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Title: Effects of Reporting Errors in Retrospective Survey Data on Indirect Estimates of Fertility and Mortality Using Vital Registration Data from Matlab, Bangladesh

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Abstract Summary: With the registration system in Matlab a unique opportunity is provided for measuring reporting errors in surveys of fertility and mortality and the effects of these errors on common indirect estimates derived from such data. The Brass fertility and mortality methods using short survey questions and fertility analyses from complete pregnancy histories will be studied. Also the effects of the fluctuations in rates caused by the war (1971) and famine (1974-75) on the indirect estimates will be examined.

A pretest of 300 interviews will be done in both the Demographic Surveillance System (DSS) Area and a non-DSS area adjacent to Matlab to measure possible contamination of responses due to the registration system itself.

The main survey will include 1680 interview with short questionnaires in 25 villages of the DSS area. Non-CRL employees will do the interviewing. Analyses will include computer simulation of age-reporting errors since exact age of the DSS women is not known.

(8) Reviews: (Leave Blank)

(a) Research Involving Human Subjects: ____________________

(b) Research Review Committee: ____________________

(c) Director: ____________________

(d) BMRC: ____________________

(e) Controller/Administrator: ____________________

ABSTRACT SUMMARY

The requirements to enter the study population are that the person reside in the Matlab area, be a female of reproductive age and not have migrated from the village since 1966. The only risk to the respondent is a minor social risk of embarrassment or something similar that would come with disclosure of a pregnancy history. This risk will be minimized by having a private interview as far as possible. Procedures for maintaining confidentiality are described separately.

It is felt that the signed consent is not required and a statement of purpose read to the respondent should be satisfactory.

The interviews will take place at the residence of the respondents. The maximum length of the interview for the full pregnancy histories will be about one hour. The short questionnaire should not require more than 15 minutes.

The benefits from the study accrue only to the society in general. With accurate estimation of fertility and mortality the government should be able to plan health, education, etc. programs better.

The records of the ICDDR,B Demographic Surveillance System will be used.

Abbreviations used

PH	Pregnancy history
CEB	Children ever born
BLY	Births last year
CD	Children dead
TFR	Total fertility rate
WFS	World Fertility Survey
BFS	Bangladesh Fertility Survey
PES	Post-enumeration Survey of BFS
MS	Main survey of BFS
CRL	Cholera Research Laboratory
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh
DSS	Demographic Surveillance System--Matlab

Contents

I. INTRODUCTION

A. OBJECTIVES

The broad objectives of this study are:

1. To determine as best possible the extent to which the presence of the Cholera Research Laboratory (CRL) vital registration system has affected the accuracy of reporting of births and deaths by village women in Matlab, Bangladesh.
2. To determine the kinds, sources, patterns and magnitudes of errors in retrospective survey data on several indirect techniques of estimating fertility and mortality.
3. For each indirect technique to quantify (a) the effects of various types of errors in survey data on the estimates of fertility and mortality and (b) the effects of violations of the assumptions underlying the indirect technique on these estimates.

B. BACKGROUND

1. General

In countries with well developed statistical systems, data on both the state of the population at a given time and the changes taking place over time in the levels of fertility, mortality, nuptiality and migration are traditionally obtained, the first, from censuses at regular intervals, and the second, from the continuous registration of vital events. In developed countries these are quite adequate for generating the demographic information needed for planning and administrative purposes.

However, in most developing countries of the world, although the first type of data, i.e. national censuses, are available, vital registration data are either simply non-existent, of poor quality and coverage, or are available only for local regions. Thus confident direct estimation of fertility and mortality levels is often not possible.

In the absence of registration data demographers have devised indirect methods of estimating the common demographic indices from cross-sectional surveys or census data. (Many of these methods are described in detail in: United Nations, 1967 and Brass, 1975). These techniques of indirect estimation are generally based on stable or quasi-stable population theory which assume either that fertility and mortality have remained fairly constant for a considerable period of time or that fertility has remained constant and mortality has declined during the recent past. There are several approaches to indirectly estimating vital rates. The first uses census data in combination with various models (e.g. model life tables, stable population theory, model fertility schedules). The second approach utilises the known theoretical relationships between the demographic rates themselves, and between these and the age-structure of the population. Here estimation is based on the use of retrospective questions in censuses or large scale surveys about past and recent fertility and mortality experiences. Finally, a third approach obtains estimates using successive censuses in combination with survey or incomplete vital registration data.

In this study we shall focus on the second type of indirect estimation techniques which are designed for use with retrospective data that may be easily collected in cross-sectional surveys. As pointed out by Hill and Trussel (1977 p.313). "The rationale underlying each method is identical." The procedure is to first express theoretically certain simple statistics (e.g. the average number of children ever born by age of woman or the proportion dead amongst children ever born by age of woman), which could be easily obtained for a population from answers to special questions. By substituting various models into the formal expressions (such as model life tables, marital fertility schedules, and nuptiality schedules) these proportions are converted into fertility rates or survivorship ratios for the population in question.

Thus errors (or biases) in the estimation of vital rates derived from these methodologies are due either to: (1) the various types of errors in the survey data used; or (2) departures from the assumptions of the method. Since these indirect methods of estimation are increasingly being used in the developing world there is a need for an evaluation of them specifically with regard to these underlying sources of error.

The specific methods we will examine are:

a. The Brass method of estimating fertility from reports on children ever born (CEB) and births last year (BLY).

b. The Brass method of estimating mortality from proportions surviving of CEB.

c. Sullivan and Trussel modifications of the Brass method for estimating mortality from proportions surviving of CEB.

d. The estimation of fertility using pregnancy history.

In the following section, for each of these methods, the data required, the technique of estimation, and the probable effects (on the estimates) of errors in the data or departures from the assumptions of the method are discussed.

2. The Estimation Techniques

a. Brass method for estimating fertility from reports on children ever born (CEB) and births in the last year (BLY)

If fertility has remained fairly constant in the recent past, if migration has not substantially affected reported fertility, and if there is little or no differential mortality by parity, then the average number of CEB reported by women 45 and above or 50 and above should equal the total fertility rate for the population. Also, if age-misreporting is not excessive, the average CEB by age of woman reproduces closely the curve of cumulative age-specific fertility. Thus it is possible to estimate the age-specific fertility rates from the reported CEB by age. However, there is a general tendency to under-report CEB, especially among older women, so that average CEB rises too slowly at ages above 30 or 35 (there may even be a decline about age 45 or 50). Younger women on the other hand presumably report CEB more accurately since events are less remote. If a standard age-pattern of fertility existed for all populations, then this curve, fitted to the data of CEB for the younger ages, could be used to predict the fertility rates for the older ages and thereby obtain an estimate of total fertility. Since such a general pattern of fertility by age does not exist one needs some reliable information about the shape of the fertility curve in order to estimate total fertility.

One source of the age pattern of fertility is responses to a question on births last year (BLY) in a census or survey tabulated by age of woman. The problem with this source is the difficulty in identifying the timing of births correctly. The causes of such "reference period" errors are likely to depend more on cultural factors, the survey itself, etc. and less on the age of the woman. If this is so, then BLY information will reflect the shape of the fertility curve accurately although the level may not be accurate because of reference period errors. By comparing the most reliable features of the two sets of data (CEB and BLY) Brass developed a technique whereby reasonable estimates of fertility may be obtained. (Brass, 1960; Brass and Coale, 1968.) Thus the data needed for this technique are numbers of children ever born and births in the last year (or the date of the most recent birth) for all women of childbearing ages. In summary, the assumptions of the method are: (1) fertility has been approximately constant in the recent past, (2) there has been no differential mortality according to the fertility status of women, (3) the average CEB of young women is accurate, (4) the errors in reporting BLY do not vary substantially by age-groups of women.

Some effects of errors in the data or the assumptions for the Brass fertility estimation technique are outlined as follows:

1) The Brass estimates of fertility may be affected by systematic omission of a certain class of births by all women in both current and retrospective data. These could be children who die very soon after birth. This would lead to an underestimate of fertility.

2) The Brass estimates will be underestimates if errors of omission or timing in BLY are not independent of the age of the mother. It is quite plausible that younger women may be more aware of birth events (possibly due to family planning campaigns) so errors may be less for them than for older women.

3) A constant bias in age reporting at all ages would affect the estimation of the total fertility rate (TFR). Also, the calculated TFR would be an underestimate if too many women are reported as being in the reproductive age span. The latter may happen if there is a tendency to overstate age near the beginning of the span and understate age near the end.

4) If fertility has not been constant in the past, fertility rates obtained by the Brass method may not be accurate estimates of true fertility since the CEB of the younger women in this case do not give a true indication of the level of fertility for the period.

b. Brass method for estimating mortality from children dead (CD) of children ever born (CEB)

In the absence of reliable death registration a simple way of finding out about past mortality is to study the proportions of children surviving from reports of children ever born by women in a census or sample survey. Brass and Coale (1968) developed a technique by which, under certain conditions, the proportion dead of children ever born to women in the age-groups 15-19, 20-24, 25-29, etc. can be converted into conventional mortality statistics; namely q(1), q(2), q(3), q(5, ..., q(35). [q(x) represents the probability of death between birth and age x.] The procedure depends on the relation between q(1) and D(1), q(2) and D_2, ..., q(35) and D_{10} (where D_i is the proportion dead of CEB to women in the ith 5-year age-group), when the fertility and mortality schedules roughly follow the age-pattern of the African "Standard" ones. These approximate equations are more affected by differences in age-patterns of fertility than by differences in the age-patterns of mortality. (If fertility begins at a very early age the children of women in each age-group would be exposed to the risk of death for a longer period on the average than if fertility had a late start.) Brass, with the use of a fertility polynominal, calculated a set of multipliers by which values of D_i can be translated into estimates of q(a), the multipliers differing for different fertility functions.

Some effects (on the estimates) of errors in the data and assumptions of the method are:

1) The child mortality estimates obtained with this method are likely to be biased downwards for the following reasons:

   i) It is possible that under high mortality conditions children whose mothers have died have a higher risk of death than other children. Thus, mothers who died and are not included in the sample, may have had children who were subject to higher death rates than other children whose mothers survived.

   ii) Omission of children who have died constitutes another problem. It seems more likely that there is a greater omission of dead than living children. This problem occurs more often with older women due to recall lapses.

2) Changes in mortality also effect the estimates. Firstly, the estimates for the relatively older women say aged 35-39, reflect past mortality. For these women most of their deaths of CEB occurred about 8 or 10 years earlier (since mortality is heaviest in the early years of life). So estimates based on data from these women will be functions of early rather than recent mortality (and fertility). Secondly, in converting the observed D_i values into life table probabilities, the mortality pattern will be affected if mortality has changed. The effects of declining mortality on the Brass estimates has recently been examined by Kraly and Norris (1978). Their research documented that the amount of overestimate of current mortality by the Brass method was a function of the rate of mortality decline, the age of onset of childbearing and the age for which mortality is estimated.

c. Sullivan and Trussel modifications of the Brass method for estimating mortality from children dead of CEB

In a modification of Brass's method of estimating child mortality from proportions dead of CEB, Sullivan (1972) has investigated the assumption implicit in the Brass model that empirical fertility schedules can be reasonably approximated by the fertility polynomial. Sullivan questioned the appropriateness of Brass's procedure of sliding the polynomial on the age-axis to represent the variability among empirical schedules of fertility with different ages at onset of childbearing. Instead, Sullivan developed a simple linear regression model relating the ratios of selected pairs of q(a) and D_i (these are defined above) to a fertility schedule parameter. These equations give multipliers that convert the observed D_i into estimates of q(a).

