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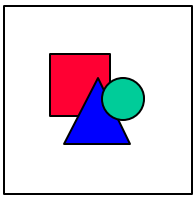

XXXV MEETING OF THE ADVISORY COMMITTEE ON HEALTH RESEARCH

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17 - 19 July 2000

MACRODETERMINANTS OF INEQUITIES IN HEALTH
(Multi-center Project)

Public Policy and Health (HDD)
Division of Health and Human Development
Washington, DC, April 2000

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MACRODETERMINANTS OF INEQUITIES IN HEALTH
(Multi-center Project)

INTRODUCTION

Considering the importance of inequalities in health in the Region of the Americas, in 1998 the Director of the Division of Health and Human Development of the Pan American Health Organization (PAHO/HDP) created an interprogrammatic group to propose research activities in this area. The group prepared a plan for a multicenter project that was submitted for consideration by the Internal Advisory Committee on Research (IACR). The plan envisaged analysis of secondary data sources, as well as primary data gathered through a household survey to be administered in different countries of the Region. While the IACR recognized the relevance of the topic and the seriousness of the proposal, it was also concerned about the plan's feasibility and, consequently, suggested that the interprogrammatic group prepare an alternative proposal limited to secondary data analysis only. Acting on this suggestion, the group prepared a new proposal, which was selected for financing by the IACR in 1999. Annex 1 includes a list of all the individuals who collaborated with suggestions and contributed to the preparation of the initial proposal, as well as this part concerned with secondary data analysis.

This plan is innovative in several aspects:

- Given the importance and quality of data obtained through the Demography and Health Survey (DHS) and the absence of data on household income and/or expenditures, the project envisages a new way of inputting values for a proxy variable for expenditure in these surveys. The performance of this inputted variable will be compared with the household assets index developed by a team of professionals from the World Bank and Macro International, the company that conducts DHS surveys;

- "Traditional" linear and logistic regression models will be developed for two health variables. During the first technical meeting of the project in January 2000, it was agreed that these analyses would concentrate on mortality in children under 5 and height-for-age in children aged 6 months to 5 years.

- A multilevel model will be created for studying height-for-age. In addition to individual variables, contextual variables at the census tract and municipal (or equivalent administrative unit) level will also be considered;

- In addition to the reports and scientific publications that arise from the project, its results should be used by research groups to initiate or promote discussions on the importance of considering alternative policies and interventions aimed at reducing these inequalities whenever possible, thereby promoting greater equity in health.

1. JUSTIFICATION

The Universal Declaration of Human Rights states that: *"Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services..."* It also states that: *"Everyone is entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as race, color, sex, language, religion, political or other opinion, national or social origin, property, birth or other status."* However, these ideals are still far from a reality in the Americas. Although the Declaration is related more to the concept of discrimination than to equity in itself, it nonetheless provides us with a starting point in terms of promoting discourse and policies concerned with social justice.

Accordingly, there are at least four main reasons why research on health inequities is important to our Region.

1.1 Inequity is the most important health problem in the Americas

According to the 1998 PAHO publication, "Leading Pan American Health,"[/i] inequity continues to be the leading health problem in the Americas. This is a reflection of the major social inequalities present in the Region, made relevant, for example, by the fact that Brazil, Guatemala, and Paraguay rank second, third, and fourth in the world in terms of income concentration.[/ii]

For many years now, research on inequities has constituted an important part of the agendas of the Pan American Health Organization/World Health Organization (PAHO/WHO). Since 1991, there has been interest within the Organization in promoting a systematic assessment of inequities in health in the Region.[/iii] In 1997, the Division of Health and Human Development commissioned leading researchers to carry out extensive literature reviews of scientific output in this subject area in Latin America and the Caribbean,[/iv] as well as the United States, Canada, and Western Europe,[/v] which have provided the background for this proposal.

1.2. The literature on health inequities in the Americas is limited

The scientific literature of the developed countries is giving growing importance to studying and understanding the relationship between living conditions and health, with a focus on inequities. A bibliographic database on this subject now contains more than 4,000 items,[/vi] and concerns about equity have now reached mainstream medical literature in the United States and Europe.[/vii/viii/ix]

On the other hand, literature is very scant with respect to areas of the world with greater disparities in socioeconomic conditions, particularly Latin America. The comprehensive review conducted by Almeida Filho lists 309 works, many of which are unpublished. Moreover, Filho notes several limitations with respect to this literature:

- A large proportion of the works deal with philosophical and theoretical considerations rather than results that can provide evidence for action;

- Studies addressing narrow age groups, with an almost virtual lack of adult health studies; and

- Results that are often unreliable due to flaws in the quality, design, or analysis of the data.

This lack of information[x] is particularly relevant in the case of Latin America, where inequities in health are so blatant. It also highlights the need to develop capacity within the countries for analyzing these inequities.

1.3. Information for decision-making is urgently needed for the Region

Decisionmakers hoping to implement interventions to reduce inequities in health lack relevant information for their needs. Most of what is known about inequalities in health and health care and the consequent inequities is the result of research conducted in—and on—the developed, industrialized countries of North America and Western Europe.

In a position paper on poverty, equity, and health in the developing world, D.R. Gwatkin of the World Bank writes that those concerned with equity (and poverty) in health are currently in a poor position to design and implement activities that can accomplish their objectives."[xi] He mentions three reasons for this, the second being the lack of basic information about health conditions, concerns, and practices among the poor, either in absolute terms or relative to other socioeconomic groups. Moreover, there is little knowledge about the relationship between economic inequalities and health inequities in Latin America and the Caribbean.

Another very important area, on which developing countries have practically no information, concerns the impact of interventions on equity in health. A recent study suggests that some interventions may in fact increase inequity, at least in the first years following their initial implementation."[xii]

Policies must be developed to ensure that new medical technologies will reduce rather than exacerbate inequity. Data originating from this project will help provide a better understanding of how health interventions may affect equity over time.

1.4. Existing data can be used to fill in the information gap

Given the recognition by PAHO that inequities are the number one health issue in the Region, it is essential to help close this knowledge gap through high-quality research, with a view to providing information for decision-making. Data compiled in administrative records, whether obtained from vital statistics or public health surveillance, are generally unsuitable for studying many problems of interest. This is because these records do not include information on socioeconomic variables, or pose problems in terms of representativeness, coverage, or other

factors. On the other hand, a large number of national household surveys have been conducted in the Region in the past decade. In many such countries, these surveys constitute the only reliable data sources concerning the relationship between socioeconomic characteristics, health status, and access to care, use of services, and expenditure in health. Nevertheless, the data provided by these surveys has hardly been used to study health inequities in Latin America and the Caribbean.

This proposal will draw on analysis of these survey and national census data, in order to gain a better understanding as to the scope of health inequalities, as well as the relationship between socioeconomic conditions, inequalities, and inequities in health in five countries of the Region.

1.5. How can this project help to improve equity?

The evidence on the relationship between poverty and health is indisputable. However, this relationship is complex and little is known about the mechanisms linking socioeconomic determinants with health status, access to care, use of services, and health care spending. A significant number of studies document the differences between the poor and non-poor in terms of health outcomes. Still in all, there have been relatively few studies that have examined the levels of health inequalities, strategies for their reduction and elimination, or the impact of earlier policy decisions. Nevertheless, socioeconomic inequalities affect health in rich and poor countries alike. This project, therefore, explores several challenges. First, it recognizes the need to establish innovative scientific ways of identifying inequalities at different levels of economic development. Second, the evolution and persistence of inequalities over time demand an ongoing review of relevant information and techniques for their monitoring and measurement. Third, while inequities are quite often mentioned in discourse, in practice they do not appear to rank very high on the policy agenda. Consequently, solid and reliable information is needed to advocate changes in unfair and avoidable inequalities in health. Finally, the current health sector reform may hold important consequences for equity; thus, it is essential to establish a baseline so that changes can be documented over time and influence policy decisions.

There is a need in the Region to develop a comprehensive research project that addresses the need to better understand the relationships among the macro determinants of health (social, economic, gender, ethnic, etc.) and inequalities at local, national, and regional levels. This project was designed to build on other research initiatives on inequalities and inequities in health status and health care. Recent examples include the PAHO-World Bank-UNDP EquiLAC Project to study equity in health in Latin America and the Caribbean;[/xiii] the PAHO-CARICOM Project in the Caribbean;[/xiv] WHO initiatives to study the problem worldwide;[/xv] USAID initiatives; and the Rockefeller Foundation Global Health Equity Initiative.[/xvi]

This project considers the exclusive use of secondary data collected in censuses and household surveys to expand knowledge of inequalities and the consequent inequities, and to advance policy proposals on how to address them. Data from the same sources will be analyzed in five countries using a standard analytical approach to ensure the comparability of results. The results will be widely disseminated through scientific publications and reports prepared for

policymakers, as well as to the general public. The analytical approach to be used in the project includes some of the most advanced statistical methodologies presently available to study these types of data.

