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Disability as a determinant of access to health care services in Colombia

Maestría en Economía

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ABSTRACT

The relationship between disability and poverty has been described in different contexts. Nevertheless, the basic characteristics of this relationship have not yet been fully established. The social exclusion and discrimination against people with disabilities increase the risk of poverty and reduce the access to basic opportunities such as health and education. This study examines the impact of a health limitation and poverty in the access to health care services in Colombia. Data from the Colombian National Health Survey (2007) was used in the analysis. Variables related with health condition and socio economic characteristics were first generated. Then interactions between health limitations and the lower levels of the asset index were created. This variable gave information related to the relationship between disability and poverty. A probabilistic model was estimated to examine the impact of a health condition and the relation between poverty and disability on the access to health care. The results suggest that living with a physical limitation increases by 10% the probability of access to health care services in Colombia. However, people with a disability and in the lowest quartile of the asset index have a 5% less probability of access to health care services. We conclude that people who live with a physical, mental or sensorial limitation have a higher probability of access to health care services. However, poor and disabled people have a lower probability in access, which increases the risk of having a severe disease and become chronically poor.

Keywords: *Disability; Access; Health care, Colombia.*

1. INTRODUCTION

In 2001, the World Health Organization (WHO) proposed a universal definition of disability. Since that year, disability has been defined as the result of the interaction between a health condition and contextual factors that act as a barrier in the social inclusion process (World Health Organization (WHO), 2001). According to the WHO and the World Bank (WB), around 15% of the world population are disabled; this percentage should increase in developing countries as a result of the violence levels, the existence of communicative diseases that are difficult to control and the barriers in access to health care services (WHO and World Bank (WB), 2011)

In the last decade, the basic characteristics of people with disabilities have been established. In general, people with disabilities are poor and are considered to be the poorest of the poor, they have low access to education, to health care services, to the formal labour market and in most of the countries they are ignored in political and social participation processes (Mitra et al. 2011; She and Livermore, 2009; Purdam, Afkham, Olsen and Thorton, 2008; Mete, 2008; Braihwaite and Mont, 2008; Cruz and Hernández, 2008; González, 2007; Saunders, 2006; Cruz and Hernández, 2006; Hernández, 2004; Foro Europeo de Discapacidad, 2003; Grushka and Demarco, 2003; Stienstra, Fricke and D`Aubin, 2002: Elwan, 1999).

In addition, since the beginning of the nineties, the relationship between disability and poverty has been described in different contexts. Nevertheless, the basic characteristics of this relationship have not yet been fully established; there is a lack of information concerning the causality of this relationship and there are only descriptive studies that analyse the possible effect of disability in poverty and of poverty in disability. Indeed, it is not well known how the relationship works and the fact that the situation of people with disabilities is different between and within countries complicates the analysis.

Disability and poverty are related in a bi-directional way. People with a disability have lower access to education, to the labour market and the costs associated with the access to health care services are higher compared with the costs involved for people without disabilities. All these characteristics increase the risk of becoming poor or chronically poor. Furthermore, poor people have higher risks of under nutrition, they have a limited access to health care services and social and economic crises strongly affect the poorer populations. As a result of this, the risk of becoming ill increases and added to the social exclusion poor people face, the risk of being disabled is higher (WHO and WB, 2011: Palmer et al, 2011; Mitra, Posarac and Vick, 2011; She and

Livermore, 2009; Braihwaite and Mont, 2008; Braithwait, J. Croll, R. et al., 2008; Mete, 2008; Hoogeveen and World Bank, 2005; Thomas, 2005; Grut and Ingnstad, 2005; Atkins and Guisti, 2003; Yeo, 2003; Elwan, 1999).

The impact of poverty on the health status of the populations has been described in different studies (Sala i-Martin, 2005; Organization for economic Cooperation and Development (OECD), 2003). However, the analysis of this relationship in middle income countries, especially in Colombia is limited and in some cases it is reduced to analysing the number of poor people in the health care system. In addition, there are no studies that analyse the determinants of access to health care services for populations with a high risk of poverty, such as people with disabilities.

In Colombia, the access to health care services depends on the type of insurance programme people are enrolled in. There are two types of programmes: the first one is the Contribute Regimen (CR), which enrols people who work in the formal sector of the economy and their families and independent workers with the ability to pay. The Subsidized Regimen (SR) enrols poor and vulnerable populations (Castano, 2004). People with disabilities usually are enrolled in the SR or are not enrolled in any type of insurance programme (Cruz and Hernandez, 2006). The situation of people with disabilities and their access to health care services in Colombia is not well known and it has not been described in detail yet.

Besides, in Colombia, the studies regarding health care have focused on the analysis of the effect of the health care reform in the number of affiliates to the health care system. Furthermore, other studies have focused on how enrolment in the SR improves the health status of the populations compared with those without health insurance (Camacho and Conover, 2009). Other studies have analysed the equity in financing health care services (Castano, 2004). However, there are no studies that include the effect of a disability in the access to health care services or how the situation of people with disabilities increases or decreases the access to health care services in Colombia.

Given the lack of knowledge of the situation of people with a disability in Colombia, it is necessary to study how a physical, mental, sensorial or cognitive limitation affects the access to health care services and how the fact that a person has any type of limitation and is poor, affects his or her access to health care services. According to the literature, living with a physical, mental, sensorial or cognitive limitation increases the demand for health care. However, when people are poor, the need is not the only determinant to the access to health care services but also factors associated with education, place of

residence and socioeconomic variables (Palmer et al, 2010; Gal, Weisverg-Yosub, Shavit and Doron, 2010).

Therefore, the research questions that I would like to answer are: What are the main determinants of access to health care services in Colombia?; Do people with physical, mental, sensorial, daily activities limitations or limitations to participate in social and political processes have less or more access to health care services?; What is the health limitation that influences the access to health care services the most? and Do people who live with a disability and are poor have more or less probability of access to health care services in Colombia?

The main goal of this document is descriptive. The study of the impact of the relationship between disability and poverty on the access to health care services in Colombia is unknown and has not been systematically addressed yet. In order to contribute to the study of this aspect, this paper analyzes data from the Colombian National Health Survey (NHS) (2007) with the intention of investigating the determinants in access to health care services in Colombia, and how the interaction between a disability and poverty affects the access to health care.

The results suggest that living with a physical limitation increases by 10% the probability of access to health care services in Colombia. However, people with a disability and in the lowest quartile of the asset index have a 5% less probability of access to health care services.

This document is divided in six parts including this introduction. The second part is the theoretical framework where a description of the relationship between disability and poverty and an explanation of the Colombian health care system are presented. In the third part, the data and methodologies used in this study are described. In the fourth chapter the results are presented, and the next section discusses the result and the limitations of this study. The last part presents the main conclusions of the study and gives some recommendations for future research.

2. THEORETICAL FRAMEWORK

2.1 HEALTH, POVERTY AND DISABILITY

From the Human Capital Theory, health is one of the mayor inputs that a country can have; it is the input associated with the strength, the power and the ability of the human body to be productive (Sala i-Martin, 2005). The relation between health and

economic growth has been studied and defined since 1975, when Preston (1975) identified a concave relationship between life expectancy and Gross National Product (GDP).

Moreover, the relation between economic growth and health is not uni-directional. In a country with a healthy population, the productivity and the accumulation of human capital increase with a direct effect on the GDP. Furthermore, the increase in GDP causes that better health technology and services can be provided to the population (Grimm, 2010). In addition, a country's productivity level is not only determined by the level of income but also by the distribution of basic services, such as health and education.

According to this, health should be understood as one of the most important human capabilities. Indeed, the distribution of health care resources and the access to those resources should be based on the need and not on the ability to pay. In general, the opportunity of access to health care should be the same for all the individuals with the same characteristics and might only include aspects related to health needs, even if those were the consequence of individual decisions (LeGrand, 1991).

Poor populations always encounter more difficult and complex health situations. They have higher risks of communicative diseases, a higher average child and maternal mortality, and low access to health care and social protection services (Organization for economic Cooperation and Development (OECD), 2003). In addition, those characteristics increase the risk of having a physical, mental, sensorial or cognitive limitation, which reduces the access to basic opportunities such as health care, education and work.

The impact of poverty in the populations' health is one of the most important problems for developing countries. The adverse effects of being poor and the relationship between poverty and disability affects the economic and social development of a country in a direct way and increases the necessity of better strategies to guarantee access to health care for vulnerable and poor populations.

In addition, the relationship between health and poverty is not uni-directional. Indeed, people with chronic diseases or permanent physical, mental, sensorial or cognitive limitations have a higher risk of becoming poor or chronically poor.

Poverty might be understood as a multidimensional phenomenon; not only associated with the acquisition of economic resources, but also with the access to basic services and opportunities. According to Sen (2002) poverty is the failure in the achievement of

some capabilities. Furthermore, it is the reduction in capabilities given by limitation in access to basic social, economic and political resources. The level of poverty depends on social and individual characteristics and it is influenced by factors that are not included in the basic measures of poverty.

Furthermore, poverty is connected with exclusion and discrimination of social processes especially those related with access to basic services such as education and health. As a result of the limited access to health services, poor populations have a higher risk of becoming sick and disabled.

Currently, disability is defined as the result of the interaction between a health condition and contextual factors that act as a barrier in the social inclusion process (WHO, 2001). This definition presents the existence of factors outside the individual's control that create social exclusion processes. Those processes increase the discrimination against people with a specific health condition such as physical, mental, cognitive or sensorial limitations, reducing their access to basic services.

People with disabilities around the world have similar characteristics which are described in the following studies: Mitra et al. 2011; She and Livermore, 2009; Purdam, Afkham, Olsen and Thorton, 2008; Mete, 2008; Braihwaite and Mont, 2008; Cruz and Hernández, 2008; González, 2007; Saunders, 2006; Cruz and Hernández, 2006; Hernández, 2004; Foro Europeo de Discapacidad, 2003; Grushka and Demarco, 2003; Stienstra, Fricke and D`Aubin, 2002: Elwan, 1999. The main findings are that people with disabilities are the poorest of the poor, have a low level of education and in some cases are illiterate. In addition, they have a low access to the labour market and to health care services. Their participation in political and social networks is limited. Furthermore, in developing countries the higher percentage of people with disabilities are of working age. All these characteristics make that this people have a high risk of social discrimination and social exclusion.

The bi-directional relationship between disability and poverty was studied in the last decade. Nevertheless, the basic characteristics of this relationship have not yet been fully established, there is not enough information regarding the causality of this relationship and there are only descriptive studies that analyse the possible effect of disability in poverty and of poverty in disability.

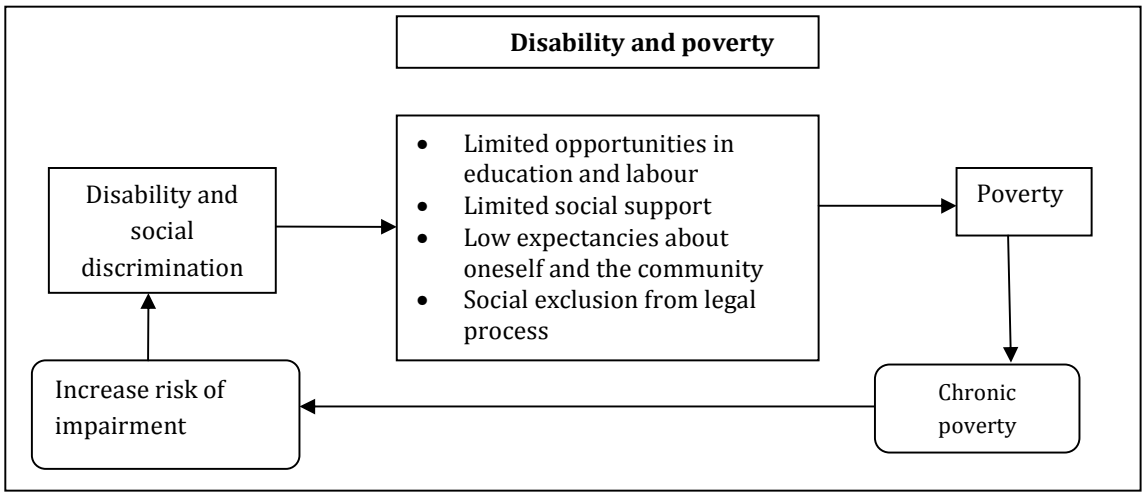
People with disabilities have lower access to education services and to the labour market, what predisposes them to have fewer resources to survive and cover their basic needs. In addition, they are excluded of social, politic, legal and economic processes, which makes them invisible for the society. On the other hand, poor people

have a higher risk of becoming ill and having a permanent limitation; this and the social exclusion process poor people face creates a disability (WHO and WB, 2011: Palmer et al, 2011; Mitra, Posarac and Vick, 2011; She and Livermore, 2009; Braihwaite and Mont, 2008; Braithwait, J. Croll, R. et al., 2008; Mete, 2008; Hoogeveen and World Bank, 2005; Thomas, 2005; Grut and Ingnstad, 2005; Atkins and Guisti, 2003; Yeo, 2003; Elwan, 1999) (see figure1).

The WHO and the WB have estimated that approximately 15% of the population around the world have any type of disability (WHO and WB, 2011). Moreover, this percentage may increase in developing countries as a result of violence and the high percentage of a poor population. However, the statistics in most of the developing countries do not reflect the real proportion of people living with disability, the main reason is the definition used in the different surveys and the difficulties in understanding the concept of disability (Pinilla, Cruz, Hernandez, 2009; Mont, 2008).

The lack of knowledge concerning the magnitude of disability and the use of different concepts into the surveys makes it difficult to compare disability statistics between countries. However, the socio economical characteristics of people with a disability are the same around the world.

