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EXPERIMENTING WITH A PROCEDURE FOR  
ESTIMATING CHILDHOOD MORTALITY FROM  
INFORMATION ABOUT THE PREVIOUS BIRTH

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## INTRODUCTION

In general the registry of births and deaths in developing countries is very deficient. Thus it is very difficult to obtain a precise measure of so important a demographic indicator as is childhood mortality--that is, mortality of children under 5 years of age--and, even more so with respect to infant mortality, i.e., mortality under age 1. There still exist some countries in Latin America, and with greater frequency regions within countries, where childhood mortality represents more than half of total deaths. The incidence of such high risks merits the special attention of the authorities responsible for formulating programs of public health directed at achieving significant reductions in childhood mortality, and as was pointed to above, particularly in infant mortality.

Given the lack of trustworthy data, demographers have been developing indirect methods which depend on information on the proportion of children surviving to women classified by age, at the time of a census or demographic survey. Brass' original ideas<sup>1</sup> have continued to be developed, and there now exist techniques, somewhat more operative, but nonetheless based on his pioneering ideas. It ought to be pointed out that these methods or techniques do not attempt to estimate infant mortality, but rather only to try to measure childhood mortality. For that reason it should not surprise one that, when these techniques are used to extend or extrapolate to obtain infant mortality, one can produce results that do not correspond with reality, but rather reflect only the mortality of a model--of a certain age structure. In spite of these limitations the studies on

childhood mortality, based on the proportions of surviving children, classified by age of the women, have made possible a big step forward in the knowledge of the levels, trends and differentials of childhood mortality. However, it should be pointed out that the estimations based on that information refer to periods prior to the time of taking the census or survey--periods which extend from around two to fifteen years before, depending on the age of the women interviewed. Therefore these estimates are not the most appropriate for tracking childhood or infant mortality trends when one wants to evaluate, for example, a mother/child health program or a specific program set up to achieve important decreases in infant mortality.

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Recently Professor Brass presented new ideas with regards a simple procedure which permits the estimation of childhood mortality. The simplicity of the method lies in the type of information which is to be gathered: each woman who receives assistance from a clinic or any other place where maternity attention is given--i.e., those dealing with birthing--is asked at the moment of registering at the maternity or assistance clinic about the survival of the child previous to the one she is about to bear. It has been shown that in countries where fertility reaches high levels, the birth interval is approximately 30 months, that is to say two and a half years. The information with regards the survival of the "previous child" would thus allow us to establish a measure of the mortality between this birth and the 30 months following. Symbolically we would have an estimation of the probability of death  $q(2.5)$ . The

numerator is made up of previous children that died, and the denominator is the sum total of previous children, whether or not they be alive at the moment in which the mother comes to the assistance center to give birth to this latest child.

The ideas developed by Brass and Sheila Macrae were also the objects of studies and modifications by CELADE, especially by Jorge Somoza, who has frequently stimulated the testing of methodological innovations around new demographic procedures, trying thus to evaluate their applicability and to adapt them to the conditions in Latin American countries.

In August of 1983 UNICEF and CELADE set up a program of collaborative activities designed to measure the levels, trends and differentials in the infant (and childhood) mortality in a few selected countries of the region where there were high mortality indicators. Among these joint activities was considered, "the experimentation in the collection of the data necessary for the estimating mortality at the beginning of life, using the administrative infrastructure and services already existing in our countries."

In order to carry out these methodological tests UNICEF and CELADE agreed upon the choice of countries with high rates of infant mortality, and among these they agreed on the choice of geographic areas where UNICEF had a special interest because it had assistance programs in place. The countries selected were Bolivia and Honduras. The Bolivian experiment was carried out in a maternity clinic in Cochabamba and two clinics in La Paz. In Cochabamba and in one of the maternity clinics of La Paz this pilot project was carried out by the Bolivian Association for

Research on Population Matters (ABIEMP). In the case of the other maternity clinic in La Paz the project was included in the work program between CELADE and the National Statistical Institute (INE).

The experiment in Honduras was carried on in a hospital in Tegucigalpa, the capital of the country, and in a hospital in San Pedro Sula. In this case the Public Health Ministry of Honduras served as the national counterpart.

In this document a separate description of each of the two projects will be given, covering all of its stages, and pointing out the problems which arose at the moment of designing the questionnaire. We also describe here the suggestions which were developed to deal with problems of supervision, the handling of questionnaires, and other aspects which can be considered of interest for further pilot projects or the perfecting of the system. Beyond that the results are also given. It can be considered that these reports represent an evaluation of the applicability of the new procedure proposed for the measurement of mortality in the first years of life. Even now we can anticipate that the results achieved are very promising, especially if the data collection about the survival of previous children is continued for three to five years, during which a mother-infant care program is carried out with the intention of lowering infant mortality. It is for this reason that we think it extremely important that the public health authorities in the country and the international institutions charged with fostering this type of program take into account these pioneering

experiences in Latin America and propose suggestions which they think would improve them.

It is important to state from the very beginning that the mortality estimations that can be derived from the information collected in the maternity clinics or assistance centers reflects only the experience of those children of the women who recur to those establishments. Obviously one cannot extrapolate from those estimations to the entire population. This would involve a greater or lesser error depending on the selectivity of the population of women who are treated in those assistance centers. For these reasons CELADE considered it useful to design a longer form than the one originally designed by the authors of this procedure. The greater extension follows from the inclusion of questions regarding some demographic and cultural characteristics of the women which allow for their comparison with the rest of the women in the area in which the assistance center is located.

In the case of Honduras the methodological pilot project was run almost simultaneously with the Second National Demographic Survey. This permitted the researchers to make comparisons, verify the selectivity of the women interviewed in the methodological pilot program, and, up to a point, to evaluate the estimates obtained. In the Bolivian case the information collected in the pilot project, along with the results, were able to be compared--and to a certain extent to be evaluated--with the results from the 1976 population census and also with the results from the National Demographic Surveys of 1975 and 1980.

This document is divided into two parts. The first covers the final evaluation report of the Bolivian experience, and the

second covers that of Honduras.

#### FOOTNOTES

1. Brass, William, Métodos para estimar la fecundidad y la mortalidad en poblaciones con datos limitados. Selección de Trabajos de William Brass. CELADE, Serie E, No. 14.

2. Brass, William and Sheila Macrae, Childhood Mortality Estimated from Reports on Previous Births Given by Mothers at the Time of a Maternity. Asian and Pacific Census Forum, East West Population Institute, November 1984, Vol. 11, No. 2.

FIRST PART

EVALUATION REPORT  
OF THE  
BOLIVIAN EXPERIMENT

1. Objectives



In any countries with inadequate statistics the magnitude of demographic variables is very difficult to know. And one of the most difficult to obtain, about which there exists a very special interest, is child mortality, and even more so, infant mortality. In order to obtain these indicators indirect procedures were developed which allow one to derive estimations of the probability of dying of the children from retrospective questions included in censuses and surveys. These have been very useful in estimating the orders of magnitude of these indicators for the entire country, regions, and sub-groupings of the population. But more and more one becomes convinced of the necessity of obtaining up-to-date information which would allow the evaluation of certain health programs or projects which have an impact on childhood mortality, generally in small communities or among users of specific services. Toward this end CELADE has recently begun to try out new procedures that are both very simple and low cost, gathering information about the survival of the previously born child declared by those women who come to a hospital (or clinic) in order to give birth.

With this goal in mind one of the pioneer experiences is being developed in a maternity clinic in Cochabamba and another in La Paz. These initial attempts are being carried out on the one hand through a contract of collaboration between CELADE and the National Statistical Institute (INE) (in the case of La Paz), and on the other by the Bolivian Association for Research in Population Matters (ABIEMP). At the same time these experiments form part of the collaborative effort between UNICEF and CELADE.

This report brings together the first evaluation of the

functioning and results of the proposed procedure.

## 2. Procedure

### (a) Data gathering.

In order to be simple and low cost the proposed data collection procedure ought to be carried out utilizing the already existing administrative infrastructure in maternity clinics or other institutions to which a woman might go in preparation for child bearing. The information to be gathered deals with the survival (or not) of the child born previous to the one which currently brings the woman to the clinic.

It has been proven that, in general, the birth interval in countries with high fertility is approximately 30 months (2 1/2 years). It would suffice, therefore, to ask each woman:

(i) Have you given birth to a live child before this current birth? Yes \_\_\_\_\_ No \_\_\_\_\_

(ii) Is that previous child alive now? Yes \_\_\_ No \_\_

A measurement of childhood mortality, approximately between birth and the first 30 months, would result from the ratio between the number of children having died (child born immediately before this current one, but who has since died) and the corresponding number of births (that is, the sum total of children immediately previous to the current ones) who have died or are still alive at the time of the interview. This yields the probability of dying between birth and 2.5 years of age [q(2.5)], if one accepts 30 months as the average birth interval.

