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LATIN AMERICA: AVAILABILITY OF DATA FOR DEMOGRAPHIC ESTIMATES ON THE BASIS OF INDIRECT TECHNIQUES

Juan Chackiel
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INTRODUCTION

The level of social and economic development is closely linked to the availability and quality of statistical information, particularly of population statistics. The development process -which, inter-alia, is also reflected in social inequality- demands specific types of information for a better understanding of reality, in particular concerning the under-privileged sectors and for the formulation of development policy goals.

Indirect procedures for the preparation of demographic estimates have been the most important tool for the analysis of Latin American demographic conditions, owing, for the most part, to the deficiencies to be found in the natural sources of data (vital statistics).

The purpose of my present paper is to describe some aspects of the development of these indirect procedures over the most recent decades, in relation to the social and economic situation, demographic trends and methodological progress in demographic research. Special attention will be paid to current availability of data for use by planners and research workers.

The varied conditions that prevail among Latin American countries will be noted throughout this report. This heterogeneity makes it difficult to reach general conclusions and to describe the development of these methods in very simple terms.

I. AVAILABILITY AND QUALITY OF INFORMATION

Conditions in Latin America, with respect to statistical availability and quality, are closely related to the development process and to historical factors. Table 1 shows how conditions differ among the countries, presenting the percentages of census omission and under-registration of deaths in recent years. There are countries in the region with very complete registers (Cuba, Uruguay, Argentina) and other where such registration include only a very small proportion of the total (Bolivia, Dominican Republic, Haiti, Honduras, Nicaragua, Paraguay, Peru,) with a range of intermediate situations.

Since statistical deficiencies are mainly of structural origin, the registers are in general more affected than the population censuses. The latter are the result of a single effort, every ten years, so that they are less costly than maintaining high-quality administrative setting up and they can count on technical and financial support from international agencies.

As population censuses are taken approximately every ten years, many countries have had to use national demographic surveys as a single or complementary source of information on basic population characteristics. Such surveys have been taken in Honduras (1970-1971 and 1983-1984), Peru (1976),Bolivia (1975 and 1980), Panama (1977), Nicaragua (1976-1978 and 1985), Guyana (1986).

Given that the development of the registration system is linked to the development of the country as a whole, presumably the improvement in the information to be obtained from such a system will be a slow process, particularly where registration does not yet cover the whole country.

This lack of adequate information on fertility and mortality obtained from its natural sources had led to the use and development of indirect procedures for the preparation of population estimates on the basis of the same vital statistics data, as well as specific questions included in censuses and surveys. The study of the state of a population in a country has become an exercise in trying to make compatible data from different sources to reach reasonably consistent and acceptable values.

To show how the availability and quality of statistical information relate to the social and economic state of a country, in Table 1 we can see the impact the economic crisis of the eighties and the armed conflict in Central America had on population censuses. El Salvador and Nicaragua have not taken censuses at all; Bolivia, lacking funds for the purpose, has replaced the census by a national survey; and about half the countries show a smaller coverage than in the censuses of the previous round.

The problem with respect to the deficient availability and quality of information is compounded when an attempt is made to study specific population sectors within each country. In analyses of social inequality, consideration must be given to the fact that errors will mainly affect the most under-privileged sectors of society, both for cultural reasons and for lack of physical access and resources. Since these groups do not benefit from health services, it is more probable that births and deaths in their families will not be registered. To a lesser degree omissions and misreporting in population censuses will probably have a greater effect in the lower income groups.

Table 1

LATIN AMERICA: PERCENTAGES OF OMISSION IN POPULATION CENSUSES AND
OF UNDER-REGISTRATION IN DEATH REGISTERS.

Country	Percentage of omission or under-registration			
	Census		Deaths	
	1970	1980	1960-65	1975-80
Argentina	2.8	1.5	5.8	1.4
Bolivia	7.0	(a)	64.1	66.5
Brazil	2.8	1.8	34.4	19.2
Chile	6.2	1.5	1.3	2.5
Colombia	5.7	6.0	13.3	24.9
Costa Rica	-0.5	5.7	11.9	6.7
Cuba	-0.2	0.6	26.4	2.7
Dom.Republic	8.2	2.1	53.4	45.2
Ecuador	4.4	7.5	12.8	19.5
El Salvador	4.2	(a)	31.3	24.3
Guatemala	10.4	13.8	12.7	4.0
Haiti	6.7	11.4	(b)	79.5
Honduras	11.1	(c)	49.8	53.7
Mexico	7.9	4.8	11.3	14.9
Nicaragua	11.4	(a)	56.4	59.6
Panama	3.6	4.7	25.2	24.5
Paraguay	5.2	10.2	58.5	38.5
Peru	2.3	4.0	42.6	35.7
Uruguay	1.1	2.2	6.0	2.6
Venezuela	3.5	6.7	24.8	9.8

a/ No census was carried out. b/ Unavailable data. c/ Census under way.

