9.058067	0.0000
C(5)	-0.463707	0.060398	-7.677557	0.0000
C(6)	-1.857922	0.066962	-27.74609	0.0000
C(7)	0.593754	0.047466	12.50918	0.0000

R-squared	0.271055	Mean dependent var	5.291376
Adjusted R-squared	0.270264	S.D. dependent var	2.059974
S.E. of regression	1.759724	Akaike info criterion	3.969454
Sum squared resid	17130.55	Schwarz criterion	3.977819
Log likelihood	-10986.40	F-statistic	342.8414
Durbin-Watson stat	0.470037	Prob(F-statistic)	0.000000

Height had a positive impact on dependent variable income, which means that taller individuals earn a higher income from productive activities than shorter ones; thus, investment in human capital made in early childhood compensates.

The point elasticity calculated for the average values of height (165.08570 cm) was 5.36165 , meaning that at this point an increase of one percent in height implied an increase of 5.36% in income.[10]

[10] We calculated the elasticity of a semilog function according to Allen, RGD. p. 244

6. Relations Among Family Per Capita Income,Height, and Educational Attainment of an Individual.

Dependent variable : Income (Y).

Independent variables : Height (H) as proxy for human capital investiment made in the individual in childhood and educational attainment (EA) as proxy for human capital investiment made in the individual from childhood until adulthood.

Control Variables: Control Variables: Age (I); Age Squared (I^2); Gender (S); Area (A);Region (R)

Y = f (H, EA)

<u>TOTAL SAMPLE (5.539 DATA)</u>

Dependent Variable: LY1
Method: Least Squares
Date: 05/06/03 Time: 15:12
Sample: 1 5539
Included observations: 5539
White Heteroskedasticity-Consistent Standard Errors & Covariance

LY1=C(1)*H+C(2)*EA+C(3)*I+C(4)*I2+C(5)*S+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.012255	0.001537	7.975013	0.0000
C(2)	0.140332	0.005246	26.74972	0.0000
C(3)	0.011267	0.001237	9.104523	0.0000
C(4)	-1.06E-05	1.41E-06	-7.512962	0.0000
C(5)	-0.791902	0.047082	-16.81969	0.0000
C(6)	-1.315632	0.064843	-20.28964	0.0000
C(7)	0.571260	0.044801	12.75108	0.0000

R-squared	0.344873	Mean dependent var	5.291376
Adjusted R-squared	0.344163	S.D. dependent var	2.059974
S.E. of regression	1.668245	Akaike info criterion	3.862684
Sum squared resid	15395.78	Schwarz criterion	3.871049
Log likelihood	-10690.70	F-statistic	485.3614
Durbin-Watson stat	0.530749	Prob(F-statistic)	0.000000

Height and educational attainment both had a positive impact on the dependent variable income. Therefore, an investment made in the formation of human capital compensates, either during childhood or at a later stage.

The point elasticity, of the log of per capita income with respect to height, calculated for the average value of height (165.08570 cm) was 2.02313, meaning that at this point an increase of one percent in height implied an increase of 2.02% in the log of per capita income. The point elasticity of the log of per capita income with respect to educational attainment , calculated for the average value of educational attainment (6.60950 years of study), was 0.92752, meaning that an increase of one percent in the number of years studied implied in an increase of 0.927 percent in the log of per capita income.

7. Towards a More Generalized Model

Dependent variable : Income (Y).

Independent variables : Height (H) as proxy for human capital investiment made in the individual during childhood, educational attainment (EA) as proxy for human capital investiment made in the individual from childhood until adulthood and self-reported health status (HS) as current health and nutritional status indicator.

Control variables: Control Variables: Age (I); Age Squared (I^2); Gender (S); Area (A);Region (R)

Y = f (H, EA, HS)

TOTAL SAMPLE (5.539 DATA)

Dependent Variable: LY1
Method: Least Squares
Date: 05/06/03 Time: 15:11
Sample: 1 5539
Included observations: 5539
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)*H+C(2)*EA+C(3)*HS+C(4)*I+C(5)*I2+C(6)*S+C(7)*A+C(8)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.013926	0.001557	8.946151	0.0000
C(2)	0.133474	0.005360	24.90185	0.0000
C(3)	-0.140829	0.024439	-5.762397	0.0000
C(4)	0.011600	0.001234	9.400813	0.0000
C(5)	-1.07E-05	1.41E-06	-7.622026	0.0000
C(6)	-0.742083	0.047848	-15.50925	0.0000
C(7)	-1.288170	0.064810	-19.87602	0.0000
C(8)	0.543184	0.044801	12.12443	0.0000

R-squared	0.349156	Mean dependent var	5.291376
Adjusted R-squared	0.348332	S.D. dependent var	2.059974
S.E. of regression	1.662933	Akaike info criterion	3.856486
Sum squared resid	15295.13	Schwarz criterion	3.866047
Log likelihood	-10672.54	F-statistic	423.8852
Durbin-Watson stat	0.522685	Prob(F-statistic)	0.000000

Height and educational attainment both had a positive impact on the dependent variable income. The coefficient of the variable health status was negative, which means, given the negative scale of health status, that better health status is reflected in a higher income level. Men earn a higher income than women. Individuals living in the richest region of Brazil (the Southeast) and in urban areas earn more than those living in the Northeast and in rural areas. Elder individuals earn a higher income in working activities than younger ones, but with age earnings increase at a decreasing rate.

The point elasticity , of the log of per capita income with respect to height, educational attainment and health status, calculated for their average values, were:

elasticity of the log of per capita income with respect to height: = 2.29898, meaning that an increase of one percent in height implied in an increase of 2.3 percent in the log of per capita income

elasticity of the log of per capita income respective to educational attainment : = 0.88220, meaning that an increase of one percent in education implied in an increase of 0.88 percent in the log of per capita income

elasticity of the log of per capita income respective to health status = - 0.36581 meaning that an increase of one percent in health status implied an improvement of 0.37 percent in the log of per capita income (bear in mind that a negative signal of health status implies an improvement in it).

8. Intergenerational Transmission of Human Capital

8.1 Transmission to Children of Investments in Parents´ Health and Nutrition

On this topic, we will study the relationship of the educational attainment (EAC) of children between 15 to 21-years old, with their parents' height (Hi), as a proxy of human capital investment made in the parents in the first two years of their lives.

Dependent variable : Child's Educational Attainment (EAc).

Independent variables : Parents' height (Hi) .

Control Variables: Family's per capita income (YPC)/ Child's Age (Ic); Area (A); Region (R).

EAc = f (Hi, YPC, Ic, A, R))

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (820 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:19
Sample(adjusted): 3 898
Included observations: 820
Excluded observations: 76 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*HAZI+C(3)*LYPC1+C(4)*IC+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.404277	0.098991	4.083993	0.0000
C(2)	0.024955	0.007620	3.274892	0.0011
C(3)	0.124348	0.007395	16.81487	0.0000
C(4)	-0.001364	0.000356	-3.831490	0.0001
C(5)	-0.117841	0.020231	-5.824720	0.0000
C(6)	0.034496	0.015799	2.183454	0.0293

R-squared	0.443503	Mean dependent var	0.640981
Adjusted R-squared	0.440085	S.D. dependent var	0.285525
S.E. of regression	0.213651	Akaike info criterion	-0.241657
Sum squared resid	37.15640	Schwarz criterion	-0.207199
Log likelihood	105.0794	F-statistic	129.7442
Durbin-Watson stat	1.857540	Prob(F-statistic)	0.000000

Results indicate that, the previously observed significant degree of influence of the parents' height on the child's educational attainment adequacy (item 8.5) was reduced by the inclusion of the variable income in the regression. In the equation presented on item 8.5, an increase of one point in HAZI, the z score of parent´s height, would imply an increase of 0.0595 in the child´s educational attainment level. In the above equation, an increase of one point in HAZI implies an increase of 0.025 in the child´s educational attainment level That is to say, the parents' height has a positive impact on a child's educational attainment adequacy, but the impact is minimized by the influence of the family's per capita income.

8.2 Transmission to the Children of Investments Made in their Parents´ Education

8.2.1 - Relationship Between the Child's Height (Hc) - a proxy of investments on health and nutrition made in children of the age bracket 2 to 7 years old - and Parents' Educational Attainment (EAi)– a proxy of investment in human capital made in parents when they were younger.

Dependent variable : Child's Height (Hc).

Independent variables : Parents' educational attainment (EAi).