Trussel,(1975) echoed Sullivan's critique of the method of "sliding fertility schedules up and down the age axis" in the Brass technique and went on to provide new multiplying factors [for converting D_i into q(a)] from more extensive regression analyses than those of Sullivan. In addition Trussel's analyses utilized the Princeton models of marital fertility (Coale and Trussell, 1974) developed at the office of Population Research.

d, Fertility estimation from Pregnancy History (PH) data

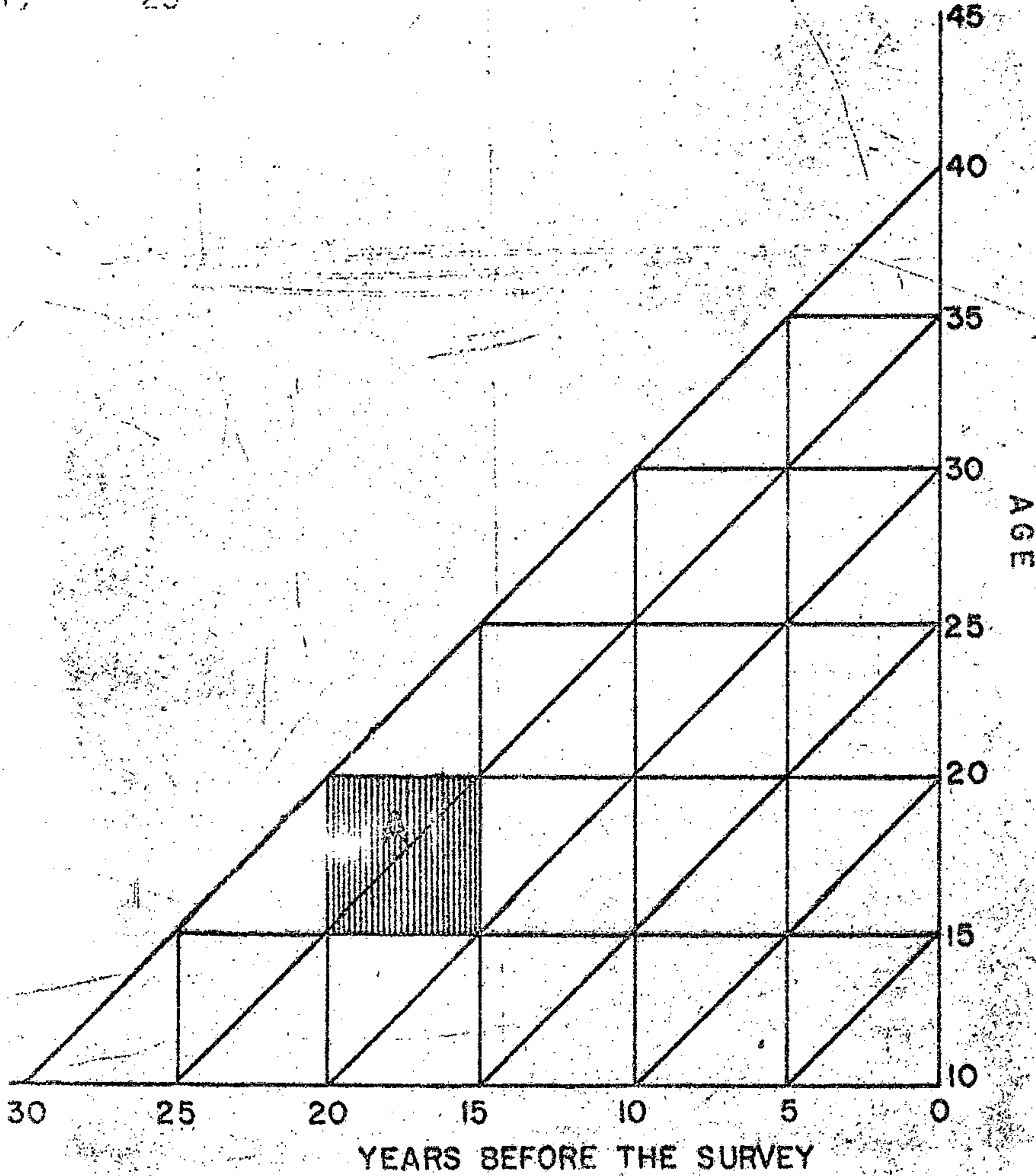
<u>The technique</u>

In the absence of vital registration data, a very popular and relatively inexpensive method for obtaining information about changes in fertility over time, is the pregnancy history (PH) technique. First recommended for extensive general use by Bogue and Bogue (1970), the technique utilizes data collected from women (usually 15-49 years of age) in a single round retrospective survey. The women are asked about each of their pregnancies in turn, either starting with their first pregnancy, (forward PH) or with their most recent pregnancy (backward PH).

By use of the concepts of a Lexis diagram and person-years, these data can be converted into fertility rates for certain five year age groups for upto 30 years prior to the survey. The diagram is shown in Fig.1. The vertical axis gives the age of the women at the date of the survey and the horizontal axis measures years before the survey date. Thus, for example, a fertility rate for women aged 15-19, 15-20 years before the survey is obtained by finding the births in that time period to women aged 30-39 at the survey date (Block A in Fig.1). In can be seen that in this way both cohort and period fertility rates are obtained though the period rates are for a progressively smaller subset of age groups as one moves back in time from the survey date. With the series of rates thus formed, trends in fertility can be studied. Pregnancy history has been widely used in surveys in the developing world (Siragelden et al. 1975, Bogue, 1976) and indeed it was the major component in the World Fertility Survey (International Statistical Institute, 1975).

FIGURE I

LEXIS DIAGRAM USED FOR STUDYING PAST FERTILITY BY FIVE YEARS AGE GROUPS FROM PH DATA



Errors in pregnancy histories

Three types of errors can occur in pregnancy history data;

1) Omission of an event(s), [pregnancy termination(s), or infant death(s)].

2) The misplacement of an event(s) in calendar time.

3) The misreporting of the woman's age (at the survey).

The first type is well recognized and the probability of its occurrence is thought to vary directly with the woman's age and time between the event and the survey, and inversely with the education of the respondent. Also miscarriages, still births and livebirths which were followed by an early infant death, are particularly susceptible to omission. Obviously, these errors can seriously distort rates calculated. The Bogues suggested an adjustment for this kind of error and the Brass indirect technique was devised to correct for the distortion caused by higher omission of children ever born in responses of older women.

Errors of the second type have been investigated recently by Potter (1977) though their possible effects were outlined earlier by Brass (1971). The direction of possible biases in rates due to these errors depends on how the events are misplaced in time. Indeed there is a small possibility of counteracting effects. Potter showed with a model and two empirical analyses, that the bias introduced by this type of error can be substantial and lead to faulty interpretations.

The magnitude and effects of errors in reporting of the age of women in pregnancy history surveys are less well documented. Van de Walle (1968) evaluated the effect of several forms of age misreporting on measures of current fertility. He found, using hypothetical age-misreporting patterns, that the patterns and levels of rates would be substantially distorted. In a recent paper Sivamurthy and Ahmad (1979) use graphical smoothing of the age distribution to correct for errors in age reporting in Bangladesh data, before applying indirect estimation techniques.

To our knowledge no quantification of these errors in PH has been done in areas with vital registration data.

3. Previous Research on Errors in CEB, CD, BLY and in PH data in Bangladesh: the Bangladesh Fertility Survey

In the Bangladesh Fertility Survey, a part of the World Fertility Survey activities, 6,000 pregnancy histories were collected in 1975/1976 throughout the country. A questionnaire based on the core questionnaire of WFS and translated into Bengali was used (Appendix B).

Included in the BFS was a Post Enumeration Survey (PES) carried out 3 months after the main survey in 353 households. The data obtained from the PES were compared with the data for the same women in the main survey (MS) (Government of Bangladesh 1978, Ahmed, 1979). In addition, some indication of errors in the dating of birth events was found from the analysis of the main survey data alone.

The extent of agreement between the MS and PES was analyzed for six variables of interest here: current age of the woman; age at marriage of the woman, total number of pregnancies, total number of children ever born, age (or year of birth) of the oldest child and age of the youngest child. The results reported below for each variable confirm that the reporting of these vital events are subject to considerable error.

Current Age: Over 50% of the women reported a different age in the two surveys and in 20% of the cases the difference was larger than five years.

Age at marriage: 71% of the women reported different ages in the two surveys. Also 11% of the cases had a discrepancy of more than 5 years in the two ages given.

Number of pregnancies and children ever born: The number of pregnancies missed was estimated to be 4.7% by Mahmud (1979). The undercount of live births was estimated at 4%. Only 73% of the women reported the same CEB in both surveys.

Ages of oldest and youngest children: For the age of the oldest child only 32% of the women gave the same response in the MS and PES. The percentage giving identical ages (or year of birth) in both surveys decreased progressively with the number of years that the event occurred before the survey. This differential "recall lapse" is also revealed by the fact that 49% of the respondents reported the same age (or birth year) for the youngest child.

Errors detected with Main Survey alone (adapted from Government of Bangladesh, 1978 pp. 72-74): In the pregnancy history section of the BFS the interviewer asked for birth dates of each child. If the woman could not give a specific date, the interviewer asked how many years ago the event occurred and was instructed to record completed years. Of the total births reported, 85% were reported in "years ago". Unfortunately it appeared that "years ago" did not mean completed years to all the respondents. In fact if one assumes that the data follow the definition of completed years, a TFR for the year before the survey of only 4.4 is derived. This is clearly an under-estimate due to the fact that many women apparently rounded to the nearest year.

In summary, though the actual number of births (CEB) reported in BFS was quite accurate, the placing of these events in calendar time (esp. BLY) was inaccurate.

4. Previous Research comparing indirect and direct estimates of fertility and mortality and recall errors in fertility surveys: The Mindanao Study

In the Philippines, a study comparing fertility and mortality rates estimated by the Brass techniques with rates estimated by the dual record keeping system (continuous vital question and periodic surveys), was done by the Philippine Population Laboratory (Madigan and Herrin, 1977). A population of about 91,000 was under surveillance during the four years of the project. Despite the fact that several assumptions of the Brass fertility method were not met, the fertility estimates were close to those of the dual recording system. On the other hand, the Brass mortality estimates differed considerably from the results of the dual record system. The causes of these discrepancies were not clear.

In addition the study design allowed for an examination of the errors of omission of births in fertility surveys according to the length of the reference period. Births reported by women in cross sectional surveys were compared with the births for these women from the dual record system. It was found that the omission of births was only around 3 percent for a reference period of up to 12 months before the survey but it increased to 5-10 percent when the reference period was 18 months.

5. The Demographic Surveillance System (DSS) in Matlab

a. General description

1) The Area[a]

Matlab Thana is located in Comilla district, about 40 miles south of Dacca (Fig.2A). It is situated on a flat deltaic plain with numerous rivers and canals. The climate is subtropical with three seasons: monsoon, cool-dry, hot-dry. Agriculture is the major economic activity, (mainly rice cultivation) followed by fishing. The population is about 85% Muslim and 15% Hindu. The density of the population is over 2,000 per square mile. Villages, usually located on raised ground, have an average of 1,000 persons with many separate "baris" (patrilineally related families). The average family of 6 members resides in a one or two room house with mud floor, jute stick walls and a thatched grass or galvanized iron roof.

