

AN ABSTRACT OF THE DISSERTATION OF

Daniel F López-Cevallos for the degree of Doctor of Philosophy in Public Health  
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Title: Understanding Health Care Utilization: A Theoretically-based Analysis of the  
Ecuadorian Health Care System.

Abstract approved:

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Chunhuei Chi

One in four Ecuadorians do not have access to health services; while more than two-thirds have no health insurance and insufficient resources to pay for the health care services they might require. The following three studies examined utilization of health care services using Andersen's Health Care Utilization Behavior Theory. Secondary data (in a multilevel multivariate framework) from the 2004 National Demographic and Maternal & Child Health Survey (ENDEMAIN) was the main dataset used. In this context, a better comprehension of people's perceived needs when it comes to utilizing health care services was crucial in determining equity in the provision of services. For such purpose, the first manuscript focused on analyzing various predisposing, enabling and need factors affecting health care utilization in the

Ecuadorian population. Adjusting for various predisposing, enabling, and need factors, economic status and ethnicity were significant predictors of health care utilization.

Study 2 analyzed the context in which individual health care utilization behavior occurred, focusing on the provision of services and health outcomes. In addition to the main dataset, province-level data from the Ecuadorian System of Social Indicators (SIISE) and the Institute of Statistics and Census (INEC) were included. Spatial autocorrelation scores revealed no significant spatial clustering of provider measures by province, excepting for public practice health personnel. In multilevel models, public practice health personnel was found to be associated with use of preventive care (positively) and antiparasitic medicines (negatively). The density of public inpatient clinics was positively associated with solution of the second reported health problem.

Finally, study 3 assessed the relationship between emigrant remittances and health care utilization in Ecuador. Emigrant predictors were strongly associated with use of antiparasitic medicines, and to a lesser extent to curative visits, even after adjusting for various predisposing, enabling, and need factors. In general, Ecuadorian policymakers need to pay closer attention to inequalities, contextual factors, and the influence of emigrant remittances in advancing health care reform.

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Understanding Health Care Utilization:  
A Theoretically-based Analysis of the Ecuadorian Health Care System

by  
Daniel F López-Cevallos

A DISSERTATION

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APPROVED:

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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

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Daniel F. López-Cevallos, Author

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## CONTRIBUTION OF AUTHORS

Daniel F López-Cevallos, MPH conceptualized the study, measures, and conducted all data analyses presented.

Dr. Chunhui Chi conceptualized the study, measures, and provided editorial comments and suggestions on the interpretation of findings.



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## Chapter 1. Introduction

*Latin America neither wants, nor has any reason, to be a pawn without a will of its own...  
Why think that the social justice sought by progressive Europeans  
for their own countries cannot also be a goal for Latin America,  
with different methods for dissimilar conditions?*

Gabriel García Márquez

In 1990, the World Bank's World Development Report highlighted the necessity to establish a new strategy of solving poverty by increasing employment opportunities and basic social services to the poor; in particular, education, nutrition, family planning, and primary health care (The World Bank, 1990). Twelve years later, in its report "Macroeconomics And Health: Investing In Health For Economic Development", the WHO Commission on Macroeconomics and Health proposed the need to achieve two goals: a) increase resources devoted to health services in poor nations; b) overcome non-financial obstacles that limit the ability of these nations to establish adequate and functional health services. Once accomplished, more than eight million lives (worldwide) would be saved which in turn will contribute to promote development (Sachs, 2002). Furthermore, the United Nations Development Program (2006) asserted that human development goes well beyond economic growth (i.e. an increase in income). By acknowledging that people are the true wealth of nations, development "is thus about expanding the choices people have to lead lives that they value". In the context of Sen's *Capability* approach, giving people more choices means building human capabilities. Hence, the most basic capabilities for human development are "to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a decent standard of living and to be able to participate in the life of the community" (Sen, 1999; United Nations Development Programme, 2006). Between 1990 and 1997, the number of low-income countries that had a life

expectancy at birth of over 70 years increased from 22 to 49; and the percentage of population with access to potable water increased from 40% to 72%. Nevertheless, the number of people infected with HIV/AIDS doubled; 2.6 billion people had no access to basic sanitation; and more than 800 million did not have access to health services (United Nations Development Programme, 1998).

Home to almost 600 million inhabitants, Latin America presents a life expectancy at birth of 73 years (70 for males, 76 for females) and a 90% of its adult population is literate. However, it presents one of the most drastic disparities in the world. According to PAHO Director, Mirta Roses, “while life expectancy in the region has risen six years” over the last 25 years, “the economic gap between rich and poor has widened” (Drexler, 2005). For instance, the highest 20% of the population receives an income 20 times higher than the lowest 20%. Besides, 33% of rural areas in Latin America lack improved sources of drinking water, and almost 60% do not have access to good sanitation facilities. Maternal mortality is about eight times, and under-5 mortality is four times higher in Latin America than in North America, Canada and the US (Pan-American Health Organization, 2006).

In the case of Ecuador, poverty reaches almost 40% of its population (62% rural / 25% urban). A quarter of the population has no access to health services and 75% do not have health insurance (Pan-American Health Organization, 2002b). Indigenous populations, who are mostly concentrated in rural regions, experience greater problems. Consequently, Ecuador presents a low development index (0.765 in 2004, ranked 83 out of 177 countries) whose per-capita income accounts of 43% of the regional average; and a society that “has historically presented deep social, ethnic and

regional inequalities” (Larrea, 2004a; United Nations Development Programme, 2006). Moreover, social and economic crises during the last ten years have led to a massive emigration of about one million Ecuadorians to countries such as the United States, Spain and Italy (Larrea, 2004b).

These antecedents claim for a reconfigured strategy to combat poverty. Increasing access to social services seems to be a necessary component. Here, health care is particularly of our interest and expertise. In this study, we are interested in analyzing the utilization of health services in Ecuador, as a signpost for assessing use of services, and provide a complementary methodology for future research, analysis and evaluation of health care interventions.

In summary, major social, health, and health care inequities prevail throughout the Americas today, and Ecuador is no exception. This is, García Márquez would say, “the very scale of our solitude” (García Márquez, 1982). Yet, the ideal of achieving better standards of living (and health) for our peoples in Latin America must be systematically addressed at all levels, including health care.

## Statement of the Problem

According to PAHO (Pan-American Health Organization), health care services utilization in Ecuador varies greatly by socioeconomic status, age, gender, and urban/rural residency (Pan-American Health Organization, 2002a). Some 25%-30% of Ecuador's population lack regular access to health services; while more than two-thirds have no health insurance and insufficient resources to pay for the health care services they might require (Echeverría, 2002). In addition, a national survey found that almost 50% Ecuadorians declared to have a disease, accident or illness; and only 11% attended a preventive care appointment, during the previous month (Ministerio de Bienestar Social, 2002). At the province level, there is a marked disparity in terms of presence of disease (32.2% in Esmeraldas; 62.1% in El Oro); health insurance affiliation (10% in Los Ríos; 33% in Loja), and use of curative health services (29% in Chimborazo; 50% in Cañar) (CEPAR, 2005).

These public health concerns highlight the need for further research to assess and compare factors that influence utilization of health care services. Amongst these, the migration phenomenon is important to consider. Although a fairly recent phenomenon, international migration of Ecuadorians has steadily increased over the last ten years. Consequently, it has increasingly important socioeconomic repercussions. The massive international migration to Spain, United States of America, and Italy (mainly) has situated emigrant remittances as the second national income (after petroleum), raising from US\$200 million in 1993 to US\$1,4 billion in

2002 (Larrea, 2004a). However, the influence of remittances in utilization of health care services in Ecuador has not been yet established.

### Purpose of the Study

It is the focus of this work to apply a widely used theory, Andersen's **Theory of Health Care Services Utilization**, to analyze the social determinants of health care utilization in Ecuador. In this context, our better understanding of people's perceived needs when it comes to utilizing health care services becomes crucial in determining equity in the provision of services. For such purpose, we focus on understanding various predisposing, enabling and need factors affecting health care utilization in the Ecuadorian population, and pointing out some areas that would have the biggest impact on utilization of health services.

Besides, realizing the context in which individual health care utilization behavior occurs will help us build a more comprehensive view of the Ecuadorian health care system. Hence, this research seeks to understand the geographic patterning of health care utilization in order to point out regions most in need. Finally, the author, alerted by the drastic increase in immigration to the so-called "developed" countries, intends to explore the influence of emigrant remittances in the utilization of health services in Ecuador.



## Research Questions

The research questions are organized into three sections corresponding to areas (manuscripts) of interest. The three manuscripts are intended for publication in *Medical Care*, *Health Policy*, and *Demography* journals, respectively.

### *Manuscript 1*

Purpose: 1) to measure the influence of perceived need, demographic (predisposing) and socioeconomic (enabling) factors on the utilization of curative and preventive services in Ecuador; 2).to evaluate equity in health care services utilization in Ecuador based on perceived need, predisposing and enabling factors.

- To what extent does perceived need and demographic (predisposing) factors influence the utilization of curative and preventive services in Ecuador?
- What is the influence of socioeconomic (enabling) factors on individual's utilization of curative and preventive services in Ecuador?
- Based on perceived need, predisposing, and enabling factors, is utilization of health services in Ecuador equitable?

### *Manuscript 2*

Purpose: 1) to analyze the context in which utilization of health services in Ecuador takes place, focusing on the provision of services and health outcomes.

- What is the relationship between provider measures and health outcomes by province in Ecuador?

- What is the influence of provider-level measures (controlling for predisposing, enabling, perceived need, and utilization of health care services) in reported health outcomes by province/region in Ecuador?

### *Manuscript 3*

Purpose: 1) to evaluate the influence of emigrant remittances in the utilization of health care services among individuals that have a family member that emigrated from Ecuador to other countries.

- What is the influence of emigrant remittances (controlling for predisposing, enabling, and perceived need) in the utilization of health services in Ecuador?

Across all studies, the author seeks to propose recommendations that can lead national and local health authorities to specific research-based interventions, and policies.

## Significance of the Study

This study provides a theoretically-based framework for understanding the use of health care services in Ecuador. As mentioned in the introduction, such an analysis becomes more transcendental as we witness rather interesting transformations in the Ecuadorian socio-political map. Two events, in particular, are rather relevant for the current work. First, the Universal Health Insurance project (AUS), under the auspices of now former president Palacio, provides us with a goal: achieving universal health insurance coverage by the year 2015. For various reasons, this project was operating by the second semester of 2006. However, it was discontinued by the following administration. Second, the current president, Dr. Rafael Correa, bringing with him a “XXI century socialism” philosophy, has proposed a drastic change in the current national development model. Departing from neoliberalism and promoting a more participative model of governing, with a strong focus on social issues (migration, education, housing, health care); president Correa has accumulated the support of the middle-class and minorities (Indians, Afro-Ecuadorians) that see in his proposal a truly “human-centered” model (Falconí & Túpac-Yupanqui, 2006).

Therefore, providing a methodology for baseline and progress assessment is important in order to evaluate the successes and failures of the AUS or similar projects and the macro- and micro-policies that may be implemented by the new government. Most importantly, by focusing on the patient (client) side of the health care spectrum, this study highlights the need for a more patient-centered approach in the provision of services in Ecuador.

In order to understand utilization of health services, the current study focuses on three aspects considered fundamental in Ecuador today (Organizacion Panamericana de la Salud, 2006; Pan-American Health Organization, 1999, 2002a). First, achieving equity in health services utilization is a constitutional right granted to every Ecuadorian. In this aspect, this study presents a theoretical framework to assess equity based on need, predisposing and enabling factors. Second, this study goes beyond the “population at risk” perspective of the original model, to look into delivery system measures that would permit us to contrast utilization of health services with the capacity of the current system to serve the community (Aday, Begley, Lairson, & Balkrishnan, 2004; Phillips, Morrison, Andersen, & Aday, 1998). Third, this study is important in exploring the relationship between emigrant remittances and its contribution to utilization of health services, which is one aspect of human development (United Nations Development Programme, 2006). The “perpetual movement of people across borders”, authorized or not by the receiving countries, is but one of the many faces globalization has (Terry & Wilson, 2005). In particular, those emigrants who send money to their families back home, in small amounts, but whose contribution to the local economies is enormous.

### Delimitations

Using the most updated information available, the present study is first circumscribed by the levels of analysis of the manuscripts. For manuscripts 1 and 3, most of the measures are at the individual and household levels (although we include

census segment and province levels to recognize the sampling frame multilevel structure); while for manuscript 2, we include measures at the province/region level. In the former, the levels of analysis was dictated by the dataset utilized (ENDEMAIN 2004), in which a national coverage, urban/rural, region and province representative sample of households (and all individuals within that household) was surveyed. For the latter, adding measures at the province/region level was chosen for the following reasons: 1) during the last few years there has been a “heated” debate around decentralizing and autonomic initiatives at the province level, being Guayas (which includes the biggest city in Ecuador, Guayaquil) the leading province in this movement; 2) these local governments, as parts of their claims, gain governance on education and health services (Ponce, 2001). Hence, it is important to present an analysis of health care utilization at this level, given that the information is readily available.

#### Abbreviations/Acronyms

CDC	Centers for Disease Control and Prevention
CEPAR	Center for Population and Social Development Studies (Centro de Estudios de Población y Desarrollo Social).
CONASA	National Health Council (Consejo Nacional de Salud).
EAP (PEA)	Economically Active Population (Población Económicamente Activa).
ENDEMAIN	Demographic and Maternal & Child Health Survey (Encuesta Demográfica y de Salud Materna e Infantil).
ERAS	Health Care Resources Survey (Estadísticas de Recursos de Salud).

IADB (BID)	Inter-American Development Bank (Banco Interamericano de Desarrollo).
IESS	Ecuadorian Social Security Institute (Instituto Ecuatoriano de Seguridad Social).
IMF (FMI)	International Monetary Fund (Fondo Monetario Internacional).
INEC	Ecuadorian Institute of Statistics and Censuses (Instituto Ecuatoriano de Estadísticas y Censos).
ISSFA	Military Health Insurance Institute (Instituto de Seguridad Social de las Fuerzas Armadas).
ISSPOL	Police Health Insurance Institute (Instituto de Seguridad Social de la Policía).
JBG	Guayaquil Welfare Board (Junta de Beneficiencia de Guayaquil).
MPH (MSP)	Ministry of [Public] Health (Ministerio de Salud Pública).
NHCS	National Health Care System.
PAHO (OPS)	Pan-American Health Organization (Organización Panamericana de la Salud).
SA	Spatial Autocorrelation.
SIISE	Ecuadorian Integrated System of Social Indicators (Sistema Integrado de Indicadores Sociales del Ecuador).
SOLCA	Cancer Society (Sociedad de Lucha contra el Cáncer).
UHI (AUS)	Universal Health Insurance Project.
WHO (OMS)	World Health Organization (Organización Mundial de la Salud).
WB (BM)	World Bank (Banco Mundial).

## Chapter 2. Manuscript 1

Health care utilization in Ecuador: A multilevel analysis of socioeconomic  
determinants and equity issues.

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## Abstract

**Background.** Utilization of health care services in Ecuador varies greatly by socioeconomic status, age, gender, and urban/rural residency. Almost a third of Ecuador's population lack regular access to health services; while more than two-thirds have no health insurance and insufficient resources to pay for the health care services.

**Objectives.** 1) To assess the relationship between predisposing, enabling, need factors, and use of health care services in Ecuador; 2) To analyze equity in health care utilization.

**Methods.** Secondary data was used from the 2004 National Demographic and Maternal & Child Health Survey (ENDEMAIN). Using Andersen's model of health care utilization behavior, relevant variables were selected from ENDEMAIN household survey to create the analysis dataset. Four outcomes were assessed: use of preventive services, number of curative visits, hospitalization; and use of antiparasitic medicines.

**Results.** Adjusting for various predisposing, enabling, and need factors, a significant negative relationship was found between household economic status and utilization of preventive and curative services. The same was true for use of antiparasitic medicines. Similarly, ethnicity was found to be a significant predictor of health care utilization.