Source: Chackiel, J. and Arretx, C: Recent experiences in the collection of
demographic data in Latin American population census of the 1980s.
Submitted to a Seminar on Collection and Processing of demographic data
in Latin America. May 23 to 28, 1988, CELADE and IUSSP, Stgo. Chile.

Chackiel, J.: La investigación sobre causas de muerte en la América
Latina, en Notas de Población N° 44. CELADE, Stgo., Chile, August, 1987.

II. DEVELOPMENT OF INDIRECT METHODS.

Indirect methods arose in response to the need of countries with deficient data to study the basic demographic characteristics of their population. It is interesting to trace the development of these methods in relation to the state of available information, the social and economic conditions of the region, demographic changes which alter simplifying hypotheses, scientific and technological progress and experience accumulated. The development of indirect methods in the sixties and seventies will be examined in the present chapter. Chapter III will deal with current challenges in terms of information requirements.

The stages outlined below represent an attempt to simplify the evolution of indirect methods and their sources of information, but in fact events took place in a much more confused and complex manner. Each stage, consequently, is defined by its salient characteristics which have determined later developments.

1.   The sixties: pre-transitional fertility stage.

The sixties can be described as a period in which the fall in mortality was not accompanied by important changes in fertility; in fact, in some countries fertility rose. The countries of Latin America seemed to have reached a quasi-stable population and some had even attained stability. The main feature of the decade was a generally high fertility rate and important gains in mortality. Consequently, there was at the time world-wide concern over the high growth rates and therefore, the commencement of an attempt to develop birth control programmes.

The countries of the region, under the aegis of the recently established Latin American Demographic Centre (CELADE), embarked on a more systematic study of the general demographic conditions in their territories and started to train the first professional cadres specializing in population studies. This was in essence a quantitative stage of measurement of aggregated variables.

Special attention was given to the sources of data, mainly population censuses which initiated in the fifties, spread to the whole region. On the basis of this information, indirect procedures were applied to estimate population variables. The procedures developed at that time were mainly based on the theory of stable populations.

The ideas underlying these methods were based on Lotka (1976); other important contributors at the time were Coale and Demeny (1966), who by mid-decade had published their model life tables and stable population tables; and Bourgeois-Pichat, author of a United Nations (1970) manual on estimation procedures and model tables for stable populations.

The central idea of the indirect procedures applied in the sixties are based on the knowledge on part of the population dynamics (age structures, growth rate, age-specific mortality, etc.) and, by applying models, to complete the estimation of the remaining population parameters. The unknown parameters were derived by applying the mathematical formulae which necessarily rule the population variables in stable conditions, or by introducing reference tables to represent models of stable populations which combined different fertility and mortality levels.

Although it is inconceivable that real populations should behave as stable populations do (constant fertility and mortality age-specific rates and zero migration), it was possible in the sixties to apply such procedures because in quasi-stable populations, with little change in fertility rates and in the age structure, formulae are approximated to those obtained in stable conditions. Efforts were made to improve estimates when mortality dropped considerably. Model tables for quasi-stable populations were developed (Tabah, 1962); Carrier and Hobcraft, 1971) and attempts were made to correct the estimates based on stable populations (Coale, 1967; Chackiel and Mezquita, 1970).

These procedures have not enough robustness when changes in fertility take place or populations are affected by large-scale migratory flows. Such phenomena, which over time became habitual in Latin America, led to the gradual disuse of these procedures.

Owing both to the development strategies prevailing during the sixties and to methodological reasons, the procedures were generally applied only to obtain estimates at the national level. At that time overall economic development plans were in favor, based on a rather centralized development strategy, so that there was little demand for data on large and intermediate administrative units and still less for the smaller areas. Moreover there were no methodological tools to give an adequate response to such requirements. Studies at a disaggregate level generally presented data only for urban and rural population.

Although the above paragraphs might seem to indicate a precarious situation with respect to indirect estimates during the sixties, there was during that whole decade a constant concern over developing more suitable techniques for different requirements. Sponsored by CELADE, the first national demographic multiround survey was initiated (Somoza, 1975) and comparative rural and urban fertility surveys were taken (CELADE, 1963), true forerunners of the World Fertility Survey (WFS). In addition, retrospective questions for censuses and surveys came into use; they played a key role as from the 1970 censuses but had already been discussed by Giorgio Mortara (Mortara, 1948).