Figure1. Disability and poverty cycle



Source: **Atkins, D. Guisti, C. (2003)** *Poverty and the most vulnerable. The confluence of poverty and disability.* **In The realities of poverty in Delawere-2004.**

The reduction in access to basic opportunities such as health and education has an impact on the quality of life of people with a disability and their families. The analysis of disability cannot be limited to the individual situation; instead the family and the social network of people with disability should be included, because of the economic

impact of the disability and the fact that the extra cost and the care of the person with disability are usually assume by the family, who are poor in most of the cases.

The high out of pocket payments (OOP) and other payments associated with health care expenditures are one of the reasons of becoming poor for people with disabilities and their families (Mitra, Findley and Sambamoorthi, 2009). Different studies have been conducted on this topic, finding that, if the national measure of poverty included the additional expenditures for families with a member with a disability, the proportion of families living in poverty might increase (Palmer et al, 2010; Mitra, Findley, Sambamoorthi, 2009; Cullinan, Gannon y Lyons, 2008; Institute of Medicine, 2007-1997-1987; Saunders, 2006; Zaidi y Burchardt, 2005-2003; Tibble, 2005).

In general, people with a disability have a higher risk of becoming poor compared with other populations. As a result of this, international entities such as the WB, the Unit Nations (UN), the WHO and the Inter- American Development Bank (IDB) have recognized the importance of including this group in the strategies to reduce poverty. The main purpose is the reduction of discrimination and social exclusion processes.

Although people with disabilities have been recognized as a vulnerable population in developing countries such as Colombia, strategies to reduce the economic impact of disability in the family income do not exist. According to Colombian law (Republica de Colombia, 1997), people with disabilities have access to some special resources. However, this access is limited by contextual barriers that are outside the individual's control and have a direct impact on the access to basic opportunities such as health and education.

In Colombia, according to national statistics, 6.4% of the national population live with a disability (DANE, 2006). Besides, they are considered to be the poorest of the poor and to have a reduced access to health care and education (Cruz and Hernandez, 2006). Even though there are different strategies to include people with disabilities, especially in the capital city (Alcaldia Mayor de Bogota, 2007) people with disabilities continue to be socially excluded of basic opportunities.

It is important to guarantee the access to health care, including activities to promote health, prevent diseases and rehabilitation (WHO and WB, 2011). The low access to health care services that people with disabilities have, is one of the main sources of social exclusion and is a risk factor of becoming poor.

In conclusion, poor populations usually have worse health status and are more at risk of becoming ill and getting a permanent limitation. On the other hand, people with

physical, mental, sensorial or cognitive limitations have a lower level of education and their access to the labour market is restrictive. Additionally, they use more of their budget paying for health care resources, which makes them more likely to be poor or chronically poor.

2.2 THE COLOMBIAN HEALTH CARE SYSTEM AND OTHER CONSIDERATIONS

In order to analyse the effects of living with a disability and being poor in the access to health care services in Colombia, it is important to describe and understand how the health care system works in this country.

The Colombian health care system was reformed in 1993, aiming to fulfil objectives related to universality, equity and solidarity (Florez and Tono, 2002). However, the assumptions to fulfil those objectives were that the unemployment rate was to be lower than 10% and the economic growth was to be at least 2 or 3% per year (Gaviria, Medina and Mejia, 2006). However, this has not been the case in Colombia; the economic recession in 1999, the high non-wage cost[1] (NWC) and the high number of informal workers have had a negative impact on the financing of the system.

The reform aimed to promote decentralization, improve efficiency and equity in the health care delivery with an increase in the health insurance coverage. The main goal of the reform was universal coverage by 2000 (Camacho and Conover, 2009). However, this goal was not reached by that time, and even today it has not been achieved.

After the reform, the access to health care is organised through two insurance programmes. The first one is related to the labour market. Formal sector employees, retirees, and high-income self-employed workers, have to be compulsorily enrolled in the Contribute Regimen (CR). In the CR, there are Health-Promoting Enterprises (EPS for their Spanish acronym). Once the worker chooses the EPS, the compulsory contribution is 12.5% payroll tax. This tax is shared between employer (8.5%) and employee (4%) (Castano, 2004). Besides, people in the CR could have access to private pre-payment insurance companies, which provide higher quality health care services.

The second scheme is the Subsidized Regimen (SR), which is aimed at the unemployed, the poor self-employed (mostly informal workers), and the poor and vulnerable: the elderly, the chronically ill, people displaced by the armed conflict and others. Given

[1] Non-wage cost are defined as all the payments faced by the employer (other than the wage) that include health and pension contributions, payroll taxes and transportation (commuting) subsidies, among others (Mondragon-Velez, Peña and Wills, 2010)

that this scheme is aimed at the informal and poor population, the government has to identify the poorest, in order to select them for the subsidy (Castano, 2004).

After the reform, the highest achievement was the increase in the enrolment of poor and vulnerable populations in the SR. However, there was a reduction in the percentage of people in the CR (Restrepo, 2002). This reduction has been the result of the NWC and the flexibility of the labour market in Colombia, which affects the affiliation to the CR in a direct way.

To control and to be able to find and give the opportunity of access to the SR to people who need it the most, the Colombian Government has used the System of Identification and Classification of Potential Beneficiaries of Social Programmes (SISBEN for their Spanish acronym[2]). This instrument has been used since 1993, and it was modified on three occasions with the objective of reducing corruption and improving the selection of beneficiaries.

The SISBEN is an instrument that allows the identification of vulnerable people using information from employment, income, household, demographic characteristics, education and public services. The SISBEN gives a score from 0 to 100 to each individual, organising the population from the poorest to the richest and dividing them in six levels. The lowest levels (1 and 2)[3] include the poorest and most vulnerable individuals in the society (National Planning Department (NPD), 2001).

The survey is applied only to people living in strata one to four (Camacho and Conover, 2011; Gaviria, et al, 2006). Strata is a classification that combines information about type of household construction, urbanization, housing location, number of households per dwelling, services available in the urbanization, number of connections to public services and use of public services[4]. In addition, Strata and SISBEN are indexes whose

[2] By 2007, the instrument that was available was SISBEN II, which included additional variables. Information regarding the housing location, household conditions, public services, schooling, social security and assets ownership was included in the survey (DNP, 2001).

[3] Level 1 corresponds to the persons, who had a score lower than 18 in rural areas or 36 in urban areas. In addition, level 2 are those who had a score between 18 -30 and 36 -47 for rural and urban areas, respectively (NPD, 2008).

[4] In Colombia, the NPD and the National Statistics Department (DANE) have classified the households according to different characteristics that are related to the Unsatisfied Basic Needs (UBN). All households are classified in a scale from 1 to 6 and it is established for neighbourhoods. According to this scale public services are charged. The principal point of criticism is that it excludes important aspects of the population, which determines the degree of poverty of a society (Alzate, 2006). However, strata is a national classification, which gives information about socioeconomic status and is still being used.

purpose is to find and select vulnerable populations. Moreover, they give information for the implementation of different social programmes (NPD, 2008).

People with SISBEN levels I and II have access to the SR and they receive the services included in the benefit package for SR (total subsidies). In the urban areas, people with SISBEN level equal to III, could have access to the SR benefit package if the health care resources in the region are enough to cover the enrolment of those people. However, if there are not enough resources or the person received a higher classification in the survey he or she has access to a reduced benefit package that covers a certain number of services, but does not give complete or integrated coverage to the population (partial subsidies) (Consejo Nacional de Seguridad Social en Salud (CNSSS), 2004). All people enrolled in the SR with total subsidies may choose a Health-Promoting Enterprises for SR (EPS-S), which offers a network of providers in the three levels of coverage.

However, there is a percentage of the population that does not have access to SR or CR. Those people are eligible but not covered in the SR, because they are not enrolled with an EPS-S. They are entitled to the services provided by public hospitals and the costs of those services are covered with supply side subsidies, this group is called the "*linked population*" (Gaviria et al, 2006).

Furthermore, there is a group of the population that live in the lowest strata levels, do not work, do not have enough economic resources to be enrolled as independent workers in the CR and they have not answered the SISBEN survey. As they are not enrolled in any programme; they are defined as *without insurance*.

According to the Colombian National Constitution (1991), all people living in Colombia should have access to health care services if they are in a life threatening situation. However, the access to health care in most of the cases is determined by the enrolment in an EPS or EPS-S and not by the need for health care services.

Furthermore, to be enrolled in the CR or in the SR does not guarantee the access to health care services. In 2010 the percentage of the population who were covered by the SR was 47.63% and by the CR 41.0% (data from 2008) (Asi vamos en salud, 2011). Factors associated with the benefit package, the cost sharing strategies, the waiting lists and the economic and social resources in the society have an impact on the access to health care, especially in the SR.

One of the main differences between SR and CR is the benefit packages and the types of health care providers (public or private). In the SR, the benefit package is reduced

compared with the one in CR, the inclusion of chronic and costly diseases such as Cancer or Acquired Immune Deficiency Syndrome (AIDS), is usually done using legal mechanisms[5]. After 2008, different strategies have been proposed to reduce those differences, however, even now those strategies have not been implemented yet.

Moreover, cost sharing mechanisms differ from one insurance programme to another. In the CR, the individual pays a contribution every time he receives a service and the number of contributions and the type of services are defined by law. Those contributions depend on the individual wage. For in-patient services the individual does not have to pay anything. In the SR, the percentage of money the individual has to pay depends on his SISBEN level. People with SISBEN III have to pay 30% of the cost or until three minimum wages. In SISBEN II, they pay 10% of the cost or until one minimum wage and in SISBEN I, 5% of the total cost or until one minimum wage (Gaviria et al, 2006).

Another main difference between the programmes is the type of provider EPS have contracts with. In the CR, the EPS are private insurance companies that establish contracts with private providers in different levels of health care attention (First, Second and Third attention level[6]). In the SR, the EPS-S are usually private insurance companies that have contracts with public entities (Castano, 2004). Differences in quality and waiting time between public and private hospitals are two of the main concerns for people enrolled in the SR. However, it is established by law that EPS-S have to contract at least 60% of the services with public hospitals, which limits having contracts with private providers (Republica de Colombia, 2001 and 2011).

Furthermore, another dissimilarity between CR and SR is the premium per each affiliated that the EPS or EPS-S receive. This premium is lower in the SR because the number of services included in the benefit package is fewer than in the CR (Castano, 2004).

Besides, the differences between insurance programmes and the existence of incentives to be enrolled in the CR (more services and better quality); the percentage of the population in the SR is higher and the tendency has not been different since 2000 (Asi vamos en salud, 2011). Different reasons could explain this; the first one is

[5] According with the national constitution a person has the right to demand for the fulfillment of several rights when those rights are violated. The basic mechanism to do this is "*Accion de tutela*".

[6] Those levels are defined by law in the Activities Manual, Interventions and Procedures Mandatory Health Plan (MAPIPOS for this Spanish acronym). They include different and specific services and differ between each other for the complexity of the services that are provided, for example level one includes general practitioner consultations, vaccination and nursing care (Republica de Colombia, 1994).

related to the high level of poverty and inequality in Colombia[7] and the second is the impact of the flexibility of the labour market in the selection of health care programmes (See Mondragon-Velez et al, 2010 for more details) .

Authors such as for example Santa Maria et al. (2009) have found that SR has increased the incentives to become an informal worker and that it acts as a subsidy to informality. The principal factor of this is the high number of barriers that the poor population find to become a formal employee and the flexibility in the labour contracts in the formal sector. Furthermore, factors associated with the type of health care services and the amount of money that people should pay for those services in SR, negatively influence the number of people who aim to work as formal employees.

Another aspect related to the labour market is the difficulty and long duration of the transition between insurance programmes when the person is employed in the formal sector. This causes the employee and his\her family to not have access to health care services during the time of transition. Additionally, most of the population do not perceive differences in the quality of services between SR and CR (Mondragon-Velez et al, 2010).

Last but not least, the fact that the person has a SISBEN level equal to one, makes him/her eligible for social programmes, such as *Familias en Accion* (conditional transference programme). Therefore, by accepting a formal job, the worker and his family gain access to the CR but can potentially lose other economic benefits (Mondragon-Velez et al, 2010).

In general, the access to health care services in Colombia depends on the type of programme the person is enrolled in. Additionally, the enrolment in the CR depends on having or not having a job in the formal labour market. As a result of the limitations to access to this sector, the informal workers are enrolled in the SR, which has a limited benefit package and a lower quality of services.

In addition to the dissimilarities between programmes, Florez and Tono (2002) found considerable differences in the access to health care, which depends on the residence

[7] In 2009, 45.6% of the population in Colombia were considered to be poor. Moreover, in the urban and rural areas the poverty rate was 39.6% and 64.3%, respectively. In addition, 16.4 % lived on less than one dollar per day; 12.4% in urban areas and 29.1% in rural areas. Moreover, in the same year at national level, the Gini Coefficient was 0.578. It was 0.555 in urban areas and 0.487 in rural areas (NPD, 2011).

area (rural- urban) and the region where the person lives. The main finding is that the inequalities in access and use of health care services are greater in rural areas compared with urban ones, with an impact on the health status of the population. The inequality of access in rural areas could be the result of the distribution of health care providers, for example the hospitals that provide high complexity services (tertiary level), which usually are in the district cities or in the country's capital city, Bogotá.

Likewise, the socioeconomic characteristics of the Colombian population, especially those related with poverty conditions predispose that communicable and infectious diseases are more prevalent. According to Lampis (2007), the impact of the low access to health care services increases the vulnerability to becoming poor.

In conclusion, in Colombia the socioeconomic characteristics of the population have an impact on the mechanics of the health care system. The system is divided in two programmes (CR and SR) and the enrolment in those depends on the access to the labour market or the family`s poverty level. Many differences exist between the programmes; most of them give more benefits to people covered by the CR. However, the percentage of people enrolled in the SR has increased since 1993 and this tendency has not been seen in the CR. Furthermore, the flexibility of the labour market and the NWC have an impact on the number of affiliates in the CR and create incentives to be insured in the SR. As a result of this, the health care system in Colombia is currently facing several difficulties in financing and in giving real access to all the population.