**Conclusions.** This article found strong evidence of inequalities by economic status and ethnicity present in the utilization of health care services in Ecuador. From a policy perspective, this study highlights the need for health care reform in Ecuador to address these inequalities systematically.

Key words: Use of health services, health care need, multilevel analysis, equity in health care, Ecuador.

Despite the important health development achievements in Latin America, the region presents one of the most drastic disparities in the world. While life expectancy in the region has risen six years over the last 25 years, “the economic gap between rich and poor has widened” (Drexler, 2005). In Ecuador, poverty reaches almost 40% of its population (62% rural / 25% urban). This Andean country presents a low development index (0.765 in 2004, ranked 83 out of 177 countries); per-capita income that accounts for 43% of the regional average; and a society that has historically presented profound social, ethnic and regional inequalities (United Nations Development Programme, 2006). Indigenous populations, who are mostly concentrated in rural regions, experience greater challenges (Larrea & Montenegro, 2006).

Utilization of health care services in Ecuador varies greatly by socioeconomic status, age, gender, and urban/rural residency. Some 25%-30% of Ecuador's population lack regular access to health services; while more than two-thirds have no health insurance and insufficient resources to pay for the health care services they might require (Pan-American Health Organization, 2007). The Ecuadorian health sector is made up of a combination of public and private institutions, both nonprofit and for-profit. The principal institutions of the sector, the Ministry of Public Health (MPH) and the Ecuadorian Social Security Institute (IESS) together have the largest health care infrastructure. IEES insures approximately 20% of the population (urban employees and rural farmers); while private insurance covers less than 3% of the middle- and upper-income population (Pan-American Health Organization, 2007). The financing of each institution is separate, adding to the complexity of the system (H. R. Waters, 1999).

In understanding utilization of health services, there are three major concepts described in the literature that require further discussion. These are: equity in health care, health care need and health care utilization. Many approaches have been applied to assess equity in health care, focusing primarily on need and its relationship with utilization of health care services (Aday et al., 2004; Braveman, 2006; A. Wagstaff & van Doorslaer, 2000a). Traditionally, health equity, and health care equity, has been required to distinguish between “the appropriateness of equal and unequal distributions” (Gwatkin, 2000; Pan-American Health Organization, 1999). In other words, to acknowledge that similar conditions should be treated in similar ways and dissimilar conditions in dissimilar ways. The former, called *horizontal equity*, has occupied much of the empirical work in health care (Adam Wagstaff & van Doorslaer, 2000b; Adam Wagstaff, van Doorslaer, & Paci, 1991; H. R. Waters, 2000) and the present study is no exception.

In the context of the *Theory of Health Care Services Utilization*, equity in health care is achieved when demographic variables (such as age and gender), and particularly need variables, have a strong positive association with healthcare utilization (Aday et al., 2004; Andersen, 1995). In other words, at the core of this theoretical framework is the value judgment that the health care system would be considered fair or equitable if need-based criteria (and to a lesser extent predisposing factors), used in a statistical model, would be the major determinants of the amount of health care utilized. On the other hand, inequity in health care occurs when enabling characteristics and resources such as health insurance or income determine who obtains medical care (Andersen & Davidson, 2007).

Need, in the context of Andersen's theoretical model, refers to illness (i.e. health status) as a fundamental factor affecting health care utilization (Aday et al., 2004). Hence, need could be diagnosed by a health care provider (*evaluated need*), or reported by individuals/households as symptoms, health problems, disability days, etc. (*perceived need*) (Aday & Awe, 1997). Throughout this paper, the term utilization instead of access is described. When researchers and policymakers have proposed to examine *access*, most of times they mean to study *utilization*, particularly in the Americas (Aday et al., 2004; Andersen, 1995; Culyer, van Doorslaer, & Wagstaff, 1992b; H. R. Waters, 2000). In other words, *utilization* refers specifically to health care visits (which are the variables used in the present study) (Culyer, van Doorslaer, & Wagstaff, 1992a). Finally, Aday and Awe (1997) have pointed out the importance of identifying the level of individual discretion when using health services. In this context, preventive care utilization would be more discretionary (i.e. mostly influenced by predisposing and enabling factors), while curative care would be less discretionary (i.e. primarily influenced by need).

In Latin America, there are a few studies looking specifically at health care use or access (Glei, Goldman, & Rodriguez, 2003; Guarnizo, 2003; Paqueo & Gonzalez, 2003; Rosero-Bixby, 2004a). In Guatemala, Glei and colleagues found that obstetrical need was a strong predictor of pregnancy care; while Guarnizo found inequalities in accessing health care services by sex, age, income, and marital status in Colombia. In Mexico, Paqueo and Gonzales found that ethnicity and insurance were significant predictors of use; while Rosero-Bixby found that a geographic information system (GIS) platform allowed a better understanding of both population and health care

facilities distribution in Costa Rica. In Ecuador, previous research on social and economic determinants of health care utilization is scarce. However, two papers are particularly relevant (H. R. Waters, 1999, 2000). Using a national dataset (the 1995 Ecuador Living Standards Measurement Survey), Waters (2000) measured equity in the distribution of access to health services; while his 1999 paper evaluated the impact of publicly-financed health insurance on health care utilization.

This paper analyzes the utilization of health services in Ecuador, focusing on socioeconomic determinants and equitable use. Three research questions are proposed: a) to what extent do perceived need and demographic (predisposing) factors influence the utilization of curative and preventive services in Ecuador? b) What is the influence of socioeconomic (enabling) factors on individual's utilization of curative and preventive services in Ecuador? c) Based on perceived need, predisposing, and enabling factors, is utilization of health services in Ecuador equitable?

## Methods

### *Study Design*

This cross-sectional study utilized data from the 2004 Demographic and Maternal & Child Health Survey (ENDEMAIN) (CEPAR, 2005). Using a deductive approach, the author applied a widely used theory, Andersen's Theory of Health Care Services Utilization Behavior, to analyze the social determinants of health care utilization in Ecuador (Aday & Awe, 1997). In this context, our better understanding of people's perceived needs when it comes to utilizing health care services becomes crucial in determining equity in the provision of services. For such purpose, this paper focused

on analyzing various predisposing, enabling and need factors affecting health care utilization in the Ecuadorian population. Ultimately, equity in the use of health services was examined.

#### *Data & Study Population*

The latest ENDEMAIN survey, conducted in 2004, was selected as the main source of data for the present study. Through the years, its design has allowed researchers to add components that were judged relevant at the time. ENDEMAIN 2004 surveyed households to gather information on utilization of health services, and health care and consumption expenditures (CEPAR, 2005). ENDEMAIN 2004 used a multistage clustering design to provide a nationally representative sample of 28,908 households in Ecuador. Two separate questionnaires were applied to different sub-samples: 1) an interview with a woman of reproductive age about sexual and reproductive health issues was completed in 10,813 households; and 2) an interview with an adult about health utilization and expenditures was completed in 10,985 households. In this survey, the response rate was 88.7% (CEPAR, 2005). The sample was selected in two stages. In the first stage, 692 segments from the 17 established strata were selected randomly with probability proportional to the number of households existing in each segment, according to the 2001 National Census. ENDEMAIN 2004 divided the country in two regions (Amazon and Galapagos Islands) and 15 provinces (10 from Sierra region and 5 from Costa region). Hence, this paper uses the term *province/region* to refer to this level of analysis. In order to preserve provincial generalizability and compensate for unequal probability selection of households within each stratum, the analysis established weights to normalize the contribution of

individual strata. In the second stage, 42 households from each segment were selected randomly. Within this group, 24 households were selected for the sexual and reproductive health questionnaire, and 18 for the health utilization and expenditures questionnaire (CEPAR, 2005). For use of preventive care, curative visits, and hospitalization, the subsample of participants 12 years and older [n=33387] was used (since they were asked both marital status and educational level); while for use of antiparasitic medicines, the subsample of participants under 15 years [n=16416] was used.

#### *Operationalization of Key Concepts*

In the context of this study, the three key concepts mentioned in the introduction (equity in health care, health care need, and health care utilization) were operationalized.

*Equity in Health Care.* In this study, equity in healthcare utilization was studied in two ways: 1) In the case of *curative* care, equity was assessed by the association between perceived need, predisposing factors, and enabling factors (in that order) with number of curative visits. 2) In the case of *preventive care*, equity was assessed by the association between household economic status (as measured by assets and consumption quintiles) and utilization of preventive services (Aday et al., 2004; Andersen, 1995).

*Health Care Need.* In this study, perceived need was used as a predictor of utilization of health care services. ENDEMAIN 2004 asked individuals if they had health problems during the previous 30 days, and to mention the two most important problems (CEPAR, 2005). From these questions, ENDEMAIN 2004 created a variable



to identify the number of health problems mentioned by the participants (none, one problem, and two problems). In a previous study (Dunlop, Coyte, & McIsaac, 2000), number of health problems was also used as a need predictor.

*Utilization of Health Care Services.* Both preventive and curative measures of *realized* utilization were employed in this paper. ENDEMAIN 2004 asked participants regarding *preventive care*: 1) if they visited a physician for a preventive appointment in the last 30 days; and *curative care*: 1) if they visited a physician for a curative appointment in the last 30 days (and how many times); 2) if they were hospitalized in the last 12 months; and 3) if persons under 15 years were taking antiparasitic medicines. All these variables were dichotomous (yes/no), except for the curative appointment which was a count.

#### *Other Measures*

Besides the key constructs outlined above, there are other explanatory variables considered in this study, classified following Andersen's model. *Predisposing factors* included age (years), sex (male, female), ethnicity (mestizo, indigenous, others) and marital status (married, single, living with a partner, separated/divorced, widow). For use of antiparasitic medicines, household head sex and marital status were included.

*Enabling factors* were area of residence (urban, rural), assets quintile (1 to 5), consumption quintile (1 to 5), educational level (none, elementary, high school, college, doesn't know/answer), and health insurance affiliation (insured, uninsured). The assets and consumption quintiles were created to rank household economic status from 1 (lowest) to 5 (highest). The assets quintile is based on household characteristics and durable goods availability; while the consumption quintile is based on household

consumption of goods and services (CEPAR, 2005). The uninsured category includes people that have neither public nor private health insurance. For use of antiparasitic medicines, household head educational level was included.

### *Analysis*

Summary statistics for all discrete and continuous variables were calculated. Table 1 summarizes the variables used in the analysis for use of preventive care, number of curative visits and hospitalization. Table 2 summarizes the variables used in the analysis for use of antiparasitic medicines.

--- Insert Table 1 about here ---

Given that ENDEMAIN 2004 sampling frame had four levels: 1) individual (n=33387), 2) household (n=10985), 3) census segment (n=692); and 4) province/region (n=17), multilevel models were used to examine the influence of predisposing, enabling and need factors on utilization of health care. This study recognized the need to account for clustering in such a complex sample design (so that no statistical information or power are lost; and the variance of estimated coefficients are not underestimated) (Rodriguez & Goldman, 1995, 2001; Subramanian, Jones, & Duncan, 2003b). The multilevel structure allowed for the simultaneous analysis of data at the various levels of hierarchy in ENDEMAIN 2004. Hence, there was no need to identify a single “appropriate” level of analysis. Furthermore, multilevel modeling offered the possibility of adding “contextual richness and complexity” to the analysis. There are various recent studies that used multilevel modeling to assess health care utilization (Chaix, Boelle, Guilbert, & Chauvin, 2005a; Daniels & Gatsonis, 1999; Gleit et al., 2003).

Preliminary analysis to assess the relevance of a four-level model was conducted. By fitting a *non-conditional* (empty) model, variance was partitioned across levels to assess its statistical significance and contribution to overall variance (Duncan, Duncan, Hayrettin, Strycker, & Hix-Small, 2003). Moreover, significant variance was a requirement for adding higher level predictors into the conditional models. As implemented in MLwiN, models were fitted using the iterative generalized least squares maximum likelihood estimator. The marginal quasi likelihood approximation with a first order Taylor linearization procedure was applied for all the dichotomous outcomes (Subramanian, Delgado, Jadue, Vega, & Kawachi, 2003a). The predictive/penalized quasi likelihood approximation was applied for the count outcome (Rasbash, Steele, Browne, & Prosser, 2004). Given that 97% of individuals were not hospitalized during the previous 12 months (i.e. there was a preponderance of zeroes), an extra-binomial logit model was applied to the hospitalization outcome (Williams, 1982; Wright, 1997). For each model, variables were assigned to each significant level (as they were originally collected) to build three *conditional* models in a sequential order (Subramanian et al., 2003a). SPSS 11.5 and Stata MP V9.2 were used for data preparation, and MLwiN 2.02 was used to fit all multilevel models.

--- Insert Table 2 about here ---

## Results

Table 3 presents the results for use of preventive care services, curative visits, and hospitalization. Due to space considerations, only the final conditional models are presented. Except for age, all predictors were entered in the models as indicator dummy variables.

For preventive care, need, as expected, was not a significant predictor of use. The constant (reference category) in model 4 represents a mestizo man, aged 35, who is married and lives in an urban area, belongs to the highest assets and consumption quintile categories, with college education and health insurance, and reports no health problems during the previous 30 days at the time of the survey. In other words, this “best group” had a 9.6% probability of using preventive services. Adjusting for predisposing factors at the individual and household levels, and enabling factors (urban/rural residence, education), a significant relationship between household economic status and use of preventive services was observed. More importantly, there was a strong gradient in assets and consumption quintiles in the use of preventive services. Compared to the “wealthiest” group (assets and consumption quintiles 5), the very poor (assets and consumption quintiles 1) were least likely to use preventive services (OR=0.44, 95% CI: 0.34 – 0.57; and OR=0.37, 95% CI: 0.29 – 0.48, respectively). In turn, households at a higher economic level (assets and consumption quintiles 4) were closer to the “best” use of preventive services (OR=0.78, 95% CI: 0.68 – 0.89; and OR=0.81, 95% CI: 0.69 – 0.95, respectively).

--- Insert Table 3 about here ---

For number of curative visits, there was a strong positive association between reported health problems and the utilization of curative care, even after adjusting for predisposing and enabling factors. Being indigenous or other ethnicity had a strong negative association with number of curative care visits. Similarly, household economic status (consumption quintiles 1-4) had a significant negative association with the outcome of interest. Similar to use of preventive services, there was a gradient in the relation between household economic status and number of curative care visits. However, none of the assets quintile levels were strongly related to number of curative care visits.

For hospitalization, the non-conditional model showed that there was no significant variation at the household and census segment levels. Hence, no household-level predictors were included in all conditional models. After adjusting for predisposing factors, variation at the census segment level was statistically significant. Consequently, the census-level predictor (area of residence) was added to the final conditional model. Similar to number of curative visits, need predictors had a strong positive association with use of hospital services (one health problem: OR=1.16, 95% CI: 1.00 – 1.33; two health problems: OR=1.68, 95% CI: 1.30 – 2.16). After adjusting for need and predisposing factors, living in a rural area (OR=0.83, 95% CI: 0.69 – 0.99) and being uninsured (OR=0.72, 95% CI: 0.66 – 0.79) significantly decreased the odds of using hospital services. The constant in model 4 represents a man, aged 27, who is married and lives in an urban area, with high school education and health insurance, and reports no health problems. This “best group” had a 2.6% probability of hospitalization.

The results for use of antiparasitic medicines are presented in Table 4. Model 1 shows significant variation at the household, census segment and province/region levels. Model 2 reveals that only having a second health problem is slightly significantly related to use of antiparasitic medicines. However, when adjusting for predisposing and enabling factors, need becomes a strongly significant predictor of use (one health problem: OR=1.12, 95% CI: 1.05 – 1.19; two health problems: OR=1.32, 95% CI: 1.12 – 1.55). Model 3 shows that being of indigenous descent significantly decreased the odds of a child to use antiparasitic medicines (OR=0.61, 95% CI: 0.44 – 0.86).