There have been designed in CELADE blank forms for annotating the information of each woman on one line. Questionnaires were prepared as simple as the one sketched above, and others in which

additional questions had been included. The latter, on the one hand, permit the refining of mortality measures, and on the other, allow the characterization of the group of women surveyed with variables that are simple to gather, as for example: age, number of years of schooling completed, and total number of births. On the following page a suggested design of the longer blank form is presented.

(b) Calculation of the rates.

(i) In the case of the restricted questionnaire.

In this case one assumes that one only has access to the total number of penultimate children born and the total of these that have died or survived.

The calculation is quick and simple: The ratio between the children that died from among those children of the previous births and the total number of previous births ( i.e., those immediately preceding the one in which the women are currently involved). This ratio yields the probability of dying from birth until the age of 2 1/2 years (which is symbolized  $q(2.5)$ ). If there were some indication that the average interval between births were different from 2.5--say for instance, 1--then in that case the probability of dying would be  $q(1)$ .

(ii) The case of the extended questionnaire.

Here it is assumed that, besides the information available in case (i), one has the date of birth of the immediately previous child and the date of death if, perchance, this previous child has died. Here one can obviously go through the same calculation as in case (i), but now one is also in the position

EXAMPLE OF FORMAT FOR THE LISTING OF DEATHS OF THE PREVIOUS CHILD  
HEALTH CENTER .....

First and last name	Vital Event		Woman's age	Years of study completed	Did she have a previous live birth?		Date of this previous birth Day Mo. Yr.	Is that child presently alive?		If dead:		Date of interview Day Mo. Yr.	Name of interviewer						
	BA <sup>1</sup>	FD <sup>1</sup>			Yes	No <sup>2</sup>		Yes <sup>2</sup>	No	Date of death				Cause					
										Day	Mo.				Yr.				
1. P. Aguirre	X		23	7	X		14	8	79	X				28	7	83	A.Sotomayor		
2. X. Valdebenito		X	18	4		X								28	7	83	A.Sotomayor		
3. G. Guerrero	X		35	10	X		3	5	75		X	11	5	76	Diarrhea	29	7	83	C.Andraca
4. ....																			

1 BA: Born Alive; FD: Fetal Death

2 The interview ends here

to estimate the actual average birth interval, and consequently the value of  $I$ , which allows one to better define the probability of dying to which the ratio refers. This procedure allows for the use of all the data.

Since the information exists regarding the dates of birth and death of the children in question, it is possible to know the age at death, and therefore the number of deaths according to age at death. This allows us to calculate directly the probability of dying between birth and a given age  $x$ , by taking as the numerator the deaths of children younger than  $x$  years, and in the denominator the sum total of births that precede the actual one in process. In this way one can easily obtain, for example, the infant mortality rate or the probability of dying during the first year of life.

A more refined way of proceeding would be to calculate the central rate of mortality between the ages of  $x$  and  $x+n$ ;  $m(x,n)$ : the numerator would be the number of dead children between the ages of  $x$  and  $x+n$ , and the denominator would be the number of years of exposure to the risk of death. For example, to calculate the central rate of infant mortality  $m(0,1)$ :

Numerator: deaths of children under one year of age.

Denominator: (i) those children presently living, over one year of age, plus those who died after their first birthday and who consequently contribute at least one year of exposure to the risk of death.

(ii) those children presently living below the age of one, who contribute the difference between the date of the interview and the date of birth.

(iii) and the number of years contributed by those children who die before their first birthday. This figure is calculated as the difference between the date of death and the date of birth of the given child.

The total central mortality rate of those born immediately preceding the present birth is derived as follows:

Numerator: total deaths. Denominator: (i) each survivor contributes the difference between the date of the present birth minus the date of his/her own birth (the total birth interval). (ii) those dead contribute the difference between the date of their death and that of their birth.

This latter rate would represent the death rate of those children who die between birth and 1.

Next we move on to the probability of death, which is calculated by means of the following formula derived from Reed and Merrell <sup>1</sup> :

$$q(x, n) = n \cdot m(x, n) / [1 + (n-f) \cdot m(x, n)]$$

where f is the separation factor of deaths between x and x+n.

### 3. The experience in Bolivia

The above-described procedure turns out to be very attractive because of the simplicity of the data which one must gather, because of the ease of calculation of the various rates, and because it is inexpensive. As with every new procedure, its on-site testing is absolutely required in order to verify its feasibility and the consistency of the results. It was this that motivated the setting up of pilot projects in countries which witnessed conditions of high mortality, where one would think

that the results would be very useful in the formulation of health policy. It was for this reason that an effort was made to do experimental research in several countries, among which was Bolivia. The idea was quickly taken up by demographers in that country. And thus the pertinent institutional contacts were arranged in order to carry out the referred to registration in maternity centers.

(a) The institutional framework.

The national institutions involved were the National Statistical Institute (INE), the Bolivian Association for Research in Population Matters (ABIEMP) and the Ministry of Public Health and Social Welfare (MPPS). The agreements between these agencies, CELADE and UNICEF were the following:

(i) Experiments would be carried out in maternity clinics in La Paz. ABIEMP had already contacted the Centro San Gabriel of La Paz, which fell under the domain of the MPPS, and was planning another experiment in Cochabamba. In addition studies would be carried out in other maternity clinics, some within the orbit of the Social Security system and in some center where UNICEF had a direct relationship.

(ii) The consultancy for putting into operation these studies would fall under the aegis of the demographers who worked in the entities where the studies would be carried out, or if that were not possible, of demographers from ABIEMP and INE. The demographers' task would consist in periodically checking that the information was recorded according to the ordained format and in setting up an analysis of the information obtained (after a certain amount of time when the number of cases collected would

warrant analysis).

The criterion employed in Bolivia for these experiments was to give wide participation and responsibility to the national personnel, with the understanding that what was being sought was a procedure that could be made at once very simple and could be carried out independently from international organizations and therefore would be a method allowing for permanent follow up. Nevertheless CELADE would lend expertise in the various stages of the research.

(b) Completed studies.

(i) The Maternity Clinic German Urquidi (Cochabamba).

ABIEMP carried out a pilot project in the maternity clinic German Urquidi in the city of Cochabamba. On the following page is shown the form that was used. Note that there exist important differences between it and the one originally recommended by CELADE.



PILOT PROJECT: MORTALITY IN THE FIRST YEARS OF LIFE

Health Center or Clinic \_\_\_\_\_

A. The interview must be gone through with every woman who is admitted to the institution to give birth.

1. Names and Surnames of the mother \_\_\_\_\_

2. Mother's age (complete years lived) \_\_\_\_\_

3. Place of habitual residence \_\_\_\_\_

\_\_\_\_\_  
Neighborhood (if in city of \_ \_ \_ ) Locality Province Dept.

4. Date of Birth or Fetal Death \_\_\_\_\_  
Day Month Year

5. Did she have an infant born alive prior to this birth or fetal death?  
Yes\_\_ (Go on to question No. 6) No \_\_ (end of interview)

IN THIS SECTION LIST THE INFORMATION ABOUT THE IMMEDIATELY PRIOR LIVE BIRTH

6. Date of Birth: \_\_\_\_\_  
Day Month Year

7. Sex of the live birth: Male \_\_\_ Female \_\_\_

8. Is this child presently alive?  
Yes \_\_\_ (end of interview) No \_\_\_

Date of the interview: Day \_\_\_ Month \_\_\_ Year \_\_\_\_\_

Name of person who filled out the questionnaire \_\_\_\_\_

PILOT PROJECT: MORTALITY IN THE FIRST YEARS OF LIFE

Health Center or Clinic \_\_\_\_\_

A. The interview must be gone through with every woman who is admitted to the institution to give birth.

1. Names and Surnames of the mother \_\_\_\_\_

2. Mother's age (complete years lived) \_\_\_\_\_

3. Place of habitual residence \_\_\_\_\_

\_\_\_\_\_  
Neighborhood (if in city of \_ \_ \_ ) Locality Province Depart.