2.   **The seventies: a period of fertility transition**.
The main feature at this stage in the development of indirect procedures for the estimation of demographic variables and of the approaches to population data analysis is the change in fertility which could be observed in several countries of the region. This was one of the main reasons for looking for new ways of obtaining greater robustness demographic estimates than those based on the comparison of real populations with the typical behavior of stable populations.

As a reason for investigating new procedures for the collection of data, the literature of the seventies always mentioned the poor quality of traditional sources, mainly vital statistics. This was the underlying cause for the search for new ways of studying reality, to which was added the need

to find less rigid and more robust procedures than those based on theoretical models.

The following techniques for data collection, together with their corresponding analytical procedures had begun in the sixties but they were further developed in the following decade.

a)   Multiround surveys

The multiround survey, as defined, tries to "estimate the most elemental, general, and specific annual rates with reasonable accuracy; the rates must be consistent with the age distribution of the population, for example, or with the rate at which the population has evolved between the dates of two censuses". (Somoza, 1975).

The survey entails a first round of visits on households to register all attributes to be studied; in general, sex, date of birth, educational level and marital status. Later, new visits are made periodically to the household to register changes during the period which affect the individuals (births, deaths, marriage or separation, migration). For immigrants the attributes are registered as on the first round and they fall under observation from the time of registration; however, births during the period are observed from the time of they occurred.

The national demographic survey of Honduras (EDENH) was the first and perhaps the most successful experience of this type (Macció, 1975). The survey took place from December 1970 to October 1972, with four rounds at approximately three to four month-intervals, except for the last one which was delayed owing to budgetary difficulties. The sample included some 35 000 individuals, that is to say about 1.2 per cent of the universe.

The study of the demographic situation in Honduras can be divided into two stages, before EDENH and after EDENH, in spite of the very simple nature of the data collected. In effect, for the first time Honduras had reliable values for mortality, fertility, migration and for the sub-populations within the country (urban and rural, socio-economic category and educational level of the head of household). The high quality of the data is due in large measure

to the unrelenting efforts of the Honduran staff which participated in this project, as well as the permanent support of international advisors through CELADE.

EDENH's success led several other countries to try this type of survey: Peru (1976), Panama (1975-1976), Nicaragua (1976-1978). The latter experiences, despite positive results, showed that this kind of field work requires a very great and long-sustained effort which is not easy in countries lacking resources. This type of research can be very useful to study the state of a country's population at a given moment, but its cost precludes a frequent repetition of such an experience in order to follow up the trends of each variable.

b)   Retrospective questions in censuses and surveys.

Retrospective questions are a series of enquiries into an individual's past, either throughout his life, or during a specific reference period. Among such questions, the most important are addressed to women in reproductive age as to the number of children ever born, the number currently alive, date of birth of the last child born alive and others. With these data it is possible to calculate conventional measures of fertility and childhood mortality.

Already on the last round of EDENH an additional questionnaire was included which contained a set of retrospective questions from which demographic estimates could be derived. For this purpose the indirect procedures mainly developed by Professor William Brass were applied (Hill, 1976). These later procedures evolved considerably, and were recently condensed in Manual X of the United Nations (United Nations, 1983). The Brazilian 1940 census had already included retrospective questions, Professor Giorgio Mortara having developed procedures for their use (Mortara, 1948).

The Honduras experience and that of several censuses in the seventies, as well as others for which independent estimates were available, show that at a much lower cost than that of multiround surveys, retrospective questions provide relatively reliable demographic information in countries with insufficient data.

The seventies, then, were a period of rapid development of indirect demographic estimation procedures and their use and field of application was considerably widened. Table 2 summarizes the questions included in the 1980 censuses in Latin America.

The following information on demographic components is usually sought.

i) Fertility and childhood mortality.
* Total number of children ever born.
* Of these, the number of children alive (or dead) at the time of the census.
* Date of birth of the last child born alive or children born alive during the last year.
* Survival of the last child born alive or of the children born during the past year.

These questions have been proved to be very useful to improve the knowledge of fertility and mortality at early ages. There is abundant literature on procedures used to obtain demographic estimates from these data (Brass, 1974; United Nations, 1983).

ii) Adult female mortality. Maternal orphanhood can be determined by asking the entire population whether the mother is still alive at the time of the census. In many countries, this information has provided the only available indication of adult mortality. Techniques for analyzing it may be found in the aforementioned publications (Brass, 1974; United Nations 1983).

iii) Deaths in the household by sex and age. Brazil and Haiti have included a section on deaths in the household, by sex and age, during the year prior to the census; this information is used to estimate adult male and femalemortality following the "growth balance equation" procedure developed by Brass (1977).

