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# THE DETERMINANTS OF THE HEALTH STATUS IN A DEVELOPING COUNTRY: RESULTS FROM THE COLOMBIAN CASE

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## ABSTRACT

*This paper tries to find empirical evidence of the health determinants, as a measure of health capital in a developing country after a deep reform of its health-care sector. It follows the Grossman model (1972) and also takes, besides individual and socioeconomic variables, institutional factors of the health sector. Two surveys from 1997 and 2000 in Colombia, with a subjective (self-report) health status of the individuals, and information about the health system affiliation type, were used. The estimation method is an order probit model. At the end, the results show an important connection between individual, institutional and socioeconomic variables with the health status of a person in Colombia. The effect of the type of access to medical care strengthens the inequities in health outcome.*

*Key words: Demand for health; health production, developing countries, probit estimations.*

*JEL Classification: I11, I12.*

## RESUMEN

*El artículo busca encontrar evidencia empírica de los determinantes de la salud, como una medición de capital salud en un país en desarrollo después de una profunda reforma en el sector salud. Siguiendo el modelo de Grossman (1972) y tomando factores institucionales, además de las variables individuales y socioeconómicas. Se usaron las encuestas de 1997 y 2000 donde se responde subjetivamente sobre el estado de salud y tipo de afiliación al sistema de salud. El proceso de estimación usado es un probit ordenado. Los resultados muestran una importante conexión entre las variables individuales, institucionales y socioeconómicas con el estado de salud. El efecto de tipo de acceso al sistema de salud presiona las inequidades en salud.*

*Clasificación JEL: I11, I12*

*Palabras Clave: Demanda por salud, producción de salud, país en desarrollo, estimación probit.*

## INTRODUCTION

The estimation of the health status determinants is an important input for the public policy making. It helps to understand the risk of specific habits and its effects in productivity and economic growth (Savedoff and Schultz 2000). It also brings information to the policy makers about the effects of particular public strategies in the health condition of the population (Gerdtham et al. 1999).

The approach of this work follows the Health Demand Theory, making a distinction between the demand for health and demand for health care (Grossman 1972). From the theory of human capital formulated by Becker (1965), Grossman built a model where individuals use medical care and their own time to produce health. Individuals were assumed to invest in health production until the marginal cost of health production equaled the marginal benefits of improved health status.

Grossman (1972) explains theoretically the determination of the health status. Many epidemiologists have stressed the importance of the relationship between socioeconomic status and health outcomes, often implying a causal relationship running from the former to the latter. Others works by Wagstaff (1993), Gerdtham et al. (1999) and Grossman (2000) have presented empirical evidence about this relationship. In Colombia, Ribero and Nuñez (2000) in a two stage method trying to analyze the effects of health conditions on productivity, found intermediate results of socioeconomic determinants of health status. They used a Colombian survey in 1991, before of the structural reform of the health sector. The dependent variable measuring health was an anthropometrics measure -high of a person.

This paper tries to find empirical evidence of the health determinants, as a measure of health capital in a developing country after a deep reform of its health-care sector. Different from Ribero and Nuñez (2000), two surveys from 1997 and 2000 in Colombia, with a subjective (self-report) health status of the individuals, and information about the health system affiliation type were used. Although both surveys are not comparable, important hypothesis can be confirmed from two different periods of time, with different economic and social conditions in the country. This could be relevant in the evaluation of the health reform.

The non observability of the health capital (health status) is a main issue in the empirical analyses (Folland et al. 2001; Wagstaff (1993); Baker et. al. (2001). A subjective measure of the health status is used in this case through a question in both surveys about the individual perception of his health condition –poor, fair, good or excellent. The variable is based on a very simple survey question that has high reliability, but does not yield a continuous health status measure, making difficult to interpret the size of the regression coefficients in a demand-for-health regression equation (Baker et al. 2001). The estimation method is an order probit model.