2. CONCEPTUAL FRAMEWORK

In this project, a distinction is drawn between the terms *inequality* and *inequity*.[xvii/xviii] Whereas *inequality* indicates systematic and relevant differences between individuals and social groups in a given population, *inequity* means that an observed inequality is also unnecessary and unfair. Equity means that the needs of individuals guide the distribution of opportunities for well-being.[/xix] Pursuing equity in health status and health care is to attempt to reduce avoidable gaps in the health status of individuals, and in their access to, use of, and spending on health care services—between groups with different levels of social privilege.

Many conceptual frameworks exist to describe the relationship between the social and economic context in a given society and the health status of its members.[/xx/xxi/xxii] However, none seems to be completely satisfactory; thus the need for continuing research in this area. Some of the existing frameworks have been useful to organize the discussion of possible determinants of health status and access to health care at the individual and household levels. Accordingly, these frameworks can be used both to study the relationships between macroeconomic and social policies and to detect potentially important interventions to improve the levels of health and well-being in the population in a given context. Because only secondary data are being considered, the study framework narrows; thus its objective is limited to support for examination of the possible relationships to be explored in this project.

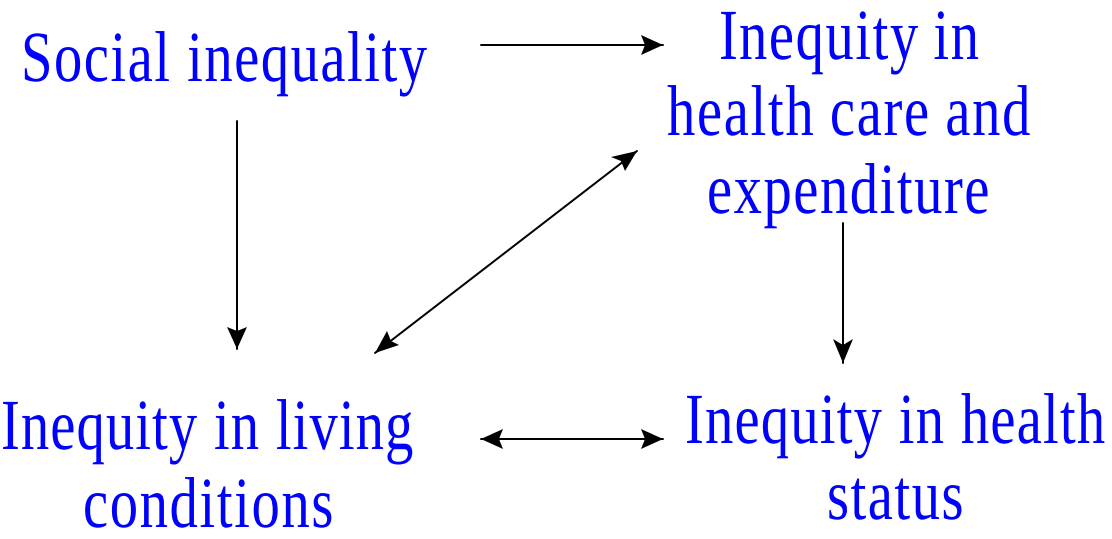

Figure 1 – Simplified diagram depicting the relationships between social inequities and inequities in living conditions, health status, health care access, and expenditure.

Figure 1 represents a very simplified model of a complex chain of determinations. Social inequalities lead to inequities in living conditions and health care (accessibility, use, quality), as well as in health expenditure; these, in turn, interact to cause inequities in health status. Throughout this document, the term *health inequities* will be used to refer to inequities in health status, health care access and utilization, and health expenditure. Another very useful model thathighlights the importance of household surveys in the study of health inequalities has been developed by the Rockefeller Foundation for application in its project on health inequities."[xxiii] A simplified version of this model is presented in Figure 2, depicting the areas of information generally available from multipurpose household surveys.

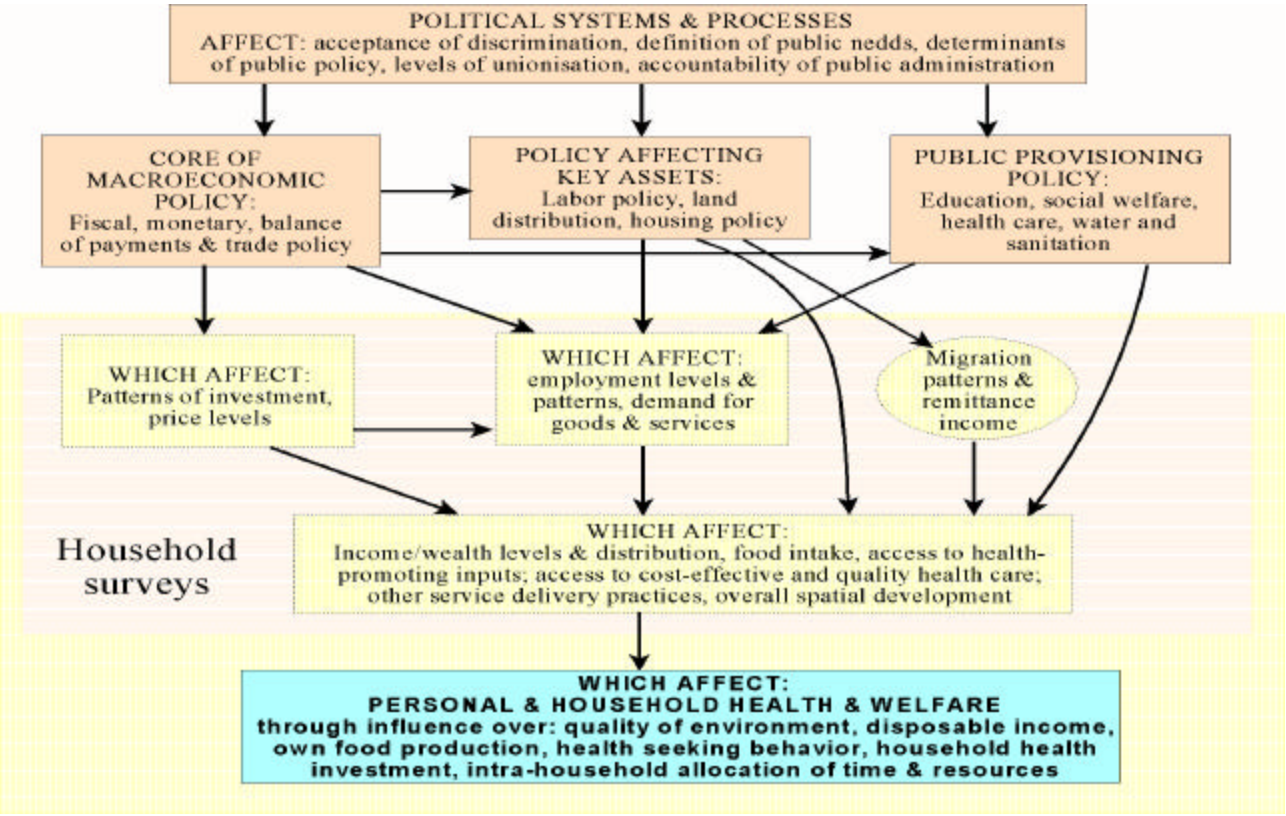

Figure 2 Diagram dipicting the relationship between public policies and health, health care access and utilization, with some possible intermediation among them, and indicating the area generally covered by multipurpose household surveys.

Without denying the importance of elaborate theoretical frameworks encompassing multiple (complex) aspects of these problems, this study will use specific conceptual models to guide the analyses of outcomes, including in each case only those variables that are available in the sets of data being used. These analytical models will be developed separately for each

outcome, since determinants may vary. The models will respect the hierarchy by which socioeconomic factors represent the basic determinants of most health indicators.[xxiv] The models will also take into account that the effect of socioeconomic factors are usually mediated through proximate determinants, including environmental, reproductive, behavioral, and nutritional variables.

Due to the constraints imposed by the exclusive use of secondary data, access to health care and health needs will be considered here in very specific contexts, with very precise meanings for each analysis. One example is the need for adequate care associated with pregnancy and childbirth and access to prenatal care and delivery attended by trained personnel or in an appropriate institutional setting.

Another aspect that is receiving growing attention in the literature is the importance of context in epidemiological analyses. Many conditions that influence health status and access to health care are not characteristic of the individuals but of the physical, social, and cultural environment in which they live. These contextual variables[xxv] provide additional information to fill gaps in what is available in the survey data, but primarily, they create additional possibilities for studying the processes that determine health status, care, and expenditures. An excellent example of contextualization is study of the health status of individuals and income inequality in the community (municipality, state, or their equivalent) in which they live.[xxvi/xxvii/xxviii] Other examples include land tenure patterns[xxix] and the percentage of the population with unmet basic needs, and many others.