4. Date of Birth or Fetal Death \_\_\_\_\_  
Day Month Year

5. Did she have an infant born alive prior to this birth or fetal death?  
Yes\_ (Go to question No. 6) No \_ (end of interview)

IN THIS SECTION LIST THE INFORMATION ABOUT THE IMMEDIATELY PRIOR LIVE BIRTH

6. Date of Birth: \_\_\_\_\_  
Day Month Year

7. Sex of the live birth: Male \_\_\_ Female \_\_\_

8. Is this child presently alive:  
Yes \_\_\_ (end of interview) No \_\_\_

Date of the interview: Day \_\_\_ Month \_\_\_ Year \_\_\_\_\_

Name of person who filled out the questionnaire \_\_\_\_\_

- On each page the information from two women is recorded, while in the original proposal each woman takes up one line of a page. The use of separate sheets for each woman, besides increasing the costs, is less manageable and runs the risk of the loss of sheets. The CELADE format, on the other hand, permitted access to a large number of cases on a single page and thus facilitated their transcription with less risk of loss.

- The question about the date of death of the child is missing. This limits the possibilities for analysis. Without this information one cannot compute the time of exposure to the risk of death of those born alive who later died. The exclusion of this question would be justified only in the case where one was working with the more restricted questionnaire, but in that case one could also prescind from other questions.

- The question about the number of school years completed is not included. This question was asked in order to study the possible selectivity of the female population served by these assistance centers.

- The place of habitual residence of the mother is asked. It is not clear of what use this information can be for this pilot project. Perhaps its purpose was to assess whether the women who avail themselves of the maternity clinic come from the city itself or whether a certain percentage come from the surrounding rural area.

- There is no attempt made to investigate the cause of death. Admittedly, while this information is of great interest, it is very difficult to try to obtain it with this type of questionnaire. In this sense its elimination does not appear to

be critical.

The available material covers the months from November 1983 through February 1984. According to the information provided by ABIEMP, there was only one interruption of 10 days in December, owing to labor problems.

(ii) Maternity Clinic "18 de Mayo" (La Paz).

In this assistance center the experiment was carried out from October 1 through December 31, 1983. Here the supervision was in the hands of demographers from INE. Around 400 cases were recorded, about which information was lacking when this report was prepared. It would have been very interesting to analyze these results, given that in this maternity clinic the questionnaire used was the one recommended by CELADE.

(iii) Maternity Clinic San Gabriel (La Paz).

In this maternity clinic work was begun, but had to be suspended because of administrative problems (change of the person in charge) and because of labor problems during the month of December 1983. This center, under the aegis of ABIEMP, began using an extended questionnaire, allotting one sheet per woman.

Summarizing, for analysis of the Bolivian case there exists only the information from the maternity clinic German Urquidi in the city of Cochabamba.

#### 4. Analysis of Results

From the study in the Maternity Clinic German Urquidi in Cochabamba the following information is available:

(i) 168 cases registered between November 4 - 30, 1983. Of these 100 had had a birth prior to the present one. The others were women who came for their first child.

(ii) Manual tabulation of those cases corresponding to the period between November 1983 and February 1984. There were 578 total cases, of which 362 had had a prior childbirth. Among these cases are those listed above in (i).

Since complete data exist for 100 cases, it was possible to do a more detailed analysis with them. With the rest of the data the analysis was more restricted.

(a) Birth interval.

The proposed procedure rests on the assumption that the survival of the immediately previous child corresponds to a time of exposure to the risk of dying equal to the average birth interval (I), which is thought to be around 2.5 when fertility is high. Given that in the questionnaire from the maternity clinic German Urquidi were included both the date of birth of the prior and present child, an empirical calculation of the value of I is possible.

The proposed exercise, the calculation of the average birth interval for those cases under study, can only be done completely for those 100 cases for which complete information is available. For the rest we have births classified by quinquennial age groups of the mothers and according to the following categories of birth intervals: less than 1 year, 1 to 1.9 years, 2 to 2.9 years, and 3 years and over. Thusly the value of I was calculated for the 100 complete cases by quinquennial age groups of the mothers, and in order to utilize the rest of the information, the mid-point of the "3 years and over" group was calculated (Table 1).

The average interval between the last two births for the

total of the 100 women studied is practically equal to 3. One would have expected that it would have grown by age groups, but this trend is not clearly present, probably because of the low number of births that the limited data source offers.

Table 1  
 MATERNITY CLINIC GERMAN URQUIDI: COMPUTATION OF THE AVERAGE BIRTH INTERVAL (I) AND THE MID-POINT OF THE "3 YEARS AND OVER" CATEGORY FOR THE LAST TWO BIRTHS BY AGE GROUP OF THE MOTHERS, CORRESPONDING TO THE 100 CASES OFFERING COMPLETE INFORMATION

Age groups	Previous births	Average I	Mid-point for the Group "3 and over"
15-19	5	1.30	---
20-24	27	3.00	5.18
25-29	28	2.78	4.78
30-34	18	3.56	5.38
35-39	16	3.02	4.59
40-44	4	2.92	3.89
Unknown	2	8.29	8.29
TOTAL	100	3.03	5.15

The average birth interval for those births separated by 3 years and over is 5.15 overall. This information is used to compute I for the totality of births which are classified by spans of interval between births. In Table 2 the total basic data are given along with the computation of the average interval between the last two births, multiplying the mid-point of the interval by the number of cases.

Using the 362 cases of births immediately prior to the present one, the average birth interval also yields approximately 3 years, which would imply that the probability of dying of the total of those born would correspond to the first three years of life:  $d(3)$ . This seems logical if one thinks that we are looking at a maternity clinic in the city of Cochabamba that might not

deal with very high fertility women.

Table 2  
MATERNITY CLINIC GERMAN URQUIDI: COMPUTATION OF THE AVERAGE  
INTERVAL (I) FOR THE LAST TWO BIRTHS BY AGE GROUPS OF THE  
MOTHERS, CORRESPONDING TO THE SUM TOTAL OF AVAILABLE INFORMATION

Age groups	Previous births	Birth interval				Average I
		-1	1-1.9	2-2.9	3 and over	
15-19	26	1	15	8	4	2.27
20-24	116	3	39	43	31	2.82
25-29	100	3	29	32	36	3.10
30-34	56	1	14	19	22	3.25
35-39	46	2	7	13	24	3.64
40-44	11	0	1	3	7	4.10
45-49	3	0	0	0	3	5.15
Unknown	2	0	0	0	2	5.15
TOTAL	362	10	105	118	129	3.10

The value of I by age group (Table 2), now with a greater number of cases, shows consistent results: there is a systematic growth with age. And furthermore, it could be said that taking into account the age of the mothers one can derive an estimation from  $q(2)$  through  $q(5)$ .

(b) Computation of the probabilities of dying.

In the first place the simplest calculation is presented by means of the quotient between dead children and the total number of live births. In Table 3 these results are given for the 362 births immediately prior to the present one, classified according to sex and mothers' age. The total number of deaths is only 46. The number is very small and therefore little weight can be put on the disaggregated information. One expects that with the advancing age of the mothers the figure will be higher, since the estimated mortality refers to a probability from birth up to an older age of the child. That expected trend does not appear, but rather there are wide fluctuations. Neither do we find the

expected differences in mortality between sexes, rather the results systematically show a greater mortality for female children than for male, while on the other hand the sex ratio at birth (1.06) is consistent.

Table 3  
 MATERNITY CLINIC GERMAN URQUIDI: COMPUTATION OF THE PROBABILITIES OF DYING FROM BIRTH UP TO THREE YEARS OF AGE, LISTED ACCORDING TO THE MOTHERS' AGE GROUPS AND SEX OF THE CHILDREN, CORRESPONDING TO ALL THE AVAILABLE INFORMATION

Age Groups	Births		Deaths			Probabilities			
	Tot	Male	Female	Tot	Males	Females	Total	Males	Females
15-19	28	15	13	6	2	4	0.2143	0.1333	0.3077
20-24	116	63	53	15	7	8	0.1293	0.1111	0.1509
25-29	100	50	50	11	7	4	0.1100	0.1400	0.0800
30-34	56	27	29	5	2	3	0.0893	0.0741	0.1034
35-39	46	25	21	8	5	3	0.1739	0.2000	0.1429
40-44	11	5	6	1	0	1	0.0909	---	---
45-49	3	0	3	0	0	0	---	---	---
Unknown	2	1	1	0	0	0	---	---	---
TOTAL	362	186	176	46	23	23	0.1271	0.1237	0.1307

With the available data a total probability of dying of 127 per thousand is obtained, which is approximately equivalent to a  $q(3)$ , given what we saw above with regards the average interval between the last two births. Over and above this it is possible to break down this probability for the 100 cases from November on the one hand, and for the births prior to those born in the December to February period. With these we note the following rates:

November 1983:  $q(3) = 0.100$

December 1983 - February 1984:  $q(3) = 0.141$

These figures indicate that the statistic 0.127 corresponding to all the births could be underestimating the mortality because it contains the November cases which are

suspiciously low. Perhaps the information improved notably and we can consider  $q(3) = 0.141$  as the best estimate for the universe of births under study. Is this an admissible figure for the years prior to 1984? As a point of reference we have here the estimated probabilities for the city of Cochabamba and for the department of the same name according to the 1976 census :

City of Cochabamba:  $q(3) = 0.149$

Department of Cochabamba:  $q(3) = 0.270$

The 141 per thousand does not seem to be out of line considering that one is dealing with a select population set who frequents a maternity clinic located within the city and that, additionally, the probability refers to a time perhaps 10 years after the census estimation.