The Health Sector in Colombia was deeply transformed in 1993 under a central purpose of improving the population health status through the reduction of the health services barriers. The improvements of health insurance coverage is notorious in the first three years of the implementation; the percentage of people accessing to a health insurance changed from 20% in 1993 to 55% in 1997 and 57% in 2000 (Jaramillo 1999; Bitran & Asociados and Econometria 2002), showing a very slow evolution in health insurance coverage during these

last years. The health insurances designed in the systems differ in terms of conditions and quality. We believe that these differences influence at the end in the health status of the people covered by them, and the fact that poor people access to a less quality health service makes an increasing gap between social sectors. Under these circumstances it is important to study the individual, family and community characteristics that determine the health status of an individual.

The plan of the paper is as follows. The next section briefly explains the Colombian health-care sector after the reform in 1993. The third section explains the methodology, including the data, hypothesis and model implemented. The fourth section presents the estimation results and finally we conclude.

## **INSTITUTIONAL BACKGROUND: THE COLOMBIAN HEALTH-CARE SECTOR**

The Health System in Colombia was deeply transformed in 1993 and rebuilt under the principles of efficiency, equity, and solidarity. Public and protectionist national health system, with a centralized and vertical organization, was changed by the reform into a social security system based in insurance processes, competition between the insurance administrators and the suppliers, and a redistribution capacity to transfers resources to subsidize the poor population (Londoño 1996; Yepes 2000; Trujillo 2003; McPake et. al. 2003). The improving of population health status through the reduction of the health services financial barriers was one of the main purposes of the reform.

Two parallel regimes under the health social security system were built. A *contribution regime*, in which all workers are obligated to affiliate –employees and independent with a minimum payment capacity, which is established by the government –, and a *subsidize regime*, for those with no payment capacity and with the need to be financially helped –partially or totally- by the State in order to access to the health system. Any citizen has to be affiliated in the system through one of the two regimes. Nevertheless, because of the system evolution and the macroeconomics performance in Colombia there has been a very important percentage of the population not covered by the health insurance —45% in 1997 and 43% in 2000 (Jaramillo 1999; Bitran & Asociados and Econometria 2002). The people without payment capacity but not poor enough to be subsidized or people evading the payment are both in this group.

A mandatory payroll tax of 12% of the worker's labor income is made to enter to the *contribution regime*. The family of the employee is covered by the insurance. The payment is split between the workers (4%) and their employer (8%), while the self-employed contribute 12% of their income. The affiliation process is made through private and public intermediate institutions, called *Entidades Promotoras de Salud* (EPS), which offer a health plan (POS) regulated by the government. The people contribution is transferred by these entities to an equalization fund (called FOSYGA) (Trujillo 2003). The EPS received from the FOSYGA a payment for each individual enrolled, differentiated by age, sex and residence region, and a 8.3% of the transfer made by the EPS to the FOSYGA is redistributed to cover part of the affiliation of the poor people into the security system –under the second type of regime.

To determine the social-economics conditions of the individuals, a survey (SISBEN) is made. The population is divided in six socioeconomic groups (estratos), being group 1 the poorest and 6 the richest. The individuals from groups 1 and 2 enters to the Social Security System through the subsidize regime. The affiliation for a health plan (POSS) has to be made through a special sickness funds, called *Administradora de Régimen Subsidiado* (ARS). Their financing depends of a percentage of the contribution regime income and a financial support from the central and local governments, transferred from FOSYGA.

Two complementary health care access type work in the health system. On one hand, public safety net (GP) is promoted trying to attend the low-income population not covered by the subsidized program, and that do not qualify for the contribution plan —non affiliated; it is usually locally promoted, and it is financed by general tax revenues. The quality of the services is low, the access is limited and the services package is minimum. On the other hand, a traditional private health insurance (PI) is available and any individual can pay for specific health plan attended by private institution. This option is not a substitute, but complementary, to the contributive regime affiliation.

The conditions offered by the POS, POSS and the GP are quite different. At the moment, the quality of health care services into the POS is much greater than the one into the POSS and the GP. This is true because of the number of the services included in each package and the number of health care service institutions available for the different regimes. The difference between the health plans suggests that people in the contribution regime tend to have a better health conditions than those in other regimes.