2) Evolution of the Demographic Surveillance System[b]. In the spring of 1966 in conjunction with a vaccine trial of the Cholera Research Laboratory (CRL) a census assigning each individual an unique identification number

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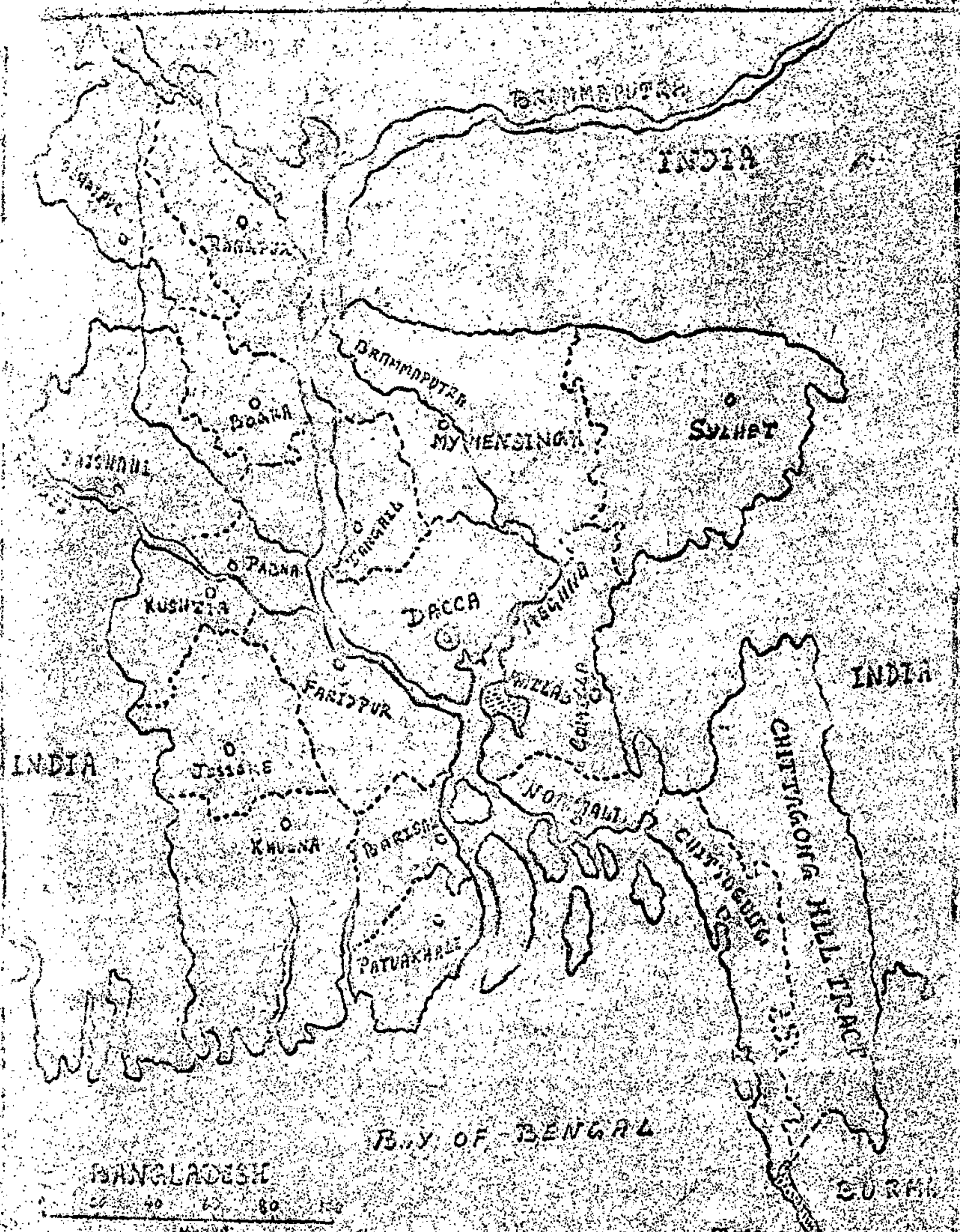
[a]Adapted from Chen et al. 1974.

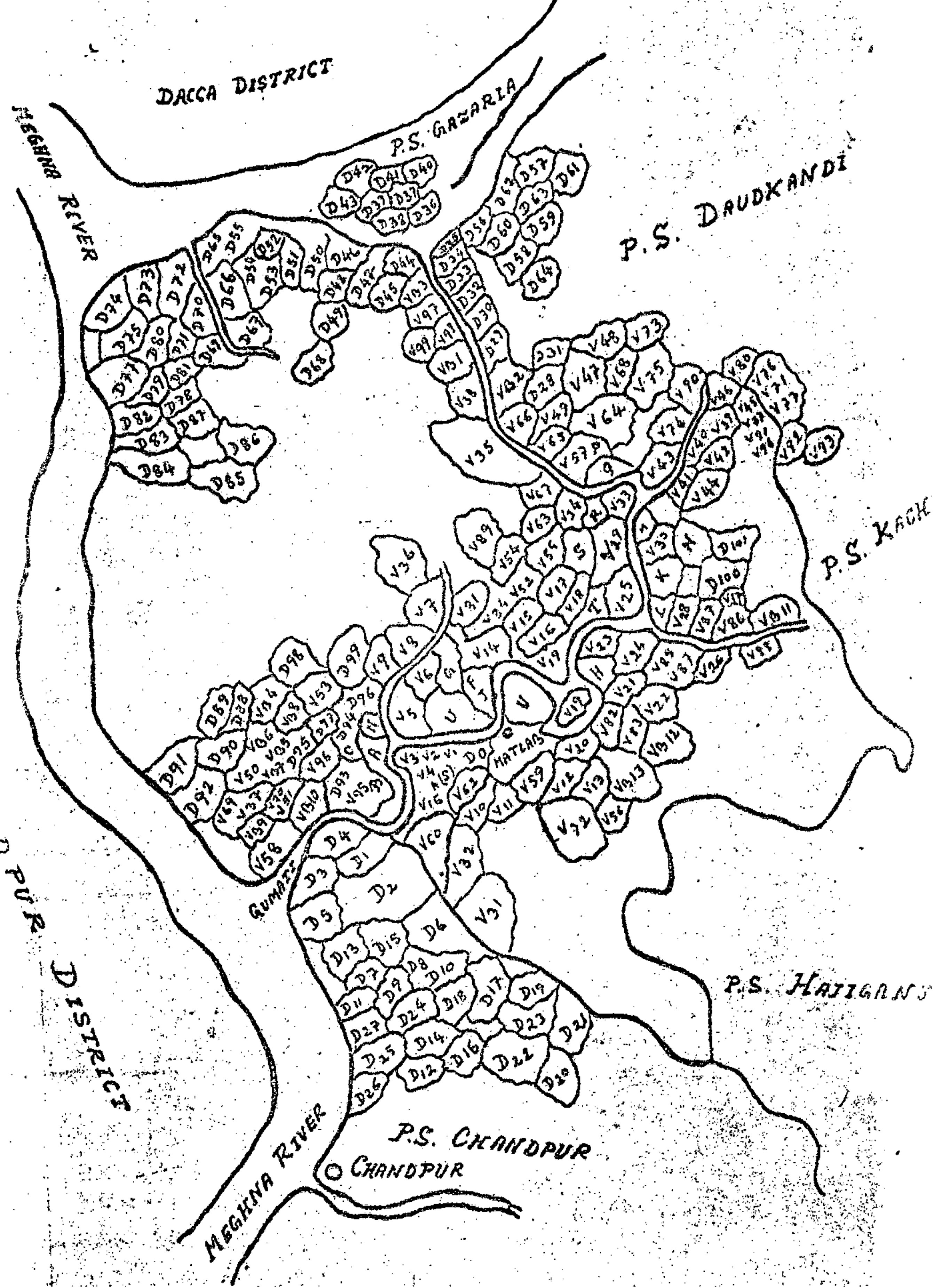
[b]Adapted from CRL, 1978.


BRAHMAPUTRA
INDIA
RANGPUR
BOGRA
MYMENSINGH
SYLHET
TANGAIL
PABNA
KUSHTIA
DACCA
MEGHNA
FARIDPUR
JESSORE
KHULNA
NOAKHALI
CHITTAGONG
CHITTAGONG HILL TRACT
PATUAKHALI
BAY OF BENGAL
BANGLADESH
BURMA
TEKNAF

MAP - II

Figure - 2B

MATLAB SURVEILLANCE AREA, 1977



was conducted in 132 villages yielding a population of 112,000. These villages are collectively called the Old Trial Area (See Figure 2B). Soon after the census, registration of births, deaths and migrations was instituted in these villages by the CRL. In 1968, 101 other villages were added to the DSS. These villages, constituting the New Trial Area, are not considered in this protocol as the fertility records for women in these villages are two years shorter than those in the Old Trial Area.

A second census of the OTA was done in 1970 yielding a population of 120,694. In a third census in 1974, 134,038 persons were enumerated.

3) Vital registration procedures

Essentially, with the exception of some changes in staffing patterns and some details of the registration forms, the vital event surveillance procedures of the CRL been the same from 1966 to the present. (Marriage registration was added in 1974 but is not relevant to this protocol.) There is basically a three-tiered staffing structure for the recording and checking of vital events. A female village worker visits each household bi-weekly and inquires about births, deaths, marriages and migrations and records them in her note-book. At the next level, a male field assistant visits each household monthly and with the help of the female worker's notebook, records all events on standard registration forms, in the field copy of the latest census book, and on the family record sheet which is hung in each household. In turn these men are supervised by senior field assistants who visit each household once in three months to check independently on the completeness of birth and death registration.

When the registration forms reach the Matlab Office, they are recorded serially in an event book and then forwarded to Dacca for keypunching and processing. In addition, periodically the office copies of the latest census books are updated with the vital events recorded in the field copy.

In Dacca, after punching, verifying and editing, and often transfer to computer tape, the registration forms are used in routine tabulations of demographic events and in numerous special studies. Currently, for example, the Johns Hopkins University has a grant to consolidate, edit and tabulate the various registration and census files for the first eight years of the DSS.

b. Definitions for registration of events[a]

1) Registration of births

All births occurring to individuals included in the census (regular residents) and to new in-migrants into the surveillance area who satisfied the definition of 'resident' are registered regardless of the place of occurrence. Births occurring within the surveillance area to temporary visitors are also registered. The recording and registration of births is essentially a registration of pregnancies. To make sure that all live births are detected, the DSS requires recording of a result of a pregnancy: whether miscarriage or still birth is based on the duration of the pregnancy. If the pregnancy, according to the woman's assessment, lasted for less than seven months, the outcome of the pregnancy— a foetus which did not show any signs of life — will be recorded as miscarriage. If, on the other hand, the woman indicates a pregnancy duration longer than seven months the event will be recorded as a still birth. Multiple confinements are recorded according to the outcome of the pregnancy: if at least one of the issue is live born the confinement is recorded as resulting in a live birth.

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[a]From Cholera Research Laboratory, 1978 pp.9-11.

2) Registration of Deaths

Deaths of residents in the surveillance area are recorded on the Death Report Form. The death form contains information on individual identification number, date of death, age of death, sex, mother's identification number, village of residence, place of death, and type of doctor consulted. The report also contains a crude diagnosis of the cause of death.

3) Registration of migration

Data on migration are collected with respect to change of the place of residence within the area of the Demographic Surveillance as well as migration into and migration out of the Surveillance area.

An out-migrant is defined as a person originally listed on a census record as a resident, or a person who became a resident after a census by birth or in-migration, who has subsequently permanently moved out of the surveillance area. An in-migrant is, likewise, an individual not recorded on the census schedule who has permanently moved into the surveillance area.

