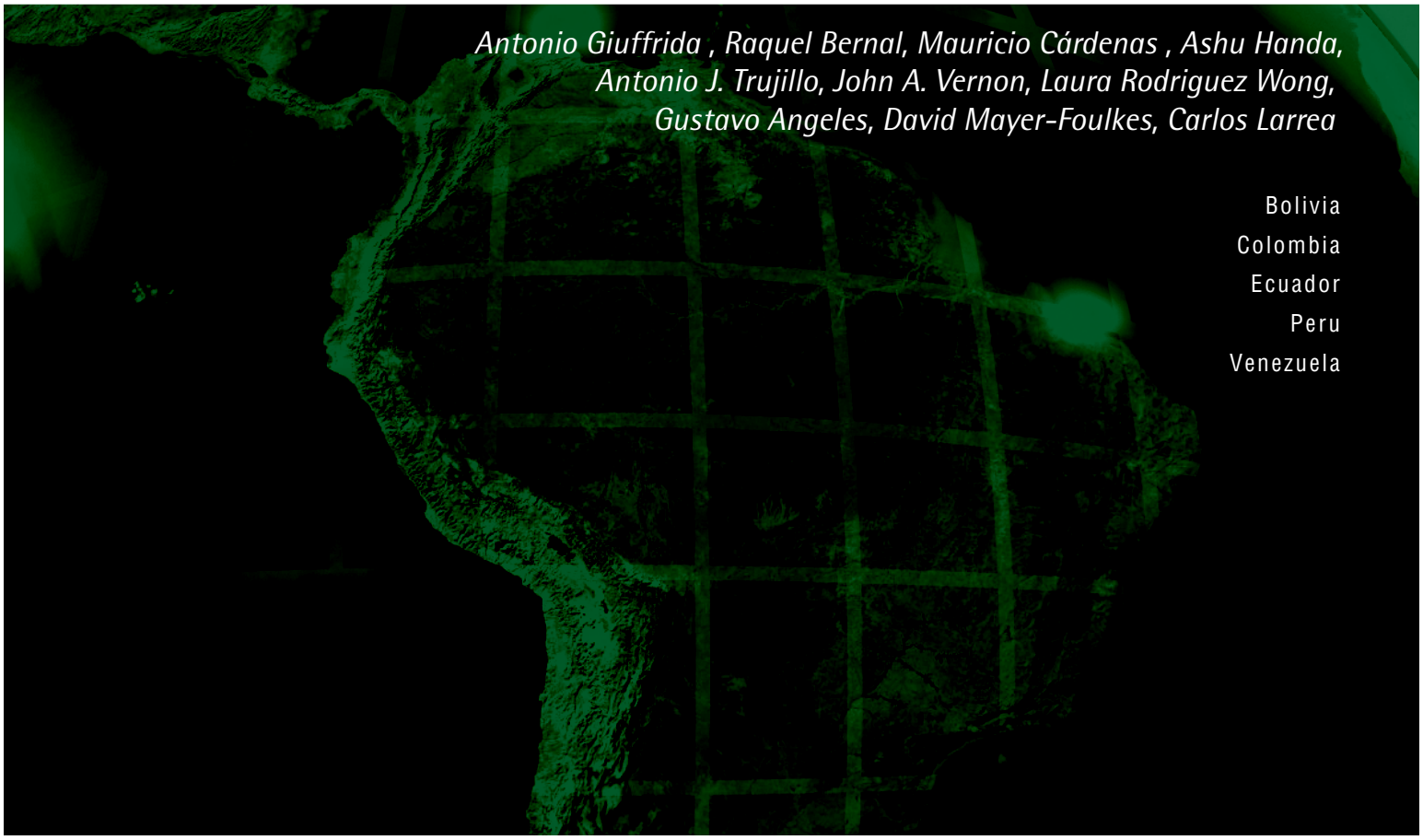
Country Department Andean Group

Racial and Ethnic Disparities in Health in Latin America And The Caribbean



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RACIAL AND ETHNIC DISPARITIES IN HEALTH IN LATIN AMERICA AND THE CARIBBEAN

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SOCIAL PROTECTION AND HEALTH DIVISION
COUNTRY DEPARTMENT ANDEAN GROUP

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The findings, interpretations and conclusions expressed in this publication are entirely those of the contributors, and do not necessarily represent the views of the Inter-American Development Bank, its Executive Directors, or the countries they represent.

FOREWORD

There is increasing awareness that race and ethnicity play an important role in the poverty and social marginalization of Latin American and Caribbean populations. Indigenous and Afro-descendants populations, who comprise a significant portion of LAC countries' populations, not only have lower incomes and household consumption patterns, but they also have limited access to health services and poorer health outcomes.

The process of social exclusion of indigenous and Afro-descendants populations in LAC is a multifaceted and cumulative process, which has both historical roots and direct linkages to the health of these populations. In other words, there is a strong relationship in many countries between indices of poverty, disaggregated by race and ethnic groups, and other indices of human development such as access to education, health and social protection. However, the extent of racial and ethnic disparities in health and health care in the Region are not well documented.

The reasons for these health disparities are complex and poorly understood. They may reflect socioeconomic differences, differences in health-related risk factors, environmental degradation, and direct and indirect consequences of discrimination. Differences in access to healthcare (e.g. health insurance coverage) are also likely to play a role. Concern is growing, however, that even at equivalent levels of access to care, some racial and ethnic groups experience lower quality health services and are less likely to receive adequate health care than non-minority groups.

This publication presents a series of studies financed by the IDB Social Inclusion Trust Fund, which explore the relationship between race, etnicity and health in various Latin America and the Caribbean countries. Using a variety of statistical techniques and datasets, the studies measure the extent of disparities in health among race and ethnic groups, and attempt to determine how factors such as access to health care and socio-economic characteristics contribute to these disparities. Finally, the studies provide recommendations regarding interventions that policy makers could use to reduce the extent of health disparities.

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I. RACIAL AND ETHNIC DISPARITIES IN HEALTH IN LATIN AMERICA AND THE CARIBBEAN: A SURVEY

Antonio Giuffrida

Introduction

Indigenous populations in Latin America and the Caribbean (LAC) represent around 8% of the total population and the Afro-descendants more than a quarter of the region's citizens. The health of populations in the region has improved markedly over time. Average life expectancy at birth has increased from 68.8 in 1995 to 72.5 years in 2006 (PAHO, 2007) and the control of many serious diseases and the elimination of some have been observed. Yet, Indigenous and Afro-descendant groups in LAC continue to experience dramatically differences in health status and access to health services. An increasing number of studies have shown multiple differences between racial and ethnic groups in the pattern of diseases, health status, access to and use of health services (Montenegro and Stephens, 2006).

Differences among Indigenous, Afro-descendant and other populations in the LAC region persist in several areas beside health, such as employment, income, education and housing. A consensus is developing that health disparities affecting these populations groups are the result of complex dynamics of social exclusion, poverty, adverse environmental factors as well as cultural and behavioural aspects. Differences in health are only one dimension of deep socioeconomic and cultural differences (Bello and Rangel, 2000; 2002).

The inclusion of race and ethnicity in health research has a long history (LaVeist 1994). The most common use of race and ethnicity in applied health research is as a binary (dummy) variable used as a control in regression analysis. However, race and ethnicity are often conceptualized as a proxy for other (not measured) variables that are known or believed to correlate with race (e.g., socioeconomic status, discrimination, cultural factors, unspecified biological differences, etc.). Thus, if race and ethnicity are proxies for other factors such as biology or culture, then a need exists to find more creative ways to measure these other factors to elucidate the different patterns of diseases observed among population groups, and probably more important, explaining the different access to, utilization and impact of health services.

This publication brings together the results of research studies supported by the Social Inclusion Trust Fund of the Inter-American Development Bank (IDB), aimed to improve the understanding of factors determining health disparities observed in the Indigenous and Afro-descendants populations in LAC.

This chapter presents a survey on ethnic and racial disparities in health in LAC. It begins describing the concepts of race, ethnicity and indigeneity and provides demographic

estimates of Indigenous and Afro-descendant populations in the LAC region. It then discusses the possible causes of racial and ethnic differences in health and how these should be interpreted in the context of the even larger socioeconomic disparities observed among those population groups. The chapter concludes by focusing on the opportunities and challenges for reducing ethnic and racial inequalities in health in the LAC region.

Chapter 2 presents a study conducted by Raquel Bernal and Mauricio Cárdenas analyzing racial and ethnic disparities in health outcomes and access to health care in Colombia using data from the 2003 Living Standards Survey and the evaluation of the *Familias en Acción* program. The authors document significant differences across racial and ethnic groups. However, differences tend to disappear once the analysis controls for socioeconomic characteristics of individuals, employment status and characteristics of the job and geographic location.

Chapter 3 presents a study by Ashu Handa, which uses a unique panel data set from rural Mexico to control for measurement error and unobserved individual and household heterogeneity, which are critical issues in studies of health status. The analysis indicates that in this sample of poor rural households, there are few significant differences in health outcomes by ethnic status. When control is made for unobserved heterogeneity at the household and individual level, the few differences that are observed disappear.

An analysis of race and health disparities among seniors in urban areas in Brazil conducted by Antonio Trujillo, John Vernon, Laura Rodriguez Wong and Gustavo Angeles is presented in Chapter 4. White seniors report better health than Black seniors even after controlling for baseline health conditions and several demographic, socio-economic and family support characteristics.

Finally, Chapter 5 presents the study conducted by David Mayer-Foulkes Carlos Larrea, which utilizes merged, comparable, Demographic and Health Surveys (DHS) from Bolivia, Brazil, Guatemala and Peru to decompose health inequity between ethnic groups. The overall conclusion is that Indigenous and Afro-descendant populations have worse health status and face more severe barriers in accessing health services than white people living in comparable geographic locations and belonging to similar social groups.

Conceptual considerations about Race, Ethnicity and Health

Race and ethnicity are complex issues in LAC. Most of LAC's 540 million residents descend from three major racial/ethnic groups: (i) indigenous peoples, of whom there are some 400 distinct groups; (ii) Europeans, largely of Spanish and Portuguese heritage; and (iii) Africans, descendants of slaves brought to the region during the colonial era. The term *Mestizo* generally refers to people of mixed European and indigenous lineage, while the term *mulatto* refers to people of mixed African and European background. After centuries of racial mixing, there are numerous racial variations in Latin America, and many people of mixed African, European, and indigenous ancestries coexist.

The biological concept of race, according to which human populations are divided into sub-species mainly on the basis of biological and visible physical characteristics, was

developed in the context of slavery and imperial colonialism. Race functioned not only to classify human variation, but also to justify the exploitation of groups that had been defined to be inferior (Montagu, 1965). Scientists have challenged the biological concept of race as ill defined, poorly understood, and invalid. The key proof is that human races are not biological distinct, as there is more genetic variation within races than between them, and racial categories do not capture biological distinctiveness (Braun, 2002). On the contrary, the modern concept of race emphasizes its social origins rather than its biological basis (Kaplan and Bennett, 2003). In other words, the fact that we know what race we belong to tells us more about our society than about our genetic makeup. Racial taxonomies are arbitrary, and race is more of a social category than a biological one.

The word ethnicity derives from the Greek word ethnos, meaning a nation. Ethnicity is a multi-faceted quality referring to the group to which people belong to, or are perceived to belong to, as a result of certain shared characteristics, including geographical and ancestral origins, particularly cultural traditions and languages. The characteristics defining ethnicity are not fixed or easily measured, so ethnicity is imprecise and fluid. While race and ethnicity are different, they are overlapping concepts often used synonymously (Bhopal, 2004).

The concept of indigeneity is also complex and has varying definitions. Indigenous peoples are the original inhabitants of an area, the descendants of the original inhabitants who were colonized, and those living in an Indigenous way and are accepted by the Indigenous community. Indigenous people could also be those who are successful in maintaining ancestral behaviors over specific territories with or without traditional lands (Delgado, 2003).

To summarize, the concepts of race, ethnicity and indigeneity are not primarily biological concepts, but rather complex definitions, which involve social and cultural factors as well as behaviors and beliefs.

History of Indigenous and Afro-descendant populations in LAC

To understand current distributions of Indigenous and Afro-descendant populations in the Region, we need to understand their demographic history. In Latin America and the Caribbean, there are two clearly defined periods: before and after the European invasion of the late 15^{th} and early 16^{th} centuries. The region had previously been a mosaic of Indigenous groups and territories produced by thousands of years of competition among different cultures. The estimated total population of Indigenous peoples before the European invasion ranged from 52.9 to 150 million. Indigenous groups had different social structures. Complex imperial cultures such as the Inca, Maya or Aztec exercised their political and military influence over growing territories, with large urban populations. On the other hand, semi-nomads hunters and gatherers groups maintained a less permanent control over their territories and lived in smaller communities.

Rapidly, European invasions drastically changed the pre-Columbus mix of people, cultures, territories and populations, and their inter-ethnic and ecological relationships.

More exposed populations, such as those of coastal areas, suffered the greatest effects. The indigenous communities living in isolated environments or difficult climates survived for some time without external influences. Indigenous people faced an even greater threat than armed invasions: diseases. Within 100 years, the estimated total Indigenous populations dropped from up to 150 million before the European invasion in 1492, to 11 million. This massive demographic collapse was mainly due to foreign bacterial and viral diseases introduced by Europeans. Smallpox and measles were among the most deadly diseases introduced, but influenza, yellow fever, and typhus also arrived during this time. Some demographic recovery seems to have taken place in the late 20th century. In 1960 the total Indigenous population of LAC was estimated as 1.4 million, by 2003 it was more than 40 million. In view of the issue of measurement of Indigenous demography and the effects of changing definitions of indigeneity, most analysts agree that population estimates remain only approximate. For example, the development of self-definition as a criterion for defining indigeneity could be responsible for some of the apparent recovery of population numbers.

The vast majority of Afro-descendants in LAC descend from the millions of slaves brought by European traders from the West African coast. It appears that the first slaves arrived in the early 16th century in the Hispaniola Island. It is estimated that about 12 million Africans were brought into the American continent during the 400-years history of slave trade. From those, more than 50% ended up in Brazil while 5% went to the United States. Although many Africans perished due to harsh working conditions and diseases, new slaves from West Africa continued to replace them until abolition occurred. Slavery was abolished in most Latin American countries at or soon after their independence from Spain in the 1820s, but continued in Brazil until 1888.

As slavery and lingering racism have left an indelible mark on Afro-Latinos, so too has the long but little-known legacy of black rebellion and self-liberation (marronage). The first slave rebellions occurred in Puerto Rico (1514) and Hispaniola (1522). By the 17th century, maroons (escaped slaves) in Latin America have been estimated to have numbered between 11,000 and 30,000. Maroons formed communities with sovereign territoriality in remote terrains with low population densities that now constitute the prominent Afro-Latino areas of eastern and northern South America, Central America, and the Caribbean.

The result is a particularly mixed population. For example, a study analyzing mitochondrial DNA in a representative sample of the Puerto Rico population revealed that maternal ancestries are 61.3% Amerindian, 27.2% sub-Saharan African and 11.5% western Eurasian (Martinez-Cruzado et al. 2005).

Races and Ethnic groups in LAC

Demographic estimates of Indigenous and Afro-descendant populations in LAC vary, and fundamentally depend on the way in which indigeneity and race are defined and measured. The first difficulty is that not all LAC population censuses identify Indigenous

and Afro-descendant populations. Secondly, censuses trying to identify these populations use different questions, making comparisons and aggregations difficult.

As indicated in Table 1, despite those limitations, the Afro-descendant population in LAC is estimated to represent more than 113 million, or as much as 21 percent of all the region's citizens. Indigenous populations account for more than 42 million about 8 percent of the total population.

Table 1. Afro-descendant Indigenous populations in the 26 IDB member countries

Country	Total population (July 2006 estimates)	Indigenous populations	Afro-descendant	Indigenous populations %	Afro-descendant %
Argentina	39,921,833	391,000	-	1.0%	-
Bahamas	303,770	-	259,000	-	85.3%
Barbados	279,912	-	252,000	-	90.0%
Belize	287,730	48,000	89,000	16.7%	30.9%
Bolivia	8,989,046	4,943,975	2,000	55.0%	0.0%
Brazil	188,078,227	332,000	84,070,967	0.2%	44.7%
Chile	16,134,219	484,027	-	3.0%	-
Colombia	43,593,035	653,896	7,846,746	1.5%	18.0%
Costa Rica	4,075,261	40,753	122,258	1.0%	3.0%
Dominican Republic	9,183,984	-	4,132,793	-	45.0%
Ecuador	13,547,510	3,386,878	406,425	25.0%	3.0%
El Salvador	6,822,378	68,224	-	1.0%	-
Guatemala	12,293,545	4,978,886	-	40.5%	-
Guyana	767,245	69,113	226,869	9.0%	29.6%
Haiti	8,308,504	-	7,893,079	-	95.0%
Honduras	7,326,496	512,855	146,530	7.0%	2.0%
Jamaica	2,758,124	-	2,507,135	-	90.9%
Mexico	107,449,525	12,700,000	-	11.8%	-
Nicaragua	5,570,129	278,506	501,312	5.0%	9.0%
Panama	3,191,319	191,479	478,698	6.0%	15.0%
Paraguay	5,884,000	157,000	-	2.7%	-
Peru	28,302,603	12,736,171	1,471,735	45.0%	5.2%
Suriname	439,117	25,000	180,038	5.7%	41.0%
Trinidad & Tobago	1,065,842	-	400,000	-	37.5%
Uruguay	3,431,932	1,000	137,277	0.0%	4.0%
Venezuela	25,730,435	514,609	2,573,044	2.0%	10.0%
Total	543,735,721	42,513,370	113,696,906	7.8%	20.9%

Note: author's estimation based on Bello and Rangel (2000) and CIA (2006).

Health differentials in Indigenous and Afro-descendants populations

Data on the health of Indigenous and Afro-descendant populations in LAC are scattered. Availability of health data is somehow affected by the geographical isolation of some Indigenous groups. In some cases, information is obtained only when an epidemic has started and health professionals arrive and begin to treat patients. Indigenous health information is also affected by the nature of being a community within a nation state, and by the movement of individuals and families between rural and urban areas. In addition,

some indigenous communities cross national boundaries, which creates challenges for data collection.

Table 2 (at the end of this chapter) summarizes information on health inequalities related to race and ethnicity available for Latin American and Caribbean countries. We distinguished between differences in health status, access to health services and quality of health services used to capture the different dimensions of health inequalities. Even if we were not able to provide information for every country in the region, it is clear that there is a pending debt toward Indigenous peoples and Afro-descendant populations in all three dimensions.

Why do health disparities exist?

The various factors at the individual and community levels having an influence on health status are referred to as the determinants of health (Evans et al, 1994) or as the health inputs into the production of health (Grossman, 1972). A good deal is known about what they are and how they affect population's health (Kindig and Stoddart, 2003). To a large extent health is determined by factors such as genetics, where we live and the state of the physical environment, income, educational level, our relationships with friends and family, access, use and quality of health care services.

The distribution of these factors varies widely between population groups. Thus, inequalities across population groups in the distribution of health determinants may explain difference in health between population groups. In this section we outline the extensive research that has investigated the relative importance of the above-mentioned factors in determining racial and ethnic disparities in health relevant to LAC.

Genetics. Inheritance plays an important part in determining lifespan, healthiness and the likelihood of developing certain illnesses. Research on racial variations in health has been dominated by a genetic model that views race as primarily reflecting biological homogeneity and indigenous-black-white differences in health as largely genetically determined. The genetic model of racial differences in health was based on three assumptions: (i) that race is a valid biological category; (ii) that the genes that determine race are linked to those that determine health; and (iii) that the health of a population is largely determined by the biological constitution of the population. In retrospect, the biological concept of race was ill-defined, poorly understood and invalid, as human races are not and never were pure (Braun, 2002). Additionally, research within the biological sciences has provided strong evidence that broad groupings of population into races explain little in terms of the overall genetic variation of human beings.[1] Even if some diseases have been found to be purely hereditary, the constant interaction between genes and the environment means that it is difficult to disentangle genetic from environmental

[1] For example, Lewontin (1972) showed that over 85% of the observed genetic variation (using internal proteins as markers of genetic variability) occurred within racial groups, only 6.3 percent of variability occurred between racial groups, and approximately 8.3 percent of variability between ethnic groups within a race.

factors. If racial and ethnic groups do not represent distinct gene pools, then genetic explanations for health inequities are weakly (if at all) informative.

An emphasis on biological sources for variations in health can serve important ideological functions. If it is believed that racial or ethnic differences in health result from innate biological differences, then societal structures and policies determining poor health are absolved from responsibility, leaving little room for interventions that can be effective in reducing health differentials (Williams et al., 1994). On the other hand, a more comprehensive conceptualization that includes environmental, social and behavioral factors among the elements affecting populations' health, provide for effective health politics both at the social level (e.g. improving health services quality, environment, occupational safety) and at the individual level (e.g. reduce smoking, drug and alcohol use, reduce teenage pregnancy).

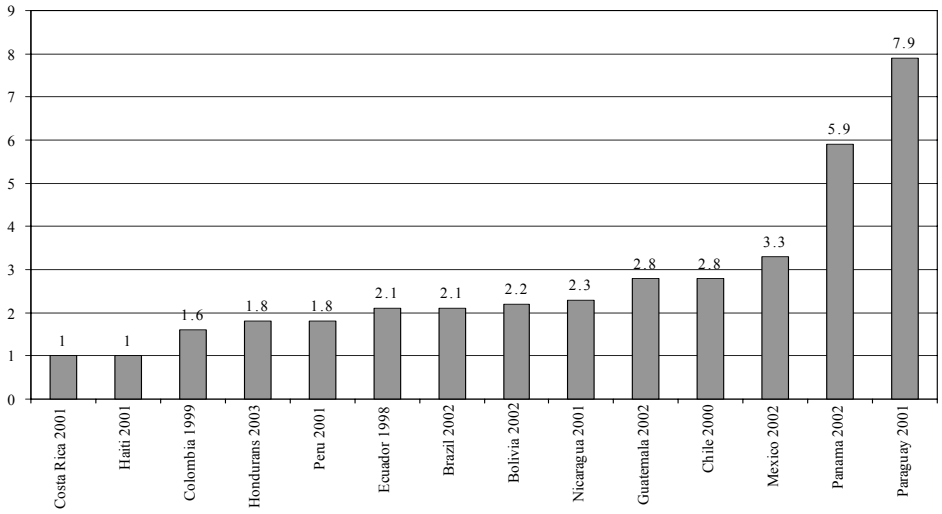
Environmental factors. Safe water and clean air, healthy workplaces, safe houses, communities and roads all contribute to good health. Many Indigenous populations in LAC still live in isolated environments where conditions are harsh. People living within natural ecosystems are exposed to many health hazards produced mostly by their difficult environment. In the past, health risks were linked to basic access to food, water, shelter and, in many contexts, risks from predators. Resource exploitation in remote areas of LAC affects Indigenous peoples health, almost always negatively. Effects can be direct through environmental contamination, but can also be linked to social contact with workers in mining and exploration projects.

Diseases from acculturation and encountering. Support from families, friends and communities is linked to better health. Culture, customs and traditions, and the beliefs of the family and community all affect health. The arrival of new populations from Europe brought new diseases that were especially lethal for communities living in warm lowlands (see section 2.2). But still western diseases spreads among Indigenous communities with lethal consequences. Some authors believe that Indigenous communities living near urban areas or having regular contact with mining and forestry workers, particularly the wildcat golddiggers known as 'garimpeiros' are at high risk of being infected with some form of sexually transmitted diseases. Thus, HIV/AIDS may have the same effect on Indigenous peoples as the original epidemics brought by the conquistadores (McKenna, 1993). Indigenous communities more integrated into mainstream society are more vulnerable to so-called modern diseases, such as alcoholism, drug use and domestic violence (Seale et al., 2002). Some investigators have looked at the maintenance of traditional culture, and suggested that this is a protective factor, especially for problems related to nutrition and transition from a nomadic to a sedentary urban life (Hollenberg, et al. 1997).

Finally, social and political violence is a reality for many Indigenous and Afro-descendants communities in Latin America, with repercussions of deaths in some countries or exile and subsequent mental health difficulties.

Poverty. One unifying feature of Indigenous and Afro-descendants groups in LAC is that of poverty (Renshaw and Gras, 2004). The historical factors that explain the poverty condition of these populations, include the progressive loss of land entitlements for indigenous communities, breakup of community economies, reduced access to educational and health care services, and the consequent difficulties in participating in the labor dynamics. Indigenous peoples and Afro-descendant populations get lower wages for jobs that are comparable to those of the rest of the population, and are more likely to work in the economy's informal sector without social protection. All this results in a much greater incidence of poverty in the ethnic and racial minorities than in the rest of the population, as shown in
Figure 1. The incidence of extreme poverty among Indigenous and Afro-descendant individuals is much higher than in the rest of the population, ranging from 1.6 times (Colombia) to 7.9 times (Paraguay), excluding the cases of Costa Rica and Haiti, where the ethnic condition does not seem to imply any difference in the levels of indigence.

Figure 1: Incidence of extreme poverty in Indigenous and Afro-descendant populations / incidence in the rest of population. Source ECLAC, household surveys various years



Research focusing on individuals has found a very robust relationship between an adult individual's income and his/her health, using a range of measures for both. Regardless of how measures of health status and measures of poverty are combined, there is little doubt that poverty leads to ill health (see Pritchett and Summers 1996; Mullahy, Robert and Wolfe, 2001; Benzeval and Judge, 2001). Some research from the United States suggests that the cost of care is an important consideration in clinical decisions for ethnic minority groups (Mayberry et al. 2000).

Further important conclusions from this body of literature include: (i) the relationship between individual income and health is non-linear (i.e. poor suffer larger negative health consequences than health benefits reaped by rich); (ii) longer-term measures of average income have larger associations with health than measures of current income, which can be highly volatile; (iii) long-duration poverty has larger (negative) health consequences

than occasional episodes of poverty; (iv) both income level and income changes are significant predictors of health status, but income level is the more important of the two; and (v) negative income shocks are more important for health than positive shocks.

Health services access, use and quality. Access and appropriate use of health services prevent and treat diseases improving individual and population health. Racial and ethnic minorities have not access to health services at the same rate, as whites because of geographical, economic and cultural factors. Indigenous populations are often rural, disperse, in some case nomads or located in areas of difficult geographical access. Afro-descendant populations are often located in marginalized urban areas, where less health service providers are available.

Several studies have also drawn attention to the importance of addressing cultural and communication barriers, as well as racial and ethnic prejudice and stereotype in order to build effective health service delivery (Williams and Rucker, 2000). In the United States and Brazil it has been documented that Afro-descendant patients are less likely than white patients to receive pain medication when they are hospitalized (LaVeist, et al. 1995; Leal et al. 2005), but it has been proven difficult to link these examples to a patent pattern of racism and racial discrimination (Bohopal, 1998). In Latin America and the Caribbean it is likely that prejudices and stereotypes play an important role in reducing access for indigenous and Afro-descendant populations, but the existing evidence is mainly anecdotic. On the other hand, studies suggest that the health services serving indigenous and Afro-descendant populations in LAC are often culturally inappropriate. Health personnel often disregard, disrespect or simply ignore traditional practices, languages and culture, creating and uncomfortable and hostile environment for these populations (see PAHO, 2001).

Policies to reduce health inequalities

Recognizing the issue

The relative scarce focus on ethnicity and race could be explained by the long-standing myth of racial democracy existing in a number of LAC countries. Only recently the nascent affirmative action movements in LAC has begun to exert pressure for recognizing the importance of racial and ethnic factors (Bailey, 2004). Another shortfall to be recognized is the paucity of information about ethnicity and race, which have limited the possibility of comparing differences in health as well as other social outcomes across population groups. Obviously, the incapacity of producing compelling evidence on the dimension and scale of such inequality has limited the opportunity of recognizing the issue of ethnicity and race in the open political agenda.

The production of this information involves an undeniable political component, since for the affected parties it means disclosing their situation and a form of recognition vis-à-vis the others. Furthermore, without reliable data, baseline and target indicators, and periodic measurements, it is impossible to make political decisions to tackle the discrimination problem and target resources to groups that endure multiple exclusions based on ascriptive factors. Therefore, recognition and racial/ethnic democracy are two sides of the

same coin: becoming statistically visible is part of the process of constructing a social identity and demanding social rights (Hopenhayn, 2005).

In general, it seems to be more difficult to collect information about race than indigeneity as the latter allows the possibility of using proxies such as language spoken and the former require self-identification or identification by the interviewer (Mejía and Moncada, 2000).

The experience in the Region of collecting information about race and ethnicity through household surveys shows that the use of proxy variables such as language is not sufficient to identify indigenous group, as belonging to an indigenous population is more complex than being fluent in a specific language. It is preferable to use a number of related questions on languages (e.g. the language learned at home and the language usually spoken) together with self-identification to identify individuals as belonging to a race/ethnic group. Moreover, the simultaneous use of questions on languages spoken by the parents, the language usually spoken, together with self-identification allows the possibility of analyzing the loss or resurgence of languages. More recently more subtle questions about indigeneity, such as ethnic self-identification and use of cultural clothing have also been used in censuses. It is considered that the use of these new variables has the effect on increasing indigenous populations estimates in LAC (Mejia and Moncada, 2000).

In this regard it is worth mentioning the technical assistance provided by the IDB and other international organization such as the World Bank and ECLAC, through the MECOVI and other programs to the statistical agencies of the majority of Governments in the region.

Provision of health services: articulation and cultural adaptation

Effective provision of health care services to indigenous and Afro-descendant populations involves several challenges. The first and more easily understood challenge is the geography. Historically, indigenous populations have been physically segregated in rural and remote areas, while and Afro-descendants are concentrated in periurban and low-income neighborhoods. In addition, health services (both private and public) are highly concentrated in non-poor urban areas and that health workers often do not want to work in remote areas or poor neighborhoods because of fear of isolation, violence and a lack of security.

The second challenge is constituted by the presence of cultural barriers, which can be understood as the lack of understanding between two coexisting populations of different cultures. Health services are typically organized and offered according to modern medical criteria and methods, but the clients for whom these services are designed have different beliefs, preferences, and criteria to cure their ailments, which originate in the ancient indigenous and Afro-descendant cultures. Both systems have coexisted for many years and coincide in recommendations that have a strong rational base, typical of each system, such as not lifting heavy objects, preventing the loss of blood during pregnancy, not getting upset during pregnancy or breastfeeding, and exclusive breastfeeding for

newborns. However, differences in preferences and beliefs between the two systems can create obstacles when accessing health services. For example, indigenous families perceive childbirth to be a familiar and intimate act that should take place in warm and enclosed spaces. They prefer that the husband be the only person to attend the woman in labor, and that he carries out traditional rituals related to feeding and clothing the woman, and disposing of the placenta as tradition requires. On the other hand, maternity wards have transformed childbirth into an almost public act, where several strangers provide care, and women feel strange in cold and ventilated labor rooms, barely covered by a robe, and where the placenta is simply disposed of (Camacho et al. 2006).

The articulation of health services among indigenous and Afro-descendant populations involves a comprehensive strategy. From one side it is necessary to strengthening the provision of the health system serving indigenous and Afro-descendant populations that historically have been under- funded, under-staffed and under-equipped. On the other hand it is key to take into account users' needs and cultural perspectives. Progress in this direction has been irregular. Already back in 1978, the WHO asked national governments to study and progressively implement traditional medicine as an extension that would complement official medicine. This call has been repeated by the Pan American Health Organization (PAHO)[2] and actively implemented by several nationally and internationally supported efforts, However, much more is needed to validate and systematically incorporate into the national primary health care strategy and medical protocols elements of the traditional health systems that indigenous and Afro-descendant users are acquainted with (Puertas and Schlesser, 2004).

Addressing the socio-economic determinants of health: education, skill accumulation and poverty

Afro-descendant and indigenous groups have systematically lagged behind the white population in terms of educational achievement and skill accumulation over many generations in LAC. In addition, labor market discrimination and market segmentation along racial and ethnic lines have led to the restricted access of Afro-descendant and indigenous individuals to high productivity jobs and high growth industries. The subordinate role of descendant and indigenous groups in segmented economies like the Latin American ones explain their persistent lower mean earnings compared to whites (see Buvinić et al, 2004).

Given the virtuous circles between education, socio-occupational mobility, better income and better health, education is considered to be the primary mechanism to overcome intergenerational poverty reproduction and reduce the existing health differentials affecting Afro-descendant and indigenous groups. The educational models implemented up to now have resulted in two forms of discrimination. On the one hand, in the sphere of achievements and progress, indigenous peoples and Afro-descendants are clearly disadvantaged as compared to the rest of the population. On the other hand, education has contributed to the process of cultural homogenization and denial of indigenous and Afro cultures. Today, governments are aware that access to quality education with a

[2] See Resolution V and VI on the Health of the Indigenous Peoples.

multicultural vocation is one of the privileged levers to promote social citizenship. The major challenges in this field refer to the promotion of bilingualism and literacy as two core tools to attain a greater prospect of equality among indigenous and non-indigenous populations. The implementation of linguistic policies in the region, addressing indigenous training in modernity codes, but without relinquishing their ethnic identity, language and culture, is a first step to overcome the education models applied up to now. New approaches (interculturality, multiculturalism, bilingualism and respect for cultural diversity) are increasingly implemented in countries such as Bolivia, Mexico, Paraguay, Peru and Guatemala, among others.

Voluntary isolation as a coping strategy

Perhaps as an extreme reaction to the health and social problems deriving from the process of acculturation and encountering, several Indigenous communities of various countries in Latin America have chosen to live in voluntary isolation from mainstream societies. Such isolation can profoundly affect the health conditions of these communities both positively and negatively. Arguably, a comparatively reduced life expectancy in isolation is usually accompanied by a better life quality, according to Indigenous peoples' own standards. Nevertheless, self-isolation of an Indigenous people from others is difficult to maintain when the community lives close to resources valuable to mainstream society. In reality, self-isolation can only be successful with strong and consistent government support, and in geographically remote or inaccessible regions. For example, in the Javari Valley of the Brazilian Amazonia, several uncontacted Indigenous groups currently live in isolation in an area recognized by the State as Indigenous lands. Other Indigenous groups that have decided to remain as isolated as possible are the Nukak in Colombia, the Ayoreo in Paraguay, the Hauorani in Ecuador, the Nahua in Peru, and some Mbya Guarani communities of the Yaboti Reserve in Argentina.

Some researchers have also argued that isolation of the community is a protective and preventive measure against so-called civilization diseases (Azanha and Possuelo, 2004). However, it is extremely difficult to establish the overall health impact of voluntary isolation, partly because it is neither ethical nor practical to access groups who do not wish to have contact with outsiders to access their health status. Partly because of the difficulty of obtaining baseline information and constructing the counterfactual situation.

Positive discrimination

Given the significant disparities in health between Indigenous, Afro-descendant and the rest of the population in LAC, the application of the notion of equity has important implications for the formulation of health policies. In the field of health, the concept of vertical equity – treating differently those who are different in relevant respects, such as having different health needs – is strictly linked to the concept of positive discrimination (Culyer, 1995; Wagstaff and van Doorslaer, 2000). The extent of health disparities among ethnic and racial groups in LAC supports the argument that traditional health policies have failed to improve equity in health and that there is a need for positive discrimination to promote equity better in future (Mooney, 2004).

The idea of positive discrimination and affirmative actions originated in the United States, growing out of the civil rights and social justice movements to achieve the full integration of American society. With the support of Congress, explicit policies were crafted in the late '60s and '70s to provide greater opportunities for minorities in employment, education, the awarding of public contracts, and political participation (Orfield, 2001). Positive discrimination and affirmative actions policies are rare and recent occurrences in Latin America and the Caribbean.[3]

The discussion about adoption and implementation of affirmative action policies to achieve health equity among racial and ethnic groups in Latin America is incipient (Torres, 2003). In general it is possible to distinguish two groups policies. On one hand we identify policies that, applying the vertical equity principle, allocate more health resources to those populations, such as Indigenous, Afro-descendant communities with more severe health needs (Wiseman and Jan, 2004). On the other hand, we distinguish policies, such as the use of quotas, directed to facilitate the entrance of Indigenous and Afro-descendant individuals in the health professions, recognizing that those admitted to health professions through affirmative actions proved to be more likely to address the health needs of those Indigenous and Afro-descendant communities than others (Ready, 2001).

[3] The Brazilian government's endorsed an affirmative action policy in 2001 establishing quotas for Afro-Brazilians in government service and higher education (Htun, 2004).

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Table 2. Racial and Ethnic Disparities in Health in Latin America and the Caribbean

Country	Health Status	Use of health services	Coverage and quality of health services
Belize		In Toledo and parts of Stann Creek, where most indigenous people live, access to health care is of concern (PAHO, 2007)	
Bolivia	Child chronic malnutrition 50.5% vs. 23.7% in non- indigenous communities (Larrea and Freire 2002)	Institutional delivery: 30% Indigenous; 55% non-indigenous (Valenzuela 2004)	Health insurance coverage: 12% Indigenous; 19% non-indigenous (Hall and Patrinos, 2005)
Brazil	In the year 2000 life expectancy at birth was 71 years, whereas for Afro-descendant it was 65.7 years (Borges Martins 2004). AIDS mortality rate for Afro-descendant is 50% higher than for white (PAHO, 2007). A sample of postpartum women seen in public maternity hospitals detected a persistent unfavourable situation was for mulatto and black women as compared to white: highest rates of adolescent pregnancy, physical violence, smoking, attempts to interrupt pregnancy (Leal et al. 2005)	Afro women seek care in more than one hospital before being admitted: 31.8% vs 18.5% (Leal et al. 2005)	Afro women were less likely to receive anaesthesia during delivery: 21.8% vs 13.5%; Afro women were less likely to use private providers (considered of higher quality): 11.6% vs 43.7%; (Leal et al. 2005)
Chile	National infant mortality was 17.1 per 1,000 live births compared to 20.6 in indigenous communities (PAHO, 1998)		
Ecuador	Child chronic malnutrition 58.2% vs. 24.2% in non- indigenous communities (Larrea and Freire 2002). The mortality rate of all sons and daughters born alive is 10.5% for indigenous mothers, compared to 5.1% for non-indigenous mothers (Hall and Patrinos, 2005)	Deliveries assisted by a professional health care provider: 33% Indigenous; 82% non-indigenous. About 36% of indigenous mothers report having no prenatal checkup at all during their last pregnancy, compared to 12% of non-indigenous (Hall and Patrinos, 2005)	Indigenous families depend more on health care delivered by public health centers or sub-centers and have lower rates of health insurance coverage than non-indigenous families (Hall and Patrinos, 2005)

Country	Health Status	Use of health services	Coverage and quality of health services
Guatemala	Child chronic malnutrition in indigenous communities 34% vs. 11.1% in non-indigenous communities (Adams, 2005)	Prenatal care: 63% of indigenous women vs. 82% of non-indigenous. Institutional births: 15% of indigenous women vs. 51% of non-indigenous. Contraceptive method: 32% of indigenous women knowledge and 12% use vs. 71% and 57% of non-indigenous (Hall and Patrinos, 2005)	Health insurance coverage: 5% Indigenous; 18% non-indigenous (Hall and Patrinos, 2005)
Honduras	National maternal mortality rate: nation level 147 for 100,000 live births. In the departments of Colón, Copán, Intibucá, Lempira and La Paz, with large indigenous populations, between 255 and 190 for 100,000 live births (PAHO, 1998). Life expectancy at birth: 36 for indigenous men compared to 65 for all men; 43 for indigenous women compared to 70 for all women (PAHO, 1998). HIV prevalence rate: 7.8% among Garifuna's population compared to 0.8% for national average (WB, 2002).		
Mexico	Child chronic malnutrition: 44% indigenous; 14% non-indigenous (Hall and Patrinos, 2005). Infant mortality year 2000: 38.5 per 1,000 live births among indigenous vs. 24.9 non-indigenous (CONAPO, 2001). Child mortality year 1997: 120 per 1,000 live births among indigenous vs. 59 at national level (PAHO, 2002). In the year 2000 life expectancy at birth was 74 years, whereas for indigenous was 69 years (PAHO, 2002).	Medical consultations: (i) among children 0-17 indigenous patients use 14% less services than non-indigenous; and (ii) among adults, indigenous use 18.6% less services than non-indigenous; Hospital services: indigenous populations use 65.7% less services than non-indigenous population (Paqueo and Gonzalez, 2003)	Health insurance coverage: 17% Indigenous; 43% non-indigenous (Hall and Patrinos, 2005)

Country	Health Status	Use of health services	Coverage and quality of health services
Nicaragua	Municipalities affected by plasmodium falciparum are in the Autonomous Atlantic Coast Regions of the country, an area of indigenous and Afro-descendant populations settlements (OPS-NIC, 2003).		
Peru	Child chronic malnutrition 47% vs. 22.5% in non- indigenous communities (Larrea and Freire 2002). Infant mortality was 169 per 1,000 live births compared to 269 for indigenous populations (PAHO, 1998)	Deliveries assisted by a professional health care provider: 30.7% Aymara speakers; 53.3% Quechua speakers; 73.4% Spanish speakers (ENDES 2004-5). Access to medicine in case of illness: 57% indigenous compared to 81% non-indigenous population (Pshcaropoulos and Patrinos 1994)	Health insurance coverage : 41% Indigenous; 47% non-indigenous (Hall and Patrinos, 2005)

II. RACE AND ETHNIC INEQUALITY IN HEALTH AND HEALTH CARE IN COLOMBIA

Raquel Bernal and Mauricio Cárdenas

Introduction

Health inequalities have recently started to receive a good deal of attention in developing countries. Although scarce, some preliminary literature has begun to explore the extent of health inequalities in developing countries, in particular, across the socioeconomic dimension. In other words, trying to understand how large the differences in health outcomes are across socioeconomic groups. Conclusions of these studies coincide with what has already been found for industrialized countries: health outcomes are significantly better for individuals that are better off in terms of income and socioeconomic conditions.

In a recent paper, Wagstaff (2002) presents measures of health inequality, much in the spirit of concentration indices commonly used to measure income inequality. In a nutshell, the measure is calculated by plotting the cumulative proportion of individuals experiencing a given health outcome (e.g., deaths in the case of mortality measures) against the cumulative proportion of population at risk, ranked by economic status. The concentration index is then calculated as twice the area between the resulting curve and the diagonal. By convention, if the concentration index is negative, it implies that the constructed curve lies above the diagonal, i.e. that the penetration of that outcome (mortality in our example) is higher among poorer individuals and inequalities in mortality are therefore to the advantage of better-off children.

Strikingly, during the nineties Latin America and the Caribbean exhibited the largest inequalities on all measures of health which include: infant mortality rate (IMR), under-five years of age mortality rate (U5MR), percent of children stunted (percent of children whose height measurement is more than two standards deviation below the median reference standard for their age, as established by the World Health Organization), percent of children underweight, diarrhea prevalence (percent of surviving children under three, four, or five years old who had diarrhea in the two weeks preceding the survey) and acute respiratory infection prevalence (ARI). While Colombia exhibits worse health inequalities than the world average, these are slightly above the Latin American average.

The growing interest in health inequalities in developing countries reflects the extent of the broad interpretation being given to the term “poverty” in the academic literature, and the increasing tendency of defining goals of multilateral institutions and aid organizations in terms of poverty reduction. At the same time, there is a growing consensus that health inequalities (defined between the poor and the rich, and or in other dimensions that characterize different populations, like minorities) are unjust. In other words, reducing

the cross-country and intra-country gaps between different population groups does not simply imply reducing poverty, but also improving social justice and equity (see Alleyne, Casas, and Castillo-Salgado, 2000).

As the debate on socioeconomic and health inequalities in developing countries continues, particularly related to the question of furthering the development assistance from aid agencies and industrialized countries in developing countries, much remains to be understood about the nature of these inequalities, their magnitude, characteristics and cross-countries differences.

The main objective of this paper is to explore race and ethnic health inequalities in Colombia. Not only literature about race inequality in health in Colombia is non-existing but also the literature on the more general topic of social and economic exclusion of minorities defined by race and ethnicity in Colombia is rather limited. A remarkable exception is a study by Florez, Medina and Urrea (2003) who review the literature about social exclusion by race in Latin America and the Caribbean. In spite of the fact that data about race and ethnicity is rather scarce in Latin America and the Caribbean, the authors show some evidence that minorities (blacks and indigenous populations) in Latin America have lower levels of income and human capital. A few studies (see Psacharopoulos and Patrinos, 1994, Patrinos, Velez and Psacharopoulos, 1993) indicate that after controlling for a set of observable characteristics, a significant part of the difference in income and human capital between blacks/indigenous populations and whites is still explained by race itself.

In this paper, we first characterize the situation of afro-colombians and indigenous populations in Colombia in terms of access to health care and health outcomes. Second, we set up a statistical model that allows us to test whether some of the health inequalities that are observed still remain after controlling for a wide range of individual and household observed characteristics, including access to health care. Third, we explore possible reasons for ethnic health disparities when present. Finally, based on these results we provide some specific policy recommendations to address health inequalities in Colombia.

According to recent data from the Living Standard Survey (LSS) (2003) the afro-Colombian population (blacks, "mulatos", palenqueros or raizal del archipiélago[4]) represents approximately 7.2% of the country's total population, while approximately 2% is indigenous. Some authors report that most part of the black population in Latin America and the Caribbean seems to be located in Brazil, Colombia, Haiti, Cuba and Dominican Republic[5]. Hence, it seems to be important to understand the status of these minorities in terms of health and access to health in Colombia.

[4] Mulatos or palenqueros who live in San Andrés y Providencia.
[5] Florez, Medina and Urrea (2003).

Description of Racial and Ethnic Minorities in Colombia

The main source of data for this section (and this paper) is the Living Standard Survey (LSS) carried out by the National Department of Statistics (DANE) during 2003 at the national level. The objective of the LSS is to provide measures of socioeconomic status of the Colombian population and understand the incidence of poverty and the relevance of various determinants of poverty. This survey was applied to a basic sample of 22,949 households, which are expanded to the 11,194,108 households that constitute the total Colombian population. This survey has national coverage by region: Atlantic (Atlántico, Bolívar, Cesar, Córdoba, Guajira, Magdalena and Sucre), Eastern (Boyaca, Cundinamarca, Meta, Norte de Santander and Santander), Central (Caldas, Caquetá, Huila, Quindío, Risaralda and Tolima), Pacific (Cauca, Chocó and Nariño), Orinoquia-Amazonia (Arauca, Casanare, Guaviare and Putumayo), Antioquia, Valle del Cauca, San Andrés y Providencia and Bogotá by municipality.