--- Insert Table 4 about here ---

The constant in model 4 represents a mestizo boy, age 7, who lives in an urban area, belongs to the highest assets and consumption quintile categories, has health insurance, reports no health problems, and whose household head is male, married, and with college education. In other words, this “best group” had a 64.3% probability of using antiparasitic medicines. When adjusting for predisposing and enabling factors, and need, there was a significant relation between household economic status and use of antiparasitic medicines. There was a similar gradient as observed in use of preventive services. The very poor households (consumption quintile 1) were least likely to use antiparasitic medicines (OR=0.58, 95% CI: 0.45 – 0.76), while the better-off households (consumption quintile 4) were closer to the “ideal” use of antiparasitic medicines (OR=0.76, 95% CI: 0.60 – 0.97). Rural residence had a strong positive association with use of antiparasitic medicines (OR=1.23, 95% CI: 1.08 – 1.39). On the contrary, compared to households where the household head had college education,

children's odds of using antiparasitic medicines decreased significantly when the household head had no education (OR=0.63, 95%CI=0.50 – 0.79).

## Discussion

Based on a nationally representative cross-sectional sample of Ecuador, this study found evidence of inequalities in the utilization of health care services. Following theoretical assumptions, perceived need was found a significant predictor of use of antiparasitic medicines, curative care visits, and hospitalization, and played a non-significant role in the use of preventive services. However, major differences by economic status, and ethnicity were found. First, for all utilization outcomes where economic measures were considered, families on the lowest 20% of the consumption distribution were least likely to utilize health care services, even after adjusting for other factors (such as age, marital status, urban/rural residence, educational level, and health insurance status). Similarly to the relationship between income and self-rated health, as described by Subramanian et al (2003) for the case of Chile, this paper found that there was a gradient in the relationship between economic status and utilization of health care services in Ecuador. For instance, when comparing with households on consumption quintile 5 (highest 20%), the odds of using preventive services decreased 63% for households on consumption quintile 1 (lowest 20%). In contrast, the odds of using preventive services decreased 19% for households on consumption quintile 4.

Second, indigenous ethnicity played a strong predictive role for use of preventive care, antiparasitic medicines, and curative care visits. For the last two

outcomes, the same held true even after controlling for enabling factors. For example, the odds of using antiparasitic medicines decreased 25% for children of indigenous households. In Mexico, previous research found a negative association between ethnicity and utilization of medical consultations and dental services (Paqueo & Gonzalez, 2003). Also, Paqueo and Gonzalez found that indigenous people were more likely to use preventive services. In turn, this paper found initial evidence that indigenous ethnicity was negatively associated with use of preventive services (OR=0.52, 95%CI=0.35 – 0.77). However, this relationship was not statistically significant when adjusting for enabling factors (urban-rural residence, economic wealth, education, and health insurance), which in turn may reiterate the importance of socioeconomic status, regardless of ethnicity (Subramanian, Smith, & Subramanyam, 2006). Nevertheless, it is relevant to keep in mind that more than 75% of indigenous Ecuadorians are poor, their life expectancy is 10-20 years below the general population, and infant mortality is 1.5 to 3 times higher than the national rates (Cujilema & Ochoa Davila, 2003; Hall & Patrinos, 2006). The situation is similar throughout Latin America, despite their increased political power and representation (Hall & Patrinos, 2006). In the case of indigenous peoples, government policies should systematically account for their social and cultural characteristics, and incorporate their traditional knowledge in the public provision of health services –i.e. towards a more “intercultural” health system (Orellana Salvador, 2003).

Although this paper did not attempt to evaluate insurance programs, health insurance status was consistently found to be a significant predictor of use, except for antiparasitic medicines. Similar to a previous study (H. R. Waters, 1999), a strong



positive association was found between health insurance and use of curative care (Table 3). However, this study also found a significant relation with use of preventive care. When comparing with insured individuals, the odds of using preventive services decreased 33% for the uninsured, after adjusting for other socioeconomic factors. Insurance status is one of the key elements for reform in Ecuador, considering the low percentage of population with some form of health insurance, the regressive distribution of government expenditures on health, and its huge dependence on out-of-pocket expenses which accounts for almost 65% of the health financing mix (Pan-American Health Organization, 2007; Suárez-Berenguela, 2002). Definitely, more research is needed to take into account differences between public and private insurance programs.

In Latin America, there are serious gaps in policies affecting the health of women, particular poor, indigenous and less-educated women (Correia & Van Bronkhorst, 2000; Hall & Patrinos, 2006; Levine, Glassman, & Schneidman, 2001). However, this study found a positive relationship between being a female and use of preventive care, curative care, and antiparasitic medicines (a 72%, 4% and 4% increase in the odds, respectively), and non-significant relationship for hospitalization. Levine, Glassman, and Schneidman pointed out that women and men had similar resources for use health services and health insurance coverage, but mostly concentrated in high-income households. This assertion is supported by the present study, since household in the lower assets and consumption quintiles were significantly less likely to use preventive or curative care. Future research should look more specifically at the use of health care services among women and its differences

by ethnicity, socioeconomic status, and regular source of care (Sambamoorthi & Macalpine, 2001).

Similarly, use of antiparasitic medicines requires more attention. To the authors' knowledge this is the first time a study has looked at use of antiparasitic medicines nationally. Besides, it controlled for the influence of household head's sex, marital status, and educational level. This study found that the probability of poor, indigenous children to have access to these medicines decreased drastically (36.5% compared to 64.3% of the average child). Various local studies on low-income, school-aged children in Ecuador found prevalence of parasitic infections ranging between 48% and 84% (Andrade, Alava, De Palacio, Del Poggio, Jamoletti, Gulletta et al., 2001; Ortega, 2000; Quizhpe, San Sebastián, Hurtig, & Llamas, 2003). Future research should specifically contrast prevalence by ethnicity, income, and other socioeconomic factors, such as parental education level.

This study has a number of limitations. First, by using secondary data, there was a risk of inheriting problems that could alter the analysis and its interpretation. By design, generalizability is limited to the following levels: national, province/region, and urban-rural residence. Also, there was a risk of decontextualizing behavior and its implications (Daly, Kellehear, & Gliksman, 1997). Second, since variables were measured at a single point in time, the possibility of inferring cause-effect relationships (directionality) was limited. Third, ENDEMAIN 2004 relied heavily on participant's report of behavior rather than observation (except for ethnicity). Therefore, measurement error could have been introduced by respondents' inability to recall past events accurately, instability of their opinions, misunderstanding of

questions, and lack of honesty in their answers – i.e. respondents might have tended to give “socially desirable” answers (Singleton & Straits, 1999). Nevertheless, this paper explicitly used a multilevel analytical framework to assess the relationship between various predisposing, enabling, need factors, and health care utilization in Ecuador. Contributing to the growing empirical research on health inequalities in Latin America (Almeida-Filho, Kawachi, Filho, & Dachs, 2003), this study found strong evidence of various inequalities present in the Ecuadorian health care system. From a policy perspective, this study highlights the need for health care reform in Ecuador to address these inequalities systematically. Future research should include the availability of health care services as a possible predictor of use (Valdivia, 2002), and assess health outcomes (Phillips et al., 1998).

Table 1. Unweighted descriptive statistics for use of preventive care, curative visits and hospitalization.

Variable	Mean or percent	SD	Level
<i>Predisposing factors</i>			
Age (in years)	35.4	18.5	Individual
Sex (%)			
Male	49.2		Individual
Female	50.8		
Ethnicity (%)			
Mestizo	85.7		Household
Indigenous	8.6		
Others	5.7		
Marital status (%)			
Living w/ partner	15.5		
Married	37.2		Individual
Separated/divorced	5.2		
Widow	4.1		
Single	37.9		
<i>Enabling factors</i>			
Area of residence (%)			
Urban	51.6		Census segment
Rural	48.4		
Assets quintile (%)			
1	22.5		
2	20.5		Household
3	19.0		
4	18.8		
5	19.2		
Consumption quintile (%)			
1	23.0		
2	20.5		Household
3	19.4		
4	19.0		
5	18.0		
Educational level (%)			
None	8.3		
Elementary	45.0		Individual
High School	35.5		
College	11.2		
Doesn't know/answer	.1		
Insurance (%)			
Insured	22.6		Individual
Uninsured	77.4		
<i>Need</i>			
Health problems (%)			
No problems	52.8		Individual
1 problem	40.1		
2 problems	7.1		
<i>Utilization</i>			
Preventive care use (%)	4.6		Individual
Number of curative visits	.21	.48	Individual
Hospitalization (%)	3.0		Individual

Table 2. Unweighted descriptive statistics for use of antiparasitic medicines.

Variable	Mean or percent	SD	Level
<i>Predisposing factors</i>			
Age (in years)	7.1	4.2	Individual
Sex (%)			
Male	50.4		Individual
Female	49.6		
Ethnicity (%)			
Mestizo	83.2		Household
Indigenous	10.6		
Others	6.2		
Household Head Sex (%)			
Male	85.1		Household
Female	14.9		
Household Head Marital status (%)			
Living w/ partner	26.6		
Married	58.5		Household
Separated/divorced	7.4		
Widow	4.9		
Single	2.6		
<i>Enabling factors</i>			
Area of residence (%)			
Urban	47.7		Census segment
Rural	52.3		
Assets quintile (%)			
1	26.7		
2	23.1		Household
3	19.8		
4	16.8		
5	13.6		
Consumption quintile (%)			
1	28.7		
2	22.9		Household
3	19.7		
4	16.6		
5	12.1		
Household Head Educational level (%)			
None	8.3		
Elementary	55.8		Household
High School	26.0		
College	9.9		
Doesn't know/answer	.1		
Insurance (%)			
Insured	11.7		Individual
Uninsured	88.3		
<i>Need</i>			
Health problems (%)			
No problems	54.9		Individual
One problem	41.9		
Two problems	3.2		
<i>Utilization</i>			
Use of antiparasitic medicines (%)	59.5		Individual

Table 3. Multilevel weighted regression estimates for use of preventive care, curative visits and hospitalization<sup>†</sup>.

Parameters	Use of preventive care	Number of curative visits <sup>‡</sup>	Hospitalization <sup>§</sup>
Constant	-2.238	-2.622	-3.636
<i>Predisposing factors</i>			
Age	-0.002 (0.003)	-0.00004 (0.001)	0.013 (0.002)***
Female	0.541 (0.068)***	0.041 (0.024)*	0.069 (0.065)
Indigenous	-0.024 (0.214)	-0.184 (0.063)***	
Other ethnicity	0.225 (0.105)**	-0.175 (0.083)**	
Living w/ partner	0.105 (0.076)	-0.008 (0.053)	-0.063 (0.082)
Separated/divorced	-0.241 (0.144)*	-0.064 (0.031)**	0.067 (0.075)
Widow	0.070 (0.087)	0.013 (0.034)	-0.286 (0.113)**
Single	-0.161 (0.076)**	-0.188 (0.030)***	-0.435 (0.121)***
<i>Enabling factors</i>			
Rural	-0.067 (0.063)	-0.097 (0.059)	-0.190 (0.093)**
Assets quintile 1	-0.825 (0.134)***	-0.031 (0.097)	
Assets quintile 2	-0.341 (0.135)**	0.004 (0.095)	
Assets quintile 3	-0.126 (0.086)	0.024 (0.059)	
Assets quintile 4	-0.250 (0.069)***	0.005 (0.050)	
Consumption quintile 1	-0.989 (0.130)***	-0.344 (0.071)***	
Consumption quintile 2	-0.764 (0.109)***	-0.136 (0.063)**	
Consumption quintile 3	-0.516 (0.062)***	-0.124 (0.042)***	
Consumption quintile 4	-0.214 (0.081)***	-0.061 (0.037)*	
No education	-0.334 (0.184)*	0.038 (0.058)	-0.0003 (0.222)
Elementary school	-0.106 (0.095)	0.042 (0.038)	-0.032 (0.112)
High school	0.106 (0.068)	0.083 (0.039)**	0.024 (0.091)
Doesn't know/answer	0.141 (0.505)	-0.177 (0.453)	
Uninsured	-0.401 (0.060)***	-0.226 (0.026)***	-0.325 (0.043)***
<i>Need</i>			
One health problem	-0.016 (0.061)	1.547 (0.053)***	0.144 (0.072)**
Two health problems	0.082 (0.137)		0.516 (0.130)***
<i>Random parameters</i>			
Level 4: province/region	0.053 (0.029)*	0.019 (0.008)**	0.014 (0.009)
Level 3: census segment	0.113 (0.060)*	0.037 (0.009)***	0.063 (0.043)
Level 2: household	2.337 (0.602)***	0.135 (0.023)***	0.163 (0.304)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

<sup>†</sup> A four-level binomial logit model (IGLS, MQL1) was fitted for Use of preventive care. A four-level Poisson model (IGLS, PQL1) was fitted for Number of curative visits. A four-level extra-binomial logit model (IGLS, MQL1) was fitted for Hospitalization. For each outcome, the final conditional model was fitted with health care need, predisposing and enabling factors as fixed effects, and random variance at the household, census segment and province/region levels. Figures in parentheses represent the standard errors.

<sup>‡</sup> Due to convergence problems and questionable effects of the original categorical need predictor, it was run as a continuous variable [*health problems*].

<sup>§</sup> Given non-significant variation at the household level in the non-conditional model, no predictors were added at this level.

Table 4. Multilevel weighted regression estimates for use of antiparasitic medicines<sup>†</sup>.

Parameters	Model 1	Model 2	Model 3	Model 4
Constant	0.426	0.415	0.008	0.590
<i>Predisposing factors</i>				
Age			0.062 (0.005)***	0.062 (0.005)***
Female			0.047 (0.022)**	0.044 (0.022)**
Indigenous			-0.487 (0.169)***	-0.291 (0.159)*
Other ethnicity			-0.044 (0.141)	-0.065 (0.164)
HH Female <sup>§</sup>			0.066 (0.080)	0.063 (0.085)
HH Living w/ partner			-0.114 (0.039)***	-0.011 (0.037)
HH Separated/divorced			-0.209 (0.108)*	-0.146 (0.110)
HH Widow			-0.269 (0.123)**	-0.111 (0.112)
HH Single			-0.215 (0.146)	-0.169 (0.160)
<i>Enabling factors</i>				
Rural				0.205 (0.064)***
Assets quintile 1				-0.311 (0.121)**
Assets quintile 2				-0.094 (0.091)
Assets quintile 3				-0.186 (0.098)*
Assets quintile 4				-0.045 (0.065)
Consumption quintile 1				-0.541 (0.135)***
Consumption quintile 2				-0.318 (0.137)**
Consumption quintile 3				-0.228 (0.148)
Consumption quintile 4				-0.271 (0.125)**
HH No education				-0.467 (0.120)***
HH Elementary school				-0.355 (0.102)***
HH High school				-0.128 (0.060)**
HH Doesn't know/answer				-1.245 (0.429)***
Uninsured				-0.022 (0.080)
<i>Need</i>				
One health problem		0.016 (0.034)	0.118 (0.031)***	0.112 (0.031)***
Two health problems		0.134 (0.076)*	0.278 (0.078)***	0.275 (0.082)***
<i>Random parameters</i>				
Level 4: province/region	0.067 (0.030)**	0.066 (0.029)**	0.059 (0.026)**	0.082 (0.032)**
Level 3: census segment	0.139 (0.037)***	0.139 (0.037)***	0.118 (0.032)***	0.117 (0.032)***
Level 2: household	1.154 (0.049)***	1.154 (0.048)***	1.198 (0.048)***	1.199 (0.055)***

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

<sup>†</sup> Based on a four level binomial logit model (IGLS, MQL1). Model 1 presents a non-conditional model with no fixed effect predictors and random variance at the household, census segment and province/region levels. Model 2 presents a conditional model with health care need as a fixed effect, and random variance at the household, census segment and province/region levels. Model 3 presents a conditional model with health care need and predisposing factors as fixed effects, and random variance at the household, census segment and province/region levels. Model 4 presents a conditional model with health care need, predisposing and enabling factors as fixed effects, and random variance at the household, census segment and province/region levels. Figures in parentheses represent the standard errors.