3. Data and Methods

3.1 Data sources

Cross section data on household conditions, health status, health care demand, chronic diseases, disability and other variables were derived from the Colombian National Health Survey (NHS) 2007 (Social Protection Minister, Colciencias, Cendex, Sistemas Especializados de Información, Pontificia Universidad Javeriana, 2009).

The NHS included information on morbidity, disability, demand and supply of health care services and household composition. Moreover, it was a nationally representative survey (Social Protection Minister et al, 2009).

The survey study covered all the regions and departments in Colombia and it had a sample size of 41.543 households and 164.474 persons. It was divided in two main parts. The first was related to the household and the second one to the supply of health care services.

The household part was divided in four modules that were: 1) the household survey, which included variables related to the housing characteristics, personal data of family members and information on prevention of malaria and rabies. 2) A survey for persons older than 6 years old with information on education, employment, morbidity, demand for health care services, disability, chronic conditions, traffic accidents, dental care, prevention of yellow fever and risk factors for chronic diseases; 3) A survey for people younger than 6 years and 4) a survey for people older than 18 years, which main focus was sexually transmittable diseases. Variables included in the first and second module were the source of information for this study.

3.2 STUDY SAMPLE

The sample size was 85.252 observations for individuals from 0 to 69 years old[8]. Variables with missing values which affected the quality of the data were excluded. To reduce the education level bias and because population under 18 years old were over represented in the sample[9], only information from individuals between 18 and 69 years was included and the final sample size was 37.277.

3.3 VARIABLES INCLUDED IN THE MODEL

Access was included as a dependent variable. To constructed this variable the answers of two questions were included. The first question was whether individuals needed health care and then information on access to formal or informal health care services in the last 30 days was asked separately for (i) those that had answered affirmatively to the need for health care and (ii) those that had answered negatively to the need for health care[10]. The 29.86% of the population included in the sample had access to health care services in the formal or informal sector (see figure A3.1).

Health condition: The NHS contained one module on chronic diseases[11] and one on the World Health Organization Disability Assessment Schedule (WHODAS)[12]. The

[8] The NHS (2007) does not include information for people older than 69 years old.

[9] The percentage of the population under 18 years in the sample was 48.49%. According to national statistics the percentage of the population under 18 years in 2007 was 36.27% (DANE, 2011)

[10] The question related to need was "Related to the health problems that you have had in the last 30 days, have you consulted someone or asked for help?" The answer was yes or no. The question related to no need was "In the last 30 days, have you consulted anyone or have gone to health care services even though you did not need it?" The answer was yes or no.

[11] The diseases included were cancer, epilepsy, Chronic Pulmonary Disease (CPDO), HIV/AIDS, chronic stomach diseases and Diabetes.

[12] In 1998, the World Health Organization (WHO) generated the WHODAS, which is an instrument to evaluate the daily aspects of disability. The results give the functional profile in different domains, assist in the identification of people with disabilities and in the evaluation of the rehabilitation process. There

questions in these modules were asked to the whole sample and were taking into account to generate the variables related to chronic diseases and physical, mental, sensorial, participation and daily life activities limitations.

The 16.96% of the population referred to have been diagnosed with a chronic health condition, in which were included cardiovascular disease, chronic obstructive pulmonary disease (COPD), cancer, epilepsy, HIV/AIDS, chronic stomach problems and other diseases (see table A3.1).

Furthermore, mobility limitations had a higher prevalence among the population (11.28%) compared with other types of limitations. Additionally, participation, visual and cognitive or mental limitations presented a high percentage in the population included in the sample. Contrary to what was expected, hearing limitations were not one of the most prevalent and the percentage of population living with this condition was 0.96% (see tableA3.1) (see Appendix 1).

In addition, a disability index was constructed using a factor analysis of the variables related to each type of limitation. The main objective of use factor analysis was to determine the correlation between the variables and to give to each type of limitation a score according to the severity. In this way, the disability severity index was a continuous variable, which gave a value to each person according to the number and severity of limitations (see Appendix 1) (see table A3.1).

Personal characteristics: Variables related to individual characteristics, such as age and gender were included. The 57.04% of the observations corresponded to female individuals (see table A3.1) and the mean age of the population included in the sample was 39.2 years old (see figure A3.2). The tendency of the variable gender was similar to the one given by the National Statistics (DANE, 2011). However, the variable age showed different peaks, which did not have a logical explanation.

Health Insurance: Information regarding health insurance and insurance programmes was not available in the data set[13]. For this reason, proxy variables were generated. It was assumed that all people who were working were enrolled in the CR. At the same time, the non-working population with SISBEN level equal to one or two were in the SR with total subsidies. Besides, non- working people in urban areas who had a SISBEN

are 32 questions, related to different limitations and participation constraints of people living with a disability (Mont, 2007b). See appendix 1 for more details.

[13] This information was deleted from the original data base to protect the identity of the participants in the survey.

level equal than 3 received SR with partial subsidies. Finally, individuals who were not working and had a SISBEN level higher than three or did not answer the SISBEN survey were classified as "*an individual without health insurance*" (see table A3.1). It was not possible to generate a variable that defined a *linked population*, because information on the enrolment to EPS-S was not available. According to this, 28.1% of the population had SR with total subsidies, only 2.0% had SR with partial subsidies, and 18.3% had no health insurance (see Figure A3.3).

Although the variable no insurance is the one which presented different magnitudes compared with the National Data, the percentage of people enrolled in the CR was similar to the National Statistics (Quality of Life survey (2008))[14] (DANE, 2009)[15]. It is important to consider that the sample included in this study corresponds only to individuals between 18 and 69 years old and the *linked population* was not included in the sample, these two aspects influence the percentage of people in each insurance programme[16].

Socio economic variables: The education level was represented by four dummy variables (Primary, High School, Technical and University), which included the answers to two questions[17] (see table A3.1). According to the information included in the NHS, in Colombia 39.7% of the population were educated on high school level and 32.7% on elementary school level. Only 12.1% of the individuals included in the sample had an education level equal or higher than under graduated (see figure A3.4 and table A3.1).

[14] In the Quality of Life survey (2008) the percentages of the population enrolled in the CR was 48.5% and in the SR (including total and partial subsidies) were 51.1% (DANE, 2009).

[15] It is important to consider that the number of people enrolled in each programme differs according to the information source. Unfortunately, there is not a unique national source which provides this information. The health care sector`s monitoring group estimates that in 2007, 49.19% of the population were in the SR, 38.91% in the CR and 11.90% did not have a health insurance (Asi vamos en Salud, 2011).

[16] According to the Colombian National Constitution and other National Laws, individuals older than 18 years are citizens and have the right and duty to work. Individuals younger than 18 years cannot work without a working permit. Furthermore, people older than 69 years old are more vulnerable to be poor, especially if they do not receive money from a pension scheme. As a result of the exclusion of vulnerable populations (people younger than 18 years old and older than 69), the percentage of people enrol in the SR could be lower than was expected.

[17] One question was asked to the population that was not studied and another question was asked to the individuals enrolled in the education system. The first question gave information on the last grade of education and the second about the last level of education. According to the national educational law, which defines the number of grades in each education level, four dummy variables were created (Primary, High School, Technical and University (under and post graduate studies)).

The NHS did not include information regarding family income or expenditures. For this reason different variables related to ownership of assets and house characteristics were selected to generate a proxy variable, which gave information about the family wealth[18]. The principal component approach was used to create the asset index. This index included variables related to housing characteristics and possession of different goods and was developed by Filmer and Pritchett (1999, 2001 and 2008).

The asset index which I constructed in this study, combined information on a set of household assets and living conditions, such as the ownership of a radio, television, fridge, computer, and a car. Furthermore, the availability of clean water and toilets, the material used to construct the wall and floor of the household dwelling, type of energy or fuel used to cook and source of waste disposal were taken into account.

For each question, dummy variables[19] were generated. After this, an asset index was created (Global Asset Index), which included all variables related to house characteristics and assets ownership (see Appendix 2). Finally, to examine if the Global Asset index reflects the socio economic status (SES) in Colombia, the distribution of the index was analysed with other SES variables, such as regions, strata levels, SISBEN levels and rural and urban areas (see Appendix 2).

Another variable that reflected SES was Region. To study the difference between regions, six dummy variables were generated. Those variables corresponded to the principal regions and the capital city in Colombia (Amazonas, Andina, Atlantica, Orinoquia, Pacifica and Bogotá)[20]. Each region included data from different departments and cities (see table A3.1).

[18] There are two approaches to measure the standard of life. The first is the direct measure; the most popular are income and consumption; those measures allow the comparison between samples. The second type is the proxy measures, which use data on household assets and other characteristics to create a measure of welfare or living standards. Moreover, these measures are ordinal; they rank individuals or households and do not allow the comparison. Three different approaches have been developed to construct the asset index. The first is the "arbitrary" approach, which is the sum of indicators or dummy variables of the assets the household has. The second approach is the principal components and factor analysis index, which is the simple sum of different assets that are in the data set. The final one is the predicting consumption that is used when complementary consumption data are available (O´Donnell, van Doorslaer, Wagstaff and Lindelow, 2008).

[19] The methodology used to construct the asset index was the same one used by Filmer and Pritchett and the one recommended by Rustein and Johnson (2004). Even though the principal component analysis is not recommended to be used with dummy variables, in this methodology most of the variables included to construct this index were dummies.

[20] The Regions included were the principal ones in Colombia. Bogotá was included as a specific region, for its characteristics and for being the largest city in the country and it has the highest number of health care services in the Country.

In the Andean Region, 39.37% of the population lived. In the Atlantic and Pacific Regions lived 25.79% and 15.15% of the population, respectively. Although Bogota was included as an individual variable, it should be noted that the size of this city cannot be compared with the size of a region (7.17%) (see tableA3.1).

Furthermore, Area gave information about the SES. Rural and urban areas had differences in aspects related to housing characteristics, access to public services and other socio economic aspects which had an impact on the number of health care services that were available, increasing the economic cost and time cost of having access to health care. According to the information from the sample, 8.72% of the population lived in rural areas (see table A3.1).

SISBEN and Strata levels were included in the data as dummy variables for each level. (see table A3.1) where 33.78% of the individuals in the sample were in SISBEN level 1. Furthermore, 34.05% did not have SISBEN levels (see figure A3.4). Of those without a SISBEN survey, 90.77% correspond to Strata levels one to three and 41.77% of the households were in strata level 2 (low-middle). Less than 1% of the households were classified in the highest levels (five and six) (see figure A3.6).

Interactions: In order to describe how the interaction between a health limitation and the poverty level affects the access to health care services in Colombia, several interactions were constructed.

Analysing how the interaction between a health condition and the level of the asset index or the type of health insurance affects the probability of access to health care services, several interaction variables were created. The first set of variables was the result of the interaction between a health condition (chronic disease or health limitations) and the type of health care insurance; these variables may be interpreted as the effect on the access to health care services when the person had a health condition and a specific type of health insurance (see table A3.1).

The second group of variables showed the interaction between the global asset index and the type of insurance. This may be interpreted as the interaction between the increase in the household wealth index and the type of health insurance. It supposes that in the highest quartile the population should have CR and this increases the access to health care services (see table A3.1).

The third group included the relationship between the asset index first quartile and the type of health insurance. In this relationship it was analysed how the interaction

between having the lowest wealth conditions and the type of insurance affected the access to health care services. In this way, the expectation was that people in the lowest quartile and in SR with total subsidies or in CR had a higher probability of access to health care services, compared with those who were in this quartile but had SR with partial subsidies (see table A3.1).

Furthermore, the interaction between the quartile 1 of the global asset index and the disability index showed how the increase in the severity of disability when the person was poor affected the access to health care services. In this case, it was expected that the increase in severity and being poor reduced the access to health care services. In the same way an interaction between a moderate to severe health limitation and the first quartile of the global asset index gave information about the relationship between disability and poverty (see table A3.1 and appendix 1).

Finally, the interaction between Bogota and the highest quartile of the asset index represented the proportion of population who had a high wealth level and live in the capital city. It was expected that the impact of the interaction was negative, for the existence of a private health care insurance market (pre-payment health care services) (see table A3.1).

Table A3.1 contains the definition and basic statistics of each variable included in the models.

3.4 METHODS OF ANALYSIS

In order to determine the effect of disability in the access to health care services, a probabilistic model was estimated (equation 1). The depended variable was access to health care services.

Equation 1

$$F(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k k) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k k)$$

The dummy variables that were taken as a base category were related with no limitations, male, not having any health insurance, no level of education, urban area, living in the Andean Region, quartile 1 in the asset index, strata level 2, SISBEN level 2 and other activities.

In order to analyse how the probability of access to health care services is affected by the severity of disability, different models were estimated using as independent variables the disability index, instead of limitations dummy variables.

We perform an analysis of how the access to health care services was affected by health conditions, personal factors, health insurance and socio economic status. The first model that was estimated include only variables related to chronic diseases and health limitations. In a second model, variables related to personal characteristics such as gender and age were included. Then the type of health insurance and socioeconomic variables such as area, region, strata and the asset index were included. The final models included interaction variables.

Three groups of models were estimated. Those differ in the explicative variables that were included. The first group included the disability severity index as an explanatory variable and the interaction between the disability severity index and the first quartile of the Global Asset Index. The main purpose was to determinate the impact of disability severity in the access to health care services. The second group of models included as a dependent variable the different types of limitations and the interaction between a moderate to severe health limitation and the first quartile of the Global Asset Index.

As was mentioned before, proxy health insurance variables were created to analyse the effect of the type of health insurance in the access to health care services. However, given that the information did not completely reflect the reality, the last group of models included as independent variables the SISBEN level and economic activity, instead of type of health insurance.

After having estimated the probabilistic models, the marginal effects of the average over the whole sample were calculated and are reported in table A3.1. STATA 11 was used as econometrical package to estimate the models.