Basic Descriptive Statistics

According to the LSS, around 6.6% of the population[6] is afro-colombian (afrodescendent, "mulato" or palenquero), 2% is indigenous and less than 1% reports being either "raizal del archipiélago" or gipsy in 2003. That means that approximately 9.2% of the Colombian population belongs to a racial or ethnic minority. Figure 3 shows the composition of the population by region. Minorities are mainly concentrated in the Pacific (54.71% of the population in that region is either afro-Colombian or indigenous), San Andrés y Providencia (46.79%), Valle del Cauca (20.3%) and the Atlantic region (13.1%)[7]. In the appendix we include two maps of Colombia, which describe the ethnic composition by region. The first one corresponds to the distribution of afro-colombians, while the second shows the distribution of indigenous population across the different regions.

Figure 4 shows the specific composition of racial and ethnic minorities by region in Colombia in 2003 according to the LSS. Around 75% of minorities in the Pacific region are afro-Colombian, while 25% are indigenous. In Valle del Cauca, approximately 97% of minorities are afro-Colombian and only 3% are indigenous groups. In the Atlantic region, around 69% of minorities correspond to afro-colombians, while 31% are indigenous and 90% of minorities in San Andrés y Providencia are "raizal del archipiélago"[8] and 8.7% are afro-Colombians. Finally, 72% of ethnic minorities in the Amazon are indigenous, while the remaining 27% are afro-Colombians.

Table 2 provides some descriptive statistics about the socioeconomic status of minorities[9] using data from the LSS. In 2003 the percentage of minorities that belonged to Sisben

[6] The total Colombian population was estimated to be 43.7 millions (LSS).
[7] A significant 7.6% of the population is a racial or ethnic minority in the Amazon region.
[8] It is common to consider individuals who report being "raizal del archipiélago" as afrocolombians. See CONPES #3310 (2004).
[9] We refer to minorities as afro-colombians, indigenous, raizal del archipiélago and gypsies.

levels[10] 1 and 2 was approximately 49.4% compared to 25.6% in the case of the rest of the population. The percentage of minorities in the lowest income quintiles (1 and 2) was approximately 49%, while this fraction was equal to 45% in the case of their non-minority counterparts. Similarly, while almost 80% of the non-black, non-indigenous population did not report unsatisfied basic needs (UBN), only 53% of minorities did not.

The average household size of minorities was 4.38 compared to 3.85 for the rest of the population. In particular, afro-colombian or indigenous households had 1.39 children, while the average for the rest of the population was 1.04 children per household. According to the LSS the average schooling level of the head of minority households was 5.88 vs. 7.39 in non-black, non-indigenous households. Similarly, the average schooling level of household members older than 17 years old was 6.47 in the case of minorities and 7.39 for the rest. The percentage of the population 5 to 18 years old that attended school was equal to 84.1% for the non-minority population, while this fraction was equal to 77% in the case of minorities.

These results confirm the existence of socioeconomic disadvantages of minorities in Colombia with respect to the rest of the population. Figure 5 shows the percentage of afro-colombians that belongs to Sisben levels 1 and 2 by region. Quite clearly, more blacks (in all regions) live in worse socioeconomic conditions than the rest of the population. For example, while 68% of afro-colombians in Valle belong to Sisben levels 1 and 2 only 35% of the rest of the population in that region do. Similarly, Figure 6 shows that the unemployment rate of blacks in almost all regions is higher than that of the rest of the population. A significant difference is observed in the case of the Atlantic region where the unemployment rate of afro-colombians is approximately 22%, while the unemployment rate of the rest of the population in that region is only 12%.

The National Planning Department (DNP) collected information from several sources[11] about 68 municipalities with large black populations (majority of the population) according to the 1993 Census (National Department of Statistics- DANE). Most of these municipalities are located in the Pacific and Atlantic regions, specifically in rural areas. The population of these municipalities corresponds to approximately 4.3% (1,957,077 people) of the total population.

Table 3 shows some basic measures of development of these municipalities compared to the national average. The municipal development index (calculated by the National Planning Department) is a composite of socioeconomic measures (education coverage, health, basic services and utilities, unsatisfied basic needs, etc.) and fiscal variables (like tax and non-tax revenues per capita, expenditures per capita, etc.). The scale of this index is 0 to 100, with 100 indicating the maximum degree of development and 0 complete lack of development. According to the results presented in Table 2, this index averages 30.6 in the 68 municipalities with large black populations, while the national average is 38.1.

[10] Socioeconomic strata measured in a scale from 1 to 6, with 1 being the lowest socio-economic level and 6 the highest.
[11] Education Ministry, Labor and Health Ministry, National Department of Statistics and ICFES.

The percentage of people with unsatisfied basic needs (UBN) is 21 percentage points higher than the national average of the total 1,098 municipalities in the country, which is equal to 40%. At the same time, the coverage of basic household utilities is lower than the national coverage (for example, only 46% of households in these 68 municipalities have electricity, while the national average is 70%). Additionally, these municipalities with large black populations exhibit higher illiteracy rates than the rest of the country (23% vs. 16%). These measures indicate that minorities in these municipalities exhibit poorer social and economic status than the rest of the Colombian population.

The National Planning Department also documents the fact that none of these municipalities achieved any of the six goals in vaccination coverage established at the national level (71.2%). In particular, none of these municipalities achieved more than 57% of coverage. Similarly, while the rate of risk for malaria has been set at 2,377 per 10 thousand inhabitants at the national level, this rate corresponds to 7,825 per 10 thousand inhabitants in these 68 municipalities.

Health Outcomes and Access to Health Care

Living Standards Survey, 2003

Figures 7 through 9 provide some basic information about access to health care insurance. According to the LSS, in 2003 approximately 31% of non-minority population in Colombia did not have access to health care insurance (see Figure 7). This proportion was equal to 48% in the case of racial and ethnic minorities (black and indigenous populations). From the covered population, most minorities were covered by the subsidized regime (19.36% of total minorities) while 32.85% of total non-minorities were affiliated to the contributive regime.

In Figure 8 we present information about access to health care insurance by racial/ethnic group. It is clear that afro-Colombians' health insurance situation is more critical than that of indigenous groups. Approximately 53.8% of blacks did not have health insurance in 2003, while this proportion was equal to 37.9% in the case of indigenous groups. Most of the insured indigenous population was affiliated to the subsidized regime compared to only 10.64% of blacks. In Figure 9 we can observe that most minorities that are insured are so through Sisben[12] or because they belong to a *resguardo*[13] (36% and 16%, respectively), while most of the insured non-minorities are affiliated through a family member who works (40% of the total non-minority population).

This difference in health insurance among ethnic groups can be explained by the characteristics of the special indigenous health insurance system. Law 691/2001 created a special system of subsidized health insurance for the indigenous population. If an

[12] Subsidized health insurance offered to individuals in socioeconomic Sisben levels 1 and 2.
[13] Indian reservations.

individual is registered as "native" in a *resguardo* has immediate access to the subsidized national-wide insurance. The law created a special type of administrator of the subsidized regime to handle these affiliations (ARSI)[14]. Probably the most important characteristic of indigenous health insurance is the exemption of service fees for any treatment taken. Coping with an illness episode is substantially easier for this group, relative to the other minorities.

Funding of the indigenous health insurance comes basically from the subsidized regime funds, and from the Solidarity Fund FOSYGA. Each ARSI receives a payment for each affiliate (Capitation Payment Unit UPC), which can be 50% higher than the one paid to a regular ARS. Table 4 shows the number of affiliates to Indigenous ARS and regular ARS. There are 8 indigenous ARS (out of a total of 44 ARS), which affiliate 73.5% of all natives in the subsidized regime. Also, Table 4 shows regional funding per capita. Regions with higher black and indigenous population (Atlantic, Pacific and Amazonia) receive more funding per affiliate.

In regards to health status, Figure 10 shows the distribution of self-reported health status of minorities and non-minorities using data from the LSS. In particular, the health outcome corresponds to a self-reported measure of excellent-to-poor health on a 1 to 4 scale. The measure is equal to 1 if the individual reported that his/her health status is excellent, 2 if it is good, 3 if it is fair and 4 if it is poor. These distributions are significantly different at 99% confidence level. According to these results a lower percentage of minorities characterize their health status as either very good or good (65.8% vs. 74.6% in the case of non-minorities), while a higher proportion of indigenous groups and blacks characterize their health as fair (30.7% vs. 22.7%) or poor (3.5% vs. 2.8%) with respect to their non-minority counterparts. This information might be suggestive of significant differences in health status between minorities and the rest of the population in Colombia. However, one has to be careful when interpreting self-reported health measures. As it has been well documented, these measures are prone to error and highly correlated to other variables such as education and income[15].

In Table 4a we turn to additional variables that measure individuals' health. In spite of being self-reported they provide a more accurate measure of health than the widely used excellent-to-poor scale. Ideally, one would rather use anthropometric measurements such as height-for-age and weight-for-height, which are thought to be more objective indicators of child health. Unfortunately, the LSS, which by the way is the only survey that contains a race/ethnic question, does not include any anthropometric measures.

Table 5a presents the percentage of individuals (in a given racial/ethnic group) that report a certain health related episode, as well as the p-value of a χ^2 test for statistical significance of the difference between minorities and the rest of the population. According to this information, the incidence of chronic diseases is higher among non-minorities than minorities (14.2% vs. 12.9%) and this difference is statistically significant at 99% confidence level. The rate of occurrence of an illness episode within the last 30

[14] Although indigenous individuals can also be insured through regular ARS and receive the same benefits.
[15] See Manning et al., 1982.

days is statistically different between minorities and the rest of the population. This rate is equal to 11.73% for minorities and 11.45% for the rest of the population. For those people who experienced an illness episode during the last 30 days, the number of days in which normal activities were interrupted due to that illness is higher for minorities (5.88 days) than for non-minorities (5.37 days) and this difference is statistically significant.

Additionally, from the group of individuals that experienced a recent illness episode, approximately 68% of minorities sought professional treatment, while 72% of non-minorities did. This is clearly related to the health care insurance status of minorities, which we documented earlier in this section (see Figures 7 through 9). From the group of people that sought for professional care during an illness episode, 76% of minorities were prescribed medicine, while approximately the same fraction was prescribed in the case of their non-minority counterparts (the difference between the two rates is statistically insignificant). This might suggest that there is no strong discrimination effect in the provider-patient relationship, which has been provided as an explanation for race/ethnic health disparities in other countries.[16]

Finally, 5.6% of minorities reported having been hospitalized during the 12 months prior to the date of the interview, while 6.77% of the rest of the population did, and this difference is statistically significant at 99% confidence level. This information suggests that minorities cannot be said to be worse off in terms of health than the rest of the population. In particular, more non-indigenous and non-blacks report to suffer from a chronic disease, while approximately the same fraction of minorities and non-minorities report having experienced an illness episode within the last 30 days. Additionally, a higher proportion of non-minorities report having been hospitalized within the 12 months prior to the date of the interview. The fact that a lower proportion of minorities who suffer from an illness seek professional help seems to be related to their health insurance status.

In Table 5b we present the same health outcomes but given by racial group. In other words, we separate indigenous populations from afro-colombians. These numbers indicate that members of indigenous groups are healthier than blacks given that their rate of incidence of chronic diseases is significantly lower (11.62%) than that for blacks (12.93%) and non-minorities (20.06%), as is the rate of occurrence of an illness episode within the last 30 days (7.21% vs. 12.94% and 12.93%, respectively).

[16] See for example Van Ryn and Burke (2002) for the U.S. case.

Evaluation of the *Familias en Acción* Program

There is at least another survey that could be useful to look at, in particular, because it contains more reliable measures of health status such as anthropometric measures. We use data from a recent survey conducted in 2002 for the evaluation of *Familias en Acción* a conditional cash transfers program adopted in rural areas in 2000 (this survey was used for the measurement of the baseline). This survey has been recently made available by DNP[17], and offers rich information on perceived morbidity, vaccination, and health outcomes in terms of weight and height (both at birth and at the time of the survey) for children (age 0-6). The survey was conducted in 122 municipalities (57 under treatment and 65 operating as control group).

Unfortunately, this survey does not contain data on race or ethnicity. In order to obtain an approximate measure of health outcomes associated with race and ethnicity, we divide the population in two, those who live in municipalities with a high black/indigenous population (greater than 60% of the total) and those who live in municipalities with low minority populations. Table 5a presents a few self-reported health measures. People who live in municipalities with a relatively high minority population are more likely to have health insurance compared to the rest (89.1% vs. 76.6%) In the same vein, they had more frequent illness episodes than the rest. Children younger than 6 years old are more likely to have suffered from flu and fever if they live in a minority municipality, but the incidence of diarrhea is not different between children in any type of municipality.

Table 5b presents different measures of health status that are thought of as being more reliable than self-reported measures. For example, we show anthropometric measures of children and their mothers. Evidence of these measures against black/indigenous municipalities is not clear. The standard deviations to the international standard of weight-for-age and weight-for-height measures favor children in black/indigenous municipalities (i.e., children's anthropometric measures in ethnic municipalities are closer to the international standard). Differences in other anthropometric measures, like birth weight and height are not significant between high and low black/indigenous municipalities, even though all of them tend to favor high black/indigenous municipality inhabitants.

This information suggests that health disparities between minorities and the rest of the population are not clear. Although there are differences in access to health insurance, self-reported health characteristics from both LSS and *Familias en Acción* do not suggest that ethnic minorities are worse off. In the same way, anthropometric characteristics from high black/indigenous municipalities are not significantly different from municipalities with a relatively low black/indigenous population.

The Statistical Model

The starting point for the empirical analysis is a theoretical model of health production *à la* Becker (Becker 1993) that constitutes the main building block in the health literature.

[17] http://www.dnp.gov.co/01_CONT/EVALUACI/EVAL_RAS_BASES_DATOS_FA.HTM

According to this framework, households produce certain goods like human capital and health using a number of inputs. Typically, the health production function is given by:

$$(1) \qquad H_i = f(X_i, X_h, I_h, P_h, P_g, \mu_i, \mu_h)$$

where H_i is a health outcome which depends on demographic characteristics of the individual i (X_i) and characteristics of the household (X_h), income of the household (given that the budget constraint implies that total income is distributed among medical care and other goods and services, such as food, which enhance health), a vector of goods prices P_g and health prices P_h. Finally, it depends on unobserved attributes of both individuals μ_i and households μ_h.

The main variable of interest is race, which belongs to the vector X_i. If the associated regression coefficient is significant, it would imply that even after conditioning on a wide range of observable characteristics that include education, age and income, race itself explains part of the variation in health outcomes. Vector X_i includes as many observable characteristics as possible in order to avoid omitted variable bias. In other words, being black/indigenous might be highly correlated with low income, certain types of employment, residing in certain regions of the country, etc., which could be in turn, correlated with poor health outcomes. Omitting some of these relevant variables might induce a bias in the coefficient associated with the race dummy variable.

For instance, it seems plausible to argue that minorities and individuals with lower income will be more likely to be unemployed[18] which will significantly affect the probabilities of accessing and affording health care and thus, have an effect on the individual's health outcomes. Hence, excluding the individual's employment status from vector X_i could cause a significant bias on the coefficient associated with the race dummy variable since part of the effect of employment status will be attributed to race. Additionally, in terms of policy, this seems extremely relevant in the sense that if health inequalities are present, and the results indicate that the employment situation minorities plays an important role in explaining them, then there is potential for policy aimed at improving the status of minorities in Colombia.

Another example is associated with the region of residence and migration patterns of an individual. This seems particularly relevant in a country like Colombia in which the political conflict has created massive changes in migration patterns, particularly affecting minorities like indigenous populations and/or blacks who used to live in rural areas now affected by the conflict. These changes have affected the socioeconomic status of minorities in urban areas and increased the likelihood of participating in informal employment, which in turn, presumably affects health outcomes and access to health care. Again, excluding the region of residence and whether the individual has recently migrated could potentially induce a significant bias in the coefficient of interest, namely the one associated with race. Similarly, in terms of policy this seems extremely important

[18] The evidence presented in Figure 6 suggests that this in fact the case.

since we can better understand the mechanism(s) through which the social and political conflicts have affected minorities with a particular focus on health.

Similarly, in order to assess the effect of race on access to health care we run the following regression:

$$(2) \qquad AH_i = f(X_i, X_h, I_h, P_h, P_g, \mu_i, \mu_h)$$

where AH_i indicates whether individual i is affiliated to a health care provider or not. Again, if the probit coefficient associated to race is significant, that would imply that even after controlling for a set of observable characteristics that include education, income and age, race itself explains part of the variation in access to health care.

Another word is needed for the race and ethnicity variable. There is no agreement about the definition of race and ethnicity, as well as the fact that the way in which racial status is assigned varies across societies and has changed over time. The term race has been commonly defined in terms of biological differences between groups that are assumed to be genetic, but research within the biological sciences have proved that human genetic diversity cannot be partioned into genetically determined racial categories. Thus, lack of major systematic genetic differences between ethnic groups, together with significant differences in lifestyle (nutrition, alcohol, smoking, etc), means that ethnic differences in morbidity and mortality to some extent provide evidence against the importance of genetic factors and for the importance of environmental factors.

In order to explore the effects of race and shed some light about the mechanisms that mediate between race and health (outcomes and access) it can be useful to specify models separately for the groups being compared and conduct tests for whether the coefficients are significantly different[19]. Or what is equivalent, to run fully interacted models in which the race dummy variable is interacted with each of the explanatory variables. This would allow us to determine whether racial differences exist in the effect of a given variable on the health outcome. For example, in explaining a given health outcome one could include in the model individual characteristics and whether the individual has access to health care. If the coefficient on health care is statistically different between groups (black/white) then the effect of having access to health care on the health outcome is different from one group to the other. This, one could argue, is evidence of race discrimination in health care services and public policy could be design to reduce this type of effects.

In sum, it is important to understand that race is not necessarily a biological concept but rather a complex definition, which involves social and cultural factors. Interpreting the race variable as purely genetic leaves little room for interventions at the disposal of governments or institutions that can be effective in reducing race-associated health differentials. A purely behavioral interpretation suggests that all interventions should focus on modifying the individuals' behavior. Finally, a more comprehensive

[19] See LaVeist (2002).

conceptualization that includes social and individual behavioral factors suggests that changes can be made at the social (for example, health services, sanitation, nature of employment, etc.) and at the individual level.

Estimation Results

Living Standards Survey (2003)

We first present estimates of equation (2) using the LSS in Table 8a. The dependent variable is a dummy variable, which equals 1 if the individual has health insurance, 0 otherwise. The results of the probit model turned out to be as expected. In particular, the probability of having health insurance increases with age[20] and is significantly higher for children younger than 12 years old. Being unemployed has a statistically significant negative effect on the probability of having health insurance, while being employed with a contract has a positive and significant effect. The Sisben socioeconomic level has a very significant positive effect on the probability of having health insurance.[21] In other words, the probability of having health insurance is higher, the higher the socioeconomic status of an individual. Interestingly, being a male significantly reduces the probability of having health insurance. This might be due to the fact that women are very likely to be affiliated through their spouses' employer-sponsored health insurance plan. On the other hand, this might be an unexpected result, given that Colombian health insurance system is strongly based on labor contracts and women are less likely to be formally employed (Ribero, 2003; Flórez, 2002).

All regional dummies are statistically significant in explaining access to health care insurance. The excluded category is Bogotá. That means that living in any other region of the country (except for San Andrés y Providencia) reduces the likelihood of having health insurance with respect to people who reside in Bogotá. This does not seem to be related to residing in a capital city, which, by the way, turns out to be significant but negative (and somehow puzzling result). Hence, it might be related to other location-specific factors like the predominance of rural population, less availability of health care facilities, etc.

Finally, the race dummy variable (1 if indigenous/black, 0 otherwise) turns out to be negative but statistically insignificant. However if one estimates the same equation but using three different ethnicity dummies instead of a single race dummy variable, i.e., a dummy variable for whether the individual is black or not, another dummy variable for whether the individual belongs to an indigenous group or not and finally a dummy for

[20] Age squared does not turn out to be statistically significant.

[21] An alternative model that includes (log) expenditures per capita, the number of unsatisfied basic needs and education was also estimated. As expected, results indicated that the expenditures and education increase the probability of having health insurance, while the unsatisfied basic needs (UBN) index decreases it. However, these variables turn out to be insignificant if Sisben level is also included because of strong multicolinearity. However, the model presented in Table 8 is more powerful (R^2 is 0.1363 vs. 0.098) which probably indicates that Sisben level has a higher predictive power given that it captures additional features of socioeconomic status like the characteristics of the individual's home and the neighborhood of residence.

whether the individual belongs to another minority group or not, the results are strikingly different. As can be seen in Table 8b, if an individual is black the probability of having health insurance significantly decreases (even conditioning on socioeconomic variables and regional dummies), while the opposite is true for individuals that belong to indigenous populations. There is no significant effect of belonging to another minority group on the probability of having health insurance.

The result according to which belonging to an indigenous group increases the probability of having health insurance might be explained by the fact that Indians tend to be members of communities and this can have two positive effects on access to health insurance. On one hand, the community acts as a network that allows individuals to be better informed and find help easier within members of their group. On the other hand, Indian reservations are eligible for a special publicly funded health insurance plan.

These results suggest that even after controlling for the socioeconomic status of an individual, his/her employment status and geographic location, being black still has additional explanatory power on the probability of having health insurance. That means that while the fact that blacks have higher unemployment rates, are less likely to work in the formal sector, are less educated and in general, live in worse socioeconomic conditions than the rest of the population partly explains ethnic disparities in access to health care insurance (documented in Figures 7 through 9) there is still an unobserved ethnic-specific characteristic that reduces the probability of having health insurance.

A test for whether the model estimated on minorities only is equivalent to the one estimated on the rest of the population only suggests that these models are not statistically equivalent. In particular, the χ^2 statistic of joint significance is equal to 81.5 and the p-value to 0.0000 (Table 8c). That means that the effects of the explanatory variables on the probability of having health insurance are not always the same for minorities and for the rest of the population. Specifically, the effect of being unemployed is lower for minorities than for non-minorities, the effect of being employed with a contract is higher for minorities, as is the effect of being in a higher socioeconomic Sisben level. Finally, there is a higher negative effect on the probability of having health insurance if a black/indigenous individual lives in the Pacific or in Valle del Cauca, while the effect is less negative or more positive in the Atlantic and San Andres respectively. These results further explain why minorities are less likely to have health care insurance due to their disadvantageous socioeconomic and employment status.

Having estimated a model to explain the probability of having health insurance, we now turn to study the determinants of health outcomes by estimating equation (1) using data from the LSS (2003). In doing this, we want to control for health care insurance on top of a variety of observable characteristics of individuals. Quite clearly, the health status of an individual should depend on whether he or she has access to health care. However, the effect of having health insurance on health outcomes is likely to be biased given the fact that individuals who choose to have health insurance are systematically different from individuals who do not. In other words, there is self-selection of individuals into the group of insured and the characteristics of individuals that determine the insurance choice

might be systematically correlated with unobserved characteristics of individuals that, in turn, determine health outcomes.

For this reason we estimate equation (1) using a method based on the propensity score. In particular, the regression for health outcomes includes a dummy variable that equals 1 if the individual is insured, 0 otherwise, as well as the predicted probability of having health insurance obtained from estimation of equation (2)[22]. This predicted probability is commonly known as the propensity score. In this case, the estimated propensity score plays the role of the control function. The idea is that the estimated propensity score should contain all the information in the covariates that is relevant for estimating the effect of the "treatment". In this case, treatment refers to participation in health insurance[23].

The results are presented in Table 9a. In the first column the health outcome corresponds to a self-reported health status measured by the excellent to poor scale. In particular, the scale is equal to 1 if the individual reported that his/her health status is excellent, 2 if it is good, 3 if it is fair and 4 if it is poor. The results of the ordered probit model indicate that access to health care is not significant in explaining individuals' perception about their own health. This is not surprising exactly because the health outcome corresponds to the individual's perception of his/her own health, as opposed to his/her actual health status, which one might expect to be associated with access to health care.

Additionally, we find that higher household expenditures per capita[24] are significantly associated with a lower rating, i.e., a better perception of one's health, as is the socioeconomic status measured by the Sisben level. Similarly, years of schooling and whether the individual is employed with contract have a positive and significant effect on self-reported health status (negatively correlated with the excellent to poor scale), as one would expect. Being unemployed has a significant negative impact on the individual's perception of her/his health status (positive correlated with the health status scale). Also, the higher number of durable goods in the household, which is meant to capture additional socioeconomic characteristics of the household, is significantly associated with a lower self-reported health rating, i.e., better perception of the individual's own health status.

Interestingly, the fact that a member of the household is an addict or alcoholic has a positive and significant effect on the health status rating, i.e. a negative effect on the individual's own perception of his/her health status. This variable is introduced to capture other social and cultural habits/characteristics of the household that are related to behaviors that affect the individual's exposure to health risks and cannot be fully captured by socioeconomic measures. We include a variable that equals 1 if at least one

[22] Results presented in Table 8.
[23] The following are the exclusion restrictions that identify the two-stage model: whether the individual is unemployed, whether the individual is currently studying or not and whether the individual resides in a capital city.
[24] Given that household expenditures are expected to be endogenous what we include in this regression is predicted household expenditures based on a model that includes as explanatory variables average age (and age squared) and education of adult members.

member of the household did not eat anything during an entire day because he/she did not have enough money to buy food, 0 otherwise in order to have a more crude proxy for economic hardship. In fact, a change in this variable from 0 to 1 has an adverse and significant effect on the individual's perception of his/her own health.

Males have a better perception about their own health than do women, while older people are more likely to have a worse perception of their own health status, as one would expect. Finally, living in the Atlantic, Oriental, Pacific and Amazon regions is significantly associated with a worse perception of the individual's health status relative to the excluded category (Bogotá), while the opposite happens with individuals living in Antioquia and San Andres y Providencia. These regional dummies are meant to capture location-specific features that might be associated with differential exposure to health risks. For example, different climate, proximity to the ocean or the jungle, altitude, humidity, types of food more readily available, quality of the water, etc. At the same time, they are meant to capture regional-specific cultural traditions, habits and/or beliefs that are potentially associated with individuals' behaviors, as well as other location-specific characteristics, such as the penetration of the armed conflict which might affect the stress level and well-being of inhabitants of the region and hence, have a significant effect on their health outcomes. These regional dummies turn out to be quite significant in explaining the variation in the self-reported health status scale.

The dummy variable that indicates whether the individual belongs to a minority group or not is insignificant in explaining the individual's perception about his/her own health. In other words, after controlling for a comprehensive set of socioeconomic characteristics of the individual, the race or ethnic group of the individual does not contain any additional explanatory power. This means that the differences in self-reported health status by race/ethnicity reported in Figure 10 are completely explained by the fact that minorities live in worse socioeconomic conditions, are less likely to be employed in the formal sector, less educated, more likely to experience economic hardship and more likely to live in regions characterized by higher exposure to health risks than the rest of the population and not associated with being a minority *per se*.

The fact that the fit of the model is fairly good (R^2 equal to 0.1245) and higher than the fit of all the other models in Table 9a provides further evidence that a self-reported health measure such as the excellent-to-poor health status scale is prone to be highly correlated with socioeconomic characteristics such as education and income and to be measured with error. In this sense, it might not be a very reliable measure of health.

The second column in Table 9a reports the results of estimation of equation (1) using as a dependent variable a dummy that equals 1 if the individual reports to have a chronic disease (such as diabetes, hypertension, etc.) and 0 otherwise. The results indicate that the prevalence of a chronic disease is less related to socioeconomic characteristics such as the socioeconomic Sisben level, the number of durable goods in the household and whether the individual was unemployed than was the self-report health status scale (column 1 in Table 9a). This makes sense since one would expect chronic diseases to be explained more by unobserved characteristics of the individual given that they tend to be

highly associated to genetic and heritable features and less so by their socioeconomic conditions. Surprisingly, however, log expenditures per capita are associated with a higher probability of having a chronic disease. This might suggest that individuals who are economically better-off are more likely to be exposed to stress and/or other habits (like lower likelihood of exercising) that might be, in turn, associated with higher incidence of chronic diseases.

It is interesting to note that access to health insurance is positively (and significantly) associated with the probability of having a chronic disease. This might be a case of inverse causality in the sense that being insured actually increases the probability of diagnosis of a chronic disease. Men are more likely to have a chronic disease, as are older people. In fact, age explains much of the variation in the prevalence of chronic diseases. Additionally, age squared is positive and significant. This implies that each additional year of age has a greater negative effect on health. As expected, education is negatively (and significantly) correlated with the probability of having a chronic disease, as is being employed with a contract. Additionally, the fact that a member of the household is alcoholic/addict is associated with a higher probability of chronic disease, as is evidence of economic hardship (a member of the household did not eat anything during at least one day involuntarily). An interesting result indicates that people who migrate (a dummy variable which equals 1 if the place of residence is different from the place of birth, 0 otherwise) have a lower probability of chronic disease.

Most of the regional dummies are statistically significant in explaining the prevalence of chronic diseases except for San Andrés y Providencia y Amazonia/Orinoquia. In particular, living in the Atlantic Region (compared to Bogotá, the excluded category) is associated with a lower probability of chronic disease, while living in any of the other regions is positively correlated with this probability. Again, these regional dummies capture location-specific features not controlled for that capture differential exposure to health risks like climate, different food and/or water, bugs, vegetation, etc., as well as other location-specific characteristics that affect behaviors like culture, folklore or even the armed conflict.

Finally, the race dummy variable is insignificant in explaining the prevalence of chronic diseases. This means that the observed difference in the prevalence of chronic diseases between black/indigenous groups and the rest of the population[25] is fully explained by differences in access to health care insurance, log expenditures per capita and geographic location.

In the third column of Table 9a we present the results of estimating equation (1) by using as a health outcome a dummy variable equal to 1 if the individual experienced an illness episode (which did not imply hospitalization) within the 30 days prior to the date of the interview. The fit of this model is considerably poor with an R^2 of only 0.0185. In fact, one would expect an illness episode to be highly associated with idiosyncratic and random shocks like the propagation of a virus or bad weather, which we are unable to

[25] This difference, by the way, is in favor of black and indigenous populations (see Table 4a).

control for[26]. Still, the explanatory variables are jointly significant but account for a very low portion of the variation in the prevalence of illnesses within the last 30 days.

Some of the results are actually unexpected. In particular, having health insurance is positively and significantly correlated with the probability of an illness episode. Again, in this case it might also be possible that having access to health care increases the likelihood of diagnosis of an illness that would otherwise be overlooked by the individual. Somewhat surprising results indicate that log expenditures per capita, socioeconomic Sisben level and being employed with a contract are positively correlated with the possibility of an illness episode. Although speculative, a possible explanation could be associated with higher levels of stress and exposure to health risks (due, for example, to traveling, interacting with a larger number of people, lower likelihood of exercising, etc.) associated with working and having a higher socioeconomic level. However, the number of durable goods in the households is negatively correlated with the probability of an illness episode.

On the other hand, education is negatively correlated with the probability of an illness episode as expected. This would imply that better educated people have a better idea of how to avoid health risks or prevent illnesses overall. Again, males are more likely to report an illness episode than women, as well as older people. Economic hardship (as measured by a variable that indicates whether at least one member of the household did not eat during an entire day for lack of money to buy food) is significantly positively correlated with the probability of having an illness.

The regional dummies are all highly significant in explaining illness episodes. This is further evidence in favor of the idea that this kind of health outcome should be associated to random shocks or location-specific shocks like changes in weather or the propagation of a virus in a certain region. In particular, the probability of having an illness within 30 days prior to the date of the interview is higher for people living in other regions of the country with respect to those who live in Bogotá. This might be associated with the fact that other regions have higher health risks.

Finally, the minority dummy variable is negative and statistically significant. That means that black and indigenous individuals have a lower probability of having been ill during the last 30 days. In other words, after controlling for access to health care, socioeconomic and cultural characteristics and geographic location, non-minorities are actually more likely to get sick than blacks and indigenous populations[27]. To explore this result further, we ran a fully interacted model, i.e., all the explanatory variables are interacted with the minority dummy variable and included in the original model (as suggested in Section 2).

[26] It is worth reminding the reader that the R^2 associated with the self-reported excellent-to-poor health status regression is significantly higher and equal to 0.126 which is in agreement with the idea that this variable is highly correlated with characteristics of the individual compared to other measures of health that are thought as more "objective".

[27] The difference in the occurrence of an illness episode between minorities and non-minorities reported in Table 4 was actually in favor of non-minorities.

The results (first column in Table 9b)[28] indicate that the model run with minorities only is statistically different from the model run with non-minorities only. This implies that part of the negative effect of being a non-minority on the probability of experiencing an illness episode during the past 30 days is related to the fact that the effects of some of the explanatory variables are significantly different for minorities than for the rest of the population.

For example, the effect of higher socioeconomic status on the probability of having been ill during the last 30 days is positive and significant for non-minorities, while the effect of a higher socioeconomic status on the probability of being ill is negative and significant in the case of black and indigenous populations. This means that while being economically better off is actually bad in terms of non-minorities' health status[29], the opposite occurs in the case of black and indigenous populations. Something similar happens with the effect of having a job (with contract). The intuition in this case is the same. The coefficient of the race dummy variable in the fully interacted model is negative and still significant. This means that while part of the difference between minorities and non-minorities can be explained by the difference in the effects of the explanatory variables, part is due to unobserved characteristics that we are not controlling for.

Finally, column 4 in Table 9a reports results in the case in which the health outcome is a dummy variable equal to 1 if the individual was hospitalized within the 12 months prior to the date of the interview, 0 otherwise. Once again, having access to health care is associated with a higher probability of being hospitalized. As before this might be related to the fact that if an individual is insured then the probability that an illness is diagnosed and the individual is sent to the hospital or just the probability that the individual goes to the hospital in case of an emergency increases.

Log expenditures per capita are not significant in explaining hospitalization episodes, while the socioeconomic Sisben level is positively associated with the probability of being hospitalized. Additionally, education reduces the probability of having been hospitalized and males are more likely to experience a hospitalization episode than women, as are older people. Just as in the case of an illness episode (column 3), the probability of having been hospitalized is positively (and significantly) related to being employed with contract. It is possible, for example, that working individuals with higher socioeconomic characteristics are exposed to higher health and accident risks related to their job (for example, high stress, little rest, bad eating habits, traveling, etc.) and that causes a positive correlation. This hypothesis is plausible especially since the number of durable goods in the households turns out to be insignificant. This could mean that socioeconomic level and employment status do not affect the health outcome by proxying for how well off an individual is but rather through a different mechanism.

[28] Note that only when the race dummy variable turns out to be significant we run a fully-interacted model in order to explore this result. We do this to better understand the source of these ethnic disparities.

[29] As we mentioned earlier, this might be due to the fact that being economically better-off is, in turn, associated with less healthy habits like working in excess, exercising less, bad eating habits, etc.

Economic hardship is positively correlated with the probability of having been hospitalized. Only a few regional dummies are significant in explaining episodes of hospitalization. In particular, living in the Central region, in Antioquia or Valle del Cauca reduces the probability of having been in the hospital (with respect to residing in Bogotá), while living in San Andrés or the Amazonia increases the probability. Finally, the dummy variable that indicates whether an individual is black/indigenous is negative and significant. In other words, after controlling for socioeconomic characteristics, access to health insurance and geographic location, being part of a minority group reduces the probability of having been hospitalized.

To understand this better we ran the fully interacted model (second column in Table 9b). Note that some of the effects of the explanatory variables on the probability of being hospitalized vary depending on whether the individual belongs to a minority or not. For example, the effect of being employed with a contract is significantly higher for non-minorities than for blacks and indigenous populations. It could be, for example, that for non-minorities jobs are a source of stress and are linked to a particular lifestyle that is associated with a higher probability of having a serious illness and/or accident (and hence be hospitalized) like bad eating habits, little rest and exercising, etc., while this effect is less strong in the case of minorities.

It is worth mentioning that we also ran the models presented in Table 9a separately for men and women. Results are uninteresting except for the fact that a dummy variable that indicates whether a woman has a child younger than 2 years old is always significant in explaining health outcomes except in the case of a chronic disease, as one would expect.

Concluding Remarks and Policy Recommendations

Studies about social and economic exclusion of minorities (defined by race and ethnicity) in Colombia are rather scarce. Furthermore, the literature about racial and ethnic health disparities is basically inexistent. This paper is an attempt to document the socioeconomic situation of black and indigenous populations in Colombia with a particular focus on health outcomes and access to health care. Additionally, we setup a statistical model to test whether health racial disparities remain after controlling for a broad set of socioeconomic characteristics of individuals.

We use data from the Living Standards Survey (2003), data collected by the National Planning Department for 68 municipalities with a majority of black population and data from the evaluation of the *Familias en Acción* program to document the situation of minorities in the country and understand the source of racial and ethnic health disparities. Some basic stylized facts indicate that minorities (who account for approximately 9.2% of the Colombian population) are worse off in terms of socioeconomic status (Sisben level), income, unemployment rates, access to formal employment, unsatisfied basic needs, education and access to basic utilities (water, electricity, sewer).

In regards to health, minorities are significantly less likely to have health insurance. In particular, while 31.41% of non-minorities do not have health insurance, 48% of black

and indigenous populations do not. Also minorities have a worse perception of their own health status (according to data from the LSS) than the rest of the population and a higher likelihood of having been ill during the 30 days prior to the date of the interview but are less likely to suffer from a chronic disease or having been hospitalized within the 12 months prior to the date of the interview than non-minorities. In sum, evidence from self-reported health measures suggests that there are no significant differences (at least against minorities) in health outcomes between racial/ethnic groups.

For most part, results from the statistical models setup to study the determinants of access to health care and health outcomes suggest that health disparities disappear once we control for socioeconomic characteristics, employment, geographic location, etc. In other words, differences in socioeconomic level, access to formal employment, unemployment rates, income and geographic location fully account for these disparities.

A notable exception indicates that if an individual is black the probability of having health insurance significantly decreases (even conditioning on socioeconomic variables and regional dummies), while the opposite is true for individuals that belong to indigenous populations. This result is obtained by using access to health care information from the LSS (2003). This result is associated with the fact that being a member of an indigenous group can have two positive effects on access to health insurance. On one hand, the community acts as a network that allows individuals to be better informed and find help easier within members of their group. On the other hand, indigenous reservations (*resguardos*) are eligible for a special publicly funded health insurance plan under the subsidized regime.

In the case of health outcomes, the results presented in this paper suggest that after controlling for socioeconomic characteristics, employment status and geographic location, the minority dummy variable turns out to be insignificant in explaining the variation in health outcomes. In other words, the racial and ethnic disparities in access to health care insurance can be fully accounted by the fact that minorities are worse off in almost every single socioeconomic dimension (employment, education, income, etc.).

In particular, once we control for a comprehensive set of individual characteristics, the race dummy variable turns out to be insignificant in explaining differences in self-reported health status (according to the excellent-to-poor scale). That means that the fact that minorities have a worse perception about their own health is associated with the fact that they have lower expenditures per capita, lower socioeconomic Sisben level, lower education, are less likely to be employed with a contract and more likely to be unemployed. Similarly, the fact that non-minorities are more likely to suffer from a chronic disease can be fully accounted for by their socioeconomic characteristics, employment status and geographic location and is unrelated to race *per se*.

We also find that the probability of having experienced an illness episode during the 30 days prior to the interview date and the probability of having been hospitalized during the previous 12 months is significantly explained by race and this effect remains even after controlling for socioeconomic characteristics of individuals. In particular, minorities are

less likely to experience an illness episode and to be hospitalized. To further understand this result we ran a fully interacted model. The results indicated that part of this is due to the fact that the effects of some of the explanatory variables on these particular health outcomes are different for minorities and non-minorities. For example, the effect of higher socioeconomic status on the probability of having been ill during the last 30 days is positive and significant for non-minorities, while the effect of a higher socioeconomic status on the probability of being ill is negative and significant in the case of black and indigenous populations.

Finally, using data from the evaluation of the *Familias en Accion* program we show that differences in height and weight to age (with respect to international standards) between blacks and indigenous populations and the rest of the population are fully accounted for by the family's socioeconomic status, parents' education, inheritance and geographic location. In other words, after controlling for this set of variables, the race dummy variable does not have any additional explanatory power in explaining the variation in weight and height measures.

A very interesting result indicates that while the average schooling attainment of the child's parents is positive and very significant in explaining weight variation it is insignificantly related to height. This is in agreement with the basic intuition that weight is likely to be associated with healthy behaviors like eating habits, the likelihood of exercising, etc., and these in turn, tend to be highly correlated with education, while height is typically thought of as being associated with heritable features.

The implications of these results in terms of policy are straightforward. Racial and ethnic disparities in health outcomes and access to health care exist mainly because minorities are worse off in terms of socioeconomic status (Sisben level), income, unemployment rates, access to formal employment, unsatisfied basic needs, education and access to basic utilities (water, electricity, sewer).

Given this, it is clear that policy should be designed with the objective of improving the socioeconomic status of minorities in the country instead of aimed at changing the structure of institutions, for example, health care providers. In particular, it seems like education plays a very important role, as does access to formal employment. Policies aimed at increasing education coverage and improving literacy rates in regions of the country with high concentration of black and indigenous populations can prove useful in improving minorities' health outcomes and access to health care. A possibility could be to consider implementing affirmative action policies for schools and universities.

This alone could also increase the access of minorities to formal employment which, in turn, is associated with better health outcomes and higher probability of having health insurance according to the results presented in this paper. High unemployment rates in some regions of the country can be significantly contributing to the disadvantageous health situation of minorities. Hence, policies aimed at improving labor market outcomes in general could improve the overall status of minorities and hence reduce racial/ethnic socioeconomic and health disparities.

However we find that blacks are worse off in terms of access to health care even after conditioning on a wide range of individual characteristics, while the opposite is true in the case of indigenous populations. This suggests that a public policy design to provide access to health care to afro-colombians through a publicly funded system, similar in nature the one that is available for indigenous reservations, could prove extremely useful in reducing ethnic disparities in access to health care. In other words, we find the significant differences between blacks and indigenous groups are related to policy choices, specifically in the context of insurance provided by the government.

Further research aimed at understanding the reasons why minorities have less access to education and formal employment would be useful in understanding the possible consequences of implementing a policy like affirmative action.

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Appendix

Table 1. Inequalities in Mortality, Malnutrition and Morbidity among Children

Region	IMR	U5MR	Stunting	Underweight	Diarrhea	ARI
Asia, Near-East and North Africa	-0.1147	-0.1345	-0.16	-0.166	-0.0407	-0.0155
Latin America & Caribbean	-0.1491	-0.1722	-0.2605	-0.2796	-0.0851	-0.0458
Sub-Saharan Africa	-0.0772	-0.0891	-0.1031	-0.1275	-0.0048	-0.0458
Colombia	-0.1207	-0.1306	-0.2376	-0.2929	-0.0867	-0.0174
Average	-0.1025	-0.119	-0.1512	-0.1696	-0.0512	-0.0323

Source: Wagstaff (2002), Table 2 using Demographic and Health Survey (DHS) data.

Table 2. Description of Minorities in LSS (2003)

	Minority	Rest
% of group in Sisben levels 1 and 2	49.43	25.6
% of group in income quintil 1 and 2	49.1	45.0
Schooling coverage	77.7	84.1
Number of persons in household	4.38	3.85
Number of children in household	1.39	1.04
Schooling level head of household	5.88	6.78
Schooling level members older 17 yrs	6.47	7.39
% of group without unsatisfied basic needs	53.0	79.3

Source: LSS (2003)

Table 3. Measures of municipal development

	68 municipalities	National average
Municipal development index	30.62	38.11
% of households with water	39.85	57.13
% of households with sewer	19.53	32.44
% of households with electricity	46.2	69.57
% of households without Unsatisfied Basic Needs	41.04	60.41
# of rooms per person	0.47	0.55
% of literacy	76.54	83.66

Source: National Planning Department, CONPES # 3310.

Table 4. Indigenous Health Insurance - affiliates 2004

	Indigenous ARS	Non indigenous ARS	Total
Number	8	36	44
Affiliates - total	681775	11307479	11989254
Affiliates - indigenous	451582	163204	614786
Affiliates by funding			
Local Transfers	445499	7510020	7955519
FOSYGA	212775	3213754	3426529
Own resources	13223	242310	255532
Other	10278	341396	351674
Total	681775	11307479	11989254
Funding per capita - total affiliates /1			
Atlántica	n.a.	n.a.	25.5
Oriental	n.a.	n.a.	21.6
Central	n.a.	n.a.	15.8
Pacífica	n.a.	n.a.	20.0
Bogotá	n.a.	n.a.	11.5
Antioquia	n.a.	n.a.	21.7
Valle	n.a.	n.a.	14.6
San Andrés	n.a.	n.a.	0
Amazonia, Orinoquia	n.a.	n.a.	28.6

Source: Social Protection ministry

/1 Thousands of pesos

Table 5a. Health Status of Minorities

(Percentage of racial/ethnic group)

	Minority	Rest	Pr(χ^2)
Chronic Disease	12.91	14.16	0.002
Occurrence of illness episode last 30 days	11.73	11.45	0.000
No. of days stopped normal activities due to illness	5.88	5.37	0.000
Sought professional treatment for that illness	68.04	71.57	0.008
Prescribed medicine during illness episode	76.05	76.2	0.926
Has been hospitalized within last 12 months	5.68	6.77	0.000

Source: LSS, 2003.

Table 5b. Health Status of Minorities

(Percentage of racial/ethnic group)

	Indigenous population	Afro-Colombians	Other minorities	Pr(χ^2)
Chronic Disease	11.62	12.93	20.06	0.000
Occurrence of illness episode last 30 days	7.21	12.94	12.93	0.000
No. of days stopped normal activities due to illness	6.3	5.75	12.1	0.000
Sought professional treatment for that illness	69	66.49	96.72	0.000
Prescribed medicine during illness episode	63.4	75.46	98.02	0.000
Has been hospitalized within last 12 months	5.57	5.26	11.38	0.000

Source: LSS, 2003.

Other minorities include gypsies and "raizal del archipiélago"

Table 5a. Health Status of Minorities

(Percentage of racial/ethnic group)

	Minority	Rest	Pr(χ^2)
Chronic Disease	12.91	14.16	0.002
Occurrence of illness episode last 30 days	11.73	11.45	0.000
No. of days stopped normal activities due to illness	5.88	5.37	0.000
Sought professional treatment for that illness	68.04	71.57	0.008
Prescribed medicine during illness episode	76.05	76.2	0.926
Has been hospitalized within last 12 months	5.68	6.77	0.000

Source: LSS, 2003.