<sup>§</sup> HH= Household head. Household head predictors included sex, marital status, and educational level (See Table 2).

## Chapter 3. Manuscript 2



Understanding the context of health care utilization in Ecuador: A multilevel analysis.

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## Abstract

*Objective:* This study examines the context in which utilization of health services in Ecuador takes place, focusing on the provision of services and health outcomes.

*Methods:* The main dataset was the 2004 National Demographic and Maternal & Child Health Survey (ENDEMAIN). Moreover, province-level data was obtained from the Ecuadorian System of Social Indicators (SIISE) and the Institute of Statistics and Census (INEC). Statistical analysis included spatial and multilevel modeling of utilization and health outcomes.

*Results:* Spatial autocorrelation scores revealed no significant spatial clustering of provider measures by province, excepting for public practice health personnel. In multilevel models, public practice health personnel was found to be associated with use of preventive care (positively) and antiparasitic medicines (negatively). The density of public inpatient clinics was positively associated with solution of the second reported health problem.

*Conclusions:* From a policy perspective, the strengthening of the public health care delivery system should be a priority since it appears it could significantly impact people's ability to find a solution to their health needs (particularly when there is more than one health problem).

Key words: Ecuador, health care provision, use of health services, socioeconomic factors, multi-level analysis.

## 1. Introduction

Over the past few years Ecuador has slowly emerged from a deep political, economic, and social crisis that has had a heavy impact on all sectors, with vulnerable groups being the hardest hit. The main political and social problems that have a direct impact on the health situation include high levels of poverty (40% of the population, over 70% among indigenous groups), limited access to institutional health services (70-80%), and low insurance coverage (20%) (Pan-American Health Organization, 2001). This is due in part to the lack of a National Health System structured as indicated in the National Constitution. In 2000, the Ecuadorian Congress approved a major health reform law that incorporated a variety of mechanisms in order to establish a “true” National Health Care System (NHCS). Although, there are important pieces missing (such as how to finance Universal Health Insurance (UHI); connection with local and regional services, etc.), it provided a basic agreement to work on for the future of a NHCS. In its report about Health Reform in Andean Countries, PAHO mentions that Ecuador has not shown evidence that the current reform influenced any indicators selected to evaluate access or use of health care resources (Pan-American Health Organization, 2002a). Moreover, the political instability present since 2001 has caused problems in governance, administrative stability, and continuity in public management, which in turn has affected the health sector reform process (Pan-American Health Organization, 2007).

From an ecological perspective –which guides much of the research and interventions in public health– it is important to analyze contextual factors affecting

the use of health services (at the community, institutional and policy levels) (National Cancer Institute, 2005). During the last forty years, Andersen's Health Care Utilization Behavior model has been adapted to consider more system-level measures, focusing on the availability, organization and financing of services (Aday & Andersen, 1974; Aday et al., 2004). Therefore, it is acknowledged that besides predisposing, enabling and need factors, the environment and provider-related factors also affect healthcare utilization (Aday & Awe, 1997). From a programmatic and policy perspective, connecting peoples' perceptions of health services and health care delivery system characteristics would allow understanding of utilization behavior in a more comprehensive manner. In a systematic review of the literature, Phillips and colleagues found that the majority of studies that included environmental variables measured only urban/rural location, or region, which may be imprecise proxies for more specific measures such as supply of services (Phillips et al., 1998). Hence, characteristics such as *physician supply* and *availability of physicians in the community* would be important contextual variables to be considered within the health services utilization model (Andersen & Davidson, 1996). Similarly, Andersen; and Aday & Awe, highlight the importance of including health outcomes measures in these types of analyses (Aday & Awe, 1997; Andersen, 1995). In other words, health and well being (quality of life) is a fundamental achievement of any medical care system (Aday et al., 2004). Infant mortality is an indicator that has been used in the past to analyze health care services utilization (Dammert, 2001).

There are few studies that have looked at the context of health care utilization in Latin America. Most studies have analyzed the relationship between income

inequality and health outcomes (De Maio, 2007; Larrea & Kawachi, 2005; Subramanian et al., 2003a), and food poverty (Farrow, Larrea, Hyman, & Lema, 2005). Interestingly, Larrea and Kawachi pointed out that, in Ecuador, the strongest relationship between income inequality and stunting operated at the province level. The purpose of this study was to analyze the context in which utilization of health services in Ecuador takes place, focusing on the provision of services and health outcomes. Two research questions were proposed: 1) What is the relationship between provider measures and health outcomes by province in Ecuador?; 2) What is the influence of provider measures (adjusting for predisposing, enabling, perceived need, and utilization of health care services) in reported health outcomes in Ecuador?

## 2. Materials and Methods

### 2.1. Data

The main dataset utilized in this study was the 2004 Demographic and Maternal & Child Health Survey (ENDEMAIN) (CEPAR, 2005). Various provider measures at the province level were extracted from the Ecuadorian System of Social Indicators (SIISE), including: a) Public practice physicians, b) Private practice physicians, c) Public practice health personnel, d) Private practice health personnel, e) Public inpatient clinics, f) Private inpatient clinics, g) Outpatient clinics, per 10 000 inhabitants (Ministerio de Bienestar Social, 2005). From the Ecuadorian Institute of Statistics (INEC), the following province level health outcomes were included: 1) Infant Mortality, 2) General Mortality, and 3) Maternal Mortality (INEC, 2007). Table 1 presents a summary of province level measures.

---Insert Table 1 about here---

Following the proposed research questions, this study was divided in two components. First, an ecological analysis of provider measures and health outcomes at the province level was conducted; including an analysis of spatial patterns. Second, a multilevel analysis of the relationship between provider measures and individual health care utilization and outcomes was conducted. Using ENDEMAIN 2004, Andersen's model of health care utilization served as a framework to classify predictors of health care utilization in three categories: predisposing (demographic), enabling (socioeconomic), and need factors. Predisposing factors included age (years), sex (male, female), ethnicity (mestizo, indigenous, others) and marital status (married, single, living with a partner, separated/divorced, widow). For use of antiparasitic medicines, household head sex and marital status were included. Enabling factors consisted of area of residence (urban, rural), assets quintile (1 to 5), consumption quintile (1 to 5), educational level (none, elementary, high school, college, doesn't know/answer), and health insurance affiliation (insured, uninsured). For use of antiparasitic medicines, household head educational level was included. Perceived need was defined as the reported number of health problems during the last 30 days (0, 1, 2). Health care utilization was measured by use of preventive services (yes/no); use of antiparasitic medicines (yes/no); curative care visits during the last 30 days: First problem curative visit (yes/no), Second problem curative visit (yes/no); and hospitalization during the last 12 months (yes/no). In terms of individual health outcomes, three were extracted from ENDEMAIN 2004. Two variables for curative care: 1) First health problem solved (yes/no), 2) Second health problem solved

(yes/no); and one for hospitalization: problem solved (yes/no)<sup>1</sup>. Table 2 summarizes the predictors included in the analysis for use of preventive care, first health problem solved, second health problem solved, and hospitalization problem solved. Table 3 summarizes the predictors included in the analysis for use of antiparasitic medicines.

--- Insert Table 2 about here ---

## 2.2. *Statistical Analysis*

First, for the ecological analysis, Global Moran's I statistic was used to assess spatial autocorrelation. Also, univariate LISA (Local Indicator of Spatial Autocorrelation) maps were produced to assess specific spatial patterns of province level variables. Moreover, Bivariate Pearson correlation coefficients were calculated for all province level measures. Second, for the multilevel analysis, the various levels present in ENDEMAIN 2004 sampling frame<sup>2</sup> made necessary to use multilevel models to examine the relationship between provider level measures and individual health outcomes (adjusting for various relevant predisposing, enabling and need factors, and utilization of health care). In doing so, this study explicitly accounted for clustering in such a complex sample design (Rodriguez & Goldman, 1995, 2001; Subramanian et al., 2003b). Failing to recognize relationships existing at these levels – by aggregating or disaggregating data– could incur in ecological, or individualistic fallacy; and statistical issues (Subramanian et al., 2003b). Furthermore, multilevel

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<sup>1</sup> ENDEMAIN 2004 did not collect information on outcomes for use of preventive services or antiparasitic medicines. Consequently, use constituted the outcome variable in their respective models.

<sup>2</sup> The highest level consisted of 17 strata which included two regions (Amazon and Galapagos Islands) and 15 provinces (10 from Sierra region and 5 from Costa region). Consequently, this paper used the term province/region to refer to this particular level of analysis.

modeling offered the possibility of merging provider measures at the province/region level to the analysis.<sup>3</sup>

---Insert Table 3 about here---

Models were built in a sequential manner (Subramanian et al., 2003a), starting with a *non-conditional* (empty) model to partition variance across levels and assess its statistical significance (Duncan et al., 2003). Models were fitted using the iterative generalized least squares maximum likelihood estimator. Since all outcome variables were dichotomous, the marginal quasi likelihood approximation with a first order Taylor linearization procedure was applied (Subramanian et al., 2003a). For each outcome variable, predictors were assigned to each significant level (as they were originally collected) to build various *conditional* models. For provider measures, preliminary bivariate multilevel analyses determined the variables significantly associated (at  $p < 0.1$ ) with the outcomes of interest. Only these provider measures were utilized in further analyses. The multivariate multilevel models adjusted for predisposing, enabling, need factors, and health care utilization. Stata MP v9.2 was used for data preparation, descriptive statistics, and merging (StataCorp, 2007). GeoDa 0.9.5-i5 was used to calculate the Global Moran's I and LISA functions (Anselin, 2003). MLwiN 2.02 was used to fit all multilevel models (Rasbash et al., 2004).

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<sup>3</sup> Since ENDEMAIN 2004 reduced the *Oriente* provinces (Sucumbios, Orellana, Napo, Pastaza, Morona Santiago, and Zamora Chinchipe) to a single stratum, an average was calculated for each *Oriente* provider measure to be included in the multilevel models.



### 3. Results

Spatial autocorrelation (Moran's I) scores revealed no significant spatial clustering of provider measures by province, excepting for public practice health personnel. For this provider measure, although the initial Global Moran's I showed no clustering ( $I=-0.18$ ,  $p<0.05$ ), it became somewhat clustered when the provinces of Galapagos and Sucumbíos were excluded ( $I=0.09$ ,  $p<0.05$ ). Moreover, LISA analysis showed there was a significant ( $p<0.05$ ) cluster of low public practice health personnel in Guayas, Cañar, and Cotopaxi. In terms of province-level health outcomes, only general mortality was significantly clustered ( $I=0.13$ ,  $p<0.05$ ). LISA analysis showed there was a significant ( $p<0.05$ ) cluster of high general mortality in the provinces of Manabí, Los Ríos, Guayas, Cotopaxi, Tungurahua, Bolívar, and Cañar (Figure 1). The density of outpatient clinics had a significant negative correlation with both infant and general mortality ( $r=-0.39$ , and  $r=-0.37$ , respectively).<sup>4</sup> However, it had a significant positive correlation with maternal mortality ( $r=0.37$ ). Public inpatient services density had the highest negative correlation with general mortality ( $r=-0.58$ ). Private inpatient services density was positively correlated with infant mortality ( $r=0.35$ ); while it was negatively correlated with maternal mortality ( $r=-0.46$ ). Inversely to outpatient services, the density of private practice physicians was positively correlated with infant and general mortality ( $r=0.32$ , and  $r=0.33$ , respectively); while it was negatively correlated with maternal mortality ( $r=-0.43$ ). In summary, the preliminary ecological analysis showed that, for the most part, the provision measures were randomly

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<sup>4</sup> The correlation matrix is available from the author upon request.

distributed across space. Consequently, multilevel models assumed there was no spatial clustering in the provision of services in Ecuador.

Table 4 presents the results for use of preventive care, first health problem solved, second health problem solved, and hospitalization problem solved. Except for provider measures and age, all explanatory variables were entered in the models as indicator dummy variables. In bivariate analyses, four provider measures were significantly associated with use of preventive care. After adjusting for predisposing, enabling, and need factors, the density of public practice health personnel had a slightly significant positive association with use of preventive care. In other words, for a 1-unit increase in the density of public practice health personnel, the odds of using preventive care increased 0.9%.

---Insert Table 4 about here---

The density of outpatient clinics had a negative association with *first health problem solved* (OR=0.90, 95%CI=0.82 – 0.99). However, this relationship was not statistically significant when adjusting for predisposing, enabling, and utilization factors. Surprisingly, the use of curative services for the first reported health problem had a strong negative association with having the problem solved (OR=0.69, 95%CI: 0.62 – 0.77). Compared to the richest 20% of households, the poorest 20% were less likely to have their first health problem solved (OR<sub>assets quintile 1</sub>=0.73, 95%CI: 0.62 – 0.87; OR<sub>consumption quintile 1</sub>=0.86, 95%CI: 0.74 – 1.01). Similarly, compared to males, females were less likely to solve their first health problem (OR=0.91, 95%CI: 0.84 – 0.98). The constant for *first health problem solved* represents a mestizo man, aged 40, who is married and lives in an urban area, belongs to the highest assets and

consumption quintile categories, with college education and health insurance, and did not have a curative visit for the first reported health problem. This reference group had an 85.4% probability of having their first health problem solved.<sup>5</sup> The density of public inpatient clinics was significantly associated with *second health problem solved* (OR=2.85, 95%CI: 1.01 – 8.06). This strong positive relationship was statistically significant even after adjusting for predisposing, enabling, and utilization factors. While age had a significant (although small) negative association with the outcome of interest (OR=0.99, 95%CI: 0.98 – 0.99), being a widow had a strong positive association with having a second health problem solved (OR=1.36, 95%CI: 1.02 – 1.82). The constant for *second health problem solved* represents a married man, aged 48, who lives in an urban area, with college education and health insurance, and did not have a curative visit for the second reported health problem. This group had a 62.3% probability of having their second health problem solved.<sup>6</sup> Given that there was no statistically significant variation at the province level, no provider measures could be entered for *hospitalization problem solved*. After adjusting for predisposing and enabling factors, perceived need was significantly associated with having their hospitalization problem solved. In fact, there was a “gradient of need” from reporting one health problem (OR=0.39, 95%CI: 0.26 – 0.56) to reporting a second health problem (OR=0.28, 95%CI: 0.21 – 0.36) during the previous 30 days.

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<sup>5</sup> If the reference group used curative care, the probability of solving their first health problem was 80.2%.

<sup>6</sup> If the reference group used curative care, the probability of solving their second health problem was 62.4%.

Table 5 presents the results for use of antiparasitic medicines. Similar to use of preventive care, the null model revealed statistically significant variation at the household, census segment, and province/region levels.<sup>7</sup> Model 2 showed that the density of public practice health personnel was slightly significantly associated with use of antiparasitic medicines (OR=0.99, 95%CI: 0.98 – 1.00). This negative relationship was confirmed in model 3, after adjusting for predisposing, enabling, and need factors. For a 1-unit increase in the density of public practice health personnel, the odds of using antiparasitic medicines decreased 1.4%.

---Insert Table 5 about here---

#### 4. Discussion and conclusions

Overall, this paper found initial evidence of a statistically significant relationship between availability of health services, and individual utilization of such services and health outcomes. Indeed, preliminary ecological analysis conducted at the province level showed that increasing the density of outpatient clinics could decrease infant and general mortality; while increasing the density of private practice physicians could decrease maternal mortality. Although this analysis did not control for the influence of the other provider predictors (or socioeconomic factors), it demonstrated that (at least in the Ecuadorian context) the province level required further consideration (Larrea & Kawachi, 2005). Consequently, this study used a

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<sup>7</sup> Particularly for use of preventive services and antiparasitic medicines, most variation was concentrated at the household level, even after adjusting for other factors. Consequently, there might be other household-level relevant factors not included in the models (which may constitute a source of bias).

multilevel framework to advance our understanding of the context of health care utilization by incorporating provider measures and reported health outcomes (Diez Roux, 2001; Phillips et al., 1998). Except for *hospitalization problem solved*, all other outcome variables had significant variation at the province level in non-conditional models, which in turn permitted to assess the influence of provider measures in reported health outcomes.