## METHODS

### MODEL AND HYPOTHESIS

The next model for health demand was the base of the estimation, and follows the framework of Grossman (1972):

$$H_i = \beta_1 * Y_i + \beta_2 * E_i + \beta_3 * D_i + \beta_4 * I_i + \beta_5 * S_i + \mu_i$$

$\mu_i$  is an error term with zero mean and constant variance.  $\beta_1$ - $\beta_5$  are the unknown coefficients to be estimated.  $H_i$  is the health status of the individual  $i$ .  $Y_i$  is the income of the individual  $i$ , and there is an expectation of a positive sign of its coefficient ( $\beta_1 > 0$ ); an individual with better income has better life conditions and greater payment capacity to access to good nutrition and quality health services. A wealthy person also tends to invest more in health production resulting in a better health status (Grossman 1972; Gerdtham et al. 1999). The situation is similar with education  $E_i$ . Education is assumed in the Grossman model to increase the productivity in the production of health. Therefore, we expect a positive sign of  $\beta_2$ . Other determinant of the health status is the depreciation of health, represented by  $D_i$ , a vector of exogenous variables that affect the rate of depreciation during the live cycle. Socioeconomic ( $S_i$ ) and institutional health system ( $I_i$ ) variables are also considered as determinants. Socioeconomic variables, in the same perspective as the income, tend to influence the health status in a positive way (Attanasio

and Emmerson 2001; Ross and Mirowsky 2000). The institutional variables affect the conditions of health, depending of the quality and the number of services offered to the individual (Ross and Mirowsky 2000).

## DATA

Two data surveys were used. The “Encuesta Nacional de Demografía y Salud ENDS2000” (*demographic and health national survey 2000*) elaborated by PROFAMILIA,<sup>1</sup> covers 47.520 people and 10.905 households in different regions of Colombia and asks for demographic and institutional health conditions, including a self-report of the individual health perception. The “Encuesta de Calidad de Vida de 1997 ECV97” (*living standards measurement*)<sup>2</sup> is the major survey about life quality in Colombia, national wide representative, with data of 29 of 33 states in Colombia, covering 38.518 people and 9.121 households, and elaborated by the government statistic agency “Departamento Administrativo Nacional de Estadística (DANE)” in 1997. Sub samples of 28.477 individuals and 15.315 are taking from the ENDS2000 and the ECV97, respectively –labor force participant, from 16 to 65 years old.

The two surveys were made in different periods, both crucial in the health reform implementation process. The ECV97, was made when the reform was three years old, and the economy and employment were improving. The health insurance coverage in both regimes reached the 55%. In 2000, when the ENDS2000 was implemented, Colombia was consumed in a critical economic situation, with the deepest depression in 50 years. The health insurance coverage in that year reached the 57%, just two points above from three years ago, and far away from the 100% coverage goal.

## VARIABLES

The data used in the analysis are defined in Table 1 and summary statistics for these variables are given in Table 2. The health status of an individual is measure as the individual perception of his health condition –poor, fair, good or excellent. The variable is based on a very simple survey question that has high reliability.<sup>3</sup>

The independent variables are taking as follow. The income is represented as the natural logarithm of household income. The occupation of the individual is also positively related with his earnings. We expect the health condition to improve as the income increases, and as the occupation is more stable and safe. The level of education —non education, elementary, high school, undergraduate and post-graduate— is the measure for the person education.

Variables like age and gender are taking as determinants of the rate of depreciation in health (Gerdtham et al. 1999). Age is a continuous variable and the gender is dummy variable were

<sup>1</sup> Asociación Pro-Bienestar de la Familia Colombiana. The International Planned Parenthood Federation (IPPF) affiliate in Colombia

<sup>2</sup> This survey follows the procedure of the World Bank living standard surveys

<sup>3</sup> The data shows that people without a chronic illness perceive better health status (probability of 75%). At the same time, people that have not had health problems before 30 days from the date the survey was made, tend to perceive a better health than those who have had (76% against 56%). The data is consistent with this statement.