Table 5b. Health Status of Minorities

(Percentage of racial/ethnic group)

	Indigenous population	Afro-Colombians	Other minorities	Pr(χ^2)
Chronic Disease	11.62	12.93	20.06	0.000
Occurrence of illness episode last 30 days	7.21	12.94	12.93	0.000
No. of days stopped normal activities due to illness	6.3	5.75	12.1	0.000
Sought professional treatment for that illness	69	66.49	96.72	0.000
Prescribed medicine during illness episode	63.4	75.46	98.02	0.000
Has been hospitalized within last 12 months	5.57	5.26	11.38	0.000

Source: LSS, 2003.

Other minorities include gypsies and "raizal del archipiélago"

Table 6a. Self-reported Health Status of Minorities - *Familias en Acción*

(Percentage of race/ethnic town)

	Ethnic towns	Non ethnic towns	Pr(χ^2)
Have health insurance	76.63	89.09	0.000
Younger than 6 years old:			
Diarrhea last 15 days	14.75	14.81	0.949
Flu and fever last 15 days	49.21	44.22	0.000
Ceased normal activities due to illness	41.53	38.87	0.119
Hospitalized during last 12 months	5.02	7.35	0.006
Older than 7 years old:			
Illness episode during last 15 days	23.6	18.54	0.000
Hospitalized during last 12 months	5.96	6.17	0.478

Source: Familias en Acción

Table 6b. Other Measures of Health Status - *Familias en Acción*

(Means by race/ethnic town)

	Ethnic towns	Non ethnic towns	Signif.*
Weight at birth (kgs)	3.55	3.54	
Length at birth (cms)	49.78	49.77	
Child's height at time of the survey (cms)	95.36	95.70	
Mother's height at time of the survey (cms)	153.24	154.76	**
Child's weight at time of the survey (kgs)	14.93	14.72	
Mother's weight at time of the survey (kgs)	59.56	59.14	
Height-for-age (sd. dev. from international standard)	-.850	-.953	
Weight-for-age (sd. dev. from international standard)	-0.413	-0.564	**
Weight-for-height (sd. dev. from international standard)	0.196	0.086	**

Source: Familias en Acción

*Difference significant at 95%

Table 7a. Probit Model: Access to Health Care Insurance (using LSS, 2003)

Dep. Var.-> Access to Health Insurance	Mg. effect	Std. error
Minority	-0.0147	(0.0095)
Age	0.0036	(0.0002)**
Less than 12 yrs old	0.0892	(0.0076)**
Unemployed	-0.14705	(0.0148)**
Employed with contract	0.2928	(0.0085)**
Currently studying	0.0730	(0.0065)**
Socioeconomic Sisben level	0.1459	(0.0027)**
Gender	-0.0306	(0.0054)**
Resides in a capital city	-0.0574213	(0.0073)**
Atlantic Region	-0.101809	(0.0093)**
Oriental Region	-0.05423	(0.0099)**
Central Region	-0.158543	(0.0100)**
Pacific Region	-0.08735	(0.0108)**
Antioquia	-0.07197	(0.0107)**
Valle del Cauca	-0.18396	(0.0098)**
San Andres y Providencia	0.10957	(0.0153)**
Amazonia/Orinoquia	-0.03574	(0.0154)**
No. of observations	83067	
Pseudo R^2	0.1363	

Table 7b: Probit Model Access to Health Care Insurance by ethnic group (LSS, 2003)

Dep. Var.-> Access to Health Insurance	Mg change	Std. error	
Indigenous	0.0758917	(0.0156)	**
Afrodescendents	-0.0429127	(0.0105)	**
Other minorities*	0.0667582	(0.0875)	
Age	0.0024228	(0.0008)	**
Age^2	0.0000144	(0.0000)	
Less than 12 yrs old	0.07692	(0.0105)	**
Unemployed	-0.1439989	(0.0149)	**
Employed with contract	0.2945242	(0.0084)	**
Currently studying	0.0724477	(0.0065)	**
Socioeconomic Sisben level	0.1460135	(0.0027)	**
Gender	-0.0308499	(0.0054)	**
Resides in a capital city	-0.0569131	(0.0073)	**
Atlantic Region	-0.102418	(0.0093)	**
Oriental Region	-0.0536126	(0.0100)	**
Central Region	-0.1587078	(0.0100)	**
Pacific Region	-0.0898153	(0.0109)	**
Antioquia	-0.0712799	(0.0107)	**
Valle del Cauca	-0.1780352	(0.0099)	**
San Andres y Providencia	0.0790192	(0.0392)	*
Amazonia/Orinoquia	-0.0391903	(0.0154)	**
No. of observations	83067		
Pseudo R^2	0.1372		

Table 7c: Fully Interacted Probit Model Access to Health Care Insurance

Dep. Var.-> Access to Health Insurance	Mg change	Std. error	Cumul. Pr(chi2)	
Minority dummy	-0.1593798	(0.0628)	0.0095	
Age (for minorities)	0.0090225	(0.0020)	0.002	**
Age (for non minorities)	0.0016355	(0.0008)		
Age^2 (for minorities)	-0.0000571	(0.0000)	0.0053	**
Age^2 (for non minorities)	0.0000228	(0.0000)		
Less than 12 yrs old (for minorities)	0.106608	(0.0243)	0.0004	**
Less than 12 yrs old (for non minorities)	0.0729204	(0.0113)		
Unemployed (for minorities)	-0.0570886	(0.0437)	0.0001	
Unemployed (for non minorities)	-0.1566154	(0.0157)		
Employed with contract (for minorities)	0.2994514	(0.0212)	0.0001	**
Employed with contract (for non minorities)	0.2913876	(0.0087)		
Currently studying (for minorities)	0.0996087	(0.0152)	0.0002	**
Currently studying (for non minorities)	0.0673311	(0.0070)		
Socioeconomic Sisben level (for minorities)	0.1494298	(0.0076)	0.0003	**
Socioeconomic Sisben level (for non minorities)	0.1454975	(0.0029)		
Gender (for minorities)	-0.0405484	(0.0151)	0.0006	**
Gender (for non minorities)	-0.0299911	(0.0058)		
Resides in a capital city (for minorities)	-0.0545729	(0.0253)	0.0009	**
Resides in a capital city (for non minorities)	-0.0588708	(0.0077)		
Total Cumul. Chi2	81.5			
No. of observations	83067			
Pseudo R^2	0.1374			

Regional dummies not reported

Table 8a. Probit Model: Health Outcomes (using the LSS, 2003)

Dep. Var.->	Excellent-to-Poor Scale		Chronic Disease		Illness episode last 30 days		Hospitalization last 12 months	
Minority	-0.009951		0.0045817		-0.0109844	**	-0.0133732	**
	(0.0226)		(0.0065)		(0.0054)		(0.0041)	
Access to health insurance	0.1136227		0.0335336	**	0.0110896	**	0.0200883	**
	(0.1179)		(0.0038)		(0.0038)		(0.0027)	
Propensity Score (access to health insurance)	0.018388		-0.041102		-0.168259	**	-0.1903089	**
	(0.0148)		(0.0321)		(0.0314)		(0.0221)	
log (expenditures per capita)	-0.0720585	**	0.0173864	**	0.0161601	**	0.0035181	
	(0.0187)		(0.0047)		(0.0047)		(0.0035)	
Socioeconomic Sisben level	-0.1018644	**	0.0095369	*	0.0351677	**	0.0264774	**
	(0.0185)		(0.0050)		(0.0049)		(0.0035)	
Average years of schooling	-0.0357798	**	-0.0039435	**	-0.0027274	**	-0.0007665	*
	(0.0021)		(0.0005)		(0.0005)		(0.0004)	
Gender	-0.1867981	**	-0.0328459	**	-0.0271005	**	-0.0273328	**
	(0.0133)		(0.0035)		(0.0034)		(0.0026)	
Age	0.0176386	**	0.0022663	**	-0.0014467	**	-0.0008769	**
	(0.0014)		(0.0003)		(0.0003)		(0.0002)	
Age^2	0.0000478	**	0.0000265	**	0.0000302	**	0.0000236	**
	(0.0000)		(0.0000)		(0.0000)		(0.0000)	
Employed with contract	-0.2249673	**	-0.0209329	**	0.0348731	**	0.0544104	**
	(0.0359)		(0.0081)		(0.0109)		(0.0098)	
Number of durable goods in household	-0.0580386	**	0.000217		-0.0024974	**	0.0097066	**
	(0.0034)		(0.0008)		(0.0009)		(0.0074)	
Member of household addict/alcoholic	0.1247028	**	0.0163975	*	0.0371391	**	-0.001341	
	(0.0351)		(0.0096)		(0.0108)		(0.0006)	
Place of birth different from place of residence	-0.070671	**	-0.0122749	**	-0.0303898	**	-0.0176285	**
	(0.0148)		(0.0038)		(0.0039)		(0.0029)	
A member did not eat during an entire day involuntarily	0.167175	**	0.014628	**	0.0239026	**	0.0167459	**
	(0.0222)		(0.0067)		(0.0064)		(0.0051)	
Atlantic Region 1	0.0780619	**	-0.0264925	**	0.0349493	**	-0.0061815	
	(0.0209)		(0.0053)		(0.0061)		(0.0039)	
Oriental Region 2	0.0625536	**	0.0281018	**	0.0319478	**	0.0065619	
	(0.0203)		(0.0059)		(0.0061)		(0.0041)	
Central Region 3	-0.0039854		0.0092065		0.0069661		-0.0094431	**
	(0.0226)		(0.0065)		(0.0064)		(0.0040)	
Pacific Region 4	0.3616192	**	0.0295711	**	0.0833424	**	0.0027067	
	(0.0214)		(0.0068)		(0.0078)		(0.0045)	
Antioquia 6	-0.199753	**	0.0368501	**	0.0414441	**	-0.0139041	**
	(0.0247)		(0.0067)		(0.0074)		(0.0036)	
Valle del Cauca 7	-0.0584042	**	0.0225956	**	0.0140258	**	-0.0135045	**
	(0.0256)		(0.0073)		(0.0072)		(0.0042)	
San Andres y Providencia 8	-0.2203852	**	0.0066368		-0.0278203	**	0.0393496	**

	(0.0388)		(0.0114)	(0.0110)		(0.0118)	
Amazonia/Orinoquia 9	0.0844085	**	-0.0076439	0.047868	**	0.0412876	**
	(0.0347)		(0.0089)	(0.0118)		(0.0089)	
Estimation	Ord. probit		Probit	Probit		Probit	
No. of observations	82938		82938	82938		82938	
Pseudo R^2 / R^2	0.1245		0.1297	0.0185		0.0278	

Table 8b. Fully Interacted Probit Model: Health Outcomes (using the LSS, 2003)

Dep. Var.->	Illness episode last 30 days		Hospitalization last 12 months	
Minority	-3692875	**	-1484961	
	(0.8352)		(1.1018)	
Access to health insurance (minority)	0.0326779		0.142998	**
	(0.0529)		(0.0686)	
Access to health insurance (non minority)	0.0464748	**	0.1600183	**
	(0.0216)		(0.0254)	
Propensity Score (access to health insurance) (minority)	0.4332881		-1242903	**
	(0.4468)		(0.5405)	
Propensity Score (access to health insurance) (non minority)	-1033934	**	-1632235	**
	(0.1732)		(0.1902)	
log (expenditures per capita) (minority)	0.4332881	**	0.1065424	
	(0.4468)		(0.0863)	
log (expenditures per capita) (non minority)	0.0394973		0.0145124	
	(0.0271)		(0.0307)	
Socioeconomic Sisben level (minority)	-0.104115		0.1560066	*
	(0.0702)		(0.0839)	
Socioeconomic Sisben level (non minority)	0.2294987	**	0.2376993	**
	(0.0273)		(0.0304)	
Average years of schooling (minority)	0.0046829		-0.0050658	
	(0.0088)		(0.0109)	
Average years of schooling (non minority)	-0.0172915	**	-0.0076754	**
	(0.0030)		(0.0035)	
Gender (minority)	-0.1444467	**	-0.1196645	*
	(0.0496)		(0.0643)	
Gender (non minority)	-0.1468824	**	-0.2403407	**
	(0.0195)		(0.0228)	
Age (minority)	-0.0091665	*	-0.0005324	
	(0.0048)		(0.0055)	
Age (non minority)	-0.0035697	**	-0.0040209	*
	(0.0018)		(0.0021)	
Age^2 (minority)	0.0002399	**	0.0001301	*
	(0.0000)		(0.0000)	
Age^2 (non minority)	0.0001151	**	0.0001654	**
	(0.0000)		(0.0000)	
Employed with contract (minority)	-0.1227768		0.2456131	
	(0.1535)		(0.1780)	
Employed with contract (non minority)	0.1906087	**	0.3711435	**
	(0.0507)		(0.0543)	
Member of household addict/alcoholic (minority)	0.2567202	*	0.2288953	
	(0.1324)		(0.1439)	
Member of household addict/alcoholic (non minority)	0.1630219	**	0.0464068	
	(0.0508)		(0.0591)	
Number of durable goods in household (minority)	-0.0169081		0.0082454	
	(0.0146)		(0.0173)	

Number of durable goods in household (non minority)	-0.0119276	**	-0.0117693	**
	(0.0050)		(0.0053)	
A member did not eat during an entire day involuntarily (minority)	0.0660059		0.0820725	
	(0.0655)		(0.0871)	
A member did not eat during an entire day involuntarily (non minority)	0.1267986	**	0.136365	**
	(0.0332)		(0.0394)	
Constant	-1.828135		-1.450532	
	(0.3326)		(0.3761)	
No. of observations	82938		82938	
Pseudo R^2 / R^2	0.0183		0.0267	

Figure 1

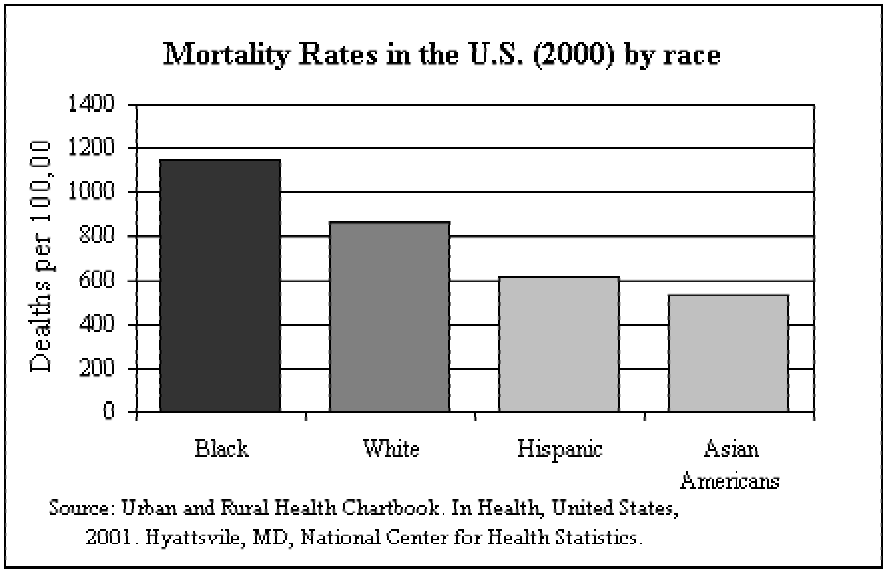


Figure 2

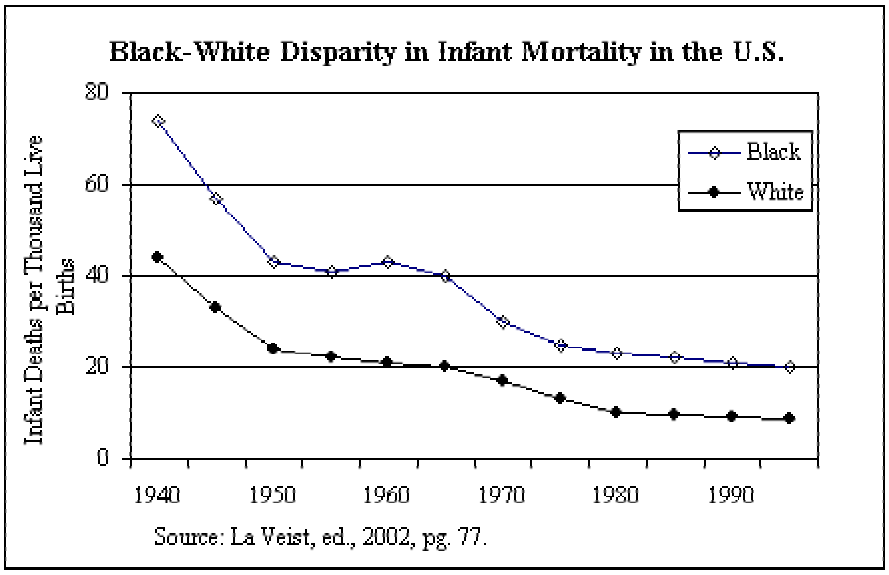


Figure 3a

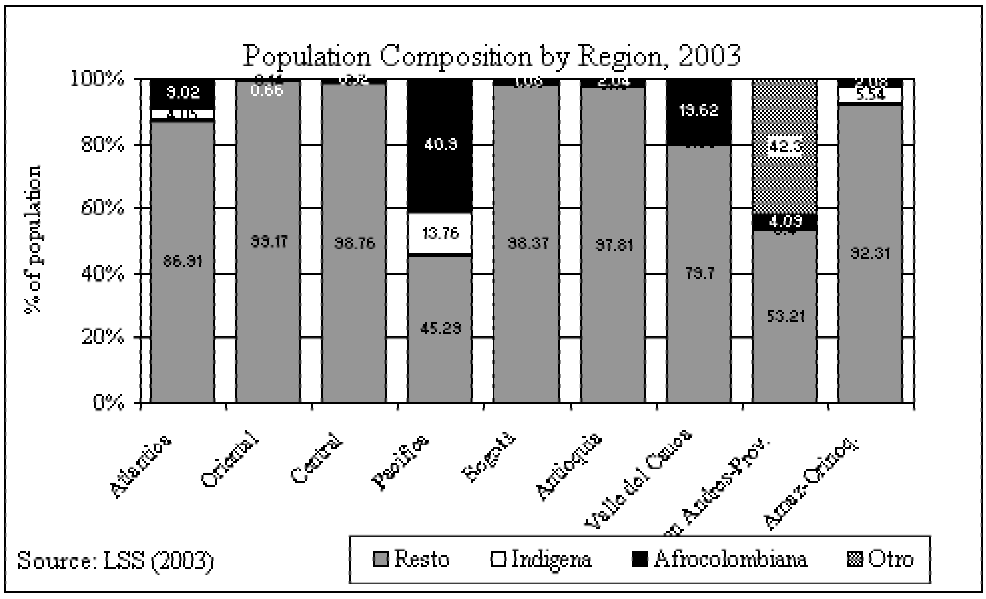


Figure 3b

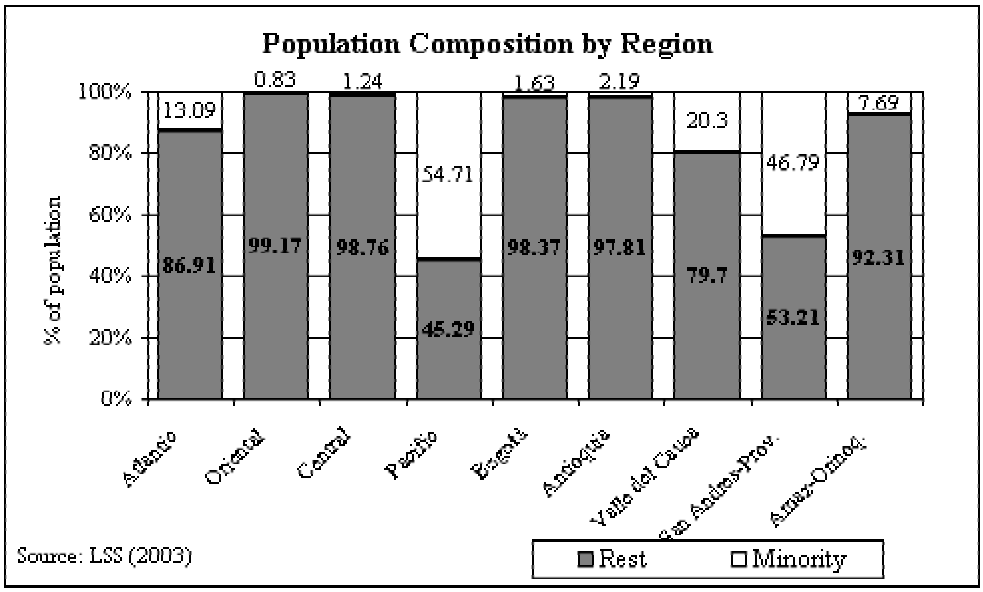


Figure 4

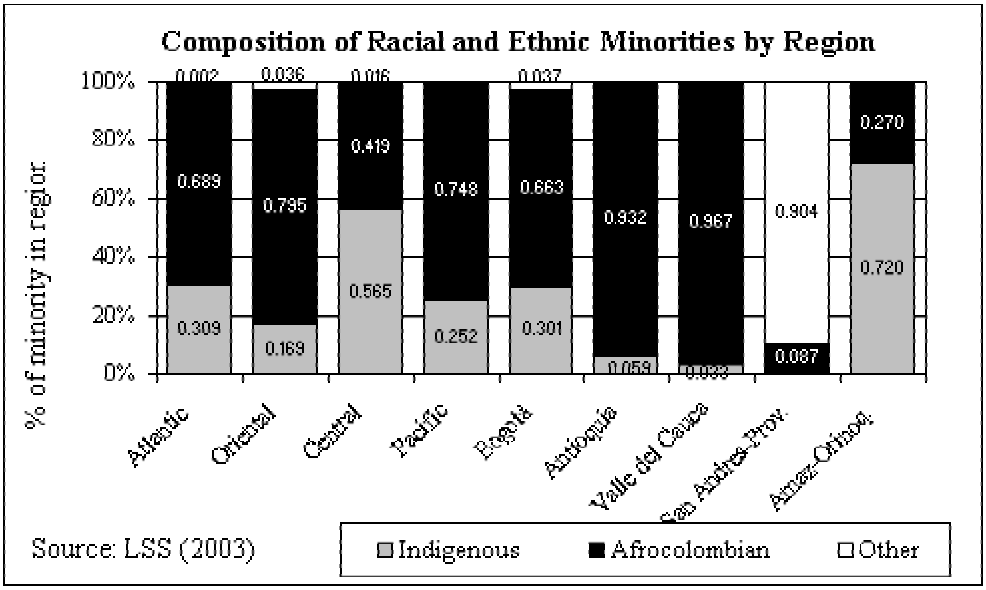


Figure 5

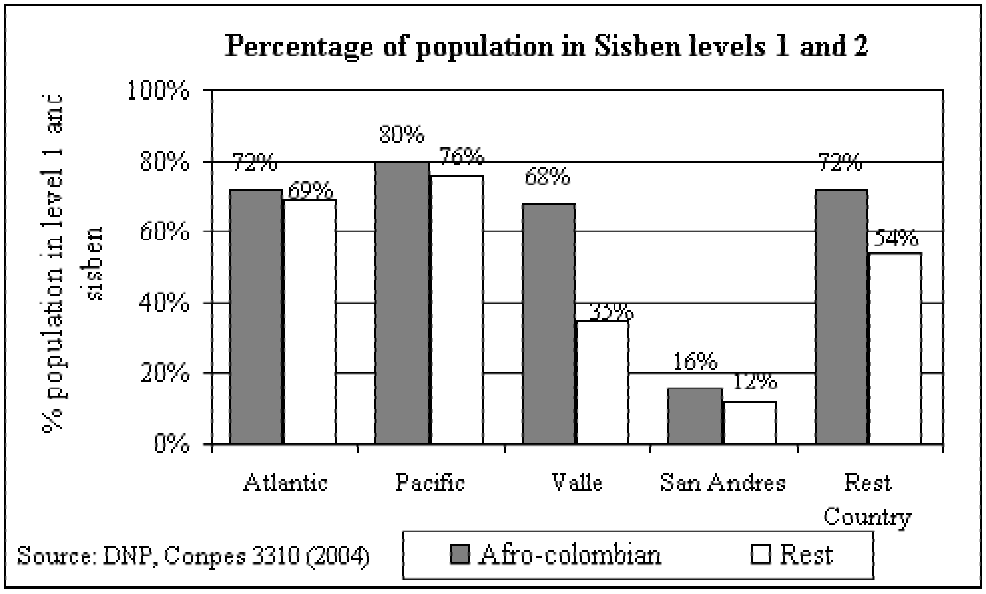


Figure 6

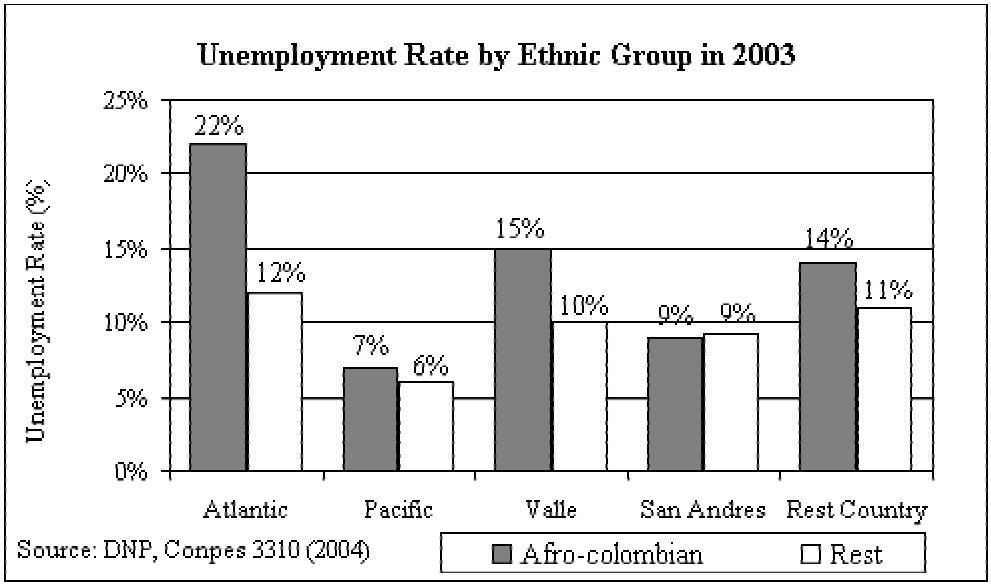


Figure 7

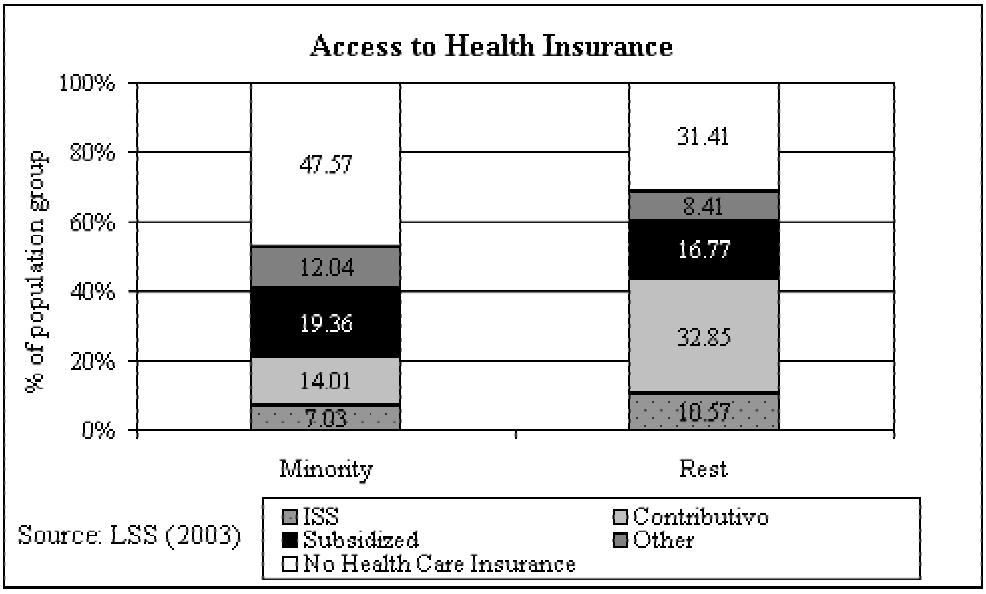


Figure 8

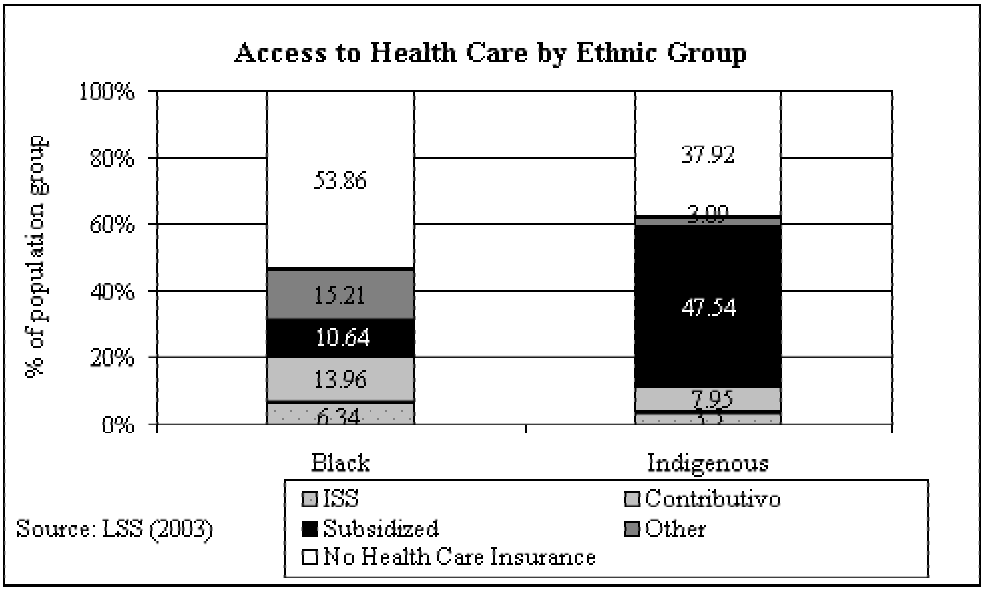


Figure 9

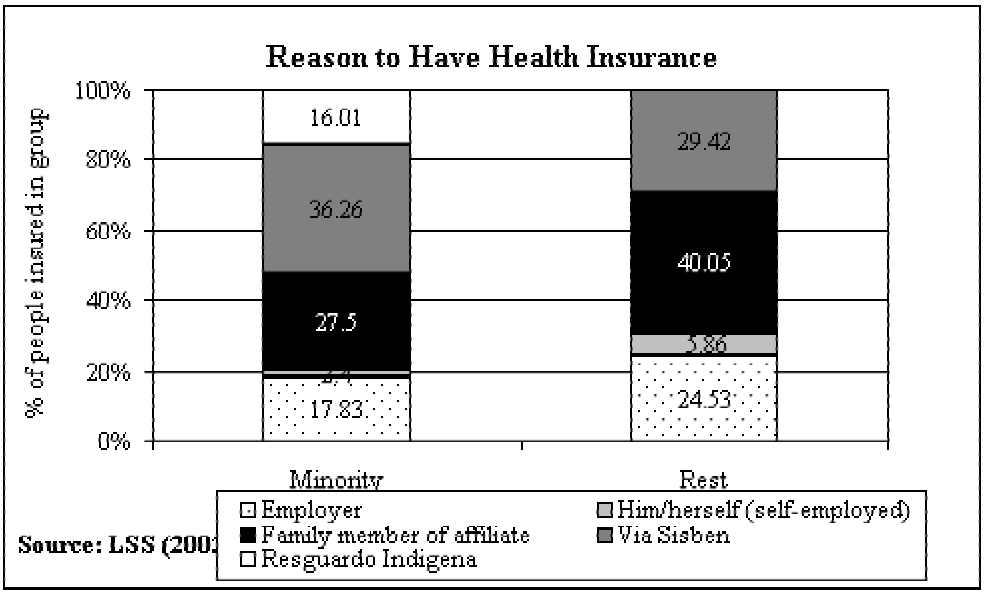
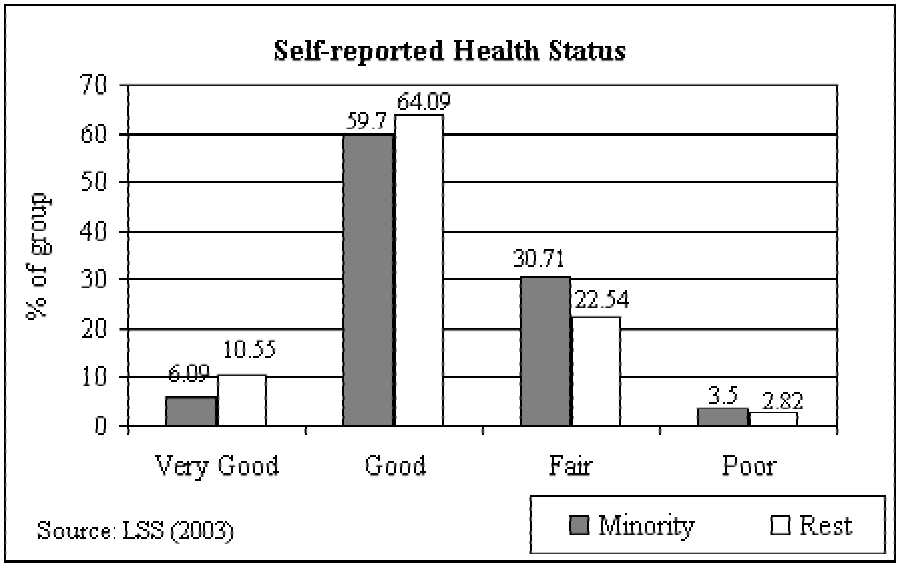


Figure 10


Self-reported Health Status
% of group
70
60
50
40
30
20
10
0
6.09
10.55
59.7
64.09
30.71
22.54
3.5
2.82
Very Good
Good
Fair
Poor
Source: LSS (2003)
Minority
Rest

III. INDIGENOUS HEALTH IN MEXICO

Ashu Handa

Introduction

There are anywhere from 40 to 60 million indigenous people in Latin America, and Mexico houses the largest group of indigenous people in the region. The 2000 Mexican Census estimates about 10 percent of the population, or approximately 10 million individuals, are indigenous using language as the definition. The indigenous population has higher rates of poverty and worse health outcomes relative to the rest of the country, and this pattern persists through out the LAC region. In Mexico for example, life expectancy is 69 among the indigenous population compared to the national average of 74, chronic malnutrition rates for children under 5 are at 44% compared to 17% nationally, and infant mortality is 50% higher among the indigenous (NDPIP).[30] Access to health care services is also highly unequal in Mexico. The NDPIP reports that the number of doctors per 100 is 0.13 in indigenous areas of Oaxaca State compared to the state average of 0.93, and similar inequities exist for number of hospital beds and availability of primary health facilities in rural communities. Given the existing inequities and the size of the indigenous population in Mexico, a detailed study of the determinants of health status and utilization among indigenous and non-indigenous groups in Mexico is extremely relevant.

This study represents the first serious study of the economic and social determinants of health status and health care utilization by ethnicity in Latin America. The study uses an economic behavioral framework, which allows the proper identification of truly exogenous factors, and a unique panel data set from rural Mexico to control for measurement error and unobserved individual and household heterogeneity which are critical issues in studies of health status. The results are somewhat surprising. In this sample of poor rural households, there are few significant differences in health outcomes by ethnic status. And when control is made for unobserved heterogeneity at the household and individual level the few differences that are observed disappear. These results are corroborated by a nationally representative household survey—the Encuesta Nacional de Salud (ENSA). The paper also shows that the Mexican Government's flagship poverty alleviation program is successful at influencing the health care utilization behavior of indigenous families in rural areas.

Mexican Health System

A defining characteristic of health care in Mexico is the direct provision of health care by the health insurance institutions and the public health care "safety nets" for the population they cover (Parker and Wong, 1997). This health care delivery system has been cited as fragmented with limited coverage and duplication of services to different segments of the population (Gutierrez and Bertozzi, 2003). In general, individuals who have health insurance through social security have access to relatively comprehensive and affordable health care. Most individuals who lack

[30] National Development Program for the Indigenous Populations 2001-2006, National Indigenous Institute (2001).

health insurance are able to access health care through the state health care system; however, this care is more costly to the patient in comparison to the social security system.

Approximately half of the Mexican population is covered by health insurance (poblacion derecho habiente). Several different insurance types exist within the social security system, as insurance is provided as a benefit of employment in the formal sector. The largest insurance institution, the Mexican Social Security Institute (IMSS), covers the population working in the private sector and individuals who choose to "opt-in" by paying for this social health insurance. These individuals have the right to use health care services from a very extensive health care network. Public sector workers are covered by social security through the Institute of Social Security and Services for State Workers (ISSSTE). The other institutions, which insure a smaller portion of the population, include the Armed Forces Social Security, the Mexican Oil Workers Social Security (PEMEX), and other health services for state and federal government employees (Parker and Wong, 1997; NERA). In addition to social security health insurance, private health insurance is also available. However, only a very small proportion of the population is privately insured.

Compulsory employment-related contributions finance social health care services through mandatory earmarked income taxes, and the benefits are used to purchase medical care from either the public or private sector (Gertler and Solon, 2000). The enrollment of a worker implies coverage for all of that worker's dependents. Social security benefits are provided to all legal dependents, including the spouse, children and parents who are classified as economically dependent (NERA).

The rest of the population, poblacion abierta, is uninsured, but can use the federal and state funded government "safety net" services. Most of the uninsured receive healthcare services from Secretariat of Health (SSA) and to a lesser extent by IMSS-Solaridad. The SSA is the largest agency responsible for delivering health care services to the uninsured population, including individuals living in rural areas. IMSS-Solaridad also targets the poor; however, it is not present in all states (Guigale, Lafourcade and Nguyem, 2001; NERA, 1998). However, the government services are not free. Patients are required to pay a co-payment that accounts for the economic circumstances of the user (NERA, 1998). Health care is almost exclusively provided free of charge for individuals insured through the social security system; however, households that lack coverage by the social security system (individuals not employed in the formal sector and unable to "opt-in") face higher prices for health care (NERA, 1998; Parker and Wong, 1997). The co-payment fee is categorized into levels designed to match the socioeconomic level of the user. Although this fee is scaled according to the economic conditions of the individual, it may be significant for some rural households who also have a higher opportunity cost (transport over long distances or time lost from work) (NERA, 1998). In addition to the costs associated with "safety net" institutions, they have been described as "over-stretched, with insufficient capacity to respond to current health care demands" (NERA, 1998).

A segment of the uninsured population, approximately 10 to 15 million people, are reported to have no access to health care services principally due to geographical marginalization (they live in an area which is not served by governmental health services). Problems are also created by poverty (they cannot afford to pay co-payments, even when they are small, or the costs of traveling to the health center) and a lack of education (they cannot overcome the administrative

hurdles for obtaining health services) (NERA, 1998). The Second National Health Satisfaction Survey found that among those who had a serious health problem in the past 15 days, 52% did not seek care due to financial reasons (Parker and Wong, 1997; Leyva-Flores et al., 2001).

The Mexican government has recognized the presence of inequalities in access to health care for the poor and indigenous and has proposed a reform to address these problems (Marquez and de Geyndt, 2003). The premise of the National Health Program, entitled *Programa Nacional de Salud* 2001-2006, is that health is a central component of individual and national capital and that good health is an indispensable condition for equality in opportunities. The vision of the National Health Program is that in the year 2025 all Mexicans will have access to health insurance, independent of the capacity to pay, the level of risk, or labor affiliation guaranteeing access to services under an integrated model of health care. The National Health Program's goal is to address the needs of the most vulnerable groups, with the explicit aims to reduce the largest gaps in health that exist among the different subgroups of the population. The contributions to the system will be proportional to the capacity to pay, and the benefits will be distributed according to the needs of population (SSA, 2001; WHO, 1998).

The System for Social Protection of Health (known by the Spanish acronym SPS) incorporates a group of clearly-defined medical goods through a subsidized pre-payment plan. At the end of 2003, the System for Social Protection of Health financially protected 614 thousand families, the majority belonging to the poorest population deciles. Financing for this insurance plan comes from the federal and state governments and from families benefited. Health services to individuals are distributed in a package of essential services, and a package of high-cost services financed through a Protection Fund against catastrophic Expenses.

Insurance works with prepay. Pay for 3 months, 6 months or 1 year. There are 10 levels – based on ability to pay. People in levels I don't have to pay anything. They have the same rights to health care for all regardless of ability to pay. SPS covers a catalog of medical services (91 interventions). With the new social protection system, it is expected that by 2006, five million Mexican families will benefit from the Program. By then, all citizens will have universal access to the system. The SPS is financed mostly by federal fiscal resources, as well as by the states and individuals. By halting the vicious circle of poverty-diseases-poverty, the Mexican government is fulfilling its responsibility of financial protection for the health of its citizens."

Results from ENSA

I begin the investigation by reporting ethnic differences in health outcomes using a Mexican nationally representative survey. These preliminary estimates will provide a good baseline for the more detailed investigation using the Progresa data, which is focused on very poor rural households and so may not be representative of the entire country.

Data: The Encuesta Nacional de Salud 2000, National Survey of Health 2000, (ENSA 2000) is a cross-sectional data set consisting of 190,214 nationally representative observations of a population of roughly 100 million. The ENSA 2000 survey contains individual-level modules describing household characteristics, health status and health care use. A report of the survey results is available (in Spanish) at (www.insp.mx/ensa). Seven dependent variables are analyzed from this data set. These include: 1) use of preventive health services in the last 12 months; 2)

morbidity (a binary measure of illness, lesion or accident in the last two weeks); 3) use of ambulatory health service for individuals who reported morbidity in the last two weeks; 4) healthy (a binary measure for individuals who reported having very good or good health for the last year); 5) an indicator of whether an adult is obese (defined as BMI greater than or equal to 30); 6) a binary indicator of presence of diabetes; 7) a binary indicator of presence of hypertension. Two of these are measures of health care utilization, 2 are self-reported measures of health (morbidity and general health), and 3 are objective measures of health. The latter 3 measures are based on actual reported diagnosis or testing carried out in the survey from a sub-sample of approximately 45,000 adults. The key independent variable is indigenous status (i.e., individual speaks an indigenous language). Other variables included in this data set are basic demographic characteristics, socioeconomic variables including insurance status, and measures of housing sanitation.

Descriptive Statistics: Table 1 reports means by indigenous status for the 2 self-reported health and 2 health care utilization outcomes from the national sample of adults (age 20+), and these indicate very few differences between the two study groups. The use of preventive care is about 2 percentage points higher among the indigenous but self-reported morbidity is 4 points lower, as is typically found among lower socioeconomic groups. However, the use of curative care, if sick, is virtually identical (59%) among the two groups. Finally, self-reported general health status, reported here as the proportion reporting excellent or good health, is around 60% for both groups. Of course this measure may reflect measurement error due to different standards, for example, which might systematically under- or over-state true health.

The last 3 rows of Table 1 report the objective health outcomes by ethnicity and these confirm that in fact the indigenous appear to be healthier. Both hypertension and diabetes rates are about 2 percentage points lower among the indigenous, while the rate of obesity is nearly half the rate among the non-indigenous.

Table 2 reports these means by urban and rural region and indigenous status. Overall the self-reports and utilization outcomes are not too different across regions except perhaps for self-reported general health status, where only 56% of rural adults report themselves as healthy compared to 62% in urban areas. Curative care utilization (if sick) is also slightly higher in urban areas but the difference is only about 2 percentage points. There are some differences across regions in the means between indigenous and non-indigenous groups. For example, the indigenous are less likely to report being sick (relative to non-indigenous) in rural areas but not in urban areas; similarly the indigenous are more likely to report being healthy in rural areas relative to urban areas (compared to non-indigenous). On the other hand, the indigenous are more likely to utilize curative care (if sick) in rural areas compared to the non-indigenous (60 versus 57%), but less likely to do so in urban areas relative to the non-indigenous (58 versus 59%).

The main revelation in Table 2 is the objective health outcomes among indigenous in urban areas. These are significantly higher than for rural indigenous, and are the same (obesity, diabetes) or higher (hypertension) than the non-indigenous outcomes in urban areas. This suggests that living in an urban area has a deleterious impact on the health status of indigenous groups.

Table 1: Variable Definitions and Summary Statistics for Indigenous and Non-Indigenous for Full Sample

Variable Name	Description	Total Sample	Indigenous	Non-Indigenous	Sample Size
Dependent variable					
Use preventive care	1 if individual reports using preventive care in last year	0.3033	0.3182	0.3021	188581
Morbidity	1 if individual had a disease, accident, or any health problem in the last 2 weeks	0.1462	0.1189	0.1485	188486
Use curative care	1 if individual reports using curative care for morbidity in last 2 weeks	0.5848	0.5948	0.5841	26837
Healthy	1 if individual reports very good or good health status in last year	0.5988	0.5967	0.5989	188104
Objectives Health Outcomes					
Obese	1 if individual has a BMI ≥30	0.2573	0.1509	0.2664	43224
Diabetic	1 if individual reports a diagnosis or tests positive for diabetes at the time of survey	0.0766	0.0524	0.0786	42952
Hypertensive	1 if individual reports a diagnosis or tests positive for hypertension at the time of survey	0.3456	0.3275	0.3469	37350

Table 2: Summary Statistics by Indigenous and Rural Status for Full Sample

Variable Name	**Rural**			**Urban**		
	Total Sample	**Indigenous**	**Non-Indigenous**	**Total Sample**	**Indigenous**	**Non-Indigenous**
Dependent variable						
Use preventive care	0.3038	0.3180	0.3011	0.3030	0.3190	0.3027
Morbidity	0.1328	0.1109	0.1369	0.1557	0.1682	0.1554
Use curative care	0.5754	0.5995	0.5718	0.5904	0.5760	0.5906
Healthy	0.5648	0.6056	0.5571	0.6227	0.5419	0.6242
Objective Outcomes						
Obese	0.2250	0.1216	.2454863	.277822	.283779	.2776812
Diabetic	0.0674	.0408381	.0725533	.0824233	.103869	.0819105
Hypertensive	0.3504	.3067948	.3571732	.3428907	.4007934	.3415695

Table 3 breaks down these outcomes by sex and age group in rural areas only in order to provide a basis for comparison with the Progresa sample that is analyzed in the next section. Focusing first on the outcomes by sex, we see that differences by sex are much more significant than differences by indigenous status within each sex group. Women in each group are more likely than men to have utilized any health care (preventive or curative), and these differences are slightly larger among the indigenous. For example, the difference between men and women in use of curative care (if sick) is about 7 percentage points among indigenous but only 4 percentage points among the non-indigenous. In terms of self-reported health outcomes, the same pattern exists in rural Mexico as it does worldwide—women are more likely to report being in poorer health status than men, and these gender differences are about the same for indigenous and non-indigenous. The objective health outcomes in the bottom part of Table 3 show significantly larger rates of obesity among women of any ethnicity relative to comparable males,

no significant differences for diabetes, and significantly higher rates of hypertension for non-indigenous males relative to females (40 versus 33 percent), although this is slightly reversed among the indigenous population, where hypertension rates are actually slightly higher among females. In general, indigenous women appear to be significantly less healthy than their male counterparts.