After adjusting for various predisposing, enabling, and need factors, public practice health personnel density was slightly associated with use of preventive care (positively) and antiparasitic medicines (negatively) (Table 6). While a one unit increase in the density of public practice health personnel increased 0.1% the probability of using preventive care; it decreased 0.3% the probability of using antiparasitic medicines. From all provider measures included in the multilevel models, the positive relationship between public inpatient clinics and solution of the second reported health problem was the strongest. The probability of solution increased 23.4% with a one unit increase in the density of public inpatient clinics. From a policy perspective, the strengthening of the public health care delivery system should be a priority since it appears it could significantly impact people's ability to find a solution to their health needs (particularly when there is more than one health problem). However, the negative relationship between first problem curative visit and having a solution to their reported health problem points out that, regardless of health insurance status and other factors, people in Ecuador may turn to other options when a health need arrives. In fact, only 17.5% used curative care, while 20.8% used over-the-counter-drugs, and 5% did nothing (CEPAR, 2005). The same is applicable to use of

antiparasitic medicines. This may be related to poorly staffed and equipped health services (particularly in the public sector) which in turn may affect the provision of adequate care (Gage, 2007).

---Insert Table 6 about here---

Although it was not the main focus of this study, it is relevant to mention that after adjusting for predisposing, enabling, need, utilization, and provider measures, economic wealth had a significant influence on utilization of health care services and health outcomes.<sup>8</sup> As it can be seen in tables 4-5, it is evident that compared to the highest 20%, households ranking in the lowest 20% (in terms of assets and consumption quintiles) were less likely to use preventive services, antiparasitic medicines, or having a solution to their first reported health problem. This situation may be exacerbated by what has been labeled as “double epidemiologic overlap” (W. F. Waters, 2006). In Ecuador, there are high prevalence rates of infectious and chronic diseases, and the urban and rural poor experience a higher burden of both types of diseases. In his article, Waters points out that the so-called “modern” (chronic) diseases are particularly sensitive to access to health care and health policy.

The following caveats should be considered in interpreting the empirical findings of this study. First, in terms of data availability, this study relied primarily on secondary survey data (ENDEMAIN 2004). In survey design, an important assumption is that although questions are usually asked about temporal (dynamic) processes, “fixed” populations are studied (Blalock, 1993). Second, the presence of

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<sup>8</sup> The correlation between provider measures and assets and consumption quintiles, respectively, showed no multicollinearity.

facilities and providers was measured at the province/region level. Such level of aggregation prohibits its use for local decision-making. Besides, it does not account for issues such as overlapping coverage, redundant services, potential for overcrowded facilities (mainly in major cities, such as Quito and Guayaquil), and variation in quality of services (Rosero-Bixby, 2004b). Also, regression model results are affected by the modifiable areal unit problem (MAUP) since space was fragmented in administrative province/regions (Chaix, Merlo, Subramanian, Lynch, & Chauvin, 2005c; Maheswaran & Craglia, 2004). Third, the relatively small number of provincial units was another limitation.<sup>9</sup> Yet, this paper analyzed preliminary data at the province level, calculating Moran's I (both globally and locally), which provided empirical evidence of spatial randomness in the geographical distribution of provider measures. Concurring with previous research, spatial visualization of provider measures and health outcomes proved to be an important complement to tabular ecological analysis (Farrow et al., 2005). Future research should consider utilizing a more "relational" perspective that may reinforce the idea of a reciprocal connection people-space (Cummins, Curtis, Diez-Roux, & Macintyre, 2007); and refining the administrative division (probably at the canton or parroquia levels) to facilitate linkages with provider data at those levels (Phillips et al., 1998), and allow better (and more meaningful) empirical analyses (Chaix, Merlo, & Chauvin, 2005b; Sridharan, Tunstall, Lawder, & Mitchell, 2007).

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<sup>9</sup> At the time of analysis, there were 22 provinces in Ecuador. However, Ecuadorian Congress recently approved the creation of province "Santo Domingo de los Tsáchilas" (on October 2, 2007); and province "Santa Elena" (on October 16, 2007).

This study was one of few in attempting to connect utilization of services with both the context in which utilization occurs (by including health care services provision) and the outcome of such utilization (reported health outcomes). This approach acknowledged the important connections between individual behaviors and contextual factors (Dunn & Cummins, 2007). In other words, this study went beyond the “population at risk” perspective of the original Andersen’s model, to look into delivery system measures that would permit us to contrast utilization with provision of services (Aday et al., 2004; Phillips et al., 1998). Regionally, this study builds on recent empirical work on health outcomes in Latin America (De Maio, 2007; Hertel-Fernandez, Giusti, & Sotelo, 2007; Larrea & Kawachi, 2005; Subramanian et al., 2003a), by combining preliminary ecological analysis (at the province level) with a multilevel regression framework. Moreover, the present study showed the necessity of building a stronger national health care information system (Arcury, Gesler, Preisser, Sherman, Spencer, & Perin, 2005; Chaix et al., 2005b; Rosero-Bixby, 2004b). Ultimately, these efforts would help inform the public and policymakers on the advances of health care reform in Ecuador (Bambas, Braveman, Dachs, Delgado, Gakidou, Moser et al., 2005).

Expanding on the idea of “context”, an important factor to be considered in future research is political context in both Ecuador and Latin America. Previous research has shown that long periods of government by the same political party influenced a country’s social inequalities and health indicators (Navarro & Shi, 2001). In this regard, Ecuador’s political and economic instability of the past decade has aggravated the social conditions for millions of Ecuadorians (Larrea, 2004b). Many



have left the country to pursue a better future for them and their families. Future research should assess the contribution emigrants make to the betterment of social and health conditions of their families in Ecuador.

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Table 5. Descriptive statistics of province level measures.

Variable	n	Mean	SD
<i>Provider measures<sup>a</sup></i>			
Public practice physicians	22	8.401	2.352
Private practice physicians	22	5.450	4.243
Public practice health personnel	22	26.044	16.179
Private practice health personnel	22	7.239	6.171
Public inpatient clinics	22	0.277	0.242
Private inpatient clinics	22	0.305	0.176
Outpatient clinics	22	3.919	1.762
<i>Health Outcomes<sup>b</sup></i>			
Infant Mortality <sup>c</sup>	22	18.791	6.092
General Mortality <sup>d</sup>	22	4.032	1.202
Maternal Mortality <sup>e</sup>	21	112.138	52.633

<sup>a</sup> Per 10 000 inhabitants. Data source: Ministerio de Bienestar Social (2005).

<sup>b</sup> Data source: INEC (2007).

<sup>c</sup> Per 1000 live births. <sup>d</sup> Per 1000 inhabitants. <sup>e</sup> Per 100 000 live births.

Table 6. Unweighted descriptive statistics for use of preventive care and self-reported health outcomes.

	Level	Sample N=33387	Use of preventive care N=1528 <sup>a</sup>	<i>Self-Reported Health Outcomes</i>		
				First health problem solved N=8585 <sup>a</sup>	Second health problem solved N=1092 <sup>a</sup>	Hospitalization problem solved N=784 <sup>a</sup>
<i>Predisposing factors</i>						
Age in years: mean (SD)	Individual	35.4 (18.5)	35.5 (0.5)	35.7 (0.2)	44.0 (0.6)	41.1 (0.7)
Sex (%)						
Male	Individual	49.2	37.7	46.8	41.5	46.6
Female		50.8	62.3	53.2	58.5	53.4
Ethnicity (%)						
Mestizo	Household	85.7	88.2	87.5	90.4	88.1
Indigenous		8.6	4.5	7.4	4.9	6.0
Others		5.7	7.3	5.1	4.7	5.9
Marital status (%)						
Living w/ partner	Individual	15.5	13.8	16.4	17.6	18.2
Married		37.2	42.7	38.5	42.5	46.8
Separated/divorced		5.2	5.0	5.6	9.4	7.7
Widow		4.1	4.1	4.4	9.2	4.9
Single		37.9	34.4	35.1	21.3	22.4
<i>Enabling factors</i>						
Area of residence (%)						
Urban	Census segment	51.6	67.6	54.9	57.0	57.3
Rural		48.4	32.4	45.1	43.0	42.7
Assets quintile (%)						
1	Household	22.5	8.2	20.1	19.3	15.2
2		20.5	13.6	20.9	23.2	19.4
3		19.0	19.0	19.8	22.8	22.3
4		18.8	22.0	20.1	19.0	21.3
5		19.2	37.2	19.1	15.7	21.8
Consumption quintile (%)						
1	Household	23.0	9.2	20.7	21.0	17.1
2		20.5	11.9	19.5	19.3	18.9
3		19.4	17.3	20.4	20.7	20.9
4		19.0	26.3	20.8	22.0	21.4

5		18.0	35.3	18.6	17.0	21.7
		<i>Self-Reported Health Outcomes</i>				
	Level	Sample N=33387	Use of preventive care N=1528 <sup>a</sup>	First health problem solved N=8585 <sup>a</sup>	Second health problem solved N=1092 <sup>a</sup>	Hospitalization problem solved N=784 <sup>a</sup>
<i>Need</i>						
Educational level (%)						
	Individual	8.3	3.7	8.2	11.4	9.7
	Individual	45.0	31.2	43.4	47.4	43.7
	Individual	35.5	44.8	37.1	31.9	33.7
	Individual	11.2	20.2	11.2	9.0	12.9
	Individual	.1	.1	.1	.3	.0
Insurance (%)						
	Individual	22.6	35.3	23.2	23.9	29.5
	Individual	77.4	64.7	76.8	76.1	70.5
<i>Health problems</i>						
Health problems (%)						
	Individual	52.8	52.3	N/A	N/A	48.5
	Individual	40.1	40.0	N/A	N/A	40.9
	Individual	7.1	7.7	N/A	N/A	10.6
<i>Utilization</i>						
First health problem curative visit (%)						
	Individual	16.0	N/A	33.3	N/A	N/A
	Individual	84.0	N/A	66.7	N/A	N/A
Second health problem curative visit (%)						
	Individual	2.1	N/A	N/A	31.6	N/A
	Individual	97.9	N/A	N/A	68.4	N/A

N/A = Not applicable.

<sup>a</sup> Subsamples include only those individuals who answered “Yes” to use of preventive care services, first health problem solved, second health problem solved and hospitalization problem solved, respectively.

Table 7. Unweighted descriptive statistics for use of antiparasitic medicines.

	Level	Sample N=16416	Use of antiparasitic medicines N=9765 <sup>a</sup>
<i>Predisposing factors</i>			
Age in years: mean (SD)	Individual	7.1 (4.2)	7.6 (0.04)
Sex (%)			
Male	Individual	50.4	49.8
Female		49.6	50.2
Ethnicity (%)			
Mestizo	Household	83.2	85.4
Indigenous		10.6	8.2
Others		6.2	6.4
Household Head Sex (%)			
Male	Household	85.1	85.0
Female		14.9	15.0
Household Head Marital status (%)			
Living w/ partner	Household	26.6	27.0
Married		58.5	58.3
Separated/divorced		7.4	7.6
Widow		4.9	4.6
Single		2.6	2.5
<i>Enabling factors</i>			
Area of residence (%)			
Urban	Census segment	47.7	49.7
Rural		52.3	50.3
Assets quintile (%)			
1	Household	26.7	23.7
2		23.1	23.2
3		19.8	19.8
4		16.8	17.9
5		13.6	15.4
Consumption quintile (%)			
1	Household	28.7	24.9
2		22.9	22.9
3		19.7	20.5
4		16.6	17.4
5		12.1	14.3
Household Head Educational level (%)			
None	Household	8.3	7.2
Elementary		55.8	52.9
High School		26.0	28.2
College		9.9	11.6
Doesn't know/answer		.1	.1
Insurance (%)			
Insured	Individual	11.7	12.1
Uninsured		88.3	87.9
<i>Need</i>			
Health problems (%)			
No problems	Individual	54.9	53.8
1 problem		41.9	42.7
2 problems		3.2	3.5

<sup>a</sup> Subsample includes only those individuals who answered "Yes" to use of antiparasitic medicines.

Table 8. Multilevel weighted regression estimates for use of preventive care and self-reported health outcomes.

Parameters	Use of preventive care <sup>a</sup>	Self-Reported Health Outcomes		
		First health problem solved <sup>a</sup>	Second health problem solved <sup>b</sup>	Hospitalization problem solved <sup>b</sup>
Constant	-2.855	1.765	0.504	1.936
<i>Provider measures</i>				
Public practice physicians	0.055 (0.033)			
Private practice physicians	-0.009 (0.013)			
Public practice health personnel	0.009 (0.005)*			
Private practice health personnel	0.002 (0.006)			
Public inpatient clinics			1.291 (0.569)**	
Outpatient clinics		-0.072 (0.043)		
<i>Predisposing factors</i>				
Age	-0.001 (0.003)	-0.019 (0.001)***	-0.014 (0.003)***	-0.004 (0.005)
Female	0.538 (0.065)***	-0.099 (0.040)**	-0.113 (0.059)*	0.123 (0.175)
Indigenous	-0.027 (0.206)	0.043 (0.093)		
Other ethnicity	0.223 (0.102)**	0.034 (0.131)		
Living w/ partner	0.118 (0.079)	0.001 (0.049)	0.068 (0.087)	0.591 (0.187)***
Separated/divorced	-0.226 (0.143)	-0.101 (0.088)	0.194 (0.133)	0.115 (0.415)
Widow	0.075 (0.084)	0.058 (0.100)	0.310 (0.147)**	-0.033 (0.301)
Single	-0.156 (0.073)**	0.024 (0.035)	0.088 (0.112)	-0.066 (0.206)
<i>Enabling factors</i>				
Rural	-0.074 (0.061)	0.075 (0.045)*		
Assets quintile 1	-0.805 (0.130)***	-0.310 (0.087)***		
Assets quintile 2	-0.321 (0.132)**	-0.160 (0.061)***		
Assets quintile 3	-0.117 (0.084)	-0.044 (0.070)		
Assets quintile 4	-0.245 (0.064)***	0.023 (0.066)		
Consumption quintile 1	-0.976 (0.128)***	-0.149 (0.079)*		
Consumption quintile 2	-0.751 (0.105)***	-0.208 (0.060)***		
Consumption quintile 3	-0.504 (0.060)***	-0.068 (0.080)		
Consumption quintile 4	-0.206 (0.076)***	-0.033 (0.067)		
No education	-0.352 (0.183)*	-0.109 (0.101)	-0.340 (0.196)*	-0.426 (0.284)
Elementary school	-0.122 (0.093)	-0.077 (0.078)	-0.121 (0.167)	-0.208 (0.224)
High school	0.098 (0.065)	0.001 (0.065)	0.146 (0.155)	0.084 (0.212)

			<sup>c</sup>	<sup>d</sup>
Doesn't know/answer	0.156 (0.484)	-0.394 (0.182)***		
Uninsured	-0.400 (0.056)***	-0.008 (0.041)	0.032 (0.095)	0.300 (0.172)*
	Use of preventive care <sup>a</sup>	<i>Self-Reported Health Outcomes</i>		
		First health problem solved <sup>a</sup>	Second health problem solved <sup>b</sup>	Hospitalization problem solved <sup>b</sup>
<i>Need</i>				
One health problem	-0.011 (0.059)	N/A	N/A	-0.953 (0.194)***
Two health problems	0.091 (0.135)	N/A	N/A	-1.290 (0.133)***
<i>Utilization</i>				
First health problem curative visit	N/A	-0.369 (0.057)***	N/A	N/A
Second health problem curative visit	N/A	N/A	0.003 (0.152)	N/A
<i>Random parameters</i>				
Level 4: province/region	0.039 (0.028)	0.028 (0.007) ***	0.097 (0.057)	0.017 (0.029)
Level 3: census segment	0.094 (0.049)*	0.088 (0.025) ***		
Level 2: household	2.006 (0.568)***	0.594 (0.047) ***		

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

N/A = Not applicable.