Cuadro 2
QUESTIONS ON THE COMPONENTS OF DEMOGRAPHIC CHANGE INCLUDED IN 1980 CENSUSES IN LATIN AMERICA

	Adult mortality		Fertility and child mortality				International migration		
	Maternal Orphanhood	Deaths in last 12 months	Children ever born	Children still living	Births in the last year	Surviving children born in the last year	Surviving children living abroad	Place of birth	Year of arrival in country
Argentina * (1980)	-	-	x	x	x(b)	-	-	x	x
Bolivia (1976)	-	-	x	x	x(a)	-	-	x	-
Brazil * (1980)	x	x	x	x	x(a)	-	-	x	-
Chile (1982)	-	-	x	x	x(b)	-	-	x	-
Colombia * (1985)	x	-	x	x	x(a)	x	x	x	-
Costa Rica (1984)	-	-	x	x	-	-	-	x	x
Cuba (1981)	-	-	x	x	-	-	-	-	-
Ecuador (1982)	-	-	x	x	x(a)	x	-	x	-
Guatemala (1981)	x	-	x	x	x(a)	x	-	x	x
Haiti (1982)	-	x	x	x	x(a)	-	x	x	-
Mexico (1980)	-	-	x	x	x(a)	-	-	x	-
Panama (1980)	x	-	x	x	x(a)	x	-	x	-
Paraguay (1982)	x	-	x	x	x(a)	x	x	x	x
Peru (1981)	x *	-	x *	x *	x(a)	x *	-	x	-
Dominican Rep. (1981)	x	-	x	x	x(a)	x	x	x	x
Uruguay (1985)	-	-	x	x	x(b)	-	x	x	x
Venezuela (1981)	-	-	x	x	x(b)	-	-	x	x

*   Study by sample
(a)   Date of birth of last child
(b)   Birth during the year prior to census

iv) International migration.

* Country of birth for those born abroad.

* Year of arrival in the country, in the case of those born abroad.

These questions provide the basis for CELADE's research programme on International Migration of Latin Americans (IMILA), which includes a data bank containing information on nationals of each country who have been enumerated in a foreign country (CELADE, 1986).

v) International emigration. Studies on this subject -using indirect techniques- are still at the experimental stage and are based on indirect questions concerning residence in and outside the country of certain relatives of the persons enumerated (Somoza, 1980; Zaba, 1986). In five censuses in the region, international emigration has been studied by breaking down the data on surviving children according to whether they live in the country or abroad.

The most important and encouraging conclusion is that the countries are fully aware of the usefulness of these questions. An example of this is the fact that every single country included the questions on children ever born and on children surviving, even those countries which had not formulated them in the 1970 round of censuses.

One of the most important developments in this period was the utilization of this information to study differential demographic behavior within the countries. The data obtained from the census or from a survey is the basis for estimating fertility and infant mortality rates, for whichever category can be identified in the questionnaire.

A great number of research studies have thus been carried out, showing existing inequalities, particularly those relating to infant mortality. In the early 1970's, under the aegis of CELADE, the programme on infant mortality investigation in Latin America (IMIAL) was established (Behm, H. and Primante, D., 1978). Its purpose was to estimate differential mortality rates in early

years on the basis of the children ever born and surviving as declared by women in census questionnaires.

The results obtained, with respect to the difference within the countries, are also a response to an increasing demand from research workers and planners, who find that information for the country as a whole is not sufficient as a basis for development policies and plans. National aggregates conceal extreme variations, which pose different problems and demand different solutions.

Retrospective questions included in censuses offer some advantages over vital statistics for the preparation of demographic estimates by social and economic sectors. On the one hand, the census applies a greater number of discriminating variables (education, occupational characteristics, residence, housing, etc.); on the other hand, there is total consistency between numerator and denominator, since the facts investigated have direct reference to the population producing them. The rates calculated on the basis of vital statistics, however, must use as a denominator the population counted by the census, with the consequent difficulty in the consistency of the socioeconomic groups as defined in the registry and the definition of the exposed population. Therefore, indirect procedures become of vital importance in the study of the demographic aspects of social inequality even in countries with good vital statistics.

Extreme inequalities in mortality and fertility within the countries and in some cases differential trends, were widely documented for many countries of the region during this period.

c)   Birth histories

The World Fertility Survey (WFS), under the International Statistical Institute based in London, began its operations in 1972 and was very active during the seventies. "The first and most basic aim of the WFS Programme is to assist countries to acquire the scientific information that will permit them to describe and interpret their populations' level of fertility. Individual country surveys undertaken as part of the WFS will strive to identify meaningful differentials in patterns of fertility and

fertility regulation and clarify factors affecting fertility. Improved data on these topic will facilitate national efforts in economic, social and health planning." (International Statistical Institute, 1975). The following Latin American countries were included in the programme: Colombia, Costa Rica, Dominican Republic, Ecuador, Mexico, Panama, Paraguay, Peru and Venezuela.