4. RESULTS

Different types of models were estimated, all included as the dependent variable access to health care. However, the independent or explicative variables were different between models. In table A3.2 detailed results are presented. In addition, in table 1 the results of the best models are shown, those models were selected because the variables included presented the expected impact and the sing and magnitude of the coefficients were robust in all the estimations.

In general, the access to health care services increased when the person had a chronic disease or a health limitation, was female, had a higher level of education, was enrolled in the SR with total subsidies, had a higher level of education, was in the highest quartiles of the asset index and lived in the urban area or in the Amazonas or Atlantic region.

Access to health care services was explained by the disability severity index, chronic diseases, age, age squared, gender, type of health insurance, level of education, region, area, asset index (quartiles) and two interaction variables (model 1). The probability of access to health care increased by 5.1% (p-value=0.00) when the person had a disability and the severity increased. In the same way, when the person had a chronic disease, the probability of access increased by 13% (p-value=0.00). As was expected, females had a positive and significant probability of access (11.3%) (p-value=0.00). On the other hand, when the individual lived in a rural area the probability decreased by 2% (p-value=0.03). Moreover, Bogotá had a positive but insignificant effect in the probability of access to health care services (p-value>0.3).

The existence of a health limitation had a positive impact on the access to health care. However, daily activities limitation had a negative impact on all the models, but it was not significant (p-value>0.1). In fact, when variables related to the type of limitation were included (model 2), the probability of access to health care services increased by 10 % when there was a mobility limitation (p-value=0.00); by 10.3% when the person had limitations in participation (p-value=0.00); by 5% when they had a hearing limitation(p-value<0.1); by 4% when they had a visual limitation (p-value<0.05); and decreased by 2% when the person had a daily activities limitation.

In addition, only to have SR with total subsidies increased the probability of access to health care by 1% (p-value<0.1). Moreover, when the individual was enrolled in the CR or in the SR with partial subsidies the probability of access to health care services was reduced by 2% (p-values=0.00) and 0.8% (p-values>0.1), compared to having no health insurance.

The inclusion of variables related to SISBEN level and the economic activity (working) did not have an effect on other variables coefficients (model 3). Moreover, the coefficients associated with the SISBEN level were never significant with a p-value higher than 0.2. The coefficient associated with the variable working was always significant (p-value=0.00) and presented a negative impact on all the models that included this variable.

Furthermore, variables related to socioeconomic status always had the effect that was expected. Indeed, the increase in the quartile of the asset index had a positive and significant effect (p-value=0.00) in the probability of access to health care. In the highest quartile, the probability of access increased by 5%, compared with the lowest quartile. Besides, a higher education level increased the probability of access by at least 5%. The highest coefficients were associated with a university and technological level of education.

The interaction between health limitations and the lowest quartile of the asset index, represented the relationship between poverty and disability. In this case, I found that the variables related to this relationship always had a negative and significant coefficient (p-value<0.1). In model 1, the probability of access to health care decreased by 1% when the person was in the lowest quartile in the asset index and the severity of the disability increased. Furthermore, in model 2, the probability of access decreased by 5% when the person was poor and had a mild to severe limitation.

The inclusion of other interaction variables in all the cases did not provide additional information. Besides, in most of the cases the variables were not significant at 10% and did not have the expected impacts. The interactions between type of health insurance and a health condition (chronic disease or health limitation) did not provide the information that was expected (see table A3.2).

The interaction between the asset index and health insurance did not provide new information on the models (see table A3.2). Furthermore, the interaction between the lowest quartile of the asset index and type of health insurance did not present the expected results and in most of the cases the information given by this coefficients was contradictory (see table A3.2).

The last interaction included was between the variables Bogota and the highest quartile in the asset index. This interaction provided information regarding the existence of private pre-payment health insurance companies. In all the cases this was not significant (p-value>0.10) and the impact on the access to health care services was negative.

Table1. Average Marginal effects

Variable	Model 1	Model 2	Model 3
Disability	0.05***		

Chronic Disease	0.13***	0.13***	0.13***
Cognitive or mental limitation		0.01	0.01
Daily activities limitation		-0.02	-0.02
Participation limitation		0.103 ***	0.10***
Hearing limitation		0.05*	0.04*
Visual limitation		0.04**	0.03**
Mobility Limitation		0.1***	0.1***
age	-0.000	-0.0003	-0.000
age2	0.00004 ***	0.0004***	0.00003***
Female	0.11***	0.11 ***	0.10***
RC	-0.02***	-0.03***	
SR totals	0.01*	0.01*	
SR partials	-0.008	-0.007	
SISBEN 1			0.01
SISBEN 3			-0.01
SISBEN 4			-0.05
SISBEN 5			0.04
SISBEN 6			0.15
No SISBEN			0.002
Do not know if have SISBEN			-0.003
Working			-0.04***
Primary	0.06***	0.05***	0.05***
High school	0.08 ***	0.07***	0.07***
Technical	0.13***	0.12***	0.12***
University	0.13***	0.12***	0.12***
Rural	-0.02**	-0.02**	-0.02***
Bogota	0.003	0.003	0.003
Amazonas Region	0.052***	0.05 ***	0.05***
Atlantic region	0.072***	0.07***	0.07***
Orinoquian Region	-0.002	-0.003	-0.003
Pacific Region	-0.009	-0.008	-0.01
Asset index quartil2	0.05***	0.05***	0.05***
Asset index quartil3	0.07***	0.06***	0.06 ***
Asset Index quartil4	0.04***	0.04 ***	0.04***
Poverty and disability	-0.01*	-0.05***	-0.05***
Bogota and asset index 4	-0.015	-0.015	-0.015
Pseudo- R2	0.0513	0.0526	0.0527

*p<.1; **p<.05;***p<.01

5. DISCUSSION

The results of this study suggest that the main determinants of the access to health care services in Colombia are living with a health condition, gender, level of education, area, region and level of asset index. The factors that influence the access the most are the level of education and the existence of a health condition. The last result is explained by the increase in the need for health care services that people with a health condition has (Palmer et al, 2010).

Moreover, gender is another important determinant in the access to health care services in Colombia. Females take more care of their health status and they are more aware of health problems (Dachs, Ferrerm, Florez, Barros, Narvaez and Valdivia, 2002).

Furthermore, the type of health insurance programme determines the access to health care. However, in some cases to be enrolled in a programme does not guarantee the access to health care services. Even though the probability of access to health care services increases when the person is enrolled in the SR with total subsidies, the reduced benefit package and the premium per each affiliated limit the access to high cost and specialized services in the SR. Some studies analyzed the effect of being enrolled in the SR compared with not having insurance. The main finding was that the access and the utilization of health care services increases when the person is enrolled in the SR (Giedion, Díaz, Alfonso and Savedoff, 2009; Trujillo, Portillo and Vernon, 2005).

Although people enrolled in the CR have access to a higher number of services, the results show that the probability of access to health care is lower if the person has this type of health insurance. One possible explanation of this reduction is the opening hours of the health care services and first level hospitals[21].

Even though, the results show that the SISBEN level is not a determinant in the access to health care services, people with the lowest and highest levels of SISBEN have a higher probability of access to health care, because they have SR or CR. Nevertheless, when the person has a SISBEN level III or IV the probability of access decreases. This is associated with the existence of partial subsidies, which only allows the access to a few health care services and does not provide comprehensive care to the population.

The available information does not allow a detailed analysis of aspects related to the type of health care programme, or the effect of pre-payment private health insurances

[21] In the first level of attention services related to public health, basic medical consultations, clinic laboratory and low complexity hospitalization are provided.

in the access to high cost of health care services in Colombia. However, the results are the expected and reflect the real situation of the health care system in Colombia.

Socioeconomic variables are important determinants of the access to health care services in Colombia. The level of education has a direct effect on the access to health care services. This finding is similar to the findings presented by Mejia, Sanchez and Tamayo (2007); Marmot,(2005) and Florez and Tono (2002). In fact, highly educated populations are more aware of their health condition and have more knowledge regarding diseases, which increases the demand for more specialized and complex health care services.

In addition, Mejia et al. (2007), Marmot (2007) and Florez et al. (2002) found that the probability of access to health care increases when the person lives in an urban area and decreases when the person lives in deprived regions such as the Pacific Region. These results are similar to the ones found in this study.

Moreover, the probability of access to health care services increases when the person has a higher level of living standard. This finding is similar to the one described by the WHO (2003), Sala i-Martin (2005), Florez and Tono (2002) and other studies which related different poverty measures to access to health care.

Furthermore, variables related to Strata and SISBEN level show the expected impact, but they are not significant and do not provide additional information in the models that were included. In contrast to this, the asset index always presents the expected impacts and is significant in all the models. It should be taken into account that SISBEN and Strata have been criticized for the lack of accuracy and the high levels of corruption in the final results (Camacho and Conover, 2011; Alzate, 2005) .

This study has shown that the people who live with a health condition (chronic disease or a physical, mental, sensorial limitation or a limitation to participate in social and political processes) have a higher probability of access to health care services, compared with people without limitations. The main reason is that people with a health condition have higher needs for health care services, which increases the demand for different types of inpatient and outpatient services (Goodman, Stapleton, Livermore and O'Day, 2007). However, people with limitations in daily activities have a lower probability of access to health care services. This could be explained by the severity of the limitation. In most of the cases, people with daily activities limitations have difficulties in basic personal tasks which are the consequence of the severe disability.

Furthermore, the study identified that physical limitations have a higher influence on the access to health care services in Colombia These findings are associated with the high prevalence of physical limitations in this country. According to the National CENSUS, 29.5 % of the population have a physical or mobility limitation (DANE, 2006).

The results of this study show that people who live with a health limitation and are poor, have less probability of access to health care services in Colombia. These results are similar to those found in the WHO and the WB (2011), Mitra et al. (2011, 2008), Palmer et al (2011), Godman et al. (2007), Iezzoni et al. (2006) and Yeo et al(2003).

People with disabilities present different socioeconomic characteristics that increase the risk of poverty and in most of the cases reduce the access to basic facilities, such as health care services. The extra cost associated with health care is the main cause of the reduction in access to health care. In addition, the physical barriers that people with disabilities have to face is another important factor that reduces the access to health care services.

Moreover, people with disabilities in Colombia have a low level of education and live in rural areas (Hernandez and Hernandez, 2004). Those characteristics are associated with a reduction in the access to health care services. In fact, social exclusion to basic services is given by the combination of different risk factors that increase the vulnerability of poverty. It also has an impact on the economic resources as a family has to pay for extra health care services. Besides the social discrimination process people with disabilities have to face, the access to the labour market is reduced, which is directly related to being enrolled in the CR. Because of this, people with disabilities might be enrolled in the SR or in the worst case scenario, they do not have a health insurance. All this has a direct impact on the quality and quantity of the services they receive. In addition, the main consequence of this process is the reduction in their health condition and an increase in the severity of the disability. Furthermore, the risk of poverty increases as well as the social exclusion of this population.

Although, the probability of access to health care increase when the person is enrol in the SR, this insurance programme has a reduced benefit package, fewer providers, a low quality of services, a longer waiting time and a higher number of administrative processes. These factors reduce the access and have a direct impact on the economic resources the individual and his/her family have to pay to ensure access to health care services. Poor and vulnerable populations in Colombia are enrolled in the SR. So, people with disabilities are poor and vulnerable, have access to low quality services,

which limits their rehabilitation process, increase the discrimination against them and reduce their opportunity to be active on the labour market.

Amartya Sen (1996, 2000, 2002, 2004, 2005, 2009) has described that people with disabilities are poor and might have access to different basic opportunities, which may increase their capabilities and their freedom. However, they are considered the poorest of the poor and have a reduced set of opportunities, including access to basic health care services, that includes prevention, primary care and specialized care. For these reasons, they are more vulnerable to poverty and to be socially excluded.

In conclusion, the access to health care services in Colombia is determined by factors associated or not with the individual. In general, females, highly educated individuals with high living standards, who live in urban areas, in regions with a high concentration of health care services and with chronic diseases or health limitations have a higher probability of access to health care services

Furthermore, people who are poor and live with a health limitation have less probability of access to health care services. This is related to social discrimination and social exclusion processes. In addition, the extra cost associated with the access to health care services for people with disabilities has been determined as one important aspect that reduces the access to health care. In Colombia, poor and vulnerable populations have access to a reduced benefit package that does not allow the access to basic and necessary services such as an integral rehabilitation treatment.

5.1 Study Limitations

An important limitation of my study was the definition of disability that was used in the NHS (2007). Even though the WHODAS is an important instrument in the measure of disability, it is not universally accepted and is, therefore, problematic in the concept of disability. Since 2000, the Washington Group on Disability Statistics has been working on a set of questions that might be included in CENSUS and other national surveys and might provide information on the magnitude of disability in a country and allows cross national comparisons. As a result of the difference between concepts in the definition of disability, our results should be read carefully because the definition of disability used in the NHS was not universally accepted and could sub estimated the magnitude of disability in Colombia.

A second limitation was that the available information from the NHS did not include variables related to health insurance. For this reason, a detailed analysis of the effect of the type of health insurance affected the access to health care services, was not

possible. The proxy variables that were constructed provided limited information and conclusions on this topic should be interpreted carefully.

In this study, time cost could not be included in the analysis because the NHS did not provide information related to this topic for the whole sample. However, the data available showed that the time cost was not an important issue. In fact, more than 80% of the population who answered the question said that the time that they spend from their house to the health care providers was less than one hour. Another limitation was that in the NHS the question related to access did not specify the type of health care service the person had access to. The question included information regarding informal and formal health care services.

I did not include people older than 69 years because the NHS did not include this population in the sample. However, in the analysis of access to health care for people with a disability this group is important, given by the high prevalence of health conditions in individuals older than 69 years old.

It was not possible to analyse the cost associated to health care expenditures for people with disabilities. All the variables that provided information on cost were only asked to the population that had access to health care services and no to the whole sample. This was an important limitation, because people with a disability have to pay extra for health care services and costs associated with transportation and informal caregivers, affecting the opportunity of access to health care.