Whether a movement constitutes a permanent change of residence or not is decided upon by the duration of stay; residence of at least six months duration is considered permanent. Consequently, the act of movement is noted first in a preliminary form and the Migration Report is filled out only after the six months waiting period has elapsed. The date of migration is considered as the beginning of the 6 month period. Moves of less than 6 months duration are considered transient and these movements are not registered. Note that multiple migrations for the same individual are possible.

c. Points of particular relevance to this study

1) Identification of birth and infant death events with mother's number

For constructing a pregnancy history from vital registration, this identification is essential. There are basically two convenient ways possible to obtain these histories. First; the series of Matlab census books (1966, 1970, 1974), in conjunction with the records of births and deaths from which a pregnancy history of 13 years can be drawn. Second; with a computer file which has matched all demographic events for each women in the DSS, the same 13-year pregnancy history is also available.

2) Migrations within, out of, and into the Old Trial Area

If a woman leaves the registration area, even if she eventually returns, her pregnancy history constructed from the vital registration data may be incomplete. Thus women who at any time, out-migrate from the area must be excluded from this study. In-migrants must also be excluded since the length of their pregnancy histories will be truncated. In addition, women who migrate to other villages within the DSS area must be excluded. This is because: (a) the definition of the area changed in 1968, (b) women in the non-DSS (control) villages will be selected only if they had never migrated from their village since 1966. Since internal migrations were not recorded on registration forms, for this work the updated census books are essential.

3) Age

For children born after 1966, exact ages are available. However, for the women of reproductive ages in the study only the stated ages from the censuses are available. Indeed, the ages given for these women on birth, migration and death records are only updated from the given census age.

d. Trends of demographic events from 1966 to 1978

Since the Brass fertility and mortality estimation method and the extensions of Trussell and Sullivan include the assumption that fertility and mortality have remained relatively constant in the recent past, the known time series of these rates in Matlab DSS must be considered. Tables 1 and 2 and Figures 3 and 4 (from Chowdhury and Sheikh, 1979) show the age-specific fertility and mortality rates in Matlab over the period. In both figures, the most prominent features are the large fluctuations of the rates over time. In particular it is known that mortality rose sharply in 1971-72 as a result of the Bangladesh war of independence and in 1975 as a result of the famine in Bangladesh. Fertility also was affected by these events with an especially sharp decline in 1975. (These responses of mortality and fertility are explored in detail in Curlin et al., 1976 and Chowdhury and Chen, 1977.) With regard to trend, only the fertility of women 15-19 shows a significant decline with time. This is due to an increasing age at marriage (Chowdhury 1977).

The effect of large fluctuations around a fairly constant level of fertility and mortality, on the estimates derived by the indirect techniques has not been studied. Since there is no perceptible downward trend in mortality in Matlab over the period 1966-1978, the modifications of the Brass techniques which take account of declining mortality are not considered in this protocol.

Table 1. Fertility rates (per 1000) in Matlab, Bangladesh by age group of women and year

Age Group	Project Year							Calendar Year			
	1966-67	'67-68	'68-69	'69-70	'70-71	'71-72	'72-73	'74	'75	'76	'77
All Ages	223.7	214.5	212.4	193.1	191.1	196.4	181.2	202.6	100.1	144.8	155.3
10-14	8.6	8.6	20.9	25.3	18.7	4.6	5.5	5.6	3.7	4.7	5.9
15-19	238.6	232.3	204.2	205.8	199.1	192.0	139.0	161.3	116.4	158.8	177.1
20-24	331.4	333.6	357.9	302.9	275.2	260.0	282.8	311.8	223.3	351.0	349.1
25-29	306.9	297.3	292.3	320.3	280-9	318.8	276.7	323.3	200.3	289.6	316.1
30-34	248.8	204.3	227.3	197.6	192.2	207.1	220.7	253.8	179.4	266.3	275.9
35-39	138.5	127.9	101.3	117.7	142.2	159.4	117.9	163.4	95.0	127.3	152.4
40-44	50.0	44.2	40.0	30.9	53.4	47.9	53.3	55.8	36.3	41.3	49.3
45-49	15.4	19.3	12.4	9.9	14.9	14.6	8.8	16.3	7.1	8.0	10.6
Total Fertility Rate	6.7	6.3	6.3	6.1	5.9	6.0	5.5	6.5	4.3	6.2	6.7

Source: Chowdhury and Sheikh, 1979

Table 2. Death rates (per 1000) in Matlab, Bangladesh by age and year

Age Group	Project Year							Calendar Year			
	1966-67	'67-68	'68-69	'69-70	'70-71	'71-72	'72-73	'74	'75	'76	'77
1	110.7	125.4	123.8	127.5	131.3	146.6	127.7	137.9	174.3	112.0	113.7
1-4	24.9	29.4	23.8	23.1	27.9	36.9	22.7	25.4	34.9	29.6	19.6
5-9	4.1	5.0	3.9	3.3	2.3	11.4	14.1	5.6	5.8	5.3	4.0
10-14	1.7	2.1	1.7	1.0	1.3	2.2	2.0	1.4	1.7	1.3	1.2
15-44	4.1	4.4	3.7	3.8	2.7	5.1	2.9	3.4	4.8	2.9	2.7
45-64	15.3	17.9	17.4	17.9	14.4	20.0	14.7	17.5	31.0	17.8	16.5
65	67.9	79.3	74.4	71.1	72.9	119.1	96.5	88.8	112.6	74.6	76.2
All Ages	15.0	16.6	15.0	14.9	14.8	21.0	16.2	16.6	20.8	14.8	13.7

Source: Chowdhury and Sheikh, 1979

FIGURE 3

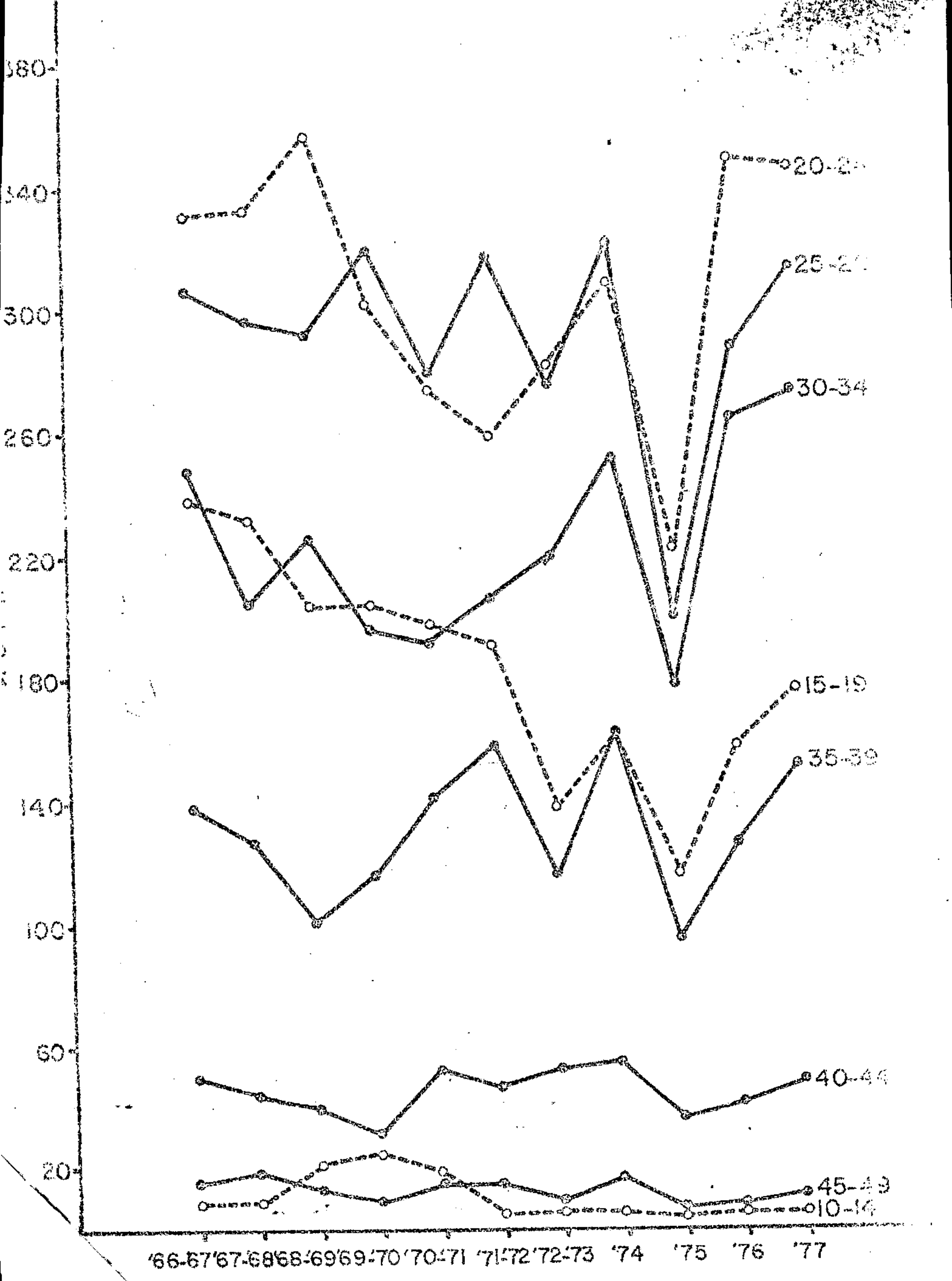
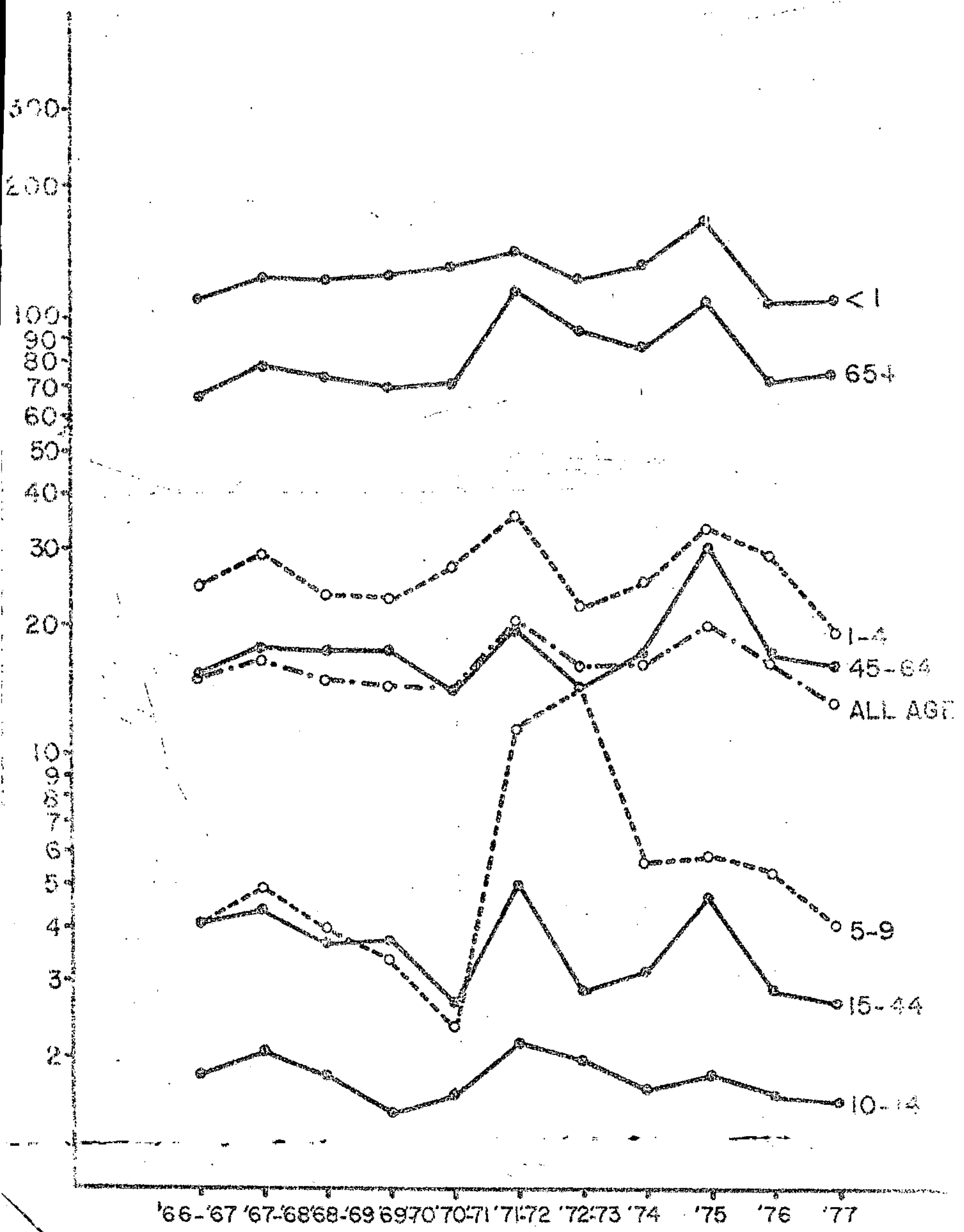