The plan of analysis will take into consideration the concepts discussed above. Socioeconomic factors will be included in all analyses as major underlying determinants of health inequities. The relationships between health status, health care access and utilization, and health care expenditure will be systematically explored. Different levels of geographic aggregation and sophisticated statistical approaches will be used to incorporate contextual variables in the study.

3. OBJECTIVES AND PURPOSE

The general objective of this project is to use existing data from five Latin America countries to describe the levels of and trends in health inequities, and also to understand their determinants, with a view to produce information for policy recommendations aimed at improving equity in health.

The specific objectives are:

- To document the existence of inequities in health status, health care (access and utilization of health services) and out-of-pocket health expenditure, and to measure their magnitude;
- To describe time trends in health inequities;
- To assess levels of access and utilization of services in terms of specific health care needs;

- To gain a better understanding of which socioeconomic factors are most strongly associated with health inequities at different levels of aggregation, identifying possible determinants and association webs;
- To develop methodological approaches for linking and analyzing different types of survey and census data.

The results will be disseminated and presented to government officials, politicians, NGOs, and advocacy groups, as well as to the mass media, with a view to raising awareness and promoting action on different policy alternatives aimed at improving equity in health status, health care, and health expenditure. The study will also provide inputs for evaluating the impact of policy changes on health inequities.

The results will be useful in guiding future research on the subject in Latin America, the Caribbean, and other developing countries around the world.

In addition to these objectives, the study may also serve other purposes. The results obtained may be used to make recommendations for future surveys on the types of socioeconomic and health-related variables required for the study of inequity, and to develop local capacity in the use of the methods employed in this project.

One expected result of the project concerns the possibility of compiling a text on the use of household survey data in the study of health inequalities, for use in graduate courses in Public Health and in the training of individuals involved in the design and analysis of such surveys.

4. DATA SOURCES AND ANALYTICAL APPROACH

National teams of investigators will carry out analyses in five countries of Latin America. Household survey and census data will be used in each country.

4.1. Household surveys

The past decade has witnessed a sharp increase in the number and quality of household surveys conducted in Latin American and Caribbean countries, aimed at providing the necessary data for formulating macroeconomic and social policy. Many of the surveys were part of regional or global projects (MECOVI,[/xxx] LSMS[/xxxi]), while others were planned and conducted by national institutions. Many of these surveys include health modules for data collection on health status and/or access to the health care, as well as, in many cases, health care expenditures.[/xxxii] In addition, since the early 1980s Demographic and Health Surveys (DHS) [/xxxiii] have been conducted in several countries of the Region. In most of these surveys, databases can be obtained either directly from Internet websites or from national institutes of statistics. To better understand and appreciate the importance and implications of this research project, it is necessary to briefly describe the different types of surveys, their contents, and limitations.

The DHS collect information on fertility and family planning, maternal and child health, child survival, and other reproductive health topics. They include modules on the household, on

women of childbearing age, and on the children born to these women. Health status outcomes and access to health services for specific conditions include the incidence and/or prevalence of some childhood diseases, mortality in children under 5 (including neonatal, postneonatal, and infant mortality), nutritional status of the children, mothers' nutritional status, access to prenatal care and care in childbirth, breast-feeding, family planning and fertility./[xxxiv] However, these surveys do not include modules on household consumption and income (with very rare exceptions). A few recent surveys have included modules with information on the husbands of the women in the sample.

Table 1. Some of the variables related to health and household economics in the LSMS and DHS and national censuses.

	LSMS	DHS	CENSUS
HEALTH STATUS	– Self-assessment of health status – Infant/child mortality – Days unable to work	– Fertility levels – Birth intervals – Breast-feeding – Infant/child mortality – Child nutritional status – Diarrhea and ARI in children	
HEALTH CARE ACCESS AND UTILIZATION	– Consultations – Vaccinations – Prenatal care – Contraceptive use – Geographical access to health care – Health insurance	– Prenatal and delivery care – Knowledge and use of contraceptives – Immunization – Unmet family planning needs	
HEALTH EXPENDITURES	– Health care expenditure	– Only some expenditures	
LIVING CONDITIONS AND SOCIOECONOMIC STATUS	– Very wide availability of socioeconomic variables	– Limited set of variables – No information on income/consumption	– Housing conditions, sanitation, variables to calculate unmet basic needs and others

Surveys included in the broad category of the Living Standards Measurement Surveys (LSMS) collect data on many dimensions of household well-being, including consumption, income, savings, employment, health, education, fertility, nutrition, housing, and migration. Their limited health modules generally include questions on self-assessment of health status, access and utilization of different types of services, and health care expenditures. These surveys use large modules to study the structure of household expenditures and to determine consumption levels. In some cases, instead of consumption variables, the module includes questions to determine household income.

Other national household surveys vary substantially from one country to another, and even within the same country for different periods. The CASEN[/xxxv] survey in Chile has modules for income and also for health, but the latter is substantially different from that typically used in LSMS. The Brazilian annual PNAD[/xxxvi] survey included health modules in selected years. Mexico has now conducted three national health surveys and also administers annual household surveys on income and expenditure.

Based on information gathered in these household surveys, it is possible to explore the relationship between health status, access, utilization, and health care expenditure, and socioeconomic variables such as dwelling structure, income, consumption, employment, occupation, and educational levels—whenever this information is part of the same survey. As mentioned previously, DHS surveys do not usually include information on either household consumption or income. In an effort to overcome this problem, the World Bank and Macro International have created an index of household assets to be used in DHS surveys.[/xxxvii] This makes it possible to study infant mortality, the nutritional status of children and mothers, in addition to other variables, according to the distribution of assets in the household.

On the other hand, LSMS surveys generally collect a very limited amount of information on health status, but as mentioned above, provide a great deal of information on household economics.

Table 1 summarizes the types of variables available in each of the two types of surveys (LSMS and DHS), which can be used to investigate the relationship between health inequalities and socioeconomic determinants.

The discussion above shows that neither type of survey is ideally suited to investigate inequities in health status, health care access, utilization, and expenditure. In order to conduct a more in-depth analysis, the two types of surveys must be combined, together with national census data.

4.2. Census data

As was briefly discussed in section 2, in addition to the practical reasons for supplementing household survey data with external information, there are also theoretical advantages in including contextual variables. Since surveys identify the census tract to which each unit (household) of the sample belongs, contextual variables at this level or higher, obtained from national censuses, can be associated with each household (and with individuals who live in that household). Censuses are more adequate sources from which to create these contextual variables, since data are collected on all households in the corresponding tracts. Moreover, it is also possible to create contextual variables at higher levels of the hierarchy of territorial division. For variables such as income inequality, if working with very small units, very low values are always obtained, since values within these units are very homogeneous.

This allows the investigator to contextualize the study of determinants of inequalities and inequities in health status, health care, and health expenditure.[/xxxviii]

4.3. Combining different data sources

In the analyses of data from LSMS-type surveys, the large number of socioeconomic variables will be utilized to model and adjust the limited number of health-related variables. To each record (either a household or an individual, depending on the response being considered) in the sample, contextual variables created from census data will be added at the municipal and/or state levels (or their equivalents). The same contextual variables will be added to the women and children record in the DHS data.

It will not be possible to combine directly the date from the LSMS and DHS surveys, since the census tracts sampled in each survey are almost always different. Even so, information from LSMS may be used to guide the analysis of DHS data and vice versa. For example, both surveys include common household variables. LSMS data will be analyzed to explore different combinations of the common household variables in an attempt to construct indices of household socioeconomic status (SES) that may be used as proxies for household consumption and/or income. Such indices, if properly validated, may then be used in the analyses of DHS survey data in which income and consumption information is not available. Health variables can then be studied in distributional terms in accordance with these proxies, as well as the household assets index created by Macro International and the World Bank (see item 4.1). Two types of SES indices will be investigated: the best country-specific index and also indices that perform well across countries (or at least across several countries).

4.4. Selection of countries

The choice of countries for the project was limited by the availability of both LSMS and DHS surveys in recent years. Table 2 shows the five countries of Latin America for which surveys of both types are available in this decade.

Consequently, the project will be carried out in these five countries. Moreover, since Bolivia, Brazil, and Peru have had three DHS surveys within a period of 8 to 14 years, it will be possible to study time trends for these countries. In Peru, data from the three LSMS surveys can be used to study these trends.

Table 2 Latin American countries with both DHS and LSMS surveys and year carried out.

Country	DHS Surveys	LSMS Surveys
Bolivia	1989, 1994, 1998	1995
Brazil	1986, 1991, 1996	1997
Colombia	1986, 1995	1998
Nicaragua	1998	1997
Peru	1982, 1992, 1996	1991. 1994, 1997

5. VARIABLES AND PLAN OF ANALYSIS

5.1. Defining contextual variables

The choice of contextual variables is limited by the type of variables collected in the national census data. At least two contextual variables will be used at two different levels, municipality and state (or the equivalent administrative units):

a) Percentage of population with unmet basic needs;[xxxix]
b) Combination of the percentage of women in the job market and their level of education, which captures one dimension of the contextual situation of gender.