Table 3 also reports means by younger (20-35) and older (36+) age groups. As is to be expected, the older age group reports a higher incidence of morbidity and is less likely to be in excellent or good general health. However, these differences are much bigger among the non-indigenous relative to the indigenous. For morbidity the age-specific mean difference is 7 percentage points among the non-indigenous and 6 points among the indigenous; for general health the difference is 16 points among the non-indigenous but only 13 points among the indigenous. There are also some ethnic differences in the age-specific means for health care utilization. For both preventive and curative care, older non-indigenous adult are more likely to utilize services relative to younger adults. Among the indigenous, however, the older group is less likely to utilize preventive care relative to the younger age group (28% for age 36+ compared to 31% for age 20-35). This general pattern of age differentials holds for the objective health outcomes: older cohorts are less healthy, but the differences by age are larger among the non-indigenous compared to the indigenous. For example, there is a 10 percentage point difference in diabetes rates across the non-indigenous age cohorts, compared to a difference of only 5 percentage points among the indigenous age cohorts.

Table 3: Summary Statistics by Indigenous Status, Sex and Age for Rural Sample

Variable Name	Indigenous				Non-Indigenous			
	Male	Female	Both		Male	Female	Both	
	Total	Total	Age 20-35	Age 36+	Total	Total	Age 20-35	Age 36+
Dependent variable								
Use preventive care N=90795	0.2117	0.4222	0.3049	0.2792	0.2091	0.3907	0.2658	0.2952
Morbidity N=90668	0.0925	0.1288	0.0942	0.1475	0.1184	0.1550	0.1104	0.1800
Use curative care N=12269	0.5599	0.6273	0.5432	0.5652	0.5503	0.5877	0.5489	0.5908
Healthy N=90561	0.6259	0.5858	0.5948	0.4665	0.5740	0.5407	0.5549	0.3990
Objective Health Outcomes								
Obese N=19739	0.0746	0.1479	0.0864	0.1499	0.1783	0.2796	0.1869	0.3009
Diabetic N=19623	0.0423	0.0400	0.0092	0.0663	0.0633	0.0773	0.0158	0.1259
Hypertensive N=16370	0.2897	0.3141	0.1730	0.4070	0.4010	0.3376	0.2163	0.4816

Overall, the age and gender breakdown suggests some important differences in the pattern of reported health status by ethnicity in rural areas of Mexico. Among the age 36+ cohort, the indigenous are less likely to utilize health services, but are also less likely to report having health problems.

Regression Results: We now estimate a series of multivariate regressions to isolate the association between ethnicity and the 7 health outcomes. The regressions include controls for individual schooling, sex (where appropriate), age and marital status. Household level controls include a composite wealth index derived from principal components, as well as indicators describing the sanitation, water and drainage condition in the home; all models also include state level dummy variables. For ease of interpretation, the models are estimated using OLS, and only the dummy variable indicating indigenous status is reported in the tables below, along with the associated t-statistic of the coefficient estimate. The coefficient is interpreted as the average percentage difference in the health outcome between indigenous and non-indigenous individuals.

Table 4A: Linear Probability Regression on Full Sample

	(1)	(2)	(3)	(4)
Dependent variable:	preventive care	morbidity	curative care	Healthy
Indigenous	0.005	0.001	0.115	0.084
	(0.25)	(0.07)	(3.34)**	(2.90)**
Observations	35913	35794	8324	35733
R-squared	0.08	0.02	0.03	0.07

Coefficient estimate of indigenous dummy variable from linear probability regression model on dependent variable listed at the top of each column. Curative care model estimated only on those who reported being sick in reference period. Other control variables in models that are not reported include age, sex (if appropriate), marital status, household wealth index, sanitation, water, drainage and state dummies. Absolute value of t statistics in parentheses; * significant at 5%; ** significant at 1%.

Table 4B: Linear Probability Regression on Full Sample – Objective Outcomes

	(1)	(2)	(3)
Dependent variable:	obese	hypertensive	diabetic
Indigenous	-0.041	-0.027	-0.034
	(1.61)	(1.20)	(3.00)**
Observations	9485	8523	9455
R-squared	0.06	0.15	0.09

Coefficient estimate of indigenous dummy variable from linear probability regression model on dependent variable listed at the top of each column. Other control variables in models that are not reported include age, sex (if appropriate), marital status, household wealth index, sanitation, water, drainage and state dummies. Absolute value of t statistics in parentheses; * significant at 5%; ** significant at 1%.

The estimates over the full sample reported in Table 4A indicate that the indigenous are significantly more likely (by 12 percentage points) to seek curative care if sick, but are also more likely to report being in good or excellent general health status (by 8 percentage points—column 4). These results are somewhat different from the raw means reported in Table 1 which showed no difference in means in these two outcomes, but did show a lower likelihood of self-reported morbidity among the indigenous, a difference that is not statistically significant in the regression estimate in Table 4A. Consequently, differences in control variables (e.g. wealth, schooling) between the two groups exist and are systematically associated with health related behavior (self-reports and utilization).

Table 4B reports the regression results for the three objective health outcomes. The large raw difference in obesity reported in Table 1 (15 versus 27 percent) is virtually eliminated in the multivariate analysis, with the indigenous coefficient indicating only a 4 percentage point

marginal difference, which is not statistically significant. On the other hand, differences in the prevalence of diabetes is statistically significant with the point estimate indicating the rate is about 3 percentage points lower among the indigenous.

Table 5A: Linear Probability Regressions by Sex: Rural Sample Only

	Preventive		morbidity		curative		healthy	
	Female	Male	Female	Male	Female	Male	Female	Male
Indigenous	0.012	0.005	-0.002	0.005	0.117	0.105	0.080	0.092
	(0.67)	(0.15)	(0.13)	(0.23)	(2.92)**	(2.39)*	(2.58)*	(3.01)**
Observations	22212	13701	22136	13658	5053	3271	22100	13633
R-squared	0.05	0.13	0.03	0.02	0.04	0.04	0.07	0.07

See notes to Table 4A for explanations.

Table 5B: Linear Probability Regressions for Objective Measures by Sex: Rural Sample Only

	Obese		Hypertensive		Diabetic	
	Female	Male	Female	Male	Female	Male
Indigenous	-0.053	0.015	-0.020	-0.055	-0.041	0.002
	(1.61)	(0.47)	(0.81)	(1.14)	(3.14)**	(0.10)
Observations	7622	1863	6908	1615	7596	1859
R-squared	0.06	0.06	0.17	0.12	0.10	0.10

See notes to Table 4B for explanations.

Tables 5 and 6 report the regression controlled mean difference in health outcome by sex and age group for the rural sample only. These continue to show significant differences by ethnicity for curative care and self-reported general health, and as observed in the full sample, the indigenous are more likely to seek curative care if sick and also more likely to report being in good or excellent general health. These differences are roughly the same for men and women (Table 5A). The objective health outcome results in Table 5B indicate that the significant difference in diabetes rates are driven by better (i.e lower) rates among indigenous women relative to non-indigenous women, given by the statistically significant coefficient in the penultimate column of Table 5B.

Table 6A shows that the ethnic differences in curative care and self-reported general health are driven by differences among the older age groups (36+), as these are the only coefficients that remain significant after splitting the sample by age. Among this older cohort, the indigenous are 8 percentage points more likely to seek curative care and 6 percentage points more likely to report being in good or excellent general health. Table 6B reports results for the objective health measures by age cohort, and these also show that the observed statistically significant ethnic difference in diabetes prevalence is driven by the difference among the older age cohort, where the point estimate is a rather large 7.2 percentage points.

Table 6A: LPM Regressions by Age: Rural Sample Only

Dependent variable:	Preventive		morbidity		curative		healthy	
Age group:	20-35	36+	20-35	36+	20-35	36+	20-35	36+
indigenous	-0.027	0.013	0.005	-0.004	0.046	0.080	0.085	0.056
	(1.20)	(0.55)	(0.22)	(0.20)	(1.09)	(1.99)*	(1.92)	(2.58)*
Observations	8115	10214	8088	10201	1561	2824	8081	10179
R-squared	0.25	0.14	0.03	0.03	0.05	0.04	0.05	0.03

See notes to Table 4A for explanations.

Table 6B: LPM Regressions for Objective Outcomes by Age: Rural Sample Only

Dependent variable:	Obese		Hypertensive		Diabetic	
Age group:	20-35	36+	20-35	36+	20-35	36+
Indigenous	-0.040	-0.051	-0.026	-0.031	-0.002	-0.072
	(1.47)	(1.45)	(0.91)	(0.83)	(0.23)	(3.31)**
Observations	4340	5145	3759	4764	4329	5126
R-squared	0.06	0.07	0.03	0.09	0.02	0.05

See notes to Table 4B for explanations.

Summary of ENSA results: The difference in health care utilization and self-reported health status between indigenous and non-indigenous groups in Mexico found in the ENSA is somewhat surprising. The raw means indicate that overall utilization patterns (preventive and curative) are not significantly lower among the indigenous, while the regression adjusted means show significantly higher curative care utilization among the indigenous in both rural and urban areas. Differences in self-reported health status vary by region. In rural areas the raw means indicate that the indigenous are less likely to report any sort of poor health, while in urban areas this group is more likely to do so, relative to non-indigenous. On the other hand, the objective measures of health show that indigenous in urban areas are significantly less healthy than any other group including their non-indigenous urban counterparts.

When we adjust for observed individual and household characteristics in rural areas, the difference in self-reported general health persists but does not persist for morbidity. Finally, the regression adjusted means for rural areas show significant ethnic differences for curative care and self-reported general health for both men and women, differences that appear to be driven by differences among the older cohort only. However, these show a higher use of curative care among the indigenous.

It is useful to keep these overall national results in mind as we explore ethnic differences in more detail using the Progresa data set, which is a sample of very poor rural households in 6 states in Mexico. Specifically, the ENSA results indicate that ethnic differences in health outcomes may be driven by differences among *urban* residents and not rural ones. On the other hand, the ENSA rural sample is nationally representative while the PROGRESA data is a very poor sample of rural residents. It will thus be interesting to see whether the national results for rural areas are repeated among the rural poor.

Adult Health Outcomes in Poor Rural Communities: Data, Variables and Methodology

The Progresa data: Progresa is a conditional cash transfer program that was launched in late 1997 by the Mexican government with the objective of reducing extreme rural poverty and enhancing the human capital of the extreme poor. Though initially targeted towards rural communities, the program expanded into urban areas in 2000 and changed its name to Oportunidades. A social experiment was conducted in 1998 to evaluate the impact of the program. During the second phase of expansion of the program, 506 localities were selected to participate in the experiment; one-third of these localities were randomly selected for delayed entry and served as the control group, while the remaining localities began receiving benefits in mid 1998. A baseline survey was administered in March 1998 and 4 follow-up rounds of data were collected approximately every 6 months (the surveys are called Encuestas de Evaluación, or ENCEL). The ENCEL surveys collected data on all households in the 506 treatment and control

communities numbering over 24,000 households in total (approximately 125,000 individuals) of which roughly one-third are self-classified as indigenous defined by whether the individual speaks an indigenous language.

The ENCEL collected basic health utilization information on all individuals across all survey rounds. Special modules were introduced in specific rounds to measure household decision-making, time-use, attitudes towards women, and health. Activities of daily living (ADLs) and morbidity were collected in June and November 1999 and again in November 2000. Household decision-making and opinions on the status of women were also collected in June 1999, while two specific questions on health knowledge (whether the household boils water and whether the household can administer oral rehydration therapy) were asked in the baseline survey in March 1998. The main analysis in this paper thus uses the June 1999 round of the ENCEL to explore differences in health status and utilization by ethnicity. Additional health outcomes are also taken from the 2000 ENCEL to explore changes in outcomes over time to control for possible reporting bias in self-reports of morbidity—this is discussed below in more detail. In order to remove any potential confounding effect of program participation on health status and behavior, the analysis in this section only uses observations from the control localities. In a later section I explore the potential differential impact on preschool children of the Progresa program by ethnicity.

Outcome variables: Four main outcomes are used in the study. *Morbidity* is defined as a dummy variable indicating whether or not the individual had difficulty doing his or her normal daily activities (work or home activities, child care, schooling, etc) in the last 4 weeks (question 35 in the survey instrument). *Utilization* indicates whether the individual went to a public or private hospital or health clinic or saw a health assistant or private doctor in the last 4 weeks for any reason (question 149 and related responses).[31] Two more objective measures of health status are also analyzed. An *ADL index* is constructed based on the responses to 5 separate questions about activities of daily living: vigorous activities, moderate activities, carrying 10 kilograms for 500 meters, picking up a piece of paper from the floor, walking 2 kilometers, and bathing (questions 38, 39, 40, 41, 42, and 44). Response categories to whether or not the individual can do these activities are yes with ease, yes but with difficulty, and no, which are coded 1,2 and 3 respectively and summed across all categories; higher scores on the index indicate worse health status. The final objective health measure is taken from question 45, which asks whether the respondent has suffered from any *physical pain* in the last 4 weeks. Respondents who had suffered moderate, severe or very severe pain were coded as having suffered pain (yes).

Policy variables: The key policy variable of interest is ethnicity, coded as 1 if the individual speaks an indigenous language. This variable is taken from the Progresa baseline survey and is measured at the individual level, in contrast to some studies that identify all household members as indigenous if the household head speaks an indigenous language. In fact, the data set contains some 'blended' or 'mixed' households where some individuals speak an indigenous dialect and some do not. We will take advantage of this to estimate household level fixed effects models, which measures health differences by ethnicity while controlling for unobserved household factors, which might be correlated with reporting bias.

[31] The coding of this information is extremely complex in this ENCEL round. These questions are reported in the household level files, with separate variable names for each individual in the household who had seen a health care professional. They refer to utilization for both curative and preventive care.

In order to go beyond basic demographic factors and understand health related behavior we exploit some of the special modules of ENCEL to construct variables that measure household decision-making, attitudes and health related knowledge. We posit that sensitivity to health status (crucial for self-reports), and the inclination to use modern health care will be related to both prior health related knowledge as well as the degree to which 'traditional' attitudes and beliefs are replaced by more modern ones. An indicator of health related knowledge is given by two questions from the March 1998 ENCEL on whether the household boils its water or knows how to apply oral rehydration therapy. Modern versus traditional attitudes and values are measured by a series of questions on household decision-making responsibilities in the June 1999 ENCEL.Questions 137-146 ask whether the man, the woman or both are mainly responsible for decisions regarding a range of household activities. These decisions are divided into two groups: 'social and organizational' relate to decisions about children's schooling and health and the purchase of children's clothes, shoes and household food. 'Economic or financial' decisions relate to large spending items to upgrade or fix the house or buy durable goods, use of income earned by the woman and whether the woman can leave the house by herself. These two indexes are coded so that higher values correspond to increasing female autonomy. Finally, question 148 in ENCEL-99-June asks respondents to agree, disagree or neither disagree nor agree on each of 6 statements about the rights, obligations and activities of women.[32] These are also coded such that a higher score on the index indicates a higher 'status' for women. These variables are interacted with ethnicity to explore any possible differences in their impact among the indigenous.

Control variables: The regression analysis reported below also includes 3 sets of variables that are not of immediate interest but which are important to control for intervening factors that may bias the estimated relationship between the policy variables and outcomes. Individual level variables include the age and its square, sex and schooling (5 mutually exclusive levels); household level variables include land and assets owned (mainly livestock) as well as the composite proxy means test score used by Progresa to identify potential program beneficiaries; community level variables include distance to social services such as health clinic, schools, state highway, municipality capital, and a locality marginality index calculated by Progresa to determine eligibility at the community level.

Conceptual framework: The theoretical framework to motivate the empirical analysis is a Household Production Model of behavior, where households are posited to maximize a joint utility function over health (H), leisure (L) and consumption of goods (X) subject to a time, money and technology constraint. Health is produced according to a production function, which depends on household time input and market purchased inputs, as well as technology (health knowledge, for example). Under the usual conditions for an interior solution, this model can be solved to yield reduced form demand equations for health, which depend on all exogenous variables to the system for all goods, including prices. See Strauss & Thomas (1995) for a detailed description of the model and applications to health in developing countries.[33]

[32] For example whether a woman should stay home, obey a man, have the same rights as men, have her own opinion, or work outside the house.

[33] Strauss, J. & Duncan Thomas, 1995, "Empirical Modeling of Household and Family Decisions," in J.Behrman & T.N. Srinivasan (eds) Handbook of Development Economics Vol. 3A, Amsterdam: North-Holland.

The models estimated in this paper are reduced form equations and hence only include system exogenous variables. An alternative approach would be to estimate the health production, which requires information on health inputs as well instrumental variables to identify these inputs. For example, utilization is an important input in the health production function determining morbidity, but the two are jointly determined. A theoretically consistent production function for morbidity (or some other health outcome) would include utilization but would use instrumental variables to control for choice of utilization. One candidate for an instrument would be the distance to the health clinic, which would influence the production of health through the time cost of obtaining health care (i.e. utilization). In this production function (for morbidity), distance to health center would not appear as a direct regressor; in the reduced form demand for morbidity, however, this distance variable would appear since the reduced form is a function of all exogenous variables in the system. It is important to keep this distinction in mind in the results presented below.

The empirical equations that are used in the analysis and reported below have the following general form:

$$(1) \qquad H = \alpha + \beta_1 * X_h + \beta_2 * X_{indiv} + \beta_3 * X_{locality} + \beta_4 * Indig + \varepsilon$$

In this framework, H is the health related outcome of interest (of which there are 4), X_h is a vector of household characteristics which include land and livestock assets, X_{indiv} is a vector of individual characteristics not including indigenous status, $X_{locality}$ is a vector of locality characteristics, and Indig is a dummy indicating whether the individual speaks an indigenous language.

Results for Adults from June 1999 ENCEL

Basic Results: We begin the analysis by pooling the data for adults age 18 and over and measuring mean differences in outcome with a dummy indicator for indigenous status. For ease of interpretation, we estimate all regressions using OLS—for the dummy dependent variables (SICK, UTLIZATION, PAIN) these are therefore linear probability models and the coefficients are interpreted as percentage point changes. The three health status indicators are coded so that higher values indicate worse health hence negative estimated coefficients lead to reductions in poor health or improvements in health; utilization is coded 1 if the individual utilized modern health care for any reason. Table 5.1A reports the coefficient for the indigenous dummy variable for the reduced form models discussed above which control for all individual, household and locality level variables. Since sample sizes are generally large we will only focus on statistical significance at the 5 percent level or better.

The initial estimates in Table 5.1A are consistent with the national results from ENSA; the indigenous are about 2 percentage points less likely to report being sick and less than 1 percentage point less likely to have suffered any pain in the last month. However, the indigenous were also less likely to have visited a health practitioner but that difference is not statistically significant. Also reported in this table is the dummy indicator for male, which is of interest because men and women tend to perceive and report health on different scales. In this sample, women tend to utilize health services more frequently than men and report being in poorer physical health (based on the ADL index and pain variable) than men—these results are

consistent with the international evidence, which indicates that women are more frequent users of health facilities (partially due to child birth) and also report being in worse health status.

Table 5.1A: OLS Regression Results on Full Sample of Adults

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	-0.016	-0.006	-0.009	-0.025
	(3.94)	(1.64)	(2.04)	(0.64)
Male	-0.000	-0.023	-0.010	-0.302
	(0.12)	(8.25)	(3.15)	(10.40)
Observations	19883	19883	19835	19786
R-squared	0.05	0.01	0.08	0.36
Mean dep. Variable	0.051	0.041	0.061	7.065

Absolute value of t-statistics in parentheses. Regressions include all control variables listed in the text.

Table 5.1B reports the coefficient of the indigenous 'effect' using alternative sets of control variables, which allows us to see exactly which groups of characteristics intervene in the relationship between ethnicity and health in rural Mexico. Column (a) is a base specification with no control variables and so gives the mean difference in the outcome by ethnic group. This column shows significant differences in all outcomes except for the ADL Index, with lower rates of pain, sickness and health utilization rates. Columns (b)-(d) add individual, household and locality level controls to the equations (the specification in (d) is the same as the one in Table 5.1A). The results for Sick and Pain are robust to inclusion of these controls as the quantitative effect and level of significance do not change across the columns. However, the lower utilization rates among indigenous appears to be correlated with locality level factors—the negative indigenous coefficient is cut in half and is no longer significant in column (d) relative to column (a). On the other hand, the results for the ADL Index show that household characteristics among the indigenous are actually damaging for this outcome—when we control for these 'worse' characteristics in column (c) the indigenous group shows significantly better outcomes on the Index.

Table 5.1B: OLS Regression Results of Indigenous Variable Under Different Model Specifications

	(a)	(b)	(c)	(d)
Specification:	No controls	Individual	(b) + household	(c) plus community
Outcome				
Sick	-0.014	-0.015	-0.020	-0.016
	(4.43)	(4.90)	(5.93)	(3.94)
Utilization	-0.012	-0.012	-0.010	-0.006
	(4.14)	(4.01)	(3.26)	(1.64)
Pain	-0.009	-0.011	-0.014	-0.009
	(2.39)	(3.28)	(3.80)	(2.04)
ADL Index	-0.003	-0.042	-0.073	-0.025
	(0.07)	(1.37)	(2.28)	(0.64)

Sample is the same as in Table 5.1A. Numbers shown are the coefficient of the indigenous indicator in an OLS model on the dependent variable shown in the first column. In (a) no control variables are included in the model. Successive columns add additional sets of control variables to the model. The model in (d) is identical to that in Table 5.1A.

Table 5.2: OLS Regression Estimates of Indigenous Status on Health by Sex

	Sick		Utilization		Pain		ADL Index	
	M	F	M	F	M	F	M	F
	(1)	(2)	3	(4)	(5)	(6)	(7)	(8)
Indigena	-0.012	-0.021	0.001	-0.013	-0.002	-0.016	0.005	-0.052
	(2.03)	(3.57)	(0.13)	(2.12)	(0.29)	(2.51)	(0.09)	(0.94)
Observations	9656	10227	9656	10227	9627	10208	9605	10181
R-squared	0.05	0.06	0.01	0.01	0.07	0.08	0.34	0.38
Mean of Y	0.052	0.051	0.030	0.051	0.057	0.065	6.935	7.188

Absolute value of t-statistics in parentheses below coefficients. Equations include full set of individual, household and locality level control variables.

Table 5.3: OLS regression Results with Full Interactions with Indigenous Status

	Sick in last 30 days		Utilization last 30 days		Moderate or severe pain last 4 weeks		ADL Index	
	1	2	3	4	5	6	7	8
		Interaction		Interaction		Interaction		Interaction
Individual variables								
Male	0.000	-0.002	-0.027	0.010	-0.011	0.001	-0.267	-0.101
	(0.11)	(0.26)	(7.78)	(1.72)	(2.69)	(0.11)	(7.55)	(1.63)
Age in years	-0.005	0.001	0.002	-0.001	-0.004	0.000	-0.138	0.028
	(7.87)	(1.39)	(3.78)	(1.17)	(6.16)	(0.01)	(25.56)	(3.03)
Age squared	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
	(13.35)	(2.47)	(1.70)	(0.58)	(12.44)	(0.25)	(41.04)	(3.05)
Schooling: none	-0.015	0.021	0.002	-0.038	0.008	0.015	0.180	-0.044
	(0.93)	(0.72)	(0.16)	(1.43)	(0.48)	(0.48)	(1.18)	(0.16)
Some primary	-0.028	0.033	0.012	-0.044	-0.002	0.006	-0.016	-0.205
	(1.80)	(1.17)	(0.85)	(1.69)	(0.10)	(0.19)	(0.11)	(0.77)
Primary complete	-0.018	0.023	0.014	-0.042	0.002	0.019	0.001	-0.098
	(1.17)	(0.79)	(0.97)	(1.61)	(0.13)	(0.62)	(0.01)	(0.37)
Secondary complete	-0.031	0.047	0.008	-0.032	0.002	0.019	-0.072	-0.008
	(1.90)	(1.53)	(0.50)	(1.15)	(0.09)	(0.59)	(0.47)	(0.03)
Household level								
Poverty index	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(2.91)	(0.08)	(3.01)	(1.48)	(3.81)	(1.71)	(1.29)	(0.40)
Land owned (hectares)	0.001	0.001	0.000	0.001	0.001	0.002	0.003	-0.008
	(1.01)	(0.76)	(0.34)	(0.64)	(1.36)	(1.87)	(0.63)	(0.73)

Table 5.3: OLS regression Results with Full Interactions with Indigenous Status

	Sick in last 30 days		Utilization last 30 days		Moderate or severe pain last 4 weeks		ADL Index	
Number of horses	0.001	-0.010	0.005	-0.001	0.004	-0.009	0.006	-0.085
	(0.59)	(1.40)	(2.32)	(0.10)	(1.85)	(1.25)	(0.27)	(1.31)
Number of donkeys	-0.006	0.005	0.000	0.001	-0.002	0.010	-0.073	0.221
	(2.23)	(0.81)	(0.05)	(0.20)	(0.70)	(1.50)	(3.08)	(3.83)
Number of oxen	0.011	-0.018	0.012	-0.008	0.021	-0.017	0.049	-0.215
	(1.49)	(1.29)	(1.78)	(0.63)	(2.65)	(1.13)	(0.70)	(1.64)
Number of cows	-0.002	-0.002	-0.002	0.007	-0.002	0.002	-0.028	0.023
	(2.20)	(0.67)	(3.48)	(2.97)	(2.67)	(0.87)	(4.22)	(1.00)
Number of Pigs	0.000	-0.002	0.001	0.000	-0.001	0.001	-0.031	0.012
	(0.04)	(1.37)	(0.60)	(0.31)	(0.66)	(0.61)	(3.34)	(0.72)
Locality level								
Distance health centre	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.06)	(4.43)	(1.14)	(2.51)	(2.05)	(3.74)	(3.61)	(1.35)
Distance primary school	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(2.90)	(0.11)	(1.71)	(0.29)	(0.44)	(0.22)	(3.20)	(1.50)
Distance sec school	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(1.14)	(1.95)	(2.09)	(0.05)	(0.69)	(3.62)	(2.52)	(1.98)
Distance munic. Capital	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(4.52)	(3.92)	(1.59)	(1.89)	(2.40)	(3.15)	(4.08)	(2.58)
Distance state highway	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(1.63)	(1.36)	(1.99)	(2.55)	(1.79)	(1.61)	(3.46)	(1.74)
Locality marginality	-0.003	-0.003	-0.005	0.001	-0.004	0.002	-0.015	-0.041
Index	(0.90)	(0.52)	(1.38)	(0.24)	(1.01)	(0.24)	(0.43)	(0.66)
Constant/Indig Dummy	0.153	-0.079	-0.043	0.077	0.110	-0.097	8.522	-0.592
	(6.76)	(1.86)	(2.08)	(1.97)	(4.49)	(2.13)	(39.97)	(1.48)
Observations	19883		19883		19835		19786	
R-squared	0.06		0.01		0.08		0.36	
P-value joint of significance of interactions								
Individual variables	0.00		0.01		0.71		0.02	
Household variables	0.36		0.09		0.70		0.01	
Locality variables	0.00		0.03		0.00		0.02	

Absolute value of t-statistics in parentheses below coefficients.

We further explore sex differences by estimating these basic equations by sex to check for patterns in the ethnicity differential. These results, shown in Table 5.2, indicate that ethnic differences are larger for women than they are for men. For example the difference in morbidity is 2.1 percentage points for indigenous women but not even significant for men; utilization rates are also significantly different for women (1.3 pp) but not for men.

Table 5.3 estimates the pooled model from Table 5.1 but now includes a full set of interactions between each independent variable and the indigenous dummy variable. This 'switching' model allows the response of each variable to differ by ethnicity. The first column under each dependent variable reports the regular coefficient for that variable, while the second column reports the coefficient of that variable interacted with the indigenous dummy variable; these latter coefficients thus represent the difference in the impact of that variable between indigenous and non-indigenous respondents. The p-value for joint tests of significance of different groups of interaction terms are reported at the bottom of the table. These joint tests indicate that the locality level variables differ significantly by ethnic group, while the individual level variables only differ (jointly) in 3 of the 4 equations; household level variables only differ across ethnic groups for the ADL index (consistent with the discussion around Table 5.1A).

At the locality level the effect of distance to health center has a significantly larger influence for the indigenous (significant in 3 of the 4 equations); the positive coefficients for morbidity and pain mean that the detrimental impact of living further away from a health center is even bigger for indigenous groups. In other words, reducing barriers to access by reducing travel time or distances would have a larger (positive) benefit for the indigenous. Distance to municipality capital is also consistently significant and while the positive coefficient of the interaction terms has the same interpretation as it does for health clinics, the implication for public policy is less straightforward.

At the individual level there is a significant difference in age squared for the morbidity and ADL outcomes by ethnicity; the positive interaction term indicates that the ageing process seems to have a stronger negative influence on the health of the indigenous relative to others and this is a result with potential policy implications. It also suggests that it might be more appropriate to separate the sample by age and focus on differences among the older age cohorts; differences among younger cohorts may be less pronounced due to changes in access and attitudes over time due to say the expansion of health and schooling opportunities.

Additional policy variables on knowledge and attitudes: I now include the variables on decision-making, health knowledge and women's status to the basic models reported above, along with an interaction term to measure any differences in their impact by ethnicity. Results for these policy variables only are reported in the tables below, but the regressions continue to include all the control variables described in equation (1).

Prior health knowledge: The pre-program round of ENCEL, collected in March 1998, asked about the household's knowledge on preparation of oral rehydration therapy and

whether or not the household boiled its drinking water. These variables are taken as measures of health awareness and knowledge and could be linked to sensitivity to health problems and reporting standards. Preliminary estimates showed that the indicator for boiling water was never statistically significant, and since there are issues with potential endogeneity surrounding this variable, only the results for familiarity with oral rehydration therapy are shown.

The first line in Table 5.4 can be compared to the results in Table 5.1 to assess the correlation among indigenous status, knowledge of oral rehydration and the health outcomes. The significant coefficients for morbidity and pain have been eliminated with the inclusion of these additional policy variables. In columns 1, health knowledge is positively associated with reporting morbidity (though not statistically significant) while in column 2 this knowledge is positive and significant—increased prior knowledge leads to an increase in utilization. This pattern of associations suggests that the lower degree of prior health knowledge among the indigenous explains the lower reporting of morbidity and utilization of health care facilities. Of course there is still the possibility that a common third factor, such as attitudes to modern health care, may determine health knowledge, reporting, and utilization of services.

Table 5.4: OLS Regression Results on Full Sample of Adults: Oral Rehydration Therapy Knowledge

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	-0.010	-0.002	-0.010	0.061
	(1.33)	(0.24)	(1.20)	(0.84)
Know oral rehydration	0.004	0.010	0.001	0.063
	(0.74)	(2.30)	(0.26)	(1.41)
Indigenous*oral	-0.008	-0.005	0.001	-0.109
Rehydration	(0.97)	(0.74)	(0.08)	(1.42)
Observations	18549	18549	18514	18465
R-squared	0.05	0.01	0.08	0.35

Absolute value of t-statistics in parentheses. Regressions include all control variables listed in the text.

Status of women: Information on the household's perception of the status of women may reflect the degree of traditional beliefs existing within the household, which in turn may be correlated with attitudes towards modern health care. We follow the same approach as above and include the index of women's status to the base regression reported in Table 5.1, along with the interaction with the indigenous dummy variable—these results are reported in Table 5.5.

Once again, the statistically significant coefficient for indigenous in the morbidity and pain equations in Table 5.1 are eliminated with the inclusion of this additional policy variable. The direct relationship of higher women's status on morbidity and utilization is positive and significant. For sickness, the interpretation of the interaction term is that among the indigenous, higher women's status results in lower reported morbidity. However, the interaction term in column 4 suggests that physical health status is significantly lower among the indigenous when women's status is higher. This seems inconsistent with the results in column 1 and suggests that column 1 may suffer from

reporting error due to different standards; of course the two-outcome measure slightly different dimensions of health status as well so the results are not conclusive.

Table 5.5: OLS Regression Results on Full Sample of Adults: Status of Woman

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	0.015	0.010	-0.013	-0.302
	(1.35)	(0.95)	(1.04)	(2.88)
Status of woman	0.008	0.003	0.001	-0.025
	(4.84)	(2.38)	(0.56)	(1.67)
Indigenous*status	-0.007	-0.004	0.001	0.067
	(2.92)	(1.63)	(0.34)	(2.84)
Observations	19883	19883	19835	19786
R-squared	0.05	0.01	0.08	0.36

Absolute value of t-statistics in parentheses. Regressions include all control variables listed in the text. Higher values of status index indicate higher status.

Household decision-making: The final exploration is to augment the base model with an index of women's authority in household decision-making in two separate spheres—economic and social and organizational. This is done separately for the two indexes under the hypothesis that women are traditionally more likely to exert some influence in social and organizational spheres but not as much in economic spheres. Table 5.6 reports the results of the key policy coefficients for social and organizational decisions. While none of the interaction terms are significant, the direct effect of increased decision-making authority for women is to increase utilization, and to lead to greater problems in physical health and with increased pain. In addition, the direct effect of indigenous status is eliminated in columns 1 and 3.

The results for the economic decision-making index are reported in Table 5.7 and these show fewer significant coefficients, but the direct impact of higher women's decision-making authority in column 4 is to worsen physical health, and is consistent with the result in Table 5.6. The interpretation of this direct effect in Tables 5.6 and 5.7 is not clear, since presumably the ADLs are a more objective measure of health and thus more likely to reflect 'true' physical health status.

Table 5.6: OLS Regression Results on Full Sample of Adults: Social and Organization Decision-Making of Woman

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	-0.008	0.003	-0.005	0.098
	(0.52)	(0.21)	(0.28)	(0.65)
Social/organizational	0.001	0.002	0.003	0.049
Decision-making	(1.54)	(2.53)	(2.57)	(5.40)
Indigenous*decision	-0.001	-0.001	-0.001	-0.013
Making	(0.44)	(0.74)	(0.30)	(0.86)
Observations	19535	19535	19489	19444
R-squared	0.05	0.01	0.07	0.35

Absolute value of t-statistics in parentheses. Regressions include all control variables listed in the text. Higher values of decision-making index indicate more autonomy for woman.

Table 5.7: OLS Regression Results on Full Sample of Adults: Economic and Financial Decision-Making of Woman

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	-0.014	0.000	-0.001	-0.118
	(0.61)	(0.02)	(0.05)	(0.55)
Economic/financial	0.000	0.001	0.003	0.038
decision-making	(0.14)	(0.61)	(1.77)	(3.07)
Indigenous*decision	-0.001	-0.001	-0.001	0.012
making	(0.21)	(0.24)	(0.21)	(0.54)
Observations	16256	16256	16218	16181
R-squared	0.05	0.01	0.08	0.34

Absolute value of t-statistics in parentheses. Regressions include all control variables listed in the text. Higher values of decision-making index indicate more autonomy for woman.

Household fixed effects results: A key problem with self-reports of health status (e.g. the variables sickness and physical pain) is measurement error stemming from different perceptions of health and reporting standards. If these reporting standards differ systematically by ethnicity we will not be able to estimate the true impact of ethnicity on health outcomes. In the previous analysis we hypothesized that measurement error may be related to differences in prior health knowledge, or attitudes towards modern health care practices, and found some evidence that this was the case. Another way to control for systematic differences across households that influence health reporting is to use a household fixed effects model which controls for unobserved household level heterogeneity by estimating differences in health between household members. Since household members share the same common household, the fixed effects model will control for this effect and allow a more precise measure of the true relationship between ethnicity and health. The problem with this approach is that all shared household level variables (observed and unobserved) are eliminated from the fixed effects estimates. This requires that indigenous status must vary within households in order for us to identify the relationship between ethnicity and health using this approach.

Recall that in this study we identify ethnicity at the individual level instead of at the household level (usually by the ethnicity of the household head) as is typically done. The working sample contains roughly 20,000 individuals living in 7313 households, and 2843 households contain at least one indigenous resident. However, of these households, around 600 households contain at least one non-indigenous resident. These 'blended' households contain approximately 1600 individuals, and can be used in the households fixed effects model while still retaining an estimate of the indigenous dummy variable coefficient.

The means of the outcome variables for blended families, who are likely to be a select sample, are reported in Table 5.8 and do not show any large differences from the full-sample means, although utilization and pain rates are slightly lower. A similar analysis of the control variables also did not reveal any major differences (available upon request). The majority of these blended households have an indigenous head (85 percent). In these households the non-indigenous resident is most likely to be a child (48 percent) or spouse (23%) or son- or daughter-in-law (17%). In the households headed by a non-indigenous

individual the indigenous resident is typically the spouse (75%) followed by the child (10%).

Table 5.8: Mean Outcomes Among Blended Families

	Blended (n=1574)	Full Sample (n=1990)
Sick	0.047	0.050
Utilization	0.040	0.040
Pain	0.052	0.060
AD Index	7.08	7.05

Table 5.9 reports the coefficient estimates of the policy variables in the household fixed effects model estimated over blended families only. I have included a sex interaction to capture differences by sex within the household as well. None of the estimates of these variables are statistically significant suggesting that unobserved household level heterogeneity may be related to the previous differences in health outcomes by ethnicity reported in Table 5.1.

Table 5.9: Household level fixed effects estimates using blended families only

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	-0.002	-0.015	-0.013	0.175
	(0.11)	(0.82)	(0.70)	(0.55)
Male	-0.034	-0.023	-0.009	-0.108
	(1.68)	(1.14)	(0.44)	(0.55)
Indigenous*male	-0.028	0.002	0.009	-0.185
	(1.11)	(0.10)	(0.36)	(0.75)
F statistic	6.84	1.33	7.87	68.32
R-squared	0.06	0.01	0.06	0.37

Absolute value of t-statistics in parentheses. Regressions include age, age squared and schooling but these are not reported. Sample is the 1574 individuals in the 531 families with complete data and that have both indigenous and non-indigenous residents.

Results for Adults over Time

As mentioned above, the key issue in the analysis of self-reported health is measurement error due to different reporting standards. If these standards differ systematically by ethnicity then the cross-sectional results presented in Table 5 may simply reflect these differences rather than true differences in health. In principle, the threat of measurement error of this nature is large for morbidity and pain, which are pure self-reports; the ADL index is a more objective measure of physical health status and thus less likely to be contaminated by different reporting standards.

Fortunately, we have multiple observations of our 4 dependent variables, which we can use to try and control for this heterogeneity. Specifically, by looking at changes in health outcomes over time we may be able to wipe out the individual specific reporting bias that might be related to ethnicity and thus obtain a cleaner measure of true health status. Such a fixed effect model would relate changes in health status over time to changes in the independent variables in the reduced form demand equation (the individual, household and locality variables). This would yield a viable equation only if some of the X variables also changed over time. In our data the household level variables (livestock and land

ownership) could in principle change over time but unfortunately these were not collected in the November 2000 ENCEL. The locality and individual characteristics also do not change so we must be somewhat creative in our attempt to use outcomes from another year. Two approaches are used. In the first approach, all the control variables are measured at their 1999 level but the outcomes are measured at two points in time. These observations are 'stacked' and equation (1) is estimated, augmented by a dummy variable indicating the year that the outcome variable is measured (1999 or 2000), and an interaction between the round variable and indigenous status. The coefficient on this interaction term estimates the difference-in-difference estimate of the impact of ethnicity on health outcomes. Specifically, the difference in difference equation is given by:

$$(2) \qquad H = \alpha + \beta_1 * X + \beta_2 * Indig + \beta_3 * Round + \beta_4 * (Indig * Round) + \varepsilon$$

In this framework beta 2 measures the difference between indigenous and non-indigenous in 1999, beta 3 measures the difference among the non-indigenous over time (between 1999 and 2000) and beta 4 is the double difference (DD) estimator, measuring the difference in changes in health status over time between the indigenous and non-indigenous. X is a vector of control variables, which are constant for each individual and measured at 1999 levels. In these data each observation (individual) thus appears twice and the standard errors are adjusted to account for this.

Difference-in-differences: Table 6.1 reports the coefficient estimates for these three variables from models which include all the locality, individual and household characteristics, and where standard errors are corrected for repeated observations. The first line of this table shows that in 1999 the mean rate of sickness and health care utilization was significantly lower among the indigenous (beta 2) relative to others (consistent with Table 5.1), and line 3 of column 2 indicates that the utilization rate declined significantly during this time period among the non-indigenous. However, the DD estimates are all statistically 0—there are no differences in the patterns of change over time in health outcomes by ethnicity. The DD is significant at 10 percent for the ADL index; the negative coefficient implies that there was a marginally significant improvement in physical health among the indigenous relative to the non-indigenous.

Table 6.1: Difference in difference estimates using 1999 and 2000 ENCEL data

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	-0.010	-0.008	-0.004	0.016
	(2.37)	(2.49)	(0.91)	(0.42)
Round=2000	0.001	-0.011	-0.004	0.030
	(0.31)	(4.42)	(1.39)	(1.18)
Indigenous*2000 (beta 4)	0.003	-0.002	-0.005	-0.080
	(0.62)	(0.53)	(0.98)	(1.90)
Observations	33130	34658	33063	32896
R-squared	0.05	0.01	0.07	0.37

Absolute value of t-statistics in parentheses. Regressions include all control variables at 1999 levels. Standard errors corrected for clustering on individuals.

Results using changes in outcomes between 1999 and 2000: The second approach is to simply estimate equation (1) in changes, so that the dependent variable is the change in

the outcome between the two survey years, defined as 2000 minus 1999. In this framework, positive values indicate declines in the 3 health status variables but an improvement in utilization.

Table 6.2 presents the results of the change model as described above and these now show no significant difference in any outcome by ethnicity. In addition, the large difference between males and females in the ADL index are also eliminated although men now have significantly lower chances of reporting any pain in the reference period, relative to women (1.5 percentage point difference; t=2.87). These results present strong evidence of no differences by ethnicity in health status or utilization patterns among this very poor rural population in Mexico.

Table 6.2: OLS estimates of Changes in Health Outcomes (2000-1999) Difference in difference estimates using 1999 and 2000 ENCEL data

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	0.010	-0.003	0.000	0.070
	(1.56)	(0.49)	(0.04)	(1.28)
Male	-0.007	0.006	-0.015	0.021
	(1.56)	(1.45)	(2.87)	(0.51)
Observations	15801	17330	15741	15581
R-squared	0.01	0.00	0.00	0.01

Absolute value of t-statistics in parentheses. Regressions include all control variables at 1999 levels. Standard errors corrected for clustering on individuals.

Additional policy variables in change model: Following the approach in section 5, the additional policy variables and their interactions with indigenous are added, one at a time, to the basic change model presented above to see if they are associated with health outcomes.

Health knowledge: Estimates including knowledge of oral rehydration therapy and interaction are shown in Table 6.3. The inclusion of this variable now renders the indigenous effect positive and significant in column 3. The negative interaction term means that indigenous health is better (less pain) when prior health knowledge exists. The pattern of coefficients indicates that this prior knowledge is significantly lower among indigenous households, and is correlated with reporting on health status.

Table 6.3: OLS Regression Results of Changes in Health Outcomes: Oral Rehydration Therapy Knowledge

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	0.016	-0.001	0.039	0.086
	(1.34)	(0.14)	(3.11)	(0.84)
Know oral rehydration	0.005	-0.012	0.022	-0.039
	(0.67)	(2.01)	(2.82)	(0.60)
Indigenous*oral	-0.009	-0.001	-0.049	-0.037
Rehydration	(0.69)	(0.10)	(3.65)	(0.34)
Observations	14802	16242	14751	14602
R-squared	0.01	0.00	0.00	0.01

Absolute value of t-statistics in parentheses. Regressions include all control variables listed in the text.

Status of women: Table 6.4 reports the change models including the status of women index, and here the big change is in column 4 where the indigenous coefficient becomes positive and significant. This pattern also indicates that the status variable is lower among indigenous households; the negative interaction means that physical health status is actually significantly better when the status of women is higher among indigenous households.

Table 6.4: OLS Regression Results of Changes in Health Outcomes: Status of Woman

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	0.007	-0.020	0.003	0.532
	(0.42)	(1.41)	(0.17)	(3.58)
Status of woman	-0.005	-0.004	-0.005	0.050
	(2.23)	(2.23)	(1.74)	(2.39)
Indigenous*status	0.000	0.004	-0.001	-0.111
	(0.09)	(1.27)	(0.24)	(3.33)
Observations	15801	17330	15741	15581
R-squared	0.01	0.00	0.00	0.01

Absolute value of t-statistics in parentheses. Regressions include all control variables listed in the text. Higher values of status index indicate higher status.

Women's role in household decision-making: Table 6.5 includes the index of decision-making in the social and organization sphere in the base model, and this has no influence on the estimated effects of ethnicity on health outcomes. The only significant coefficient in this table is the direct effect of the index on the ADL index, where higher values of the index lead to better health outcomes. Table 6.6 reports results for the decision-making in the economic and financial spheres and these also do not change the results from the baseline change models.

Table 6.5: OLS Regression Results of Changes in Health Outcomes: Social and Organization Decision-Making of Woman

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	-0.013	-0.021	-0.027	-0.293
	(0.51)	(1.01)	(1.01)	(1.35)
Social/organizational	-0.001	-0.001	-0.002	-0.059
Decision-making	(0.98)	(1.19)	(1.40)	(4.45)
Indigenous*decision	0.002	0.002	0.003	0.038
making	(0.90)	(0.97)	(1.10)	(1.79)
Observations	15502	17015	15445	15291
R-squared	0.01	0.00	0.00	0.02

Absolute value of t-statistics in parentheses. Regressions include all control variables listed in the text. Higher values of decision-making index indicate more autonomy for woman.