20-24
25-29
30-34
15-19
35-39
40-44
45-49
10-14
20
60
100
140
180
220
260
300
340
'66-67
'67-68
'68-69
'69-70
'70-71
'71-72
'72-73
'74
'75
'76
'77

FIGURE 4


300
200
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
< 1
65+
1-4
45-64
ALL AGE
5-9
15-44
10-14
'66-'67
'67-'68
'68-'69
'69-'70
'70-'71
'71-'72
'72-'73
'74
'75
'76
'77

e. Previous pretest of pregnancy history in the DSS

1) Description

In June 1977 under the direction of Ray Langsten at the CRL, a PH was done for 50 women above the age of 30 in 5 villages of the New Trial Area of the DSS. 25 had the forward PH and 25 had the backward PH. Vital registration data for these women were available starting from 1968. The female field interviewers were experienced workers from the BFS survey work. The PH and VR data for these women were brought together but an analysis has not been reported. In addition, the original interview forms are not available and the summary sheets do not indicate the names of the children or whether it was a forward or backward PH so it is difficult to assign misplaced births and the backward and forward interviews must be analyzed together.

2) Results

Missed events: It is almost impossible to identify all of these without the original forms. From the data we have, only 2 events were definitely missed. (less than 2%)

Timing of events: a) Table 3 shows errors in the timing of events which occurred. 50% of the events were reported exactly. 20% were one to eleven months off and 30% were a year or more off. It can be seen that in many cases the women remembered the month correctly but the year was one off. It is very interesting to note that the year off is in either direction. Thus in the sample as a whole these errors tend to counterbalance each other. However, this may be counterbalancing effects of the two types of PH used.

b) Table 4 shows the effects of the reporting errors on the fertility rates for these women in the two five-year periods before the survey. These results are shown graphically in Fig.5. Despite the finding in Table 3 that 50% of the births are misplaced in time, it is seen that the overall effect on five-year fertility rates is trivial. This is because: (a) the errors of timing are small relative to the five-year time period, (b) the timing errors tend to be equally likely in either direction from the actual time of the event so in the population there is a counterbalancing effect.

Table 3. Errors in Timing of Births for Births with Month Reported[a]

	Months off	No.events	% events
	All events	117	
Date of reported	>12	5	4
event before	12	12	10
actual date	1 - 11	16	14
Reported date exact	0	58	50
Date of reported	1 - 11	7	6
event after actual	>12	13	11
date	12	6	5

mean absolute discrepancy 5.5 months

[a]In addition for nine births, the month was not reported and 2 birth events were misused

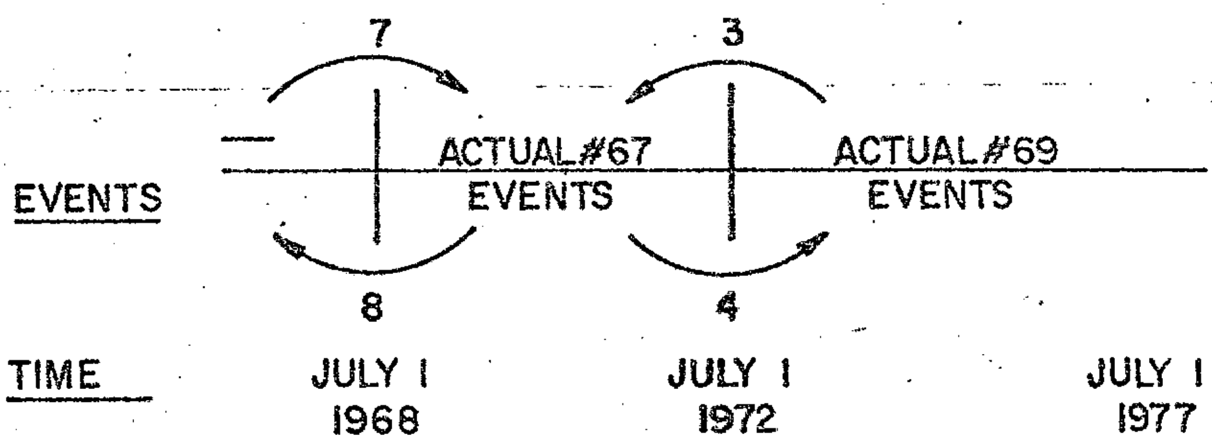
Table 4. Summary of effects of errors in reported time of birth events on fertility rates in the periods 0-4 and 5-9 years before the survey

Period and events	Numbers	Rate[a] per 1000
July 1968 to June 1972		
actual events	67	268
events misreported into interval		
from before 1968	7	
from after 1972	3	
events misreported out of interval		
into 1972 to 1977 interval	4	
into before 1968	8	
net events placed in interval	65	260
July 1972 to June 1977		
actual events	69	276
events misreported into interval		
from before 1972 (see above)	4	
events misreported out of interval		
into 1968 to 1972 (see above)	3	
net events placed in interval	68	272

[a] For 50 women there are 250 women-years

FIGURE 5

MISPLACEMENT OF BIRTH EVENTS IN 5-YEAR INTERVALS BEFORE THE SURVEY FOR 50 WOMEN IN THE PH SURVEY



3) Conclusions

The PH data for these samples women reveal relatively small errors in the placing of birth events in time. The direction of the errors does not appear to be systematic though this may be due to the combining of forward and backward PH interviews.

C RATIONALE/SIGNIFICANE

With inadequate or non-existant vital registration systems many developing countries are turning to indirect estimation of fertility and mortality levels from retrospective data. Among such countries are Bangladesh (Bangladesh Census Commission and Ministry of Overseas Development, London, 1977), many countries of Africa (Brass et al., 1968, Adegbola, 1977, Gaisie, 1975) and Korea (Cho, 1971). PH data from retrospective surveys are used to estimate levels and trends of fertility. Simple questions on CEB, CD and BLY are used to estimate current fertility and mortality. It is crucial to determine
(a) the magnitude of errors which occur in such survey data, and
(b) the extent to which any inaccuracy affects the indirect estimates of fertility and mortality derived. In addition, for the mathematical techniques utilizing CEB, CD and BLY, it is essential to determine how close the indirect estimates are when perfectly accurate data (from vital registration) are used.

The DSS system of Matlab provides a unique setting for evaluating these techniques. Here, in one of the very few accurate large scale vital registration systems in a developing country, it is possible to compare estimates obtained from the indirect techniques with actual rates over a 13-year period.

It is charged by some that the DSS cannot provide this validation since, with 13 years of continuous surveillance in the vital registration system, the population has become very aware of the number and timing of vital events. Thus it is argued that their retrospective reports, unlike those of persons in other areas of Bangladesh, will be very accurate. This is commonly known as the contamination effect. But the fact is that the validation of these methods can only be done under such circumstances. Therefore, to argue that contamination nullifies the research is to argue that the techniques should go forever without validation. The usefulness of necessarily contaminated studies is well-documented. An example closely related to this study is the validation of diet recall studies with simultaneous intake studies.

Instead, aware of the argument, we propose to estimate the level of such contamination as a part of the research, by comparing survey data from a non-DSS area with survey data for the DSS area. Several outcomes are possible.

1) The data from both the DSS and non-DSS are nearly perfect.

2) The data from the DSS are of very good quality but the non-DSS data are of poor quality.

3) The data from both the DSS and non-DSS areas are of poor quality.

This comparative work, of value in itself, has never been done methodically for the DSS. However from work that has been done there are clues as to what can be expected. Below is a summary of what has been found and what will be added by this research. This is done for the PH, CEB, CD and BLY.

The pretest of Langsten in 1977 revealed quite accurate reporting of pregnancy histories in the DSS area but no comparison was done with the non-DSS area. Also the small net errors could have been due to the compensating of errors from the forward and backward PHs. But this cannot be determined with the data available. In addition, the small sample was only of women above age 30 so comparison of effects of errors on fertility rates in various age groups was not possible, though it is expected that younger women would have even more accurate reporting. PHs may be quite inaccurate in the non-DSS area. For example, from the PH data of the BFS, the TFR for the year preceding the survey was calculated as 4.4 which is clearly in error (all other evidence points to a TFR of 6.0 or above). Also 28% of women reported different numbers of CEB in the Main Survey and the Post-Enumeration Survey.

Since we expect quite accurate PH in the DSS, a pretest will be done with a minimum sample size needed to detect and measure contamination in DSS and non-DSS comparisons. If the DSS PH data are found to be inaccurate (according to the criteria presented in Section IIIC) then it would be necessary to do a larger PH survey in the DSS. Since it is unlikely that the DSS PH data will be inaccurate, a proposal for such a larger survey would only be submitted as an addendum after the pretest.

Even if the reporting errors are considerably less in the DSS than elsewhere-due to contamination — it is still important to document the types of errors which occur since it is likely that the same types occur elsewhere, only with a higher frequency and/or higher magnitudes. Some insight on this will also be gained from the DSS and non-DSS comparisons.

CEB, CD, BLY

From the pretest of PH in the DSS area, very few births were missed in the 9 years for which vital registration data were available. Since BFS revealed that 28% of women reported different CEB in two full pregnancy history surveys, it is expected that CEB and CD will be even less accurate if asked alone. In almost all cases in which these data are used for estimation, they are asked alone. It is important, therefore, to document their accuracy in this situation. Thus CEB, CD and BLY will be compared in the DSS and non-DSS pretest and then, in the full DSS sample, the reported CEB, CD and BLY will be compared with their actual values.

Analytical work

Comparison studies of indirect estimates of fertility and mortality from data on CEB, CD and BLY and from PH, with rates from accurate vital registration in the same population are sorely needed to validate the techniques and determine how errors in the estimates arise. Thus even if CEB, CD, BLY and the PH are very accurately reported in the DSS, discrepancies between the indirect estimates and actual levels of fertility and mortality are expected due to violations of the assumptions of the methods.