With the births declared in November it is possible to compute the total time of exposure to the risk of dying. This is done in the following manner:

(i) For the surviving children this was figured as the difference between the date of the interview and the date of birth of the previous child.

(ii) For those children who died, given that the date of death was not asked, half the time between the date of their birth and the date of the interview was used.

The computed time of exposure was 286.83 person years. This figure was used to calculate the central mortality rate between 0 and 3 years of age:

$$m(3) = 10/286.83 = 0.034864$$

Applying the formula used on page 14 yields a probability of



dying between 0 and 3 years:

$$q(3) = 3 \times 0.034864 / [1 + (3-0.8652) \times 0.034864] = 0.09735$$

The value of  $f = 0.8652$  was taken from "level" 11 of the "West" model mortality tables by Coale and Demery, corresponding to a high mortality.

The  $q(3)$  found in this way is practically equal to that calculated from deaths divided by births for the month of November (100 per thousand). In addition this shows the coherence of the result of  $q(I)$  with the value of  $I$  adopted.

(c) The problem of selectivity.

The fact that the recorded births and deaths (of children born prior to the present one) correspond only to a group of women who frequent a certain maternity clinic leads one to think that one is dealing with a population that is necessarily selected from various points of view.

(i) Selectivity according to the age of the mother.

Those women who come to have their children delivered in the maternity clinic German Urquidi are in large measure concentrated in the age group ranging from 20-24 (more than one third). This contrasts with the relative distribution for those women surveyed in the census for the city and department of Cochabamba. In Table 4 it is evident that in general the female population coming to this maternity clinic is younger than that found in the city and departmental census. That is, while 77.2% of those who come to said clinic are less than 30 years old, according to the 1976 census women in both the city and department of Cochabamba who are under 30 years of age represent only about 60% of that population.

(ii) Selectivity according to birth order.

The information recorded allows for a classification of the women according to the order of the current birth: one or more than one. The woman who states that she has had no previous child is having a child of the first order, and obviously contributes no cases for the study of the death of a prior child. Of the total of 578 women registered between November and February 216 (or 37.4%) are primiparous. As a point of reference the percentage of first births is 18% of births of the last year in the National Demographic Survey of 1975 (EDEN I) and 21% of all births in the National Demographic Survey of 1980 (EDEN II).

This selectivity of births of the first order is explained largely by the age structure of the women who come to the maternity clinic for birthing (Table 4), since it is clearly noticeable that when one compares the percentage of primiparae by age structure, the differences between those of this current experiment and those of other sources considered (EDEN I and EDEN II) are not as great in the first groups (Table 5).

Table 4  
RELATIVE DISTRIBUTION OF BIRTHS ACCORDING TO THE AGE OF THE MOTHER, MATERNITY CLINIC GERMAN URQUIDI, CITY AND DEPARTMENT OF COCHABAMBA (1976 CENSUS).

Age groups	Births during the last year (1976 CENSUS)		
	German Urquidi	City	Department
15-19	22.0	25.4	22.6
20-24	33.9	20.6	18.9
25-29	21.3	15.1	15.6
30-34	10.8	11.2	12.5
35-39	8.8	10.6	11.8
40-44	2.5	8.1	9.1
45-49	0.7	9.0	9.5
TOTAL	100.0	100.0	100.0

Table 5  
 PERCENTAGE OF FIRST BIRTHS IN THE TOTALITY OF BIRTHS ACCORDING TO  
 THE AGE OF THE MOTHER, MATERNITY CLINIC GERMAN URQUIDI AND  
 BOLIVIA (EDEN I AND EDEN II).

Age groups	German Urquidi	Bolivia	
		EDEN I	EDEN II
15-19	77.6	72.5	72.2
20-24	39.6	35.4	36.6
25-29	17.4	10.9	11.6
30-34	8.2	5.0	6.5
35-39	8.0	3.0	1.3
TOTAL	37.4	18.3	21.4

By construction the procedure implies a certain selectivity against the higher birth orders: since information is given concerning the birth prior to the present one, the last child born to a woman will never be considered.

(iii) Selectivity according to socio-economic conditions.

Unfortunately the questionnaire that was used did not include a question that might serve as an indicator of the socio-economic condition of the women who come to the maternity clinic to give birth. It is highly probable that these women have idiosyncratic characteristics, and that women of better or worse situation are over-represented. Obtaining information of this nature would have permitted the comparison with estimates derived from other sources corresponding to women with similar characteristics.

Given that the question about the habitual residence of the mother was included, one might have thought it useful for investigating this type of selectivity, at least in relation to the area of residence (urban or rural). However, this datum was very poorly collected, since of the 100 cases for which there

exists information, only 17 noted down the locality and 34 the province.

##### 5. Evaluation of the experiment and recommendations.

Considering that we are dealing with a single experiment and with only a limited number of cases, no definitive conclusion can be reached. Be that as it may, we can draw some important conclusions that will help better the data collection process, and thus improve the mortality estimation of the children under study.

###### (a) The selectivity of the information.

Just as was to be expected, the women who come to have a child in a health center have special characteristics, for which reason it is impossible to generalize the results to the rest of the population of the area. The data as analyzed indicate that the women who come to the maternity clinic German Urquidi are of a younger age structure than those of the city and department of Cochabamba, and in the second place that the women who are about to give birth to their first child are over-represented. No elements were at hand that would permit a determination of the existence of a selectivity in relation to the socio-economic conditions of the women studied.

The fact mentioned in the previous paragraph makes it necessary to emphasize that one ought not think in the generalizability of this type of study with the idea of deriving indicators of national or even regional mortality. The objective of such studies should rather be the follow up for specific projects in which the population involved is that which goes to a

certain health center for childbearing. Even so, it is necessary to use control variables for selectivity for the purpose of clearly establishing when the changes in childhood mortality are due to socio-economic improvements or rather are a result of changes in the structure of the female population. In order to control for the age structure the information concerning the mother's age is useful. In order to control for the distribution according to birth order it would be of interest to incorporate the question referring to the number of children that the woman has delivered up till now. Additionally a control variable for the socio-economic condition is required--for which CELADE recommends the number of years of study completed by the mother.

(b) The questionnaire.

The format used in the maternity clinic German Urquidi is not the most adequate. In spite of the fact that CELADE made a very concrete proposal as to the form and content, ABIEMP decided to use a questionnaire different in both aspects. CELADE conceives of two possibilities related to the concrete circumstances in which the research is carried out: (i) for complex cases, with poor working facilities and with poorly qualified personnel, the restricted questionnaire is suggested, with simple and very few questions (the woman's age, whether she had a previous child, the survival of that child); and (ii) when favorable conditions are present the extended questionnaire is recommended, with questions added about the date of birth of the previous child, the date of death of that child (if the child has died), and the number of years of schooling of the mother.

The format used in this maternity clinic is similar to the

extended form, but two significant questions are missing: the date of death of the child under study, and the number of years of schooling completed by the mother. The first question is useful for a more refined calculation of mortality. And the second permits clarification of aspects related to the selectivity of the women. An interesting recommendation that arises from the analysis of the data is the usefulness of asking the number of children born to the woman up to the moment of the interview, since that would reveal the distribution of the births according to order. This is important because of the differential of mortality according to this variable and because of the particular characteristics of the births being studied.

(c) Administrative aspects.

Certain accidental and administrative factors have played a negative role in the development of the experiments in Bolivia. Labor conflicts in the health sector impeded the realization of the study in the maternity clinic San Gabriel in La Paz and led to a 10 day suspension of the work in Cochabamba. It is to be assumed that this type of problem would not weigh so heavily when the procedure is applied in a determined clinic in a non-experimental way and when the national authorities give it priority and special attention. However, these problems do caution one against an over-enthusiastic attempt at extending this system in a wide and complex form. In such a case one would encounter the same problems that are present in the current official vital statistics.

(d) Results.