The survey is based on a sample of households from which the women are selected to whom a questionnaire in depth, on the subject to be studied, will be applied later. In general these women have been ever married and they are of reproductive age. The individual core questionnaire contains as the most important information the birth history of the women interviewed and some of her characteristics, such as knowledge and use of contraceptives, marital history and participation in economic activity, as well as some data on her last husband. This questionnaire was supplemented, according to each country's requirements, with other information, such as family planning, abortion, fertility regulation, etc.

The abundant information obtained through these surveys has been invaluable for research studies on fertility levels and trends, and it has provided basic material for a deeper analysis of those factors which determine these variables or are associated with them. The complete fertility history obtained, coupled with the social, cultural and biological factors relating to human reproduction, give a much broader insight into how these processes take place.

The WFS has played a complementary role with respect to the data obtained from population censuses through indirect questions. The census provides more complete information on fertility and infant mortality values for the national aggregate, by geographical subdivisions and social and economic strata, while the survey makes it possible to study aspects which cannot be investigated for the universe, such as contraception, breast feeding, spacing of births, relation between mortality and fertility. In addition, while census data are only useful for a cross-sectional analysis, the collection of fertility histories has given strong impetus to the development of methods based on longitudinal approaches.

This type of survey has fulfilled its end, and though it would be possible to repeat the experience in some countries (which is happening in fact with the current Demographic Health Survey), it does not seem to be an adequate source of data on a more or less permanent basis, on account of both its high cost and the sophisticated analyses it requires.

III.   CURRENT INFORMATION REQUIREMENTS

1.   Demographic information as a tool for development

In the under-developed world, population data, as well as the estimates derived therefrom, should be mainly useful instruments for the formulation of development policies, plans and programmes and should be geared to the satisfaction of high priority needs.   Both the sources of data and the estimation and analytical procedures, therefore, should be focussed on responding to the requirements of development strategies as defines by each country, including the following priorities: a) elimination of extreme poverty; b) development with equity; c) incorporation of women to the development process; d) improvement of childhood maternal health; e) conservation of an adequate environment; f) protection of the individual in informal employment; g) health, housing, education, social security for all.

Development strategies are giving increasing importance to regional, local and sectorial planning, in addition to over-all planning; this, evidently, is reflected in all the types of information required to achieve the ends in view.

The priorities mentioned above are increasingly being pursued at a decentralized level, so that a strong demand for information on small geographical areas and communities is being generated.   Procedures must be capable of giving support to specific action programmes to deal with priority groups.

In accordance with the strategies for vanquishing poverty elaborated jointly by CEPAL, UNDP and UNICEF, in the "Meeting on Possible Measures to

Deal with the Immediate and Long-Term Impact on Social Development of the External Crisis and the Adjustment Process" carried out in Lima in November 1986, the social groups that require more attention are:

a)   The indigenous population or that section of the population which is separated by linguistic and cultural barriers.

b)   The rural population, which is most numerous in the least-developed regions and countries.

c)   The poor urban population of non-metropolitan areas, whose average income is lower than that of families living in similar circumstances in capitals and cities which are poles of development.

d)   The poor urban population living in metropolitan areas of long-standing marginality.

e)   Families with a female head of household.

As mentioned in the preceding chapter, the indirect estimate methods of demographic variables have been used to determine the behavior differences according to socioeconomic and geographical sectors, mainly in relation to childhood mortality and fertility.   In order to integrate this knowledge on fertility and mortality differentials with the efforts made to improve the knowledge of poverty, it is better to analyze the population dynamic of these subpopulation defined as preferential, than to analyze the differentials separately according to variables.   The comprehension of the biological and social reproduction of these sectors could be important for determining the goals to overcome the present condition and foresee its growth impact in order to pay attention to its demand.

On the other side, for making the "poverty maps" with all these demographic indicators it is necessary to use all the scientific and technological advances in order to provide the adequate and timely information coming from different sources.   *Now, I want to mention some*   *in recent years.*
In what follows, new lines of work developed in the region are presented. These are in relation to indirect techniques of estimate and with the creation of a data base useful for giving adequate and timely information.   With regard to the indirect methods, procedures more linked to childhood maternal

mortality have been used, due to the transcendency it has in the policies for assisting priority demands.

2.   New procedures for estimating childhood mortality.

Retrospective questions in censuses and surveys have been the most important source for obtaining reasonable estimates of childhood mortality for developing countries. Of the procedures used to date, those based on questions on the total number of children ever born and children surviving to women over their reproductive period have provided the most robust results.