Control Variables: Family's per capita income (YPC), a proxy of the child's access to health and other public services; Child's Age (Ic); Area (A);Region (R)

Hc = f (EAi, YPC,Ic, A, R)

YOUNGEST CHILD IN FAMILIES WITH CHILDREN IN THE 2-7 YEARS AGE BRACKET (1,211 DATA)

Dependent Variable: HAZC
Method: Least Squares
Date: 05/06/03 Time: 16:10
Sample: 1 1211
Included observations: 1139
Excluded observations: 72
White Heteroskedasticity-C
Consistent Standard Errors & Covariance
HAZC=C(1)+C(2)*EAI+C(3)*LYPC1+C(4)*IC+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.425937	0.319316	-4.465599	0.0000
C(2)	0.038828	0.015355	2.528674	0.0116
C(3)	0.198539	0.054647	3.633127	0.0003
C(4)	-0.006222	0.002561	-2.429808	0.0153
C(5)	-0.070276	0.103596	-0.678369	0.4977
C(6)	0.216492	0.089947	2.406880	0.0162

R-squared	0.074011	Mean dependent var	-0.315154
Adjusted R-squared	0.069924	S.D. dependent var	1.513323
S.E. of regression	1.459455	Akaike info criterion	3.599257
Sum squared resid	2413.300	Schwarz criterion	3.625796
Log likelihood	-2043.777	F-statistic	18.11127
Durbin-Watson stat	1.738294	Prob(F-statistic)	0.000000

Results show a positive impact from parents' educational attainment on the child's height. The introduction of the log of per capita income in the regression reduces significantly the coefficient of education.

Parents' education has a two-fold role. It acts directly on the intergenerational transmission of human capital and acts also indirectly, since better educated parents tend to have a higher family per capita income and as a consequence are more efficient in the transmission of human capital to their children, in the first two years of their lives. Also, if we interpret the family's per capita income (YPC) as a proxy of the child's access to health services, the coefficient obtained for income means that the access to these services has a positive impact on the child´s height, a measure of the investment in human capital on the child.

8.3. Relationship Between the Educational Attainment (EAc) of individuals in the age bracket 15 to 21 years old– a measure of the outcome of investments in human capital made in children - and Parents' Educational Attainment (EAi)– a proxy of investment in human capital made in parents when they were younger.

Dependent variable : Child's Educational Attainment (EAc).

Independent variable : Parents' educational attainment (EAi)..

Control Variables: Family's per capita income (YPC); Child's Age (Ic); Area (A); Region (R) .

EAc = f (EAi, YPC, Ic, A, R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (836 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:20
Sample(adjusted): 3 901
Included observations: 836
Excluded observations: 63 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*EAI+C(3)*LYPC1+C(4)*IC+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.326773	0.090639	3.605192	0.0003
C(2)	0.024575	0.002130	11.53603	0.0000
C(3)	0.071522	0.008674	8.245128	0.0000
C(4)	-0.000881	0.000342	-2.576187	0.0102
C(5)	-0.075943	0.018958	-4.005951	0.0001
C(6)	0.059921	0.014590	4.106863	0.0000

R-squared	0.499577	Mean dependent var	0.640629
Adjusted R-squared	0.496563	S.D. dependent var	0.284814
S.E. of regression	0.202085	Akaike info criterion	-0.353106
Sum squared resid	33.89582	Schwarz criterion	-0.319168
Log likelihood	153.5982	F-statistic	165.7197
Durbin-Watson stat	1.844962	Prob(F-statistic)	0.000000

Parents' educational attainment bears a positive influence on the child's educational attainment adequacy. When the parents' educational attainment is increased by one year, the child's educational attainment adequacy (to his/her age) is increased in 0.025. Nevertheless, the effect was slightly reduced by the introduction of the variable family's per capita income in the regression (as compared with results obtained in the regressions presented in the Annex).

The elasticities estimated at the medium points were:

- elasticity of a child's educational attainment adequacy with respect to the parents' educational attainment = 0.208
- elasticity of a child's educational attainment adequacy with respect to the log of the family´s per capita income– 0.582.

The elasticity of a child's educational attainment adequacy with respect to the parents' educational attainment (0.208) is very significant. It means that when the parents' education is increased by one percent, the child´s educational attainment adequacy is increased by 0.21 percent .

The following example well illustrates the importance of this result: Suppose a parent has 10 years of study and his/her child is 18 years old. The latter should have 11 years of study, but has only 9, instead. So his/her educational attainment is 9/11, or 0. 818. If the parent's education is increased by ten percent, from 10 to 11 years of study, we may expect the child´s educational attainment to increase by 2.1%, that is, its new value will be 0.835, corresponding to 9.189 years, or 9 years and 2.27 months. Therefore, in this example, an increase of 1 year in a parent´s educational attainment would correspond to an increase of 2.27 months in the child´s educational attainment.

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ANNEX

EVIEWS REGRESSIONS RESULTS

DATABASE : LIVING STANDARDS MEASUREMENT SURVEY (PESQUISA DE PADRÃO DE VIDA - PPV) 1996/1997 - IBGE

1. RELATIONSHIP BETWEEN AN INDIVIDUAL'S HEALTH STATUS AND HEIGHT

HS = f (H)

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENTE VARIABLE HEIGHT (H)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), GENDER (S), AREA (A) AND REGION (R)

TOTAL SAMPLE (8,880 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:22
Sample: 1 8880
Included observations: 8880
Number of ordered indicator values: 5
Convergence achieved after 13 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.019429	0.002772	-7.009928	0.0000
I	-0.002301	0.001057	-2.175873	0.0296
I2	6.40E-06	1.17E-06	5.462658	0.0000
S	0.156509	0.050556	3.095780	0.0020
A	0.588521	0.046269	12.71962	0.0000
R	-0.312519	0.039613	-7.889284	0.0000
Limit Points				
LIMIT_2:C(7)	-4.582186	0.525069	-8.726827	0.0000
LIMIT_3:C(8)	-3.266340	0.524194	-6.231170	0.0000
LIMIT_4:C(9)	-1.397594	0.523226	-2.671109	0.0076
LIMIT_5:C(10)	0.897133	0.525244	1.708029	0.0876

Akaike info criterion	2.726684	Schwarz criterion	2.734670
Log likelihood	-12096.48	Hannan-Quinn criter.	2.729403
Restr. log likelihood	-12586.30	Avg. log likelihood	-1.362216
LR statistic (6 df)	979.6543	LR index (Pseudo-R2)	0.038917
Probability(LR stat)	0.000000		

HS = f (H)

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENTE VARIABLE HEIGHT (H)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

MALE INDIVIDUALS (4,012 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:26
Sample: 1 4012
Included observations: 4012
Number of ordered indicator values: 5
Convergence achieved after 14 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.021358	0.004023	-5.308669	0.0000
I	-0.001862	0.001567	-1.188375	0.2347
I2	5.65E-06	1.74E-06	3.245849	0.0012
A	0.522280	0.066523	7.851088	0.0000
R	-0.232015	0.059080	-3.927155	0.0001
Limit Points				
LIMIT_2:C(6)	-4.817843	0.766507	-6.285451	0.0000
LIMIT_3:C(7)	-3.534427	0.765017	-4.620061	0.0000
LIMIT_4:C(8)	-1.660031	0.763226	-2.175020	0.0296
LIMIT_5:C(9)	0.491464	0.766944	0.640808	0.5216

Akaike info criterion	2.742245	Schwarz criterion	2.756371
Log likelihood	-5491.944	Hannan-Quinn criter.	2.747252
Restr. log likelihood	-5671.867	Avg. log likelihood	-1.368879
LR statistic (5 df)	359.8463	LR index (Pseudo-R2)	0.031722
Probability(LR stat)	0.000000		

HS = f (H)

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENTE VARIABLE HEIGHT (H)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

FEMALE INDIVIDUALS (4,868 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:24
Sample: 1 4868
Included observations: 4868
Number of ordered indicator values: 5
Convergence achieved after 13 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.018017	0.003828	-4.707220	0.0000
I	-0.002685	0.001434	-1.872195	0.0612
I2	7.03E-06	1.58E-06	4.437368	0.0000
A	0.651923	0.064438	10.11700	0.0000
R	-0.378627	0.053439	-7.085224	0.0000
Limit Points				
LIMIT_2:C(6)	-4.602230	0.680781	-6.760223	0.0000
LIMIT_3:C(7)	-3.254167	0.679638	-4.788086	0.0000
LIMIT_4:C(8)	-1.387234	0.678376	-2.044935	0.0409
LIMIT_5:C(9)	1.003728	0.680644	1.474675	0.1403

Akaike info criterion	2.714852	Schwarz criterion	2.726852
Log likelihood	-6598.951	Hannan-Quinn criter.	2.719064
Restr. log likelihood	-6867.552	Avg. log likelihood	-1.355577
LR statistic (5 df)	537.2024	LR index (Pseudo-R2)	0.039112
Probability(LR stat)	0.000000		