For example the presence of highly fluctuating rates over short periods [e.g. seasonality and the crisis of war (1971 and famine (1974)]may distort the estimation or, on the other hand, the estimates may be quite robust to such fluctuations. Several researchers have postulated some conditions under which the original techniques do poorly and the providing correcting factors, but even these have not been tested against actual vital rate data.

Similarly, though Van De Walle (1968) did theoretical work on effects of age-reporting errors it did not include the effects on the indirect estimates. Since accurate age is not known for the DSS women, this work can only be done with computer simulation.

II. SPECIFIC AIMS

To determine any contamination effect of the DSS system

1. Compare the reporting of timing and number of births and infant and child deaths in DSS villages and comparable adjacent villages not in the DSS from PH surveys, by age groups of the women.

2. Compare the reporting of CEB, CD and BLY in DSS villages and comparable adjacent villages not in the DSS, by age groups of the women.

To determine types/patterns of errors and effects of these on estimates of fertility and mortality

3. From the PH survey data DSS area and the VR data for the same women, determine the errors in the PH and their effects on fertility rates.

4. Determine the actual levels of age-specific fertility and child mortality in the calendar year prior to the survey (from vital registration data).

5. Estimate the levels of fertility and child mortality in the previous year from the survey data using the several estimation techniques.

6. Determine the errors in reported CEB and CD in the survey by comparing with vital registration data for the same woemn since 1966.

7. Determine the effects of errors in CEB and CD in the survey on the fertility and mortality estimates given by the several techniques.

8. Determine the accuracy of the assumptions implicit in each estimation technique using the vital registration data for this population.

9. Determine the effects of any violations of the assumptions of each technique on the estimates derived. In particular examine the effect of the large fluctuations of fertility and mortality during the 13-year period, on the estimates.

10. Where required, determine from vital registration data a more appropriate form of the equation or model which is used in the estimation.

11. Estimate the effects of errors in age-reporting on the several fertility and mortality estimates (including those obtained from the PH) using computer simulations of age errors and exact information on CEB and CD for the survey women.

III. METHODS AND PROCEDURES

A pretest will be conducted in a number of DSS and non-DSS villages before the main survey. Simple information on CEB, CD and BLY will be asked in one sample of women and full PH in another sample of women. In the main survey, to be done in the DSS villages, information will only be gathered on CEB, CD and BLY. If the results of the pretest indicate that PH information should also be collected for a larger DSS sample, then an addendum for this work would be submitted after the pretest.

A. INTERVIEW FORMS AND INTERVIEWERS

For women who will be asked less than the full pregnancy history, a short questionnaire based on the WFS household questionnaire has been developed (Appendix A). For the sample of ever-married women for whom PH information will be collected, two questionnaire formats will be used. The first is the standard BFS PH questionnaire (Appendix B) which proceeds forward from the birth of the first child to the present. The second is similar to that of the BFS but proceeding backwards from the youngest child to the oldest (Appendix C).

For the short questionnaire for CEB, CD and BLY, ICDDR,B field workers will do the work and the main survey could even be conducted simultaneously with the 1979 census. For the PH since (i) it is important that our procedures follow exactly those recommended by the WFS so that the results will be acceptable and useful internationally, (ii) the training for WFS field workers lasted three weeks,

(iii) the use of Matlab field staff for the interviewing could lead to biased results, and (iv) many of the BFS trained field workers are available in Bangladesh, it is therefore, advantageous to employ a group of former BFS workers to do the interviewing. They would need only a short refresher course of perhaps a week at most.

B. CRITERIA FOR SELECTION OF SAMPLE VILLAGES AND WOMEN

1. DSS villages

Among the 132 villages of the OTA, the following groups of villages will not enter the selection:

a. Any village in the Contraceptive Distribution Area (83). Fertility has declined in these villages in 1978 and the basic rationale behind application of the indirect fertility techniques is not appropriate.

b. Any village in the Determinants of Natural Fertility Study (14) There could easily be an additional contamination effect of this longitudinal survey (at monthly intervals) of fertility dynamics.

From the remaining 37 villages, enough villages will be randomly sampled until the required number of women (see sample size below) have been interviewed.

2. Non-DSS villages

The non-DSS villages for the pretest will be selected according to the following criteria:

a. In the same geographic area as the DSS selected villages

b. Not predominantly Hindu villages

c. Not directly adjacent to the selected villages

The exact determination of the villages to be selected will be made later in consultation with Matlab staff.

3. Women

a. All women in the DSS area aged between two and forty years in the 1966 census in the selected villages [see (1) above] who were in the 1970 and the 1974 censuses and did not out-migrate from the village at any time between these censuses or in-migrate or die after the 1974 census to date will be eligible for selection in the sample. The sample will be selected initially in the Matlab office by reviewing the records.

b. In the non-DSS villages, only those women who have not out-migrated from or in-migrated to the village since 1966 will be eligible for interviewing.

C. PRETEST

1. Sample size

For the short questionnaire, a sample size of 300 women is sufficient to detect a true difference of 0.5 in mean CEB and mean CD with 90% confidence. This assumes a one-sided alternative; i.e. that reported CEB and CD would be less, if anything in the non-DSS area.

For the PH we wish to determine the extent to which reporting of the timing of events by the DSS women is more accurate than reporting of events by non-DSS women. (It is known that the errors of timing rather than the errors of omission are more frequent in PH data.) In the BFS one of the major errors arose because women only reported ages of their children instead of birth year and there were several common definitions of age other than that of completed years which was the definition desired in BFS. Knowledge of the year of birth would be presumably higher among women in the DSS area than among non-DSS women if contamination exists. Thus one easy way to test for contamination is to compare the proportions of women (and/or birth events) who give the year of birth of their child (children) in the DSS and non-DSS areas. Thus, denoting p_1 as the proportion of DSS women giving the year of birth, and p_2 as the same proportion for the non-DSS area, to detect a true difference of 0.10 between p_1 and p_2 with 90% confidence (and Type II error of .2) the required sample size is

$$n = (p_1 q_1 + p_2 q_2)(Z_\alpha + Z_\beta)^2/(p_1 - p_2)^2$$

where $q_1 = 1-p_1$, $q_2 = 1-p_2$ and Z_α and Z_β are the ordinates of the Normal distribution corresponding to percentage points α and β.

This equation as a function of p_1 and p_2 assumes its maximum for $p_1 = p_2 = .5$ which when substituted, yields.

$$n = (.5 \times 6.2)/(.1)^2 = 310$$

$$\simeq 300$$

Thus, the pretest requires samples of approximately 300 interviews each for the short questionnaire and the full PH.

2. Field procedure

In both the DSS and the non-DSS villages, an inquiry will be made at the time of the interviews to determine whether the woman satisfies the criteria for eligibility (set out in B above). If she is ineligible, she will be excluded from the sample; if not, then age, education and marital status will be ascertained. If she is never-married the interview will be terminated at this point. In the DSS villages the family record card will be removed from the households by the field workers so the women cannot make reference to them.

a. Short questionnaire

In 5 or 6 non-DSS villages [selected according to criteria in (B)] eligible women will be sampled until 300 interviews are completed. The only questions asked will be age, education, marital status, CEB, CD and BLY. Next, in an equal number of DSS villages (selected according to criteria in B) 300 eligible women will be interviewed in such a way that the number in each age-group is the same as for the sample in the non-DSS villages. This is done to ensure that comparison of mean CEB and mean CD by age-group is possible. The women sampled for the pretest will be part of the sample for the main survey [see sample selection procedure in Section (D) below].

b. Pregnancy History

The sample of women to whom the full PH questionnaire is addressed will be different from the sample for the short questionnaire for reasons given above. In the non-DSS villages the full PH will be collected from 300 eligible ever-married women. In the DSS villages, the PH will be asked of a sample of eligible ever-married women whose age-groups have been matched with the non-DSS sample. Half of the sample will be given the forward PH form and half the backward PH form. The exact procedure for selecting these two groups (i.e. whether according to interviewer, village or serial number of the sample women) will be decided in consultation with BFS and Matlab personnel.

D. MAIN SURVEY (DSS villages only)

1. Sample size (women and villages)

The sample size in terms of number of women needed is determined by two factors: (1) the magnitude of the difference between reported and actual quantities, and (2) the Type 1 error we are willing to tolerate in testing significant differences between reported and actual quantities.

Letting a represent age, and t represent the time of the survey, the quantities of interest from the short questionnaire are:

CEB (a, a+5)

CD (a, a+5)

BLY (a, a+5)

For each quantity if we specify the precision needed for analytical purposes, then setting $\alpha = 0.5$, and with some distributional assumptions, a sample size is determined. The maximum of these separate estimates determines the sample size needed. Since all the quantities will be age-specific, the sample sizes calculated will correspond to the maximum number of women needed in each five-year age-group. A summary of this work for each of the three measures is given below:

a. CEB (a, a + 5): Assuming virtually no over-reporting, and a Poisson distribution with Pr(no error in CEB) = 0.6, and the fact that we want the mean error to be measured precisely within 0.10 children, a sample size of 204 is derived.

b. CD: Let $CD_r(i)$ and $CD_c(i)$ represent the reported and correct number of children dead respectively for the ith sampled woman. We assume $CD_c - CD_r$ has a multinomial distribution on the range 0, 1, 2, 3, 4 with certain probabilities of each outcome. Using reasonable estimates for these probabilities and desiring to test the equality of these distributions in the DSS and non-DSS areas, a sample size of 234 is derived.

c. BLY: This is a yes-no (Bernoulli) variable. For the examination of errors, four groups of women must be distinguished:

Women who had a birth in the last year and reported it as occurring in the year.

Women who had a birth in the last year and did not report it as occurring in the year.

Women who did not have a birth in the last year who report a birth in the year.

Women who did not have a birth in the last year who report that they did not have a birth in the year.

If we let:

p pr(a woman had a birth last year)

r pr(a woman who had a birth in the last year reports it in the survey)

s pr(a woman who does not have a birth in the last year, nevertheless reports a birth in the year)

Then the following table shows probabilities associated with each outcome in this analytical framework.

		Birth in the last year	
		Yes	No
Reported birth in the last year	Yes	pr	(1-p)s
	No	p(1-r)	(1-p)(1-s)

Since r is estimated only from women who have births in the previous year, its desired precision will determine the maximum sample size. If we accept 2SE(r) ≃ 0.2, an estimated sample size of 25 women with births is required. The errors in BLY for women above 40 contribute almost nothing to the overall error in the fertility estimates (i.e. over-reporting is rare and actual BLY is virtually zero), so we only need precise estimates of r for younger women. Using the lowest value of p, (a fertility rate of 150 for women 35-39 years of age) a maximum sample size of 167 is derived.

The table below summarizes the estimates of sample size needed (for each age group) for the three measures.

Quantity	Maximum Sample size required
CEB	204
CD	234
BLY	167

Thus 240 women per 5-year age-group is a reasonable sample size in order to estimate the reporting errors in the quantities with the desired precision. In order to account for non-response a list of 280 eligible women will be made for each age-group according to the procedure described below.