Nevertheless, the procedure based on the proportion of dead children over the reproductive lifetime of the women has certain limitations, among which the following may be mentioned: a) the estimates obtained with reliable data (from women aged 20-34) correspond to a time located several years before the census or survey, so no current indicator of infant mortality is available.   b) the infant mortality estimate obtained is derived from the probability of dying by the age of two, three, five, ten, fifteen and twenty years through model patterns of mortality by age, which has been demonstrated not to be a robust procedure (Guzmán, 1985).

The above-mentioned limitations constitute a serious problem in the face of the demand for indicators of infant mortality which would be useful for the evaluation of health programmes aimed at reducing the incidence of infant mortality. Planners wish to know the present situation of this indicator and compare it with what occurred before the implementation of their programmes.

There are other promising procedures which can provide more recent estimates of infant mortality, less dependent on model schedules, such as those based on the survival of the last-born child. To date, two procedures have been proposed: a) the inclusion of questions on the survival of the last-born child in censuses and surveys, and b) surveys of the survival of the pre-ceding birth when a woman attends a health centre to give birth to a new child. While these procedures do not suffer from the disadvantages noted above, the first has not so far given encouraging results and the second,

which is at in experimental stage of development, is affected by strong selec-
tivity because it covers only women who give birth in hospitals.

a) Survival of the last live-born child declared in censuses or
surveys.

In earlier work, estimates of infant mortality, using data on
the last live-born child, were made based on the survival of those children
born in the 12 months preceding the census or survey. Women of reproductive
age were asked whether they had a live birth in the twelve months previous to
the interview (or between two specified dates), and in the case of an
affirmative response, were asked whether the child was still alive or not.

The results obtained using this procedure cast doubt on the
quality of the information obtained, among other factors due to the high
probability of committing errors about the reference period. This fact led to
a more precise form of obtaining the data, asking: a) Date of birth of the
last child; b) Is this last child still alive? This information then yields
births which occurred in the year prior to the data collection operation.

In one form or another these questions have been included in a
large number of censuses and surveys in Latin America in the past two decades.
In the 1980s census round, seven countries investigated the survival of the
last-born child (Chackiel and Arretx, 1988) and in addition these questions
were included in the Demographic Surveys of Honduras (1983) and Guyana (1986).

The most important source of error lies in data collection,
fundamentally as regards possible omissions of those births which culminated
in the premature death of the children. Motivated by this thought, CELADE,
jointly with the Cruzada Patagónica of Argentina, carried out a census in
Junín de los Andes (Somoza, 1988) to investigate possible biases produced in
the declaration of the date of birth of the last child and the survival of
that child.

The principal assumption made in the research in Junín de los
Andes was that there is a proportionally greater omission of births of
children who subsequently died. To verify this, respondents were asked if

after the last child there was another birth and if this ended in a live birth or a still-birth. While this question is not logical, it was asked intentionally to detect omissions. After the census a return visit was made to clear up these and other observed contradictions.

The return visit permitted the clarification of inconsistencies which, although they did not noticeably influence the final result, allowed the detection of possible patterns of error. In summary, with respect to the last birth and its survival, various causes for problems in the accurate collection of information were established which influence both the correct location of last births and their survival: omission of births of children who afterwards died, omission of births of children later given in adoption, errors in the date of birth, fetal deaths recorded as live births and subsequent deaths.

With a view to avoiding the declaration of the last-born child presently living instead of the last live-born child, in the most recent censuses and surveys it was decided to invert the order of the questions asked on this topic, so that the respondent must also consider those children who have died: a) Is the last child born to ... alive or dead? b) On what date was this last child born?

The questions were asked in this way in the Guyana survey, in the Colombian census (1985) and in the Experimental Census of Junín de los Andes. In the cases of Guyana and Junín de los Andes the results were reasonably good, but this was not the case in Colombia, which may however be related to the general quality of this last census.

Regarding other possible data collection biases, in the majority of cases the inadequacy of interviewer training stands out as an important factor.

b)   Survival of previous child declared in maternity clinics.

The central idea of this method is to take advantage of the occasion on which a woman attends an assistance centre, for example a maternity clinic, to give birth, in order to obtain information on the

survival of the immediately preceding birth. Two types of research have been carried out in this area:

(i) The original idea presented by Brass and Macrae (1985) suggests that by simply asking the women, on the occasion of the current childbirth, whether their immediately preceding child is alive or dead, it is possible to estimate childhood mortality. On the assumption that the mean birth interval is approximately 30 months in high-fertility countries, the proportion of preceding children who have died represents the probability of dying between birth and age two years, $q(2)$. This estimate is situated in the period included between the time of the interviews, and a point 2.5 years earlier.