2. RELATIONS AMONG THE HEALTH STATUS, HEIGHT, AND EDUCATIONAL ATTAINMENT OF AN INDIVIDUAL

HS = f (H, EA)

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENT VARIABLES HEIGHT (H) AND EDUCATIONAL ATTAINMENT (EA)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), GENDER (S), AREA (A) AND REGION (R)

TOTAL SAMPLE (8,880 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:23
Sample: 1 8880
Included observations: 8880
Number of ordered indicator values: 5
Convergence achieved after 14 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.007281	0.002858	-2.547294	0.0109
EA	-0.091030	0.004990	-18.24115	0.0000
I	-0.001171	0.001062	-1.102290	0.2703
I2	4.79E-06	1.18E-06	4.069255	0.0000
S	0.307708	0.051426	5.983543	0.0000
A	0.279831	0.049353	5.669963	0.0000
R	-0.299990	0.039754	-7.546201	0.0000
		Limit Points		
LIMIT_2:C(8)	-3.035609	0.533217	-5.693013	0.0000
LIMIT_3:C(9)	-1.690995	0.532637	-3.174762	0.0015
LIMIT_4:C(10)	0.226423	0.532372	0.425309	0.6706
LIMIT_5:C(11)	2.552264	0.534733	4.772973	0.0000

Akaike info criterion	2.688953	Schwarz criterion	2.697737
Log likelihood	-11927.95	Hannan-Quinn criter.	2.691944
Restr. log likelihood	-12586.30	Avg. log likelihood	-1.343238
LR statistic (7 df)	1316.706	LR index (Pseudo-R2)	0.052307
Probability(LR stat)	0.000000		

HS = f (H, EA)

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENT VARIABLES HEIGHT (H) AND EDUCATIONAL ATTAINMENT (EA)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

MALE INDIVIDUALS (4,012 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:27
Sample: 1 4012
Included observations: 4012
Number of ordered indicator values: 5
Convergence achieved after 14 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.009619	0.004165	-2.309397	0.0209
EA	-0.082223	0.007458	-11.02543	0.0000
I	-0.000786	0.001573	-0.499686	0.6173
I2	4.29E-06	1.75E-06	2.451393	0.0142
A	0.236859	0.071423	3.316260	0.0009
R	-0.213309	0.059278	-3.598428	0.0003
Limit Points				
LIMIT_2:C(7)	-3.243829	0.780394	-4.156658	0.0000
LIMIT_3:C(8)	-1.937547	0.779408	-2.485921	0.0129
LIMIT_4:C(9)	-0.025554	0.778623	-0.032820	0.9738
LIMIT_5:C(10)	2.148041	0.782744	2.744244	0.0061

Akaike info criterion	2.712097	Schwarz criterion	2.727792
Log likelihood	-5430.466	Hannan-Quinn criter.	2.717659
Restr. log likelihood	-5671.867	Avg. log likelihood	-1.353556
LR statistic (6 df)	482.8017	LR index (Pseudo-R2)	0.042561
Probability(LR stat)	0.000000		

HS = f (H, EA)

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENT VARIABLES HEIGHT (H) AND EDUCATIONAL ATTAINMENT (EA)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

FEMALE INDIVIDUALS (4,868 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/04/03 Time: 20:15
Sample: 1 4868
Included observations: 4868
Number of ordered indicator values: 5
Convergence achieved after 14 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.005594	0.003939	-1.420266	0.1555
EA	-0.098584	0.006736	-14.63483	0.0000
I	-0.001577	0.001442	-1.093616	0.2741
I2	5.27E-06	1.59E-06	3.310738	0.0009
A	0.324873	0.068404	4.749308	0.0000
R	-0.373705	0.053653	-6.965259	0.0000
Limit Points				
LIMIT_2:C(7)	-3.267346	0.689751	-4.736994	0.0000
LIMIT_3:C(8)	-1.883785	0.688936	-2.734340	0.0063
LIMIT_4:C(9)	0.041267	0.688562	0.059931	0.9522
LIMIT_5:C(10)	2.469372	0.691261	3.572273	0.0004

Akaike info criterion	2.670629	Schwarz criterion	2.683962
Log likelihood	-6490.312	Hannan-Quinn criter.	2.675309
Restr. log likelihood	-6867.552	Avg. log likelihood	-1.333260
LR statistic (6 df)	754.4796	LR index (Pseudo-R2)	0.054931
Probability(LR stat)	0.000000		

3. RELATIONS AMONG THE HEALTH STATUS, HEIGHT, EDUCATIONAL ATTAINMENT, AND INCOME OF AN INDIVIDUAL

HS = f (H, EA, Y)

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENT VARIABLES HEIGHT (H), EDUCATIONAL ATTAINMENT (EA) AND INCOME (Y)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), GENDER (S), AREA (A) AND REGION (R)

TOTAL SAMPLE (5,539 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:52
Sample: 1 5539
Included observations: 5539
Number of ordered indicator values: 5
Convergence achieved after 14 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.006740	0.003632	-1.855515	0.0635
EA	-0.067951	0.006513	-10.43349	0.0000
LY1	-0.096880	0.015153	-6.393499	0.0000
I	-0.000959	0.001429	-0.671185	0.5021
I2	4.52E-06	1.59E-06	2.850057	0.0044
S	0.252801	0.066123	3.823157	0.0001
A	0.205512	0.065295	3.147423	0.0016
R	-0.268396	0.051264	-5.235538	0.0000
	Limit Points			
LIMIT_2:C(9)	-3.270790	0.680200	-4.808570	0.0000
LIMIT_3:C(10)	-1.918388	0.679358	-2.823824	0.0047
LIMIT_4:C(11)	0.089419	0.678881	0.131716	0.8952
LIMIT_5:C(12)	2.624867	0.683953	3.837786	0.0001

Akaike info criterion	2.645974	Schwarz criterion	2.660315
Log likelihood	-7316.025	Hannan-Quinn criter.	2.650974
Restr. log likelihood	-7694.178	Avg. log likelihood	-1.320821
LR statistic (8 df)	756.3063	LR index (Pseudo-R2)	0.049148
Probability(LR stat)	0.000000		

HS = f (H, EA, Y)

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENT VARIABLES HEIGHT (H), EDUCATIONAL ATTAINMENT (EA) AND INCOME (Y)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

MALE INDIVIDUALS (3,218 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:56
Sample: 1 3218
Included observations: 3218
Number of ordered indicator values: 5
Convergence achieved after 14 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.011090	0.004668	-2.375618	0.0175
EA	-0.065453	0.008688	-7.533610	0.0000
LY1	-0.087262	0.020056	-4.350985	0.0000
I	-0.000209	0.001866	-0.112191	0.9107
I2	3.77E-06	2.06E-06	1.828388	0.0675
A	0.200375	0.082613	2.425476	0.0153
R	-0.223437	0.067397	-3.315220	0.0009
		Limit Points		
LIMIT_2:C(8)	-3.748805	0.877766	-4.270849	0.0000
LIMIT_3:C(9)	-2.396167	0.876353	-2.734248	0.0063
LIMIT_4:C(10)	-0.365711	0.875225	-0.417848	0.6761
LIMIT_5:C(11)	2.006424	0.882243	2.274229	0.0230

Akaike info criterion	2.652732	Schwarz criterion	2.673503
Log likelihood	-4257.245	Hannan-Quinn criter.	2.660176
Restr. log likelihood	-4453.294	Avg. log likelihood	-1.322948
LR statistic (7 df)	392.0971	LR index (Pseudo-R2)	0.044023
Probability(LR stat)	0.000000		

HS = f (H, EA, Y)

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENT VARIABLES HEIGHT (H), EDUCATIONAL ATTAINMENT (EA) AND INCOME (Y)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

FEMALE INDIVIDUALS (2,321 DATA)

Dependent Variable: HS
Method: ML - Ordered Logit
Date: 05/02/03 Time: 17:46
Sample: 1 2321
Included observations: 2321
Number of ordered indicator values: 5
Convergence achieved after 14 iterations
Covariance matrix computed using second derivatives

	Coefficient	Std. Error	z-Statistic	Prob.
H	-0.000395	0.005823	-0.067825	0.9459
EA	-0.070573	0.009888	-7.137399	0.0000
LY1	-0.110793	0.023476	-4.719509	0.0000
I	-0.002361	0.002241	-1.053557	0.2921
I2	5.90E-06	2.50E-06	2.358902	0.0183
A	0.221457	0.107426	2.061492	0.0393
R	-0.329536	0.079380	-4.151354	0.0000
Limit Points				
LIMIT_2:C(8)	-2.953396	1.024905	-2.881629	0.0040
LIMIT_3:C(9)	-1.600112	1.024096	-1.562463	0.1182
LIMIT_4:C(10)	0.383075	1.023670	0.374217	0.7082
LIMIT_5:C(11)	3.107538	1.030699	3.014982	0.0026