6. CONCLUSIONS

The determinants of access to health care services in Colombia are the health status, the level of asset index, the level of education, the region and the area where the person lives. People who live with a physical, mental or sensorial limitation have a higher probability of access to health care services. However, poor and disabled people have a lower probability in access, which increases the risk of having a severe disease and become chronically poor. In addition, people with disabilities run more risks of not having access to health care, because they have low levels of education, high levels of poverty and live in rural areas, which are determinants of not having access to health care services. Public policies that aim to increase the real access to health care services for people with disabilities who are poor could help to reduce the risk factor that is one of the causes of the relationship between disability and poverty. Identifying the impact

of direct and indirect cost in the access to health care services for people who live with a health limitation is an important topic for future research.

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APPENDIX 1: WHODAS QUESTIONNAIRE. DISABILITY SEVERITY INDEX

The WHODAS questionnaire is an instrument which main objective is to identify people who live with a disability. The set of questions include aspects related to cognitive, physical or mobility, daily activities, participation, and hearing and visual limitations. The questions do not ask for deficiencies, instead they ask for difficulties, and this has a positive effect on the population and reduce the cultural and social bias. This instrument takes into account the definition of disability proposed by the International Classification of Impairments, Disabilities and Handicaps (WHO, 1980). However, it is not universally accepted and it does not take into account the current definition of disability.

The questions that were included in the analysis are presented in table A1.1. The answers ranked from having no difficulty to having extreme difficulty. People who answered that "*they did not do any activity"* were included in having no difficulty.

The questions were distributed to six groups according to the activity they were asking for. The groups are:

1. Cognitive or mental limitations
2. Mobility limitations
3. Daily life activities limitations
4. Participation limitations
5. Hearing limitations
6. Visual limitations

After grouping the questions, different variables were created. The first variable was the disability severity index. This index was the result of the first factor in factor analysis. Aiming to analyse the severity of disability and how different limitations were correlated, factor analysis was implemented. Variables that took values from 1 to 5 were created, one meaning no difficulty and five severe difficulty. After having created those variables, they were included in factor analysis and the correlation matrix was generated. The disability severity index is the predicted value of the first factor.

Aiming to identify which limitation had a greater impact on the access to health care services, different dummy variables were created, each of them took the value of one when the person had that limitation and zero if not. Only answers from moderate to severe disability were included. In addition, a variable named *disability moderate to severe* was created. This variable took the value of one if the person answered having at

least one moderate to severe difficulty and zero if the person answered no to all the questions.

Table A1.1. WHODAS questions included in the analysis

In the last 30 days how much difficulty did you have to…?
➢ Concentrate on doing something for ten minutes or more?
➢ Learning something new?
➢ Standing for long periods such as 30 minutes?
➢ Walking long distances such as a kilometre?
➢ Washing your whole body?
➢ Getting dressed?
➢ Dealing with people you do not know?
➢ Maintaining a friendship?
➢ Taking care of your household responsibilities?
➢ Your day to day work?
➢ How much of a problem did you have joining in community activities?
➢ How do you describe your hearing capability?
➢ Do you have any difficulty seeing even though you are wearing glasses?

Source: ENH

Two variables were used to create the interaction between disability and poverty (disability severity index and *disability moderate to severe).* When the disability severity index was used, the values of the interaction ranged from -0.63 to 10.30. Furthermore, the variable disability moderate to severe was used. The variable that was constructed took the value of one when the person was in the lower quartile of the asset index and had a moderate to severe limitation and zero when one or both variables were different from one.

APPENDIX 2: ASSET INDEX

This appendix explains in detail the construction of the global asset index. In addition, the distribution of the asset index per region, strata levels, SISBEN levels and rural area were analysed.

The global asset index included aspects related to household characteristics and the ownership of assets. The first aspect took into account characteristics associated with the floor and walls material, the water supply, the type of toilet, of garbage collection and the fuel or energy used to cook (see table A2.1). Each question included 6 to 9 alternatives, one dummy variable was created per alternative and those dummies were included in the principal components analysis.

Table A2.1. Questions and alternatives

Question	Alternative
What is the principal walls material?	Stone Prefabricated material Adobe Wood Other vegetable material Plastic or carton No walls
What is the principal floor material?	Marble Carpet Wood Cement Sand
What source of energy or fuel do you use to cook?	Gas Kerosene Electricity Wood Carbon Waste material Do not cook
What is the principal mechanism to dispose of garbage?	Garbage is collected by the public cleaning services Is collected by other It is buried It is thrown in the river It is thrown in the yard It is burned
What is the principal source of water?	Public aqueduct Other aqueduct Tanker Well River Bottle of water Rain Neighbour
What type of toilet does the house have?	Connected to the sewage system Connected to a septic tank

	Without connection
	Hole
	Does not have any

Source: NHS

The second aspect of the global asset index included variables related to the ownership of assets by the family. Furthermore, one dummy variable was constructed per each asset. As with the previous aspects, the dummy variables were included in the principal component analysis. Table A2.2 presents the list of assets that were taken into account.

Table A2.2. Assets included in the PCA

Type of asset
Radio
Color television
Fridge
Blender
Stereo
Washing machine
DVD
Computer
Internet
Cable television
Oven
Microwave
Vacuum cleaner
Water heater
VHS
Motorcycle
Car
Black and white television

Source: NHS

After generating the dummy variables they were included in the principal component analysis (PCA). The Eigenvalues were estimated. Table A2.3 presents the Eigenvalues of the PCA for the Global Asset Index. The first principal component explained 18.52% of the variance in the sample. According to the Eigenvalues higher than one, the first 14 components should be included in the index. However, the literature states that the index may be equal to the first principal component.

Table A2.3. Eigenvalues Global asset index

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	7.591	4.428	0.185	0.185

Comp2	3.163	1.106	0.077	0.262
Comp3	2.057	0.225	0.050	0.313
Comp4	1.832	0.357	0.045	0.357
Comp5	1.475	0.038	0.036	0.393
Comp6	1.437	0.253	0.035	0.428
Comp7	1.184	0.021	0.029	0.457
Comp8	1.163	0.041	0.028	0.486
Comp9	1.122	0.036	0.027	0.513
Comp10	1.086	0.003	0.027	0.539
Comp11	1.084	0.049	0.026	0.566
Comp12	1.034	0.022	0.025	0.591
Comp13	1.013	0.006	0.025	0.616
Comp14	1.007	0.023	0.025	0.640
Comp15	0.983	0.033	0.024	0.664
Comp16	0.95	0.007	0.023	0.688
Comp17	0.943	0.075	0.023	0.711
Comp18	0.867	0.025	0.021	0.732
Comp19	0.843	0.056	0.021	0.752
Comp20	0.787	0.012	0.019	0.771
Comp21	0.775	0.011	0.019	0.790
Comp22	0.764	0.035	0.019	0.809
Comp23	0.728	0.003	0.018	0.827
Comp24	0.725	0.034	0.018	0.844
Comp25	0.691	0.031	0.017	0.861
Comp26	0.66	0.027	0.016	0.877
Comp27	0.632	0.019	0.015	0.893
Comp28	0.613	0.002	0.015	0.908
Comp29	0.611	0.022	0.015	0.923
Comp30	0.589	0.004	0.014	0.937
Comp31	0.585	0.017	0.014	0.951
Comp32	0.568	0.017	0.014	0.965
Comp33	0.551	0.046	0.013	0.979
Comp34	0.505	0.149	0.012	0.991
Comp35	0.356	0.340	0.009	1.000
Comp36	0.016	0.017	0.000	1.000
Comp37	0	0	0	1
Comp38	0	0	0	1
Comp39	0	0	0	1
Comp40	0	0	0	1
Comp41	0	.	0	1

Source: Author calculations using NHS data

In figure A2.1 the scree plot of Eigenvalues of the Global asset index is presented. In this figure, the decision rule stated that at least the first eight components should be included in the analysis.

Although the decision rules suggest that more components might be included in the analysis, the first principal component was selected as the asset index. All the studies that use this index took the first component as the asset index (Wagstaff and Lindelow, 2010; Filmer and Scott, 2008, Van de Poel, Hosseinpoor, Speybroeck, Van Ourti and Vega, 2008; O´Donnell et al, 2008; Vyas and Kumaranayake, 2006; Sahn, 2003; Filmer and Pritchett 1999, 2001). Additionally, with the purpose of analysing how the level of family wealth affects the access to health care, the sample was sorted according to the Global asset index values and then divided in four equal parts. In this way, the households in the first quartile are those in the worst economic conditions.

An analysis of the distribution of households according to the quartiles in area, regions, strata and SISBEN levels was made.

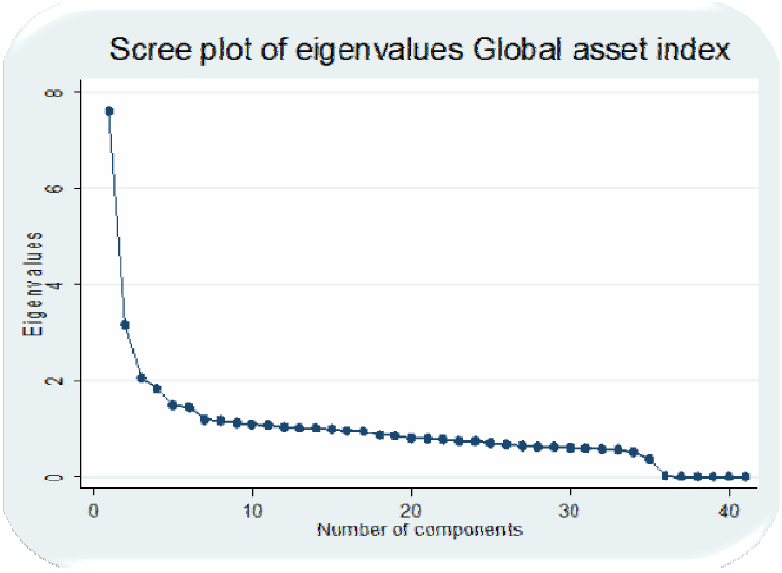
The correlation between the first component and the variables is in most of the cases higher than 10%. These results showed that the inclusion of only the first component gives information on all the variables. Although it did not explain the variance between variables completely, it would be appropriate for the analysis of living standards.

Figure A2.2 showed the distribution of the global asset index in the rural and urban areas. This figure shows that in the rural area, most of the families lived in the second and third quartile, with less than five percent of families living in the highest quartile. This results were expected because people living in rural areas have a lower number of assets and the house characteristics are worse compared with urban areas. However, the number of people in urban areas in the lowest quartile was higher than in rural areas. This could be explained by the immigration from rural to urban areas, specifically to Bogota, which has created "*poverty belts*" around the major cities in the country.

In figure A2.3 the distributions of the Global Asset Index in the six principal regions of the country are shown. In this figure, it can be seen that in the Andean Region 63.24% of the families were in the second quartile of the Global Asset Index. The results were expected in all the regions. Because of the differences between cities, the percentage of population in each quartile of the asset index in all the regions could be different. For example, in the Amazonas region 83.61% of the population was in the highest quartile

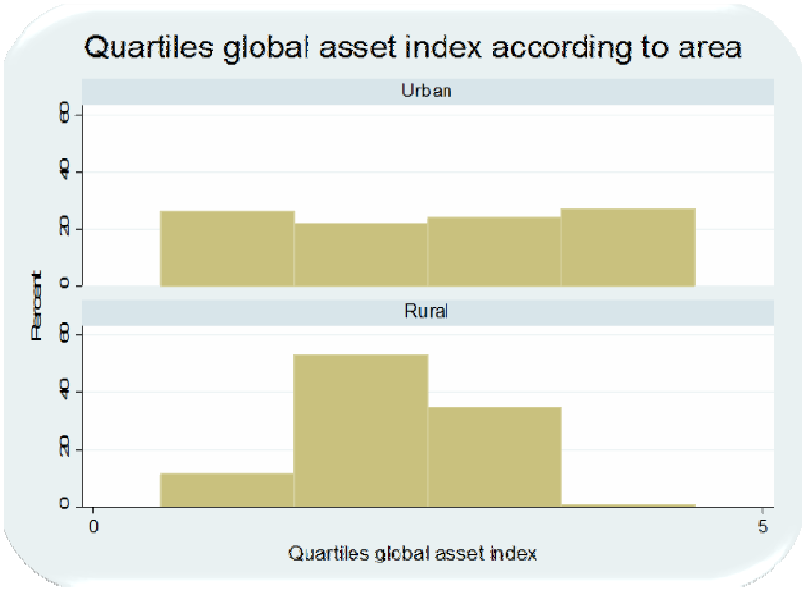
of the Asset Index. However, 16% was in the second quartile, which could be considered as poor populations.