(ii) In Latin America, using the original idea of Brass and Macrae, a few questions were added to those aimed at information about the survival of preceding children. In particular, in all these cases, the study included the date of birth of the previous child and of its death in those cases in which it had died. This additional information allows the calculation of the probabilities of dying by age, and in particular infant mortality, and the exact placement of them in time.

The applications made in Latin America have led to promising results both for the estimation of childhood mortality and for the analysis of certain socio-economic and biological differentials in its level and trend. The inclusion of additional questions such as those regarding the dates of birth and death has permitted the analysis of the adequacy of the assumptions of the original method, and other data such as the age of the mother, her level of education and her area of residence have served to give some idea of the selectivity of the population studied. In the analysis of the biases which may affect these procedures, the most interesting results will be presented, as summarized in UNICEF and CELADE (1985) and Guzmán (1988).

In the preceding birth method, when the objective is to derive representative estimates in a given area, the major danger lies in selection of women who attend maternity clinics for their childbirth. In general, women who would be omitted from study would be those not attending hospitals who, in large degree, face higher risks of having a child die. Additionally care

should be taken to choose health centres for such a study which are representative of the population since the danger exists of choosing centres with a disproportionate lead of high-risks cases or clinics which cater largely women from higher social strata.

Selection would not be a problem if the objective was only to monitor childhood mortality among the population attending a given health centre. Moreover, it would always be possible to choose a number of hospitals, on the basis of various characteristics, which would give a reasonable idea of how this indicator behaves at the national level.

Other was idea is the

3)   **Indirect estimate of maternal mortality.**

There is a great deal of concern among health planners about the relatively high maternal mortality which affects women of reproductive age in the less developed countries, that is to say deaths which occur due to complications of pregnancy, childbirth and the period of confinement.

The indirect estimation of maternal mortality would be a particular case of the procedures for the estimation of female adult mortality. The estimation of female adult mortality from questions about the survival status of some near relative has been carried out principally via the survival of the mother, then of the first wife or partner and on some occasions from information on sisters. Now, it is a simply question of adding a question to investigate whether the death occurred from one of the causes related to the pregnancy, childbirth or period of confinement.

There are arguments for and against supporting each one of those procedures mentioned in the previous paragraph as the most appropriate for measuring maternal mortality. Below are presented the proposals which consider as most viable the information on survival of sisters on the one hand and maternal orphanhood on the other.

a)   Survival of sisters. In the Population Studies Centre (PSC) of the London School of Hygiene & Tropical Medicine work is being done in the direction of adapting the sibling survival procedure to obtain estimates of maternal mortality (Graham and Brass, 1988). The conclusion has been reached

that this is the most appropriate, after analyzing the problems which the other possibilities present.

In this manner it is proposed to include in single-round censuses or surveys, adapting to the concrete necessities, a series of questions such as the following:

"- How many sisters have you ever had (born to the same mother) who lived to be old enough to bear children?

- How many of these sisters are still alive?

- How many of these sisters are dead?

- How many of these dead sisters died whilst they were pregnant, during childbirth or during the period of confinement?"

Field work was done in the Gambia in September of 1987 by the PSC in collaboration with the British Medical Research Council and the results were promising. Approximately 2000 households were interviewed, which should be sufficient since, according to the authors of the study, interviews may be done with some 5000 respondents.

b) Survival of the mother. The condition of maternal orphanhood is practically the unique form of investigating female adult mortality, using this type of questions, which has been shown to work successfully in varying conditions. For this reason the question "Is your mother alive?" has been included in the majority of the national demographic surveys of the region and in a large number of population censuses (see Table 2). This empirical argument seems to be sufficient for considering the possibility of using this route with the proposal of obtaining an approximate measure of maternal mortality.

The limitations on using this method may affect the results to a lesser degree than do the problems of collecting the information in the field. Accumulated experience has shown that people know much better what happened to their mother and have more difficulty informing about the destiny of other relatives. (Chackiel, 1988).

During the last year CELADE participated in some experimental research (Bolivia and Chile (Mapuche Indians)), in which various proposals were included, with the aim of analyzing the real possibilities of focussing mortality measurement through these procedures. The questions on sisters, maternal orphanhood and on other variables useful for characterizing the respondent population and for controlling the data quality were used. The inclusion of these questions may be done on different occasions, for example in censuses or surveys, but also in other instances, in particular in the previous child procedure research may be done on the survival of the sisters of the respondents.

CELADE is now analyzing the results. If these experiments are successful, a promising path for the study of determining factors and the elements which surrounded these deaths will be opened, via case studies in which these aspects may be studied in more detail.