When data allow, other contextual variables to be considered are:

a) Percentage of dwellings owned by their residents;[xl]
b) Income inequality (Gini index, 20/20, or both).

Each of the contextual variables will be added to the corresponding records of both LSMS and DHS surveys.

5.2. LSMS data and analysis

5.2.1. Defining a proxy SES index at the household level

The LSMS and DHS surveys include at least eleven common variables related to household assets, namely:

1. Quality of dwelling (type of floor)
2. Size of dwelling (number of persons per sleeping room)
3. Source of household drinking water
4. Type of excreta disposal system
5. Availability of electricity
6. Household possessions: radio
7. Household possessions: television
8. Household possessions: refrigerator
9. Household possessions: means of transport
10. Possession of farm land
11. Availability of household help

Using LSMS survey data, the best proxy for household consumption and/or income will be determined using these eleven variables as well as others, such as education, occupation, etc. Several approaches can be explored, among them:

Linear regression – Income or consumption as a dependent variable, and the aforementioned eleven variables as independent variables. Explore the minimum set and the equation to be used in each country. Explore the possibility of having a common predictor of income or consumption.

Discriminant analysis – Income and/or consumption quintile(s) as classificatory variable, and the aforementioned variables to construct discriminant functions. Explore the best discriminant function for each country and also the possibility of having a common discriminant function for income and consumption.

The proxy(ies) and classification functions (hereafter called "proxy SES indices") so determined will be used in the DHS to classify household SES levels.

By analyzing DHS surveys, researchers at the World Bank and Macro International developed a household assets index using eleven variables and performing a principal component analysis. The index is the first principal component. This third alternative will be compared against the other two in the process of studying the health variables of the DHS in distributional form.

5.2.2. Constructing concentration curves for health variables

The number and type of health-related questions in the LSMS surveys is small, although variations exist from country to country. In general, they include at least the following health-related variables:

a) Some form of self-assessment of health status (generally obtained by asking each member of the household if he/she presented certain symptoms during the past four weeks), by sex;
b) Health care seeking during the past four weeks, including traditional health workers and pharmacists, etc., by sex;
c) Health care expenditures, including consultations, hospitalizations, and drugs, etc., by sex;
d) Some measure of geographical access, which includes means of transportation and time taken to get to the health care provider, by sex;
e) Vaccination coverage;
f) Prenatal care (for women 15 to 49 years of age);
g) Contraception (for women 15 to 49 years of age);
h) Questions about children born alive and survivors, which make it possible to compute mortality rates for different age groups under 5 years (in some cases, the questions only permit indirect mortality estimation).

Concentration curves will be constructed for each survey variable,[xli] and concentration indices calculated using income, consumption, the proxy variables mentioned in item 5.2.1, education level of head of household, and others as classificatory variables.

5.2.3. Other analyses of SES, health status and health care

Many health status and health care variables are binary; for example, consultation in the past four weeks (yes or no), type of health facility used (public or private), and purchase of drugs (yes or no), etc. In these cases, logistic regression models will be used to predict the response variables using SES explanatory variables, such as income/consumption, employment status of

men and women, education of men and women, sex, tenure of the dwelling, household structure, and others.

For surveys that allow the estimation of under 5 mortality by the direct method, an abridged life-table will computed. It is then possible to develop a model for the hazard function of this table using SES explanatory variables. This type of analysis will be performed primarily with DHS surveys, due to the greater quantity and quality of their data on child survival. However, repeating this analysis with LSMS data will facilitate crosschecking of the consistency of the results of the two types of surveys.

5.3. DHS variables and analysis

The first step in the analysis will be to include in the DHS data record the proxy SES indices obtained in 5.2.1., as well as the values of the contextual variables at municipal and state levels (or their equivalents).

5.3.2. Construction of concentration curves

With the inclusion in each record of the proxy SES indices, it will be possible to construct concentration curves for the health variables in DHS surveys, distributing according to the proxy variables as well as other SES indicators, including educational level, number of durable goods in the household and others. The health-related variables to be contemplated include (variables of child health status refer to children under age 5):

1. Parity in high-risk groups;
2. Birth intervals;
3. Contraceptive use;
4. Child mortality;
5. Prenatal care and care in childbirth;
6. Vaccination coverage;
7. Prevalence of diarrhea and acute respiratory infections in children;
8. Breast-feeding.

5.3.3. Other analyses of SES and health & health care

These analyses will be similar to those that can be performed with data from LSMS surveys, mentioned in item 5.2.3.

Many of the health status and health care variables are binary. In these cases, it will be explored whether logistic regression models are adequate for predicting the response variable using different combinations of SES and other variables. Examples include prenatal care (yes/no; or below/above a certain number of consultations; or first consultation within/after the first three months of pregnancy), death of a child below age 1 (or ages 1 to 4) in the past five years (yes/no), and others. Another possibility is to use logistic regression with the number of children born as the denominator and the number of child deaths as the numerator. The dependent variable is then:

Logit (children dead/children born).

The models obtained for mortality from age 1 to 4, infant mortality, and neonatal mortality will show the relative importance of different types of factors for these three cases. It is expected that for infant mortality, and especially for neonatal mortality, the quality of care in childbirth and the use of prenatal services will play a larger role than with under 5 mortality. It will be very important to explore how these explanatory variables interact with other SES and contextual variables.

This analysis will be restricted to children born during the past five years and may, perhaps, be better in some cases than treating child death as a dichotomous variable. [/xlii]

The DHS data allow the direct estimation of under 5 mortality. It is thus possible to develop models for the hazard function of this table using SES explanatory variables.

5.4 Contextualizing the analyses

Once contextual census variables have been included in the records of both LSMS and DHS (see item 5.1) it is then possible to contextualize the analyses. There are at least two types of analyses that can be employed:

- Stratify the records of the survey according to levels of a contextual variable and explore differences in behavior of the concentration curves or of fitted models for these strata;[/xliii]
- Use both individual and contextual variables to fit again those models described in item 5.2.3. and 5.3.3. These models are of the type known as multilevel (contextual), and require the use of appropriate statistical tools and software.[xliv/xlv]

The combination of census or context data with survey data is the most innovative part of the proposed analysis. To date, there are few examples in health status and health care research using this type of approach, but these studies have encountered (or have rigorously confirmed) striking results by combining individual and ecological variables in the modeling of individual responses.[/xlvi] The validity of using census micro-data/geocode characteristics as a proxy for individual socioeconomic conditions is discussed in depth, from a strictly statistical standpoint, by Geronimus et al.[/xlvii]

5.5. Analysis of time trends

One of the specific objectives of the project refers to the analysis of time trends in equity. For three of the countries included (Bolivia, Brazil, and Peru), data is available from three DHS surveys over an 8 to 14-year period (see Table 2). The main analyses described above will be repeated for the three surveys in these countries. This will allow the study of how equity is changing over time, and how these trends may be related to developments in health policy and socioeconomic trends. This same type of approach may be followed in Peru to analyze LSMS surveys, provided that at least three such surveys are carried out over a 6-year period.

5.6. Analysis and use according to need

A major objective of the proposed study is to relate health care utilization and expenditure to health care needs. As can be seen in Table 1, however, the DHS survey is stronger on the health status side, while LSMS provides more information on health care.

With the LSMS data of surveys, it will be possible to study health care utilization and expenditure according to self-assessed health. In the DHS dataset, it will be possible to study utilization of maternal-and-child health services in terms of several health status variables.

These analyses will be complemented with multilevel models.

- Contextual data on families under the poverty line or with unmet basic needs will be crosstabulated with all health care and expenditure variables.

With respect to DHS data, these analyses will be repeated over time in the countries with multiple surveys.

6. USING THE RESULTS

There will be three main approaches to disseminating the results: scientific publications, interaction with policy makers, and the mass media and community.

6.1. Scientific publications

The results of this research will be published in country reports, while papers summarizing the most important findings will be submitted by each research group for publication in international and Latin American journals. The results from the five countries will be combined in a separate report to be prepared by the project coordination group, and again summarized for publication in scientific journals. A summary of the work will also be published as a book with the following proposed structure: Introduction; Data Sources; Methods; Country Chapters; Intercountry Comparisons; and Conclusions.

6.2. Interaction with policy makers

An important aspect of applied research is interaction with policymakers whom researchers would like to influence with the results of these surveys. In this case, policymakers include officials at the ministries of health and finance, authorities at the regional (state) and local (municipal) levels, and legislators (senators, representatives) interested in health issues and their relationship to economic and social policies. Accordingly, it is essential to involve them in the phase where project findings are disclosed, in order to ensure that these results will be used to redirect policy actions in the interest of reducing inequities in health status, health service utilization, and expenditure.

Two rounds of interaction are proposed, possibly through short workshops to be carried out in the capital city of the respective countries. In the first seminar, decisionmakers and other social actors will meet with the investigators during the initial stage of the analyses, and their input will be sought concerning the type of analyses to be carried out. Towards the end of the project, these actors would take part in a second seminar to discuss the primary research findings, with a view to seeking alternative interventions and actions to improve health equity in the countries.