2. Sample selection procedure

For the selected villages, the 1966, 1970 and 1974 updated census books in Matlab will be used for sampling as follows:

a. A list of all women aged 2-40 in the 1966 census book including serial number, age and name will be made.

b. With the 1970 census book for the same village, the 1966 serial numbers for all women will be checked against the list in (a) to confirm that the woman was present in both censuses. The 1970 family number will be noted. In addition, if there is any indication that a woman out-migrated from the village after 1970, a note will be made for deletion.

c. With the 1974 census book, and the list from (a) and (b), women in 1974 will be checked against the list using the 1970 family number. In addition, if any woman has died or migrated from the village after 1974, a note will be made for deletion.

d. A list of all female out-migrants between 1966 and 1970 for the selected villages will be made by computer. This list and the women remaining in the sample after step (c) will be compared to assure that the woman did not leave the village and return in the period 1966-1970.

e. This work will be continued for the selected villages until the list of eligible women includes at least 280 individuals.

3. Number of villages

In order to determine the number of villages needed in the sample to obtain 240 interviews per age-group, it is necessary to consider; (i) the proportion of women now in the village who have not out or in-migrated since 1966, and (ii) the age distribution of such women. From work with the several census books in Matlab we estimate that (a) about 76 percent of women in the 1966 census were present in the same village in 1970, and (b) of those women present now, the proportion who have been there (without in or out-migration) since 1970 is 73 percent. Multiplying these two estimates, approximately 57 percent of the women now in the village have been there continuously since 1966. Since in the age range to be sampled the oldest group of women is proportionately the smallest group, the number of villages needed in the sample is determined by this proportion. In the 1974 census, women aged 50-54 represented 3.1 percent of the total female population and the mean number of females in the Old Trial Area villages was 544. Combining the three numbers (0.57, 0.031, 544) we estimate that women would need to be interviewed in 25 OTA villages. Since there will be more younger women in these 25 villages who meet the criteria than required, the women to be interviewed from these age groups will be randomly selected from the Matlab census books (as described earlier) according to their proportionate distribution.

4. Field procedure

At the time of the interview an inquiry will be made to determine whether the woman has indeed not out-migrated from or in-migrated to the village since 1966. Otherwise, the interview will be terminated. For all eligible women in the sample (see section B for details), age will first be ascertained and then a question will be asked to determine if she has ever-married. If she is never-married the interview will be terminated at this point.

From the selected villages 240 interviews of eligible women in each age-group will be completed using the short form (Appendix B). This sample will include the 300 women who were already interviewed (using the same short questionnaire) in the pretest.

E. CODING

1. Format

Basically two sets of data will need coding: first, the field survey for the DSS and non-DSS sample for the pretest, and the DSS sample for the main survey; second, the vital registration data for the women in the DSS sample. For convenience at the analysis stage, both sets of data will be coded with the same card format. The information collected for all women (age, education and marital status) will be coded at the beginning of the record; data for most of the women (CEB, CD and BLY) will follow this and the PH information (from the pretest only) will be last. The name of the village and the respondent's name will be coded for identification purposes.

2. Sources

The data from the survey will be coded directly from the field forms. The vital registration record for each woman can be obtained from either of two sources:

a. The consolidated file produced by the Johns Hopkins University with DSS vital registration and census data from 1966 to 1976 can be used to obtain these data very efficiently.

b. Alternatively, the vital registration computer tapes at ICDDR,B could be used and the data for individuals matched by hand.

F. WORK-LOAD

1. Work load of interviewing

On average it is expected that a full PH interview will require 30 minutes to conduct, while the short questionnaire, where the PH is not asked, should require not more than 10 minutes. In the pretest 600 pregnancy histories (300 each in the DSS and non-DSS areas) are needed, requiring approximately 300 hours of interviewing. With an average of 30 hour work-weeks, this represents 10 person-weeks of work. For the sample of 1980 women (1680 in the DSS villages and 300 in non-DSS villages) to whom the short questionnaire is administered, 11 person-weeks of work are needed. This represents a work load of 21 person-weeks of interviewing for both the pretest and the main survey.

2. Work load of coding

The coding of the survey data from the 1680 short interviews in the DSS area will require virtually no coder's time since the forms will be precoded. It will only require keipunching time.

From the vital registration records, approximately 30 minutes per woman will be needed to code identifying information, age, marital status, CEB, CD and BLY. Since only a third of the sampled women (1680 women) will be less than twenty-five years of age and thus have a full record of births and deaths, this means about 280 hours of coding time is needed.

For the 600 PH from the pretest survey approximately 200 hours of coding time is required.

For the 300 cases in the DSS the PH data from the V.R. will require about 150 hours of coding time (30 minutes of coders time per woman is needed because of the extensive searching in the vital registration records).

Thus total coding time needed for the pretest and the main survey is approximately 25 person-weeks.

G. ANALYSIS

1. Pretest: Pregnancy history — DSS - non-DSS comparison

As noted in section C.1, one important statistic for comparing the DSS and non-DSS sample women to determine if contamination exists is the proportion of women who can report the year of birth of their child (children). (For each woman an index combining information on number of children born and number with birth year reported must be created.) The proportion of births with years reported will also be tabulated. In addition, the following tabulations for the two areas will be helpful for revealing any contamination which may exist.

a. the distribution of the time since last birth

b. the distribution of closed birth interval

c. the number of births in a given time period in the past

d. the distribution of births in (monthly) calendar time in the past

2. Pretest: Pregnancy history — DSS vital registration and survey comparison

For the 300 women in the DSS area a 13 year PH (either forward or backward) from the survey will be available and an actual PH from the vital registration data will be available. These will be coded in identical format for processing ease in the following analyses.

With these actual and reported pregnancy histories for the 13 year period, the following tables will be prepared:

a. Actual CEB versus reported CEB by age of women and/or period before the survey. The same for CD. Also actual versus reported BLY can be tabulated by the age of the women. These tabulations can be compared with those for the women who only had the short questionnaire (CEB, CD and BLY) to determine to what extent the use of a full PH improves the reporting accuracy of these variables.

b. The number of missed events in the survey reports (births and infant or child deaths) by age of the women and/or period before the survey.

c. The number of "extra" events reported in the survey by age of the women and/or period before the survey.

d. The proportion of births (and infant or child deaths) reported in the exact month by age of the women and/or period before the survey.

e. The number of child deaths missed in the survey by the age of the child at death.

f. The distribution of the number of months off in the date of births (and child deaths) by age of the women and/or period before the survey.

In addition, to the extent that sample size permits, these tables will be done by education of the women and by whether a forward or backward PH was given.

Though these tabulations in general will be straight forward, several technical problems which arise, will need careful solution.

a. For events which occurred 13 years ago, the error distributions may not be possible to determine.

b. When large discrepancies in dating of events exist in the two sources it may be necessary to check the names of the births involved, to be sure that the same birth is being reported.

After this work we can compare the age-specific fertility rates calculated with the PH data with those of the V.R. over the past 13 years and quantify exactly the effects of the various types of errors.

3. Pretest: CEB, CD from short questionnaire

As mentioned in section C.1 the mean CEB and CD will be compared for the DSS and non-DSS samples. In addition to the extent sample size permits, comparisons will be made on these variables by age-group.

4. Main Survey: CEB, CD, BLY vital registration and survey comparison

a. From vital registration data determine the actual levels of age-specific fertility and child mortality in the calendar year prior to the survey.

From the birth records of the women in the survey villages for the 12-month period prior to the survey a frequency distribution of births by age-group will be made. From this age-specific fertility rates will be calculated.

In a similar manner, from the death records of these villages for the calendar year before the survey, age-specific death rates by single years of age up to age 15 or 20 will be computed. The calculated age-specific death rates will be converted into proportions dying before reaching the second, third, fifth birthdays (in life table notation $q(2)$, $q(3)$, $q(5)$,....), etc.

These age-specific birth rates and proportions dying are the actual levels of fertility and mortality prevailing in the year before the survey (see col.1 of tables 5 and 6 respectively).

b. Using reported CEB and reported BLY collected during the survey, indirect estimates of fertility rates will be obtained by application of the Brass method of fertility estimation. Next using reported CEB and reported CD, by age of mother, indirect estimates of $q(x)$ values (namely $q(2)$, $q(3)$, $q(5)$, $q(10)$, etc.) will be obtained by the Brass method of mortality estimation. Finally, further estimates of the $q(x)$ values will be calculated by applying the Sullivan and the Trussell modifications.

Table 5. Estimates of fertility using reported survey CEB and BLY, actual CEB and BLY and [illegible] of these using Brass technique, for comparison with actual fertility from 1979 vital registration in Matlab by Age

Age	Data used for estimation							
	With Reported Age				With Simileted Age			
	Accurate CEB and BLY	Accurate CEB, Reported BLY	Reported CEB, Accurate BLY	Reported CEB, Reported BLY	Accurate CEB and BLY	Accurate CEB, Reported BLY	Reported CEB, Accurate BLY	Reported CEB, Reported CD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
15-49								
15-19								
20-24								
25-29								
30-34								
35-39								
40-44								
45-49								

Table 6. Estimates of Mortality using reported survey CEB and CD, actual [illegible] of these, according to several estimation techniques, for comparison with actual mortality from 1979 vital registration in Matlab

		Data used for estimation							
		With Reported Age				With Simileted Age			
Author or Technique	Parameter to estimate	Accurate CEB and CD	Accurate CEB, Reported CD	Reported CEB, Accurate CD	Reported CEB, Reported CD	Accurate CEB and CD	Accurate CEB, Reported CD	Reported CEB Accurate CD	Reported CEB, Reported CD
		(1)	(2)	(3	(4)	(5)	(6)	(7)	(8)
Brass (original)									
	q_2								
	q_3								
	q_5								
Sullivan									
	q_2								
	q_3								
	q_5								
Trussell									
	q_2								
	q_3								
	q_5								

c. With the vital registration data for the sample women since 1966, true CEB and CD will be compared with reported CEB and reported CD by age-group from the survey data. Since vital registration data exists only since 1966 direct comparison will be possible only for the younger women, i.e. women whose oldest child is aged not more that 13 years. The magnitude and patterns of these errors in the reported CEB and CD will be analyzed.

d. We will then determine the effects of errors in reported CEB and CD in the survey on the indirect fertility and mortality estimates derived from the several estimation techniques. Using the Brass method, estimates of age-specific fertility will be calculated, first, with both accurate CEB and BLY from vital registration data. Except for age-reporting errors, these estimates are free of reporting errors. (See col.1 of Table 5.) In order to quantify the effects of errors in reported CEB and BLY estimates will be computed using first, true CEB and reported BLY and, second, reported CEB and true BLY. (See column 2 and 3 of Table 5.) Differences between the estimates of columns (1) and (2) may thus be attributed to misreporting of BLY only. Similarly any difference in the estimates of col.(1) and (3) will be due to reporting errors in CEB only.

e. In a similar fashion, indirect estimates of q(2), q(3), etc. are calculated by the three estimation procedures — Brass (original), Sullivan and Trussell — using true CEB and true CD from vital registration data of the sample women. (See col.1 of Table 6.) The estimates will then be calculated for the three techniques using first, reported CEB and true CD and then true CEB and reported CD. (See cols. 2 and 3 of Table 6.) The effect of errors in reporting of CEB on the indirect mortality estimates will be reflected in the differences among the estimates obtained in this manner.

f. The two main assumptions underlying the Brass methods and the modifications of these considered in this protocol are that fertility (at least for younger women) has remained unchanged in the recent past and infant and child mortality rates have been nearly constant. The effects of departures from these assumptions can be studied using the 13 years of vital registration data. The effects of the large fluctuations of fertility and mortality will be examined by calculating the indirect estimates for the series of calendar years since 1966. (The values of CD and CEB will need to be adjusted for each year.)