This is the most encouraging aspect of the experiment, since in spite of the above-mentioned difficulties, results were found that were both reasonable and of great interest. Some of the following conclusions can be mentioned: (i) The average birth interval is in this case 3 years, instead of the 2.5 generally observed in populations with high fertility. (ii) The probability of dying between birth and three years of age is a plausible value: in the period from December 1983 through February 1984 it was 141 per thousand. (iii) Additionally, we observe an improvement in the quality of the data gathered--as witnessed by the fact that in November of 1983 q(3) reached a much lower value (100 per thousand). (iv) With a larger number of cases one would be able to obtain estimates of the probability of dying between birth and two, three, four and five years of age, by taking into account the variation in the average birth interval according to the age of the mother.

FOOTNOTES

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SECOND PART

EVALUATION REPORT  
OF THE  
HONDURAN EXPERIMENT



## 1. Introduction.

The principal aspects of the methodological test case carried out in hospitals in Honduras are summarized in this brief report. The object of the projects was to develop estimates of mortality at the beginning of life by means of the registration of deaths of the previous child. This research was carried out within the program of cooperation between UNICEF and CELADE.

The information necessary for the study was collected in the two principal hospitals of Honduras, the Hospital Escuela (Teaching Hospital) in Tegucigalpa and in the Leonardo Martinez Hospital in San Pedro Sula. The procedure consists in asking all women who go to the hospital to have a child about the survival of the previous child. Said information is directly related to the probability of death between the time of birth and the first two and a half years of life.

Within the country the national organization that participated as a counterpart in this study was the Honduran Public Health Ministry. The gathering of data took place between December 1983 and April 1984, during which period some 5500 women were interviewed.

The questionnaires were processed as the information was gathered. This made it possible to evaluate the results obtained on the spot. For this evaluation the results derived from the National Demographic Survey of Honduras (EDENH-II), carried out during the second semester of 1983, were useful.

As for the results obtained, it should be pointed out that the information gathered during the first month indicated very

low infant mortality rates, but during the following months, as the supervision became more effective, the estimated levels of mortality turned out to be approximately equal to those derived from the National Demographic Survey.

## 2. Objectives and methodology.

In some Latin American countries the demographic statistics still have some significant deficiencies which make difficult their use for planning and health sector orientation. Owing to these deficiencies new indirect methods are being developed, based principally on questions included in the censuses and surveys, which allow us to obtain more up-to-date and reliable demographic information.

Aware of this need, UNICEF and CELADE established a program of joint activities in August of 1983, with the following principal objectives.

### "a) Evaluation of the lack of data.

Utilizing all available information, the attempt will be made to develop estimates of the levels, trends, and differentials of infant mortality in the last twenty years. ..."

### "b) Experimentation with simple procedures for the measurement of infant mortality.

Experimentation in the gathering of data, utilizing the administrative and service infrastructure already existing in the countries with the purpose of estimating mortality at the beginning of life. ..."

The present report deals with the concrete realization of the above point (b), and in it is summarized the experiment and

the chief results obtained from the methodological test run in the hospitals of Honduras.

The experimentation in data gathering to estimate mortality at the beginning of life was arranged, taking advantage of the already existing administrative and service infrastructure in the countries, by means of the use of a format in which is registered the information given by the mothers who come to the health centers.

The areas of experimentation were chosen by common agreement between UNICEF and CELADE, taking into special consideration the geographic areas where UNICEF had ongoing programs, or thought to set up future programs.

The very simple methodology utilized in this Honduran experimental project designed to measure mortality at the beginning of life is based on studies by W. Brass and Sheila Mcrae and taken up by CELADE. These studies have demonstrated that in high fertility populations the birth interval is approximately 30 months. This behavior would make it possible to measure childhood mortality, from birth up to 2 1/2 years of age,  $q(2.5)$ , by simply asking mothers at the moment when they register a recent birth, if the child they had previous to this one is still alive. The quotient between the dead children and the total number of births which preceded the ones being presently recorded directly yields an approximate value for the probability of dying  $q(2.5)$ . This information can be gathered in hospitals or other similar institutions where childbearing is handled.

### 3. Antecedents related to the study in Honduras.

In September 1983 the first contacts were made with the authorities from the Honduran Ministry of Public Health, to inquire about their interest in including the country in the projected studies. The Ministry of Health gave not only a positive response, but was very enthusiastic and interested, proposing besides a widening of the study in order to investigate also the urban/rural residence of the mother and the medical assistance received by the child.

At this same time the hospitals were selected in which the research would be carried out, and the most appropriate time frame for gathering the data was agreed upon.

Taking advantage of the fact that during the last trimester of 1983 CELADE was offering technical assistance for carrying out the National Demographic Survey of Honduras (EDENH-II), it was possible to give a follow up push to this project, using the support teams already set up for the Survey.

During the visits of the technical mission the format of the questionnaire was gradually defined, the hospitals were chosen where the data would be gathered, the necessary organizational arrangements were made for carrying out the study and the personnel for doing so were selected.

By October 1983 a preliminary questionnaire was ready, with which some tests of its workability were arranged, collecting information from women who had been admitted into the Hospital Leonardo Martinez in San Pedro Sula. A medical intern and a nurse from the hospital, who were put in charge of interviewing the women, collaborated in this pilot project. This test made it

possible to detect some problems in the topics considered in the questionnaire, and also to catch some mistakes in the phrasing of some of the questions, which made possible an improved second version.

Arrangements for the study went forward during the month of November. Some new tests were run with the questionnaire, and the definitive questions were agreed to with the national authorities. Data gathering began in early December in both Tegucigalpa and San Pedro Sula.

Given that in this experimental study mortality is only measured through the information supplied by women who are cared for in given hospitals, the results may not be representative of the conditions prevailing among the regional population. In this sense, there was the advantage in Honduras that almost simultaneously the National Demographic Survey was being run. This served as a backdrop for judging the quality of the information gathered experimentally and the degree to which the study was representative of the entire population of San Pedro Sula and Tegucigalpa.

#### 4. Design of the questionnaire.

The final questionnaire used in the pilot project on infant mortality in the hospitals of Honduras, based in the registry of the death of the previously born child, is given in the appendix together with some guidelines for filling it out. The following are the main comments about its content:

- Each questionnaire allowed the gathering of information corresponding to 6 women.

- General information that applies to all persons included in the form is found in the heading. The information referring to the "Ward" seemed to be of interest, since each ward had only one person in charge of filling out the information. The "ward" could also be an analysis variable, since in each ward women with distinct childbearing complications were put together. The interview date is unique for each page.

- Regarding the mother's characteristics (Section I), information about name and surname, age, years of schooling completed, present place of residence, and her total number of live births was recorded.

- The inclusion of the question about the present residence was requested by the Ministry of Health. The question about the number of live births gives one a wider perspective on the woman's reproductive history and acts as a control variable for the questions that follow. It also can be used to analyze the mortality of the previous child according to birth order.

- Section III is the most important, since it contains the information about the previous live birth.

- The last two questions about medical assistance were included by request of the Honduran Ministry of Health.

- The form is totally precodified to facilitate the input of the data. 1500 copies of the form were printed.

##### 5. Organization, personnel and data gathering.

By common agreement with the national authorities the research was done in two Honduran hospitals: the Teaching Hospital in Tegucigalpa, which has four delivery wards (gynecology, pathology, septic, and normal delivery) where some

12 to 14 thousand births per year are handled, and the Leonardo Martinez Hospital in San Pedro Sula where around 9 thousand births per year are handled.

Due to the fact that neither the statistical departments of the two hospitals nor the Ministry of Health could lend personnel to do the interviewing, the cooperation of the head nurse and nurses in the post-partum wards was asked.

All the new mothers in the Hospital of San Pedro Sula go to the post-partum ward area.

As was mentioned above, in Tegucigalpa there are four wards where post-partum women can be placed. There the head nurses did the interviewing.

Given that the majority of mothers go to the normal post-partum ward, the interviewing there took a longer time, and the assistance of two more nurses was solicited.

In the Teaching Hospital the head of interviewers was the sub-director of the Department of Statistics. In this hospital there was also a coordinator, the Nursing Director, who was in charge of personnel problems (as for instance when the nurses lacked time to do the interviewing or when they were absent).

The Mother-Infant Division of the Ministry of Health was the contact point for the distribution and gathering of the forms.

As interviewers the nurses have the advantage of knowing everything that goes on in the ward: new patients, patients released, etc. And beyond that there is a relationship of trust between nurse and patient which allows her to obtain information which would be difficult for other interviewers to get. On the

other hand, these nurses will be the personnel which perforce will have to be used in any future research, since one cannot normally count on contracting specially trained personnel.

One disadvantage in this type of data gathering is that the nurses are very busy and this may occasion a low quality interviewing.