6.3. General public

The theme of inequity should receive wider attention from the mass media. In parallel with the scientific publication of the study results, press releases will be prepared and key mass media organizations in the country (television, radio, newspapers, magazines) contacted and asked to disseminate the study findings. Nongovernmental organizations and civil society groups should also be involved in disseminating the results to the general public, with a view to generating momentum for action.

7. COORDINATION

A multicenter project, which implies several groups from different countries working simultaneously and following the same protocol, requires well-established coordination mechanisms to ensure adherence to the plan of analysis and comparability among countries. These mechanisms are also important for detecting the need for technical support and providing that support to overcome specific problems arising during the research process.

This project will include several mechanisms for coordination and follow-up:

- Coordination within each local research group: The research groups and their respective coordinators will be selected in each country through a competition. In the five countries where the project will be carried out, research groups experienced in the use of surveys and the proposed methods of analysis will be invited to submit their credentials. Selection of the research groups on the basis of their credentials will be the responsibility of an interprogrammatic group comprised of representatives of the Division of Health and Human Development (HDP) programs and other invited external experts;

- General coordinator: HDP staff member Dr. Norberto Dachs will be responsible for the general technical coordination of the project, with the support of the HDP interprogrammatic group. The interprogrammatic group will meet at the end of each project phase to follow-up on progress and assess the need for additional coordination efforts.

- Communication among the research groups and between them and the general coordinator: A methodological workshop for all research group coordinators will be held at the beginning of the project. Moreover, a closed discussion list will be

established in order to provide the members of all teams with a forum to facilitate the discussion of technical problems and to resolve any difficulties encountered during implementation. Technical assistance will be provided by the general coordinator, by the members of the research groups, or by invited experts according to specific needs. The general coordinator will make at least one visit to each group during the project;

- Administrative coordination: The Research Coordination Program will provide administrative support for the project.

8. TIMETABLE

TASK	MONTH															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Initial meetings, procurement of data																
Preparation of data files for analysis																
Initial data analyses																
Multivariate methods																
First draft of report																
Discussion of first draft																
Final draft of report																
Preparation of scientific papers																

9. COUNTRY RESEARCH TEAMS

The country research teams are as follows:

BOLIVIA: Economic and Social Policy Analysis Unit (UDAPE)

Chief Investigator: Rory Narváez, Economist

Other team members: economist and epidemiologist

BRAZIL: Department of Preventive and Social Medicine, Universidade Federal de Pelotas

Chief Investigator: Dr. César Victora, Ph.D., London School of Hygiene and Tropical Medicine

Other team members: epidemiological statistician and economist. Dr. Aluisio Barros, Ph.D., is an epidemiological statistician and principal consultant on methodology for the project; he holds a Doctorate from the London School of Hygiene and Tropical Medicine and has published a variety of scientific articles on multilevel models.

COLOMBIA: Economic Development Studies Center (CEDE), Universidad de los Andes

Chief Investigator: Dr. Carmen Elisa Flores, Ph.D. in Economics, Princeton University

Other team members: epidemiologist and economist

NICARAGUA: International Foundation for the Global Economic Challenge/Fundación Internacional para el Desafío Económico Global (FIDEG)

Chief Investigator: Dr. Jaime Espinosa

Other team members: statistician, economist, and epidemiologist

PERU: GRADE
Chief Investigator: Dr. Martín Valdivia, Ph.D. in Econometrics, University of Minnesota

Other team members: epidemiologist and economist

ANNEXES

ANNEX 1 – ACKNOWLEDGEMENTS

This proposal expands and presents the details of item 5.2 (National level: Systematic review of existing sources of health statistics) of the original profile presented to the Program on Research Coordination (HDR) in January of 1999, "Multicenter Study on Health Inequities in the Americas: From Nations to Neighborhoods." The original profile was written by Dr. César Victora of the Universidade Federal de Pelotas in Brazil, with participation of the members of the interprogrammatic group for research on health inequities of the Division of Health and Human Development of the Pan American Health Organization (PAHO/HDP). In preparing the project profile, they took into account the studies on production in this area in the Hemisphere carried out by Drs. Steve Wing and David Richardson of the University of North Carolina, Chapel Hill, and Dr. Naomar de Almeida Filho of the Universidade Federal da Bahia in Brazil. The members of the interprogrammatic group were Dr. Alberto Pellegrini, Dr. Elsa Gómez, Dr. Norberto Dachs, and Dr. Edward Greene.

A preliminary version of the profile was discussed at a meeting of experts in December 1998. The suggestions of this group were adopted for inclusion in the final version. In addition to the members of the interprogrammatic group and Drs. César Victora, Naomar de Almeida Filho. and David Richardson, this consultative group was made up of Dr. Paula Braveman of the University of California, San Francisco, Dr. Moisés Goldbaum, Universidade de São Paulo, Brazil, and Dr. Pedro Luis Castellanos, PAHO consultant, Dominican Republic.

The preparation of this specific proposal using secondary data sources was coordinated by Dr. Norberto Dachs, with the active participation of the interprogrammatic group of HDP. Dr. César Victora reviewed the proposal and made significant contributions to it. All staff of the Public Policy and Health Program read the various drafts of the project and contributed actively to its improvement. In its review of the proposal, the Internal Advisory Committee on Research (IACR) made important comments with respect to several points, thus enriching the proposal. The plan of analysis was detailed during the first working meeting, with the participation of the research teams of all five countries involved in the project, as well as the focal points of the PAHO Representative Offices in these countries. Technical coordination for the project is assigned to Dr. Norberto Dachs of the Public Policy and Health Program (HDD).

ANNEX 2 – DETAILS OF THE PLAN OF ANALYSIS

Details of the plan of analysis complement item 5 of the proposal, and were developed in the course of a technical meeting in January 2000, attended by the chief investigators and analysts of the five countries.

A-2.1. PRIORITIES OF THE PLAN OF ANALYSIS

- To measure inequities in health status, health care access, and health services utilization, by socioeconomic situation and gender, and to present the results in a clear and easy-to-understand format;

- To compare trends in the distribution of inequities over time in countries where more than one round of DHS has been carried out;

- To explore the determinants of variables of health status, health care access, and utilization, using multivariate analyses, beginning with simple approaches (i.e. linear or logistic regression) and progressing to multilevel models.

A-2.2. CREATING PROXY HOUSEHOLD CONSUMPTION VARIABLES FOR USE WITH DHS (based on LSMS data).

All analyses should be made for the whole datant and for urban/rural stratification. In countries where the available survey data permit, other types of regional stratification should also be considered.

A-2.2.1 – Studying the distribution of household variables common to both LSMS and DHS data

The following variables are generally available in both surveys:

- Quality of dwelling (type of floor)
- Size of dwelling (number of persons per sleeping room)
- Source of household drinking water
- Type of excreta disposal system
- Availability of electricity
- Household possessions: radio
- Household possessions: television
- Household possessions: refrigerator
- Household possessions: means of transport
- Possession of farm land
- Availability of household help

A-2.2.2 – Creating proxy consumption variables

These variables (and other specific variables in some of the countries) can be used with LSMS data to create a proxy variable for adjusted per capita household consumption. This variable can then be created in the corresponding DHS surveys.[xlviii/xlix]

Calculations of adjusted per capita consumption (AdjPCC) will be based on total household consumption (TotHouseC) with a factor of scale equal to 2. If **n** is the number of household members, then:

$$\mathbf{AdjPCC = TotHouseC/n^{1/2}}$$

In order to explain the following steps, the proxy variable will be called:

ProConsL - in LSMS
ProConsD - in DHS

The variable ProConsL will be created using linear regression.

Also, a variable will be created with five proxy categories for quintiles of adjusted per capita consumption using discriminant analysis. For the following description, this proxy variable will be called:

ProQuiCL - in LSMS
ProQuiCD - in DHS

A-2.2.3 – Creating the household assets index variable for DHS

In this case, the procedure developed by Macro International should be followed to create this variable. Annex 2 contains the SPSS program to carry out the calculation.

In order to describe the following steps of the procedure, this household assets index variable is DHS will be called:

IndActiD - in DHS

A-2.2.4 – Comparative study of the distribution of variables

For LSMS data, study the distributions of AdjPCC and ProConsL.

For DHS data, study the distributions of ProConsD and IndActiD.

This comparison will be made by studying the two distributions separately (histograms) and constructing the respective Lorenz curves for each.[l]

When examining LSMS data, study the degree of consistency between ProQuiCL and the adjusted per capita consumption quintiles using measures such as the τ_b of Kendall, γ of Goodmann and Kruskal, κ of Cohen, and V of Cramer.

When examining DHS data, study the degree of consistency between ProQuiCD and quintiles of the household assets variable, IndActiD, using measures such as the τ_b of Kendall, γ of Goodmann and Kruskal, κ of Cohen, and V of Cramer.