**TABLE 1**  
**DEFINITION OF VARIABLES**

Variable	Definition
<b>Dependent Variable</b>	
Health Status	Categorical health self-report: 0=poor, 1=fair, 2=good, 3= excellent
<b>Independent variable</b>	
<i>Individual's Characteristics</i>	
Age	Age of individuals
Education level	Education level: 1=no education, 2=elementary school, 3= high school, 4= superior
Sex	0=male, 1=female
Occupation (ECV97)	1=worker, 2= self-employed, 3=unemployed, 4=student, 5=other
Occupation (ENDS2000)	1=employed, 2=unemployed, 3=student, 4=other
<i>Institutional Characteristics</i>	
Health Social Security System	Evaluating reform of health system: 1=contributive regime, 2=subsidize regime, 3=no affiliated
<i>Household's Characteristics</i>	
Household Income <sup>a</sup>	Natural logarithm of household income
Mother Education <sup>a</sup>	Education level: 0=no education, 1=elementary school, 2= high school, 3= undergraduate, 4=graduate
Father Education <sup>a</sup>	Education level: 0=no education, 1=elementary school, 2= high school, 3= undergraduate, 4=graduate
Persons	Number of persons into household
Rooms	Number of rooms in the housing
Fuel	1=Electricity or natural gas, 0=others
<i>Geographical factors</i>	
Region (ECV97)	1=Atlantic, 2=East, 3=Pacific, 4=Center, 5=Antioquia, 6=Bogotá, 7=Orinoquia
Region (ENDS2000)	1=Atlantic, 2=East, 3=Pacific, 4=Center, 5=Bogotá

<sup>a</sup>Variables not available in the ENDS2000

zero (0) represents a male and one (1) a female. We expect the age to affect positively the rate of depreciation of capital health, since the health status decreases with age. As the epidemiological condition of both male and female is different, the gender variable is included.

For socioeconomic conditions, variables as mother and father education, rooms and persons in the housing, type of fuel using for cooking and geographical location are used (Akin et al. 1998; Savedoff and Schultz 2000; Ross and Mirowsky 2000; Trujillo 2003). The education of the mother and father are measure in the same way that the individual's. The type of fuel is measure as a dummy variable were one (1) is electricity or natural gas, and zero (0) is other types of fuel with less quality. The geographical location is included because the importance of regional differences in Colombia. This variable is a vector of dummies that control for the different regions: Atlantic, East, Pacific, Center, Antioquia, Bogotá, Orinoquia. In the ENDS2000 includes Antioquia into the Center region and Orinoquia into the east region. The levels of earnings, the quality of life, and the labor conditions are generally worse in costal region than in the interior (Ribero and Nuñez 2000).



**TABLE 2**  
**SAMPLE DESCRIPTIVE STATISTICS**

Variable	<u>ECV97 (n=15315)</u>				<u>ENDS2000 (n=28477)</u>			
	Mean	s.d.	Min.	Max.	Mean	s.d.	Min.	Max.
<b>Dependent Variable</b>								
Health Status	1.77	0.69	0	3	1.70	0.59	0	3
<b>Independent variable</b>								
<i>Individual's Characteristics</i>								
Age	33.89	13.15	16	65	34.92	13.52	16	65
Education level	2.56	0.83	1	4	2.61	0.78	1	4
Sex	0.48	0.49	0	1	0.48	0.49	0	1
Occupation	2.86	1.64	1	5	2.02	1.32	1	4
<i>Institutional Characteristics</i>								
Health Social Security System	1.94	0.93	1	3	2.05	0.88	1	3
<i>Household's Characteristics</i>								
Household Income	12.83	1.53	5.11	17.97	-	-	-	-
Mother Education	2.23	0.89	1	4	-	-	-	-
Father Education	2.21	0.92	1	4	-	-	-	-
Persons	5.21	2.34	1	19	5.27	2.49	1	21
Rooms	3.64	1.60	1	14	2.50	1.12	1	9
Fuel	0.73	0.44	0	1	0.79	0.41	0	1
<i>Geographical factors</i>								
Atlantic	0.22	0.41	0	1	0.27	0.44	0	1
East	0.15	0.36	0	1	0.17	0.37	0	1
Pacific	0.17	0.37	0	1	0.26	0.44	0	1
Center	0.14	0.34	0	1	0.17	0.37	0	1
Antioquia	0.17	0.37	0	1	-	-	-	-
Bogotá	0.11	0.31	0	1	0.13	0.34	0	1
Orinoquia	0.04	0.20	0	1	-	-	-	-