In this context there is another important factor which had its effect on the quality of information: the research began just at vacation time. This meant that the hospital personnel who remained on the job were overburdened with work and therefore had even less time for the interviews. This factor also affected supervision.

On the part of the interviewers there was noted, in general, great interest in, and dedication to, the task. This is worth pointing out, since it implied extra work for them for which they received no pay.

Data were gathered from the beginning of December 1983 through mid-April 1984, during which period 5497 women were interviewed.

A preliminary evaluation of the results of the first two months of work was gone through at the end of January. It was discovered that the number of deaths for each 1000 previous births differed greatly from interviewer to interviewer (the results will be given below in section 7).

At the same time, by analysing mortality by week, it was noticed that the levels of mortality resulting were higher in those weeks where supervision was carried out by some official from CELADE.



This situation made it obvious that in order to obtain satisfactory results a more effective supervision is needed in the country under study.

During the last two months of research one interviewer with deficient production was let go, and a supervisor who had directed the National Demographic Survey (EDENH-II) and had much experience in this type of work was added to the program. This brought about a substantial improvement in the quality of the results.

#### 6. Data processing.

Given that the Ministry of Health did not have data-processing facilities, and with the further goal of getting feedback that would facilitate an ongoing evaluation of the data as collected, the processing of the information was done in CELADE-San Jose (Costa Rica).

All the questionnaires were brought to CELADE, and by means of a terminal the data were fed into the computer at the University of Costa Rica.

A program to discover the inconsistencies was worked out, so as to permit analysis of the most frequent errors. This was helpful in guiding the ongoing work of the interviewers.

The necessary tabulations were gotten through a program of SPSS.

#### 7. Results.

The goal of this methodology is to measure mortality at the beginning of life, by asking women who go to the hospital for childbirth, if their previous child is alive or not. The

ratio between the number of dead children and the total of previous births yields--as was said before--a value approximately equal to the probability of dying between birth and two and a half years of age,  $q(2.5)$ , assuming that the interval between births is of the order of 30 months.

In the case of the present experimental study in Honduras, besides asking if the previous child is alive or dead, information was gathered about the date on which the previous child was born and the date of the interview, which more or less coincided with the birth of the last child, all of which permitted the direct calculation of the interval between the last two births. Summing the time corresponding to all the intervals and dividing by the total of women who had had a previous child in Tegucigalpa and San Pedro Sula, an average interval of 3.0 years resulted.

Consequently, in this experimental study the proportions of previously born children now dead would correspond to the probability of dying between birth and three years of age,  $q(3)$ , referring more or less to the period 1980-1983.

In what follows the chief results obtained with information from the hospitals in Tegucigalpa and San Pedro Sula are presented.

a) General results. Comparison with the results of the National Demographic Survey of Honduras (EDENH).

In Table 1 which follows the general basic information, gathered during the four months of experimental research in the Teaching Hospital of Tegucigalpa and the Leonardo Martinez Hospital of San Pedro Sula, is presented.

In all 5497 women were interviewed, of which the 3710 who had had a previous child constituted the base of the research project, since the level of mortality is determined from the survival or death of the previous child. There were reported 202 deaths, which if related to the 3710 births, yields a mortality rate of 54 per thousand, which--as we have seen before--corresponds to a probability of dying from birth to 3 years of age approximately. With regards the two areas studied, San Pedro Sula had a slightly higher mortality than did Tegucigalpa.

Table 1

NUMBER OF WOMEN INTERVIEWED, WOMEN WITH A PREVIOUS BIRTH,  
AND MORTALITY RATE FOR EACH ONE THOUSAND PREVIOUS BIRTHS

Hospital	Number of women interviewed	Women with previous birth	Deaths	Deaths per thousand births q(3)
Total cases	5497	3710	202	54
Tegucigalpa	3211	2117	113	53
San Pedro S.	2286	1593	89	56

It is interesting to compare these results with those obtained in the national survey.

The National Demographic Survey of Honduras, EDENH-II, was carried out in 1983 by the Bureau of Statistics and Census, with the aid of CELADE. The purpose was to obtain current demographic estimates necessary for social planning. Its base was a sample of around 12 thousand households. It is presently still under analysis. This survey included questions about children born alive and their survival. With this information estimates of

mortality at the beginning of life were derived.

In terms of the probability of dying from birth until three years of age,  $q(3)$ , the results of our study and EDEN-II compare as follows. Both estimates refer to the period 1980-1983:

---

Source	Total	Tegucigalpa	San Pedro Sula
Experimental			
hospital research	54	53	56
EDENH-II	64	58	74

---

Consequently, the mortality at the beginning of life, derived from research in the two hospitals, utilizing all the information collected, is around 15% lower than that derived from EDENH-II. Some factors related to these differences are examined in the subsections which follow.

b) Results of research by month.

Data were gathered in the hospitals between December 1, 1983 and April 10, 1984.

The results for each month are presented in Table 2.

In relation to the number of interviews conducted, it should be pointed out that in Tegucigalpa the interviews maintain a certain regularity across time, while in San Pedro Sula beginning in January there is a decline which was caused by nursing schedule changes that resulted in no interviews being conducted during the weekend.

As for the levels of mortality by month, in both hospitals the rates are lower at the beginning of the period under study and increase later on, as the nurses acquired more experience and supervision became more effective. Additionally, in San Pedro

Sula the interviewer who had the poorest productivity was replaced.

Table 2

NUMBER OF WOMEN INTERVIEWED AND MORTALITY RATES FOR EACH THOUSAND PREVIOUS BIRTHS, ACCORDING TO MONTH OF RESEARCH

Month	Number of women interviewed	Women with a previous birth	Deaths	Deaths per thousand births q(3)
a) Total (Tegucigalpa + San Pedro Sula)				
December	1452	952	41	43
January	1417	960	46	48
February	1259	857	59	69
March-Apr 10	1369	941	56	60
Total for period	5497	3710	202	54
b) Teaching Hospital of Tegucigalpa				
December	654	419	21	50
January	853	558	21	38
February	868	575	35	61
March-Apr 10	836	565	36	64
Total for period	3211	2117	113	53
c) Leonardo Martinez Hospital of San Pedro Sula				
December	798	533	20	38
January	564	402	25	62
February	391	282	24	85
March-Apr 10	533	376	20	53
Total for period	2286	1593	89	56

If we eliminate the information from December, the month with the most problems, the following mortality rates result, which are again compared with those of EDENH-II:

Source	Total	Tegucigalpa	San Pedro Sula
Experimental hospital study	58	54	65
EDENH-II	64	58	74

Under these circumstances, using the information from January through April yields more reliable results. The rates

for the experimental study increase slightly, thereby reducing the difference (from EDENH-II) from 15 to approximately 9 percent.

c) Results by interviewer.

In Table 3 the information is classified by interviewer in each hospital. Here we observe a wide variation between mortality rates--presented in the last column--with values running from 21 to 84 per thousand.

Table 3  
NUMBER OF WOMEN AND MORTALITY RATES BY INTERVIEWER

Interviewer	<u>Number of Interviews</u>		Deaths	Deaths per thousand previous births q(3)
	Total	With prior birth		
-----				
a) Teaching Hospital in Tegucigalpa				
Interviewer No.1	1256	855	45	53
Interviewer No.2	753	505	25	50
Interviewer No.3	326	228	6	26
Interviewer No.4	337	223	12	52
Other Interviewers	539	296	25	84
Total	3211	2117	113	53
-----				
b) Leonardo Martinez Hospital in San Pedro Sula				
Interviewer No.5	715	471	10	21
Interviewer No.6	1286	914	67	73
Other Interviewers	285	208	12	58
Total	2286	1593	89	56
-----				

The most significant case is that of interviewer No. 5, who worked from the beginning of the study until mid-January, recording only 10 deaths in 715 interviews. She was a nurse who said that she had a great deal of work to do, that left her with little time to do the interviewing. In light of her dubious results, she was replaced by interviewer No. 6, who obtained substantially higher rates. It ought to be pointed out though that this interviewer worked only from Monday through Friday

(because she was an administrative employee) with the consequent loss of the interviews corresponding to those mothers released from the hospital over the weekend.

As in the former case, if the information gathered by the two deficient interviewers (Nos. 3 and 5) is eliminated, the results are now the following:

Source	Total	Tegucigalpa	San Pedro Sula
Experimental study in hospitals	62	57	70
EDENH-II	64	58	74

Now mortality levels of similar magnitude are evident. One must also keep in mind that the populations under study can have different characteristics, from both a socio-economic and demographic point of view. This issue will be touched upon in the following sections through looking at the level of schooling and the age composition of the women interviewed.

d) Estimates of infant mortality.