<sup>a</sup> A four-level binomial logit model (IGLS, MQL1) was fitted for *Use of preventive care*, and *First health problem solved*. For each outcome, the final conditional model was fitted with health care need, utilization, predisposing and enabling factors as fixed effects, and random variance at the household, census segment and province/region levels. Figures in parentheses represent the standard errors.

<sup>b</sup> A two-level binomial logit model (IGLS, MQL1) was fitted for *Second health problem solved*, and *Hospitalization problem solved*. For each outcome, the final conditional model was fitted with health care need, utilization, predisposing and enabling factors as fixed effects, and random variance at the province/region level. No census-segment and household-level predictors were entered. For *Hospitalization problem solved*, no provider measures were included given that there was no significant variation at the province level. Figures in parentheses represent the standard errors.

<sup>c</sup> Due to convergence problems, the category doesn't know/answer for the variable educational level was deleted (n=3).

<sup>d</sup> There were zero cases in this category.



Table 9. Multilevel weighted regression estimates for use of antiparasitic medicines.<sup>a</sup>

Parameters	Model 1	Model 2	Model 3
Constant	0.425	0.657	0.008
<i>Provider measures</i>			
Public practice health personnel		-0.012 (0.006)*	-0.014 (0.007)*
<i>Predisposing factors</i>			
Age			0.063 (0.005)***
Female			0.048 (0.023)**
Indigenous			-0.290 (0.158)*
Other ethnicity			-0.073 (0.169)
HH Female <sup>§</sup>			0.065 (0.084)
HH Living w/ partner			-0.017 (0.036)
HH Separated/divorced			-0.156 (0.113)
HH Widow			-0.120 (0.114)
HH Single			-0.169 (0.159)
<i>Enabling factors</i>			
Rural			0.206 (0.065)***
Assets quintile 1			-0.316 (0.121)***
Assets quintile 2			-0.104 (0.089)
Assets quintile 3			-0.191 (0.096)**
Assets quintile 4			-0.052 (0.064)
Consumption quintile 1			-0.534 (0.138)***
Consumption quintile 2			-0.309 (0.137)**
Consumption quintile 3			-0.224 (0.147)
Consumption quintile 4			-0.262 (0.123)**
HH No education			-0.481 (0.121)***
HH Elementary school			-0.356 (0.101)***
HH High school			-0.126 (0.059)**
HH Doesn't know/answer			-1.294 (0.444)***
Uninsured			-0.031 (0.079)
<i>Need</i>			
One health problem			0.112 (0.032) ***
Two health problems			0.274 (0.083) ***
<i>Random parameters</i>			
Level 4: province/region	0.067 (0.028)**	0.053 (0.019)**	0.063 (0.020) ***
Level 3: census segment	0.143 (0.030)***	0.143 (0.029)***	0.122 (0.029) ***
Level 2: household	1.182 (0.047)***	1.188 (0.053)***	1.232 (0.049) ***

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

<sup>a</sup> Based on a four level binomial logit model (IGLS, MQL1). Model 1 presents a non-conditional model with no fixed effect predictors and random variance at the household, census segment and province/region levels. Model 2 presents a conditional model with provider measures as fixed effects, and random variance at the household, census segment and province/region levels. Model 3 presents a conditional model with health care need, predisposing and enabling factors as fixed effects, and random variance at the household, census segment and province/region levels. Figures in parentheses represent the standard errors.

<sup>§</sup> **HH= Household head. Household head predictors included sex, marital status, and educational level (See Table 3).**

Table 10. Odds Ratios (and 95% confidence intervals) of the association between selected provider measures and health outcomes.

Provider measures	Preventive care <sup>a</sup>	First health problem solved <sup>b</sup>	Second health problem solved <sup>b</sup>	Antiparasitic medicines <sup>a</sup>
Public practice physicians	1.06 (0.99 – 1.13)			
Private practice physicians	0.99 (0.97 – 1.02)			
Public practice health personnel	1.01 (1.00 – 1.02)			0.99 (0.97 – 1.00)
Private practice health personnel	1.00 (0.99 – 1.01)			
Outpatient clinics		0.93 (0.86 – 1.01)		
Public inpatient clinics			3.64 (1.19 – 11.09)	

<sup>a</sup> Adjusted for predisposing, enabling, and need factors.

<sup>b</sup> Adjusted for predisposing, enabling, and utilization factors.

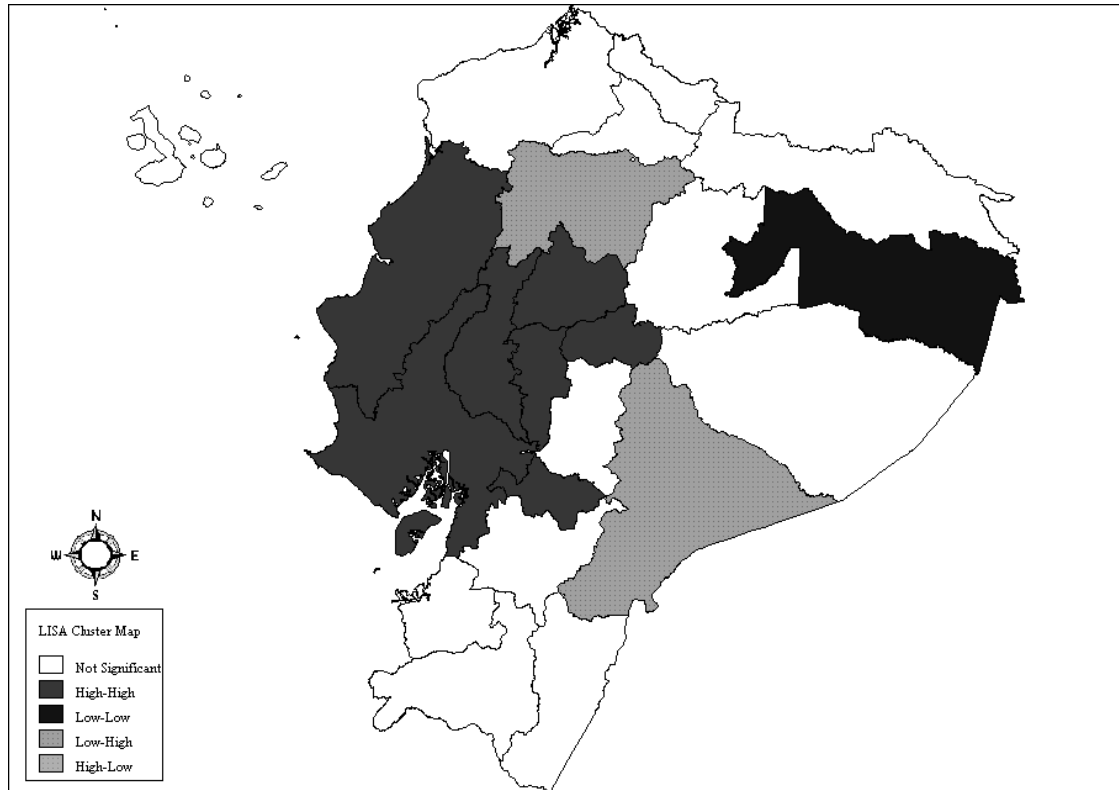


Figure 1. LISA Cluster Map of General Mortality Rate in Ecuador by province.

The high-high and low-low locations suggest clustering of similar values, whereas the high-low and low-high locations indicate spatial outliers.

## Chapter 4. Manuscript 3

The role of emigrant remittances as a predictor of health care utilization in Ecuador.

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## Abstract

This study uses data from the 2004 National Demographic and Maternal & Child Health Survey (ENDEMAIN), to examine the relationship between emigrant remittances and health care utilization in Ecuador. For such a purpose, this study uses both a theoretical framework (Andersen' model of health care utilization behavior) and a multilevel statistical framework to assess the relationship of two emigrant predictors (household has emigrants, and use of emigrant remittances) with use of preventive care, number of curative visits, hospitalization, and antiparasitic medicines. The results showed that emigrant predictors were strongly associated with use of antiparasitic medicines, and to a lesser extent to curative visits, even after adjusting for various predisposing, enabling, and need factors. No significant relationship was found between emigrant predictors and use of preventive services. In general, it seems that emigration and emigrant remittances may improve the financial access to health care services. From a policy perspective, it is crucial to further our understanding of the role migration plays in both international and intra-national human development and health care issues.

Key words: Use of health services, migration, remittances, multilevel analysis, Ecuador.

Human migration, although not a new phenomenon, is increasingly being recognized as one relevant feature of the current economic globalization scheme. More specifically, economists and policymakers are interested in the vast amounts of money that flow from migrants' host to home countries (which is more or less the same to say from high to middle and low-income countries). Migrant remittances reached \$167 billion in 2005 (International Organization for Migration, 2006), with more than half being sent to so-called "developing" countries (Gammeltoft, 2002). In 2004, \$45 billion were sent to families in the Americas. This amount is more than what Latin American countries receive in development assistance and foreign direct investment together. Yet, there is a good portion of remittances being sent outside the formal financial system, particularly in Latin America, where emigrants rely on international money-transfer companies, local operators, or hand-carriers (Terry & Wilson, 2005).

At the 2006 Ministerial Conference, the International Organization for Migration defined remittances as "monetary transfers that an emigrant makes to his or her country of origin, most often cash transfers sent to a relative" (p7). Migrant connections in the host countries seem to influence a number of migratory outcomes such as wages and working conditions, patterns of investment, and the sending of remittances (Durand, Kandel, Parrado, & Massey, 1996; Massey & Parrado, 1994; Roberts & Morris, 1996). These international transfers from emigrants to their home communities have been recognized to play a significant role in the well-being of recipients, by financing the purchase of food, clothing, housing; education and health expenses; land and businesses investments (Keely & Tran, 1989; Rozelle, Taylor, &

DeBrauw, 1999; Taylor & Wyatt, 1996); and health care utilization and outcomes (Kanaiaupuni & Donato, 1999; Lindstrom & Munoz-Franco, 2006).

As shown by previous research, a country's political atmosphere influences social inequalities and health indicators (Navarro & Shi, 2001), and Ecuador is no exception. With the beginning of the twenty first century, Ecuador is slowly recovering from two decades of deep political, economic, and social crisis that has impacted all sectors, with vulnerable groups being affected the most (W. F. Waters, 2006). High levels of poverty, low health insurance, and limited access to institutional health services have a direct impact on the health status of Ecuadorians (Pan-American Health Organization, 2007). Over the last ten years, approximately one million Ecuadorians left the country to pursue a "better" future for them and their families (FLACSO, 2006). The social and political repercussions of this massive population movement are yet to be evaluated. Nevertheless, its economic contribution is already evident. The growing emigrant community, mainly located in Spain, United States of America, and Italy, has situated emigrant remittances as the second national income (only after petroleum), raising from US\$200 million in 1993 to US\$1.4 billion in 2002, and US\$1.7 billion in 2005 (Larrea, 2004a).

Various scholars have pointed out the social and economic implications of the money migrants sent back to their families (Larrea, 2004b; Massey & Parrado, 1994; Ross, Pagán, & Polsky, 2006; Terry & Wilson, 2005). According to the literature, the potential effects of migration are described as twofold: 1) the flow of monetary funds (remittances) may help to relieve income constraints when seeking social services (e.g. health care); and 2) the exchange of informational resources in the origin communities



may influence family structure (gender roles), social networks, and information sources (e.g. healthy lifestyles) (Hadi, 2001; Kanaiaupuni & Donato, 1999). For instance, in a study using a representative sample of Mexican households researchers found that families with a migrant relative had higher birth weights than non-migrant families (Frank & Hummer, 2002). In Ecuador, the marked disparities in health care utilization and health outcomes (Larrea & Kawachi, 2005; H. R. Waters, 2000), and the increasing importance that remittances have for the Ecuadorian economy, require a closer analysis into the relationship and influence of these international money transfers in the utilization of health services (Larrea, 2004a; Pan-American Health Organization, 2002a). Hence, it was the focus of this work to apply a widely used theory, Andersen's Model of Health Care Services Utilization Behavior (Aday & Awe, 1997; Andersen, 1995), as a framework to analyze the influence of emigrant remittances in the utilization of health care services in Ecuador.

## METHODS

### Study Design and Data

Using a deductive approach, and Andersen's Theory of Health Care Services Utilization Behavior, this paper analyzed the social determinants (including emigrant remittances) of health care utilization in Ecuador. This study was cross-sectional and utilized data from the 2004 Demographic and Maternal & Child Health Survey (ENDEMAIN) (CEPAR, 2005). Based on a nationally representative sample of

Ecuadorian households, the main purpose of the ENDEMAIN surveys is to obtain information on demographic dynamics and health status of women and children (CEPAR, 2005). However, ENDEMAIN 2004 also surveyed households to gather information on utilization of health services, and health care and consumption expenditures. In ENDEMAIN 2004, data entry, verification, and validation run parallel to the data collection phase. Hence, data inconsistencies were detected and if necessary, data was collected again. For data entry, ENDEMAIN 2004 used the software CPro (Census and Survey Processing System). For statistical analysis, ENDEMAIN 2004 used SAS (for processing and reliability analysis) & SPSS software (CEPAR, 2005). ENDEMAIN 2004 used a multistage clustering design to provide a nationally representative sample of 28,908 households in Ecuador. The 2001 National Census was utilized as the sampling frame for selecting individual non-institutionalized households within census segments. Two separate questionnaires were applied to different sub-samples: 1) an interview with a woman of reproductive age about sexual and reproductive health issues was completed in 10,813 households; and 2) an interview with an adult about health utilization and expenditures was completed in 10,985 households. The latter was the dataset utilized in this study. The response rate was 88.7% (CEPAR, 2005).

## Measures

*Utilization of Health Care Services.* Both preventive and curative measures of realized utilization were employed in this paper. ENDEMAIN 2004 asked participants

regarding preventive care: 1) if persons 12 years and older visited a physician for a preventive appointment in the last 30 days; and curative care: 1) if persons 12 years and older visited a physician for a curative appointment in the last 30 days (and how many times); 2) if persons 12 years and older were hospitalized in the last 12 months; and 3) if persons under 15 years are taking antiparasitic medicine. All these variables were dichotomous (yes/no), except for the curative appointment which was a count.

*Migration predictors.* Building on previous research (Lindstrom & Munoz-Franco, 2006), two predictors were considered: 1) As a predisposing factor, if there are emigrants in each household (yes/no); and 2) As an enabling factor, use of emigrant remittances (*remuse*), which had four categories (education & health, other purposes, doesn't know/answer, and no emigrants). It was created as a combination of two variables extracted from ENDEMAIN 2004 (p812a; p812b). The original question # 812 asked to mark the two main uses of emigrant remittances. Since the focus of this paper is on health care utilization, the original variables were recoded into these categories: (4) education & health, (1) other purposes (pay debts; daily expenses; buy, build, or repair house; buy land, bank deposit, other), (0) doesn't know/ answer. Then, the two variables were added to obtain a summary variable with the following ranges: (4-5), (1-2), (0). Finally, these ranges were transformed back into these categories: (4-5) to (2) education & health; (1-2) to (1) other purposes; and (0) doesn't know/answer. The final predictor (*remuse*) also included the category (9) no emigrants.

*Other predictors.* Besides the key variables mentioned above, other explanatory variables were considered in this study, classified following Andersen's model.

*Predisposing factors* included age, sex, ethnicity and marital status. For use of

antiparasitic medicines, household head sex and marital status were included.

*Enabling factors* consisted of area of residence, assets quintile, consumption quintile, educational level, and health insurance affiliation. For use of antiparasitic medicines, household head educational level was included. *Need* was measured as the number of health problems. ENDEMAIN 2004 asked individuals if they had health problems during the previous 30 days, and to mention the two most important problems (CEPAR, 2005). From these questions, ENDEMAIN 2004 created a variable to identify the number of health problems mentioned by the participants (none, one problem, and two problems).