As an institutional variables for the health system, a differentiation was made between the insurance type —contributive, subsidize or non-affiliated. The first type took a value of one (1), the second type a value of two (2), and people with no affiliation took a value of three (3). We believe that people in the contributive system tend to have better health condition than the others, because the higher quality of its services and the wider package plans. The comparison between the subsidize regime and the not affiliation group is ambiguous, because this last group is composed with persons evading the system and some times with payment capacity.

In this context, individual variables —as age, education, gender, occupation (following Gerdtham et al. 1999)—, institutional variables (as the health system affiliation type), and environmental variables (as family income, mother and father education, number of rooms in the house, the geographical position, and the type of fuel used for cooking; Akin et al. 1998; Savedoff and Schultz 2000), are taking as a determinants of the individual health status.

## ESTIMATION METHOD

Order probit estimations were implemented. This methodology is used because of the categorical condition of the health status variable —the dependent one; it takes values from 0 to 3, if the person health status is poor, fair, good or excellent—in that order (Wooldridge 2002; Greene 2000).

Following Greene (2000) the order *probit* model is built around a latent regression given by:

$$H^* = \beta'X + \varepsilon \quad \varepsilon \sim N(0, \sigma^2)$$

The health condition is unobserved, but an individual self-report of the health status it taking as an index of measure, defined as:

$$H = 0 \quad \text{if} \quad H^* \leq \mu_0,$$

$$H = 1 \quad \text{if} \quad \mu_0 < H^* \leq \mu_1,$$

$$H = 2 \quad \text{if} \quad \mu_1 < H^* \leq \mu_2$$

$$H = 3 \quad \text{if} \quad \mu_2 \leq H^*$$

The unknown  $\mu$ 's are estimated simultaneously with the  $\beta$ . With the normal distribution the following probabilities are obtained:

$$\text{Pr ob}(H = 0) = \Phi(\mu_0 - \beta'X),$$

$$\text{Pr ob}(H = 1) = \Phi(\mu_1 - \beta'X) - \Phi(\mu_0 - \beta'X),$$

$$\text{Pr ob}(H = 2) = \Phi(\mu_2 - \beta'X) - \Phi(\mu_1 - \beta'X),$$

$$\text{Pr ob}(H = 3) = 1 - \Phi(\mu_2 - \beta'X)$$

where  $\mu_0 < \mu_1 < \mu_2$ , in order for the probabilities to be positive.

## RESULTS

One order probit model was estimated, most of the intuitions emerged from the descriptive statistics of the conditional probability [Table 3] were confirmed and the results from the both surveys were quite similar.