A-2.2.5 – Studying the distribution of other potentially explanatory variables in DHS data

Construct tables, histograms, (pseudo) Lorenz curves (when applicable); calculate statistical summaries (average, standard deviation, space between quintiles – when applicable) for the following variables:

Education of the mother	years of schooling
Education of the father	years of schooling
Number of siblings residing in the household	
Female head of household	yes/no
Number of persons per sleeping room	
Dwelling has dirt floor	yes/no
Ethnicity[/li]	
Adequate drinking water	yes/no
Adequate excreta disposal system	yes/no
Vaccinations	yes/no (complete in children < age 1)
Breast-feeding	yes/no
Breast-feeding	for how long (months)
Adequate prenatal care	yes/no (adequate care defined by ea. country)
Adequate care in childbirth	yes/no (defined by each country)
Size of family group	
Birth order of last child	
Birth interval	1 / (51 - months)
Unmet family planning needs	yes/no
Age of mother at the birth of this child	in years
Birthweight of last child	

A-2.3. STUDYING VARIABLE DISTRIBUTION IN LSMS DATA

Using adjusted per capita household consumption and the proxy ProQuiCL as distributive variables, construct concentration curves[/lii] and calculate concentration indices.

Analyses should be stratified by age (5-14, 15-44, 45-64, 65+), sex, and geographic area (urban/rural).

In addition to calculating concentration indices for each variable, other measurements of inequity should also be explored, such as ratios between the extremes. Moreover, it is important to explore different groupings to calculate ratios, among them:

Upper decile/lower decile;
Upper quintile/lower quintile; and

Top 10 percent/bottom 50 percent.

At a minimum, the following variables should be considered:

Variable	Category	Observations
Health problem within the past 4 weeks	yes/no	
Consultation within the past 4 weeks	yes/no	in Bolivia, Colombia and Nicaragua, only for individuals that had been ill; the other countries also include check-ups. Stratify by type of provider.
Interruption in routine activities	yes/no	
Type of health care provider used	public, private, etc.	Categories are specific for each country
Child born within the past 12 months	yes/no	except for Colombia and Nicaragua
Adequate care in childbirth	yes/no	for women that have had a child within the past 12 months. Adequate care to be defined by each country

Also explore the distribution of these variables according to adjusted per capita consumption quintiles and the ProQuiCL variable, created in item A-2.2.2.

In surveys that include the pertinent variables for geographic accessibility, the respective calculations should be made to determine the geographic accessibility to health care and study their distribution. In this case, geographic accessibility is defined as "travel time of one hour or less to the health care facility." In some surveys, it is important to consider two variables related to this aspect: one that asks "why didn't you seek care at a health facility when you had this health problem?," and include as a possible answer, "because it was too far away." Another question for those who did seek health care would be, "how long did it take you to get to the health facility and what means of transport did you use to get there?"

A-2.4. STUDYING VARIABLE DISTRIBUTION IN DHS DATA

Using the proxy consumption variable "ProConsD" (created in item A-2.2.2.) and the household assets variable "IndActiD" (created in item A-2.2.3) as distributive variables, construct concentration curves and calculate concentration indices for DHS data.

Analyses should be stratified by geographic area (urban/rural).

In addition to calculating concentration indices for each variable, other measurements of inequity should also be explored, such as ratios of extremes. Moreover, it is important to explore different groupings to calculate ratios, among them:

Upper decile/lower decile;
Upper quintile/lower quintile; and
Top 10 percent/bottom 50 percent.

Variable	**Category**	**Observations**
Adequate prenatal care	yes/no	criteria for adequate care to be defined by each country
Vaccination coverage	yes/no	all first year vaccines for children 12 to 23 months
Child born in the last 12 months	yes/no	
Adequate care in childbirth	yes/no	for women that have had a child within the past 12 months; criteria for adequate care to be defined by each country
Height of children under 5	below/above	2 z-scores below
Child death	yes/no	for women that have had a child within the past 5 years
Death of children age 1- 4	yes/no	for women that have had a child within the past 5 years

Also explore the distribution of these variables according to the quintiles of the household assets index and the proxy "ProQuiCL" variable for adjusted per capita consumption quintiles, created in item A-2.2.2.

A-2.5. contextual variables

When working with the multilevel models described in item A-2.6, it is important to create contextual variables. In this regard, two levels will be considered: municipal (or equivalent political-administrative unit) and census tract. Values for the variables will only be created for municipal and/or census tracts for which sampling units exist in the last DHS. Data from the last national population census will be used to create contextual variables. The contextual variables that will be used are limited by the type of data collected in national censuses.

These variables are as follows:

- Percentage of individuals with UBN[/liii] (Unmet Basic Needs).
- Percentage of women aged 15 to 64 employed in the formal economy.
- Educational level of women aged 15 and above. Use the percentage of women with a number of years of formal education equal to or greater than the national average.
- Percentage of households with children under 5 and a female head of household.
- Fertility rate (municipal level only).
- Percentage of the population living in rural areas (municipal level only).

The validity of using census micro-data/geocode characteristics to proxy individual socioeconomic conditions is discussed in depth, from a purely statistical standpoint, by Geronimus et al.[/liv]

A-2.6. TRADITIONAL MULTIVARIATE MODELS

Models will be developed for the following variables:

- z-scores of height-for-age for children between the ages of 6 months to 5 years;
- Under-5 mortality.

A-2.6.1. Analysis of height-for-age z-scores

This variable will be analyzed using multiple linear regression. To help guide construction of the model, the simplified hierarchical model shown in Figure 3 will be used.[/lv]

Explanatory variables for the model will be selected among the following:

Household socioeconomic characteristics:

ProConsD (created in A-2.2.2 above);
ProQuiCD (created in A-2.2.2 above);
IndActiD (created in A-2.2.3 above).

Characteristics of the dwelling:

V127	Quality of dwelling (type of floor);
V113	Main source of drinking water;
V151	Gender of head of household.

Characteristics and habits of the mother:

V106-V109	Use a possible combination for these for educational level of mother
V012	Age of mother
V439	Percentile of height-for-age of mothers
V440	Standard deviations of height-for-age with regard to the reference median
V441	Percentage of height with regard to the reference median
V442	Percentage of weight-for-height with regard to the reference median
V445	Body mass index of the mother

(Also see the corresponding quality control variables.)

Child health care and reproductive characteristics of the mother:

V201	Total number of children born to mother
V208	Total number of children born to mother within the past 5 years
V211	Age of mother at first birth
V218	Total number of surviving children
M2	Type of person that provided mother with prenatal care
M3	Type of person that provided care in childbirth
M13	Number of months pregnant at first prenatal visit
M14	Number of prenatal visits
M15	Place where birth occurred
M17	If child was delivered by cesarean section
M18	Size of child as reported subjectively by the informant
M19	Birthweight in grams
M30	Prolonged delivery
M31	Excessive bleeding
M32	High fever with malodorous vaginal discharge
M33	Convulsions unrelated to fever
M34	Time between birth and the first breast-feeding
M35	Number of times infant breast-fed the previous night
M5, M34-36	Breast-feeding of infant (combination)
M37A-T	Other foods
M38	If the infant was bottle-fed the day before
M39	Number of times the infant was fed
M40A-O	Frequency of feeding with different foods

(Also see variables V401-V415 in some countries or years.)

V116	Knowledge about oral rehydration salts (ORS)
H2-H10	Child immunizations

Previous child morbidity:

H11-H21	Prevalence and treatment of diarrhea
H22	Fever
H31 a H40	Prevalence and treatment of cough

z-score of height-for-age (response variable):

HW5

With respect to variables associated with prenatal care and care in childbirth, the observations presented in sections 2 and 3 concerning definitions for adequate care in each case should be taken into account. The remaining variables should be treated similarly in order to create binary variables when necessary (i.e. birthweight, treatment for diarrheas, etc.).