Questions about the date of birth and death of the previous child were included in this experimental study, along with the date of the interview, which allow us to compute the number of person years or time lived in the various age groups and their corresponding deaths.

The information obtained thusly is presented in Table 4. Relating deaths with time lived yields the mortality rates ( $m_x$ ) and the probabilities of death ( $q_x$ ) corresponding to the first three years of life. Thus one can compute the infant mortality rate and those of older children, which rates allow one to make

comparisons according to different characteristics of the population without those rates being affected by variations in the birth interval.

Table 4

TIME OF EXPOSURE, DEATHS, AND MORTALITY RATES FOR SELECTED AGE INTERVALS

Age Interval	Time of Exposure (in years)	Deaths	Mortality rates $m_x$	Probabilities of dying $q_x$
a) Tegucigalpa				
0-1 year	2023.68	84	0.0415	0.0402
1 year	1683.22	12	0.0077	0.0077
2 years	1040.36	4	0.0038	0.0038
b) San Pedro Sula				
0-1 year	1516.88	71	0.0468	0.0452
1 year	1198.53	13	0.0108	0.0108
2 years	673.06	1	0.0015	0.0015

For the calculation of  $q$  the following formula is used:

$$q_x = \frac{m_x}{1 + (1 - f_x)m_x}$$

with  $f_0$  in Tegucigalpa equal to 0.2185 and in San Pedro Sula 0.2432. And  $f_1 = f_2 = 0.50$ .

The information collected in the hospitals also allows one to compute the separation factors of deaths, relating time lived by those that die with the total number of deaths. For children under age one  $f_0 = 0.2185$  in Tegucigalpa and 0.2432 in San Pedro Sula. These values are consistent with the higher mortality of San Pedro Sula.

To compute the infant mortality presented in Table 4 all the information collected by all the interviewers over the 4 months of the project was used.

The resulting levels of infant mortality are listed below,



and are compared again with those found in EDENH-II.

INFANT MORTALITY RATE (PER THOUSAND)

Source	Tegucigalpa	San Pedro Sula
Experimental study in hospitals	40	45
EDENH-II	45	60

As in the case of mortality values previously computed for ages zero to three, infant mortality rates that vary about 15% from those of EDENH-II are obtained.

Combining the probabilities of death for ages 0, 1, and 2 from the last column in Table 4 the following probabilities of dying from birth to age 3 are obtained:

- In Tegucigalpa:  $q(3) = 57$  per thousand
- In San Pedro Sula:  $q(3) = 51$  per thousand

These probabilidades are consistent with the mortality rates in Table 1 that were respectively 56 and 53 per thousand.

It is interesting to mention here that the birth interval that was equal to 3.00 for the women under study in both hospitals, was equal to 3.15 in Tegucigalpa and 2.78 in San Pedro Sula. These values, that one might have attributed to information error, are consistent with the results that were just given. Moreover, comparing the probabilities in Table 1 that would correspond precisely with the probabilities of dying between birth and age 3.15 (in Tegucigalpa) and age 2.78 (in San Pedro Sula) with the  $q(3)$  derived from Table 4 yields the following:

	<u>According to Table 1</u>	<u>According to Table 4</u>
In Tegucigalpa . . . . .	$q(3.15) = 53$	$q(3) = 51$
In San Pedro Sula . . . . .	$q(2.78) = 56$	$q(3) = 57$

Thus it can be said that in Tegucigalpa, where the birth interval was 3.15, the probability of dying derived from Table 1 is larger than that derived from Table 4 which corresponds to 3 years, while in San Pedro Sula the opposite occurs.

The following final comparisons will be in terms of infant mortality,  $q(1)$ , in order to avoid possible variations of the birth interval by educational level or age group of the mothers. Besides  $q(1)$  is a better known index.

e) Mortality by age group of the mother.

Using information similar to that in Table 4, infant mortality rates by age group of the mother were computed. Table 5 compares these with those from EDENH-II.

Table 5  
INFANT MORTALITY RATES BY AGE GROUP OF THE MOTHERS  
1980-1983

Age Groups	<u>Experimental Study</u>		<u>EDENH-II</u>	
	Tegucig.	San Pedro	Tegucig + San Pedro	Entire Country
15-24	61	69	55	54
25-34	31	48	35	53
35 & over	65	72	104	98

In the experimental research the interviews done during December were excluded along with those done by the two problematic interviewers. In the case of the EDENH-II study the information refers to the survival of the last child born alive during the

year prior to the survey. Due to the small number of cases the data from Tegucigalpa and San Pedro Sula were added together.

A conclusion can be drawn from Table 5: There exists a mortality differential by age of the mother: mortality is lower among women from ages 25 to 34. Also, the mortality of San Pedro Sula is higher than that of Tegucigalpa for all ages.

f) Mortality by educational level of the mother.

It is a well-known fact that infant mortality varies according to the educational level of the mother. Thus this information is useful for the evaluation of the quality of the data collected.

The resulting infant mortality rates and the comparable ones from EDENH-II are presented in Table 6. In the experimental study the information from December and from the two problematic interviewers was again excluded. The rates from EDENH-II were computed from the information on children born alive and children surviving, with the results from Tegucigalpa and San Pedro Sula having been grouped together due to the small number of cases.

Table 6

INFANT MORTALITY RATES BY EDUCATIONAL LEVEL OF THE MOTHER,  
1980-1983

Years of Schooling of mother	___Experimental study___		EDENH-II
	Tegucigalpa	San Pedro Sula	Teguc + San Pedro
0	44	66	117
1-3	48	79	65
4-6	55	55	33
7 & over	39	19	52

As the mother's level of schooling increases, infant

mortality decreases in San Pedro Sula. On the other hand in Tegucigalpa that trend is not observable, rather there are indications of omissions of mortality among women with less education. It ought to be pointed out, however, that due to the low number of cases discrepancies may be attributable to random factors.

g) Representativeness of the population under study.

Since in this experimental study mortality levels are determined only through the women who give birth in the hospitals of Tegucigalpa and San Pedro Sula, it is interesting to examine to what extent those women are representative of the whole population living in the two cities.

Taking advantage of the availability of the results from the Honduran National Demographic Survey that was conducted during the same period, comparisons in terms of age and educational level are presented below.

The relative distribution of the female population in both studies is shown in Table 7. It is clear that the population studied in the hospitals has a much younger age structure. Its effect on mortality, however, is not very clear. For if indeed there is a larger proportion of younger women whose children have a higher mortality, there is also a lower proportion of women over 35 whose children too have higher mortality. There is thus a compensatory effect. In a more detailed study one could compute the effect of the age structure on the mortality rates using standardization. However, it can be anticipated that the effect will be small.

Table 7

RELATIVE DISTRIBUTION OF THE FEMALE POPULATION WHO GAVE BIRTH TO AT LEAST ONE CHILD, BY AGE. EXPERIMENTAL STUDY AND EDENH-II.

Age groups	Tegucigalpa		San Pedro Sula	
	Experimental Study	EDENH-II	Experimental Study	EDENH-II
15-19	24	5	23	5
20-24	37	20	40	18
25-29	20	22	21	20
30-34	10	18	11	19
35-39	5	15	4	17
40-44	2	11	1	11
45-49	0	9	0	10
Total	100	100	100	100

The relative distribution of the female population according to the level of schooling reached by the woman in the formal educational system is shown in Table 8.

Table 8

RELATIVE DISTRIBUTION OF THE FEMALE POPULATION AGES 15 TO 49, ACCORDING TO EDUCATIONAL LEVEL. EXPERIMENTAL STUDY & EDENH-II.

Level of Schooling	Tegucigalpa		San Pedro Sula	
	Experimental Study	EDENH-II	Experimental Study	EDENH-II
None	9	7	8	7
1-3 years	21	16	24	13
4-6 years	44	29	52	32
7+ years	26	48	16	48
Total	100	100	100	100

Contrary to initial expectations, the female population studied in the hospitals, in spite of being younger, has a lower educational level than the total female population interviewed in the demographic survey. This situation, which is witnessed in both Tegucigalpa and San Pedro Sula, is due to the fact that the population with a higher educational level tends to use private

clinics on the Social Security system, while the women cared for in the Teaching Hospital and the Leonardo Martinez Hospital are largely poor and not affiliated with the Social Security system.

As for the effect on our estimates, given that a higher level of schooling is inversely related to infant mortality, one would expect that the levels obtained from the population under study are slightly over-estimated.

#### 8. Conclusions.

The research carried on in the Teaching Hospital of Tegucigalpa and the Leonardo Martinez Hospital of San Pedro Sula has produced information helpful in estimating mortality at the beginning of life through the recording of deaths of the previously born child.