**TABLE 3**  
**CONDITIONAL PROBABILITIES**

Variable	ECV97 (n=15315)				ENDS2000 (n=28477)			
	Poor	Fair	Good	Excellent	Poor	Fair	Good	Excellent
<b>Individual's Characteristics</b>								
Age	43.31 (14.02)	38.11 (13.90)	31.62 (12.12)	31.19 (11.89)	44.46 (14.05)	39.33 (14.08)	32.72 (12.63)	33.33 (12.74)
<i>Education level</i>								
No education	7.4%	44.4%	44.0%	4.1%	9.2%	44.7%	44.7%	1.4%
Elementary	4.5%	40.7%	47.5%	7.3%	4.5%	35.9%	57.5%	2.1%
High School	1.3%	21.2%	63.4%	14.1%	1.6%	21.5%	72.5%	4.4%
Superior	0.5%	9.9%	63.5%	26.1%	0.8%	12.3%	77.1%	9.8%
<i>Sex</i>								
Male	3.8%	33.4%	52.4%	10.4%	2.5%	23.3%	69.4%	4.8%
Female	2.1%	24.9%	58.9%	14.1%	3.7%	31.0%	62.1%	3.2%
<i>Occupation</i>								
Worker <sup>a</sup>	1.2%	17.7%	62.3%	18.3%	2.32%	25.4%	67.9%	4.5%
Self-employed	3.1%	34.1%	53.4%	9.4%	-	-	-	-
Unemployed	1.8%	24.9%	60.2%	13.1%	1.7%	22.9%	70.6%	4.8%
Student	1.0%	15.1%	65.6%	18.2%	0.7%	14.6%	78.5%	6.2%
Other	5.1%	40.1%	47.4%	7.3%	5.8%	36.0%	55.9%	2.3%
<b>Institutional Characteristics</b>								
<i>Health System</i>								
Contributive regime	2.2%	22.7%	58.7%	16.4%	1.7%	19.7%	72.1%	6.5%
Subsidize regime	5.1%	42.3%	46.7%	5.9%	4.6%	36.0%	57.5%	1.9%
No affiliated	3.2%	32.6%	54.8%	9.4%	3.6%	29.6%	63.9%	2.9%
<b>Household's Characteristics</b>								
Household Income					-	-	-	-
<i>Mother Education</i>								
No education	5.3%	43.1%	44.6%	7.0%	-	-	-	-
Elementary	3.0%	31.6%	54.7%	10.7%	-	-	-	-
High School	1.9%	21.0%	63.6%	13.5%	-	-	-	-
Superior	0.4%	10.8%	59.9%	28.9%	-	-	-	-
<i>Father Education</i>								
No education	5.5%	42.4%	45.2%	6.9%	-	-	-	-
Elementary	2.8%	31.3%	55.2%	10.7%	-	-	-	-
High School	1.4%	19.5%	65.1%	14.0%	-	-	-	-
Superior	1.0%	11.2%	61.0%	26.8%	-	-	-	-
Rooms	3.24 (1.43)	3.30 (1.53)	3.62 (1.57)	4.06 (1.67)	2.35 (1.05)	2.36 (1.08)	2.55 (1.13)	2.73 (1.11)
Persons	5.41 (2.63)	5.19 (2.42)	5.20 (2.29)	4.67 (1.97)	5.49 (2.75)	5.37 (2.60)	5.26 (2.43)	4.67 (2.34)

Table 3. Conditional Probabilities (cont.)

Variable	ECV97 (n=15315)				ENDS2000 (n=28477)			
	Poor	Fair	Good	Excellent	Poor	Fair	Good	Excellent
<i>Fuel</i>								
Electricity	2.2%	24.4%	58.9%	14.5%	2.6%	24.3%	68.5%	4.6%
Other	5.3%	43.0%	46.0%	5.7%	5.0%	38.7%	54.7%	1.6%
<b>Geographical factors</b>								
Atlantic	1.9%	29.5%	61.1%	7.5%	3.6%	29.0%	64.8%	2.6%
East	4.9%	38.5%	49.0%	7.6%	2.5%	29.1%	63.4%	5.0%
Pacific	3.4%	25.9%	59.5%	11.2%	4.0%	31.2%	61.7%	3.1%
Center	2.2%	32.1%	53.8%	11.9%	3.0%	26.3%	65.6%	5.1%
Antioquia	4.0%	27.9%	46.4%	21.7%	-	-	-	-
Bogotá	1.0%	17.1%	65.7%	16.2%	2.2%	19.2%	74.4%	4.2%
Orinoquia	3.8%	38.0%	48.5%	9.7%	-	-	-	-

<sup>a</sup> In the ENDS2000 worker is employed, included worker and self-employed.

The results present a consistent relationship between health and the different variables. Changes in current household income and education have positive effects on a person's health. The age affects the health status negatively and as a person becomes older his health condition decreases and the women tend to have worse health than men. An employee (maybe because he/she has relatively more stability and less risk) has a less chance to have a regular or bad health status than a student or unemployed. These results are according to theoretical and empirical exercises like Grossman (1972, 2000), Akin et al. (1998) and Gerdtham et al. (1999).