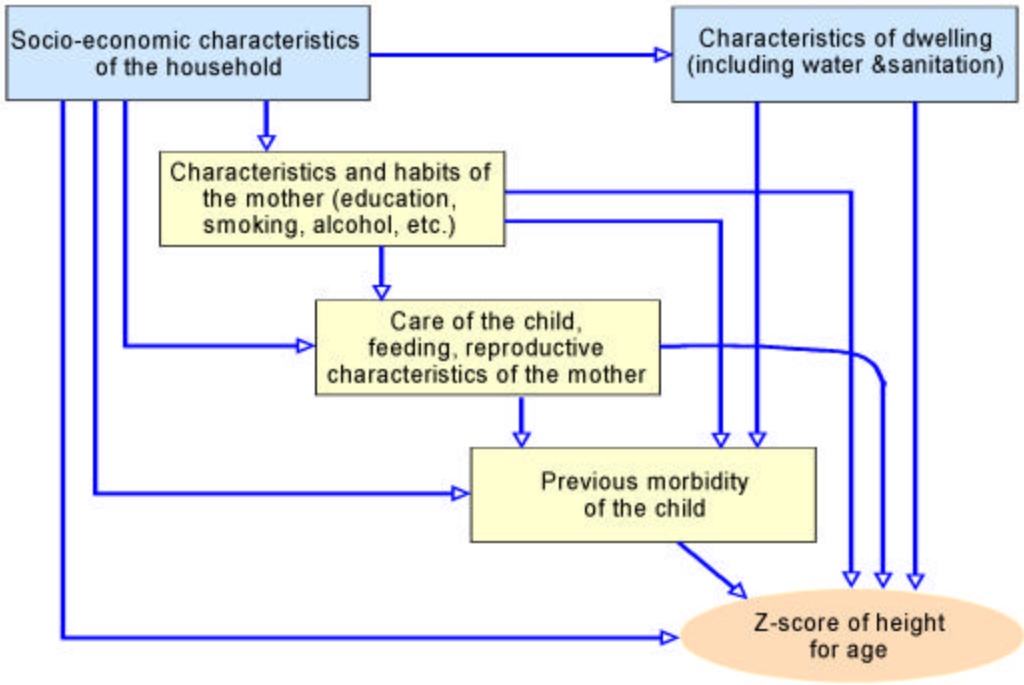

Figure 3 Simplified diagram of the hierarchical relationships between possible determinants and height for age z-scores of children aged 6 to 59 months.

A-2.6.2 – Analyses of under-5 mortality

This involves two different types of analysis: one using logistic regression and the other survival analysis.

Logistic regression will be used for variable:

MuerMen5 yes/no for all women who had a child within the past 5 years, will be **YES** if one of the children died during this period

The dependent variable is:

Logit (children dead/children born).

This analysis will be restricted to children born within the past five years and may yield better results than considering the death of the child as a binary variable.[lvi]

This analysis is meant to serve only as an initial guide for finding relevant explanatory variables, since the "MuerMen5" variable presents problems of censure. For example, if at the time of the survey, the mother has a 20-month old infant, another 40 months (following the survey) would have to pass before the child's survival could be confirmed. The explanatory variables considered are the same as in A21.

Survival analysis will be done using the Weibull model and will consider the following possible explanatory variables.

"Demographic" variables of the mother:
- Log of the age of mother on the date of the birth
- Previous variable squared
- Births (number of pregnancies up to the time of the survey)

Education variables of the mother (indicators—illiteracy omitted):
- Primary education complete
- Secondary education complete
- Some education at the university level

Characteristics of the child:
- Breast-fed
- Male

Birth order of the child

Household economic situation:
- Household assets variable "IndActiD," created in A-2.2.3 (possibly its Log)
- Proxy consumption variable "ProConsD," created in A-2.2.2.(possibly its Log)

Location of household (indicators-rural omitted):
- Large city
- Small city
- Town

Type of drinking water system in the household (indicators—piped water inside dwelling omitted):
- Piped water outside dwelling
- Well on property
- Public well
- River, lake, rainwater, other

Location of source of drinking water (indicators – source inside dwelling omitted):
- Outside dwelling
- Water in containers or supplied from trucks

Type of excreta disposal system (indicators – indoor flush toilet omitted):
- Septic tank
- Traditional latrine
- None

Floor of dwelling:
- Dirt floor

Prenatal care (during last pregnancy):[lvii])
- Adequate care (see observation in table for item 3)

Delivery care (during last delivery):
- Adequate care (see observation in table of item 3)

Type of care during last delivery (indicators – in-home delivery omitted):
- Public health facility
- Private health facility

These variables were chosen because they were part of the closest dataset (DHS) used by Wagstaff (1999) in his work with LSMS data in Cebu. This facilitates comparison of the results of this project with those obtained in his research.

Using its own criteria, each research group should explore other variables considered important for the model(s).

A-2.7. MULTILEVEL MODEL

Initially, survey records will be stratified by levels of a contextual variable and explore different behaviors of concentration curves or adjustment models for these strata.[lviii]

A multilevel model[lix/lx] will be developed for the variable:

z-score of height-for-age for children between 6 months and 5 years of age

Explanatory variables for consideration at the individual level are the same as those in item A-2.2.1. Initially, a model with only one level (municipal) will be explored. The contextual variable to consider will be "percent of the population with UBN" in the municipality.

Once the technique has been incorporated and the research group has experience with it, other municipal-level contextual variables, constructed in item A-2.2.4, will be employed.

The following step will involve the construction of a three-level model: individual, census tract, and municipal. Initially, a model based on the percentage of the population with UBN will be used in the census tract and in the municipality, and subsequently the remaining variables created in item A-4.[lxi]

A-2.8. TREND ANALYSIS

One of the specific objectives of the project is to conduct trend analysis of inequalities in health over time. Four countries included in the study—Bolivia, Brazil, Colombia, and Peru—have available DHS data from three surveys conducted over a period of 8 to 14 years (see Table 2). The principal analyses described previously in item A-2.4 will be repeated for the three surveys in these countries. This will facilitate the study of how equity is changing over time, and how these trends relate to developments in health policy and socioeconomic change. This same type of approach may be followed in Peru to analyze LSMS surveys, since there are three such surveys, conducted over a 6-year period.

ANNEX 3 – BUDGET

The total budget for the project is US$205,000.00 (US$55,000.00 for coordination and supervisory activities, and US$150,000.00 for work in the five countries). Each research group will receive a subsidy of between US$25,000.00 and $US35,000.00 dollars.

The needed expenditures will vary from one country to another. The amounts shown are average values. Some of the research groups may need more for equipment, others to contract consultants in areas such as health economics or statistics. Also, the amounts charged by the national institutes of statistics for census data vary from country to county. The survey data are available free of charge, almost always through the Internet.

A-3.1 COUNTRY BUDGET (sample)

Personnel	
Local coordinator, database manager, health economist, statistician	$15,000.00
Equipment	
Computer (including laptop)	$5,000.00
Other expenses	
Communications, bibliography, office supplies, computer materials and software, purchase of special census tabulations, final report, and local travel	10,000.00
Total	US$**30,000.00**

A-3.2 Coordination Budget

Coordination meetings	
Travel and materials for two meetings	34,000.00
Consulting	
Visits of project coordination and/or statistician	17,000.00
Other costs	
Final report and others	4,000.00
Total	US$**55,000.00**

REFERENCES AND NOTES

i. Pan American Health Organization (1998). ***Leading Pan-Amercian Health***. Washington: PAHO (Official Document No. 287).

ii. World Bank. ***World Development Report 1998/99.*** Washington, 1999.

iii. Castellanos, P.L. (coord) (1991). ***Proyecto: Sistemas nacionales de vigilancia de la situación de salud según condiciones de vida and del impacto de las acciones de salud and bienestar***. Washington: OPS/Programa Análisis de la Situación de Salud y sus Tendencias.

iv. Almeida-Filho, N. (1998). ***Desigualdades em saúde segundo condições de vida: análise da produção científica na América Latina e Caribe***. Washington: PAHO

v. Wing, S. and D. Richardson (1998). ***Material living conditions and health in the United States, Canada and Western Europe: A review of recent literature***. Washington: PAHO

vi. Stronks, K., H. van Trirum and J.P. Mackenbach (1996). ***A documentation centre on socio-economic inequalities in health***. J Epidemiol Comm Health;50:1.

vii. Editorial (1998). ***Lower Socio-economic status and increased mortality***. J Am Med Assoc; 279:1745.

viii. A recent study conducted by the editors of the Journal of the American Public Health Association shows that the number of papers submitted for publication on inequalities in health associated with socio-economic conditions has increased three times since 1996.

ix. Canadian Public Health Association (1997). ***Health impacts of social and economic conditions: implications for public policy***. Ottawa: CPHA (Board of Directors Discussion Paper, pg 29).

x. In another work, recently completed and still unpublished, a group of investigators in Central America, coordinated by Dr. Luis Rosero Bixby, has detected only 200 works that refer to inequalities in health in the Central American countries: ***Bibliografía anotada sobre equidad and salud en Centroamérica***, by Rosero Bixby; Claudia Aguilar; Laura Blanco; Miriam León, and Róger Bonilla. The report will be published by the Program on Research Coordination of PAHO later in the year.

xi. Gwatkin, D. ***Poverty, equity and health. Evidence from developing countries***. Paper presented at the Ninth Annual Public Health Forum, London School of Hygiene and Tropical Medicine, 19-23 April 1999.

xii. Victora CG. ***Reducing health inequalities: can health interventions make an impact?*** Paper presented at the Ninth Annual Public Health Forum, London School of Hygiene and Tropical Medicine, 19-23 April 1999.

xiii. Preliminary results are available for the five countries included in the project: Brazil, Ecuador, Guatemala, Jamaica, and Peru. One of the important conclusions that can be drawn from the draft report is the need to study further use of self-reporting instruments in the existing household surveys.