Akaike info criterion	2.641381	Schwarz criterion	2.668631
Log likelihood	-3054.322	Hannan-Quinn criter.	2.651311
Restr. log likelihood	-3219.888	Avg. log likelihood	-1.315951
LR statistic (7 df)	331.1320	LR index (Pseudo-R2)	0.051420
Probability(LR stat)	0.000000		

4. RELATIONSHIP BETWEEN AN INDIVIDUAL'S EDUCATIONAL ATTAINMENT AND HEIGHT

EA = f (H)

DEPENDENT VARIABLE EDUCATIONAL ATTAINMENT (EA)
INDEPENDENT VARIABLE HEIGHT (H)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), GENDER (S), AREA (A) AND REGION (R)

TOTAL SAMPLE (8,880 DATA)

Dependent Variable: EA
Method: Least Squares
Date: 05/06/03 Time: 15:05
Sample: 1 8880
Included observations: 8880
White Heteroskedasticity-Consistent Standard Errors & Covariance
EA=C(1)+C(2)*H+C(3)*I+C(4)*I2+C(5)*S+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-18.44322	1.128757	-16.33941	0.0000
C(2)	0.139143	0.005971	23.30308	0.0000
C(3)	0.013410	0.002174	6.169070	0.0000
C(4)	-1.96E-05	2.43E-06	-8.073317	0.0000
C(5)	1.653861	0.106674	15.50388	0.0000
C(6)	-3.529442	0.087781	-40.20732	0.0000
C(7)	0.234359	0.085120	2.753274	0.0059

R-squared	0.222791	Mean dependent var	6.263964
Adjusted R-squared	0.222266	S.D. dependent var	4.458431
S.E. of regression	3.931856	Akaike info criterion	5.576888
Sum squared resid	137172.1	Schwarz criterion	5.582478
Log likelihood	-24754.38	F-statistic	423.9164
Durbin-Watson stat	1.606646	Prob(F-statistic)	0.000000

EA = f (H)

DEPENDENT VARIABLE EDUCATIONAL ATTAINMENT (EA)
INDEPENDENT VARIABLE HEIGHT (H)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

MALE INDIVIDUALS (4,012 DATA)

Dependent Variable: EA
Method: Least Squares
Sample: 1 4012
Included observations: 4012
White Heteroskedasticity-Consistent Standard Errors & Covariance
EA=C(1)+C(2)*H+C(3)*I+C(4)*I2+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-20.22001	1.640790	-12.32334	0.0000
C(2)	0.148097	0.008612	17.19619	0.0000
C(3)	0.012707	0.003248	3.911660	0.0001
C(4)	-1.70E-05	3.66E-06	-4.644802	0.0000
C(5)	-3.587446	0.128285	-27.96464	0.0000
C(6)	0.313896	0.126368	2.483973	0.0130

R-squared	0.239954	Mean dependent var	6.181206
Adjusted R-squared	0.239006	S.D. dependent var	4.459722
S.E. of regression	3.890438	Akaike info criterion	5.556415
Sum squared resid	60632.84	Schwarz criterion	5.565832
Log likelihood	-11140.17	F-statistic	252.9473
Durbin-Watson stat	1.597103	Prob(F-statistic)	0.000000

FEMALE INDIVIDUALS (4,868 DATA)

Dependent Variable: EA
Method: Least Squares
Sample: 1 4868
Included observations: 4868
White Heteroskedasticity-Consistent Standard Errors & Covariance
EA=C(1)+C(2)*H+C(3)*I+C(4)*I2+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-15.35374	1.464777	-10.48196	0.0000
C(2)	0.132205	0.008272	15.98283	0.0000
C(3)	0.013380	0.002924	4.575976	0.0000
C(4)	-2.11E-05	3.25E-06	-6.487224	0.0000
C(5)	-3.477328	0.120049	-28.96579	0.0000
C(6)	0.158262	0.115120	1.374756	0.1693

R-squared	0.212343	Mean dependent var	6.332169
Adjusted R-squared	0.211533	S.D. dependent var	4.456670
S.E. of regression	3.957329	Akaike info criterion	5.590247
Sum squared resid	76141.11	Schwarz criterion	5.598247
Log likelihood	-13600.66	F-statistic	262.1479
Durbin-Watson stat	1.571000	Prob(F-statistic)	0.000000

5. RELATIONSHIP BETWEEN AN INDIVIDUAL'S INCOME AND HEIGHT

Y = f (H)

DEPENDENT VARIABLE INCOME (Y)
INDEPENDENT VARIABLE HEIGHT (H)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), GENDER (S), AREA (A) AND REGION (R)

TOTAL SAMPLE (5,539 DATA)

Dependent Variable: LY1
Method: Least Squares
Date: 05/06/03 Time: 15:07
Sample: 1 5539
Included observations: 5539
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)+C(2)*H+C(3)*I+C(4)*I2+C(5)*S+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-2.923044	0.631399	-4.629474	0.0000
C(2)	0.032478	0.003354	9.683379	0.0000
C(3)	0.014134	0.001404	10.07010	0.0000
C(4)	-1.43E-05	1.58E-06	-9.058067	0.0000
C(5)	-0.463707	0.060398	-7.677557	0.0000
C(6)	-1.857922	0.066962	-27.74609	0.0000
C(7)	0.593754	0.047466	12.50918	0.0000

R-squared	0.271055	Mean dependent var	5.291376
Adjusted R-squared	0.270264	S.D. dependent var	2.059974
S.E. of regression	1.759724	Akaike info criterion	3.969454
Sum squared resid	17130.55	Schwarz criterion	3.977819
Log likelihood	-10986.40	F-statistic	342.8414
Durbin-Watson stat	0.470037	Prob(F-statistic)	0.000000

Y = f (H)

DEPENDENT VARIABLE INCOME (Y)
INDEPENDENT VARIABLE HEIGHT (H)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

MALE INDIVIDUALS (3,218 DATA)

Dependent Variable: LY1
Method: Least Squares
Sample: 1 3218
Included observations: 3218
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)+C(2)*H+C(3)*I+C(4)*I2+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-3.532879	0.812678	-4.347207	0.0000
C(2)	0.029677	0.004298	6.904021	0.0000
C(3)	0.018490	0.001808	10.22691	0.0000
C(4)	-1.82E-05	2.01E-06	-9.036745	0.0000
C(5)	-1.662489	0.080950	-20.53733	0.0000
C(6)	0.494189	0.061588	8.024047	0.0000

R-squared	0.255394	Mean dependent var	5.586805
Adjusted R-squared	0.254235	S.D. dependent var	1.978447
S.E. of regression	1.708541	Akaike info criterion	3.911019
Sum squared resid	9376.188	Schwarz criterion	3.922349
Log likelihood	-6286.830	F-statistic	220.3382
Durbin-Watson stat	0.428906	Prob(F-statistic)	0.000000

FEMALE INDIVIDUALS (2,321 DATA)

Dependent Variable: LY1
Method: Least Squares
Sample: 1 2321
Included observations: 2321
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)+C(2)*H+C(3)*I+C(4)*I2+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-2.974668	0.938431	-3.169831	0.0015
C(2)	0.039035	0.005276	7.398215	0.0000
C(3)	0.008428	0.002183	3.861263	0.0001
C(4)	-9.16E-06	2.48E-06	-3.694379	0.0002
C(5)	-2.180511	0.115502	-18.87853	0.0000
C(6)	0.696438	0.074344	9.367824	0.0000

R-squared	0.262654	Mean dependent var	4.881771
Adjusted R-squared	0.261062	S.D. dependent var	2.100702
S.E. of regression	1.805795	Akaike info criterion	4.022461
Sum squared resid	7548.974	Schwarz criterion	4.037324
Log likelihood	-4662.066	F-statistic	164.9281
Durbin-Watson stat	0.458095	Prob(F-statistic)	0.000000

6. RELATIONS AMONG INCOME, HEIGHT, AND EDUCATIONAL ATTAINMENT OF AN INDIVIDUAL

Y = f (H, EA)

DEPENDENT VARIABLE INCOME (Y)
INDEPENDENT VARIABLES HEIGHT (H) AND EDUCATIONAL ATTAINMENT (EA)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), GENDER (S), AREA (A) AND REGION (R)

TOTAL SAMPLE (5,539 DATA)