Table 6.6: OLS Regression Results of Changes in Health Outcomes: Economic and Financial Decision-Making of Woman

	Sick	Utilization	Pain	ADL Index
	(1)	(2)	(3)	(4)
Indigenous	-0.005	-0.036	0.033	0.157
	(0.14)	(1.23)	(0.85)	(0.52)
Economic/financial	0.002	-0.001	0.002	-0.022
decision-making	(0.85)	(0.40)	(0.79)	(1.25)
Indigenous*decision	0.002	0.004	-0.003	-0.009
making	(0.52)	(1.22)	(0.84)	(0.27)
Observations	12922	14191	12873	12730
R-squared	0.01	0.00	0.00	0.02

Absolute value of t-statistics in parentheses. Regressions include all control variables listed in the text. Higher values of decision-making index indicate more autonomy for woman.

Impact of Progresa on Indigenous Preschooler Health Check Ups

As mentioned earlier, one part of the beneficiary responsibility in the Progresa program is to for all household residents to attend a health clinic for preventive check-ups according to an age specific schedule. We focus on the growth monitoring of preschool children (age 0-5) as reported in the household surveys, and compare these health care utilization rates at baseline and approximately 12 months after program initiation using the ENCEL98M and ENCEL99M evaluation surveys. Table 7.1 reports these health check-up rates by program status (treatment or control) for the entire sample of children who are program eligible (i.e. poor) as well as for indigenous children only. Column 3 in this table reports the simple difference in mean rates between the two time periods while column 4 calculates the difference-in-differences (DD) in these rates for the full sample and for the indigenous group only. The simple mean difference shows a dramatic rise in check-rates among the treatment group (11 percentage point increase) while for the indigenous the increase is 10 percentage points. The DD estimate is actually slightly higher for the indigenous group (12 percentage points) relative to the full sample (10 points), primarily because of significant pre-program differences between treatment and control groups in the indigenous sub-sample. These results indicate that the impact of the program was just as large among the indigenous as in the population as a whole.

Table 7.1. Mean Preschooler Health Check Up Rates by Program Status and Ethnicity

	Baseline	June 1999	Difference	Double Difference
		Full Sample		
Treatment	0.820	0.933	0.113	
Control	0.829	0.842	0.013	**0.100**
		Indigenous		
Treatment	0.832	0.935	0.103	
Control	0.870	0.849	-0.021	**0.124**

To check the robustness of these results a probit regression for the probability of attending clinic is estimated which includes controls for distance to health clinic, parental education, household wealth and the child's age and sex and ethnicity. Data from the two survey rounds (for program eligible children only) are 'stacked' and dummy variables are

included to indicate program status (treatment versus control: P) and survey round (baseline versus June 1999). The DD estimator for indigenous (Indig) versus non-indigenous children is obtained by interacting P with indigenous status and then interacting this new variable with survey round:

$$(3) \quad Y = \alpha + \beta_1 * X_1 + \beta_2 * Indig + \beta_3 * P + \beta_4 * Round + \beta_5 * (P * Round) + \beta_6 * (P * Indig) + \beta_7 * (P * Indig * Round) + \mu$$

In this set-up, beta 3 gives the pre-program or baseline difference in check-up rates between treatment and control groups among the non-indigenous (and should be 0 if randomization is well-done). Similarly, beta 5 gives the DD estimate of the program for the non-indigenous, while beta 7 gives the *difference* in the DD impact between non-indigenous and indigenous. The significance of this coefficient indicates whether the DD impact of the program differs by ethnicity.

Table 7.2: Probit Estimates for Probability of Health Check-Up for Children 0-5

	dF/dx	Z statistic
Indigenous	0.0364771	(3.44)
Mother's Schooling		
Incomplete primary	0.0299167	(3.67)
Complete primary or more	0.0513111	(5.67)
Father's Schooling		
Incomplete primary	0.0278915	(3.12)
Complete primary	0.025688	(2.55)
Middle or secondary school	0.0609354	(5.07)
Distance to Health Clinic		
1-3 kms	-0.0736754	(6.53)
4-5 kms	-0.1017961	(5.91)
6 or more kms	-0.1222914	(7.88)
Household wealth index	0.0000769	(2.02)
Child's age	-0.0249031	(3.02)
{Child's age}$^{1/2}$	0.0250712	(1.53)
Boy	0.0006647	(0.10)
June 1999 observation (beta 4)	0.0146105	(1.70)
Treated (beta 3)	-0.0018555	(0.19)
Treated*(June 1999) (beta 5)	0.1024479	(8.71)
Indigenous*Treated (beta 6)	-0.0253031	(1.67)
Indigenous*Treated*(June 1999) (beta 7)	-0.0147235	(0.90)
Observations	11896	
Psuedo R-sq	0.0551	
Log Likelihood	-4502.98	

Marginal probabilities and z-statistics reported in the table; standard errors are corrected for repeated observations in the sample. Excluded schooling category is no schooling; excluded distance to clinic is less than 1 km.

Estimates of this model are presented in Table 7.2. Pre-program differences are indeed 0 as indicated by the insignificance of beta 3 in the table, while the DD impact among the non-indigenous is around 10 percentage points (beta 5) and highly significant, consistent

with Table 1 above. However, there is no evidence of any differential program impact by ethnicity—the estimate of beta 7 is not significantly different from 0 (z=0.90). This is good news, and indicates that a major national program of this nature is able to impact the health care utilization behavior of traditionally excluded groups.

Summary and Policy Implications

The base model regression results indicate that the indigenous are less likely to report sickness or to suffer from physical pain, and marginally less likely to utilize modern health care. Lower utilization rates are partially explained by locality level factors, particularly distance to health care facility and main road. Separate models by sex show that ethnic differences in the outcomes are larger among women than they are among men. The full interaction model reveals important differences in the determinants of health by ethnicity. From a policy perspective the two most important findings are that the negative effect of distance to a health clinic is significantly larger for the indigenous. In addition, the ageing process seems to have a larger detrimental effect among the indigenous relative to the non-indigenous.

The more detailed analysis of possible causal pathways is insightful. There is evidence that the lower utilization rates and morbidity reports among the indigenous are correlated with prior health knowledge. This has policy content, and suggests that efforts to teach basic concepts of modern medicine (in this case, oral rehydration therapy) could influence utilization and perceptions of illness. Some of the other results in this section are somewhat counter-intuitive and require further exploration. For example, an increase in the status of women leads to *lower* reports of morbidity among the indigenous, but *lower* physical health status as well. This suggests that morbidity is subject to respondent specific measurement error. The decision-making indexes for the most part lead to direct reductions in health status (ADLs and pain) with no significant differences by ethnicity; these direct effects suggest an enhanced perception or sensitivity to health conditions. It should be noted that these additional policy variables were also interacted with sex to allow for differential impacts for women, but no significant effects were found.

A variety of techniques were used to control for measurement error due to different reporting standards or perceptions of health. Results from the household fixed effects model suggest that unobserved heterogeneity at the household level explains some of the difference in health outcomes by ethnicity; these would include the factors mentioned above such as health knowledge and attitudes towards modern medicine.

Perhaps the most robust findings are those employing the change model, which directly controls for individual level heterogeneity, and show no difference in any of the health outcomes by ethnic background. Furthermore, prior health knowledge and improving the status of women both lead to statistically significant improvements in health among the indigenous (tables 6.3 and 6.4). While the causal relationship between increasing the status of women and improved health are unclear, the potential policy implications are tremendous. Specifically, they suggest that development projects that seek to enhance health related knowledge and empower women may have real benefits for the health status of indigenous populations.

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Appendix

Table A1: Summary Statitistics

Variable	Full		Non-Indigenous		Indigenous	
Outcomes	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
sick	0.051	(0.22)	0.056	(0.23)	0.041	(0.20)
Utilization last 4 weeks	0.041	(0.20)	0.045	(0.21)	0.033	(0.18)
Pain last 4 weeks	0.061	(0.24)	0.064	(0.24)	0.055	(0.23)
ADL index	7.065	(2.51)	7.067	(2.54)	7.062	(2.45)
Individual						
Indigenous	0.339	(0.47)				
Male	0.486	(0.50)	0.481	(0.50)	0.495	(0.50)
Age	41.272	(17.26)	40.816	(17.54)	42.162	(16.68)
Age squared	2001.365	(1641.20)	1973.524	(1666.39)	2055.766	(1589.54)
No schooling	0.288	(0.45)	0.239	(0.43)	0.382	(0.49)
Some primary	0.402	(0.49)	0.421	(0.49)	0.365	(0.48)
Complete primary	0.220	(0.41)	0.237	(0.43)	0.187	(0.39)
Secondary complete	0.075	(0.26)	0.087	(0.28)	0.052	(0.22)
Household						
Oral rehydration therapy	0.778	(0.42)	0.778	(0.42)	0.778	(0.42)
Women's status index	4.235	(1.28)	4.420	(1.20)	3.872	(1.34)
Social/organization decisions index	9.897	(2.01)	10.013	(1.96)	9.669	(2.10)
Economic/financial decisions	9.358	(1.52)	9.420	(1.54)	9.229	(1.45)
Calificacion (proxy score)	746.478	(143.34)	766.552	(148.20)	707.255	(124.33)
Land owned	1.793	(3.44)	1.956	(3.81)	1.475	(2.55)
Horses	0.302	(0.79)	0.390	(0.91)	0.129	(0.43)
Donkeys	0.280	(0.70)	0.346	(0.77)	0.151	(0.49)
Oxen	0.026	(0.24)	0.031	(0.25)	0.017	(0.23)
Cows	0.718	(2.56)	0.959	(3.00)	0.248	(1.19)
Pigs	0.923	(1.95)	0.907	(2.01)	0.955	(1.84)
Locality						
Distance to health center	2830.949	(2295.97)	3200.016	(2305.80)	2109.812	(2097.02)
Distance to primary school	33.885	(240.14)	37.085	(262.70)	27.634	(188.27)
Distance to secondary school	1841.651	(2100.30)	1721.715	(1835.40)	2075.998	(2523.12)
Distance to municipal capital	10005.090	(6207.75)	10227.110	(6747.05)	9571.269	(4960.34)
Distance to sate highway	9522.379	(8061.05)	8372.896	(7748.07)	11768.410	(8187.25)
Marginality index	0.445	(0.73)	0.148	(0.58)	1.024	(0.65)
N	19883		13152		6731	

IV. RACE AND HEALTH DISPARITIES AMONG SENIORS IN URBAN AREAS IN BRAZIL

Antonio J. Trujillo, John A. Vernon, Laura Rodriguez Wong, Gustavo Angeles

Introduction

Policy makers today consider the social exclusion, or marginalization, of ethnic groups to be one reason for the existence of disparities in human capital in Latin America. Racial and ethnic inequality in the provision and utilization of health care**,** taken together with the global issues of controlling cost and increasing access, is frequently reported as one of the most important problems facing the health care sector in Latin America (WHO, 2001).

In Brazil, these racial disparities in health status have been widening**.** For example, at all ages, Blacks report higher mortality rates than Whites, lower life expectancies**,** lower survival rates for all causes, and a higher incidence (and earlier onset) of disease. Racial disparities in health have been persistent and broadening at older ages despite economic progress and overall increases in health (World Bank, 2003). Moreover, the rapid demographic transition in Brazil has only been exacerbating these health inequities. The evidence suggests that the population of Brazil is aging at a faster rate than the populations of most developed countries (Vaupel, 1998; Seabrook**,** 2003). Health care in old age absorbs an ever-increasing share of GDP, and the demand for increased services for seniors is increasingly apparent in the region's crowded urban areas. At the same time, the Brazilian public has become aware of growing racial disparities in health in old age and in the medical care available to the elderly.

It is important to understand both the economic and non-economic factors that divide the health status of the elderly and their health care resources along racial and ethnic lines. In particular, a better understanding of the direct and indirect channels through which race affects the deterioration of health capital in old age can inform policy options that aim to reduce costs and disparities in health and health care among senior citizens.

In this paper we will first examine the health disparities among the elderly in Sao Paulo, the largest city in Brazil. Following this, we will present a framework that may help explain and better understand the sources of these health differences. Lastly, we recommend policies initiatives that may help mitigate these racial disparities in health. Our analysis is conducted using the newly available SABE[34] dataset which addresses

[34] The acronym SABE is short for Salud, Bienestar, and Envejecimiento—Health, Well Being, and Aging, a 2000 survey conducted in 7 representative cities in Latin American countries. The SABE web page (www.ssc.wisc.edu/sabe) lists complete information on the agencies and researchers who participated in the project.

several dimensions of individual health, including cognitive evaluation, self-reported health status (SRHS), the prevalence of chronic and acute conditions, functional health indices[35]—Activities of Daily living (ADL) and Instrumental Activities of Daily Living (IADL), and several other alternative anthropometric measures.

This analysis should produce a more accurate description of health conditions among the elderly population, adjusted for age, gender and socio-economic group. This will make it possible to elaborate accurate risk profiles by racial group for chronic and acute conditions, disability, and physical and mental impairment in old age. This information will be useful to policy makers interested in designing effective social policies aimed at reducing the health disparities among racial groups; it should also be of use to policy makers seeking to address and reduce group-specific health risks. Donor countries and institutions will find this information to be of value as they set health care assistance priorities.

In this paper, two racial groups are compared: the control group includes those individuals who declared themselves "White", while the treatment group includes those individuals who declared themselves "Black," as well as those individuals who reported themselves to be "Mulatto"[36]. Regardless of this classification, one should keep in mind that race may be a difficult variable to measure. Race and ethnicity are, to some extent, individual characteristics that may have elements in common with nativity and even religious affiliation[37]. For instance, two individuals in different race groups could share similar cultural values because of their common country of origin. Furthermore, the self - identification of race could differ from the group identification of an individual's race. Finally, classification of individuals with mixed parents could pose some additional problems in the assignment of race. Assuming that race can be measured with some degree of accuracy, it has been identified in health research as an important risk factor that measures a combination of socio-economic, cultural and biological characteristics, which explain the accumulation and deterioration of health capital over the life span of an individual (Lillie-Blanton and LaVesist, 1996).

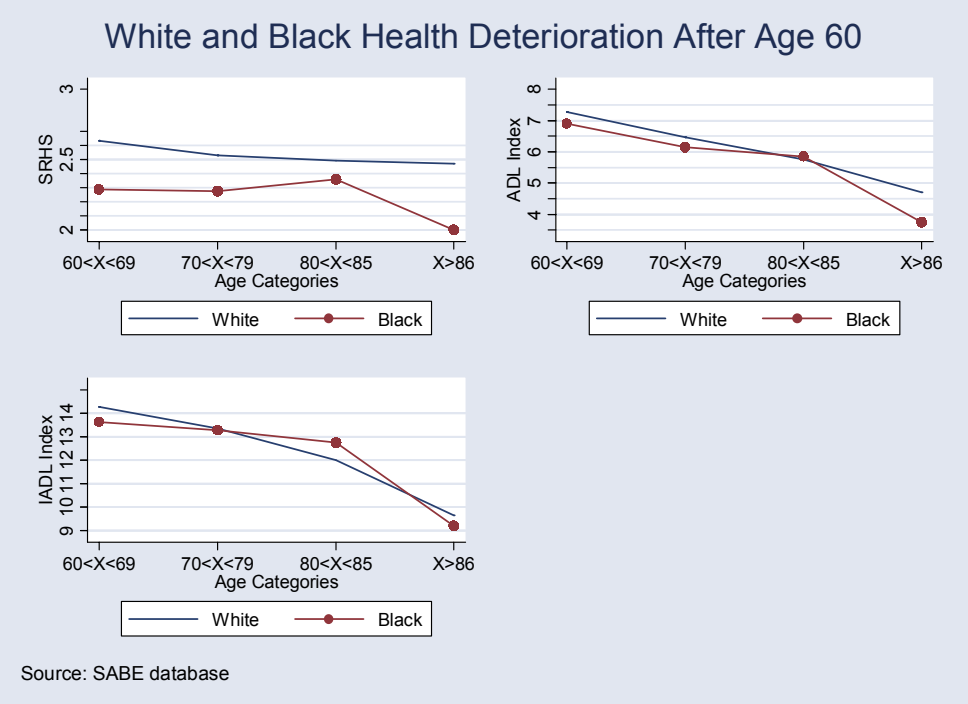
[35] SRHS, ADL and IADL were measured in the SABE dataset using the standard instrument implemented in health surveys. In particular, SRHS was measured using a question of self-perception of health between excellent, very good, good, bad and very bad. ADL includes walking, getting in and out of a bed or chair, and the use of stairs among other activities. IADLs include meal preparation, shopping, managing activities, telephone use, and light housework, among others.

[36] The SABE dataset does not include the interviewer's perception of an individual's race. The survey relies on an individual's self-perception of race based on the following question…*"could you please tell me what your race and ethnic background is"?* Telles (2002) investigates the disparities that may arise between interviewers' and respondents' classification of race. This study reports that answers are consistent in almost 80% of all cases. Individual factors such as gender, age, education, and region could explain partially the inconsistencies. For instance, a more educated person tends to "whiten" her race; but this result could vary with region.

[37] According to Mejia and Moncada (2000), for the purpose of the national census, ethnic groups have been identified in Brazil using a self-identification question since 1982. The given options are Branca (White), Preta (Black), Parda (Brown), Indigena, Amarela (Yellow which includes individuals of Asian origin) and others.

Based on the SABE dataset, Figure 1[38] shows the gradient of health deterioration by age group according to race in Sao Paulo. As expected, for both Whites and Blacks, health deteriorates as an individual ages. The gap in health differences between Whites and Blacks declines in older groups. Nevertheless, at all ages, Blacks have poorer self-reported health status than Whites. Surprisingly, the differences are less pronounced when one uses ADL and IADL as measures of health. In fact, Blacks have better ADL and IADL scores than Whites, but these gaps are not statistically significant. The reduction in the differences between racial groups with increasing age could be the consequence of a cross-over in the mortality rate among Blacks and Whites at later ages. Once a Black individual reaches the age of eighty, she or he may have better health than a similar White individual.

Figure 1: White and Black Health Deterioration after Age 60



To better understand the reasons for these differences in health, it needs to be determined whether the health gap among race groups remains after one controls for the relevant variables, other than race, that are hypothesized to impact health status. Past health status, risk-related behavior, the availability of health insurance, and demographic, socio-economic, occupational and household characteristics, as well as the geographic availability of housing, sanitation and health services are all potential factors that may explain the gap observed in Figure 1. Adding successive control variables to the analysis will help identify the channels through which race may influence health in old age (LaVeist, 1994 and Wagstaff and Van Doorslaer, 2000).

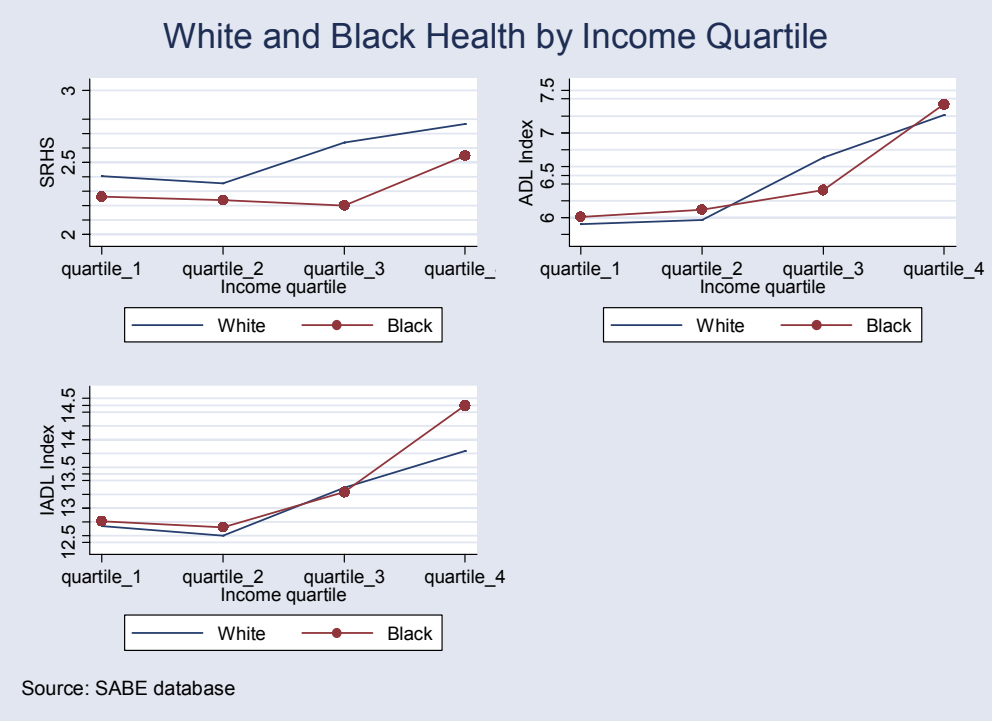
[38] Larger numbers indicate better health in terms of SRHS, ADL and IADL.

Observed racial disparities in health could be due to three factors: differences in the level of endowment or observable individual characteristics (e.g. White seniors may have higher income and education than Black seniors); differences in the marginal effect that each factor has on an individual's health; and differences in unobservable individual characteristics (e.g. genetic composition). This analysis also presents a framework for understanding the underlying factors that account for racial disparities in health among seniors.

It has been documented in the health economics literature (see Wenzlow et al. 2004, Wagstaff et al. 2003 and Case and Deaton, 2004, among others) that even at older ages the health of an individual is not only related to her or his socio-economic condition, but the relevance of this income condition declines as income increases. Clearly, the relationship extends in the opposite direction; at more advanced ages, one may expect that health affects income (see Smith, 1998). Numerous studies have suggested that there is a link between health and labor outcomes in terms of productivity, labor supply and wages (see Strauss and Thomas, 1998, for a discussion of this topic). This complex relationship between income and health has been reported in both developed and developing countries, and across different measures of income and health. The expected socio-economic gradient in health also has been documented using aggregate community data (see Krieger et al., 2003, for an example in the USA). Strong correlations between socio-economic conditions and racial disparities in mortality have been documented in the literature. Because Whites tend to report higher income than Blacks, one might expect that there would be a gap between the health of Whites and Blacks across income rankings, but this gap tends to decline as income increases. In other words, for poor Whites and poor Blacks, the differences in health could be mainly explained by differences in income. However, for affluent Whites and Blacks, the differences in health could come from sources other than income differences. Also, the marginal effect of income on health could be different for Whites and Blacks.

Figure 2 shows a relationship partially consistent with these previous empirical findings. For the case of Sao Paulo, Brazil, both Whites and Blacks report an increase in self-reported health between the first quartile and the fourth quartile of the income distribution. Interestingly, the relationship between income and health is not linear. Blacks in the third quartile of the income distribution have lower SRHS than Blacks in the second quartile. This gradient in health and income level at the extremes of the distribution is also consistent for ADL and IADL measures. Whites also report higher income than Blacks, which may in part explain the gap between self-reported health for these groups. Using IADL and ADL measures, however, the gap in health between Whites and Blacks does not grow smaller as income increases. For instance, wealthy, elderly Blacks report better ADL and IADL than wealthy, elderly Whites. It is important to keep in mind that these differences in health may also be driven by other differences across racial groups, such as education, occupation history, and/or past health status. Furthermore, different measures of income may create alternative rankings of individuals. For instance, using wealth as an alternative measure of well-being may result in different disparities in the health of Whites and Blacks. Thus, one must perform a more in-depth analysis to understand the sources of these differences in health.

Figure 2: White and Black Health By Income Quartile

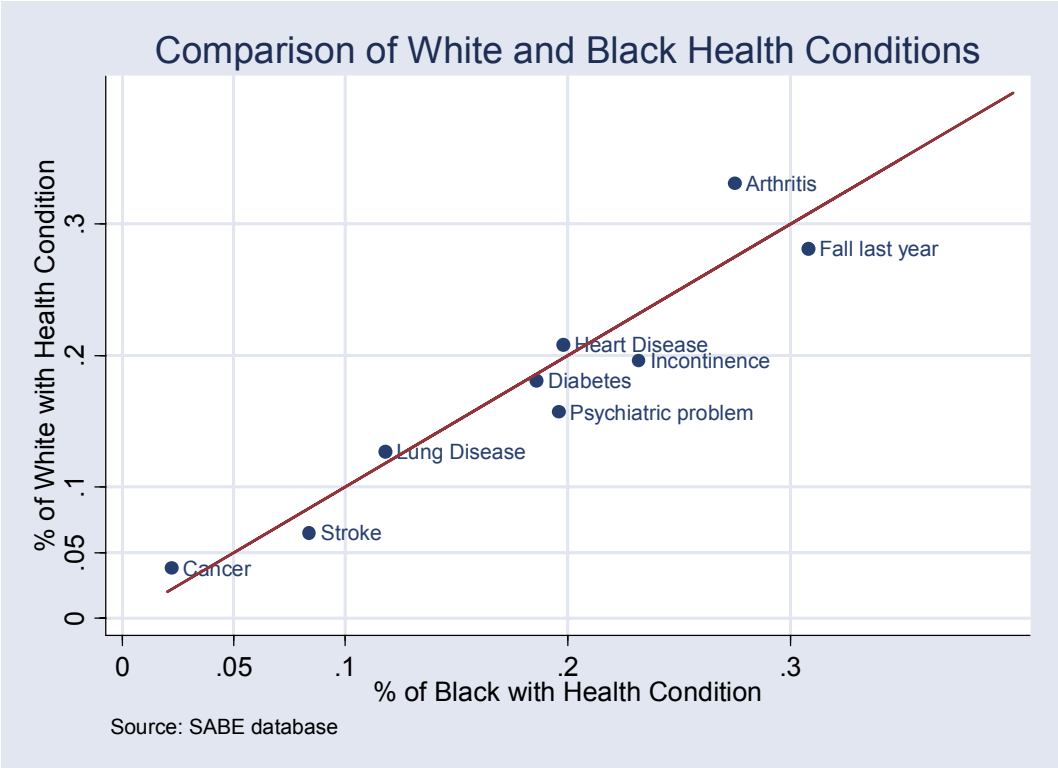


Socio-economic differences have been reported to be crucial risk factors in explaining racial disparities in health, but they are not the sole factor (William, 2005). Genetic factors may also explain these disparities. For instance, differences in the distribution of diseases among Whites and Blacks (Figure 3) could be due in part to a genetic predisposition. For example, Blacks are more likely than Whites to report strokes and psychiatric problems, while Whites are more likely than Blacks to report having arthritis and cancer. In addition, the marginal benefit from a particular medical treatment could differ by race due to a specific genetic condition (e.g. organ transplants are more successful in Whites, perhaps because Blacks have greater genetic variation, making matches more difficult). However, the vast majority of the literature on racial disparities in health suggests that differences in socio-economic and cultural environments rather than racial differences in biological factors provide the main explanations for these disparities (for a review of the literature, see Smedley, Stith and Nelson, 2002).

In addition to differences in socio-economic conditions, and genetic predisposition, other factors associated with geographic marginalization, the mechanisms of racism, social context, and access to medical care and quality have been linked to racial disparities in health. Blacks may be more likely to live in areas with poor access to medical care, greater environmental risk, and with lower quality of medical care. These disparities could translate into racial variation in health outcomes. Discrimination could reduce access to the labor market and to other goods and services, which, over time, may affect the health of the individuals. Furthermore, discrimination itself may affect the mental health and well-being of an individual by leading to stress, depression, or other mental problems. Thus, even comparing two individuals from equivalent socio-economic

conditions, differences in race could translate into variation in health and health outcomes. Blacks may also suffer from discrimination in access to certain health services. Finally, the social context may influence the variation in timing of care and risk aversion among Blacks and Whites. Notice that the roles of discrimination and social context could differ by cohort. Individuals of different ages could have different life experiences in terms of what race meant in their particular social context.

Figure 3: Comparison of White and Black Health Conditions



All of these factors may interact differently across countries, age groups, and gender. For instance, one might expect that for the elderly, the rate of unemployment would impact health disparities differently than for individuals of working age. These risk factors could affect females and males in varying ways over the life span. Lastly, a country's cultural values, medical care system, and regulations to reduce discrimination could impact racial health disparities.

In this paper, we will address three fundamental questions. (1) Are the racial disparities in health as displayed in Figure 1, Figure 2 and Figure 3, eliminated once one controls for the relevant observable individual characteristics included in the SABE database?; (2) What are the main sources of these racial disparities in health?; and (3) Are differences in endowment equally relevant to racial disparities in health among poor Black and White seniors compared to race disparities in health among rich Black and White seniors?

Our paper is structured as follows. In the next section, we will describe in more detail the racial disparities in income, wealth, and health. Section III documents additional differences between Whites and Blacks besides those differences in income and wealth that could account for the racial disparities in health among the elderly in Sao Paulo, Brazil. Section IV presents the econometric strategy implemented we employ to disentangle the effect of differences in endowment, or observable individual characteristics, from the effect of differences in the marginal impact of each risk factor. Section IV describes the SABE dataset in detail. Section V presents the main findings. Finally, Section VI concludes and establishes the main policy implications we draw from these results.

The Extent of Racial Disparities in Health and Income Among the Elderly in Sao Paulo, Brazil

The rate at which health deteriorates among the elderly depends on a complex mix of past and present events, which may differ across ethnic and racial groups. Studies in developed countries suggest that social characteristics may explain 25% of the variation in seniors' health (Vaupel, 1998). These factors include: education and socio-economic status, which directly and indirectly affect the ways in which individuals accumulate health capital over time; nutrition and infections early in life, each of which may have long term health consequences; and environment and social support during the working years, which may partially determine longevity. At most, half of the variation seems attributable to current environmental, economic, and social conditions, which are commonly cited as explanations of both health in old age and of the patterns in which it deteriorates. Current disparities in health among racial groups probably reflect this influence in a different pattern of a complex combination of cultural, behavioral, environmental, genetic and socio-demographic factors over the life course. Importantly, economic resources may play a smaller role among seniors than among younger generations in the accumulation of health stock.

Table 1 presents weighted summary statistics of the disparities in health conditions by gender for Whites and Blacks in old age. This preliminary analysis helps to motivate the development of a full econometric model to explain the effects of race on health inequalities. As Table 1 and Figure 1 show, for both males and females, SRHS is better and the ADL and IADL indices are higher among White seniors than Black seniors. Black females report the lowest functional health status among all groups. Although not shown, these differences persist across all age groups. The gradients of health deterioration differ between the two racial groups. For instance, SRHS declines at a slower rate for Black seniors than for White seniors. Since measures of functional status such as SRHS, ADL and IADL may not be entirely accurate indicators of individual health, it is important to evaluate additional measures.

Black females are more likely to report life-threatening conditions including hypertension, diabetes, and stroke, while White females are more likely to report cancer and lung disease. Black males are more likely to report hypertension and stroke.

Hypertension is usually associated with other dangerous medical conditions that differ by race such as stress and obesity. A higher prevalence of hypertension and diabetes are also factors that may explain the higher prevalence of stroke among Black males. These differences in health conditions are consistent with reports of race disparities in health among the elderly in the U.S. For instance, Williams (2005) reported a higher unadjusted mortality rate for Blacks than for Whites for several causes of death: heart disease, cancer, stroke, hypertension, and diabetes, among others. Day (1990) also reported that ethnic minorities are more likely to inherit blood disorders, coronary heart disease, diabetes, and perinatal mortality.

Interestingly, the lower prevalence of some disabling conditions among Blacks in the SABE data set may be the consequence of later diagnoses of disease. Yet, both Black males and Black females are more likely than White males and females to report a fall in the last 12 months; and Black males are twice as likely to report an incontinence problem as White males. Taking these results together suggest that Black seniors may have more severe untreated health problems than White seniors. This delay could be related to less frequent use of medical services and lower quality of care available for Black seniors. As Table 1 shows, Blacks are less likely to use hospital and physician services. Factors related to access to health care and quality could be additional underlying explanations for these differences in health. An extensive review of the U.S. literature (Smedley, Stith, and Nelson, 2002) indicates that Blacks, and minorities in general, experience greater difficulty obtaining healthcare, have geographically fewer choices, and are more likely to receive care in hospital emergency rooms. Furthermore, minorities are less likely to make routine medical visits, and in general receive a lower quality of care than Whites. For example, the authors found that Blacks are less likely than Whites to receive appropriate cardiac medication or to undergo surgery at the appropriate time, even after the authors controlled for relevant covariates. Blacks with end-stage renal disease are less likely to receive peritoneal dialysis and kidney transplantation. Black seniors with congestive heart failure or pneumonia received lower quality of care than Whites. Lastly, for many conditions (e.g., cancer) the authors found that racial and ethnic minorities wait longer than Whites to receive treatment and are diagnosed at later stages in the disease.

Blacks are more likely than Whites to report lower cognitive scores[39] and higher prevalence of emotional, nervous or psychiatric problems that could translate into a diminished ability to conduct their normal activities and to seek medical care. The lower mental health status among Black seniors could be due to chronically higher levels of stress. These results contradict findings reported in the U.S., where Black seniors are more likely to report better mental health than White seniors (Smedley, Stith, and Nelson, 2002).

Weight and height have also been suggested as measures of individual's health. Using time-series data from developed and developing countries, greater height and weight have been consistently associated with lower mortality rates. The main advantage of these indicators is that errors measuring these variables would not be correlated with any

[39] In the SABE survey, the evaluation of an individual's cognitive capacity was performed combining the Mini Mental State Examination developed by Folstein et al., 1975 with the Pfeffer Scale (1982).

individual's characteristics. As expected, on average, males are taller and heavier than females; however, once one controls for gender, White and Black seniors show very similar height and weight.

Exploring income and wealth differences among racial groups could be informative in disentangling disparities in functional health and morbidity outcomes among racial groups. Contemporaneous income and wealth correlate directly with an individual's present health (e.g., economic status may alter an individual's choice of risky behavior, an individual's level of investment in preventive healthcare, or determine one's living conditions); those who are poor have fewer resources to afford healthcare or health insurance. Fortunately, the SABE data set contains information about an individual's total financial resources, from both working and non-working sources, as well as a measure of total assets in the household. The wealth variable provides useful information regarding available financial resources in the long run, particularly in the case of seniors who are already retired and report no working income. This variable was constructed using a principal component index of a list of assets in the household. The income variable was constructed by the summation of income from the following sources: current salary if she/he is working; resources coming from retirement funds or pensions, resources from family members, rental or banking income, and income from social welfare subsidies. Wealth and income measures were both adjusted for household size.

Table 2 shows that a Black senior in Sao Paulo is more likely to report lower income as well as lower wealth than a White senior[40]. Furthermore, a Black senior is more likely to be in the lower half of the income and wealth distribution than a White senior. These findings are consistent with other results reported for Brazil. For instance, Olinto & Olinto (2002) report that regardless of age, Black and Brown women have less education, lower family income, and poorer housing conditions than White women. Burgard (2004) reports that the geographic history of slavery and European immigration lead to a concentration of Whites in more affluent and metropolitan areas, while Non-Whites were more likely to live in poor and less developed areas. Although the information is not reported in the SABE data set, it has been reported elsewhere (Beato, 2004) that the racial gap between household income and wealth also exists during early childhood and working years. Beato (2004) also compares Blacks and Whites using the Human Development Index (which is an index based on income, education and life expectancy); Blacks report lower HDI than Whites, and no State reports a higher HDI for Blacks than for Whites. According to the same author, poverty (measured by per capita income) is concentrated in the Black community and remained stable over the past ten years. Blacks represent 63% of the poor population in Brazil. The current racial disparities in health among the elderly could be the consequence of accumulated differences in income and wealth during earlier years.

Table 3 shows the income, wealth, and health gradients obtained in the SABE dataset. The results indicate that higher income and wealth translates into better SRHS, ADL and

[40] The sampling design in the SABE data set accounts for potential problems of under-representation in the final sample of individuals over 80 years of age as well as institutionalized individuals. Thus, the sample represents all seniors in Sao Paulo, Brazil.

IADL scores. Poorer people are more likely to report higher morbidity than affluent people. This strong correlation between income, wealth and functional health status remains when one looks within each race. According to these findings, a poor (based on income and wealth) White senior has a better SRHS than a poor Black senior. Likewise, a wealthy White senior has a better SRHS than a wealthy Black senior (based on income as well as a wealth index). However, one should keep in mind that SRHS is a measure adapted to each individual's reality; therefore, there may be individual differences in self-perception of poverty and personal health within seniors of different races. Furthermore, measurement errors in SRHS could be correlated with socioeconomic conditions. For instance, individuals tend to assume that they are in good condition unless medical information is provided to suggest otherwise; thus, if poorer individuals are less likely to report healthcare use, one may expect a systematic error in SRHS. Error in the SRHS could also be associated with education. People with better knowledge and access to the health care system might report themselves in worse health. Interestingly, the racial disparities in the relationship between wealth and income and alternative measures of health status such as ADL and IADL are not as strong as the relationship suggested when one uses SRHS.

Despite the fact that a strong association between income and health exists in the data, these findings are not conclusive evidence of the causal effect between income and health. Feedbacks from health to income may still be present even at old ages. For instance, as shown in Table 4, individuals who report poor health have lower wealth than individuals who report very good and excellent health. Individuals in poor health could be more likely to retire earlier, which in time explains fewer available financial resources. The same positive gradient between health and financial resources also happens when one considers income.

In sum, the previous analysis suggests that there are important racial disparities in health, income, and wealth. However, by looking at these findings one cannot determine whether additional income benefits health for a Black senior in the same manner as it does a White senior. It is also not possible to tell if this income effect is constant across a given income level. Furthermore, past and present income and wealth disparities could also translate into other individual differences such as nutritional status, educational profile, or even occupational history, which in time may explain differences in health deterioration with age. Disparities in income could also reflect geographic differences in access to healthcare. These risk factors correlate with income and wealth as well as with health. Thus, the racial disparities in health among the elderly reported in Table 3 could reflect a complex web of factors that interconnect differences in income, wealth, and other individual characteristics. Reverse causation from health to income could also be present in the data. The next section explores whether Whites differ from Blacks on other risk factors associated with health outcome.

Other Potential Demographic, Socio-economic, Family Support and Baseline Health Differences Among Race Groups

Racial differences in income and wealth could be central to the explanation of racial disparities in health among the elderly in Sao Paulo, Brazil. However, other individual

and community characteristics may also influence these racial differences in health. For instance, despite income level, occupational characteristics may represent a source of social support or environmental risk that impacts an individual's health. Furthermore, the availability of insurance could be a risk factor that affects access to medical care. For the purpose of this analysis, we collapsed the main relevant variables in the SABE data set that influence an individual's health into four vectors. Table 5 presents a comparison of White and Black demographic, socio-economic condition, family support and baseline health conditions. Several results in this table are noteworthy.

Blacks and Whites have similar age and gender compositions. Also, a similar percentage for both race groups report living alone. Given these similarities, one might expect that the main racial disparities in health are not driven by differences in age, gender, or even living alone. Nevertheless, one should keep in mind that although the age and gender composition of both racial groups is similar, an additional year of life could impact the health deterioration of White seniors differently from Black seniors. Likewise, similar endowment in the other variables could have different marginal effects on the health of White and Black seniors. Gender may play a role in the racial disparities in health, since females are more likely to live longer than males. Furthermore, widowhood could also explain the disparities in health; for instance, a Black widow may report a different health status than an asset-similar White widow.

Black seniors are more likely to report themselves to be immigrants and less likely to be married. The ethnic background of an individual could help to explain variations in health both within-race and between-race (LaVeist, 1994). For instance, individuals of the same race but from different countries of origin could have different dietary practices that affect their health. Current marital status could have a different protective effect on health by race among the elderly. For instance, using data from the U.S., Rushing et al., 1992 reported that marriage is more beneficial for White women than Black women. Different cultural backgrounds could also affect an individual's health. In both cases, these differences in individual characteristics could play a role in the racial disparities in health among seniors in urban areas.

Exploring how disparities in socio-economic conditions could affect the health of the seniors is of particular relevance for the cohort of individuals included in this analysis. Table 4 shows that Black seniors are less educated and report a lower literacy rate than White seniors. Less educated individuals could have less knowledge about medical treatment and the risk factors associated with certain behavior, be less able to provide self-care to prevent future health problems, and be less aware of environmental risks. Also, more years of education translate into better economic conditions, which may also affect an individual's health. It is important to keep in mind that education in the SABE dataset is based on years of education attained; we do not have a way to control for quality of education. This could be relevant, since the cohort of individuals included in this analysis are men and women born in the early decades of the last century, in a context where education, employment and other social opportunities were less available to Black individuals in Brazil than they are now.

Blacks report lower household and vehicle ownership. Consequently, one may expect that the differences in education compound the racial disparities in health among the elderly that result from differences in present levels of income and wealth. According to the World Bank (2003) for Brazil, Blacks of working age had less education, higher unemployment rates, were more likely to be employed in the informal sector, had fewer assets, reduced access to public services and occupied lower positions in the occupational structure of the society.[41] Taken together, these factors may imply that life experiences for Blacks are less positive than the experiences of Whites. These different life experiences also might serve to explain racial inequities in health during senior years.

Although not shown in Table 5, White seniors are more likely to be currently employed than Black seniors. It has been reported in the literature that seniors working outside the home tend to be healthier than non-workers. This effect has been established to be different for Black and White seniors (Waldron and Jacob, 1989). Furthermore, previous studies found that job satisfaction and type of job were mediators of the impact of employment on an individual's health. Interestingly, Rushing et al., 1992, reported that employment was a much better predictor of health for Blacks than for Whites. Yet, this relationship could also be causal, from health to employment status. Healthier people could be more likely to work longer hours and have higher earnings. A sick senior may be inclined to leave the work force in order to receive government financial support.

Exploring the data, one finds that both races have a similar proportion of individuals with public insurance. In Brazil, there are explicit policies to guarantee access to medical care to all seniors. Healthcare is heavily subsidized in the public sector and usually can be purchased at very low, or zero cost. However, Whites are more likely than Blacks to report having private health insurance (See Table 5). In this context of universal access, the availability of private health insurance could imply access to better quality of healthcare, and better health outcomes for White seniors than for Black seniors. If the quality between public and private providers is similar, the consequences in terms of health of these racial disparities in private health insurance coverage would decline. In sum, current racial disparities among seniors could also arise because of differences in the availability of private health insurance among White and Black seniors.

Differences in access to healthcare due to low income or lack of health insurance may be associated with poorer health outcome. Even after adjusting for racial inequalities in socio-economic conditions, circumstances at both the provider and the patient level could create potential sources of racial disparities in access to healthcare. Because of discrimination or stereotyping, a physician might be less likely to provide a specific treatment to a Black senior than to a White senior. Furthermore, patients of different races could adhere to the same treatment differently, or have different preferences for determined treatments. Elements inherent to the healthcare system could also explain

[41] Some researchers have used type of occupation as a proxy for current socio-economic conditions for the elderly. However, problems associated with measurement of the variable during the senior years, and racial variation in the role of each occupation on an individual's health suggest that a better alternative to capture the impact of available economic resources on an individual's health would be to use wealth and total income.

disparities in healthcare. On the one hand, availability of insurance could make a specific patient more attractive than another. On the other hand, geographic areas with low reimbursement rates from insurance companies might reduce the quality of supply where Blacks and poor individuals are more likely to live. Using the SABE data set, we could not evaluate the supply factors that may explain the observed racial inequalities in healthcare.

Black seniors have a larger number of people living with them, as well as larger numbers of siblings. Given the potential positive effect on health of larger numbers of household members, one may argue that these differences in endowment of family support could mitigate the racial disparities in health that would have otherwise existed. On the other hand, larger household size may imply that more individuals are dependent on the income of the seniors. As a consequence, the net effect of larger families on health could be mitigated. This is potentially the case in Brazil where many households depend solely or mostly on the income of senior individuals. As Table 5 shows, Black seniors share their income with more individuals than do White seniors (2.68 vs. 2.29).

Interestingly, Black seniors are more likely than White seniors to be past or present smokers, come from a poor family background, have worse health during the first 15 years of their life, and suffer from starvation during their first 15 years of their life. Caloric intakes predict better health and greater longevity if one survives the first years of life. All of these factors clearly have a long-lasting negative impact on an individual's health over his lifetime. In their seminal article, Rosenzweigh and Shultz (1983) developed a model that incorporates how these past family background factors, which often arise during childhood, may impact an individual's health. Contemporaneous racial disparities in health and health-related behavior could be due to present differences in income and wealth between both races, but they also may be due to the cumulative effects of initial disadvantages in environment and socio-economic conditions during early childhood. These cumulative effects would be the net result of feedbacks in the relationship between health, socio-economic and environmental conditions that prevailed over the life cycle. These risk factors presumably interact in a complex way to explain the present racial differences in health that we observe.

Conceptual framework and empirical strategy

Conceptual framework

The classical economic model developed by Grossman (1972) is now commonly used as a conceptual framework to study the determinants of individual health. The advantage of this framework is that it yields theoretical insights into the effects of economic and non-economic variables on the demand for health and medical care services, insights that have proven susceptible to empirical verification.

In the literature, researchers generally use individual data to analyze the relationship between health and race by setting up a reduced form equation of health as a function of race, controlling for relevant demographic, socio-economic and baseline health covariates. The covariates are added sequentially to analyze the remaining influence of

race on health as successive factors are taken into consideration. Because the self-reported health of an individual is a common health outcome reported in observational data, statistical models for categorical variables are usually implemented separately for males and females. Nevertheless, empirical research done in the past suggests that using simple ordinary least square (OLS) estimation yields results similar to estimations using more complex categorical variables, such as logit, probit, or multinomial probit, among others. Alternative indicators of health status that have been proposed in the literature include: work disability, hospital admissions, length of stay, existence of acute and chronic conditions, and ADL and IADL indicators. Typically, a dummy variable for self-reported race has been used as the main independent variable. Researchers often create interactive dummy variables with other covariates to explore differences in the partial effect of certain variables across racial groups. To further investigate the sources of racial disparities in health, health economists have recently employed the Oaxaca-Blinder decomposition approach. This method has been widely used in the labor economics literature to investigate differences in wages across racial groups. Finally, problems of bias in the estimates due to feedbacks from health to an endogenous variable (e.g., income) have been mainly dealt with in the literature by using longitudinal data and an instrumental variable approach[42].