### Statistical Analysis

Summary statistics for all discrete and continuous variables were calculated. Tables 1 and 2 summarize the variables used in the analysis for use of preventive care, number of curative visits, hospitalization; and use of antiparasitic medicines, respectively. Since ENDEMAIN 2004 sampling frame had four levels: 1) individual (n=33387), 2) household (n=10985), 3) census segment (n=692); and 4) province/region (n=17), multilevel models were used to examine the influence of emigrant predictors on utilization of health care, adjusting for other predisposing, enabling, and need factors. In doing so, this study recognized the importance of accounting for clustering in such a complex sample design (Rodriguez & Goldman, 1995, 2001; Subramanian et al., 2003b). The multilevel structure allowed for the simultaneous analysis of data at the various levels in which data was originally collected in ENDEMAIN 2004. Hence, no

single “appropriate” level of analysis needed to be identified. A number of recent studies used multilevel modeling to assess health care utilization (Chaix et al., 2005a; Daniels & Gatsonis, 1999; Gleit et al., 2003).

--- Insert Table 1 about here ---

Preliminary analysis to assess the relevance of a four-level model was conducted. By fitting a non-conditional (empty, null) model, variance was partitioned across levels to assess its statistical significance and contribution to overall variance (Duncan et al., 2003). Models were fitted using the iterative generalized least squares maximum likelihood estimator. The marginal quasi likelihood approximation with a first order Taylor linearization procedure was applied for all the dichotomous outcomes (Subramanian et al., 2003a). Given that 97.4% of individuals were not hospitalized during the previous 12 months (i.e. there was a preponderance of zeroes), an extra-binomial logit model was applied to the hospitalization outcome (Williams, 1982; Wright, 1997). The predictive/penalized quasi likelihood approximation was applied for the count outcome (Rasbash et al., 2004). For each model, variables were assigned to each significant level (as they were originally collected) to build conditional models in a sequential order. SPSS 11.5 (SPSS Inc, Chicago, IL) and Stata MP v9.2 (StataCorp, 2007) were used for data preparation, and MLwiN 2.02 (Rasbash et al., 2004) was used to fit all multilevel models.

--- Insert Table 2 about here ---

## RESULTS

Table 3 shows the multilevel regression estimates for the association between having an emigrant in the household and each outcome variable. While model 1 presents a bivariate multilevel model, model 2 adjust for various predisposing, enabling and need predictors in the fixed component. Both models include a random variance component at the household, census segment, and province/region levels.<sup>1</sup> For use of preventive care services, both bivariate and multivariate multilevel models showed no significant relationship with having an emigrant in the household (OR=1.03, 95%CI=0.84 – 1.27; OR=1.16, 95%CI=0.95 – 1.41, respectively). The constant in model 2 represents a mestizo man, aged 35, who is married and lives in an urban area, belongs to the highest assets and consumption quintile categories, had no emigrants in the household, with college education and health insurance, and reports no health problems at the time of the survey. In other words, this “best group” had a 9.7% probability of using preventive services.

--- Insert Table 3 about here ---

Having an emigrant in the household was positively associated with using antiparasitic medicines, even after adjusting for predisposing, enabling and need factors (OR=1.44, 95%CI=1.22 – 1.69; OR=1.34, 95%CI=1.16 – 1.54, respectively). The constant in model 2 represents a mestizo boy, aged 7, who lives in an urban area, belongs to the highest assets and consumption quintile categories, has health

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<sup>1</sup> In the case of use of preventive services and antiparasitic medicines, variation was higher at the household level. In other words, both outcomes varied significantly across households, even after controlling for other covariates. Also, it suggests that there might be other household-level relevant factors not included in the models.

insurance, reports no health problems, and whose household head is male, married, and with college education. In other words, this “best group” had a 63.5% probability of using antiparasitic medicines. Having an emigrant in the household was positively associated with number of curative care visits ( $\beta=0.103$ ,  $p<0.1$ ). However, after controlling for various predisposing, enabling, and need factors, such relationship was not statistically significant. In the case of hospitalization, the non-conditional model showed no significant variation at the household level. Consequently, no emigrant predictors could be entered in the regression models.

Table 4 presents the results of the association between the various uses of emigrant remittances and health care services utilization. As with the previous migration predictor, none of the uses of emigrant remittances were significantly associated with preventive care. For antiparasitic medicines, households that received remittances and allocated them for education and health significantly increased individual use of antiparasitic medicines, even after adjusting for predisposing, enabling, and need factors (OR=1.58, 95%CI=1.23 – 2.04; OR=1.40, 95%CI=1.10 – 1.79, respectively). Moreover, allocating remittances for other purposes (such as paying debts; daily expenses; buying, building, or repairing house; buying land; or bank deposit) was positively associated with use of antiparasitic medicines in both bivariate and multivariate analyses (OR=1.55, 95%CI=1.22 – 1.97; OR=1.47, 95%CI=1.18 – 1.83, respectively). For number of curative care visits, allocating remittances for education and health was a significant predictor in bivariate analysis ( $\beta=0.159$ ,  $p<0.01$ ). However, the association between allocating remittances to education and health purposes, and number of curative care visits turned from

(significant) positive to (non-significant) negative, after adjusting for other covariates. Further inspection in the regression model showed that the variable health problems (theoretically, one of the most important predictors of use) caused this change of direction.

--- Insert Table 4 about here ---

## DISCUSSION

Based on a nationally representative cross-sectional sample of Ecuador, this study was relevant in exploring the relationship between emigrant remittances and its contribution to utilization of health services, which is one aspect of human development (UNDP, 2006). The strongest association was found between migration predictors and use of antiparasitic medicines. Having an emigrant in the household increased 6.4% the probability of using antiparasitic medicines. Similarly, using emigrant remittances for education and health, and other purposes significantly increased the probability of using antiparasitic medicines (7.4% and 8.3%, respectively). Combined, they increased use by 14.7%. The significant impact of having emigrants may imply that there is a process of “diffusion” of health care concerns (Lindstrom & Munoz-Franco, 2006), which may raise awareness of the importance of preventing or treating parasitic diseases. This is also corroborated by the significant effect of both allocating remittances to education and health, and other purposes, such as daily expenses, or repairing the house (Lopez-Cordova, 2006). ENDEMAIN 2004 revealed that pharmacies were the main source of antiparasitic medicines (36%), followed by the *Programa de Atención Escolar* (17%), the Ministry



of Health (16%) and private physicians (15%) (CEPAR, 2005). The considerable proportion of participants obtaining antiparasitic medicines through pharmacies may suggest that economic status influences parents to turn to pharmacists instead of physicians to avoid paying the extra consultation fee.

Previous research in Mexico (Amuedo-Dorantes, Sainz, & Pozo, 2007) found that emigrant remittances were positively associated with primary care expenditures. Similarly, the present study found initial evidence that an “emigrant” household, and most specifically that allocating remittances for education and health, was positively associated with use of curative care. However, no statistically significant effects were found for use of preventive services. Due to non-significant variation at the household level, the relationship between migration predictors and hospitalization could not be assessed by the present study.

In general, it seems that emigration and emigrant remittances may improve the financial access to health care services (Lindstrom & Munoz-Franco, 2006), particularly antiparasitic medicines and curative care. This additional income for an Ecuadorian “emigrant” household becomes particularly relevant, given that 95% of health care expenditures are out-of-pocket (CEPAR, 2005). Policymakers should consider incorporating the remittances dimension in their development and health care financial planning (Hsiao, 2007).

The following limitations should be considered in interpreting the findings of this study. First, this study was unable to isolate the influence of allocating remittances to health care (due to data collection in ENDEMAIN 2004). However, a recent survey found that 10% of remittances was devoted specifically to health care while only 4%

was destined to education (FLACSO, 2006). Yet, the majority of remittances money was still used to cover daily household expenses (73%). This pattern is corroborated by previous research conducted with Mexican migrants (Durand et al., 1996). Second, due again to data limitations, this study did not assess the migrant experience more extensively (what Lindstrom and Munoz Franco call *assimilation* and *diffusion*). However, a household-level measure of diffusion -i.e. percentage of emigrant households, was used in this study). Future research should expand the work presented here to include not only economic but also the social implications of migration for both the emigrant person (Aguilera & Massey, 2003), and recipient countries, communities, families, and individuals, with a gender perspective (Hadi, 2001; Jokisch & Pribilsky, 2002; Ramirez, García Domínguez, & Míguez Morais, 2005). Third, since it takes time for households and communities to adapt to migration processes (and the reception and use of remittances), observable differences in health care utilization (and better health outcomes) may not be verified in the short term (Kanaiaupuni & Donato, 1999). This might be the case for Ecuador, given that 75% of emigrants left the country between 1999 and 2004 (CEPAR, 2005). In other words, migration is a longitudinal process that needs to be analyzed as such. Fourth, by using secondary, cross-sectional data, the possibility of inferring cause-effect relationships was limited. Also, recall bias could have been introduced by participants' inability to remember past events accurately, or giving "socially desirable" answers (Singleton & Straits, 1999).

Nevertheless, by using both a theoretical and multilevel statistical framework, this study adds to the growing body of literature linking emigrant remittances to health

care utilization and health outcomes in Latin America – which has mostly focused on the Mexican experience (Amuedo-Dorantes et al., 2007; Fajnzylber & López, 2007; Hildebrandt & McKenzie, 2005; Kanaiaupuni & Donato, 1999; Lindstrom & Munoz-Franco, 2006; Lopez-Cordova, 2006). To the author’s knowledge, it is the first of its kind in South America, and the first to operationalize a predictor that revealed the specific allocation of remittances to education and health purposes. Policymakers need to incorporate migration realities into their legislation agendas, keeping a more humanistic, rather than purely economic, perspective. In an increasingly interconnected world, it is crucial to further our understanding of the role migration plays in both international and intra-national human development and health care issues.

Table 11. Unweighted descriptive statistics (ages 12 and older).

Variable	Mean or percent	SD	Level
<i>Predisposing factors</i>			
Age (in years)	35.4	18.5	Individual
Sex (%)			
Male	49.2		Individual
Female	50.8		
Ethnicity (%)			
Mestizo	85.7		Household
Indigenous	8.6		
Others	5.7		
Marital status (%)			
Living w/ partner	15.5		
Married	37.2		Individual
Separated/divorced	5.2		
Widow	4.1		
Single	37.9		
Household has emigrants (%)	9.8		Household
<i>Enabling factors</i>			
Area of residence (%)			
Urban	51.6		Census segment
Rural	48.4		
Assets quintile (%)			
1	22.5		
2	20.5		Household
3	19.0		
4	18.8		
5	19.2		
Consumption quintile (%)			
1	23.0		
2	20.5		Household
3	19.4		
4	19.0		
5	18.0		
Educational level (%)			
None	8.3		
Elementary	45.0		Individual
High School	35.5		
College	11.2		
Doesn't know/answer	.1		
Insurance (%)			
Insured	22.6		Individual
Uninsured	77.4		
Use of emigrant remittances (%)			
Education & health	2.9		
Other uses	3.9		Household
Doesn't know/answer	3.0		
No emigrants	90.2		
<i>Need</i>			
Health problems (%)			
No problems	52.8		Individual
1 problem	40.1		
2 problems	7.1		
<i>Utilization</i>			
Preventive care use (%)	4.6		Individual
Number of curative care visits	.21	.48	Individual
Hospitalization (%)	3.0		Individual

Table 12. Unweighted descriptive statistics (ages under 15).

Variable	Mean or percent	SD	Level
<i>Predisposing factors</i>			
Age (in years)	7.1	4.2	Individual
Sex (%)			
Male	50.4		Individual
Female	49.6		
Ethnicity (%)			
Mestizo	83.2		Household
Indigenous	10.6		
Others	6.2		
Household Head Sex (%)			
Male	85.1		Household
Female	14.9		
Household Head Marital status (%)			
Living w/ partner	26.6		
Married	58.5		Household
Separated/divorced	7.4		
Widow	4.9		
Single	2.6		
Household has emigrants (%)	8.9		Household
<i>Enabling factors</i>			
Area of residence (%)			
Urban	47.7		Census segment
Rural	52.3		
Assets quintile (%)			
1	26.7		
2	23.1		Household
3	19.8		
4	16.8		
5	13.6		
Consumption quintile (%)			
1	28.7		
2	22.9		Household
3	19.7		
4	16.6		
5	12.1		
Household Head Educational level (%)			
None	8.3		
Elementary	55.8		Household
High School	26.0		
College	9.9		
Doesn't know/answer	.1		
Insurance (%)			
Insured	11.7		Individual
Uninsured	88.3		
Use of emigrant remittances (%)			
Education & health	3.1		
Other uses	3.5		Household
Doesn't know/answer	2.3		
No emigrants	91.1		
<i>Need</i>			
Health problems (%)			
No problems	54.9		Individual
One problem	41.9		
Two problems	3.2		
<i>Utilization</i>			
Use of antiparasitic medicines (%)	59.5		Individual

Table 13. Multilevel weighted estimates of the association between household emigrants and health care utilization. §

Parameters	Preventive care use		Antiparasitic medicines		Number of curative care visits	
	Model 1	Model 2 <sup>†</sup>	Model 1	Model 2 <sup>††</sup>	Model 1	Model 2 <sup>†</sup>
Constant	-3.039	-2.232	0.393	0.553	-1.657	-2.619
Household has emigrants	0.030 (0.106)	0.146 (0.101)	0.364*** (0.083)	0.289*** (0.073)	0.103* (0.058)	-0.038 (0.060)
Random parameters						
Level 4: province/region	0.079** (0.033)	0.053* (0.028)	0.065** (0.028)	0.079** (0.030)	0.042*** (0.012)	0.019** (0.008)
Level 3: census segment	0.397*** (0.105)	0.114* (0.059)	0.140*** (0.030)	0.121*** (0.030)	0.061*** (0.012)	0.037*** (0.009)
Level 2: household	2.736*** (0.892)	2.330*** (0.602)	1.185*** (0.049)	1.229*** (0.055)	0.367*** (0.027)	0.134*** (0.023)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

§ A four-level binomial logit model (IGLS, MQL1) was fitted for Preventive care use and Antiparasitic medicines. A four-level Poisson model (IGLS, PQL1) was fitted for Number of curative care visits. Figures in parentheses represent the standard errors.

<sup>†</sup> Adjusted for predisposing, enabling, and need factors (see Table 1).

<sup>††</sup> Adjusted for predisposing, enabling, and need factors (see Table 2).

Table 14. Multilevel weighted estimates of the association between emigrant remittances and health care utilization. §

Parameters	Preventive care use		Antiparasitic medicines		Number of curative care visits	
	Model 1	Model 2 <sup>†</sup>	Model 1	Model 2 <sup>††</sup>	Model 1	Model 2 <sup>†</sup>
Constant	-3.039	-2.232	0.393	0.555	-1.657	-2.620
Use of emigrant remittances						
Education & health	0.027 (0.238)	-0.143 (0.231)	0.460*** (0.130)	0.339*** (0.125)	0.159*** (0.047)	-0.093 (0.065)
Other purposes <sup>‡</sup>	-0.057 (0.172)	-0.216 (0.186)	0.440*** (0.121)	0.383*** (0.113)	0.111 (0.068)	0.040 (0.069)
Doesn't know/answer	0.128 (0.146)	-0.071 (0.128)	0.157 (0.169)	0.114 (0.175)	0.036 (0.106)	-0.080 (0.088)
Random parameters						
Level 4: province/region	0.079** (0.033)	0.053* (0.028)	0.066** (0.028)	0.079** (0.030)	0.041*** (0.012)	0.019** (0.008)
Level 3: census segment	0.395*** (0.104)	0.113* (0.059)	0.139*** (0.030)	0.120*** (0.029)	0.061*** (0.012)	0.037*** (0.009)
Level 2: household	2.734*** (0.890)	2.330*** (0.604)	1.185*** (0.048)	1.229*** (0.055)	0.367*** (0.028)	0.134*** (0.023)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

§ A four-level binomial logit model (IGLS, MQL1) was fitted for Preventive care use and Antiparasitic medicines. A four-level Poisson model (IGLS, PQL1) was fitted for Number of curative care visits. Figures in parentheses represent the standard errors.