4.   Availability of data for small areas.

The following is extracted from the document Conning, A., Finnegan, L and Silva A. (1988):

"A study in 1983 found that census information for specific small geographical areas was often not available from the population and housing censuses in the Latin American and Caribbean countries because the political and administrative boundaries used in the census frequently do not correspond to the particular areas of interest and because most statistical offices were not able and/or willing to reprocess the large census files rapidly and at low cost on their mainframe computers. The interactive REDATAM [1] system, in English and Spanish versions, was created to solve the problem of providing small-area population and housing information by using an IBM or fully compatible microcomputer to store the microdata of an entire census on a hard disk (or laser disks for larger countries) and to permit any tabulation to be produced rapidly for any area down to city blocks or smaller."

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[1] REDATAM = REtrieval of DATa for small Areas by Microcomputer.

"The census (or survey) data is stored in compressed form (approximately one fourth of the original space requirements) in a database that makes it possible to access the data directly for a given small area without having to process the remainder of the data. Version 3.1 is presently available in English and Spanish with associated User and Database Generation manuals."

"Facilities offered by the system include geographic selection, grouping of geographic areas, self-documented databases, interactive and batch processing, calculation of derived variables, use of weighing factors, hierarchical processing, generation of sub-databases, production of files for export to other packages and password protection."

"REDATAM databases have been installed for 1980-round census data in Chile, Saint Lucia, Costa Rica, Uruguay, Dominica and Colombia and for survey data in Guyana. The processing efficiency of REDATAM makes it possible for the small Caribbean countries to use REDATAM for processing at the national level. In all the countries, hard disks have been used to store the databases, except in the case of Chile where the 16 million records are stored on optical "WORM" laser disks which permit writing data once. The use of hard disk or optical disk is essentially "transparent" to the user."

"REDATAM may play an important role in the 1990 censuses in the Latin American and Caribbean countries since the system will permit the provision of timely small-area services (and at the national level in the Caribbean countries) before, as well as after, the regular data processing and publication of results are ready. This should greatly increase the use of the census data by both the governmental and private sectors, but will require some improvements in the data collection process and cartography to ensure the quality and convenience of using the small-area information."

"A new two-year project will develop an extended system, to be known as REDATAM+, that will permit the cartographic display and analysis of population and other information through an interface with a Geographical

Information System (GIS) and will associate multidisciplinary information describing geographical areas with multi-level population and housing data."

SUMMARY

The degree of socio-economic development is a determinant of the availability and quality of statistical information in general and of demographic information in particular. The degree of development, which among other things is expressed by social inequality, requires, besides data availability a certain type of information that helps, on the one hand, to know reality better, especially that of the most poorest sectors, and on the other, to formulate goals in development policies.

The document presents first of all the situation in Latin American countries in relation to the data deficiency problem. The deficiency of the continuous statistics and the resulting necessity of applying indirect procedures based fundamentally on censuses and surveys are considered.

The evolution of indirect procedures is described in the context of the condition of the existing information, the socio-economic situation of the region, the demographic changes that modify the simplifying hypotheses, technological advances and accumulated experience.

The evolution of the indirect procedures is linked not only to development problems, but also to the trends followed by the demographic components themselves. This concerns the handling of techniques, which, although they were very useful when demographic variables were not affected by important changes, showed little robustness when changes appeared, especially in fertility. Therefore new methodological development was required. For this historical analysis of recent decades, reference is made to the following stages:

- The situation in the decade of the sixties: pre-transition of fertility. This stage is one of stability or quasi-stability; therefore, the procedures in vogue are those whose hypothesis is the constancy of the demographic components. Lotka's ideas are followed, disseminating the procedures based on assumption of population stability. Another characteristic of this period is the work at the national level with no special concern for the differences within the countries.

- The decade of the seventies: the methodological approaches in the beginning of the transitional period. During this period, from the beginning of the seventies up to now, indirect techniques based on retrospective questions included in censuses and surveys become important. Later on specialized surveys (as for example the World Fertility Survey) aimed at deepening knowledge of how changes are produced in developing countries, gain importance. Moreover, during this period the differential demographic behaviour of socio-economic groups is recognized, causing a great proliferation of studies showing the extreme existing inequalities.

- The present challenge. First, briefly presented are the outstanding aspects of present social development strategies and of those sectors considered as first priority. Second, an attempt is made to find out which are the present requirements of an equitable development strategy in terms of demographic information, in other words, which necessities need an adequate answer. Today's limitations in development methodologies are presented as

well as the necessity of adapting them to present conditions and the improvements which have been made in non-conventional procedures (example: registers of previous child survival in maternity clinics). The necessity of enriching information for small geographical areas and responding to sectoral planning demands is raised. Besides being a methodological challenge this implies making use of the great expansion of microcomputer technology (in particular reference will be made to the REDATAM package developed by CELADE).

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