In this research, we will implement the conceptual framework proposed by LaVeist (1994). In that framework, race is a latent (unobserved) factor, and skin color is the most common manifest indicator. Societal norms determine how an individual's race is derived from his or her skin color. It is common for an individual to self-identify as one race based on his or her cultural ties and yet have another race ascribed to her/him based upon outward appearance, for example, upon admittance to a hospital. In LaVeist's view, risk exposure, illness factors, and both societal and cultural elements are presumed to affect an individual's observed health outcome in ways that may coincide with, or span race. Societal factors refer to external elements of an individual or household, which affect health (e.g., poor sanitation in poor communities, rate of homicide, and availability of other public services or access to medical care and quality of care). Cultural factors refer to internal elements related to individual or intra-group behavior (e.g., dietary practices, smoking, drinking, or the custom of providing a home to one's parents). Risk exposure captures environmental elements such as the geological condition of an area, or the availability of resources such as water and air, among others. Illness factors capture biological conditions such as genetic predisposition and/or risk exposure to specific illnesses. In this framework, there is an assumption of homogeneity within socio-economic and demographic groups. The key contribution of this conceptual framework is that the most important manifest indicator may or may not be the one normally associated with race in a society. For example, societal and cultural factors may differently influence the health outcomes of a "white" individual of European background and those of another "white" individual whose skin color is the same as the first, but whose background is indigenous.

[42] See Smith and Kington 2000, for a excellent description of how to identify the causal pathway between socio-economic conditions and health outcomes and viceversa.

To implement this framework empirically, we will follow the model specification suggested by Wagstaff and van Doorslaer (2000). For estimation purposes, a model where the latent variable race is measured with an error term is considered. For simplicity, instead of presenting one health equation for each racial group, one structural health equation for the entire population (linear in its parameters), is presented here:

$$(1) \qquad Health = \beta_0 + \beta_1 Race + \beta_2 Control + \beta_3 Control \times Race + \mu$$

The measurement error in the population is due to the differences between race and the skin color indicator, and is defined to be: $\varepsilon = Skin - Race$. Therefore, the equation to be estimated will be:

$$(2) \qquad Health = \beta_0 + \beta_1 Skin + \beta_2 Control + \beta_3 Control \times Skin + \eta$$

where *skin* is the manifest dummy indicator of race, *control* is a vector of current and cumulative observable random variables, the last variable in the series represents a vector of the interaction between the dummy variable skin and each relevant observable variable, and η is the error term, which accounts for unobservable individual characteristics in health (μ) and the error in measurement (ε). Notice that one may estimate a different equation for each race, and therefore the interaction between covariate and skin is no longer necessary. Examples of variables that measure current information include: current marital status, age, gender, individual income, household assets, occupation, age at retirement, family support, and the number of children. Variables that measure cumulative effects include, among others: number of past marriages, past health conditions and occupational history.

The parameters to be estimated are $\beta_0, \beta_1, \beta_2$, and β_3. β_2 and β_3 are vectors of parameters themselves; how many parameters are included in each depends on the number of control variables incorporated in the model. It is important to realize that running equation (2) with only the skin variable will give biased estimates of racial disparities in health. Using additional control variables one can determine the sources of health disparities. For instance, if the influence of the skin variable declines after controlling for socio-economic condition, one may conclude that the initial aggregate racial disparities in health are due to differences in socio-economic characteristics among the racial groups.

Some features of the data are important to note at this level. Since the SABE survey contains several different indicators of health status and health care usage, Equation (2) can be estimated using alternative measures (see the vector of dependent variables in Table 6). In addition to self-reported skin/race, the SABE survey contains information about an individual's country of origin, which allows one to control for cultural factors that may affect an individual's health. Such information will reduce the measurement problems in the variable race that have been present in previous empirical work. The database includes information on individual income, consumption and asset composition at the household level, and provides a full occupational and educational history for each

individual. Consequently, the analysis will include a full set of socio-economic information at the individual as well as at the household level as control variables. Finally, the data also allow one to control for differences in baseline health and in the condition of family support.

Econometric strategy

Two approaches are implemented in this analysis. First, a multi-stage analysis similar to the one proposed by Wagstaff and van Doorslaer (2000) helps to pinpoint the effect of each vector of covariates on racial disparities in health. Second, the previous framework is used to explore the sources of racial disparities in health using the Oaxaca-Blinder decomposition. Table 6 lists each vector and the list of variables inclusive in each. One should notice that these covariates capture past and present individual characteristics that affect the health of White and Black seniors.

For the first part of the analysis, Equation (2) is estimated for three dependent variables, SRHS and the ADL and IADL indices. Six estimations are performed. The first set of estimates uses the skin variable with no controls. A second set of estimates uses skin plus the vector of basic individual characteristics such as age, gender, immigration status, marital status and living conditions. The third, fourth and fifth sets of estimates sequentially incorporate, along with skin and the vector of demographic characteristics, each of the remaining vectors. For instance, the third set of estimates includes the following: the skin variable, the vector of individual characteristics and the vector of socio-economic characteristics. The last set of estimates includes the skin variable with all of the vectors used in the empirical analysis. Given the size of the treatment and control groups, the estimation will not be conducted separately for males and females. Simple OLS models will be implemented.

Three potential econometric issues will be addressed to obtain the relevant parameter estimates for the variables of interest. (i) The independent variable of interest is race but SABE reports the manifest indicator "skin color". One may argue that this is an example of the typical problem of measurement error in the explanatory variable. Therefore, additional control for an individual's cultural background will be used. (ii) There may be heteroscedasticity problems; the traditional assumption of constant variance of the error term may not hold in this case since large families may have larger variance in the disturbance terms. A White standard error correction will be implemented to obtain more accurate estimates of the standard errors. (iii) Correlation of income and the error term: We will start by treating an individual's socio-economic condition as an exogenous factor. We will also conduct different specification tests that compare the full model with a model that excludes different measures of the income variable. In addition, household assets will be used as instruments[43].

The second approach (Oaxaca-Blinder decomposition) also takes advantage of the framework developed in the previous section. In particular, the health equation (2) is first estimated separately for each skin group. Then the method quantifies the variation in health according to three sources: (i) differences coming from each covariate (i.e.

[43] A principal component technique will be used to collapse all the information about household assets.

variation in endowment); (ii) differences coming from the marginal effect of each risk factor on the health of White and Black seniors (i.e. variation in marginal effect); and (iii) unexplained differences coming from non-observable covariates (i.e. variation in the constant model).

To sort out the sources of these differences, the method subtracts the estimated health equations for Whites and Blacks and rearranges the results in the following fashion:

(3) $Health_{WHITE} = \alpha_W + \beta_W X_W + \eta_W$

(4) $Health_{BLACK} = \alpha_B + \beta_B X_B + \eta_B$

(5) $Health_{WHITE} - Health_{BLACK} = (\ddot{X}_w - \ddot{X}_B)\ddot{\beta}_W + (\ddot{\beta}_W - \ddot{\beta}_B)\ddot{X}_B$.

$\ddot{X}_w, \ddot{X}_B$ are the mean values of each control variable for Whites and Blacks, while $\ddot{\beta}_W - \ddot{\beta}_B$ are the estimated coefficients from Equations (3) and (4) for each covariate.

The first term in Equation (5) indicates the racial disparities that come from differences between Black and White seniors in the average magnitude of each control variable, holding constant as marginal effect the estimated effect of each variable on the health of White seniors. The second term in Equation (5) indicates the variation that comes from differences in the marginal effect of each risk factor on the health of White and Black seniors, holding constant the average level of endowment for Blacks. Lastly, the differences in the constant of each model are also taken into consideration.

In short, if one assumes that White and Black seniors differ only on the level of present income (i.e., White seniors have higher incomes than Black seniors), then the first term of Equation (5) would indicate what proportion of racial disparities could be reduced if one provides Black seniors with the average income of White seniors, and assumes that the marginal effect of this extra income is exactly what White seniors would have received. The second term would suggest the proportion of racial disparities in health that could be reduced if one assumes a similar marginal effect of extra income for both races starting from the average level of income of Black seniors. Finally, differences in the constant term capture the influence of all remaining factors other than income that may affect the health of White and Black seniors.

Notice that one may estimate each component of Equation (5) using an alternative reference group. For instance, the impact of differences in endowment could be calculated using the estimated coefficients for Black seniors as a reference. Likewise, the second term in Equation (5) could be estimated using the average level of endowment for White seniors. In this analysis, we explore the sources of racial disparities in health using the reference groups indicated in Equation (5). The control variables simultaneously include the vectors of demographic characteristics, socio-economic condition, the family support condition, and baseline health status. OLS models are used to estimate Equations (3), (4) and (5). Finally, calculations of the proportion of racial disparities due to endowment, marginal effect and differences in the constant of each model are done

separately for those individuals in the lower half of the income distribution and for individuals in the upper half of the income distribution.

Data source

The SABE database is a cross-sectional survey that collects information about the health status and health conditions of the elderly population in seven representative cities in Argentina (Buenos Aires), Barbados (Bridgetown), Brazil (Sao Paulo), Chile (Santiago), Cuba (Havana), Mexico (Mexico City) and Uruguay (Montevideo). The survey includes representative stratified samples of individuals older than 60 years of age that reside in private households living in selected urban areas. The samples were obtained from recent surveys that provide accurate sampling frameworks. In addition, the sampling design accounts for the potential problems of under-representation of individuals over 80 years of age in the final sample, as well as institutionalized individuals. The information included in the survey is similar to that provided by the Health and Retirement Survey (HRS) in the U.S. (Palloni, 1999).

This analysis uses only the data collected in Brazil. The final response rate in this country was 84.6%, which included a total of 2,142 observations in the database. For more details of the sampling design, see the User's Manual for the SABE databases (Pan American Health Organization).

Sao Paulo is the capital of Sao Paulo State in southeastern Brazil. The city had a population of 10.9 million in 2003, making it the largest city in the country. According to the last census data, 18.2 million people live in the greater Sao Paulo metropolitan area, making it the largest in South America and the second-largest in the world.

Key features of the SABE survey (mentioned above) make it particularly suitable for answering our questions. Table 6 describes all dependent variables, the independent skin variable, and some of the control variables to be incorporated in our statistical analysis. Table 6 is a relevant (albeit partial) list of variables available from the long version of the SABE survey.

Sources of racial disparities in health

In this part of the analysis, we will address three fundamental questions using two different approaches. Are the racial disparities in health (as displayed in Figure 1, Figure 2 and Figure 3) eliminated once one controls for the relevant observable individual characteristics included in the SABE database? What are the main sources of these racial disparities in health? Are differences in endowment equally important explanatory variables for the racial disparities in health among poor Black and White seniors compared to wealthy Black and White seniors?

Multi-stage analysis

Table 7 shows the estimated coefficient for the skin variable (i.e., the proxy for race) under six scenarios. When one controls only for the skin variable (Scenario 1), race seems to be an important factor for explaining differences in health only in the case of self-reported health status; for the other two measures of functional health (ADL and

IADL), race is not an important explanatory variable. For all measures of functional health, the estimated negative coefficients imply that Black seniors have lower functional health than White seniors. In this section, only the results using SRHS are discussed. SRHS has been reported consistently as a strong predictor of an individual's subsequent morbidity and mortality (Allison and Foster, 2004; Sadana, 2001, and Strauss and Thomas, 1998). This strong relationship between SRHS and subsequent mortality has been attributed to the fact that SRHS may capture the onset and severity of future medical conditions (Sadana, 2001; Thomas and Frankenberg, 2000).

As initially expected, Black seniors have a lower SRHS than White seniors even after controlling for fundamental individual characteristics (Scenario 2). The overall effect of race on health is thus less than in previous estimates. Since the control and treatment groups are very similar in terms of gender, age, and living alone status, this result suggests that the differences between Black and White seniors, in terms of the protective effect of marriage as well as in terms of immigration diversity, could play a role in explaining the racial disparities that are primary interest to us. Since the skin coefficient is still significant, one may argue that there are still other factors that account for these disparities.

When one controls for different dimensions of the economic resources available, the effect of race on health is reduced. According to our results (see Scenario 3), reducing present socio-economic differences in education, literacy, income, wealth, insurance availability and home ownership (among other socioeconomic factors) would reduce the racial disparities in health more than they would be affected by reducing race differences in endowment related to family support and baseline health conditions. This suggests that much of the racial difference in health among the elderly comes from current socio-economic conditions. Yet, even after controlling for socio-economic differences among these Brazilian seniors, race remains an important factor for explaining the variation in health across senior individuals. Finally, given the cross-sectional nature of the dataset, it is not possible to establish the exact causal pathway between socio-economic conditions and health.

Incorporating control variables for family support conditions also narrows the health differences. In this calculation, the skin coefficient declines from -0.329 to -0.282. Interestingly, in this case, since Black seniors have stronger family support than White seniors, we might expect that the skin coefficient would be of a higher magnitude (in absolute value) than the race coefficient in Scenario (2). Instead, this result suggests that weaker family support, having more siblings, may have a protective effect on the health of White seniors. Although the SABE dataset does not have the necessary variables to test this hypothesis, this result may imply that White seniors who are already in good health tend to stay in smaller households. On the other hand, larger households could imply that the help among household members is diffused away from the seniors in the house and shared among the rest of the family members.

As previously mentioned, Black seniors tend to come from poorer environments, have a poorer nutritional status, and face more severe health problems early in life than do White

seniors. Controlling for initial baseline health also reduces the racial disparities in health among seniors. These results are consistent with previous research in the U.S., where empirical findings suggest that health among seniors is partially explained by living conditions in the first 15 years of an individual's life. Yet, race is still an important risk factor for explaining health variation across these seniors after accounting for baseline conditions.

One may infer that eliminating differences in socio-economic and baseline conditions as well as in family support separately would not completely eliminate the health disparities we observed among White and Black seniors (see Table 7). Racial health disparities do not disappear even if one controls simultaneously for all covariates in the model; the estimated skin coefficient declines but is still statistically significant at -0.164 (p value < 0.01). This suggests that Black seniors report lower SRHS even after taking differences in endowment into consideration. This remaining gap in health between the two races comes from unobservable individual or community characteristics which are not fully captured in the SABE data. For instance, one might argue that Blacks have less access to medical care and good quality of care which, in time, explains the remaining disparities in health and health outcomes. Social discrimination and geographic marginalization could also play a role in explaining the racial gap. Alternatively, the estimated race coefficient could still be significant because of inherent genetic differences between Blacks and Whites. However, given the cross-sectional nature of the data, we can only speculate about the possible reasons for the remaining differences in health for these Black and White seniors.

In sum, racial disparities in health do not disappear even after controlling for relevant observable factors in the SABE dataset. Analysis using other measures of functional health indicates that racial disparities in health among the elderly could be completely eliminated if one could level the playing field in terms of socio-economic conditions, baseline health and family support.

Oaxaca-Blinder decomposition

In this section, we will discuss the Oaxaca-Blinder decomposition results. Table 9 summarizes the sources of racial disparities in health when one uses SRHS, ADL and IADL. Table 10 presents the results when the analysis is conducted by income group. Before discussing these findings, it is important to understand the implications of each element presented in these tables. The first row in the table represents the first component of Equation (5). Yet one needs to keep in mind, prior to any interpretation, that the number in Table 9 (e.g., for SRHS, it is 14.6) represents the net sum of positive and negative effects of each variable used in the analysis. Although available, the separate result for each variable is not shown. In addition, the second row, Part (a) represents the second component of Equation (5). The third row, Part (b) represents differences in the model constants. In all cases, a positive number indicates an advantage for White seniors, while a negative number indicates an advantage for Black seniors. As in the previous case, we will discuss the results as they relate to the self-reported health status indicator.

Based on endowment characteristics, White seniors have an advantage in SRHS over Black seniors. Most of these differences in SRHS come from disparities that favor White seniors in terms of education, wealth and, most notably, differences in living conditions during the first 15 years of life. Surprisingly, the highest contribution to the variation in SRHS attributable to observable explanatory variables comes from the condition of living in a rural area during the first five years of life. The second most important component is the consequence of differences in present wealth between White and Black seniors. According to these results, 48% of all the differences in health could be attributable to disparities in observable characteristics between White and Black seniors. The remaining disparities in SRHS (52%) come from variation in the coefficients (the second term of Equation 5) and differences in the model constants.

Table 8 shows within-race and between-group variation in the determinants of health. One may conclude that the marginal effects of age, immigration and economic status during the first 15 years of life are the main factors that contribute to the variation in health that is attributable to the coefficients (i.e., -114.9, see Table 8). Most of these differences favor Black seniors. At the same time, from Table 7 one should also notice that the marginal effect of most of the variables used in the analysis have the same sign, but differ slightly in magnitude for both races. For instance, wealth has a positive effect on health for both races, but the marginal effect of wealth is similar for Black seniors and White seniors. Interestingly, living in a rural area during the first 5 years of life has a similar negative marginal effect for both races. Therefore, one may conclude that the racial disparities in health from this variable are mainly due to differences in the initial conditions for White and Black seniors. Likewise, differences in socio-economic conditions favor White seniors in terms of initial levels of endowment, but additional levels of these variables would benefit both races in a similar fashion. Finally, as Table 8 indicates, the variation in health that is captured in the constant terms favors White seniors rather than Black seniors.

Using the Oaxaca-Blinder approach, one may conclude that a significant portion of the health variation between Black and White seniors shown in Figure 1 and Figure 2 comes from variability in endowment between the races in terms of past and present conditions. Most notably, living in rural areas during the first 5 years of life seems to have long-lasting effects on the health condition of these older Brazilians. As we initially suspected, current wealth and income play a fundamental role in the disparities in health. In other words, these results suggest that eliminating past differences in the living conditions between White and Black seniors, as well as reducing disparities in current income, are the two most important factors for eliminating the current racial disparities in health in this study population. Surprisingly, the marginal effects of socio-economic and past health conditions on an individual's health tend to be very similar for the two races. Clearly, using these data we could not sort out how past living conditions operate to reduce an individual's health. However, earlier living conditions may directly affect the health capital of an individual as well as his or her wages and educational capital over the course of his life, which in time also impacts how an individual's health changes over time.

Now we will ask whether observable characteristics play a different role for individuals in the lower half of the income distribution compared to individuals in the upper half of the distribution. Table 10 presents these results using total income; although not shown, the results are similar when one uses wealth. The variation in SRHS attributable to all explanatory variables for individuals in the upper half of the income distribution is lower than the variation for individuals in the lower half of the income distribution (27.5% vs. 116%). For both income groups, the differences in endowment favor White seniors. Yet, for individuals in the lower half of the income distribution, wealth and education are the variables that contribute the most to the 14.1 percent variation in favor of White seniors.

Exploring the variation for individuals in the upper half of the income distribution, one notices that variability in endowment due to observables is not only smaller as a percentage of the total disparities in health, but the source of the disparities also varies with respect to the group at the bottom of the income distribution. In fact, the principal differences in endowment between affluent White and affluent Black seniors (12.2) come from risk factors such as living in rural areas during the first 5 years and self-reported health during the first 15 years of life. The role of current wealth and present socio-economic condition in explaining racial variation in health among individuals in the upper half of the income distribution is smaller than the role among individuals in the bottom half of the income distribution. Furthermore, disparities not attributable to observable characteristics are more significant for reducing the health disparities among wealthy seniors than among poor seniors.

Concluding remarks

This research contributes to the health economics literature in developing countries by presenting evidence of racial disparities in health among seniors in Sao Paulo, Brazil according to functional health status, the prevalence of some chronic and acute conditions, and disabling conditions. Unexpectedly, these results are consistent with the extensive literature on developed countries related to racial disparities in health, where many have argued that some, but not all, of the racial disparities in health could be accounted for by eliminating current socio-economic differences. The aim of this paper was not to identify the causal pathways for each race from health and socio-economic conditions to health. Instead, the goal was to describe potential underlying factors behind the racial disparities in health that we observed. The rich nature of the SABE dataset allows us to describe the amount of variation in the racial disparity that is attributable to a vast array of contemporary and past risk factors.

The fact that inequalities in health among these two races persist even after controlling for several covariates could be a consequence of several factors. To improve the decision-making process for designing policies for seniors, one important issue we must address is the influence of geographic variation in terms of the availability of care and the quality of care in Sao Paulo among seniors of different races. Diverse geographical mechanisms could operate to explain racial disparities in health. For instance, it could be the case that, even after controlling for case mix and other patient characteristics, Black seniors are under-served compared to White seniors. Under-representation of Blacks and minorities as health professionals may result in different treatment patterns for patients of different

races. Additionally, Blacks could be more likely to live in areas where the quality of care for all types of patients is lower than in areas where White seniors are more likely to live. Notice that in both cases, a policy to ensure equal access among seniors of different races within the same geographic boundaries would do little to reduce the disparities in health. (See Chandra and Skinner, 2003, for an evaluation of this issue.) Blacks may be more likely than Whites to live in areas with fewer providers.

On the other hand, disparities could arise because the quality of health care decisions may differ by race. For instance, Black seniors could be more likely to refuse treatment, poorly follow their prescribed treatment regimen, or even to delay seeking for care. Although using the SABE data set one could not fully explore these hypotheses, the data used in this analysis indicate that Blacks have fewer visits to the hospital and physicians, regardless of the fact that they report a higher prevalence of some chronic and life threatening conditions. In this case, policies to enhance the availability of information would be effective in reducing racial disparities in health among these seniors. Alternative policies could also include greater emphasis on the prevention of those illnesses most prevalent among Blacks seniors, and the development of economic incentives to reduce inequalities in the quality of care provided to Blacks seniors.

In this paper, we also propose a method to unravel the sources of racial differences in health among these Brazilian seniors. According to our results, 48% of the total differences in SRHS among seniors of both races come from observable individual characteristics. The decomposition indicates that racial disparities are not only the consequence of variation in current socio-economic conditions, but also of variation in living conditions during the first 15 years of one's life. Of particular relevance is living in rural areas during the first 5 years of life, which may have long-lasting effects on elders' health.

Interestingly, among individuals in the poorer half of the income distribution, race disparities in health could be largely accounted for if differences in present socio-economic conditions were reduced. Among the rich, unobservable characteristics are more relevant to explaining the inequalities in health among White and Black seniors. An important implication of our results is that the health of seniors is mostly affected by past health conditions, in particular, by some conditions which arise during early childhood. The negative consequences of poor conditions and ill health are present over the life cycle and during older ages. These findings have important distributional consequences if it is still the case that Blacks are more likely to come from poorer families.

One should keep in mind that rising income among all seniors-–holding income inequalities across races constant— may increase these racial disparities instead of reducing them (see Wagstaff, A. et al., 2003 for a similar argument). Thus, policy makers should be concerned not only with the level of socio-economic condition of seniors of different races, but also of the level of racial differences in socio-economic conditions. Further research is needed to understand the channels through which reducing socio-economic inequalities impacts racial disparities in health, particularly

among poor seniors. For instance, better socio-economic conditions could raise the nutritional status of the elderly, or they could alter their rate of time preferences or their attitudes toward risky behavior such as drinking and smoking.

Finally, our findings also suggest that 52% of the differences in SRHS between White seniors and Black seniors come from differences not attributable to observable individual characteristics. For policy purposes, it thus could be important to evaluate the unobserved determinants of an individual's health at the community level. For instance, Black seniors may be more likely than White seniors to live in areas where social behavior is not conducive to good health. Notice that in this case, implementing policies to reduce income inequalities would not eliminate the inequalities in health among seniors of different races. A more effective policy would be to increase housing quality, economic development, and the environments where Black seniors are more likely to live.

In general, large cities have communities where minorities tend to concentrate with significant deprivation of resources (Day, 1990). In these communities, crime, poor health, limited job opportunities, and a range of other social issues are interrelated problems. Public officials should work in concert to ensure that these services are provided to individuals of all ethnic origins. Over-all improvement of the health and economic conditions of the population would not correct racial inequalities in health unless public officials address ethnic disparities directly.

Appendix

Table 1. Brazil
Comparison of White and Black health in old age
Weighted summary statistics.

Health Indicators	Males (765)				Females (1,086)			
	White (n = 628)		Black (n = 137)		White (n = 894)		Black (n = 192)	
	Mean	Std err	Mean	Std err	Mean	Std err	Mean	Std err
Health functional status								
Self-reported Health Status	2.602	(0.046)	2.362	(0.068)	2.595	(0.035)	2.221	(0.070)
ADL index	7.644	(0.136)	7.211	(0.267)	6.351	(0.108)	6.214	(0.187)
IADL index	11.061	(0.116)	9.403	(0.261)	12.381	(0.104)	11.334	(0.235)
Life threatening conditions								
Hypertension	0.478	(0.023)	0.589	(0.047)	0.543	(0.017)	0.631	(0.035)
Diabetes	0.171	(0.021)	0.163	(0.038)	0.187	(0.015)	0.202	(0.029)
Cancer	0.038	(0.007)	0.019	(0.015)	0.039	(0.006)	0.024	(0.117)
Chronic Lung Disease	0.146	(0.015)	0.133	(0.032)	0.114	(0.012)	0.106	(0.025)
Heart Disease	0.217	(0.019)	0.193	(0.038)	0.202	(0.016)	0.202	(0.026)
Stroke	0.078	(0.012)	0.109	(0.027)	0.057	(0.009)	0.065	(0.023)
Disabling conditions								
Arthritis, Rheumatism or Osteoarthritis	0.217	(0.019)	0.144	(0.037)	0.411	(0.017)	0.373	(0.032)
Fall in the last 12 months	0.206	(0.022)	0.253	(0.039)	0.334	(0.018)	0.347	(0.032)
Incontinence	0.091	(0.013)	0.182	(0.032)	0.264	(0.014)	0.267	(0.042)
Cognitive scores	0.964	(0.008)	0.857	(0.039)	0.941	(0.009)	0.887	(0.022)
Emotional, Nervous or psychiatric problem	0.126	(0.016)	0.194	(0.038)	0.179	(0.015)	0.198	(0.032)
Anthropometry measures								
Height (cms)	165.6	(0.336)	164.9	(1.161)	151.9	(0.259)	152.8	(0.424)
Weight (kgs)	70.1	(0.685)	69.3	(1.591)	64.2	(0.597)	63.1	(1.316)

Notes

1) Self-reported Health Status was coded 5= Excellent, 4=Very Good, 3=Good, 2=Fair and 1=Poor

2) ADL is an indicator from 0 to 10 (0 = worst condition)

3) IADL is an indicator from 0 to 15 (0 = worst condition)

4) Each health condition refers to whether a doctor or nurse ever told the individual that he or she had the condition. A dummy indicator was constructed where 1= existence of the condition, 0 otherwise.

5) Cognitive score represents the percentage of individuals with an score higher than 13 (that is, in good cognitive condition)

Table 2. Brazil
Income differences among White and Black in old age
Weighted Conditional Probability.

Income Groups	White (n = 1,520) (%)	Black (n = 331) (%)
Total Income		
Quartile 1	28.65%	29.86%
Quartile 2	17.81%	25.28%
Quartile 3	23.89%	29.17%
Quartile 4	29.65%	15.69%
Total Wealth		
Quartile 1	21.12%	33.71%
Quartile 2	23.76%	31.03%
Quartile 3	27.53%	24.89%
Quartile 4	27.58%	10.37%

Notes
1) Income includes working and non-working income adjusted by household size
2) Wealth is based on a principal component index of assets in the household adjusted by household size

Table 3. Brazil
Income and health differences among White and Black in old age
Weighted summary statistics.

Income Groups	White (n=1,520)			
	Self-reported health		ADL Index	IADL Index
Total Income				
Quartile 1	2.435	(0.051)	6.274 (0.139)	13.279 (0.149)
Quartile 2	2.385	(0.050)	6.313 (0.186)	13.076 (0.193)
Quartile 3	2.682	(0.058)	7.183 (0.156)	13.883 (0.134)
Quartile 4	2.816	(0.054)	7.586 (0.191)	14.225 (0.124)
Total Wealth				
Quartile 1	2.419	(0.044)	6.538 (0.168)	13.332 (0.152)
Quartile 2	2.441	(0.054)	6.729 (0.183)	13.563 (0.184)
Quartile 3	2.685	(0.056)	7.089 (0.186)	13.736 (0.143)
Quartile 4	2.783	(0.069)	7.103 (0.204)	13.959 (0.131)

	Black (n=331)					
	Self-reported health		ADL Index		IADL Index	
Total Income						
Quartile 1	2.324	(0.105)	6.461	(0.321)	13.065	(0.303)
Quartile 2	2.253	(0.078)	6.382	(0.405)	13.198	(0.378)
Quartile 3	2.174	(0.069)	6.633	(0.368)	13.344	(0.434)
Quartile 4	2.429	(0.109)	7.309	(0.426)	14.481	(0.218)
Total Wealth						
Quartile 1	2.121	(0.079)	6.339	(0.277)	13.273	(0.327)
Quartile 2	2.248	(0.061)	6.681	(0.233)	13.124	(0.258)
Quartile 3	2.376	(0.087)	6.698	(0.274)	13.793	(0.257)
Quartile 4	2.653	(0.159)	7.217	(0.579)	13.739	(0.828)

Notes

1) Standard errors in parentheses

2) Self-reported Health Status was coded 5= Excellent, 4=Very Good, 3=Good, 2=Fair and 1=Poor

3) ADL is an indicator from 0 to 10 (0 = worst condition), and IADL is an indicator from 0 to 15 (0 = worst condition)

4) Income includes working and non-working income adjusted by household size

5) Wealth is based on a principal component index of assets in the household adjusted by household size

Table 4. Brazil
Health and wealth differences among White and Black in old age
Weighted summary statistics.

Health Indicators	Wealth White (n=1,520)		Wealth Black (n=331)	
SRHS				
Poor	-0.363	(0.104)	-0.863	(0.297)
Fair	-0.009	(0.054)	-0.446	(0.117)
Good	0.058	(0.075)	-0.232	(0.229)
Very Good	1.032	(0.318)	0.329	(0.551)
Excellent	0.318	(0.147)	0.209	(0.072)

Notes

1) Self-reported Health Status was coded 5= Excellent, 4=Very Good, 3=Good, 2=Fair and 1=Poor

2) Higher number on the wealth index indicates wealthier individuals according to assets

Table 5. Brazil - Comparison of White and Black demographic, socio-economic, family support and baseline health characteristics in old. Weighted summary statistics of selected variables.

Variables	White (n = 1,520)		Black (n = 331)	
	Mean	Std err	Mean	Std err
Individual characteristics				
Age	69.654	(0.431)	67.876	(0.492)
Gender (Female)	0.584	(0.014)	0.585	(0.032)
Born in Brazil	0.896	(0.013)	0.999	(0.001)
Living alone	0.141	(0.013)	0.147	(0.024)
Total children alive	2.549	(0.084)	2.805	(0.102)
Currently married	0.577	(0.022)	0.508	(0.036)
Socio-Economic conditions				
Literacy	0.842	(0.017)	0.618	(0.032)
Education	1.381	(0.061)	1.056	(0.028)
Age of retirement	2.042	(0.045)	2.179	(0.087)
Home ownership	1.221	(0.021)	1.233	(0.044)
Vehicle ownership	0.486	(0.023)	0.324	(0.032)
Availability of private health insurance	0.051	(0.009)	0.03	(0.011)
Family Support				
Number of household members	2.963	(0.073)	3.661	(0.171)
Number of brothers and sisters	2.981	(0.095)	3.363	(0.231)
Number of dependents on senior's total income	2.293	(0.056)	2.681	(0.146)
Baseline health status				
Living in rural areas first 5 years of life	0.558	(0.029)	0.749	(0.033)
Smoking	0.608	(0.021)	0.743	(0.043)
Family economic condition during the first 15 years of life	1.017	(0.031)	0.911	(0.049)
Self-assessment of individual's health in the first 15 years of life	1.451	(0.024)	1.375	(0.046)
Starvation in the first 15 years of life	0.177	(0.012)	0.267	(0.026)

Notes

1) Total children included biological children, step-children and adopted children

2) Smoking was code 0= never smoke, 1=past smoker, 2= current smoker

3) Economic condition during the first 15 years of life was coded 0= Poor, 1=Average, and 2=Above average

4) Self-assessment of health during the first 15 years of life was coded 0= Poor, 1=Good, and 2=Excellent

5) Education was coded 0= Elementary, 1 = Secondary, 2 Technical and 3 =College

6) Age of retirement was coded 0=under fifties, 1=fifties, 2=sixties, and 3=seventies and above

7) Home ownership was coded 1=own, 2=rent and 3=own by other

Table 6. Brazil
Description of variables in the SABE Database

Variables	Description
Dependent Variables	
Cognitive evaluation	A vector of 10 different variables (e.g., memory at the present time, able to manage money, shopping alone, remember family events, etc).
Self-reported health status	A question that includes the following options: excellent, very good, good, fair, and poor.
Existence of chronic and acute conditions	Different questions about the existence of hypertension, diabetes, cancer, lung disease, heart attack, coronary heart disease, angina, or other heart problems, cerebral embolism, arthritis, rheumatism, or osteoarthritis.
ADL / IADL scores	Variables to measure current ADL and IADL scores. This excludes any difficulties that an individual expects to last more than three months.
Mental Health	Variables to measure emotional, nervous or psychiatric problems in the last 12 months
Health Risk Factors	Smoking, drinking, and eating behaviors
Medical Care Use	Several questions which capture hospital, outpatient, and preventive care use
Independent Variable	
Skin	Includes the following categories: White, Mestizo (combination of white and indigenous), Mulatto (combination of black and white), Black, Indigenous, Asian, Other.
Control Variables	
Vector of current demographic characteristics	Age, gender, religion, immigration status, living with someone, number of children, number of step-children, total number of individuals in the household, number of an individual's children not living at home, number of brothers and sisters, age cohort, current marital status, number of marriages, duration of each marriage, characteristics of each transition in marital status in the individual's life.
Vector of current socio-economic characteristics	Level of schooling, illiteracy, age when started to work, current work status, age at retirement, type of occupation, total income from different sources (pension, family transfers, banking income, welfare subsidy), total expenditures on goods, home characteristics, home ownership, list of household assets (e.g.., refrigerator, washer, water heater, microwave, television, telephone, VCR, radio player, heating, air conditioning, fan), availability of social security, private insurance, other public insurance.
Vector of family of support	Number of members in the household, number of sibblings, number of children who live outside home, and other family and friends
Vector of baseline health status	Father or mother alive, father or mother's age at death, living in rural areas first 5 years of life age when first diagnosed with cancer, past smoker, current smoker, family economic condition during the first 15 years of life, self-assessment of individual's health in the first 15 years of life, existence of any of the following illnesses during the first 15 years of life: kidney disease, hepatitis, measles tuberculosis, rheumatic fever, asthma, bronchitis.

Table 7. Brazil

OLS estimates of the effects of skin (proxy for race) on health status in old age

Skin coefficient and standard error. Weighted sample (N=1,851)

Vector Included	Self-reported health	ADL Index	IADL Index
I) Only the skin variable included	-0.329 (0.048) ***	-0.255 (0.185)	-0.264 (0.189)
R_Squared	0.03	0.002	0.001
F-value	46.57 ***	1.90	1.95
II) Vector of individual characteristics	-0.305 (0.053) ***	-0.352 (0.176)	-0.383 (0.187) **
R_Squared	0.04	0.12	0.13
F-value	12.47 ***	26.46 ***	24.68 ***
III) Vector of socio-economic conditions	-0.211 (0.046) ***	-0.215 (0.159)	-0.206 (0.152)
R_Squared	0.13	0.16	0.15
F-value	7.31 ***	17.64 ***	13.95 ***
IV) Vector of family support conditions	-0.282 (0.051) ***	-0.294 (0.175) *	-0.273 (0.186)
R_Squared	0.05	0.13	0.16
F-value	7.83 ***	15.35 ***	22.53 ***
V) Vector of baseline health conditions	-0.239 (0.052) ***	-0.256 (0.173)	-0.269 (0.188)
R_Squared	0.08	0.13	0.14
F-value	12.65 ***	12.41 ***	13.84 ***
VI) All variables included	-0.164 (0.050) ***	-0.113 (0.164)	-0.052 (0.154)
R_Squared	0.15	0.18	0.18
F-value	22.01 ***	20.09 ***	8.45 ***

(**) significant at p < 0.05 , (***) significant at p<0.01

Notes

1) Skin was coded 0=White, 1= Black; Self-reported Health Status was coded 5= Excellent, 4=Very Good, 3=Good, 2=Fair and 1=Poor

2) IADL is an indicator from 0 to 15 (0 = worst condition) and ADL is an indicator from 0 to 10 (0= worst condition)

3) Each regression includes a vector of basic individual characteristics such as: age, gender, living alone, married, immigrant, and total children alive

4) The vector of socio-economic condition includes: level of schooling, literacy, age when started to work, age at retirement, type of occupation total income from different sources, home characteristics, home ownership, wealth index, and availability of health insurance

5) The vector of family support includes: number of household members, number of brothers and sisters, number of children living outside home

6) The vector of baseline health includes: living in rural areas first 5 years of life, economic condition during the first 15 years of life, self-assessment of health in the 15 years of life, existence of a serious health problem during the first 15 years of life

Table 8. Brazil - OLS estimates of the determinants of health status in old age. Selected coefficients and standard error. Weighted sample (N=1,851)

	Self-reported health				ADL Index			
	White		Black		White		Black	
Variables	**Coeff.**	**(S.E.)**	**Coeff.**	**(S.E.)**	**Coeff.**	**(S.E.)**	**Coeff.**	**(S.E.)**
Constant	2.741	(0.341) ***	1.434	(0.715) **	13.516	(0.878) ***	9.015	1.951 ***
Individual Characteristics								
Age	-0.0001	(0.004)	0.010	(0.005)	-0.075	(0.009) ***	-0.046	(0.019) **
Female	0.016	(0.057)	-0.093	(0.101)	-1.174	(0.151) ***	-0.687	(0.312) **
Immigrant	0.206	(0.083) **	0.459	(0.535)	0.054	(0.211)	1.292	(0.905)
Married	-0.089	(0.064)	0.058	(0.122)	-0.249	(0.185)	0.116	(0.363)
Socio-economic condition								
Wealth	0.038	0.018 **	0.053	(0.032)	0.055	(0.045)	0.019	(0.105)
Education (Elementary)								
Secondary	0.234	(0.121)	0.194	(0.493)	-0.065	(0.302)	1.595	(0.562)
Technical	0.439	(0.134) ***	0.087	(0.202)	0.441	(0.384)	-0.194	(1.883)
College	0.076	(0.104)	0.128	(0.231)	-0.121	(0.279)	0.325	(0.638)
House ownership (own)								
Rent	-0.135	(0.106)	-0.369	(0.105) ***	-0.343	(0.255)	-0.046	(0.361)
Other	0.031	(0.118)	-0.171	(0.157)	0.161	(0.296)	-0.761	(0.579)
Working	0.278	(0.066) ***	0.214	(0.113)	0.756	(0.155) ***	0.907	(0.361) **
Family support								
Household members (single)								
Two individuals	-0.088	(0.104)	-0.077	(0.149)	-0.233	(0.276)	0.137	(0.636)
Three-to-five	-0.175	(0.103)	-0.084	(0.161)	-0.474	(0.275)	-0.141	(0.687)
More than five	-0.319	(0.124) **	-0.142	(0.156)	-0.686	(0.404)	-0.807	(0.919)
Baseline health conditions								
Living in rural area first 5 yrs	-0.237	(0.062) ***	-0.235	(0.128)	-0.377	(0.127) ***	-0.209	(0.377)
Economic status first 15 yrs (poor)								
Average	-0.047	(0.077)	-0.021	(0.145)	0.014	(0.217)	0.507	(0.594)
Above average	-0.018	(0.078)	0.085	(0.150)	0.126	(0.215)	0.248	(0.524)
Starvation during first 15 yrs	-0.109	(0.075)	-0.144	(0.139)	-0.347	(0.197)	0.222	(0.443)
R-squared	0.13		0.20		0.18		0.17	
F-value	18.56	***	7.82	**	9.40		6.12	**

(**) significant at $p < 0.05$, (***) significant at $p<0.01$

Notes: (1) In parentheses the excluded categories. Variables included but not shown: total number of children alive, living alone, number of brother and sisters, Literacy, type of occupation in the past, age began working, age of retirement, number of rooms, health status first 15 years of life

Table 9. Brazil

Oaxaca-Blinder Decomposition of the differences in health between Whites and Blacks in old age

Weighted sample (N=1,851)

Oaxaca-Blinder	**Self-reported health**	**ADL index**	**IADL index**
I) Variation in health attributable to all explanatory variables	14.6	11.2	8.8
II) Unexplained differences in health	15.8	11.6	-2.2
a) Variation in health attributable to the coefficients	-114.9	-438.5	447.7
b) Variation in health attributable to differences between model constants	130.7	450.1	-449.9
III) Total difference in health (I + II)	30.4	22.8	6.6
Percentage of the difference attributable to observable individual characteristics (I/III)	48.0%	49.1%	133.3%
Percentage of the difference not attributable to observable individual characteristics (II/III)	52.0%	50.9%	-33.3%

Notes

1) A positive number indicates advantage to Whites while a negative number indicates advantage to Blacks

2) All regressions include the following vectors: individual characteristics; socio-economic conditions; family support; and baseline health

3) Results are based on OLS estimates

Table 10. Brazil

Oaxaca-Blinder Decomposition of the differences in health by Income groups between Whites and Blacks in old age

Weighted sample

	Upper Half of Income Distribution (N=964)			Lower Half of Income Distribution (N=887)		
Oaxaca-Blinder	**Self-reported health**	**ADL index**	**IADL index**	**Self-reported health**	**ADL index**	**IADL index**
I) Variation in health attributable to all explanatory variables	12.2	-9.8	-14.6	14.1	10.5	23.6
II) Unexplained differences in health	32.2	55.8	28.5	-1.9	-27.7	-49.8
a) Variation in health attributable to the coefficients	-71.6	-219.8	-760.9	-113.3	-579	-555.2
b) Variation in health attributable to differences between model constants	103.8	275.6	789.4	111.4	551.3	505.4
III) Total difference in health (I + II)	44.4	46.0	13.9	12.2	-17.2	-26.2
Percentage of the difference attributable to observable individual characteristics (I/III)	27.5%	-21.3%	-105.0%	115.6%	-61.0%	-90.1%
Percentage of the difference not attributable to observable individual characteristics (II/III)	72.5%	121.3%	205.0%	-15.6%	161.0%	190.1%

Notes

1) A positive number indicates advantage to Whites while a negative number indicates advantage to Blacks

2) All regressions include the following vectors: individual characteristics; socio-economic conditions; family support; and baseline health

3) Results are based on OLS estimates

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V. RACIAL AND ETHNIC HEALTH INEQUITIES: BOLIVIA, BRAZIL, GUATEMALA, PERU

David Mayer-Foulkes and Carlos Larrea

Introduction

Race and ethnicity have long been intimately associated with poverty and social marginalization in Latin America and the Caribbean. Lower levels of income and consumption by indigenous groups and Afro-Latin peoples constitute a characteristic trait in the persistently unequal distribution of income and education. Even though the extent of disparities in health and health care are not well documented, it is known from statistical studies and sociological observation that these populations also have lower health, higher rates of morbidity and mortality, and more limited access to health services. A clear pattern of social exclusion is suggested, with both historical roots and direct linkages to health.

Health, human development and economic growth

The evolution of the income, education and health of different strata of the population can be understood in the context of long-term human development. Human development results from an intergenerational cycle of investment in nutrition, health and education that is essential to the process of development and to economic growth. In the long-term, this investment results in secular rises in height, weight, longevity and human capabilities in general, which have a strong impact on economic growth, as has been found for developed countries (Fogel, 2002). In this intergenerational process, investment failures imply that parental human capital levels are transmitted to the next generation, generating long-term persistence of inequality in the income distribution. Early childhood nutrition and health are critical links in this process, constituting the foundation for the human capital investment that generates future adult education, health and income. The crucial role of early childhood health is documented for England in Case, Lubotsky and Paxson (2001) and Case, Fertig and Paxson (2003), the origin of the 'gradient' of health along income, and for Mexico by Mayer-Foulkes (2004), who documents the presence of a human development trap and finds that improvements in early child development play an important role in permanence in school and therefore on the hold of the trap.

Indigenous and other ethnic groups in Latin America and the Caribbean were placed at the lower end of the income distribution since colonial times, and therefore share with other poor people in the continent income, education and health dynamics that make poverty persistent. In addition, they face additional barriers related to successful insertion in the production of income, health and education for reasons of culture, language and discrimination. How much of the poverty of these groups is due to their inherited social status and how much to the additional problems they face? Where, both geographically and socially, are the problems located? What contextual factors, resulting from policy or otherwise, alleviate or worsen the problems?

Health is an integral component of individual well-being. Moreover, in the form of early child nutrition, it is a crucial input for human capital investment. Thus, we address these questions by decomposing health inequities across population groups both within and across ethnic groups. This will not only document the extent of racial and ethnic disparities in health and health care; it will also throw considerable light on the intergenerational dynamics of poverty.

Health inequity decomposition tables: a diagnostic tool

As a first example, an examination of inequity in the distribution of stature (an excellent measure of nutritional status) amongst young children will measure the inequity with which the economic and social system delivers basic needs to its young. Hence, it will measure the extent of the intergenerational transmission of inequality. Further, decomposition[44] of this basic health inequity measure across population groups defined by ethnicity, parental education, geographical regions, and urbanization will 1) determine the social and geographical location of child malnutrition generating long-term inequalities and 2) compare the severity of these problems between ethnic and other population groups. Sensitivity analysis of health inequity to changes in health service and other contextual variables amenable to policy will then be able to locate the most effective policy instruments.

The databases that will be used for this purpose are merged, comparable, Demographic and Health Surveys (DHS) on Bolivia, Brazil, Guatemala and Peru. The advantage of using an international database is to obtain complete comparability across countries, geographical regions and social levels as measured by an education index. The decomposition described above will result in an infant stature inequity table with a cross-country regionalization (including the urban-rural subdivision) on the vertical axis and an education status variable on the horizontal axis, each entry containing the results for ethnic and other population groups.

Two such regionalizations will be used. The first will simply divide the sample into countries and each country into urban and rural areas. The second will conduct a further regionalization within countries. Health inequity is decomposed for these geographical regionalizations combined with a social subdivision consisting of levels of education and ethnic membership.