According with the expectations, the people affiliated in the social security system through the contributive regime (EPS-POS) tend to have a higher health conditions, compared with people affiliated throughout the other two systems (ARS-POSS or GP). An individual no affiliated in the system also have better health conditions that those in the ARS-POSS. This can be explain because there is a good portion of evasion in the contributive system and people with payment capacity uses the governmental program and do not enter in the formal system. There are estimations of an evasion/elusion around 35% in 2000 (Bitran & Asociados and Econometria 2002).

The results about social economic status are clear. Better social and economic position affects the health condition of a person in a positive way. The more rooms a home has, the better is the health status of its individuals, and if the family cooks with electricity or natural gas is better than other fuel. As the number of individuals in a home increases, the health status falls -contrary with the statistical descriptive.

People living in Bogotá and Antioquia —the capital and one of the richest states, respectively— are in better conditions that the population in the rest of the country. As the education of both the mother and the father increases, so it does the health of the person.

**TABLE 4**  
**ORDER PROBIT ESTIMATION**

Variable	ECV97 (n=15315)		ENDS2000 (n=28477)	
	Coefficient	z-statistic	Coefficient	z-statistic
<b>Individual's Characteristics</b>				
Age	-0.019*	-21.60	-0.019*	-29.96
<i>Education level</i>				
Elementary	0.022***	0.62	0.114*	3.70
High School	0.278*	6.91	0.312*	9.32
Superior	0.547*	11.34	0.572*	14.19
<i>Sex</i>				
Male	0.242*	11.35	0.208*	12.40
<i>Occupation</i>				
Self-employed	-0.071**	-2.50	-	-
Unemployed	-0.090****	-1.46	-0.046****	-
Student	-0.172*	-4.57	-0.103*	-3.83
Other	-0.204*	-6.85	-0.156*	-8.10
<b>Institutional Characteristics</b>				
<i>Health System</i>				
Subsidize regime	-0.137*	-4.26	-0.330*	-15.28
No affiliated	-0.086*	-3.77	-0.295*	-16.67
<b>Household's Characteristics</b>				
Household Income	0.052*	6.89	-	-
<i>Mother Education</i>				
Elementary	0.004****	0.14	-	-
High School	-0.029****	-0.93	-	-
Superior	0.124**	2.56	-	-
<i>Father Education</i>				
Elementary	0.084*	3.16	-	-
High School	0.160*	4.92	-	-
Superior	0.281*	6.35	-	-
Rooms	0.048*	7.33	0.065*	8.88
Persons	-0.024*	-5.79	-0.025*	-7.51
<i>Fuel</i>				
Electricity	0.198*	7.77	0.178*	9.32
<b>Region factors</b>				
East	-0.158*	-5.28	0.114*	5.05
Pacific	0.066**	2.26	-0.066*	-2.99
Center	0.079**	2.57	0.128*	6.36
Antioquia	0.195*	6.11	-	-
Bogotá	0.058***	1.77	0.104*	4.29
Orinoquia	-0.249*	-5.19	-	-
$\mu_0$	-1.664	0.1144	-2.416	0.0550
$\mu_1$	-0.270	0.1136	-0.914	0.0529
$\mu_2$	1.831	0.1143	1.568	0.0530
Pseudo R2	0.104		0.085	
Log likelihood	-14372.99		-22677.29	

\*  $P < 0.01$ , \*\*  $P < 0.05$ , \*\*\*  $P < 0.10$ , \*\*\*\* Not significance

Throughout these estimations of probabilistic models we can conclude that the health status of the Colombians –as a measure the health capital stock – is influenced by two types of variables: those who are referred to basic models as the current income, age and education, and those specifically for the Colombian case. The geographical condition, for instance, improve the health perspective of a person if he lives in Bogotá or the Antioquia region. The beneficial plans like the contributive ones have important and positive effects compared with the subsidized or the governmental plans. The demographic conditions and the family size influence also in the person's health.