The final results made it clear that the information gathered during the first month of the study contained omissions, and that some of the interviewers had not worked conscientiously. However, excluding these interviews, the results were reasonably good and consistent with those obtained in the National Demographic Survey of Honduras, EDENH-II.

The experience demonstrates that, to do this type of research, one requires interviewers who are interested in doing the work and supervision which is effective.

This methodology seems to be very promising as a tool for improving the estimates of mortality at the beginning of life, especially in those Latin American countries whose demographic information is deficient.

A P P E N D I X

- SAMPLE QUESTIONNAIRE
- SOME INSTRUCTIONS FOR FILLING IT OUT

REPUBLIC OF HONDURAS

Secretary of State  
Bureau of Public Health  
Director General of Health

Research on Infant Mortality  
REGISTRY OF DEATH OF PREVIOUS BIRTH

UNITED NATIONS  
UNICEF/CELADE

Medical Center: \_\_\_\_\_

Date of Interviews:    \_\_\_\_  \_\_\_\_  \_\_\_\_  
                                  Day  Month  Year

Ward: \_\_\_\_\_

Name of Interviewer: \_\_\_\_\_

I. Characteristics of the mother					II. Present birth	III. Questions referring to the previous live birth					
Name and surname	Age	How many years of schooling have you completed?	Where do you presently live?	How many children born alive have you had?	In this birth was the child born alive or dead?	What was the date of birth of your baby previously born alive? Day Month Year	Is this child now alive?	If the previous child has died:			
								Date of death	Did he/she receive medical assistance?	Did a doctor attend him/her?	
								Day Month Year			
1.			Cen Dis <input type="checkbox"/> 1 San Ped <input type="checkbox"/> 2 Oth Mun <input type="checkbox"/> 3		Alive <input type="checkbox"/> 1 Dead <input type="checkbox"/> 2		Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2		Publ <input type="checkbox"/> 1 IHSS <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Priv <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
2.			Cen Dis <input type="checkbox"/> 1 San Ped <input type="checkbox"/> 2 Oth Mun <input type="checkbox"/> 3		Alive <input type="checkbox"/> 1 Dead <input type="checkbox"/> 2		Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2		Publ <input type="checkbox"/> 1 IHSS <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Priv <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
3.			Cen Dis <input type="checkbox"/> 1 San Ped <input type="checkbox"/> 2 Oth Mun <input type="checkbox"/> 3		Alive <input type="checkbox"/> 1 Dead <input type="checkbox"/> 2		Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2		Publ <input type="checkbox"/> 1 IHSS <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Priv <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
4.			Cen Dis <input type="checkbox"/> 1 San Ped <input type="checkbox"/> 2 Oth Mun <input type="checkbox"/> 3		Alive <input type="checkbox"/> 1 Dead <input type="checkbox"/> 2		Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2		Publ <input type="checkbox"/> 1 IHSS <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Priv <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
5.			Cen Dis <input type="checkbox"/> 1 San Ped <input type="checkbox"/> 2 Oth Mun <input type="checkbox"/> 3		Alive <input type="checkbox"/> 1 Dead <input type="checkbox"/> 2		Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2		Publ <input type="checkbox"/> 1 IHSS <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Priv <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
6.			Cen Dis <input type="checkbox"/> 1 San Ped <input type="checkbox"/> 2 Oth Mun <input type="checkbox"/> 3		Alive <input type="checkbox"/> 1 Dead <input type="checkbox"/> 2		Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2		Publ <input type="checkbox"/> 1 IHSS <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Priv <input type="checkbox"/> 2 None <input type="checkbox"/> 9	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2

Observacions: \_\_\_\_\_



## INSTRUCTIONS FOR FILLING OUT THE QUESTIONNAIRE

The purpose of this research is centered around the gathering of information with regards the survival of the previous child. This data is then used to estimate child mortality for the recent past. As a subproduct, since both the present and prior births are recorded, the birth intervals can be studied.

On each questionnaire sheet the data of up to six mothers can be recorded. The data are written down in horizontal fashion, separated into three distinct sections: the first corresponds to "Characteristics of the the mother," the second to "Present birth," and the third to "Previous live birth."

The form has two kinds of boxes: open and closed. The open ones have to be filled out with numbers (age, years of schooling, dates). The closed ones present alternatives, where the little box with the correct answer is filled in with an X, leaving the others blank.

The filling out of the form begins by noting down in the heading the name of the Health Center, the ward where the interviewing takes place, the date of the interview, and the name of the interviewer.

With regards the date of the interviews: each sheet contains interviews from only one day. For example, if 20 interviews are done on the 1st of December, three complete sheets are filled out, and the two remaining interviews given a separate sheet where there are four lines left blank. In this case the blank space is crossed out. December 2nd will begin a new sheet.

## I. Characteristics of the mother.

After the name and surname of the mother, her age (in complete years) is recorded. It should be taken into account that there is a tendency to give an approximate age, for example, "I'm around 22," or "I'm working on my 22nd," instead of saying that she has completed 21 years. At other times the age is rounded off to the nearest 0 or 5 (15, 20, 25, . . . , 40 or 45 years old). In these cases it is advisable to request some identification document in order to verify the correct age.

With regards schooling, the datum of interest is the highest grade completed. If the person finished up to the third grade of primary school, 06 should be recorded; if up to the third year of secondary school, 90 should be recorded; if she has no formal schooling, or if she never passed a grade, 00 is recorded. This question refers to grades or years completed within the formal educational system, that is to say, it does not take into account courses such as cooking, sewing, languages, typing, etc.

The next question is, "Where do you presently live?" The intent here is to determine the habitual residence of the mother. By "habitual residence" is meant where the person habitually sleeps. There are three possible answers to this question: "Central District" (which includes Tegucigalpa, Comayaguela and the towns surrounding these two cities), the municipality of "San Pedro Sula," and "Other municipality" (which takes in the rest of the country).

Next the mother is asked how many children born alive she has had. This figure includes both those that are still alive and those that, having been born alive, later died. The

definition of "born alive," which is given below, should be followed.

## II. Present birth.

The question is asked, "In this recent delivery was your baby born alive or dead?" The interviewer ought to take into account that "born alive" implies that the child breathed, cried, or moved at birth. If any of these life signs were present, and then the child died, this should be considered a live birth, and consequently the corresponding box should be marked with an X.

What is of interest in this section is the viable product of conception, that is to say, when the newborn is capable of living outside of the mother's womb (generally defined by a minimum 7 month gestation period). The product of conception is not registered if it is not viable, i.e., when there is an abortion. In this case the interview is terminated, and an abortion is noted down under "observations." When working on this question, the interviewer should proceed with tact and caution with the mother whose child was born dead or died soon after birth.

## III. Previous live birth.

Next the date of birth (day, month, year) of the previous child should be recorded. If the mother does not remember the day of birth, but rather only the month, 15 should be recorded. If she does not know the date of birth, but is sure about the years completed, the year of birth should be deduced, and the birth should be allocated to the 30th of June. For example, if the interview is in November, and the mother says that she does not know the date of birth of her child, but that he/she is four

years old, the interviewer ought to record:

370/

10/6/

7/9/

Occasionally it happens that some women forget to declare children that were born alive, but died soon after birth. For this reason it is necessary to insist a little, especially when the period between the last and penultimate child is several years. In this case, for example, one can ask, "Didn't you have any other pregnancy after this (penultimate) child?" If the mother did not have any previous live birth, an X should be marked in the box corresponding to "No previous child," and the interview should be terminated.

Continuing with the questionnaire, the next question is, "Is this child still alive?" If the answer is, "Yes," 1 is marked, and the interview is terminated. If the answer is, "No," 2 is marked, and the day, month, and year of the death are recorded. After that is recorded whether the child had medical assistance during the fatal illness. Three types of medical assistance are considered: Public, that offered by some dependency of the Ministry of Health (hospital, CESAMO, CESAR, voluntary); IHSS, that offered by a dependency of the Social Security system; and Private, all other types of assistance (private physician, private clinic, etc.). If the child received no medical assistance, an X should be marked in the corresponding box and the interview terminated. If the answer was, "Yes," the final question is, "Was a doctor in attendance?."

After the line corresponding to the sixth interviewee, there is a blank space for "observations." Here should be noted down any doubt or clarification deemed necessary. If additional space

is needed, the back of the questionnaire can be used.

In this space can be clarified, for instance, that sections II and III for person "n" were not filled out because there was an abortion. Also multiple births or doubts about habitual residence, area of residence, dates, etc., should be noted here. If the previous child has died, the cause of death should also be written in the space for observations.