Dependent Variable: LY1
Method: Least Squares
Date: 05/06/03 Time: 15:12
Sample: 1 5539
Included observations: 5539
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)*H+C(2)*EA+C(3)*I+C(4)*I2+C(5)*S+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.012255	0.001537	7.975013	0.0000
C(2)	0.140332	0.005246	26.74972	0.0000
C(3)	0.011267	0.001237	9.104523	0.0000
C(4)	-1.06E-05	1.41E-06	-7.512962	0.0000
C(5)	-0.791902	0.047082	-16.81969	0.0000
C(6)	-1.315632	0.064843	-20.28964	0.0000
C(7)	0.571260	0.044801	12.75108	0.0000

R-squared	0.344873	Mean dependent var	5.291376
Adjusted R-squared	0.344163	S.D. dependent var	2.059974
S.E. of regression	1.668245	Akaike info criterion	3.862684
Sum squared resid	15395.78	Schwarz criterion	3.871049
Log likelihood	-10690.70	F-statistic	485.3614
Durbin-Watson stat	0.530749	Prob(F-statistic)	0.000000

Y = f (H, EA)

DEPENDENT VARIABLE INCOME (Y)

INDEPENDENT VARIABLES HEIGHT (H) AND EDUCATIONAL ATTAINMENT (EA)

CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

MALE INDIVIDUALS (3,218 DATA)

Dependent Variable: LY1
Method: Least Squares
Sample: 1 3218
Included observations: 3218
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)*H+C(2)*EA+C(3)*I+C(4)*I2+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.007191	0.001993	3.607717	0.0003
C(2)	0.127525	0.006948	18.35399	0.0000
C(3)	0.015293	0.001597	9.573740	0.0000
C(4)	-1.44E-05	1.81E-06	-7.950839	0.0000
C(5)	-1.203626	0.080468	-14.95773	0.0000
C(6)	0.463391	0.058402	7.934518	0.0000

R-squared	0.315631	Mean dependent var	5.586805
Adjusted R-squared	0.314566	S.D. dependent var	1.978447
S.E. of regression	1.637974	Akaike info criterion	3.826661
Sum squared resid	8617.669	Schwarz criterion	3.837990
Log likelihood	-6151.097	F-statistic	296.2756
Durbin-Watson stat	0.471724	Prob(F-statistic)	0.000000

FEMALE INDIVIDUALS (2,321 DATA)

Dependent Variable: LY1
Method: Least Squares
Sample: 1 2321
Included observations: 2321
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)*H+C(2)*EA+C(3)*I+C(4)*I2+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.016210	0.002453	6.608558	0.0000
C(2)	0.156284	0.007941	19.68041	0.0000
C(3)	0.004696	0.001886	2.489448	0.0129
C(4)	-4.26E-06	2.18E-06	-1.951484	0.0511
C(5)	-1.538640	0.108711	-14.15351	0.0000
C(6)	0.713758	0.069853	10.21806	0.0000

R-squared	0.357338	Mean dependent var	4.881771
Adjusted R-squared	0.355950	S.D. dependent var	2.100702
S.E. of regression	1.685871	Akaike info criterion	3.885023
Sum squared resid	6579.600	Schwarz criterion	3.899887
Log likelihood	-4502.569	F-statistic	257.4410
Durbin-Watson stat	0.589916	Prob(F-statistic)	0.000000

7. TOWARDS A MORE GENERALIZED MODEL

Y = f (H, EA, HS)

DEPENDENT VARIABLE INCOME (Y)
INDEPENDENT VARIABLES HEIGHT (H), HEALTH STATUS (HS) AND EDUCATIONAL ATTAINMENT (EA)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), GENDER (S), AREA (A) AND REGION (R)

TOTAL SAMPLE (5,539 DATA)

Dependent Variable: LY1
Method: Least Squares
Date: 05/06/03 Time: 15:11
Sample: 1 5539
Included observations: 5539
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)*H+C(2)*EA+C(3)*HS+C(4)*I+C(5)*I2+C(6)*S+C(7)*A+C(8)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.013926	0.001557	8.946151	0.0000
C(2)	0.133474	0.005360	24.90185	0.0000
C(3)	-0.140829	0.024439	-5.762397	0.0000
C(4)	0.011600	0.001234	9.400813	0.0000
C(5)	-1.07E-05	1.41E-06	-7.622026	0.0000
C(6)	-0.742083	0.047848	-15.50925	0.0000
C(7)	-1.288170	0.064810	-19.87602	0.0000
C(8)	0.543184	0.044801	12.12443	0.0000

R-squared	0.349156	Mean dependent var	5.291376
Adjusted R-squared	0.348332	S.D. dependent var	2.059974
S.E. of regression	1.662933	Akaike info criterion	3.856486
Sum squared resid	15295.13	Schwarz criterion	3.866047
Log likelihood	-10672.54	F-statistic	423.8852
Durbin-Watson stat	0.522685	Prob(F-statistic)	0.000000

Y = f (H, EA, HS)

DEPENDENT VARIABLE INCOME (Y)
INDEPENDENT VARIABLES HEIGHT (H), HEALTH STATUS (HS) AND EDUCATIONAL ATTAINMENT (EA)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

MALE INDIVIDUALS (3,218 DATA)

Dependent Variable: LY1
Method: Least Squares
Date: 05/06/03 Time: 15:58
Sample: 1 3218
Included observations: 3218
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)*H+C(2)*EA+C(3)*HS+C(4)*I+C(5)*I2+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.008600	0.001996	4.309464	0.0000
C(2)	0.121470	0.007041	17.25059	0.0000
C(3)	-0.127025	0.030508	-4.163620	0.0000
C(4)	0.015655	0.001597	9.800514	0.0000
C(5)	-1.46E-05	1.81E-06	-8.064829	0.0000
C(6)	-1.180274	0.080283	-14.70144	0.0000
C(7)	0.440238	0.058544	7.519731	0.0000

R-squared	0.319443	Mean dependent var	5.586805
Adjusted R-squared	0.318171	S.D. dependent var	1.978447
S.E. of regression	1.633662	Akaike info criterion	3.821698
Sum squared resid	8569.678	Schwarz criterion	3.834916
Log likelihood	-6142.111	F-statistic	251.1986
Durbin-Watson stat	0.470789	Prob(F-statistic)	0.000000

Y = f (H, EA, HS)

DEPENDENT VARIABLE INCOME (Y)
INDEPENDENT VARIABLES HEIGHT (H), HEALTH STATUS (HS) AND EDUCATIONAL ATTAINMENT (EA)
CONTROL VARIABLES AGE (I), AGE SQUARED (I^2), AREA (A) AND REGION (R)

FEMALE INDIVIDUALS (2,321 DATA)

Dependent Variable: LY1
Method: Least Squares
Date: 05/06/03 Time: 16:08
Sample: 1 2321
Included observations: 2321
White Heteroskedasticity-Consistent Standard Errors & Covariance
LY1=C(1)*H+C(2)*EA+C(3)*HS+C(4)*I+C(5)*I2+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.018621	0.002547	7.310821	0.0000
C(2)	0.147962	0.008186	18.07423	0.0000
C(3)	-0.165014	0.039540	-4.173339	0.0000
C(4)	0.005059	0.001877	2.695663	0.0071
C(5)	-4.38E-06	2.18E-06	-2.014556	0.0441
C(6)	-1.502600	0.109035	-13.78094	0.0000
C(7)	0.675767	0.069507	9.722219	0.0000

R-squared	0.362935	Mean dependent var	4.881771
Adjusted R-squared	0.361283	S.D. dependent var	2.100702
S.E. of regression	1.678877	Akaike info criterion	3.877138
Sum squared resid	6522.302	Schwarz criterion	3.894479
Log likelihood	-4492.419	F-statistic	219.7134
Durbin-Watson stat	0.578336	Prob(F-statistic)	0.000000

8. INTERGENERATIONAL TRANSMISSION OF HUMAN CAPITAL

Hc = f (EAi)

DEPENDENT VARIABLE CHILD'S HEIGHT (Hc)
INDEPENDENT VARIABLE PARENTS' EDUCATIONAL ATTAINMENT (EAi)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

YOUNGEST CHILD IN FAMILIES WITH CHILDREN IN THE 2-7 YEARS AGE BRACKET
(1,211 DATA)

Dependent Variable: HAZC
Method: Least Squares
Date: 05/06/03 Time: 16:10
Sample: 1 1211
Included observations: 1211
White Heteroskedasticity-Consistent Standard Errors & Covariance
HAZC=C(1)+C(2)*EAI+C(3)*IC+C(4)*A+C(5)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.785769	0.240891	-3.261923	0.0011
C(2)	0.073683	0.011702	6.296404	0.0000
C(3)	-0.004932	0.002474	-1.993238	0.0465
C(4)	-0.113038	0.100371	-1.126199	0.2603
C(5)	0.299981	0.086062	3.485618	0.0005