FigureA2.1. Scree plot of Eigenvalues Global Asset index



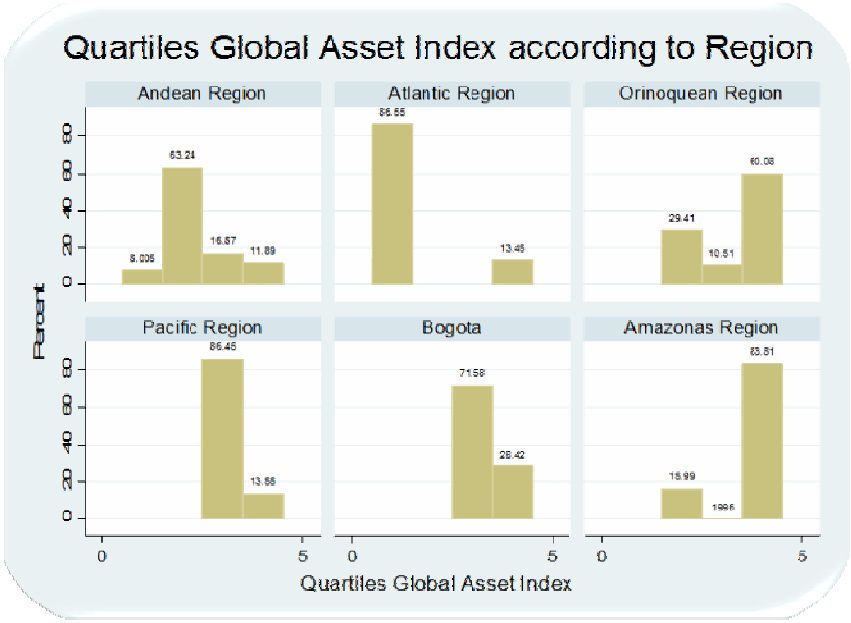
Source: Author calculations

FigureA2.2. Quartiles global asset index according to area



Source: Author calculations

FigureA2.3. Distribution Global Asset index according to Region

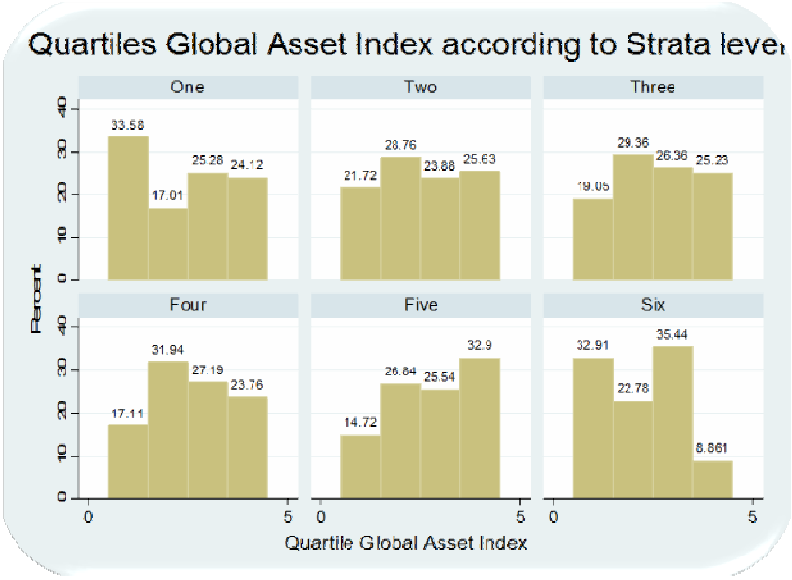


Source: Author calculations

The percentage of households in each quartile of the asset index per strata level is presented in figure A2.4. This figure shows results that were not expected because in all the cases there were families in all the quartiles. For example, in the Strata highest level, only 8.9% of the families live in the highest quartile of the global asset index. However, in the lowest strata level, the percentage of households in the first quartile was higher than in the others. The different critiques that have been done on the Strata Index should be taken into account. In most of the cases this index does not classify the families according to their living standards.

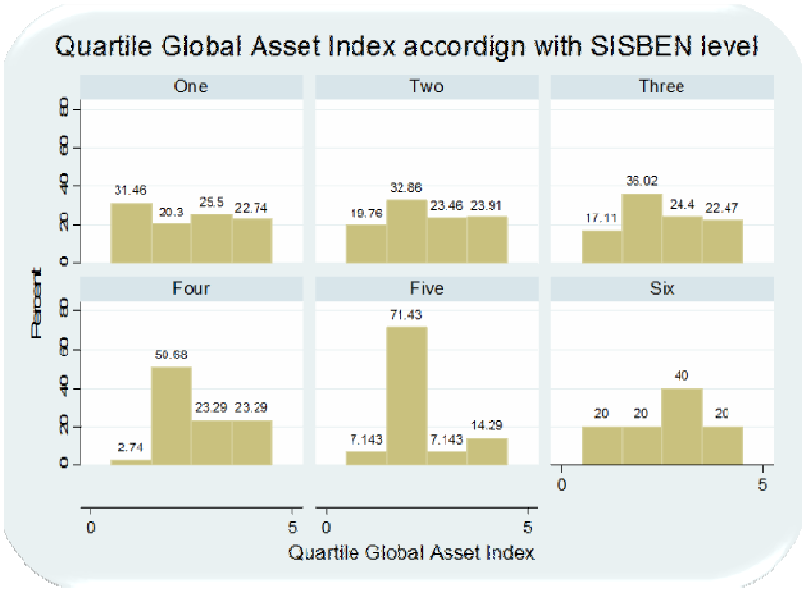
In figure A2.5, the distribution of the asset index according to SISBEN levels are presented. Similar to the results in figure A2.4, the results were not the ones expected. It was expected that the distribution of households in the different quartiles had the same order as the SISBEN levels. In other words, households in SISBEN level 1 should be in the lowest quartile. However, this is not what can be seen in figureA2.5.

Figure A2.4. Distribution Global Asset index according to Strata level



Source: Author calculations

FigureA2.5. Distribution asset index according to SISBEN level



Source: Author calculations

In conclusion, the interpretation of the Global Asset Index as an indicator of the standard of living in Colombia should be done carefully. However, it is important to take into account that indexes such SISBEN and Strata have been criticized and some studies have shown that these indices do not classify the population properly.

APPENDIX 3. TABLES AND FIGURES

TableA3.1. Variables definition and basic statistics

Variable	*Units of measure*	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
Access	Dummy variable that took the value of one when the individual had access to health care services (formal or informal) with or without need and zero when he did not have access to health care services. The question related to need was "Because the health problems that you have had in the last 30 day, have you consulted someone or asked for help?" The answer was yes or no. The question related to not need was "In the last 30 days, have you consulted anyone or have gone to health care services even though you did not need it?" The answer was yes or no.	37277	0.2986	0.458	0	1
	Education level					
· ***None****	Dummy variable that took the value of one if the person did not have education or zero if the person had any level of education.	37277	0.067	0.250	0	1
· ***Elementary school***	Dummy variable that took the value of one if the person was studying any level in elementary school or zero if the person was in another level or did not have any level of education.	37277	0.327	0.469	0	1
· ***High School***	Dummy variable that took the value of one if the person was studying any level in high school or zero if the person was in another level or did not have any level of education.	37277	0.397	0.489	0	1
· ***Technical level***	Dummy variable that took the value of one if the person was studying any technical education or zero if the person was in another level or did not have any level of education.	37277	0.089	0.284	0	1
· ***University or more***	Dummy variable that took the value of one if the person was studying at the university (bachelor or postgraduate student) or zero if the person was in another level or did not have any level of education.	37277	0.121	0.326	0	1
	Personal Characteristics					
Age	Continuous variable that took the values from 12 to 69 years	37277	39.165	13.975	18	69
Age2	Continuous variable that is the result of age^2	37277	1729.210	1172.986	324	4761
Gender (female)	Dummy variable that took the value of one if the person was a woman or zero if the person was a man.	37277	0.570	0.495	0	1
	Region					
·***Bogota***	Dummy variable that took the value of one if the person was from Bogota or zero if the person was from another region.	37277	0.0766	0.266	0	1
Amazonas region	Dummy variable that took the value of one if the person was from any department in the Amazonas Region or zero if the person is from another region.	37277	0.107	0.310	0	1
·***Andean region****	Dummy variable that took the value of one if the person was from any department in the Andean Region or zero if the person was from another region.	37277	0.394	0.4886	0	1

Atlantic region	Dummy variable that took the value of one if the person was from any department in the Atlantic Region or zero if the person was from another region.	37277	0.258	0.4375	0	1
Orinoquian region	Dummy variable that took the value of one if the person was from any department in the Orinoquian Region or zero if the person was from another region.	37277	0.072	.3585	0	1
Pacific region	Dummy variable that took the value of one if the person was from any department in Pacific Region or zero if the person was from another region.	37277	0.151	0.489	0	1
	Area					
Rural	Dummy variable that took the value of one if the person lived in a rural area or zero if the person lived in an urban area.	37277	0.0872	0.282	0	1
	Health Insurance					
Contribute Regime	Dummy variable that took the value of one if the person worked or zero if the person did not work and because of this not contribute to the social security system.	37277	0.5169	0.500	0	1
	Subsidized programmes					
Total subsidies	Dummy variable that took the value of one if the person did not work and had a SISBEN level lower than three and zero if the person that worked had a SISBEN level higher or equal than 3 or did not have a SISBEN level	37277	0.2807	0.449	0	1
Partial subsidies	Dummy variable that took the value of one if the person did not work and had a SISBEN level of three and zero if the person that worked had a SISBEN level lower or higher than three or did not have a SISBEN level.	37277	0.0195	0.138	0	1
No health insurance*	Dummy variable that took the value of one if the person did not work, had no partial or total subsidies and zero if the person that works had a total or partial subsidy.	37277	0.1828	0.387	0	1
	Activity					
Working	Dummy variable that took the value of one if the person worked and zero if not.	37277	0.5425	0.4982	0	1
Others*	Dummy variable that took the value of one if the person was doing another activity not related to work and zero if the persons worked	37277	0.4575	0.4982	0	1
	Global Asset Index					
Quartile 1*	Index that included variables related to the type of goods the household possesses and the services and the housing characteristics. It is the first principal component. The first principal component was divided in quartiles and for each quartile one dummy variable was created. Then it was divided in four parts	37277	0.2500	0.433	0	1
Quartile 2		37277	0.2500	0.433	0	1

Quartile 3		37277	0.2500	0.433	0	1
Quartile 4		37277	0.2500	0.433	0	1
Strata						
· ***Strata 1***	Dummy variable, which took the value of one when the individual was in this strata level and zero when he was not.	37277	0.3364	0.472	0	1
· ***Strata 2****	Dummy variable, which took the value of one when the individual was in this strata level and zero when he was not.	37277	0.4177	0.493	0	1
· ***Strata 3***	Dummy variable, which took the value of one when the individual was in this strata level and zero when he was not.	37277	0.2094	0.407	0	1
· ***Strata 4***	Dummy variable, which took the value of one when the individual was in this strata level and zero when he was not.	37277	0.0282	0.166	0	1
· ***Strata5***	Dummy variable, which took the value of one when the individual was in this strata level and zero when he was not.	37277	0.0062	0.078	0	1
· ***Strata 6***	Dummy variable, which took the value of one when the individual was in this strata level and zero when he was not.	37277	0.0021	0.046	0	1
SISBEN level						
SISBEN Level 1	Dummy variable, which took the value of one when the individual was in this SISBEN level and zero when he was not.	37277	0.337849	0.472983	0	1
SISBEN Level 2*	Dummy variable, which took the value of one when the individual was in this SISBEN level and zero when he was not.	37277	0.216085	0.411578	0	1
SISBEN Level 3	Dummy variable, which took the value of one when the individual was in this SISBEN level and zero when he was not.	37277	0.0415538	0.19957	0	1
SISBEN Level 4	Dummy variable, which took the value of one when the individual was in this SISBEN level and zero when he was not.	37277	0.0415538	0.19957	0	1
SISBEN Level 5	Dummy variable, which took the value of one when the individual was in this SISBEN level and zero when he was not.	37277	0.0003756	0.01938	0	1
SISBEN Level 6	Dummy variable, which took the value of one when the individual was in this SISBEN level and zero when he was not.	37277	0.0001341	0.0115809	0	1
No SISBEN	Dummy variable, which took the value of one when the individual did not answered the SISBEN survey and zero when he had.	37277	0.3402098	0.4737859	0	1
Did not know	Dummy variable, which took the value of one when the individual did not know his SISBEN level and zero if he knew.	37277	0.0618344	0.2408577	0	1
Health conditions						

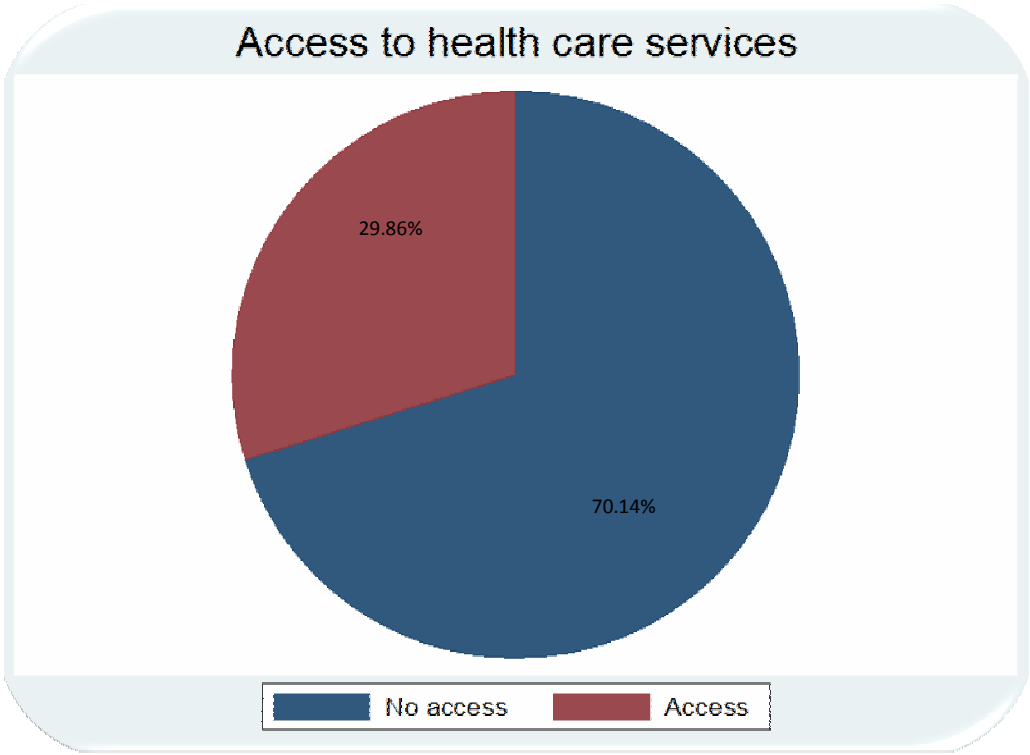
Chronic diseases	Dummy variable that took the value of one if the person had any type of chronic disease or zero if the person did not.	37277	0.1696	0.375	0	1
Limitations						
· ***Mobility limitation***	Dummy variable that took the value of one if the person had a mobility limitation from moderate to severe and zero if not.	37277	0.1129	0.316	0	1
· ***Mental or cognitive limitation***	Dummy variable that took the value of one if the person had a mental or cognitive limitation from moderate to severe and zero if not.	37277	0.067	0.244	0	1
· ***Visual limitation***	Dummy variable that took the value of one if the person had a visual limitation and zero if not.	37277	0.018	0.1329	0	1
· ***Hearing limitation***	Dummy variable that took the value of one if the person had a hearing limitation from moderate to severe and zero if not.	37277	0.0096	0.0974	0	1
· ***Limitations in participation***	Dummy variable that took the value of one if the person has a limitation in participation from moderate to severe and zero if not.	37277	0.0729	0.2599	0	1
· ***Limitations in daily activities***	Dummy variable that took the value of one if the person has limitations in daily activities from moderate to severe and zero if not.	37277	0.0373	0.1894	0	1
Disability moderate to severe	Dummy variable that took the value of one when the individual had at least one limitation from moderate to severe and zero when the individual did not have limitations from moderate to severe	37277			0	1
Disability Index	Continuous variable, which was the result of factor analysis that included the variables related with mobility limitations, mental or cognitive limitations, visual limitations, hearing limitations, limitations in participation and daily activities limitations.	37277	0.0000	0.865	-3.63	10.301
Interactions:						
Health condition and SR total insurance	Dummy variable that took the value of one if the person had a chronic disease and was in the SR with a total subsidy and zero if the person had a chronic disease but was not in the SR with a total subsidy or had this type of insurance but not a chronic disease.	37277	0.0561	0.230	0	1
Health condition and SR partial insurance	Dummy variable that took the value of one if the person had a chronic disease and was in the SR with a partial subsidy and zero if the person had a chronic disease but was not in the SR with a partial subsidy or has this type of insurance but not a chronic disease.	37277	0.0040	0.063	0	1
Health condition and CR insurance	Dummy variable that took the value of one if the person had a chronic disease and is in the CR and zero if the person had a chronic disease but was not in the CR or had this type of insurance but not a chronic disease.	37277	0.0740	0.262	0	1
SR Total and Global asset index (quartiles)	Variable from 0 to 4 that showed the relationship between having SR with total subsidy and the increase in the quartile of the global asset index. It showed the relationship between the increase in the asset index and having SR with total insurance	37277	0.6708	1.221	0	4