xiv. Pan American Health Organization (1999). ***Implementing Decentralization and Financing Strategies while Protecting the Poor: A Draft Policy Document***. PAHO/UNDP/CARICOM Project: Managing and Financing Health to Reduce the Impact of Poverty in the Caribbean. Washington, D.C.

xv. World Health Organization (1999). ***International Poverty and Health Network. Advisory Group Meeting Report***. WHO/HSD/99.1. Geneva, Switzerland.

xvi. The results of the project are to be published in a book later in 1999. There are only two countries from Latin America and the Caribbean are included in the study: Chile and Mexico.

xvii. Whitehead, M. (1992). ***The concepts and principles of equity and health***. Int J Health Serv; 22:430-45.

xviii. Braveman, P. (1998). ***Monitoring equity in health: a policy-oriented approach in low- and middle-income countries***. Geneva: WHO (Division of Analysis, Research and Assessment).

xix. An important new source for studying the basic concepts of inequity in health is the work prepared by Juan Antonio Casas and Alexandra Bambas (1999). ***Principios y Conceptos Básicos de Equidad en Salud***. Division of Health and Human Development, Pan American Health Organization, Washington, D.C. An expanded version of this report will appear as a chapter in the book ***Equidad en salud, perspectivas en la OPS***, J.A. Casas, A. Bambas, and N. Dachs eds., to be published later this year.

xx. Samaja, J. (1994). Las condiciones de vida and la salud. PAHO Report. HDP/HST.

xxi. Whitehead and Didericksen. Conceptual framework. First chapter of a book to be published later in 1999, to present the results of the GHEI project of the Rockefeller Foundation.

xxii. UNICEF. ***The UNICEF Nutrition Framework.*** New York: UNICEF (Nutrition Section), 1993.

xxiii. Whitehead, M. and F. Diderichsen (2000). ***Conceptual principles of equity in health***. Chapter of the forthcoming book of the Global Health Equity Initiative, Rockefeller Foundation.

xxiv. Victora CG, Huttly SR, Fuchs SC, Olinto MTA. ***The role of conceptual frameworks in epidemiological analysis: a hierarchical approach.*** Int J Epidemiol 1997;26:224-7.

xxv. The term "context" is used here to indicate groups– or macro-level variables that make it possible to incorporate multiple levels of determination in the study of the health status, access, use and expenditure on health care. One reference that explains in depth the meaning and importance of "context" variables and contextualized studies is in note 41. There are also two Internet sites dedicated to multi-level, contextualized studies:

http://alliage.medent.umontreal.ca/multilevel/ and

http://www.educ.msu.edu/units/Groups/LAMMP/

xxvi. Income inequality is not a characteristic but one of a community, geographic region or administrative area. The following two notes present references to some of the extensive research work being done in relation to this variable and some discussions on why they may be important for health, besides income levels.

xxvii. Wilkinson, R. G. (1996). ***Unhealthy Societies: The Afflictions of Inequality***. Routledge, London.

xxviii. Kennedy, B. P.; I. Kawachi; R. Glass and D. Prothrow-Stith (1998). ***Income distribution, socioeconomic status, and self rated health in the United States: multilevel analysis***. British Medical Journal. Vol. 317 (3 October) pp-917-921

xxix. Victora CG, Vaughan JP. ***Land tenure patterns and child health in Southern Brazil. The relationship between agricultural production, malnutrition and child mortality.*** Int J Health Serv 1985, 15:253-74.

xxx. The objetives of MECOVI (Programa para el Mejoramiento de las Encuestas para la Medición de las Condiciones de Vida en América Latina and el Caribe) are presented in:

http://www.eclac.org/espanol/estadisticas/mecovi/MECOVI.HTM

xxxi. The Living Standards Measurement Surveys project of the World Bank can be consulted at: **http://www.worldbank.org/html/prdph/lsms/lsmshome.html**

xxxii. PAHO's Public Policy and Health Program has prepared a database of household surveys with information on health, which can be consulted on the Internet:

http://165.158.1.110/spanish/hdp/asp/encuestas.asp?L=E

xxxiii. Information on the Demographic and Health Surveys (DHS) can be found at:

http://www2.macroint.com/dhs/

xxxiv. Some countries have sometimes included special modules on knowledge about AIDS and sexually transmitted diseases, human rabies, maternal mortality, cervical cancer screening, violence against women, and other topics.

xxxv. **http://www.mideplan.cl/casen2/index.html**

xxxvi. **http://www.ibge.gov.br/informacoes/pnad/Sint96/introducao.htm** and

http://www.datasus.gov.br/rnis/PNAD98/PNAD98.html

xxxvii. The World Bank. (1999). ***Fact Sheets on Health, Nutrition, Population, and Poverty***. A tabulation of Demographic and Health Survey Data commissioned by the World Bank HNP/ Poverty Thematic Group. Unpublished report. Washington, D.C.

xxxviii. Diez-Roux, A. V. (1998). ***Bringing Context Back into Epidemiology: Variables and Fallacies in Multilevel Analysis***. Amer. J. Publ. Health. Vol. 88, pp. 216-222.

xxxix. For details about computation of unsatisfied basic needs using census data see: Carrasco, Sebastián; Martínez, Jorge; Vial, Claudia (1997). ***Población and necesidades básicas en Chile: un acercamiento sociodemográfico al período 1982-1994***. Chile. Ministerio de Planificación and Cooperación Santiago: MIDEPLAN, 363 p.

xl. Many times the dwelling is "owned" by residents but not the land on which it is built. It is important to identify land ownership but this in general is asked.

xli. Wagstaff, A.; N. Kakwani and E. van Doorslaer (1997). ***Socioeconomic inequalities in health: measurement, computation and statistical inference***. Journal of Econometrics 77, 1997.

xlii. Victora, C.G.; P. G. Smith and J. P. Vaughan (1986). ***Social and environmental influences on child mortality in Brazil. Logistic regression analysis of census files***. J. of Biosoc. Science. Vol.18, pp.87-101.

xliii. This is similar to the proposal made by Castellanos for the analysis of mortality and other variables using strata of living conditions. See note 2.

xliv. Duncan, C.; K. Jones and G. Moon (1998). ***Context, composition and heterogeneity: Using multilevel models in health research***. Soc. Sci. Med. Vol. 46, No.1, pp. 97-117.

xlv. Singer, J. (1997). ***Using SAS PROC MIXED to fit multilevel models, hierarchical models, and individual growth models***. Preprint. To appear in the J. of Educ. and Beh. Stat.

xlvi. An excellent example is the paper by Kennedy et al in note 28. The references in notes 25 and 27 have lists of examples already published using this methodology.

xlvii. Geronimus, A. T.; J. B. and L. J. Neidert (1996). ***On The Validity of Using Census Geocode Characteristics to Proxi Individual Socioeconomic Characteristics***. J. Amer. Stat. Assoc. Vol. 91, # 434, pp. 529-537.

xlviii. See annex 1 for a sample of the work conducted in Peru with data from the LSMS97.

xlix. In Bolivia it will be necessary to use other variables, given the special characteristics of the LSMS survey in this country.

l. See the example of Peru in Annex 1.

li. In Bolivia and Peru only. The language spoken by the woman will be used.

lii. Wagstaff, A.; N. Kakwani and E. van Doorslaer (1997). ***Socioeconomic inequalities in health: measurement, computation and statistical inference***. Journal of Econometrics 77, 1997.

liii. For details on calculating unmet basic needs using census data from Chile, see: Carrasco, Sebastián; Martínez, Jorge; Vial, Claudia (1997). ***Población and necesidades básicas en Chile: un acercamiento sociodemográfico al período 1982-1994***. Chile. Ministerio de Planificación and Cooperación Santiago: MIDEPLAN, 363 p.

liv. Geronimus, A. T.; J. B. and L. J. Neidert (1996). ***On The Validity of Using Census Geocode Characteristics to Proxi Individual Socioeconomic Characteristics***. J. Amer. Stat. Assoc. Vol. 91, # 434, pp. 529-537.

lv. See work of Victora et al, 1997.

lvi. Victora, C.G.; P. G. Smith and J. P. Vaughan (1986). ***Social and environmental influences on child mortality in Brazil. Logistic regression analysis of census files***. J. of Biosoc. Science. Vol.18, pp.87-101.

lvii. No information is requested about the child that died.

lviii. This proposal is similar to the one presented by Castellanos for the analysis of the data on mortality and other variables utilizing strata of living conditions. See note 3.

lix. Duncan, C.; K. Jones and G. Moon (1998). ***Context, composition and heterogeneity: Using multilevel models in health research***. Soc. Sci. Med. Vol. 46, No.1, pp. 97-117.

lx. Singer, J. (1997). ***Using SAS PROC MIXED to fit multilevel models, hierarchical models, and individual growth models.*** Preprint. To appear in the J. of Educ. and Beh. Stat.

lxi. Two the variables will be created only for the municipio level: Fertility rate and percentage of rural population.