R-squared	0.061612	Mean dependent var	-0.325566
Adjusted R-squared	0.058499	S.D. dependent var	1.512782
S.E. of regression	1.467867	Akaike info criterion	3.609618
Sum squared resid	2598.488	Schwarz criterion	3.630672
Log likelihood	-2180.624	F-statistic	19.79562
Durbin-Watson stat	1.719424	Prob(F-statistic)	0.000000

Hc = f (EAi, YPC)

DEPENDENT VARIABLE CHILD'S HEIGHT (Hc)
INDEPENDENT VARIABLES PARENTS' EDUCATIONAL ATTAINMENT (EAi) AND FAMILY'S PER CAPITA INCOME (YPC)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

YOUNGEST CHILD IN FAMILIES WITH CHILDREN IN THE 2-7 YEARS AGE BRACKET
(1,211 DATA)

Dependent Variable: HAZC
Method: Least Squares
Date: 05/06/03 Time: 16:10
Sample: 1 1211
Included observations: 1139
Excluded observations: 72
White Heteroskedasticity-Consistent Standard Errors & Covariance
HAZC=C(1)+C(2)*EAI+C(3)*LYPC1+C(4)*IC+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.425937	0.319316	-4.465599	0.0000
C(2)	0.038828	0.015355	2.528674	0.0116
C(3)	0.198539	0.054647	3.633127	0.0003
C(4)	-0.006222	0.002561	-2.429808	0.0153
C(5)	-0.070276	0.103596	-0.678369	0.4977
C(6)	0.216492	0.089947	2.406880	0.0162

R-squared	0.074011	Mean dependent var	-0.315154
Adjusted R-squared	0.069924	S.D. dependent var	1.513323
S.E. of regression	1.459455	Akaike info criterion	3.599257
Sum squared resid	2413.300	Schwarz criterion	3.625796
Log likelihood	-2043.777	F-statistic	18.11127
Durbin-Watson stat	1.738294	Prob(F-statistic)	0.000000

EAc = f (Hc)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLE CHILD'S HEIGHT (Hc)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (838 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:12
Sample(adjusted): 1 838
Included observations: 838 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*HAZC+C(3)*IC+C(4)*A+C(5)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.999358	0.099205	10.07364	0.0000
C(2)	0.006993	0.004194	1.667261	0.0958
C(3)	-0.001088	0.000422	-2.580115	0.0100
C(4)	-0.229943	0.022373	-10.27791	0.0000
C(5)	0.109151	0.017858	6.112185	0.0000

R-squared	0.188569	Mean dependent var	0.641683
Adjusted R-squared	0.184672	S.D. dependent var	0.285180
S.E. of regression	0.257505	Akaike info criterion	0.130394
Sum squared resid	55.23530	Schwarz criterion	0.158622
Log likelihood	-49.63521	F-statistic	48.39522
Durbin-Watson stat	1.801668	Prob(F-statistic)	0.000000

EAc = f (Hc, EAi)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLES CHILD'S HEIGHT (Hc) AND PARENTS' EDUCATIONAL ATTAINMENT (EAi)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (838 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:13
Sample(adjusted): 1 838
Included observations: 838 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*HAZC+C(3)*EAI+C(4)*IC+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.547390	0.087521	6.254414	0.0000
C(2)	0.003938	0.003479	1.131880	0.2580
C(3)	0.036227	0.001724	21.01070	0.0000
C(4)	-0.000572	0.000352	-1.623876	0.1048
C(5)	-0.089758	0.020033	-4.480381	0.0000
C(6)	0.089054	0.015050	5.917233	0.0000

R-squared	0.439909	Mean dependent var	0.641683
Adjusted R-squared	0.436543	S.D. dependent var	0.285180
S.E. of regression	0.214067	Akaike info criterion	-0.237919
Sum squared resid	38.12621	Schwarz criterion	-0.204046
Log likelihood	105.6882	F-statistic	130.6945
Durbin-Watson stat	1.847958	Prob(F-statistic)	0.000000

EAc = f (Hi)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLE PARENTS' HEIGHT (Hi)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (883 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:14
Sample(adjusted): 1 898
Included observations: 883
Excluded observations: 15 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*HAZI+C(3)*IC+C(4)*A+C(5)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.134772	0.094463	12.01281	0.0000
C(2)	0.059543	0.008642	6.890317	0.0000
C(3)	-0.001327	0.000399	-3.322671	0.0009
C(4)	-0.220484	0.021134	-10.43282	0.0000
C(5)	0.085859	0.017437	4.923875	0.0000

R-squared	0.234946	Mean dependent var	0.634993
Adjusted R-squared	0.231461	S.D. dependent var	0.286617
S.E. of regression	0.251267	Akaike info criterion	0.081044
Sum squared resid	55.43254	Schwarz criterion	0.108129
Log likelihood	-30.78079	F-statistic	67.40795
Durbin-Watson stat	1.869838	Prob(F-statistic)	0.000000

EAc = f (EAi)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLE PARENTS' EDUCATIONAL ATTAINMENT (EAi)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (901 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:15
Sample: 1 901
Included observations: 901
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*EAI+C(3)*IC+C(4)*A+C(5)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.585506	0.086105	6.799891	0.0000
C(2)	0.036558	0.001616	22.62519	0.0000
C(3)	-0.000748	0.000344	-2.175068	0.0299
C(4)	-0.092747	0.019183	-4.834878	0.0000
C(5)	0.087800	0.014318	6.132136	0.0000

R-squared	0.442297	Mean dependent var	0.634823
Adjusted R-squared	0.439807	S.D. dependent var	0.285625
S.E. of regression	0.213779	Akaike info criterion	-0.242214
Sum squared resid	40.94851	Schwarz criterion	-0.215557
Log likelihood	114.1174	F-statistic	177.6475
Durbin-Watson stat	1.838199	Prob(F-statistic)	0.000000

EAc = f (Hi, EAi)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLES PARENTS' HEIGHT (Hi) AND PARENTS' EDUCATIONAL ATTAINMENT (EAi)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (883 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:15
Sample(adjusted): 1 898
Included observations: 883
Excluded observations: 15 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*HAZI+C(3)*EAI+C(4)*IC+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.623039	0.087904	7.087722	0.0000
C(2)	0.018097	0.007585	2.386005	0.0172
C(3)	0.035322	0.001710	20.65329	0.0000
C(4)	-0.000743	0.000343	-2.164992	0.0307
C(5)	-0.096028	0.019099	-5.027842	0.0000
C(6)	0.082945	0.014826	5.594741	0.0000

R-squared	0.454785	Mean dependent var	0.634993
Adjusted R-squared	0.451677	S.D. dependent var	0.286617
S.E. of regression	0.212237	Akaike info criterion	-0.255458
Sum squared resid	39.50395	Schwarz criterion	-0.222955
Log likelihood	118.7845	F-statistic	146.3081
Durbin-Watson stat	1.875629	Prob(F-statistic)	0.000000

EAc = f (Hc, YPC)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLES CHILD'S HEIGHT (Hc) AND FAMILY'S PER CAPITA INCOME (YPC)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (780 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:17
Sample(adjusted): 3 837
Included observations: 780
Excluded observations: 55 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*HAZC+C(3)*LYPC1+C(4)*IC+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.330711	0.099228	3.332851	0.0009
C(2)	0.001688	0.003818	0.442069	0.6586
C(3)	0.126600	0.007563	16.73879	0.0000
C(4)	-0.001242	0.000369	-3.368383	0.0008
C(5)	-0.117930	0.021220	-5.557629	0.0000
C(6)	0.042627	0.016394	2.600182	0.0095

R-squared	0.420276	Mean dependent var	0.648063
Adjusted R-squared	0.416531	S.D. dependent var	0.283522
S.E. of regression	0.216569	Akaike info criterion	-0.214153
Sum squared resid	36.30225	Schwarz criterion	-0.178312
Log likelihood	89.51949	F-statistic	112.2236
Durbin-Watson stat	1.867686	Prob(F-statistic)	0.000000

EAc = f (Hc, EAi, YPC)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLES CHILD'S HEIGHT (Hc), PARENTS' EDUCATIONAL ATTAINMENT (EAi) AND FAMILY'S PER CAPITA INCOME (YPC)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (780 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:18
Sample(adjusted): 3 837
Included observations: 780
Excluded observations: 55 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*HAZC+C(3)*EAI+C(4)*LYPC1+C(5)*IC+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.305540	0.091737	3.330618	0.0009
C(2)	0.001286	0.003529	0.364424	0.7156
C(3)	0.024602	0.002243	10.96739	0.0000
C(4)	0.068724	0.008981	7.652247	0.0000
C(5)	-0.000711	0.000351	-2.028307	0.0429
C(6)	-0.077015	0.019779	-3.893735	0.0001
C(7)	0.062568	0.015300	4.089330	0.0000