The health inequity decomposition we use is a slight modification of van Doorsaler and Jones's (2002) decomposition of the health concentration index (Wagstaff, van Doorsaler and Paci, 1989), explained in Appendix 1. The aggregate inequity measure is decomposed into inequity measures relative per capita health endowment levels for each population group. When the group-specific inequity measures acts as coefficients of the

[44] Decomposition of inequality measures is often used to understand the sources of inequality, see for example the World Bank page http://www.worldbank.org/poverty/inequal/methods/decomp.htm. Such a decomposition across population groups can be obtained for the Wagstaff and van Doorslaer (2000b) health care inequity index. Each population group contributes to the index according to its population weight, keeping a common implicit standard of health need.

relative per capita health endowment levels, the population-weighted average equals the aggregate inequity measure.

The health inequity decomposition is performed for a series of health indices for children and for women. The children's indices include height for age z-score; children's health results; children's household's health services; the last two controlled for height to age z-score as need, health services controlled with health results as proxy for need.[45] The women's indices include the same measures and also health knowledge, access to health services, children's vaccinations, and a measure of total health.

Health and other indicators constructed from the DHS datasets

Indicators for education, basic household quality, household goods, housing, employment, standard of living, health knowledge, access to health services, children's health access, women's health results, children's health results, health results, total health, women's health access are constructed from the mostly categorical variables in the DHS surveys by using Categorical Principal Components Analysis.[46] The variables used for each of these indices are shown in Table I.

The standard of living indicator is constructed including the variables used for education, basic household quality, household goods, housing and employment. This variable stands for income or wealth, and the health concentration indices are calculated in relation to it. Besides the geographic subdivision, the population is divided into three social categories according to the household education index. Three groups are constructed, according to whether this index is between 0 and 30, 30 and 50, or 50 and 100.

Health inequity decomposition tables are constructed for the remaining health indices. 34.95%, 57.29% and 7.76% of the households are in the first (lowest), second and third (highest) categories, corresponding to 34.05%, 56.80% and 9.15% of the children.

Main conclusions of the health inequity decomposition tables

The main conclusions can be seen in the series of Tables II to IV. Tables II.1 and II.2 show children's and women's ethnic disadvantage by countries and urban and rural regions. Each section of each table is divided into per-capita health inequity, average relative per-capita level of the relevant health asset, and within group inequality. What is

[45] The evaluation of the concentration of a health variable X 'controlling for need' with health variable Y, was performed by obtaining a prediction X' of X in terms of Y and then evaluating the concentration of X - X', that is, that component of X that people having Y did not achieve. This gives a natural scale and sign to Y that is to be subtracted to X. Unfortunately the available measures do not control for need in any real sense and are correlated to common causal factors. They nevertheless evaluate inequities *independent* of them. The very basic health measures used here can be considered to be universal needs in any case.

[46] As a statistical procedure, the Categorical Principal Components Analysis (CATPCA), simultaneously provides optimal quantification of categorical variables, and reduces the dimensionality of the data (Van de Geer, 1993a, 1993b; Meulman and Heiser, 1999; Meulman, 2000). CATPCA handles nominal, ordinal and numeric indicators. An index, estimated from the first principal component, can be interpreted as the linear combination of original indicators which captures the maximum possible amount of information by optimizing the explained proportion of total variance (Larrea, 2000).

shown is the number of instances for which the decomposition results showed that the situation of populations with indigenous or black membership is worse, for a particular set of indicators. Section A covers health indicators. Section B covers several combinations of health indicators controlled for health need, and Section C shows the results for education, housing and health employment, economic aspects which may be thought to be related to health.

If we only concentrated on per-capita health inequity levels, these would be localized in our dataset at the low levels of education in rural Peru, Bolivia and Guatemala. However, a more careful look at the decomposition shows that indigenous and black peoples have lower average per-capita endowments of the relevant health assets, while their within group inequalities are less. As can be seen from the tables, the lower levels of endowment are almost pervasive in the four countries, across urban and rural regions, and across educational levels. The presence of an insufficient number of indigenous or black people for the estimation occurs for rural Guatemala at high levels of education, is also consistent with indigenous disadvantage. The pattern of low assets with low within-group inequality holds for all of the indicators observed.

Tables III show that overall health inequity is worse in the urban than in the rural context, in this case especially because of worse within group inequities in the urban context within each geographic-educational-ethnic subdivision.

Table IV is analogous to Table II, except that the geographic subdivision is finer. Again, the pattern of low assets with low within-group inequality is evident throughout the geographic and educational subdivision.

Decomposition of health inequity according to education, housing and health services

Health status and inequity has complex determinants, which require quite a different kind of econometric approach. However, amongst these determinants are education, wealth and health services. Therefore, as a way of approaching the question of what policies can be most appropriate to promote health and health equity, health inequities were decomposed according to education, housing (a proxy for income and wealth; recall that the standard of living variable is used as the reference for health concentration and includes education), and health services. The decomposition was carried out for each of the health variables for which health inequity was decomposed. The results are in Tables V. In the case of children, mother's height for age z-score was also used so as to control for hereditary or past factors. As can be seen in Table V.1, in the case of children's height for age z-score, mother's height for age z-score accounts for 26.9% points of health inequity, but other than that the most important variable is housing, an index of income and wealth in the form of drinking water source, hygienic services, floor materials, number of bedrooms per person, square root of time to obtain water, and such goods as electricity, radio, car, television, refrigerator, bicycle and telephone. Once children's health results are controlled by height for age z-score, reflecting a set of environmental factors, the main factor affecting health inequities is housing, or wealth. Table V.2 shows a similar decomposition for women health inequities. The results are not surprising,

although their consistency supports the results. Women's health results depend on education, housing (or wealth), and health services. Women's health knowledge depends on education and health services, and children's vaccinations depend mostly on health services (in fact with a negative sign on housing subtracting the correlation that there might be between housing and health services!). In Table V.3 we remove women's height for age z-score as a decomposition factor. The results are similar but the concentration indices controlling for height for age z-score can be included (otherwise a spurious correlation arises). The results are fairly similar.

Table series VI and VII have the original inequity decompositions for the various indicators, calculated by the method in van Doorsaler and Jones (2002), using geographic and population membership dummies multiplied by the health index to generate a decomposition without error term. All of the numerical entries are significant at 1% (usually much better). As in the afore-mentioned paper, the significance intervals are estimated using robust estimators taking heteroskedasticity into account in the convenient regressions used for the estimation. In Tables VI the geographical areas are countries subdivided into urban and rural populations, while in Tables VII the geographical subdivision is finer. In the finer subdivision it is more evident that indigenous or black populations as well as some rural locations do not have the social sectors defined by higher educational index levels, especially in Guatemala but also in Peru and parts of Brazil and Bolivia.

Tables VI and VII are named in correspondence to Table series II, III and IV. Sections C can be consulted for the structure of the endowments in education and housing that appear in the health inequity decomposition in Tables V. In addition, a decomposition of employment inequity is presented.

Conclusions

Inequality decomposition of a series of health indicators shows that indigenous and black peoples have in general lower average per-capita endowments of the relevant health assets, while their within group inequalities are less. Even though, combined, these two facts add up to a low per-capita contribution to aggregate inequality, the overall conclusion is that indigenous and black people in comparable geographic (including urban and rural areas) and social locations (according to educational status) are less endowed with health assets and health access. These lower levels of endowment are pervasive in the four countries, across urban and rural regions, and across educational levels. In addition, less indigenous and black people are present at higher levels of education.

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Appendix

Table I. Construction of Various Indices from DHS Datasets

Index	Variables used
Education	Schooling for adults 24 and over Literacy for people 15 years and older Access to higher education for adults 24 and over Primary school enrolment ages 6 to 11 Secondary school enrolment ages 12 to 17 Higher school enrolment ages 18 to 24
Basic Household Quality	Drinking water source hygienic service Floor materials Number of bedrooms per person Square root of time to obtain water Electricity
Household Goods	Radio Car Television Refrigerator Bicycle Telephone
Housing	Indicators for Basic Household and Household Goods indices
Employment	Schooling of woman in fertile age Spouse's schooling Woman's occupation group Spouse's occupation group Woman's occupation category Woman's working time
Standard of Living	Indicators for Education, Basic Household, Household Goods and Employment indices
Health Knowledge	Time of fertility in menstrual cycle contraceptive methods

	Risk of pregnancy and maternal lactancy
Access to Health Services	Visits to health centers in last year Present or past use of contraceptives by woman Anti-tetanus vaccination in last pregnancy Number, opportunity and quality of prenatal visits in last child Place of attention of last childbirth Type of attention of last childbirth Proportion of vaccinations received by last child out of total
Children's Health Access	Proportion of vaccinations received by last child out of total
Women's Health Results	Fertility indicator controlled by woman's age Proportion of dead children BMI of non-pregnant woman
Children's Health Results	Indicator of chronic malnutrition controlled by child's age group Type of weight at birth of last child Prevalence and intensity of diarrhea of last child in last two weeks Mobility of last child in last two weeks
Health Results	Women's and Children's Health Results indicators
Total Health	Indicators for Health Knowledge, Access and Results
Women's Health Access	(Health access for Women)

Table II.1 Children's Ethnic Disadvantage by Countries and Urban and Rural Regions

(All results sgnificant to 1%)

A Ethnic Disadvantage in Children's Health Indicators (out of 3)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Peru Urban	0	0	0	3	3	3	0	0	3
Peru Rural	3	1	0	2	3	3	3	0	0
Bolivia Urbano	0	0	0	2	3	3	0	0	0
Bolivia Rural	2	1	0	2	3	2	0	0	0
Guatemala Urban	0	0	0	3	3	2	0	0	0
Guatemala Rural	1	0	Insuf Obs	3	3	Insuf Obs	0	0	Insuf Obs
Brasil Urbano	0	0	0	2	3	1	0	0	0
Brasil Rural	0	0	0	3	3	3	0	0	1

B Ethnic Disadvantage in Children's Health Indicators Controlled by Need (out of 3)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Peru Urban	0	0	0	3	2	3	0	0	3
Peru Rural	3	2	0	2	3	3	3	0	0
Bolivia Urbano	0	0	0	2	3	3	0	0	0
Bolivia Rural	2	1	0	2	3	2	0	0	0
Guatemala Urban	0	0	0	3	3	0	0	0	0
Guatemala Rural	1	0	Insuf Obs	2	3	Insuf Obs	0	0	Insuf Obs
Brasil Urbano	0	0	1	3	1	1	0	0	0
Brasil Rural	0	0	0	3	3	1	0	0	0

C Ethnic Disadvantage in Education, Housing and Employment (Children's Database) (out of 3)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Peru Urban	0	0	1	2	3	2	0	0	3
Peru Rural	2	2	0	2	2	3	3	0	0
Bolivia Urbano	0	0	0	3	3	2	0	0	0
Bolivia Rural	1	0	0	2	2	3	0	0	0
Guatemala Urban	0	0	0	3	2	3	0	0	0
Guatemala Rural	0	0	Insuf Obs	3	3	Insuf Obs	0	0	Insuf Obs
Brasil Urbano	0	0	0	2	3	3	0	0	0
Brasil Rural	1	0	0	2	2	3	0	0	0

Table II.2 Women's Ethnic Disadvantage by Countries and Urban and Rural Regions

(All results sgnificant to 1%)

A Ethnic Disadvantage in Women's Health Indicators (out of 8)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Peru Urban	1	0	3	8	8	6	0	0	8
Peru Rural	8	8	0	7	8	8	8	1	0
Bolivia Urbano	2	0	1	7	8	7	0	0	0
Bolivia Rural	5	5	0	7	8	7	0	0	0
Guatemala Urban	1	0	1	8	8	7	0	0	0
Guatemala Rural	4	0	Insuf Obs	8	8	Insuf Obs	0	0	Insuf Obs
Brasil Urbano	0	0	0	7	8	5	0	0	0
Brasil Rural	0	0	0	8	8	7	0	0	0

B Ethnic Disadvantage in Women's Health Indicators Controlled by Need (out of 6)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Peru Urban	0	0	1	6	6	5	0	0	6
Peru Rural	6	6	0	6	6	6	6	0	0
Bolivia Urbano	0	0	1	5	6	5	0	0	1
Bolivia Rural	5	5	0	5	6	5	0	0	0
Guatemala Urban	0	0	0	6	6	6	0	0	0
Guatemala Rural	3	0	Insuf Obs	6	5	Insuf Obs	0	0	Insuf Obs
Brasil Urbano	0	0	0	6	2	4	0	0	0
Brasil Rural	0	0	3	6	2	0	0	0	0

C Ethnic Disadvantage in Education, Housing and Employment (Women's Database) (out of 3)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Peru Urban	0	0	2	2	2	1	0	0	2
Peru Rural	2	0	0	2	2	3	2	0	0
Bolivia Urbano	0	0	1	3	3	2	0	0	0
Bolivia Rural	1	0	0	2	2	3	0	0	0
Guatemala Urban	0	0	1	3	1	2	0	0	0
Guatemala Rural	0	0	Insuf Obs	3	3	Insuf Obs	0	0	Insuf Obs
Brasil Urbano	0	0	1	2	2	2	0	0	0
Brasil Rural	0	0	2	2	2	1	0	0	0

Table III.1 Urban Disadvantage for Children's Indicators

A Urban Disadvantage Children's Health Indicators (out of 3)

	Per-Capita Health Inequity						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru	3	3	3	3	3	3	1	1	3	3	2	0	3	3	3	3	3	0
Bolivia	3	3	3	3	3	1	2	0	2	3	2	0	3	3	3	3	3	0
Guatemala	3	3	1	3	3	InsObs	2	3	2	3	1	InsObs	3	3	3	3	3	InsObs
Brasil	3	3	1	3	3	0	1	0	0	3	0	0	3	3	1	3	3	0

B Urban Disadvantage Children's Health Indicators Controlled by Need (out of 3)

	Per-Capita Health Inequity						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru	3	3	3	3	3	3	1	0	2	3	2	0	3	3	3	3	3	0
Bolivia	3	3	3	3	3	1	1	1	1	3	1	0	3	3	3	3	3	0
Guatemala	3	3	3	3	3	InsObs	0	3	0	3	1	InsObs	3	3	3	3	3	InsObs
Brasil	3	3	0	3	3	0	1	0	0	3	0	0	3	3	0	3	3	0

C Urban Disadvantage Education, Housing and Employment (Children's Database) (out of 3)

	Per-Capita Health Inequity						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru	3	3	3	3	3	3	0	0	1	3	2	0	3	3	3	3	3	0
Bolivia	3	3	3	3	3	1	1	1	1	3	1	0	3	3	3	3	3	0
Guatemala	2	3	2	3	3	InsObs	1	0	1	3	1	InsObs	3	3	2	3	3	InsObs
Brasil	3	3	0	3	3	0	0	0	2	3	0	0	3	3	0	3	2	0

Table III.2 Urban Disadvantage for Women's Indicators

A Urban Disadvantage Women's Health Indicators (out of 8)

	Per-Capita Health Inequity						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru	8	8	8	8	8	8	5	8	5	8	8	0	8	8	8	8	8	0
Bolivia	8	8	8	8	8	7	7	3	5	8	4	0	8	8	8	8	8	0
Guatemala	8	8	4	8	8	InsObs	6	7	5	8	4	InsObs	8	8	8	8	8	InsObs
Brasil	8	8	5	8	8	0	2	3	3	8	0	0	8	8	7	8	8	0

B Urban Disadvantage Women's Health Indicators Controlled by Need (out of 6)

	Per-Capita Health Inequity						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru	6	6	6	6	6	6	4	6	2	6	6	0	6	6	6	6	6	0
Bolivia	6	6	6	6	6	4	5	3	5	6	4	0	6	6	6	6	6	0
Guatemala	5	6	2	6	6	InsObs	3	6	4	6	4	InsObs	6	6	6	6	6	InsObs
Brasil	6	6	6	6	6	0	0	0	0	6	0	0	6	6	6	6	6	0

C Urban Disadvantage Education, Housing and Employment (Women's Database) (out of 3)

	Per-Capita Health Inequity						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru	3	3	3	3	3	3	1	1	1	3	2	0	3	3	3	3	3	0
Bolivia	3	3	3	3	3	2	1	1	1	3	2	0	3	3	3	3	3	0
Guatemala	3	3	2	3	3	InsObs	1	0	2	3	2	InsObs	3	3	3	3	3	InsObs
Brasil	3	3	3	3	3	0	0	0	0	3	0	0	3	3	3	3	2	0

Table IV.1 Overall Ethnic Disadvantage by Regions

(All results sgnificant to 1%)

Number of Health Indicators Showing Ethnic Disadvantage (out of 26)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Lima Metropolitana	15	0	Insuf Obs	19	6	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Urbano	19	0	Insuf Obs	21	8	Insuf Obs	5	0	Insuf Obs
Peru Resto Costa Rural	21	Insuf Obs	Insuf Obs	18	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Peru Sierra Urbano	18	0	4	18	21	18	1	0	25
Peru Sierra Rural	11	19	0	9	20	25	26	4	0
Peru Amazonia Urbano	21	11	Insuf Obs	16	19	Insuf Obs	10	24	Insuf Obs
Peru Amazonia Rural	24	18	0	20	18	26	11	0	0
Bolivia Antiplano Urbano	15	0	2	18	20	21	0	0	0
Bolivia Antiplano Rural	0	2	0	21	22	22	0	1	0
Boliva Valle Urbano	9	0	5	23	26	11	0	0	0
Bolivia Valle Rural	3	0	0	20	24	22	0	0	0
Bolivia Llano Urbano	21	0	7	19	24	9	20	0	26
Bolivia Llano Rural	23	18	Insuf Obs	16	24	Insuf Obs	21	4	Insuf Obs
Guatemala Metropolitan Urbano	15	Insuf Obs	Insuf Obs	15	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala Metropolitan Rural	1	Insuf Obs	Insuf Obs	22	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala North Urbano	25	7	Insuf Obs	17	15	Insuf Obs	25	16	Insuf Obs
Guatemala North Urbano	3	10	Insuf Obs	21	26	Insuf Obs	0	4	Insuf Obs
Guatemala North East Urbano	14	0	Insuf Obs	18	13	Insuf Obs	0	0	Insuf Obs
Guatemala North East Rural	20	Insuf Obs	Insuf Obs	23	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala South East Urbano	26	Insuf Obs	Insuf Obs	5	Insuf Obs	Insuf Obs	26	Insuf Obs	Insuf Obs
Guatemala South East Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Guatemala Central Urbano	14	0	Insuf Obs	24	22	Insuf Obs	0	0	Insuf Obs

Guatemala Central Rural	26	23	Insuf Obs	21	20	Insuf Obs	4	23	Insuf Obs
Guatemala South West Urbano	11	0	3	21	23	12	0	0	0
Guatemala South West Rural	24	14	Insuf Obs	24	21	Insuf Obs	10	0	Insuf Obs
Guatemala North West Urbano	7	19	Insuf Obs	22	13	Insuf Obs	0	19	Insuf Obs
Guatemala North West Rural	4	12	Insuf Obs	23	25	Insuf Obs	0	0	Insuf Obs
Guatemala Peten Urbano	19	Insuf Obs	Insuf Obs	15	Insuf Obs	Insuf Obs	5	Insuf Obs	Insuf Obs
Guatemala Peten Rural	19	14	Insuf Obs	24	24	Insuf Obs	0	0	Insuf Obs
Brasil Rio De Janeiro Urbano	16	26	0	19	13	12	21	26	0
Brasil Rio De Janeiro Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Brasil Sao Paulo Urbano	14	0	10	15	17	8	2	0	24
Brasil Sao Paulo Rural	0	26	Insuf Obs	15	10	Insuf Obs	0	26	Insuf Obs
Brasil Sul Capital Urbano	0	0	6	25	14	9	0	0	23
Brasil Sul Capital Rural	13	0	10	19	18	11	25	0	24
Brasil Centro Leste Urbano	0	15	6	21	17	19	0	0	2
Brasil Centro Leste Rural	1	0	Insuf Obs	16	22	Insuf Obs	1	0	Insuf Obs
Brasil Nordeste Urbano	7	15	20	18	13	13	9	0	5
Brasil Nordeste Rural	7	9	Insuf Obs	20	21	Insuf Obs	3	17	Insuf Obs
Brasil Norte Urbano	0	15	19	22	22	16	1	0	4
Brasil Norte Rural	2	Insuf Obs	Insuf Obs	20	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Brasil Centro Oeste Urbano	12	0	0	6	21	20	26	0	0
Brasil Centro Oeste Rural	10	7	Insuf Obs	15	10	Insuf Obs	19	9	Insuf Obs
Average	12.4	8.2	5.4	18.6	18.6	16.1	6.6	5.1	7.8

Table IV.2 Children's Ethnic Disadvantage by Regions

(All results sgnificant to 1%)

A Children's Health Indicators (out of 3)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Lima Metropolitana	0	0	Insuf Obs	3	0	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Urbano	2	0	Insuf Obs	3	1	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Rural	2	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Peru Sierra Urbano	1	0	0	2	2	3	0	0	3
Peru Sierra Rural	3	2	0	1	3	3	3	1	0
Peru Amazonia Urbano	2	3	Insuf Obs	2	2	Insuf Obs	3	3	Insuf Obs
Peru Amazonia Rural	3	1	0	3	1	3	3	0	0
Bolivia Antiplano Urbano	0	0	2	2	1	1	0	0	0
Bolivia Antiplano Rural	0	1	0	2	3	2	0	0	0
Boliva Valle Urbano	0	0	1	2	3	2	0	0	0
Bolivia Valle Rural	1	0	0	2	3	2	0	0	0
Bolivia Llano Urbano	2	0	1	2	3	2	2	0	3
Bolivia Llano Rural	2	1	Insuf Obs	2	3	Insuf Obs	3	0	Insuf Obs
Guatemala Metropolitan Urbano	0	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala Metropolitan Rural	0	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala North Urbano	3	2	Insuf Obs	2	1	Insuf Obs	3	2	Insuf Obs
Guatemala North Urbano	0	1	Insuf Obs	2	3	Insuf Obs	0	1	Insuf Obs
Guatemala North East Urbano	0	0	Insuf Obs	2	2	Insuf Obs	0	0	Insuf Obs
Guatemala North East Rural	1	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala South East Urbano	3	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs
Guatemala South East Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Guatemala Central Urbano	0	0	0	3	3	1	0	0	0
Guatemala Central Rural	3	3	Insuf Obs	3	3	Insuf Obs	1	3	Insuf Obs

Guatemala South West Urbano	0	0	1	3	2	1	0	0	0
Guatemala South West Rural	2	0	Insuf Obs	3	3	Insuf Obs	2	0	Insuf Obs
Guatemala North West Urbano	0	2	Insuf Obs	2	2	Insuf Obs	0	2	Insuf Obs
Guatemala North West Rural	1	0	Insuf Obs	2	3	Insuf Obs	0	0	Insuf Obs
Guatemala Peten Urbano	2	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala Peten Rural	1	0	Insuf Obs	3	3	Insuf Obs	0	0	Insuf Obs
Brasil Rio De Janeiro Urbano	3	3	0	3	2	1	3	3	0
Brasil Rio De Janeiro Rural	2	0	Insuf Obs	2	0	Insuf Obs	2	0	Insuf Obs
Brasil Sao Paulo Urbano	1	0	3	2	2	0	1	0	3
Brasil Sao Paulo Rural	0	3	Insuf Obs	1	1	Insuf Obs	0	3	Insuf Obs
Brasil Sul Capital Urbano	0	0	1	2	1	2	0	0	3
Brasil Sul Capital Rural	3	0	2	2	2	1	3	0	3
Brasil Centro Leste Urbano	0	0	1	3	0	2	0	0	0
Brasil Centro Leste Rural	1	0	Insuf Obs	2	3	Insuf Obs	1	0	Insuf Obs
Brasil Nordeste Urbano	3	0	2	2	1	1	3	0	0
Brasil Nordeste Rural	2	3	Insuf Obs	3	3	Insuf Obs	0	3	Insuf Obs
Brasil Norte Urbano	0	0	2	3	2	0	0	0	2
Brasil Norte Rural	0	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Brasil Centro Oeste Urbano	3	0	0	0	3	2	3	0	0
Brasil Centro Oeste Rural	3	2	Insuf Obs	2	1	Insuf Obs	3	2	Insuf Obs
Average	1.3	0.8	0.9	2.2	2.0	1.6	1.0	0.7	0.9

Table IV.2 Children's Ethnic Disadvantage by Regions

(All results sgnificant to 1%)

B Children's Health Indicators Controlled by Need (out of 3)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Lima Metropolitana	0	0	Insuf Obs	3	0	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Urbano	1	0	Insuf Obs	3	0	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Rural	2	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Peru Sierra Urbano	2	0	0	2	2	3	1	0	3
Peru Sierra Rural	3	1	0	0	3	3	3	0	0
Peru Amazonia Urbano	3	3	Insuf Obs	3	2	Insuf Obs	3	3	Insuf Obs
Peru Amazonia Rural	3	2	0	2	2	3	3	0	0
Bolivia Antiplano Urbano	0	0	0	2	3	2	0	0	0
Bolivia Antiplano Rural	0	1	0	2	3	2	0	0	0
Boliva Valle Urbano	0	0	2	2	3	1	0	0	0
Bolivia Valle Rural	2	0	0	2	3	2	0	0	0
Bolivia Llano Urbano	3	0	2	3	3	1	3	0	3
Bolivia Llano Rural	3	1	Insuf Obs	2	3	Insuf Obs	3	0	Insuf Obs
Guatemala Metropolitan Urbano	0	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala Metropolitan Rural	0	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala North Urbano	3	1	Insuf Obs	2	2	Insuf Obs	3	1	Insuf Obs
Guatemala North Urbano	1	2	Insuf Obs	2	3	Insuf Obs	0	2	Insuf Obs
Guatemala North East Urbano	0	0	Insuf Obs	2	1	Insuf Obs	0	0	Insuf Obs
Guatemala North East Rural	2	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala South East Urbano	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs
Guatemala South East Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Guatemala Central Urbano	0	0	Insuf Obs	2	3	Insuf Obs	0	0	Insuf Obs
Guatemala Central Rural	3	3	Insuf Obs	3	2	Insuf Obs	0	3	Insuf Obs

Guatemala South West Urbano	0	0	2	3	2	0	0	0	0
Guatemala South West Rural	3	0	Insuf Obs	3	3	Insuf Obs	3	0	Insuf Obs
Guatemala North West Urbano	0	2	Insuf Obs	2	3	Insuf Obs	0	2	Insuf Obs
Guatemala North West Rural	2	0	Insuf Obs	2	3	Insuf Obs	0	0	Insuf Obs
Guatemala Peten Urbano	1	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs
Guatemala Peten Rural	1	0	Insuf Obs	2	2	Insuf Obs	0	0	Insuf Obs
Brasil Rio De Janeiro Urbano	3	3	0	2	1	1	3	3	0
Brasil Rio De Janeiro Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Brasil Sao Paulo Urbano	0	0	3	3	1	0	0	0	3
Brasil Sao Paulo Rural	0	3	Insuf Obs	1	2	Insuf Obs	0	3	Insuf Obs
Brasil Sul Capital Urbano	0	0	2	3	1	1	0	0	3
Brasil Sul Capital Rural	3	0	3	3	1	0	3	0	3
Brasil Centro Leste Urbano	0	0	1	3	1	2	0	0	0
Brasil Centro Leste Rural	0	0	Insuf Obs	1	3	Insuf Obs	0	0	Insuf Obs
Brasil Nordeste Urbano	2	0	1	2	0	2	2	0	0
Brasil Nordeste Rural	2	3	Insuf Obs	2	3	Insuf Obs	0	3	Insuf Obs
Brasil Norte Urbano	0	0	1	3	2	2	0	0	0
Brasil Norte Rural	0	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Brasil Centro Oeste Urbano	3	0	0	1	1	1	3	0	0
Brasil Centro Oeste Rural	3	3	Insuf Obs	1	0	Insuf Obs	3	3	Insuf Obs
Average	1.4	0.8	1.0	2.1	2.0	1.5	1.0	0.7	0.9

Table IV.2 Children's Ethnic Disadvantage by Regions

(All results sgnificant to 1%)

C Education, Housing and Employment (Children's Database) (out of 3)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Lima Metropolitana	0	0	Insuf Obs	1	1	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Urbano	0	0	Insuf Obs	2	2	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Rural	2	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Peru Sierra Urbano	0	0	2	2	3	1	0	0	2
Peru Sierra Rural	2	1	0	1	2	3	3	0	0
Peru Amazonia Urbano	1	3	Insuf Obs	1	2	Insuf Obs	1	3	Insuf Obs
Peru Amazonia Rural	2	0	0	2	2	3	2	0	0
Bolivia Antiplano Urbano	0	0	0	2	3	3	0	0	0
Bolivia Antiplano Rural	0	0	0	3	2	3	0	0	0
Boliva Valle Urbano	0	0	1	3	3	2	0	0	0
Bolivia Valle Rural	0	0	0	3	3	3	0	0	0
Bolivia Llano Urbano	0	0	2	2	3	1	0	0	3
Bolivia Llano Rural	2	0	Insuf Obs	2	3	Insuf Obs	3	0	Insuf Obs
Guatemala Metropolitan Urbano	0	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala Metropolitan Rural	0	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala North Urbano	3	2	Insuf Obs	1	1	Insuf Obs	3	2	Insuf Obs
Guatemala North Urbano	1	1	Insuf Obs	3	3	Insuf Obs	0	1	Insuf Obs
Guatemala North East Urbano	0	0	Insuf Obs	3	2	Insuf Obs	0	0	Insuf Obs
Guatemala North East Rural	1	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala South East Urbano	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs
Guatemala South East Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Guatemala Central Urbano	0	0	Insuf Obs	3	3	Insuf Obs	0	0	Insuf Obs
Guatemala Central Rural	3	0	Insuf Obs	2	3	Insuf Obs	1	0	Insuf Obs

Guatemala South West Urbano	0	0	0	2	3	3	0	0	0
Guatemala South West Rural	2	0	Insuf Obs	1	3	Insuf Obs	3	0	Insuf Obs
Guatemala North West Urbano	1	2	Insuf Obs	2	0	Insuf Obs	0	2	Insuf Obs
Guatemala North West Rural	1	0	Insuf Obs	2	3	Insuf Obs	0	0	Insuf Obs
Guatemala Peten Urbano	2	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs
Guatemala Peten Rural	1	0	Insuf Obs	3	3	Insuf Obs	0	0	Insuf Obs
Brasil Rio De Janeiro Urbano	2	3	0	1	1	2	2	3	0
Brasil Rio De Janeiro Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Brasil Sao Paulo Urbano	0	0	3	2	3	1	0	0	3
Brasil Sao Paulo Rural	0	3	Insuf Obs	2	1	Insuf Obs	0	3	Insuf Obs
Brasil Sul Capital Urbano	0	0	2	3	3	2	0	0	2
Brasil Sul Capital Rural	3	0	1	2	2	2	3	0	3
Brasil Centro Leste Urbano	0	0	0	2	3	3	0	0	0
Brasil Centro Leste Rural	0	0	Insuf Obs	2	3	Insuf Obs	0	0	Insuf Obs
Brasil Nordeste Urbano	1	0	1	2	3	2	1	0	0
Brasil Nordeste Rural	3	2	Insuf Obs	1	2	Insuf Obs	3	2	Insuf Obs
Brasil Norte Urbano	0	0	1	2	2	1	0	0	0
Brasil Norte Rural	1	Insuf Obs	Insuf Obs	2	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Brasil Centro Oeste Urbano	3	0	0	0	3	2	3	0	0
Brasil Centro Oeste Rural	3	1	Insuf Obs	1	1	Insuf Obs	3	1	Insuf Obs
Average	1.0	0.5	0.8	2.0	2.4	2.2	0.9	0.5	0.8

Table IV.3 Women's Ethnic Disadvantage by Countries and Urban and Rural Regions

(All results sgnificant to 1%)

A Women's Health Indicators (out of 8)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Lima Metropolitana	7	0	Insuf Obs	6	3	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Urbano	7	0	Insuf Obs	6	3	Insuf Obs	2	0	Insuf Obs
Peru Resto Costa Rural	7	Insuf Obs	Insuf Obs	6	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Peru Sierra Urbano	7	0	1	6	8	6	0	0	8
Peru Sierra Rural	2	8	0	4	7	7	8	3	0
Peru Amazonia Urbano	7	1	Insuf Obs	4	7	Insuf Obs	2	8	Insuf Obs
Peru Amazonia Rural	8	7	0	7	7	8	2	0	0
Bolivia Antiplano Urbano	7	0	0	6	5	7	0	0	0
Bolivia Antiplano Rural	0	0	0	8	7	7	0	1	0
Boliva Valle Urbano	4	0	0	8	8	4	0	0	0
Bolivia Valle Rural	0	0	0	7	8	7	0	0	0
Bolivia Llano Urbano	8	0	1	7	6	3	6	0	8
Bolivia Llano Rural	8	8	Insuf Obs	5	8	Insuf Obs	5	1	Insuf Obs
Guatemala Metropolitan Urbano	7	Insuf Obs	Insuf Obs	6	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala Metropolitan Rural	1	Insuf Obs	Insuf Obs	7	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala North Urbano	8	1	Insuf Obs	7	5	Insuf Obs	8	5	Insuf Obs
Guatemala North Urbano	0	3	Insuf Obs	7	8	Insuf Obs	0	0	Insuf Obs
Guatemala North East Urbano	6	0	Insuf Obs	4	4	Insuf Obs	0	0	Insuf Obs
Guatemala North East Rural	7	Insuf Obs	Insuf Obs	7	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala South East Urbano	8	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	8	Insuf Obs	Insuf Obs
Guatemala South East Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Guatemala Central Urbano	7	0	0	7	6	7	0	0	0
Guatemala Central Rural	8	8	Insuf Obs	7	6	Insuf Obs	0	8	Insuf Obs

Guatemala South West Urbano	5	0	0	6	7	6	0	0	0
Guatemala South West Rural	8	7	Insuf Obs	8	7	Insuf Obs	0	0	Insuf Obs
Guatemala North West Urbano	4	6	Insuf Obs	8	6	Insuf Obs	0	6	Insuf Obs
Guatemala North West Rural	0	6	Insuf Obs	8	7	Insuf Obs	0	0	Insuf Obs
Guatemala Peten Urbano	7	Insuf Obs	Insuf Obs	6	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs
Guatemala Peten Rural	7	7	Insuf Obs	7	7	Insuf Obs	0	0	Insuf Obs
Brasil Rio De Janeiro Urbano	1	8	0	6	5	3	6	8	0
Brasil Rio De Janeiro Rural	1	0	Insuf Obs	2	5	Insuf Obs	8	0	Insuf Obs
Brasil Sao Paulo Urbano	7	0	1	4	7	3	1	0	8
Brasil Sao Paulo Rural	0	8	Insuf Obs	5	3	Insuf Obs	0	8	Insuf Obs
Brasil Sul Capital Urbano	0	0	0	8	5	2	0	0	8
Brasil Sul Capital Rural	1	0	1	6	5	4	7	0	7
Brasil Centro Leste Urbano	0	7	2	7	5	6	0	0	1
Brasil Centro Leste Rural	0	0	Insuf Obs	6	7	Insuf Obs	0	0	Insuf Obs
Brasil Nordeste Urbano	1	7	8	6	5	2	1	0	4
Brasil Nordeste Rural	0	1	Insuf Obs	8	7	Insuf Obs	0	6	Insuf Obs
Brasil Norte Urbano	0	7	7	7	8	6	1	0	1
Brasil Norte Rural	0	Insuf Obs	Insuf Obs	5	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Brasil Centro Oeste Urbano	1	0	0	2	7	8	8	0	0
Brasil Centro Oeste Rural	1	1	Insuf Obs	6	4	Insuf Obs	3	1	Insuf Obs
Average	4.0	2.9	1.2	6.1	6.1	5.3	1.8	1.6	2.5

Table IV.3 Women's Ethnic Disadvantage by Countries and Urban and Rural Regions

(All results sgnificant to 1%)

B Women's Health Indicators (out of 6)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Lima Metropolitana	6	0	Insuf Obs	6	0	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Urbano	6	0	Insuf Obs	4	1	Insuf Obs	1	0	Insuf Obs
Peru Resto Costa Rural	6	Insuf Obs	Insuf Obs	5	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Peru Sierra Urbano	6	0	0	5	5	4	0	0	6
Peru Sierra Rural	1	6	0	2	4	6	6	0	0
Peru Amazonia Urbano	6	0	Insuf Obs	5	5	Insuf Obs	1	6	Insuf Obs
Peru Amazonia Rural	6	6	0	5	5	6	0	0	0
Bolivia Antiplano Urbano	6	0	0	5	5	5	0	0	0
Bolivia Antiplano Rural	0	0	0	5	6	5	0	0	0
Boliva Valle Urbano	5	0	0	5	6	1	0	0	0
Bolivia Valle Rural	0	0	0	5	6	5	0	0	0
Bolivia Llano Urbano	6	0	0	5	6	1	6	0	6
Bolivia Llano Rural	6	6	Insuf Obs	4	6	Insuf Obs	4	1	Insuf Obs
Guatemala Metropolitan Urbano	6	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala Metropolitan Rural	0	Insuf Obs	Insuf Obs	4	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala North Urbano	6	0	Insuf Obs	4	4	Insuf Obs	5	4	Insuf Obs
Guatemala North Urbano	0	3	Insuf Obs	4	6	Insuf Obs	0	0	Insuf Obs
Guatemala North East Urbano	6	0	Insuf Obs	4	2	Insuf Obs	0	0	Insuf Obs
Guatemala North East Rural	6	Insuf Obs	Insuf Obs	5	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala South East Urbano	6	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs	6	Insuf Obs	Insuf Obs
Guatemala South East Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Guatemala Central Urbano	6	0	0	6	4	6	0	0	0
Guatemala Central Rural	6	6	Insuf Obs	5	5	Insuf Obs	0	6	Insuf Obs

Guatemala South West Urbano	5	0	0	5	6	1	0	0	0
Guatemala South West Rural	6	6	Insuf Obs	6	4	Insuf Obs	1	0	Insuf Obs
Guatemala North West Urbano	1	4	Insuf Obs	5	2	Insuf Obs	0	4	Insuf Obs
Guatemala North West Rural	0	6	Insuf Obs	6	6	Insuf Obs	0	0	Insuf Obs
Guatemala Peten Urbano	6	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs
Guatemala Peten Rural	6	6	Insuf Obs	6	6	Insuf Obs	0	0	Insuf Obs
Brasil Rio De Janeiro Urbano	5	6	0	6	3	4	6	6	0
Brasil Rio De Janeiro Rural	0	4	Insuf Obs	3	1	Insuf Obs	6	0	Insuf Obs
Brasil Sao Paulo Urbano	4	0	0	2	1	2	0	0	6
Brasil Sao Paulo Rural	0	6	Insuf Obs	4	2	Insuf Obs	0	6	Insuf Obs
Brasil Sul Capital Urbano	0	0	0	6	3	1	0	0	6
Brasil Sul Capital Rural	3	0	3	5	5	2	6	0	5
Brasil Centro Leste Urbano	0	6	1	5	5	5	0	0	1
Brasil Centro Leste Rural	0	0	Insuf Obs	2	5	Insuf Obs	0	0	Insuf Obs
Brasil Nordeste Urbano	0	6	6	5	1	5	1	0	1
Brasil Nordeste Rural	0	0	Insuf Obs	5	5	Insuf Obs	0	3	Insuf Obs
Brasil Norte Urbano	0	6	6	5	6	4	0	0	1
Brasil Norte Rural	0	Insuf Obs	Insuf Obs	4	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Brasil Centro Oeste Urbano	0	0	0	3	4	5	6	0	0
Brasil Centro Oeste Rural	0	0	Insuf Obs	4	1	Insuf Obs	6	2	Insuf Obs
Average	3.3	2.4	0.9	4.4	4.1	3.8	1.5	1.1	1.8

Table IV.3 Women's Ethnic Disadvantage by Countries and Urban and Rural Regions

(All results sgnificant to 1%)

C Education, Housing and Employment (Women's Database) (out of 3)

	Per-Capita Health Inequity			Average Relative Per-Capita Level			Within Group Inequality		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Lima Metropolitana	2	0	Insuf Obs	0	2	Insuf Obs	0	0	Insuf Obs
Peru Resto Costa Urbano	3	0	Insuf Obs	3	1	Insuf Obs	2	0	Insuf Obs
Peru Resto Costa Rural	2	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Peru Sierra Urbano	2	0	1	1	1	1	0	0	3
Peru Sierra Rural	0	1	0	1	1	3	3	0	0
Peru Amazonia Urbano	2	1	Insuf Obs	1	1	Insuf Obs	0	1	Insuf Obs
Peru Amazonia Rural	2	2	0	1	1	3	1	0	0
Bolivia Antiplano Urbano	2	0	0	1	3	3	0	0	0
Bolivia Antiplano Rural	0	0	0	1	1	3	0	0	0
Boliva Valle Urbano	0	0	1	3	3	1	0	0	0
Bolivia Valle Rural	0	0	0	1	1	3	0	0	0
Bolivia Llano Urbano	2	0	1	0	3	1	3	0	3
Bolivia Llano Rural	2	2	Insuf Obs	1	1	Insuf Obs	3	2	Insuf Obs
Guatemala Metropolitan Urbano	2	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala Metropolitan Rural	0	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala North Urbano	2	1	Insuf Obs	1	2	Insuf Obs	3	2	Insuf Obs
Guatemala North Urbano	1	0	Insuf Obs	3	3	Insuf Obs	0	0	Insuf Obs
Guatemala North East Urbano	2	0	Insuf Obs	3	2	Insuf Obs	0	0	Insuf Obs
Guatemala North East Rural	3	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala South East Urbano	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs
Guatemala South East Rural	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs	Insuf Obs
Guatemala Central Urbano	1	0	1	3	3	0	0	0	0
Guatemala Central Rural	3	3	Insuf Obs	1	1	Insuf Obs	2	3	Insuf Obs

Guatemala South West Urbano	1	0	0	2	3	1	0	0	0
Guatemala South West Rural	3	1	Insuf Obs	3	1	Insuf Obs	1	0	Insuf Obs
Guatemala North West Urbano	1	3	Insuf Obs	3	0	Insuf Obs	0	3	Insuf Obs
Guatemala North West Rural	0	0	Insuf Obs	3	3	Insuf Obs	0	0	Insuf Obs
Guatemala Peten Urbano	1	Insuf Obs	Insuf Obs	1	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Guatemala Peten Rural	3	1	Insuf Obs	3	3	Insuf Obs	0	0	Insuf Obs
Brasil Rio De Janeiro Urbano	2	3	0	1	1	1	1	3	0
Brasil Rio De Janeiro Rural	1	0	Insuf Obs	1	3	Insuf Obs	3	0	Insuf Obs
Brasil Sao Paulo Urbano	2	0	0	2	3	2	0	0	1
Brasil Sao Paulo Rural	0	3	Insuf Obs	2	1	Insuf Obs	0	3	Insuf Obs
Brasil Sul Capital Urbano	0	0	1	3	1	1	0	0	1
Brasil Sul Capital Rural	0	0	0	1	3	2	3	0	3
Brasil Centro Leste Urbano	0	2	1	1	3	1	0	0	0
Brasil Centro Leste Rural	0	0	Insuf Obs	3	1	Insuf Obs	0	0	Insuf Obs
Brasil Nordeste Urbano	0	2	2	1	3	1	1	0	0
Brasil Nordeste Rural	0	0	Insuf Obs	1	1	Insuf Obs	0	0	Insuf Obs
Brasil Norte Urbano	0	2	2	2	2	3	0	0	0
Brasil Norte Rural	1	Insuf Obs	Insuf Obs	3	Insuf Obs	Insuf Obs	0	Insuf Obs	Insuf Obs
Brasil Centro Oeste Urbano	2	0	0	0	3	2	3	0	0
Brasil Centro Oeste Rural	0	0	Insuf Obs	1	3	Insuf Obs	1	0	Insuf Obs
Average	1.3	0.8	0.6	1.7	1.9	1.8	0.8	0.5	0.6

Table V.1 Decomposition of Children's Health Inequities According to Education, Housing, Health Services and Women's Height for Age z-Score

(All results sgnificant to 1%)

Health Inequity Decomposition (percentages)	Children's Height for Age z-Score	Children's Health Results	Health Results Controlled for Height for Age z-Score
Education	15.3	11.1	8.4
Housing	24.8	55.7	75.7
Health Services	18.0	2.3	-7.9
Women's Height for Age z-Score	26.9	10.3	-0.4
Total	85.0	79.5	75.9

Table V.2 Decomposition of Women's Health Inequities According to Education, Housing, Health Services and Women's Height for Age z-Score

(All results sgnificant to 1%)

Health Inequity Decomposition (percentages)	Health Results	Women's Health Results	Women's Health Knowledge	Children's Vaccinations
Education	25.4	30.7	52.6	16.5
Housing	37.5	28.4	-0.7	-46.3
Health Services	13.2	17.7	31.1	111.9
Women's Height for Age z-Score	7.2	2.1	2.3	-5.8
Total	83.4	78.9	85.3	76.4

Table V.3 Decomposition of Women's Health Inequities According to Education, Housing and Health Services

(All results sgnificant to 1%)

Health Inequity Decomposition (percentages)	Women's Height for Age z-Score	Health Results	Women's Health Results	Women's Health Knowledge	Children's Vaccinations	Health Results Controlled for Height for Age z-Score	Women's Health Knowledge Controlled for Height for Age z-Score	Children's Vaccinations Controlled for Height for Age z-Score
Education	14.7	26.2	31.4	53.2	16.4	16.8	60.8	15.0
Housing	36.9	40.3	30.2	-0.1	-49.6	65.7	-7.2	-62.4
Health Services	16.3	14.2	18.5	31.6	112.1	3.7	34.6	126.0
Total	67.9	80.8	80.2	84.8	78.8	86.2	88.3	78.7