† Adjusted for predisposing, enabling, and need factors (see Table 1).

†† Adjusted for predisposing, enabling, and need factors (see Table 2).

‡ Pay debts; daily expenses; buy, build, or repair house; buy land, bank deposit, other.

## Chapter 5. Conclusions



*Health is a social phenomenon whose determinants cannot be separated from other social and economic determinants. Nor can it be assigned solely to one bureaucratic-administrative sector of the state...Health is, above all, a complex social and political process that requires political decision-making not only at the sectoral level but also by the state, so that these decisions are binding upon all sectors without exception*

David Tejada de Rivero

Primary care services are essential in granting equitable access to basic health care for all. As an entry point into the broader health care system, they can provide comprehensive and integrated care to address the health care needs of the population (Pan-American Health Organization, 2005). However, health care reform (and more broadly, public sector reform) in Latin America has hindered the ability of such a comprehensive primary care structure to provide what was promised ever since Alma Ata. The majority of health care reforms responded to general State reforms (Perú since 1995); or Constitutional reforms (Argentina, Colombia and Ecuador); and were part of State modernization processes (Argentina and Chile since 1994) (Infante, de la Mata, & Lopez-Acuna, 2000). The reform process was based on principles of openness, deregulation, privatization of public companies, and minimization of the State role in the economy (Correa, 2002b). It was labeled as the “Washington Consensus” because international financial organizations, such as IMF, WB, and the Inter-American Development Bank, are headquartered in Washington, and the reforms had the support of the United States Treasury Department. In the Latin American context, various authors have questioned the promised benefits of structural reforms (Aziz & Wescott, 1997; Correa, 2002a; Fort, Mercer, & Gish, 2004). Analyzing a panel of 17 Latin-American countries between 1984 and 1998, Correa (2002b) found no empirical support to the usual claim that these reforms “reduced poverty” and

“enhanced growth”. Specifically, he found that labor deregulation and trade liberalization were negatively correlated with human development growth.

Challenging the mainstream development paradigm is not an easy task. Besides, various attempts of “drastic” change have been quickly assimilated into its framework (Kothari & Minogue, 2002). Yet, it is relevant to revisit more integrated, multisectorial, multidisciplinary, health-promoting and preventive, participatory, and decentralized approaches to improve people’s health, especially through programs enmeshed in the health-care systems at large with active and effective participation of the population (Tejada de Rivero, 2003). Precisely, the present study sought to further our understanding of social determinants of health care utilization in Ecuador from the client’s point of view. Using secondary data (a nationally representative sample of Ecuadorian households), this study analyzed use of services in terms of inequalities, provision of services, and contribution of emigrant remittances. The first manuscript found the persistence of drastic inequalities in utilization of health care services by economic status, and ethnicity. When compared to the wealthiest 20% of Ecuadorian households, use of preventive, curative services, and antiparasitic medicines was significantly reduced among the poorest 20% of households (as measured by assets and consumption quintiles). This situation remained true after adjusting for various socioeconomic, demographic, and need factors. Moreover, there was evidence of a gradient in the relationship economic status – utilization, similar to that found in other studies (Marmot, 2005; Subramanian et al., 2003a). Similar to economic status, this study found a negative relationship between indigenous ethnicity and utilization of

preventive care, curative visits, and antiparasitic medicines, even after adjusting for predisposing, enabling, and need factors.

From an ecological perspective –which guides much of the research and interventions in public health– it was also important to analyze contextual factors affecting the use of health services (NCI, 2005). Following the development of the *Health Care Utilization Model*, this study acknowledged that besides predisposing, enabling and need factors, the environment and provider-related factors also affect healthcare utilization (Aday & Awe, 1997). From a programmatic and policy perspective, connecting peoples’ perceptions of health services and health care delivery system characteristics allowed us to understand utilization behavior in a more comprehensive manner. Effectively, manuscript 2 found initial evidence of a significant relationship between availability of health services, and individual utilization of such services and health outcomes. Indeed, preliminary ecological analysis conducted at the province level showed that increasing the density of outpatient clinics could decrease infant and general mortality; while increasing the density of private practice physicians could decrease maternal mortality. From all provider measures included in multilevel models, the positive relationship between public inpatient clinics and solution of the second reported health problem was the strongest.

Manuscript 3 addressed the issue of emigrant remittances and use of health care services. The strongest association was found between migration predictors and use of antiparasitic medicines. Similarly, this study found initial evidence that an “emigrant” household, and most specifically that allocating remittances for education

and health, was positively associated with use of curative care. The “perpetual movement of people across borders”, authorized or not by the receiving countries, is but one of the many faces globalization has (Terry & Wilson, 2005). The decision of migrating can be perceived as part of a household sustenance strategy (Bilsborrow, McDevitt, Kossoudji, & Fuller, 1987). In particular, those emigrants who send money to their families back home, in small amounts, but whose contribution to the local economies is enormous. In this matter Durand et al (1996: 261) consider that “unlike grants from foundations or development funds provided by international organizations, migradollars [migrant remittances] are not channeled through bureaucracies staffed by middle-class workers earning relatively high salaries.” In Latin America, the general trend in emigrant remittances suggest that flows will keep increasing (Fajnzylber & López, 2007). However, Larrea (2004a: 45) considers that, in the case of Ecuador, remittances will possibly decline in the next few years. This has also been a concern for other countries, like Ghana (Kabki, Mazzucato, & Appiah, 2004).

### Limitations

There are several methodological limitations that need to be considered in the interpretation of results. First, there was a risk of inheriting problems in ENDEMAIN 2004 that could alter the analysis and its interpretation. Using secondary data limited the availability of variables. For instance, ENDEMAIN 2004 did not collect information on use of traditional medicine. Also, secondary data analyses may have categorized ambiguous and changing processes artificially. In other words, it was possible to decontextualize behavior and its implications (Daly et al., 1997). By

design, ENDEMAIN 2004 generalizability was limited to national, province/region, and urban-rural residence levels. Since variables were measured at a single point in time, the possibility for inferring cause-effect relationships (directionality) was limited. The present study relied on respondent's report of behavior rather than observation (recall bias). Therefore, measurement error can be introduced by respondents' inability to recall past events accurately, instability of their opinions, misunderstanding of questions, and lack of honesty in their answers –i.e. respondents might have tended to give “socially desirable” answers (Singleton & Straits, 1999). In survey design, an important assumption is that although questions are usually asked about temporal (dynamic) processes, “fixed” populations are studied (Blalock, 1993). Multilevel analyses only considered main effects. In other words, this study did not consider specific interactions or looked at sub-sample effects.

Second, the presence of facilities and providers (manuscript 2) was measured at the province/region level. Such level of aggregation prohibits its use for local decision-making. Besides, it does not account for issues such as overlapping coverage, redundant services, potential for overcrowded facilities (mainly in major cities, such as Quito and Guayaquil), and variation in quality of services (Rosero-Bixby, 2004b). Also, regression model results are affected by the modifiable areal unit problem (MAUP) since space was fragmented in administrative province/regions (Chaix et al., 2005c; Maheswaran & Craglia, 2004). Yet, this paper analyzed preliminary data at the province level, calculating Moran's I which provided empirical evidence of spatial randomness in the geographical distribution of provider measures.

Third, manuscript 3 was unable to isolate the influence of allocating remittances to health care (due to data collection in ENDEMAIN 2004). However, a recent survey found that 10% of remittances was devoted specifically to health care while only 4% was destined to education (FLACSO, 2006). Yet, the majority of remittances money was still used to cover daily household expenses (73%). This pattern is corroborated by previous research conducted with Mexican migrants (Durand et al., 1996). Moreover, due again to data limitations, this study did not assess the migrant experience more extensively (e.g. what has been labeled as *assimilation* and *diffusion*) (Lindstrom & Munoz-Franco, 2006). However, a household-level measure of “diffusion” -i.e. percentage of emigrant households, was used in this study.

### Policy Implications

From an egalitarian standpoint, health (and health care) is a fundamental indicator of *human capability* which in turn allows human beings to “develop”, achieving higher quality of life –that includes but is not limited to economic well-being (Sen, 1992, 1999, 2002). In this sense, the present study followed Braveman’s approach to defining health equity as “minimizing avoidable disparities in health and its determinants between groups of people who have different levels of underlying social advantage or privilege” (Braveman, 1998). It was important for the authors to reveal potential differences in health care utilization by sex, ethnicity, economic status, educational level, etc. From a policy perspective, it provides policymakers with clear evidence of segments of the population that require differential treatment (Whitehead, Dahlgren, & Evans, 2001). This is particularly relevant for Ecuador today, in light of the current “citizen revolution” process promoted by current

President Rafael Correa, who has been able to neutralize conservative opposition, and capitalize on people's support to establish a Constitutional Assembly in charge of reforming the national Constitution.

In the case of indigenous households, the drastic disadvantage in utilization of health care services demands closer attention of researchers and policymakers alike. Although the rise and increasing political power of the indigenous movement (represented by the National Confederation of Indigenous Peoples –CONAIE– and its political branch –Pachacutik) since the early 1990s has advanced the dialogue, the differences and exclusion conditions of the indigenous populations remain almost intact (Larrea & Montenegro, 2006). Consequently, it is necessary to expand coverage and quality of social programs, including health care, nutrition, and education (Larrea & Kawachi, 2005). However, expansion needs to go hand in hand with a culturally appropriate approach. In other words, it would be necessary to analyze, debate, and incorporate traditional “healing” practices in the public provision of services. The Cotacachi (Vega, 2007), Otavalo, and Riobamba (Ortega, 2007) experiences of more “holistic”, alternative models of health care provision are key milestones in advancing the concept of an intercultural health care system which could be systematized and considered for adoption by regional and national authorities. Here, the political and financial support of the *Dirección Nacional de Salud de los Pueblos Indígenas* (The National Division of Indigenous Peoples' Health) is crucial in advancing such an agenda. The case of antiparasitic medicines relates to the previous discussion on indigenous health. Poor, indigenous children's access to these medicines decreased drastically. Consequently it is necessary to determine system-level mechanisms of

appropriate treatment distribution. More importantly, a political decision is needed to incorporate “conventional” and “traditional” treatment options (Ortega, 2000).

Briefly, it is also important to consider the issue of political continuity. This is evident in the case of health insurance. One initiative, the *Universal Health Insurance Project* (AUS), promoted by initiative of former president Alfredo Palacio, proposed to reach universality of health insurance coverage by the year 2015 (CARE-JHU, 2005). Although there were concerns about financial sustainability, role within the National Health Care System, and international influences (namely the World Bank), it was the most concrete initiative of its kind in the last twenty years. The current administration has since discontinued the program (and expelled the World Bank representative) and developed a *Programa de Aseguramiento en Salud* (Health Insurance Program) under a broader initiative of expanding social protection in health (Rosenberg & Andersson, 2000). From a policy perspective, it is necessary that public health authorities ensure universal access to primary health care; and reinforce the whole health care system, instead of selective vertical strategies (Italian Global Health Watch, 2008).<sup>1</sup> Moreover, the present study showed the necessity of building a stronger national health care information system (Chaix et al., 2005b; Rosero-Bixby, 2004b). Ultimately, these efforts would help inform the public and policymakers on the advances of health care reform in Ecuador (Bambas et al., 2005).

In the case of emigrant remittances, it is necessary a more comprehensive approach that pays attention to family dynamics and promotes family reunification and social security legislation. The current government has shown interest in improving

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<sup>1</sup> Projects such as *Fortalecimiento de las Áreas Básicas de Salud* (FASBASE), *Modernización de la Red de Servicios de Salud* (MODERSA), and *Programa de Apoyo al Sector Salud en Ecuador* (PASSE) are examples of selective primary care initiatives.



conditions for emigrants (particularly those wanting to return) by 1) creating a ministerial office dedicated to the definition and execution of policies directed at emigrants (*Secretaría Nacional del Migrante*); and 2) including six “emigrant” representatives to the Constitutional Assembly inaugurated on November 29, 2007. One of the governmental strategies is to provide incentives to returning emigrants. If successful in bringing back emigrants, the Ecuadorian health care system will need to incorporate their specific needs in the construction of a National Health Care System (Holzmann, Koettl, & Chernetsky, 2005; Ross et al., 2006). One step in such direction is the strengthening of bilateral agreements (such as the one between the Spanish and Ecuadorian Social Security Institutes, signed in 1974) so that previous contributions are recognized once the emigrant settles (in Spain) or decides to return (to Ecuador).

#### Recommendations for Further Research

From an epidemiologic standpoint, researchers may be interested in studying any health difference. However, when the goal is to achieve health equity (i.e. reduce/eliminate health disparities/inequalities), ethical concepts of human rights and distributive justice dictate that more specific societal differences urge to be resolved (Braveman & Gruskin, 2003a, 2003b). In this context, this research provided with a framework for baseline and progress assessment of the current administration efforts to improve health care services, from a patient-centered perspective. Health services can contribute to reductions in health (Starfield, 2007). Further research, as pointed out by Starfield, needs to consider not only the presence of health services but also, the type and orientation of services. Here it would be important for future surveys to assess use of traditional medicine, particularly among indigenous communities.

Concurring with previous research, spatial visualization of provider measures and health outcomes proved to be an important complement to tabular ecological analysis (Farrow et al., 2005). Future research should consider utilizing a more “relational” perspective that may reinforce a reciprocal connection people-space (Cummins et al., 2007). Similarly, refining the administrative division (at the canton or parroquia levels) will facilitate linkages with provider data at those levels (Phillips et al., 1998), and permit more meaningful analyses (Chaix et al., 2005b; Sridharan et al., 2007). As pointed out in the previous section, future research should take into account political context in both Ecuador and Latin America (Navarro & Shi, 2001). Considering the regressive distribution of government expenditures on health and its dependence on out-of-pocket expenses (Pan-American Health Organization, 2007; Suárez-Berenguela, 2002), it would be important to address financial burden of health expenditures and systemic health financing schemes (Hsiao, 2007).

Public participation is an issue not addressed in this study. However, it is one that requires further inspection. In Ecuador, the active involvement of health care users in monitoring and evaluation of the health care system is promoted at local health councils. However, no formal evaluation of its effectiveness in advancing health care decision making has been conducted. Recent research suggest the need to balance between an expert-led process and one “that emphasizes public involvement in decision making”(Sabik & Lie, 2008).

There are about 400 million school-age children infected with parasitic diseases (World Health Organization, 2006). According to WHO, these children may also be compromised with anemia, leading to attention deficits, learning disabilities,

school absenteeism and higher dropout rates. The failure to treat school-age children affects child development. In 2001, WHO created a databank to collect data on the number of children (preschool and school-age) who are treated each year for soil-transmitted helminthes (STH) using albendazole or mebendazole. The present study provides initial evidence of social and economic factors affecting children's (more appropriately, the parents) access to antiparasitic medicines whenever needed. Given that more than a third of antiparasitic medicines were provided by pharmacies, further research is needed to determine if economic status might cause parents to turn to pharmacists instead of physicians to avoid paying the extra consultation fee; and the implications for the broader health care provision system.

The emigration process in the case of Ecuador is not strictly related to basic needs but to mid-term social reproduction (Larrea, 2004a). Consequently, emigrants show an important socioeconomic heterogeneity (FLACSO, 2006). One of the social costs of the recent emigration process constitutes the modification of family patterns and structures in migrant-sending societies (Herrera, 2004). This reality has brought new ways of living for every member of the household, and particularly for children. In a recent survey, 36% of emigrant women and 39% of emigrant men had left at least one child in Ecuador (FLACSO, 2006). Future research (both qualitative and quantitative) should assess the influence of these "atypical" family structures in use of social services, including health care. From a policy perspective, such research would inform family reunification legislation both nationally and internationally. As Ecuadorian president Rafael Correa mentioned at the last United Nations General Assembly, globalization has created a paradox in which free flow of goods and

capitals is promoted, and at the same time, people's "freedom to travel globally in search for a better life" is punished (Correa, 2007).

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