R-squared	0.492495	Mean dependent var	0.648063
Adjusted R-squared	0.488556	S.D. dependent var	0.283522
S.E. of regression	0.202762	Akaike info criterion	-0.344634
Sum squared resid	31.77991	Schwarz criterion	-0.302820
Log likelihood	141.4072	F-statistic	125.0228
Durbin-Watson stat	1.869372	Prob(F-statistic)	0.000000

EAc = f (Hi, YPC)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLES PARENTS' HEIGHT (Hi) AND FAMILY'S PER CAPITA INCOME (YPC)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (820 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:19
Sample(adjusted): 3 898
Included observations: 820
Excluded observations: 76 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*HAZI+C(3)*LYPC1+C(4)*IC+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.404277	0.098991	4.083993	0.0000
C(2)	0.024955	0.007620	3.274892	0.0011
C(3)	0.124348	0.007395	16.81487	0.0000
C(4)	-0.001364	0.000356	-3.831490	0.0001
C(5)	-0.117841	0.020231	-5.824720	0.0000
C(6)	0.034496	0.015799	2.183454	0.0293

R-squared	0.443503	Mean dependent var	0.640981
Adjusted R-squared	0.440085	S.D. dependent var	0.285525
S.E. of regression	0.213651	Akaike info criterion	-0.241657
Sum squared resid	37.15640	Schwarz criterion	-0.207199
Log likelihood	105.0794	F-statistic	129.7442
Durbin-Watson stat	1.857540	Prob(F-statistic)	0.000000

EAc = f (EAi, YPC)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLES PARENTS' EDUCATIONAL ATTAINMENT (EAi) AND FAMILY'S PER CAPITA INCOME (YPC)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (836 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:20
Sample(adjusted): 3 901
Included observations: 836
Excluded observations: 63 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*EAI+C(3)*LYPC1+C(4)*IC+C(5)*A+C(6)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.326773	0.090639	3.605192	0.0003
C(2)	0.024575	0.002130	11.53603	0.0000
C(3)	0.071522	0.008674	8.245128	0.0000
C(4)	-0.000881	0.000342	-2.576187	0.0102
C(5)	-0.075943	0.018958	-4.005951	0.0001
C(6)	0.059921	0.014590	4.106863	0.0000

R-squared	0.499577	Mean dependent var	0.640629
Adjusted R-squared	0.496563	S.D. dependent var	0.284814
S.E. of regression	0.202085	Akaike info criterion	-0.353106
Sum squared resid	33.89582	Schwarz criterion	-0.319168
Log likelihood	153.5982	F-statistic	165.7197
Durbin-Watson stat	1.844962	Prob(F-statistic)	0.000000

EAc = f (Hi, EAi, YPC)

DEPENDENT VARIABLE CHILD'S EDUCATIONAL ATTAINMENT (EAc)
INDEPENDENT VARIABLES PARENTS' HEIGHT (Hi), PARENTS' EDUCATIONAL ATTAINMENT (EAi) AND FAMILY'S PER CAPITA INCOME (YPC)
CONTROL VARIABLES CHILD'S AGE (Ic), AREA (A) AND REGION (R)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD (883 DATA)

Dependent Variable: EAC
Method: Least Squares
Date: 05/06/03 Time: 16:21
Sample(adjusted): 3 898
Included observations: 820
Excluded observations: 76 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance
EAC=C(1)+C(2)*HAZI+C(3)*EAI+C(4)*LYPC1+C(5)*IC+C(6)*A+C(7)*R

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.356922	0.092585	3.855070	0.0001
C(2)	0.010767	0.007304	1.474057	0.1409
C(3)	0.023993	0.002185	10.98056	0.0000
C(4)	0.069976	0.008733	8.013079	0.0000
C(5)	-0.000878	0.000342	-2.566908	0.0104
C(6)	-0.080664	0.018902	-4.267572	0.0000
C(7)	0.058543	0.014934	3.920137	0.0001

R-squared	0.509361	Mean dependent var	0.640981
Adjusted R-squared	0.505740	S.D. dependent var	0.285525
S.E. of regression	0.200734	Akaike info criterion	-0.365171
Sum squared resid	32.75918	Schwarz criterion	-0.324970
Log likelihood	156.7201	F-statistic	140.6703
Durbin-Watson stat	1.865625	Prob(F-statistic)	0.000000

9. CORRELATION AND COVARIANCE MATRICES

19-59 YEARS OLD ADULTS.

CORRELATION AND COVARIANCE MATRICES AMONG VARIABLES HEIGHT (H), HEALTH STATUS (HS), EDUCATIONAL ATTAINMENT (EA), AGE (I) AND AGE SQUARED (I^2)

TOTAL SAMPLE

CORRELATION MATRIX

	H	HS	EA	I	I2
H	1.000000	-0.174430	0.225345	-0.119781	-0.121649
HS	-0.174430	1.000000	-0.280761	0.235866	0.241453
EA	0.225345	-0.280761	1.000000	-0.151102	-0.162210
I	-0.119781	0.235866	-0.151102	1.000000	0.990270
I2	-0.121649	0.241453	-0.162210	0.990270	1.000000

COVARIANCE MATRIX

	H	HS	EA	I	I2
H	86.98536	-1.690488	9.369752	-147.2246	-135870.2
HS	-1.690488	1.079778	-1.300655	32.29997	30046.28
EA	9.369752	-1.300655	19.87537	-88.77643	-86601.45
I	-147.2246	32.29997	-88.77643	17367.54	15628371
I2	-135870.2	30046.28	-86601.45	15628371	1.43E+10

CORRELATION AND COVARIANCE MATRICES AMONG VARIABLES HEIGHT (H), HEALTH STATUS (HS), EDUCATIONAL ATTAINMENT (EA), INCOME (Y), AGE (I) AND AGE SQUARED (I^2)

19-59 YEARS OLD ADULTS.

TOTAL SAMPLE

CORRELATION MATRIX

	H	HS	EA	I	I2	LY1
H	1.000000	-0.161481	0.163281	-0.114136	-0.116444	0.262272
HS	-0.161481	1.000000	-0.254856	0.201482	0.208870	-0.208491
EA	0.163281	-0.254856	1.000000	-0.108794	-0.125175	0.427802
I	-0.114136	0.201482	-0.108794	1.000000	0.990195	0.069951
I2	-0.116444	0.208870	-0.125175	0.990195	1.000000	0.049190
LY1	0.262272	-0.208491	0.427802	0.069951	0.049190	1.000000

COVARIANCE MATRIX

	H	HS	EA	I	I2	LY1
H	83.46750	-1.494221	6.870960	-130.9521	-120909.8	4.935522
HS	-1.494221	1.025818	-1.188921	25.62721	24043.53	-0.434957
EA	6.870960	-1.188921	21.21508	-62.92970	-65528.03	4.058707
I	-130.9521	25.62721	-62.92970	15771.03	14133086	18.09461
I2	-120909.8	24043.53	-65528.03	14133086	1.29E+10	11515.52
LY1	4.935522	-0.434957	4.058707	18.09461	11515.52	4.242726

CORRELATION AND COVARIANCE MATRICES AMONG VARIABLES FAMILY'S PER CAPITA INCOME (YPC), PARENTS' HEIGHT (Hi), CHILD'S HEIGHT (Hc), PARENTS' EDUCATIONAL ATTAINMENT (EAi) AND CHILD'S AGE (Ic)

FAMILIES WITH YOUNGER CHILDREN BETWEEN 2 AND 7 YEARS-OLD

CORRELATION MATRIX

	LYPC1	HAZI	HAZC	EAI	IC
LYPC1	1.000000	0.290434	0.236025	0.666662	0.093964
HAZI	0.290434	1.000000	0.312184	0.327971	0.000955
HAZC	0.236025	0.312184	1.000000	0.218704	-0.049776
EAI	0.666662	0.327971	0.218704	1.000000	0.021640
IC	0.093964	0.000955	-0.049776	0.021640	1.000000

COVARIANCE MATRIX

	LYPC1	HAZI	HAZC	EAI	IC
LYPC1	1.333913	0.333958	0.413551	3.064985	1.875555
HAZI	0.333958	0.991195	0.471518	1.299791	0.016430
HAZC	0.413551	0.471518	2.301521	1.320758	-1.305063
EAI	3.064985	1.299791	1.320758	15.84594	1.488727
IC	1.875555	0.016430	-1.305063	1.488727	298.6840