Table VI.1.A.1 Children's Height for Age z-Score

Total Inequality: 0.2	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.11	0.52	2.71	-1.52	-0.27	2.39	0.85	0.95	1.03	0.77	0.81	0.88	-1.3	0.55	2.63	-1.98	-0.34	2.72
Peru Rural	-2.79	-1.5	1.49	-2.44	-1.52	0.33	0.79	0.84	0.92	0.75	0.81	0.86	-3.53	-1.78	1.62	-3.28	-1.88	0.39
Bolivia Urbano	-1.05	0.7	2.87	-1.57	-0.03	2.55	0.87	0.92	1.02	0.81	0.9	0.94	-1.2	0.75	2.81	-1.94	-0.03	2.72
Bolivia Rural	-2.5	-1.28	1.69	-2.47	-1.34	1.11	0.83	0.89	0.91	0.77	0.8	0.83	-3.01	-1.43	1.86	-3.19	-1.68	1.33
Guatemala Urban	-1.1	0.63	2.81	-1.41	0.4	1.35	0.76	0.9	0.97	0.67	0.79	0.55	-1.44	0.7	2.88	-2.1	0.5	2.43
Guatemala Rural	-2.07	-0.3	2.22	-2.28	-1.14	InsObs	0.73	0.85	1.02	0.62	0.67	InsObs	-2.83	-0.35	2.18	-3.69	-1.71	InsObs
Brasil Urbano	-0.36	1.38	3.45	-0.6	1.09	3.37	1	1.1	1.16	1.01	1.07	1.15	-0.36	1.25	2.97	-0.6	1.02	2.94
Brasil Rural	-2.06	0.23	3.37	-2.2	-0.38	3.01	0.96	1.06	1.13	0.9	0.97	1.03	-2.14	0.22	2.97	-2.46	-0.39	2.92

Table VI.1.A.2 Children's Health Results

Total Inequality: 0.09	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.25	0.55	2.77	-2	-0.48	2.46	0.94	1	1.05	0.91	0.98	0.85	-1.33	0.55	2.64	-2.2	-0.48	2.89
Peru Rural	-3.23	-1.71	1.61	-3.05	-1.73	0.48	0.91	0.94	0.98	0.92	0.92	0.91	-3.54	-1.81	1.65	-3.32	-1.89	0.53
Bolivia Urbano	-1.18	0.73	2.95	-1.89	-0.13	2.45	0.96	0.98	1.04	1	0.96	0.9	-1.23	0.75	2.83	-1.9	-0.14	2.71
Bolivia Rural	-2.72	-1.4	1.85	-3.09	-1.63	1.31	0.89	0.96	0.97	0.94	0.91	1.05	-3.06	-1.46	1.9	-3.27	-1.8	1.25
Guatemala Urban	-1.81	0.64	3.06	-2.27	0.44	2.59	1.02	1.04	1.08	0.96	1	0.98	-1.77	0.62	2.84	-2.37	0.44	2.65
Guatemala Rural	-2.88	-0.37	2.65	-3.5	-1.66	InsObs	0.99	1.05	1.16	0.96	0.98	InsObs	-2.93	-0.35	2.28	-3.63	-1.7	InsObs
Brasil Urbano	-0.39	1.33	3.2	-0.61	1.03	3.2	1.01	1.05	1.07	0.96	1.02	1.08	-0.39	1.27	3	-0.64	1.01	2.97
Brasil Rural	-2.17	0.18	3.08	-2.41	-0.4	2.86	1	1.01	1.05	0.94	0.99	0.97	-2.18	0.18	2.93	-2.55	-0.4	2.95

Table VI.1.A.3 Children's Health Services

Total Inequality: 0.3	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.96	0.53	2.77	-1.07	-0.18	2.33	0.75	0.95	1.06	0.59	0.62	0.85	-1.28	0.56	2.62	-1.82	-0.28	2.76
Peru Rural	-1.74	-1.04	1.51	-1.55	-0.96	0.28	0.5	0.62	0.87	0.47	0.53	0.53	-3.5	-1.68	1.73	-3.28	-1.82	0.52
Bolivia Urbano	-0.89	0.76	3	-0.97	-0.16	2.71	0.76	0.89	1.05	0.6	0.72	0.95	-1.16	0.85	2.85	-1.61	-0.22	2.84
Bolivia Rural	-1.82	-0.95	1.91	-1.35	-0.81	0.96	0.61	0.7	0.96	0.42	0.49	0.6	-2.98	-1.36	1.98	-3.2	-1.63	1.6
Guatemala Urban	-1.21	0.87	3.23	-1.62	0.03	2.84	0.79	0.97	1.1	0.73	0.75	1.13	-1.53	0.89	2.93	-2.23	0.04	2.52
Guatemala Rural	-1.74	-0.17	1.89	-1.67	-0.77	InsObs	0.61	0.8	0.83	0.45	0.53	InsObs	-2.83	-0.21	2.27	-3.74	-1.44	InsObs
Brasil Urbano	-0.32	1.53	3.46	-0.69	1.21	3.39	1.1	1.12	1.15	1.03	1.11	1.15	-0.29	1.36	3.01	-0.67	1.09	2.95
Brasil Rural	-2.07	0.2	3.54	-2.21	-0.37	3.08	0.96	1.1	1.15	0.88	0.99	1.11	-2.15	0.18	3.09	-2.5	-0.38	2.77

Table VI.1.B.1 Health Results with Height for Age z-Score as Need

Total Inequality: 0.05	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.44	0.49	2.71	-1.86	-0.37	2.38	0.96	1	1.04	0.94	1	0.85	-1.5	0.48	2.61	-1.97	-0.37	2.79
Peru Rural	-3.49	-1.86	1.62	-3.29	-1.87	0.42	0.95	0.97	0.97	0.97	0.96	0.94	-3.66	-1.92	1.66	-3.39	-1.95	0.45
Bolivia Urbano	-1.29	0.72	2.91	-1.8	-0.45	2.25	1	1	1.03	1.01	0.96	0.85	-1.29	0.73	2.82	-1.78	-0.47	2.65
Bolivia Rural	-2.92	-1.48	1.92	-3.29	-1.81	1.34	0.93	0.99	1.02	0.99	0.97	1.08	-3.13	-1.5	1.88	-3.32	-1.87	1.23
Guatemala Urban	-1.81	0.77	3.12	-2.33	0.11	2.93	1.05	1.05	1.07	1.02	0.98	1.17	-1.73	0.74	2.93	-2.29	0.12	2.52
Guatemala Rural	-3.26	-0.55	2.63	-3.89	-1.79	InsObs	1.02	1.06	1.14	1.02	1.04	InsObs	-3.19	-0.52	2.31	-3.83	-1.73	InsObs
Brasil Urbano	-0.29	1.38	3.13	-0.7	1.09	3.18	0.99	1.02	1.04	0.97	1.01	1.08	-0.29	1.35	3.01	-0.72	1.08	2.95
Brasil Rural	-2.26	0.16	3.2	-2.58	-0.47	2.56	0.99	1	1.03	0.96	0.99	0.91	-2.27	0.16	3.09	-2.67	-0.48	2.81

Table VI.1.B.2 Health Services with Height for Age z-Score as Need

Total Inequality: 0.18	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.16	0.5	2.71	-1.42	-0.22	2.48	0.84	0.97	1.04	0.74	0.75	0.91	-1.38	0.51	2.61	-1.92	-0.3	2.72
Peru Rural	-2.3	-1.31	1.55	-2.14	-1.25	0.33	0.65	0.73	0.92	0.64	0.67	0.65	-3.54	-1.78	1.69	-3.32	-1.87	0.5
Bolivia Urbano	-1	0.75	2.97	-1.27	-0.26	2.82	0.84	0.94	1.04	0.73	0.8	1	-1.19	0.8	2.84	-1.74	-0.33	2.81
Bolivia Rural	-2.19	-1.11	1.93	-1.92	-1.12	1.05	0.73	0.79	1	0.59	0.64	0.72	-3.01	-1.41	1.93	-3.26	-1.74	1.47
Guatemala Urban	-1.5	0.85	3.17	-1.96	-0.01	3.08	0.91	1.01	1.08	0.88	0.87	1.22	-1.66	0.84	2.92	-2.23	-0.01	2.52
Guatemala Rural	-2.31	-0.31	1.94	-2.51	-1.12	InsObs	0.77	0.89	0.85	0.67	0.73	InsObs	-3.01	-0.34	2.28	-3.77	-1.54	InsObs
Brasil Urbano	-0.36	1.44	3.22	-0.74	1.14	3.19	1.08	1.06	1.07	1.03	1.07	1.08	-0.34	1.35	3.01	-0.72	1.07	2.94
Brasil Rural	-2.19	0.14	3.33	-2.39	-0.45	3	0.98	1.06	1.08	0.94	1	1.08	-2.23	0.13	3.09	-2.56	-0.45	2.77

Table VI.1.B.3 Health Services with Health Results as Need

Total Inequality: 0.28	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.99	0.52	2.74	-1.12	-0.16	2.41	0.76	0.95	1.05	0.61	0.63	0.89	-1.3	0.55	2.62	-1.83	-0.26	2.72
Peru Rural	-1.79	-1.07	1.52	-1.59	-0.99	0.28	0.51	0.63	0.88	0.49	0.54	0.55	-3.5	-1.7	1.72	-3.28	-1.82	0.5
Bolivia Urbano	-0.89	0.76	2.98	-1.01	-0.16	2.83	0.77	0.9	1.04	0.61	0.73	0.99	-1.16	0.84	2.85	-1.67	-0.23	2.85
Bolivia Rural	-1.87	-0.96	1.89	-1.37	-0.83	0.93	0.63	0.71	0.96	0.43	0.51	0.58	-2.97	-1.36	1.97	-3.2	-1.64	1.6
Guatemala Urban	-1.22	0.86	3.18	-1.62	0.01	2.78	0.79	0.96	1.09	0.73	0.76	1.1	-1.55	0.89	2.92	-2.22	0.01	2.52
Guatemala Rural	-1.75	-0.17	1.81	-1.7	-0.77	InsObs	0.61	0.79	0.8	0.45	0.53	InsObs	-2.85	-0.22	2.26	-3.75	-1.43	InsObs
Brasil Urbano	-0.34	1.51	3.42	-0.71	1.2	3.32	1.1	1.11	1.14	1.04	1.11	1.13	-0.31	1.36	3.01	-0.69	1.09	2.95
Brasil Rural	-2.09	0.19	3.5	-2.24	-0.39	3.13	0.97	1.1	1.13	0.9	1	1.13	-2.16	0.17	3.09	-2.5	-0.39	2.77

Table VI.1.C.1 Education (Children's Database)

Total Inequality: 0.57	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.02	0.63	4.92	-1.32	-0.24	4.81	0.73	1.16	1.86	0.69	1.07	1.77	-1.41	0.54	2.65	-1.9	-0.23	2.72
Peru Rural	-2.43	-2	3.07	-2.03	-1.97	0.79	0.68	1.07	1.79	0.63	1.06	1.69	-3.55	-1.86	1.71	-3.22	-1.87	0.47
Bolivia Urbano	-0.9	0.89	5.6	-1.26	-0.37	4.72	0.75	1.13	1.95	0.68	1.05	1.75	-1.2	0.79	2.87	-1.86	-0.35	2.7
Bolivia Rural	-2.1	-1.54	3.77	-2.13	-1.87	2.25	0.71	1.08	1.94	0.66	1.04	1.79	-2.96	-1.43	1.94	-3.22	-1.79	1.26
Guatemala Urban	-0.89	0.9	5.7	-1.13	0.08	3.76	0.59	1.11	1.92	0.57	1.12	1.5	-1.5	0.81	2.96	-2	0.07	2.52
Guatemala Rural	-1.75	-0.45	4.41	-1.76	-1.69	InsObs	0.59	1.06	1.93	0.49	1.01	InsObs	-2.94	-0.42	2.28	-3.57	-1.68	InsObs
Brasil Urbano	-0.2	1.57	5.94	-0.36	1.23	5.4	0.75	1.12	1.96	0.68	1.09	1.81	-0.27	1.4	3.03	-0.53	1.13	2.97
Brasil Rural	-1.4	0.22	5.61	-1.37	-0.49	4.99	0.66	1.03	1.82	0.58	1	1.77	-2.14	0.22	3.09	-2.38	-0.48	2.81

Table VI.1.C.2 Housing (Children's Database)

Total Inequality: 0.51	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.86	0.69	3	-1.22	-0.02	2.98	0.8	0.94	1.12	0.7	0.79	1.1	-1.08	0.73	2.68	-1.75	-0.02	2.7
Peru Rural	-1.37	-0.69	1.5	-1.19	-0.68	0.39	0.41	0.52	0.76	0.39	0.45	0.57	-3.34	-1.33	1.98	-3.04	-1.5	0.68
Bolivia Urbano	-0.8	0.9	3.34	-1.16	-0.08	3.03	0.85	1.01	1.17	0.78	0.88	1.11	-0.93	0.89	2.86	-1.49	-0.09	2.73
Bolivia Rural	-1.38	-0.67	1.59	-1.32	-0.73	0.87	0.54	0.65	0.75	0.45	0.55	0.6	-2.57	-1.04	2.12	-2.92	-1.34	1.45
Guatemala Urban	-1.28	0.99	3.64	-1.64	0.24	2.71	0.9	1.1	1.24	0.85	0.99	1.08	-1.42	0.9	2.92	-1.93	0.24	2.51
Guatemala Rural	-1.88	-0.05	2.26	-2.11	-0.99	InsObs	0.7	0.91	0.92	0.61	0.74	InsObs	-2.7	-0.06	2.45	-3.45	-1.34	InsObs
Brasil Urbano	-0.15	1.68	3.85	-0.54	1.34	3.73	1.07	1.19	1.28	1	1.14	1.26	-0.14	1.41	3.01	-0.54	1.17	2.95
Brasil Rural	-1.46	0.44	3.74	-1.68	-0.13	3.29	0.77	1.02	1.21	0.73	0.88	1.18	-1.91	0.44	3.09	-2.3	-0.15	2.79

Table VI.1.C.3 Employment (Children's Database)

Total Inequality: 0.79	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.95	0.95	4.43	-1.72	0.01	4.83	0.94	1.13	1.62	0.99	1.02	1.7	-1.01	0.84	2.72	-1.74	0.01	2.84
Peru Rural	-2.16	-1.15	2.9	-2.75	-1.49	0.98	0.68	0.86	1.61	0.9	0.96	1.4	-3.17	-1.33	1.8	-3.06	-1.54	0.7
Bolivia Urbano	-0.59	1.23	5.1	-1.15	0.14	4.95	0.86	1.1	1.75	0.82	0.83	1.78	-0.68	1.11	2.92	-1.41	0.17	2.78
Bolivia Rural	-1.49	-0.75	3.64	-1.95	-0.9	2.2	0.63	0.77	1.75	0.71	0.79	1.62	-2.36	-0.97	2.07	-2.77	-1.14	1.35
Guatemala Urban	-0.57	1.22	5.27	-1.06	0.57	4.03	0.76	0.98	1.76	0.66	0.81	1.6	-0.75	1.25	2.99	-1.6	0.7	2.52
Guatemala Rural	-0.9	0.32	3.84	-1.04	-0.52	InsObs	0.44	0.73	1.5	0.36	0.54	InsObs	-2.07	0.43	2.55	-2.87	-0.97	InsObs
Brasil Urbano	0.21	1.85	5.33	-0.29	1.56	5.16	0.9	1.11	1.74	0.92	1.08	1.72	0.24	1.66	3.07	-0.32	1.45	2.99
Brasil Rural	-1.25	0.64	6.86	-1.49	0.08	3.81	0.68	0.8	2.22	0.69	0.8	1.35	-1.85	0.79	3.09	-2.16	0.1	2.81

Table VI.1.C.4 Women's Height for Age z-Score (Children's Database)

Total Inequality: -0.58	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-2.71	0.54	3.12	-3.26	-0.55	3.16	1.68	1.52	1.22	1.58	1.77	1.29	-1.61	0.36	2.56	-2.06	-0.31	2.45
Peru Rural	-6.25	-3.13	2.1	-6	-3.08	0.43	1.7	1.57	1.29	1.76	1.59	1.41	-3.68	-1.99	1.63	-3.42	-1.93	0.31
Bolivia Urbano	-1.97	0.94	3.06	-3.1	-0.48	3.5	1.53	1.44	1.1	1.63	1.43	1.35	-1.29	0.65	2.77	-1.9	-0.33	2.6
Bolivia Rural	-4.53	-1.94	2.47	-5.63	-3.1	1.78	1.46	1.26	1.38	1.68	1.58	1.2	-3.1	-1.54	1.79	-3.36	-1.96	1.49
Guatemala Urban	-3.24	0.79	2.69	-5.15	-0.05	2.79	1.73	1.43	0.96	2.22	1.84	1.11	-1.87	0.55	2.81	-2.32	-0.03	2.52
Guatemala Rural	-6.08	-1.18	2.7	-8.62	-3.76	InsObs	1.84	1.56	0.99	2.24	2.09	InsObs	-3.3	-0.75	2.72	-3.86	-1.8	InsObs
Brasil Urbano	-0.56	0.88	0.91	-1.04	0.73	0.79	0.99	0.68	0.32	0.95	0.81	0.27	-0.57	1.29	2.87	-1.09	0.9	2.9
Brasil Rural	-2.95	-0.19	0.01	-3.16	-0.8	0.9	1.13	0.76	0	1.18	0.97	0.42	-2.62	-0.25	3.09	-2.69	-0.83	2.15

Table VI.2.A.1 Women's Height for Age z-Score

Total Inequality: 0.07	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.24	0.37	2.25	-1.75	-0.41	2.29	0.92	0.94	0.98	0.91	0.9	0.96	-1.35	0.39	2.31	-1.92	-0.46	2.37
Peru Rural	-2.84	-1.57	1.39	-2.68	-1.55	0.35	0.91	0.93	0.96	0.91	0.92	0.95	-3.12	-1.68	1.44	-2.96	-1.67	0.37
Bolivia Urbano	-1	0.58	2.51	-1.61	-0.31	2.22	0.93	0.95	0.99	0.93	0.94	0.96	-1.07	0.61	2.52	-1.74	-0.33	2.31
Bolivia Rural	-2.5	-1.31	1.69	-2.62	-1.36	0.85	0.94	0.97	0.95	0.92	0.93	0.97	-2.66	-1.35	1.78	-2.86	-1.46	0.88
Guatemala Urban	-1.39	0.52	2.53	-1.71	0.17	2.07	0.9	0.94	1	0.84	0.9	0.94	-1.54	0.55	2.52	-2.04	0.19	2.2
Guatemala Rural	-2.36	-0.29	1.98	-2.72	-1.25	InsObs	0.89	0.94	1	0.84	0.86	InsObs	-2.64	-0.31	1.98	-3.24	-1.46	InsObs
Brasil Urbano	-0.33	1.19	2.89	-0.63	0.91	2.86	1.01	1.04	1.09	1.01	1.03	1.1	-0.33	1.14	2.65	-0.62	0.88	2.6
Brasil Rural	-1.83	0.18	2.77	-2.26	-0.4	2.67	1	1.04	1.06	0.98	1.01	1.08	-1.83	0.17	2.61	-2.29	-0.39	2.47

Table VI.2.A.2 Health Results

Total Inequality: 0.17	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.17	0.42	2.57	-1.65	-0.42	2.3	0.91	1.02	1.11	0.82	0.89	0.91	-1.28	0.41	2.32	-2.02	-0.47	2.52
Peru Rural	-2.58	-1.48	1.55	-2.44	-1.44	0.22	0.83	0.91	1.02	0.82	0.85	0.92	-3.11	-1.64	1.51	-2.97	-1.69	0.24
Bolivia Urbano	-0.98	0.63	2.74	-1.49	-0.27	2.13	0.91	0.98	1.09	0.89	0.93	0.93	-1.08	0.64	2.52	-1.67	-0.29	2.29
Bolivia Rural	-2.15	-1.2	1.83	-2.4	-1.27	0.87	0.82	0.91	1.01	0.84	0.84	0.93	-2.61	-1.32	1.82	-2.84	-1.52	0.93
Guatemala Urban	-1.54	0.54	2.85	-1.86	0.33	2	0.97	1.05	1.13	0.87	1.01	0.86	-1.59	0.52	2.53	-2.13	0.33	2.32
Guatemala Rural	-2.34	-0.19	2.49	-2.73	-1.3	InsObs	0.91	1.03	1.16	0.85	0.92	InsObs	-2.58	-0.18	2.14	-3.21	-1.41	InsObs
Brasil Urbano	-0.29	1.25	3.04	-0.54	0.94	2.97	1.01	1.09	1.14	0.93	1.04	1.13	-0.28	1.15	2.66	-0.58	0.9	2.62
Brasil Rural	-1.71	0.2	2.86	-1.9	-0.32	2.33	0.97	1.04	1.12	0.86	0.98	0.95	-1.76	0.19	2.56	-2.21	-0.32	2.45

Table VI.2.A.3 Health Services

Total Inequality: 0.27	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.84	0.41	2.45	-0.96	-0.23	2.12	0.75	0.95	1.06	0.52	0.6	0.86	-1.12	0.43	2.32	-1.86	-0.38	2.45
Peru Rural	-1.5	-0.95	1.37	-1.36	-0.87	0.19	0.5	0.64	0.9	0.47	0.54	0.55	-2.98	-1.48	1.53	-2.89	-1.6	0.34
Bolivia Urbano	-0.8	0.64	2.67	-0.82	-0.15	2.29	0.77	0.92	1.06	0.57	0.74	0.92	-1.04	0.69	2.52	-1.45	-0.2	2.48
Bolivia Rural	-1.59	-0.87	1.85	-1.16	-0.68	0.85	0.63	0.72	1	0.43	0.5	0.67	-2.51	-1.22	1.84	-2.72	-1.37	1.26
Guatemala Urban	-1.16	0.6	2.79	-1.36	0.26	2.18	0.8	0.98	1.1	0.65	0.74	0.92	-1.45	0.62	2.54	-2.09	0.35	2.36
Guatemala Rural	-1.48	-0.02	1.9	-1.4	-0.65	InsObs	0.62	0.87	0.9	0.44	0.54	InsObs	-2.36	-0.03	2.12	-3.15	-1.2	InsObs
Brasil Urbano	-0.37	1.27	3.07	-0.63	0.98	3	1.1	1.13	1.15	1.04	1.12	1.15	-0.34	1.13	2.66	-0.61	0.88	2.61
Brasil Rural	-1.79	0.19	2.92	-1.95	-0.32	2.7	1.01	1.11	1.14	0.91	1.02	1.11	-1.78	0.17	2.56	-2.14	-0.31	2.42

Table VI.2.A.4 Total Health

Total Inequality: 0.31	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.98	0.44	2.68	-1.06	-0.27	2.38	0.83	1.02	1.15	0.57	0.69	0.96	-1.18	0.43	2.32	-1.88	-0.39	2.47
Peru Rural	-1.91	-1.18	1.53	-1.6	-1.03	0.21	0.63	0.77	1	0.55	0.64	0.71	-3.03	-1.54	1.53	-2.91	-1.62	0.29
Bolivia Urbano	-0.82	0.66	2.87	-0.87	-0.18	2.33	0.79	0.96	1.14	0.59	0.78	0.96	-1.04	0.7	2.53	-1.47	-0.23	2.43
Bolivia Rural	-1.69	-0.94	1.94	-1.3	-0.75	0.83	0.67	0.76	1.05	0.47	0.54	0.7	-2.52	-1.24	1.85	-2.74	-1.38	1.18
Guatemala Urban	-1.17	0.63	2.99	-1.31	0.32	2.03	0.8	1.02	1.18	0.64	0.81	0.87	-1.46	0.62	2.53	-2.05	0.4	2.34
Guatemala Rural	-1.56	-0.02	2.23	-1.49	-0.71	InsObs	0.66	0.91	1.03	0.47	0.59	InsObs	-2.37	-0.02	2.17	-3.16	-1.21	InsObs
Brasil Urbano	-0.3	1.32	3.33	-0.56	1	3.2	1.04	1.14	1.25	0.97	1.1	1.22	-0.29	1.15	2.66	-0.58	0.91	2.62
Brasil Rural	-1.65	0.23	3.2	-1.78	-0.28	2.62	0.95	1.08	1.25	0.83	0.97	1.08	-1.75	0.21	2.56	-2.14	-0.28	2.44

Table VI.2.A.5 Women's Health Results

Total Inequality: 0.18	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.2	0.41	2.57	-1.53	-0.41	2.5	0.92	1.02	1.11	0.79	0.89	1.03	-1.31	0.4	2.32	-1.93	-0.46	2.44
Peru Rural	-2.6	-1.54	1.59	-2.38	-1.44	0.25	0.84	0.93	1.06	0.8	0.86	0.95	-3.1	-1.66	1.51	-2.95	-1.68	0.26
Bolivia Urbano	-0.93	0.63	2.77	-1.36	-0.3	2.43	0.88	0.98	1.1	0.78	0.96	1.05	-1.07	0.64	2.52	-1.74	-0.32	2.31
Bolivia Rural	-2.08	-1.13	1.91	-2.29	-1.23	0.82	0.81	0.87	1.04	0.8	0.82	0.86	-2.58	-1.31	1.83	-2.86	-1.51	0.95
Guatemala Urban	-1.54	0.5	2.72	-1.62	0.32	1.74	0.93	1.02	1.08	0.82	1.01	0.78	-1.64	0.49	2.51	-1.99	0.32	2.25
Guatemala Rural	-2.26	-0.18	2.36	-2.62	-1.31	InsObs	0.88	0.99	1.1	0.82	0.93	InsObs	-2.58	-0.18	2.14	-3.21	-1.41	InsObs
Brasil Urbano	-0.3	1.24	3.07	-0.56	0.95	2.93	1.01	1.09	1.15	0.94	1.05	1.12	-0.3	1.14	2.66	-0.59	0.9	2.62
Brasil Rural	-1.67	0.17	2.97	-1.84	-0.34	2.62	0.94	1.07	1.16	0.85	0.98	1.09	-1.77	0.16	2.55	-2.16	-0.34	2.41

Table VI.2.A.6 Women's Health Services

Total Inequality: 0.28	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.78	0.42	2.46	-0.85	-0.22	2.08	0.72	0.95	1.06	0.47	0.56	0.86	-1.08	0.44	2.32	-1.81	-0.39	2.43
Peru Rural	-1.32	-0.85	1.35	-1.19	-0.77	0.18	0.44	0.59	0.88	0.41	0.49	0.5	-2.97	-1.44	1.53	-2.9	-1.58	0.36
Bolivia Urbano	-0.79	0.66	2.71	-0.86	-0.15	2.27	0.77	0.94	1.08	0.58	0.74	0.91	-1.03	0.7	2.52	-1.49	-0.2	2.49
Bolivia Rural	-1.55	-0.84	1.88	-1.13	-0.65	0.84	0.62	0.7	1.02	0.42	0.48	0.66	-2.49	-1.2	1.85	-2.72	-1.35	1.27
Guatemala Urban	-1.09	0.62	2.84	-1.31	0.26	2.13	0.78	0.97	1.12	0.62	0.7	0.9	-1.4	0.64	2.54	-2.1	0.36	2.36
Guatemala Rural	-1.33	0.02	1.88	-1.2	-0.55	InsObs	0.58	0.84	0.89	0.38	0.47	InsObs	-2.3	0.02	2.12	-3.14	-1.17	InsObs
Brasil Urbano	-0.38	1.29	3.1	-0.64	0.99	3.03	1.11	1.14	1.16	1.05	1.13	1.16	-0.34	1.13	2.66	-0.61	0.88	2.61
Brasil Rural	-1.83	0.19	2.97	-1.97	-0.32	2.73	1.02	1.12	1.16	0.92	1.02	1.13	-1.79	0.17	2.56	-2.14	-0.31	2.42

Table VI.2.A.7 Women's Health Knowledge

Total Inequality: 0.36	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.25	0.49	3.22	-1.21	-0.27	3.35	1.01	1.21	1.38	0.6	0.86	1.38	-1.23	0.41	2.33	-2.02	-0.31	2.43
Peru Rural	-2.69	-1.63	2	-1.98	-1.34	0.3	0.89	1.06	1.33	0.69	0.84	0.97	-3.02	-1.55	1.5	-2.88	-1.6	0.3
Bolivia Urbano	-0.95	0.74	3.35	-0.81	-0.25	2.75	0.88	1.09	1.33	0.55	0.79	1.16	-1.07	0.68	2.52	-1.46	-0.32	2.36
Bolivia Rural	-2.11	-1.14	2.32	-1.22	-0.75	0.92	0.83	0.9	1.28	0.45	0.57	0.78	-2.53	-1.27	1.81	-2.69	-1.31	1.18
Guatemala Urban	-1.19	0.69	3.28	-1.22	0.46	1.94	0.78	1.03	1.3	0.57	0.84	0.82	-1.51	0.66	2.53	-2.15	0.55	2.37
Guatemala Rural	-1.56	-0.06	2.53	-1.36	-0.59	InsObs	0.66	0.9	1.15	0.43	0.55	InsObs	-2.35	-0.06	2.21	-3.12	-1.08	InsObs
Brasil Urbano	-0.24	1.37	3.75	-0.5	1	3.49	0.92	1.14	1.41	0.86	1.05	1.34	-0.26	1.21	2.66	-0.57	0.96	2.61
Brasil Rural	-1.47	0.3	3.44	-1.63	-0.28	2.66	0.82	0.97	1.34	0.74	0.9	1.06	-1.78	0.31	2.56	-2.19	-0.32	2.51

Table VI.2.A.8 Children's Vaccinations

Total Inequality: 0.11	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.38	0.4	2.51	-2.04	-0.31	2.92	1.03	1.07	1.08	0.97	0.95	1.15	-1.34	0.38	2.32	-2.1	-0.33	2.54
Peru Rural	-2.98	-1.73	1.56	-2.75	-1.66	0.21	0.98	1.04	1.08	0.95	0.99	0.99	-3.04	-1.66	1.44	-2.89	-1.68	0.22
Bolivia Urbano	-0.88	0.64	2.41	-0.85	-0.14	2.71	0.82	0.91	0.95	0.6	0.74	1.07	-1.08	0.7	2.53	-1.44	-0.2	2.53
Bolivia Rural	-2.22	-1.23	1.75	-1.69	-1.1	0.97	0.84	0.9	0.98	0.61	0.73	0.9	-2.66	-1.36	1.79	-2.77	-1.51	1.08
Guatemala Urban	-1.82	0.52	2.72	-1.81	0.29	3	1.04	1.05	1.08	0.93	1.03	1.24	-1.76	0.49	2.53	-1.95	0.28	2.41
Guatemala Rural	-2.58	-0.31	2.34	-2.99	-1.24	InsObs	0.98	1.09	1.1	0.93	1	InsObs	-2.63	-0.29	2.13	-3.21	-1.25	InsObs
Brasil Urbano	-0.27	1.18	2.86	-0.61	0.91	2.78	0.97	1.04	1.07	0.96	1.01	1.05	-0.28	1.14	2.66	-0.63	0.9	2.63
Brasil Rural	-1.69	0.24	3.08	-1.92	-0.46	1.56	0.98	1.06	1.2	0.89	1.02	0.71	-1.72	0.22	2.57	-2.17	-0.46	2.21

Table VI.2.B.1 Health Results with Height for Age z-Score as Need

Total Inequality: 0.06	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.37	0.4	2.51	-1.8	-0.49	2.06	0.98	1.05	1.06	0.89	0.99	0.81	-1.4	0.38	2.36	-2.01	-0.5	2.53
Peru Rural	-3.1	-1.71	1.48	-2.96	-1.7	0.16	0.97	1	0.98	0.96	0.96	0.89	-3.21	-1.71	1.51	-3.07	-1.77	0.18
Bolivia Urbano	-1.17	0.62	2.71	-1.83	-0.35	2.2	1.02	1.03	1.05	1.07	1.02	0.95	-1.15	0.6	2.58	-1.71	-0.35	2.32
Bolivia Rural	-2.65	-1.42	1.93	-2.89	-1.57	1.06	0.97	1.01	1.06	0.99	0.98	1.12	-2.73	-1.41	1.82	-2.93	-1.59	0.94
Guatemala Urban	-1.49	0.58	2.79	-2.08	0.12	1.72	0.97	1.03	1.08	0.96	0.95	0.77	-1.54	0.56	2.58	-2.16	0.13	2.25
Guatemala Rural	-2.79	-0.34	2.25	-3.2	-1.62	InsObs	1.03	1.04	1.08	0.96	1.05	InsObs	-2.71	-0.32	2.09	-3.34	-1.54	InsObs
Brasil Urbano	-0.35	1.19	2.82	-0.62	0.91	2.72	1.02	1.03	1.03	0.95	1.02	1.02	-0.34	1.15	2.73	-0.65	0.89	2.67
Brasil Rural	-1.74	0.15	1.77	-2.17	-0.43	2.4	0.95	0.91	0.67	0.92	0.99	0.94	-1.83	0.16	2.64	-2.35	-0.43	2.54

Table VI.2.B.2 Health Services with Height for Age z-Score as Need

Total Inequality: 0.14	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.18	0.41	2.52	-1.42	-0.35	2.22	0.91	1.05	1.07	0.72	0.81	0.92	-1.3	0.39	2.36	-1.95	-0.44	2.41
Peru Rural	-2.35	-1.37	1.44	-2.16	-1.29	0.19	0.75	0.84	0.95	0.71	0.75	0.72	-3.15	-1.63	1.52	-3.03	-1.71	0.26
Bolivia Urbano	-1.03	0.65	2.75	-1.29	-0.25	2.6	0.93	1.02	1.07	0.8	0.92	1.05	-1.1	0.64	2.58	-1.62	-0.28	2.47
Bolivia Rural	-2.22	-1.15	2.07	-1.98	-1.12	1.01	0.84	0.87	1.12	0.69	0.74	0.86	-2.64	-1.33	1.86	-2.88	-1.51	1.17
Guatemala Urban	-1.3	0.61	2.71	-1.77	0.12	1.65	0.88	1.02	1.05	0.84	0.82	0.74	-1.48	0.6	2.58	-2.1	0.14	2.24
Guatemala Rural	-2.18	-0.2	1.85	-2.32	-1.16	InsObs	0.84	0.93	0.87	0.7	0.81	InsObs	-2.6	-0.22	2.12	-3.31	-1.43	InsObs
Brasil Urbano	-0.4	1.21	2.84	-0.68	0.95	2.67	1.07	1.06	1.04	1.01	1.08	1	-0.37	1.14	2.73	-0.67	0.88	2.66
Brasil Rural	-1.72	0.13	1.73	-2.07	-0.42	2.73	0.94	0.97	0.65	0.92	1.01	1.11	-1.82	0.14	2.65	-2.26	-0.42	2.47

Table VI.2.B.3 Health Services with Health Results as Need

Total Inequality: 0.25	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.86	0.4	2.43	-0.99	-0.23	2.17	0.76	0.96	1.05	0.53	0.61	0.9	-1.13	0.42	2.31	-1.87	-0.37	2.42
Peru Rural	-1.55	-0.97	1.37	-1.39	-0.89	0.2	0.52	0.65	0.9	0.48	0.55	0.57	-2.99	-1.5	1.52	-2.89	-1.6	0.35
Bolivia Urbano	-0.81	0.64	2.66	-0.83	-0.16	2.36	0.77	0.93	1.05	0.56	0.75	0.95	-1.04	0.69	2.52	-1.47	-0.21	2.49
Bolivia Rural	-1.64	-0.88	1.85	-1.19	-0.71	0.84	0.65	0.72	1.01	0.43	0.51	0.66	-2.51	-1.22	1.83	-2.73	-1.38	1.27
Guatemala Urban	-1.16	0.59	2.76	-1.36	0.25	2.2	0.79	0.97	1.09	0.65	0.74	0.93	-1.46	0.61	2.54	-2.08	0.34	2.37
Guatemala Rural	-1.48	-0.03	1.83	-1.41	-0.65	InsObs	0.63	0.86	0.87	0.45	0.54	InsObs	-2.37	-0.04	2.12	-3.16	-1.2	InsObs
Brasil Urbano	-0.38	1.26	3.04	-0.65	0.97	2.97	1.1	1.12	1.14	1.05	1.12	1.14	-0.34	1.12	2.66	-0.62	0.87	2.61
Brasil Rural	-1.8	0.18	2.91	-1.97	-0.33	2.75	1.01	1.11	1.14	0.92	1.02	1.14	-1.79	0.16	2.56	-2.14	-0.32	2.42

Table VI.2.B.4 Women's Health Services with Women's Health Results as Need

Total Inequality: 0.19	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.86	0.39	2.32	-1.14	-0.23	2	0.76	0.94	1	0.57	0.61	0.84	-1.13	0.41	2.31	-1.99	-0.38	2.39
Peru Rural	-1.57	-0.92	1.27	-1.48	-0.9	0.18	0.52	0.62	0.84	0.51	0.56	0.52	-3.01	-1.49	1.5	-2.93	-1.61	0.35
Bolivia Urbano	-0.89	0.64	2.57	-1.07	-0.17	2.2	0.84	0.95	1.02	0.69	0.76	0.88	-1.06	0.67	2.51	-1.55	-0.23	2.49
Bolivia Rural	-1.84	-0.96	1.79	-1.42	-0.82	0.88	0.72	0.77	1	0.51	0.57	0.74	-2.54	-1.24	1.8	-2.75	-1.43	1.2
Guatemala Urban	-1.16	0.6	2.74	-1.6	0.23	2.47	0.81	0.96	1.08	0.72	0.69	1.03	-1.44	0.63	2.54	-2.24	0.33	2.41
Guatemala Rural	-1.53	-0.04	1.73	-1.49	-0.61	InsObs	0.64	0.84	0.83	0.47	0.5	InsObs	-2.39	-0.05	2.09	-3.19	-1.22	InsObs
Brasil Urbano	-0.42	1.22	2.88	-0.71	0.94	2.86	1.1	1.09	1.08	1.08	1.1	1.1	-0.38	1.12	2.66	-0.65	0.85	2.61
Brasil Rural	-1.94	0.17	2.75	-2.19	-0.36	2.63	1.05	1.08	1.07	1	1.03	1.08	-1.84	0.15	2.56	-2.19	-0.35	2.43

Table VI.2.B.5 Women's Health Knowledge with Height for Age z-Score as Need

Total Inequality: 0.25	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.46	0.48	3.17	-1.51	-0.36	3.17	1.1	1.26	1.34	0.73	0.97	1.31	-1.33	0.38	2.37	-2.06	-0.37	2.41
Peru Rural	-3.15	-1.86	1.95	-2.49	-1.59	0.27	1	1.14	1.3	0.83	0.94	1.01	-3.14	-1.63	1.51	-3	-1.69	0.27
Bolivia Urbano	-1.11	0.74	3.34	-1.16	-0.32	3	1	1.14	1.29	0.73	0.93	1.25	-1.11	0.65	2.59	-1.59	-0.34	2.4
Bolivia Rural	-2.55	-1.32	2.51	-1.8	-1.05	1.07	0.97	0.98	1.36	0.63	0.74	0.91	-2.63	-1.35	1.84	-2.84	-1.43	1.18
Guatemala Urban	-1.18	0.68	3.12	-1.55	0.23	1.47	0.82	1.06	1.22	0.73	0.84	0.65	-1.44	0.65	2.57	-2.12	0.28	2.24
Guatemala Rural	-2.1	-0.2	2.28	-2.07	-1.01	InsObs	0.82	0.95	1.04	0.63	0.76	InsObs	-2.55	-0.21	2.2	-3.29	-1.32	InsObs
Brasil Urbano	-0.29	1.3	3.47	-0.56	0.98	3.09	0.94	1.07	1.27	0.87	1.03	1.16	-0.31	1.21	2.73	-0.64	0.95	2.66
Brasil Rural	-1.46	0.23	2.15	-1.79	-0.39	2.71	0.8	0.9	0.81	0.78	0.91	1.06	-1.82	0.26	2.65	-2.29	-0.43	2.55

Table VI.2.B.6 Children's Vaccinations with Height for Age z-Score as Need

Total Inequality: 0.08	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-1.52	0.41	2.58	-2.03	-0.35	2.88	1.07	1.12	1.09	0.99	0.99	1.13	-1.43	0.37	2.36	-2.04	-0.36	2.55
Peru Rural	-3.23	-1.87	1.54	-2.96	-1.8	0.16	1.03	1.09	1.06	0.99	1.03	1.01	-3.13	-1.71	1.45	-2.98	-1.74	0.16
Bolivia Urbano	-1	0.66	2.52	-1.09	-0.2	2.96	0.9	0.96	0.97	0.7	0.82	1.14	-1.11	0.69	2.59	-1.56	-0.24	2.6
Bolivia Rural	-2.53	-1.38	1.96	-1.99	-1.25	1.09	0.92	0.97	1.07	0.69	0.81	1	-2.74	-1.42	1.83	-2.87	-1.55	1.09
Guatemala Urban	-1.58	0.61	2.66	-1.76	0.1	2.04	0.95	1.05	1.04	0.94	1	0.89	-1.66	0.58	2.57	-1.88	0.1	2.28
Guatemala Rural	-2.84	-0.38	2.17	-3.19	-1.44	InsObs	1.04	1.08	1.03	0.95	1.07	InsObs	-2.74	-0.35	2.1	-3.34	-1.35	InsObs
Brasil Urbano	-0.32	1.17	2.88	-0.64	0.94	2.72	0.97	1.02	1.05	0.95	1.02	1.01	-0.33	1.15	2.73	-0.67	0.92	2.69
Brasil Rural	-1.6	0.23	1.9	-1.97	-0.51	1.72	0.93	0.96	0.72	0.87	1.02	0.76	-1.71	0.24	2.66	-2.26	-0.5	2.27

Table VI.2.C.1 Education (Women's Database)

Total Inequality: 0.52	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.88	0.49	4.29	-1.3	-0.4	4.26	0.71	1.14	1.83	0.65	1.05	1.76	-1.24	0.43	2.35	-2.02	-0.38	2.42
Peru Rural	-2.02	-1.71	2.7	-1.76	-1.71	0.56	0.67	1.06	1.77	0.62	1.04	1.68	-3.03	-1.62	1.52	-2.85	-1.65	0.33
Bolivia Urbano	-0.77	0.73	4.87	-1.09	-0.27	3.91	0.73	1.12	1.91	0.65	1.04	1.69	-1.05	0.65	2.55	-1.68	-0.26	2.31
Bolivia Rural	-1.76	-1.37	3.52	-1.76	-1.55	1.58	0.7	1.06	1.92	0.64	1.03	1.72	-2.53	-1.3	1.83	-2.77	-1.51	0.92
Guatemala Urban	-0.87	0.58	4.82	-0.97	0.31	4.11	0.6	1.08	1.87	0.52	1.08	1.73	-1.45	0.54	2.58	-1.88	0.29	2.37
Guatemala Rural	-1.4	-0.2	4.01	-1.43	-1.42	InsObs	0.57	1.05	1.92	0.47	0.99	InsObs	-2.44	-0.19	2.1	-3.02	-1.43	InsObs
Brasil Urbano	-0.2	1.3	5.16	-0.34	0.98	4.71	0.72	1.11	1.92	0.68	1.07	1.79	-0.28	1.17	2.68	-0.5	0.91	2.64
Brasil Rural	-1.11	0.21	4.22	-1.14	-0.37	4.29	0.65	1.02	1.65	0.57	0.99	1.74	-1.71	0.2	2.56	-2.01	-0.38	2.46

Table VI.2.C.2 Housing (Women's Database)

Total Inequality: 0.43	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3	Ed 1	Ed 2	Ed 3
Peru Urban	-0.71	0.54	2.53	-1.04	-0.13	2.56	0.73	0.86	1.06	0.57	0.71	1.07	-0.97	0.62	2.39	-1.82	-0.18	2.39
Peru Rural	-1.07	-0.56	1.23	-0.96	-0.57	0.28	0.38	0.48	0.71	0.35	0.43	0.51	-2.86	-1.16	1.73	-2.72	-1.33	0.54
Bolivia Urbano	-0.65	0.73	2.95	-0.92	-0.03	2.51	0.78	0.96	1.16	0.68	0.82	1.07	-0.83	0.76	2.54	-1.35	-0.04	2.36
Bolivia Rural	-1	-0.5	1.44	-0.89	-0.5	0.65	0.46	0.57	0.71	0.37	0.47	0.57	-2.16	-0.87	2.04	-2.43	-1.07	1.14
Guatemala Urban	-1.11	0.65	2.94	-1.42	0.39	2.09	0.8	1	1.16	0.75	0.95	0.87	-1.38	0.65	2.54	-1.88	0.42	2.41
Guatemala Rural	-1.48	0.05	2.1	-1.68	-0.79	InsObs	0.66	0.88	0.92	0.57	0.69	InsObs	-2.25	0.06	2.27	-2.93	-1.14	InsObs
Brasil Urbano	-0.27	1.42	3.48	-0.54	1.08	3.35	1.09	1.21	1.31	1.03	1.15	1.28	-0.25	1.17	2.66	-0.52	0.94	2.62
Brasil Rural	-1.33	0.34	3.19	-1.55	-0.13	3.05	0.84	1.09	1.25	0.78	0.94	1.24	-1.58	0.31	2.56	-2	-0.14	2.46

Table VI.2.C.3 Employment (Women's Database)

Total Inequality: 0.64	Per-Capita Inequality						Average Relative Per-Capita Level						Within Group Inequality					
	Non Indigenous			Indigenous			Non Indigenous			Indigenous			Non Indigenous			Indigenous		
Geographic Region	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**	**Ed 1**	**Ed 2**	**Ed 3**
Peru Urban	-0.86	0.83	3.27	-2.03	-0.19	4.05	1.03	1.1	1.33	1.14	1.21	1.62	-0.84	0.76	2.45	-1.78	-0.16	2.49
Peru Rural	-2.27	-1.16	2.4	-3.14	-1.76	0.91	0.86	1	1.46	1.18	1.25	1.25	-2.63	-1.16	1.65	-2.66	-1.41	0.73
Bolivia Urbano	-0.59	1.06	3.43	-1.15	0.31	3.77	0.99	1.05	1.3	0.95	0.88	1.54	-0.6	1	2.63	-1.21	0.36	2.44
Bolivia Rural	-1.58	-0.77	2.99	-2.35	-1.12	1.36	0.78	0.87	1.51	0.98	1.05	1.25	-2.02	-0.89	1.98	-2.4	-1.07	1.08
Guatemala Urban	-0.51	0.92	3.77	-0.81	0.88	4.12	0.77	0.87	1.41	0.68	0.93	1.74	-0.66	1.05	2.67	-1.19	0.95	2.36
Guatemala Rural	-0.91	0.34	3.03	-0.96	-0.51	InsObs	0.53	0.77	1.32	0.43	0.69	InsObs	-1.71	0.44	2.3	-2.26	-0.74	InsObs
Brasil Urbano	0.25	1.56	3.69	-0.11	1.34	3.84	0.89	1.04	1.34	0.96	1.04	1.44	0.28	1.5	2.76	-0.12	1.29	2.66
Brasil Rural	-1.08	0.64	3.77	-1.44	0.22	3.79	0.82	0.9	1.44	0.84	0.97	1.5	-1.31	0.71	2.62	-1.7	0.23	2.53