SR Partial and Global asset index (quartiles)	Variable from 0 to 4 that showed the relation of having SR with total partial and the increase in the quartile of the global asset index. It showed the relationship between the increase in the asset index and having SR with partial insurance	37277	0.0476	0.365	0	4
CR and Global asset index (quartiles)	Variable from 0 to 4 that showed the relation of having CR and the increase in the quartile of the global asset index. It showed the relationship between the increase in the asset index and having CR insurance	37277	1.3206	1.512	0	4
Disability and poverty	Continuous variable that took the value between -0.363 and 10.30 and showed the relationship between the increase in the severity of disability and being in the lowest quartile in the asset index.	37277	-0.0062	0.414	-0,363	10.30
Disability moderate to severe and poverty	Dummy variable that took the value of one when the person was in the lowest quartile in the asset index and had at least one limitation from moderate to severe and zero in the other case.	37277			0	1
Bogota and 4th quartile asset index	Dummy variable that took the value of one when the person lived in Bogotá and was in the highest quartile in the asset index. It showed the relationship between a high asset index and living in the capital city.	37277	0.0218	0.146	0	1
SR total Disability index	Continues variable that took the highest value when the person had a severe limitation and had a SR with total subsidies	37277	0.0455	0.599	-0	10
CR Disability index	Continues variable that took the highest value when the person had a severe limitation and had a CR	37277	-0.0668	0.388	-0	9.8
SR partial Disability index	Continues variable that took the highest value when the person had a severe limitation and had a SR with partial subsidies	37277	0.0027	0.152	-0	8.4
Any disability and SRT	Dummy variable that took the value of one if the person had any type of disability and was in the SR with a total subsidy and zero if the person had a limitation but was not in the SR with a total subsidy or has this type of insurance but was not a limitation.	37277	0.0319	0.176	0	1
Any disability and CR	Dummy variable that took the value of one if the person had any type of disability and was in the RC with a total subsidy and zero if the person had a limitation but was not in the CR or had this type of insurance but was not a limitation.	37277	0.024	0.153	0	1
Any disability and SRP	Dummy variable that took the value of one if the person had any type of disability and was in the SR with partial subsidy and zero if the person had limitation but was not in the SR with a partial subsidy or had this type of insurance but was not a limitation.	37277	0.0023	0.048	0	1

Asset index 1 and SRT	Dummy variable that took the value of one if the person had a value equal to one in the first quartile in the asset index and was in the SR with a total subsidy and zero if the person had a value equal to one in the first quartile in the asset index but was not in the SR with a total subsidy or had this type of insurance but was not a value equal to one in the first quartile in the asset index.	37277	0.6707621	1.221	0	1
Asset index 1 and SRP	Dummy variable that took the value of one if the person had a value equal to one in the first quartile in the asset index and was in the SR with a partial subsidy and zero if the person had a value equal to one in the first quartile in the asset index but was not in the SR with a partial subsidy or had this type of insurance but was not a value equal to one in the first quartile in the asset index.	37277	0.0035142	0.05918	0	1
Asset index 1 and CR	Dummy variable that took the value of one if the person had a value equal to one in the first quartile in the asset index and wais in the CR and zero if the person has a value equal to one in the first quartile in the asset index but was not in the CR or had this type of insurance but was not a value equal to one in the first quartile in the asset index.	37277	0.1241248	0.32973	0	1

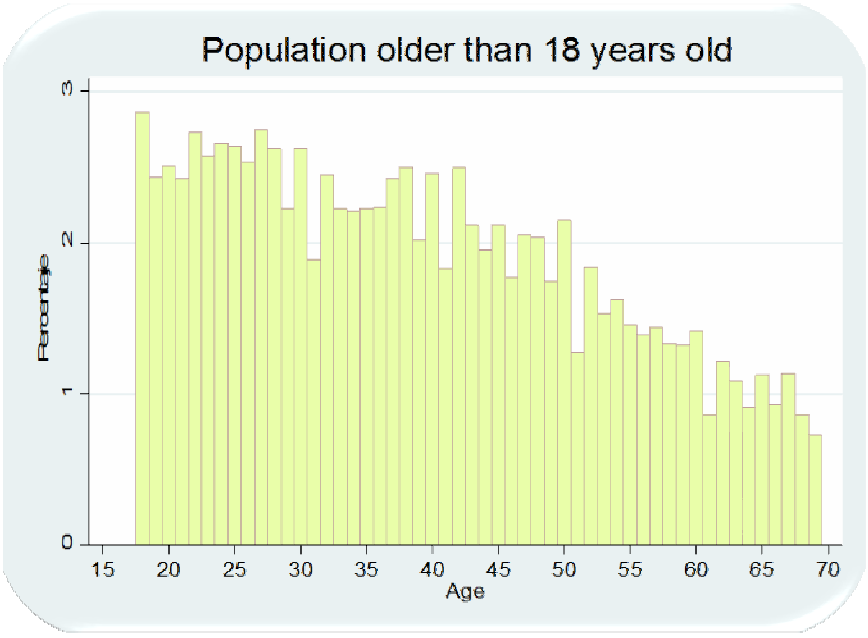
*Base category

Figure A3.1. Percentage of population with access to health care services the last month