## CONCLUDING REMARKS

Order probit estimation confirmed the initial hypothesis about health status determinants. Therefore, the health status of the Colombian people, as an indicator of health capital stock, seems to be determined by two groups of variables. Individual variables as income and education tend to influence positively the health of an individual, while age influences it negatively. A group of institutional or socio-economic variables also affects the health status of a person. An individual in a good working position in terms of income, living in a urban and relatively reach geographical region, has a much greater chance to perceive a good health status, than other with less income and from poor areas. People in the contributive regime have better health conditions than the ones in the subsidence regime (the poorest population).

The reform of health system has been concentrated in expanding the affiliation but the health problems not only depend on the improving of health insurance covering, but on others socioeconomic or demographic characteristics. The effect of the type of access to medical care strengths the inequities in health outcome.

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## REFERENCES

- Akin J, Guilkey D, Hutchinson P, McIntosh M. 1998. Price elasticities of demand for curative health care with control for sample selectivity on endogenous illness: an analysis for Sri Lanka. *Health Economics* 7: 509-531.
- Attanasio O, Emmerson C. 2001. Differential mortality in the UK. *The Institute for Fiscal Studies Working Paper* 16.
- Baker M, Stabile M, Deri C. 2001. What do self-reported, objective, measures of health measure?. *National Bureau of Economic Research Working paper* 8419.
- Becker G. 1965. A theory of the allocation of time. *Economic Journal* 75: 493-517.
- Bitrán & Asociados, Econometría. 2002. Evaluación y reestructuración de los procesos, estrategias y organismos públicos y privados encargados de la afiliación, pago y recaudo de aportes al sistema. *Reporte Final*, Ministerio de Salud - Colombia.

- Folland S, Goodman A, Stano, M. 2001. *The economics of health and health care*. New Jersey: Prentice-Hall.
- Gerdtham U-G, Johannesson M, Lundber L, Isacson D. 1999. The demand for health: results from new measures of health capital. *European Journal of Political Economy* 15: 501-521.
- Greene W. 2000. *Econometric analysis*. New Jersey: Prentice-Hall.
- Grossman M. 1972. On the concept of health capital and the demand for health. *Journal of Political Economy* 80: 223-255.
- Grossman M. 2000. The human capital model. In: Culyer A, Newhouse J (ed). *Handbook of health economics*. North-Holland.
- Jaramillo I. 1999. *El futuro de la salud en Colombia. La ley 100 de 1993 cinco años después*. Bogotá: FESCOL, FES, FRB y Fundación Corona.
- Londoño JL. 1996. Managed competition in the tropics. Paper presented at the International Health Economics Association Inaugural Conference, Vancouver, May.
- McPake B, Yepes FJ, Lake S, Sanchez LH. 2003. Is the Colombian health system reform improving the performance of public hospitals in Bogotá?. *Health Policy and Planning* 18: 182-194.
- Ribero R, Nunez J. 2000. Adult morbidity, height, and earnings in Colombia. In: Savedoff W, Schultz P (ed). *Wealth from health. Linking social investments to earnings in Latin America*. Latin American Research Network. Washington D.C: Inter-American Development Bank.
- Ross C, Mirowsky J. 2000. Does medical insurance contribute to socioeconomic differentials in health? *The Milbank Quarterly* 78: 291-321.
- Savedoff W, Schultz P. 2000. Earnings and the elusive dividends of health. In Savedoff W, Schultz P (ed). *Wealth from health. Linking social investments to earnings in Latin America*. Latin American Research Network. Washington D.C: Inter-American Development Bank.
- Trujillo A. 2003. Medical care use and selection in a social health insurance with an equalization fund: evidence from Colombia. (forthcoming) *Health Economics*.
- Wagstaff A. 1993. The demand for health: an empirical reformulation of the Grossman model. *Health Economics* 2: 189-198.
- Wooldridge J. 2002. *Econometric analysis of cross section and panel data*. Cambridge: Massachusetts Institute of Technology Press.
- Yepes FJ. 2000. Health reform and equity in Colombia. In: Lloyd-Sherlock P (ed). *Health care reform and poverty in Latin America*. ILAS Series. London: Institute of Latin American Studies, University of London.