CORRELATION AND COVARIANCE MATRICES AMONG VARIABLES CHILD'S EDUCATIONAL ATTAINMENT (EAc), PARENTS' EDUCATIONAL ATTAINMENT (EAi), CHILD'S HEIGHT (Hc), PARENTS' HEIGHT (Hi), CHILD'S AGE (Ic) AND FAMILY'S PER CAPITA INCOME (YPC)

FAMILIES WITH CHILDREN BETWEEN 15 AND 21 YEARS-OLD

CORRELATION MATRIX

	EAC	EAI	HAZC	HAZI	IC	LYPC1
EAC	1.000000	0.637546	0.116408	0.274281	-0.072880	0.618816
EAI	0.637546	1.000000	0.107479	0.313871	-0.087374	0.671310
HAZC	0.116408	0.107479	1.000000	0.173135	-0.126014	0.121656
HAZI	0.274281	0.313871	0.173135	1.000000	-0.018611	0.296118
IC	-0.072880	-0.087374	-0.126014	-0.018611	1.000000	0.033086
LYPC1	0.618816	0.671310	0.121656	0.296118	0.033086	1.000000

COVARIANCE MATRIX

	EAC	EAI	HAZC	HAZI	IC	LYPC1
EAC	0.080602	0.788581	0.079368	0.080020	-0.424531	0.206638
EAI	0.788581	18.98109	1.124544	1.405212	-7.810259	3.439994
HAZC	0.079368	1.124544	5.767440	0.427274	-6.209174	0.343635
HAZI	0.080020	1.405212	0.427274	1.055990	-0.392397	0.357906
IC	-0.424531	-7.810259	-6.209174	-0.392397	420.9681	0.798448
LYPC1	0.206638	3.439994	0.343635	0.357906	0.798448	1.383401

10. RELATIONSHIP BETWEEN HEIGHT AND AGE

DEPENDENT VARIABLE HEIGHT (H)
INDEPENDENT VARIABLE AGE (I)

TOTAL SAMPLE

H = f (I)

H=C(1)+C(2)*I

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	167.2153	0.391710	426.8857	0.0000
C(2)	-0.107250	0.009611	-11.15876	0.0000

R-squared	0.761494	Mean dependent var	163.0326
Adjusted R-squared	0.755378	S.D. dependent var	1.472272
S.E. of regression	0.728175	Akaike info criterion	2.250999
Sum squared resid	20.67930	Schwarz criterion	2.334588
Log likelihood	-44.14548	F-statistic	124.5179
Durbin-Watson stat	1.262441	Prob(F-statistic)	0.000000

11. RELATIONSHIP BETWEEN HEALTH STATUS AND PRESENCE OF CHRONIC AND/OR ACUTE DISEASES

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENT VARIABLES PRESENCE OF CHRONIC DISEASE (DC) AND/OR ACUTE DISEASE (DA)

<u>TOTAL SAMPLE</u>

HS = f (DC, DA)

HS=C(1)+C(2)*DC+C(3)*DA

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	5.643572	0.059738	94.47265	0.0000
C(2)	-1.187960	0.026733	-44.43730	0.0000
C(3)	-0.436528	0.023881	-18.27937	0.0000

R-squared	0.232589	Mean dependent var	2.679955
Adjusted R-squared	0.232416	S.D. dependent var	1.039182
S.E. of regression	0.910447	Akaike info criterion	2.650576
Sum squared resid	7358.272	Schwarz criterion	2.652972
Log likelihood	-11765.56	F-statistic	1345.229
Durbin-Watson stat	0.876085	Prob(F-statistic)	0.000000

12. RELATIONSHIP BETWEEN HEALTH STATUS AND AGE

DEPENDENT VARIABLE HEALTH STATUS (HS)
INDEPENDENT VARIABLE AGE (I)

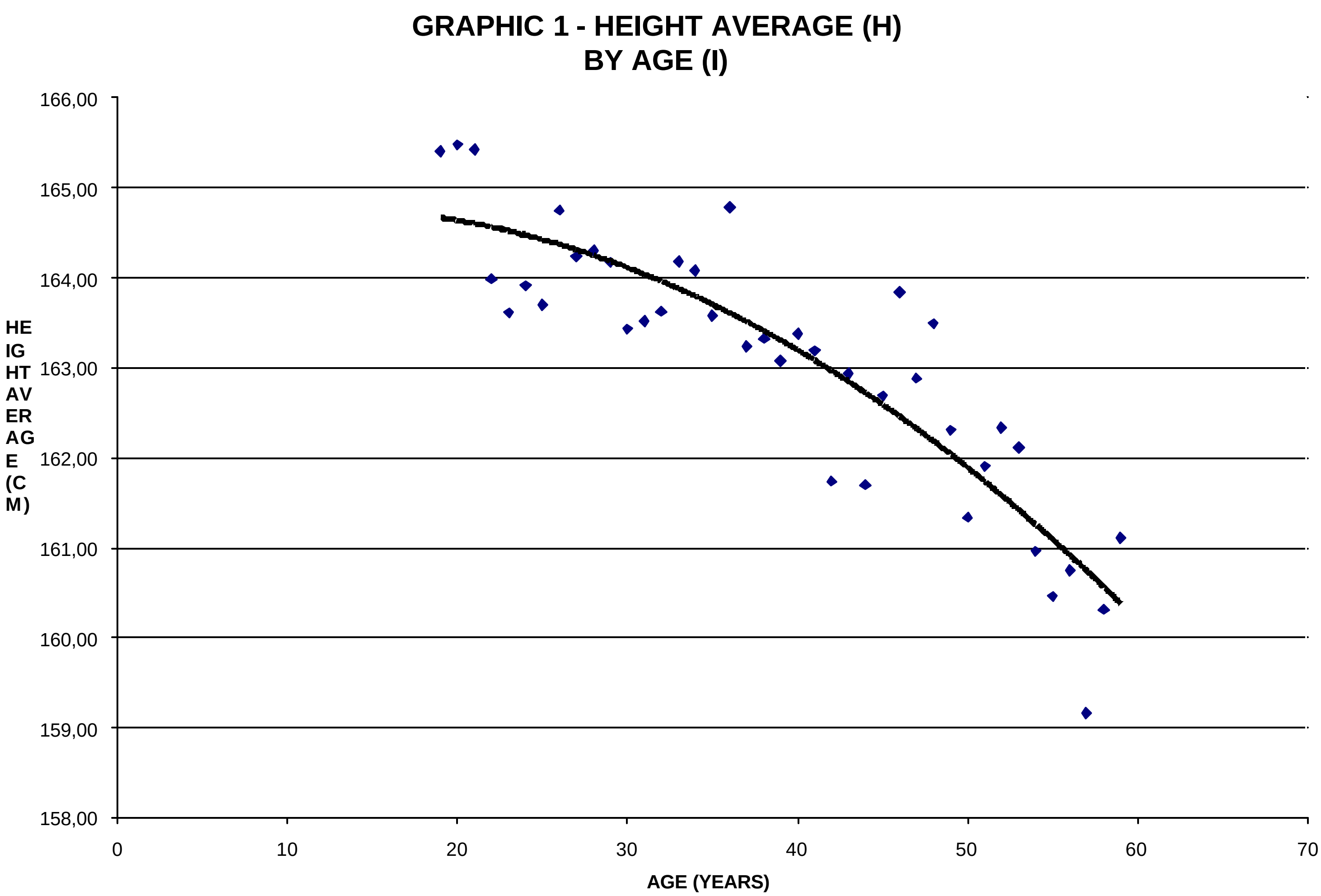
TOTAL SAMPLE

HS = f (I)

HS=C(1)+C(2)*I

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.881127	0.036537	51.48513	0.0000
C(2)	0.001860	8.13E-05	22.86929	0.0000

R-squared	0.055633	Mean dependent var	2.679955
Adjusted R-squared	0.055526	S.D. dependent var	1.039182
S.E. of regression	1.009919	Akaike info criterion	2.857843
Sum squared resid	9055.000	Schwarz criterion	2.859440
Log likelihood	-12686.82	F-statistic	523.0046
Durbin-Watson stat	0.729378	Prob(F-statistic)	0.000000


GRAPHIC 1 - HEIGHT AVERAGE (H)
BY AGE (I)
HEIGHT AVERAGE (CM)
166,00
165,00
164,00
163,00
162,00
161,00
160,00
159,00
158,00
0
10
20
30
40
50
60
70
AGE (YEARS)

GRAPHIC 2 - Incidence of Chronic and Acue Diseases by Health Status