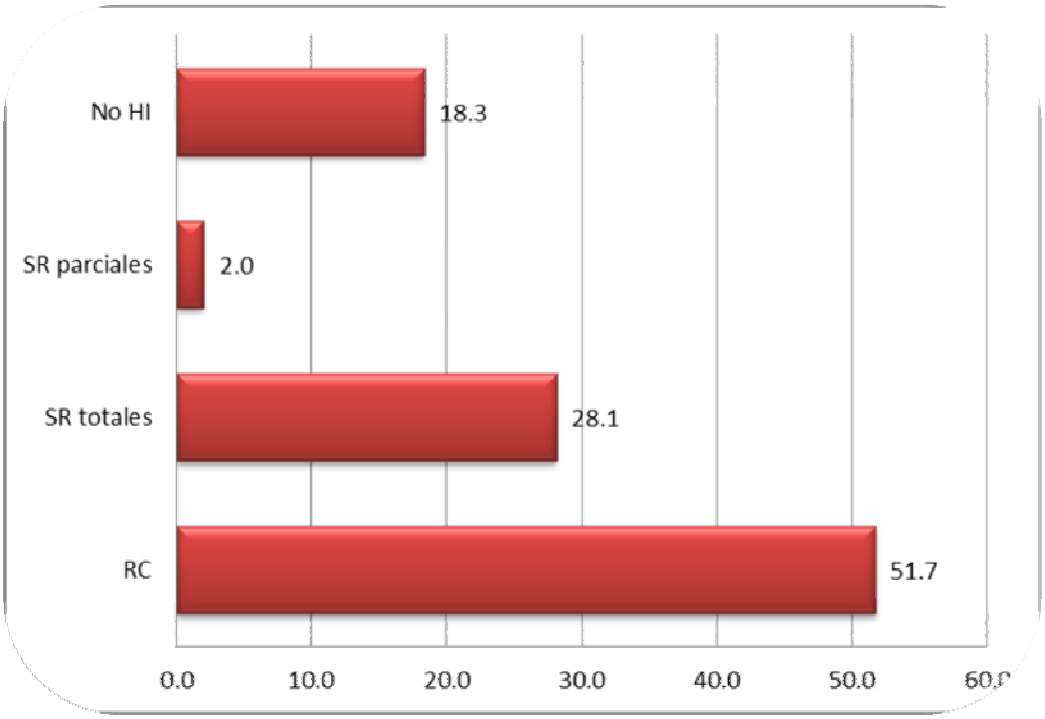
Source: Authors

Figure A3.2. Age



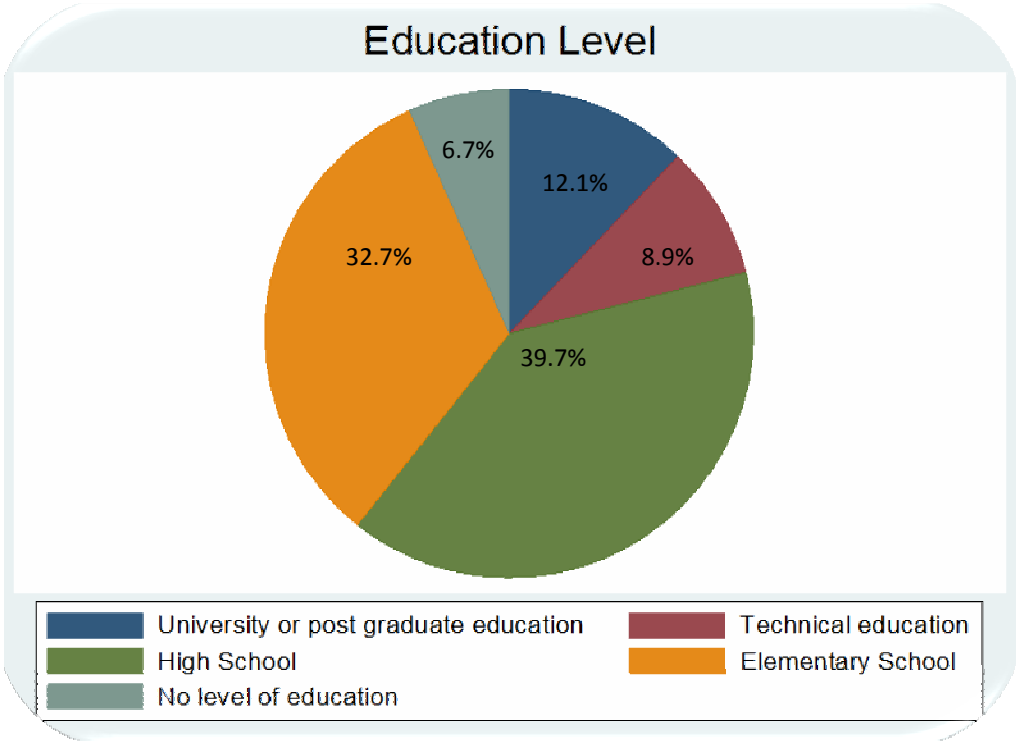
Source: NHS

FigureA3.3. Health Care Insurance



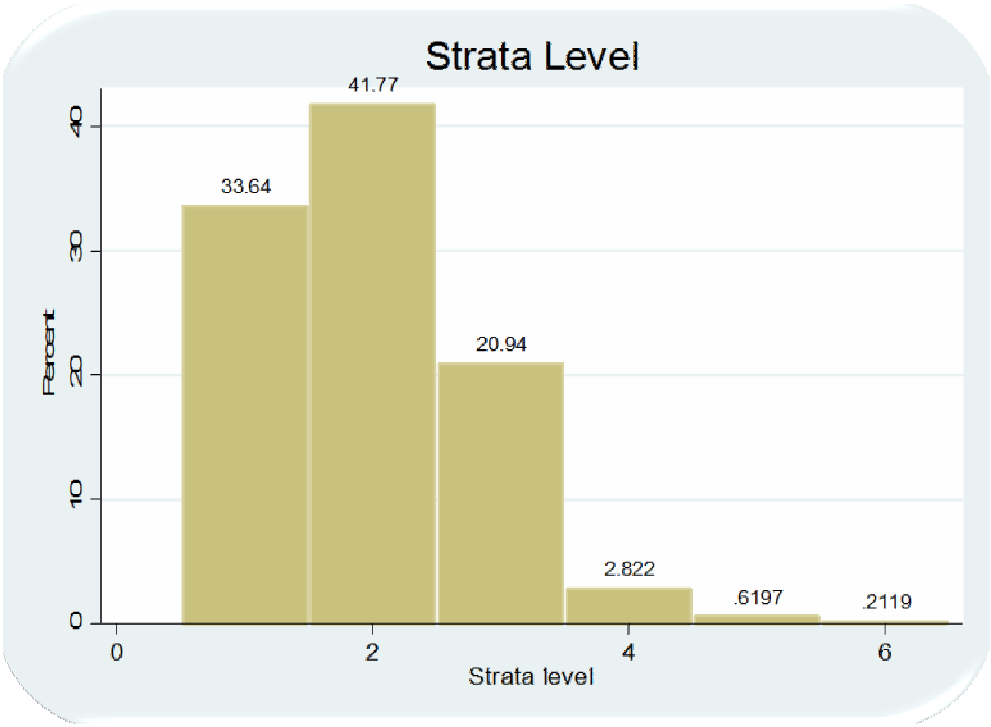
Source: NHS, Calculations by the Author

Figure A3.4. Education level



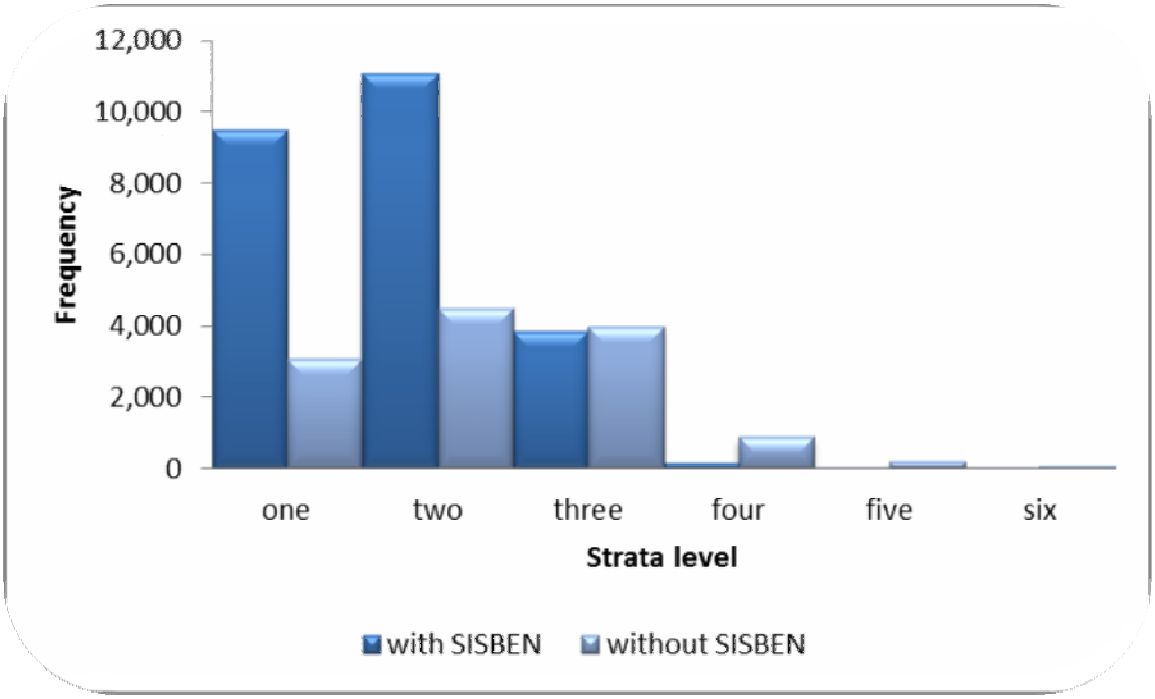
Source: NHS

FigureA3.5. Percentage of households by strata level



Source: NHS

FigureA3.6. Relationship between Strata level and SISBEN level



Source: NHS

TableA3.2. Results

Variable	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8	Model9
Disability Severity index	0.053***	0.047***	0.046***	0.05***	0.049***	0.04***	0.05***	0.05***	0.05***
Chronic Disease	0.15***	0.13***	0.13***	0.13***	0.13***	0.16***	0.13***	0.13***	0.13***
Age		-0.002	-0.0007	-0.0002	-0.00	-0.00	-0.00	-0.00	-0.00
Age2		0.0004***	0.00004***	0.00003***	0.0004***	0.00004***	0.00004***	0.00004***	0,00004***
Female		0.12***	0.11***	0.11***	0.11***	0.11***	0.11***	0.11***	0.11***
RC			-0.2***	-0.021***	-0.02***	-0.01***	-0.03***	-0.02***	-0.02***
SR Total			-0.004	0.011	0.01	0.024***	0.002	0.01	0.013*
SR Partial			-0.009	-0.014	-0.00	-0.006	-0.05	-0.02	-0.008
Primary School				0.06***	0.06***	0.06***	0.06***	0.06***	0.06***
High School				0.09***	0.09***	0.08***	0.09***	0.09***	0.08***
Technical Level				0.14***	0.14***	0.13***	0.13***	0.13***	0.13***
University				0.14***	1.14***	0.13***	0.13***	0.13***	0.13***
Strata1					0.01				
Strata3					-0.006				
Strata4					-0.01				
Strata5					0.05				
Strata6					0.006				
Rural					-0.02**	-0.02***	-0.02***	-0.02***	-0.02***
Bogota					-0.006	0.002	0.003	0.003	0.003
Amazonas Region					0.05***	0.05***	0.05***	0.05***	0.05***
Atlantic Region					0.07***	0.07***	0.07***	0.07***	0,07***
Orinoquian Region					-0.000	-0.003	-0.002	-0.001	-0.001
Pacific Region					-0.01	-0.01	-0.01	-0.01	-0.01
Asset Index quartile 2					0.06***	0.05***	0.05***	0.05***	0.05***
Asset Index quartile3					0.07***	0.07***	0.06**	0.07***	0.07***
Asset Index Quartile 4					0.04***	0.04***	0.03**	0.04***	0.04***
SRT and chronic disease						-0.05***			

SRP and chronic disease						-0.07*			
RC and chronic disease						-0.03**			
SRT and Disability severity index						0.01			
SRP and Disability severity index						0.06***			
RC and Disability severity index						0.001			
Poverty and Disability severity Index						-0.009		-0.01***	-0.01*
Bogota and Asset index quartile 4						-0.015	-0.015	-0.015	-0.015
Asset index SRT							0.006		
Asset index SRP							-0.02		
Asset index RC							0.004		
SRT and asset Index quartile1								-0.00	
SRP and asset index quartile 1								0.07	
RC and Asset index quartile 1								-0.002	
Pseudo R2	0.027	0.045	0.045	0.049	0.051	0.052	0.0513	0.0514	0.0513

*p<.1; **p<.05;***p<.01

Variable	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8	Model9
Cognitive or Mental limitation	0.008	0.005	0.003	0.007	0.006	0.013	0.006	0.01	0.01
Mobility Limitation	0.13***	0.1***	0.1***	0.1***	0.1***	0.1***	0.1***	0.1***	0.1***
Daily Activities Limitation	-0.03**	-0.03**	-0.03**	-0.02*	-0.02*	-0.02	-0.02*	-0.02*	-0.02
Participation limitation	0.1***	0.1***	0.1***	0.1***	0.01***	0.1***	0.1***	0.1***	0.1***
Hearing Limitation	0.04	0.03	0.03	0.04*	0.04*	0.05*	0.04*	0.05*	0.05*
Visual Limitation	0.05**	0.03*	0.03*	0.04**	0.04**	0.04**	0.03**	0.04*	0.04**
Chronic Disease	0.15***	0.13***	0.12***	0.13***	0.13***	0.16***	0.13***	0.13***	0.13***
Age		-0.002*	-0.00	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Age2		0.00005***	0.00003***	0.00003***	0.00003***	0.00003***	0.00004**	0.00004***	0.00004***
Female		0.11***	0.11***	0.11***	0.11***	0.11***	0.11***	0.11***	0.11***
RC			-0.02***	-0.02***	-0.02***	-0.02***	-0.04**	-0.03**	-0.03***
SR Total			-0.003	0.011	0.01	0.02**	-0.003	0.01	0.01*
SR Partial			-0.008	-0.01	-0.004	-0.005	-0.04	-0.02	-0.007
Primary School				0.05***	0.05***	0.05***	0.05***	0.05***	0.05***
High School				0.08***	0.07***	0.07***	0.07***	0.07***	0.07***
Technical Level				0.12***	0.12***	0.12***	0.12***	0.12***	0.12***
University				0.12***	0.12***	0.12***	0.12***	0.12***	0.12***
Strata1					0.006				
Strata3					-0.005				
Strata4					-0.004				
Strata5					0.05*				
Strata6					0.003				
Rural					-0.02**	0.02**	-0.02**	-0.02**	-0.02**
Bogota					-0.0006	0.003	0.003	0.004	0.003
Amazonas Region					0.05***	0.05***	0.05***	0.05***	0.05***
Atlantic Region					0.07***	0.07***	0.07***	0.07***	0.07***
Orinoquian Region					-0.001	-0.003	-0.003	-0.003	-0.003
Pacific Region					-0.01	-0.01	-0.008	-0.008	-0.008
Asset Index quartile 2					0.06***	0.05***	0.05***	0.05***	0.05***

Asset Index quartile3				0.07***	0.06***	0.06***	0.06***	0.06***
Asset Index Quartile 4				0.04***	0.04***	0.03***	0.04**	0.04***
SRT and chronic disease					-0.043**			
SRP and chronic disease					-0.06*			
RC and chronic disease					-0.02			
SRT and Disability severity index					-0.03			
SRP and Disability severity index					0.013			
RC and Disability severity index					0.02			
Poverty and Disability severity Index					-0.05**		-0.05**	-0.05**
Bogota and Asset index quartile 4					-0.015	-0.015	0.015	-0.015
Asset index SRT						0.006		
Asset index SRP						-0.02		
Asset index RC						0.005		
SRT and asset Index quartile1							-0.001	
SRP and asset index quartile 1							-0.003	
RC and Asset index quartile 1							0.005	
Pseudo R2		0.046	0.047	0.05	0.0525	0.0529	0.0525	0.0527	0.0526

*p<.1; **p<.05;***p<.01

Variable	Model1	Model2	Model3	Model4	Model5	Model6	Model7
Cognitive or Mental limitation	0.003	0.007	0.006	0.011	0.006	0.01	0.01
Mobility Limitation	0.1***	0.1***	0.1***	0.1***	0.1***	0.1***	0.1***
Daily Activities Limitation	-0.03**	-0.02*	-0.02*	-0.02	-0.02*	-0.02	-0.02
Participation limitation	0.1***	0.1***	0.1***	0.1***	0.1***	0.1***	0.1***
Hearing Limitation	0.03	0.04*	0.05*	0.05*	0.04*	0.05*	0.04*
Visual Limitation	0.03*	0.04**	0.04**	0.03**	0.04*	0.04**	0.03**
Chronic Disease	0.13***	0.13***	0.13***	0.14***	0.13***	0.13***	0.13***
Age	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Age2	0.00003***	0.00003***	0.00003***	0.00003***	0.00003***	0.00003***	0.00003***
Female	0.11***	0.11***	0.10***	0.10***	0.1***	0.11***	0.1***
SISBEN 1	0.007	0.02	0.01	0.01	0.01	0.01	0.01
SISBEN 3	0.001	-0.01	-0.01	-0.01	-0.002	-0.02	-0.01
SISBEN 4	-0.03	-0.05	-0.04	-0.05	-0.04	-0.05	-0.05
SISBEN 5	0.06	0.04	0.04	0.04	0.05	0.04	0.04
SISBEN 6	0.22	0.2	0.15	0.15	0.16	0.15	0.15
No SISBEN	0.02**	0.007	-0.003	-0.002	0.01	0.003	0.002
Do not Know SISBEN level	0.01	0.001	0.003	-0.01	0.005	-0.003	-0.003
Working	-0.03***	-0.03***	-0.03***	-0.04***	-0.04***	-0.03***	-0.04***
Primary School		0.05***	0.05***	0.05***	0.05***	0.05***	0.05***
High School		0.07***	0.07***	0.07***	0.07***	0.07***	0.07***
Technical Level		0.13·***	0.12***	0.12***	0.12***	0.12***	0.12***
University		0.13***	0.12***	0.12***	0.12***	0.12***	0.12***
Strata1			0.003				
Strata3			-0.005				
Strata4			-0.007				
Strata5			0.05				
Strata6			-0.000				
Rural			-0.02**	-0.02**	-0.02***	-0.02**	-0.02**
Bogota			-0.0006	0.003	0.004	0.003	0.003
Amazonas Region			0.04***	0.05***	0.04***	0.04***	0.05***
Atlantic Region			0.07***	0.07***	0.07***	0.07***	0.07***
Orinoquian Region			-0.002	-0.004	-0.004	-0.003	-0.003
Pacific Region			-0.01	-0.01	-0.01	-0.01	-0.01
Asset Index quartile 2			0.06***	O.5***	0.05***	0.06***	0.05***

Asset Index quartile3			0.07***	0.06***	0.06***	0.07***	0.06***
Asset Index Quartile 4			0.04***	0.04***	0.03**	0.04**	0.04**
SRT and chronic disease				-0.03*			
SRP and chronic disease				-0.05			
RC and chronic disease				-0.01			
SRT and Disability severity index				-0.02			
SRP and Disability severity index				0.02			
RC and Disability severity index				0.03			
Poverty and Disability severity Index				-0.05**		-0.05**	-0.05**
Bogota and Asset index quartile 4				-0.015	-0.015	-0.015	-0.015
Asset index SRT					0.01**		
Asset index SRP					-0.001		
Asset index RC					0.005		
SRT and asset Index quartile1						0.01	
SRP and asset index quartile 1						0.1*	
RC and Asset index quartile 1						0.001	
Pseudo R2	0.0475	0.0509	0.0527	0.0529	0.0527	0.0528	0.0527

*p<.1; **p<.05;***p<.01