5. Pretest and Main Survey: Analysis of effects of age misreporting on fertility estimated from PH data and on estimates of fertility and mortality from CEB, CD and BLY data

The effects of age misreporting on rates derived from PH and from the several indirect estimation procedures cannot be assessed directly with the Matlab vital registration data. This is due to the fact that exact ages are available only for females under 13 years of age, while the women in a fertility survey are of course older. Thus the ages of women in the Matlab data are subject to the same kinds of errors as age data from any other part of Bangladesh.

Therefore, to measure the effects of such errors, we, as other authors (Van de Walle, 1968, Potter, 1977), must resort to simulation.

General Analytic Method:

We can gain insight into the forms and extent of age misreporting by examining: (a) the reported single year age distributions in the 1966, 1970 and 1974 censuses, (b) the three reported ages <u>for the same women</u> in the 1966, 1970 censuses and this 1979 survey. (The 1974 age was merely updated from the 1970 census books.)

From this work a probability model for the age-misreporting of women will be developed. Using this, a random number generator, and the information on age for each woman in the survey, a new simulated age for the women will be obtained. With this new age all the analyses of the former section will be redone to determine the (independent) effect of age misreporting on the fertility and mortality estimates. See columns 5-8 of Tables 5 and 6.

IV. FACILITIES REQUIRED

A. OFFICE SPACE

Existing space should be sufficient for:

work space of PI

coding work in Dacca

coding work in Matlab

Additional space will be needed for:

Simeen Mahmud to work at ICDDR,B in Dacca occasionally

the interview materials of the non-ICDDR,B workers in Matlab

B. LODGING

Temporary lodging for the non-ICDDR,B workers will be needed in Matlab (3 weeks).

C. LABORATORY SPACE - None

D. HOSPITAL RESOURCES - None

E. ANIMAL RESOURCES - None

F. LOGISTICAL SUPPORT

Keypunching, coding, and IBM 360 computer support will be needed from the Statistics Branch. Also use of the IBM 370 at the Engineering University may be necessary.

G. MAJOR ITEMS OF EQUIPMENT - Tape recorder

H. TRANSPORT

Two Matlab speed boats will be needed for 5 weeks (depending on the location of the villages finally selected) almost continuously.

V. COLLABORATIVE ARRANGEMENTS

Simeen Mahmud, an employee of the Bangladesh Institute of Development Studies, has been collaborating on this protocol from the beginning.

Within Bangladesh we are obtaining the assistance of Dr. Aminur Rahman Khan of the Planning Commission and Mr. Nawab Ali of NIPORT, who were both intimately involved with the BFS. These persons will help us select and train the non-ICDDR,B field workers for the PH interviews.

In addition to the interest of these persons from BFS within Bangladesh Dr. M. Ahmed of the Cairo Demographic Research Institute has expressed special interest in testing the forward and backward PH questionnaires. Dr. Brass, of the London School of Hygiene and Tropical Medicine is very interested in this validation study.

It is because of the wide interest in this work among demographers within and outside Bangladesh, and its relevance to the World Fertility Survey that we are submitting this protocol for funding consideration outside the ICDDR,B.

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BUDGET SUMMARY

	TAKA	DOLLARS
PERSONNEL	65,600	6,000
SUPPLIES AND MATERIALS	800	20
EQUIPMENT	2,000	-
ICDDR,B TRANSPORT	33,000	-
TRAVEL AND TRANSPORTATION OF PERSON	5,600	7,000
TRANSPORTATION OF THINGS	-	1,000
PRINTING AND REPRODUCTION	6,500	500
OTHER CONTRACTUAL SERVICES	60,000	-
ADMINISTRATIVE OVERHEAD (35%)	60,000	4,000
	Tk.233,500	$ 18,520

(Converted into $15,566)

TOTAL (in $) 34,086

SECTION III - BUDGET

A. DETAILED BUDGET

PERSONNEL SERVICES

Name	Position	% of effort or no. of days	Annual Salary	PROJECT REQUIREMENTS TAKA	PROJECT REQUIREMENTS DOLLARS
Investigators					
Stan Becker	Investigator	50%	$ 12,000	-	$ 6,000
S. Mahmud[a]	Investigator	-	-	-	-
ICDDR,B Support Personnel					
Field Supervisor (1)		1 month		2,922	-
Female Field Workers(4)		12 person-weeks	-	2,751	-
Coders(2)		25 person-weeks	-	8,613	-
Computer Programmer		33 weeks	-	32,298	-
Key Punch Operator (3)		4 person-weeks	-	1,450	-
Secretary		2 months	-	5,600	-
Research Associate		2 months	-	8,000	-
Non-ICDDR,B Personnel					
Female workers (5) Tk.1,000/month per worker		15 person-weeks	-	3,800	-

SUPPLIES AND MATERIALS

Items		Unit Cost	Amount Required	TAKA	DOLLARS
Interview forms	Tk.	.15	5000 pages	450	-
Coding sheets	Tk.	.15	1000 pages	150	-
Computer cards	$	10.13	10,000 cards	-	$ 10.13
Carrying cases for workers	Tk.	25.00	9 pcs.	225	-
Pencil, Lead	$	.18	40 pcs.	-	$ 7.20

EQUIPMENT

	Unit Cost	Amount Required	TAKA	DOLLARS
Tape Recorder	Tk. 2000.00	1 pc.	2,000	-

PATIENT HOSPITALIZATION - NONE

OUTPATIENT CARE - NONE

ICDDR,B TRANSPORT

		TAKA	DOLLARS
[illegible], Matlab/Dacca	Tk. 3.00/mile	8,400	-
20 trips (2 persons)	Tk. 3.50/hour	420	-
Speed-boat charges		3,160	-
Speed-boat runs for project, 2 for 5 weeks	Tk. 105/hours	21,000	-

[a] Salary paid by BIDS.

..../....

(Budget contd.)
... - 2

	Unit Cost	Amount Required	PROJECT REQUIREMENTS TAKA	DOLLARS
TRAVEL & TRANSPORTATION OF PERSONS				
Local				
Food & accommodation of Investigators in Matlab[a] 40 person-nights				
Food & accommodation of Non-ICDDR,B female field workers, 5 persons for 5 weeks	Tk.80/day per worker		5,600	-
International				
Becker round trip to Bangladesh December 1980 with per diem				$ 3,500
Simeen round trip to U.K. or U.S. for presentation with per diem				$ 3,500
8. TRANSPORTATION OF THINGS				
Documents from Matlab				$ 1,000
9. RENT, COMMUNICATION UTILITIES - NONE				
10. PRINTING AND REPRODUCTION				
Mimeograph (or cyclostyle) (reports will use approx. 250 pages)	Tk.10/stencil Tk.0.20/paper	5000 pages	3,500	-
Printing report		1,000	2,000	-
Xeroxing	Tk. 1.00	1,000	1,000	-
Publication		-	-	$ 500
11. OTHER CONTRACTUAL SERVICES				
Computer time[b]	Tk.600/hr	100 hrs.	60,000	-
12. CONSTRUCTION, RENOVATION, ALTERATION - NONE				

[a] paid from Director's office budget.

[b] this expense will not be incurred if ICDDR,B has its own computer.

Appendix A

Demographic Estimation Study--Short Interview Form

Date ____________________

/_/ D.S.S.

/_/ Non-D.S.S.

Village name ___________________________

Vill. No.______
Family No.______
Ind. No. ______

Individual name ________________________

Have you lived in this village since 1966?

____

If so, have you ever left the village for a period of more than 6 months at one time since 1966? ____________________

How old are you? ________________________

/_/ eligible

/_/ ineligible

What is your current marital status?

____

Have you ever been to school? __________

If yes what is the highest class attained?

____

Do you have any children of your own living with you? If yes how many sons and how many daughters? sons _______ daughters _____

Do you have any children of your own who do not live with you. If yes, how many sons and how many daughters? sons _______ daughters _____

Have you ever given birth to a child who later died. If yes, how many sons and how many daughters? sons _______ daughters _____

Just to make sure I have this right, you have had _____ births. Is that correct?

____

In what month and year did your last live-birth occur? month ______ year __________

Was that a boy or girl? __________

Is that child still living? _______

Interviewer's name ______________________________

PREGNANCY HISTORY TABLE

308. INTERVIEWER: USE ONE ROW OF THE PREGNANCY HISTORY TABLE FOR EACH PREGNANCY, STARTING WITH THE FIRST AND PROCEEDING CHRONOLOGICALLY, (THAT IS, THE FIRST PREGNANCY IN THE FIRST LINE, THE SECOND PREGNANCY IN THE SECOND LINE....... UPTO THE LAST PREGNANCY). IF TWINS, USE ONE LINE FOR EACH AND CONNECT WITH A BRACKET AT THE LEFT.

THE FOLLOWING QUESTION SEQUENCES ARE TO BE ASKED TO RECORD PREGNANCY HISTORIES FOR THE FIRST SEGMENT, THAT IS, THE INTERVAL BETWEEN MARRIAGE AND THE FIRST LIVE BIRTH.

<u>IF RESPONDENT HAS HAD ANY LIVE BIRTH:</u>

309. Now I want to ask you some questions about each of your pregnancies, that is each live birth, each still birth, each miscarriage and each abortion. If you have had any of these or any children who have died or who live away from home I would like to know about them.

What is the name of your first baby born alive ______________________ (name)

310. After you (first) were married and before.........................(name) was born, did you have any other pregnancies?

YES [1]

NOW ASK 319-323 AND RECORD FOR THE FIRST PREGNANCY, REPEAT 319-323 FOR EACH PREGNANCY UNTIL THE FIRST LIVE BIRTH IN THIS INTERVAL. THEN REPEAT NAME OF FIRST BABY BORN ALIVE UNDER 313 IN THE NEXT ROW, ASK 315-318 AND RECORD.

NOW ASK 313 AND 314 AND ACCORDINGLY PROCEED TO EITHER 315-318 OR 319-323. REPEAT SEQUENCE FOR ALL REMAINING PREGNANCIES.

NO [2]

ENTER THE NAME OF FIRST LIVE BIRTH UNDER 313, ASK 315-318 AND RECORD.

NOW ASK 313 AND 314 AND ACCORDINGLY PROCEED IN THE NEXT ROW TO EITHER 315-318 OR 319-323. REPEAT SEQUENCE FOR ALL REMAINING PREGNANCIES.

<u>IF PREGNANCY OCCURRED TO THE RESPONDENT IN THE PAST BUT NOT RESULTED IN LIVE BIRTH:</u>

311. Think back to your first (second,..............etc.) pregnancy and tell me about it.

INTERVIEWER: NOW ASK 319-323, REPEAT SEQUENCE FOR EACH PREGNANCY

<u>IF NO PAST PREGNANCY OCCURRED TO THE RESPONDENT:</u>

(Skip to 333)

.../...

(Appendix B, contd.)

PREGNANCY HISTORY TABLE

312	313	314	IF A LIVE BIRTH			
			315	316	317	318
Pregnancy Order	What was the name of your first/next baby born alive?	After ____ (name) and before ____ was (name) born did you have any other pregnancies?	In what month and year was ____ (name) born?	Was the baby a boy or a girl?	Is the child still living?	(If not alive) How long did this boy/girl live?
01		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH ____ YEAR ____ YEARS AGO ____ MONTH ____	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY NO [2] (ASK 318)	MONTHS ____ YEARS ____ ASK THE NEXT PREGNANCY
02		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH ____ YEAR ____ YEARS AGO ____ MONTH ____	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS ____ YEARS ____ ASK THE NEXT PREGNANCY
03		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH ____ YEAR ____ YEARS AGO ____ MONTH ____	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS ____ YEARS ____ ASK THE NEXT PREGNANCY
04		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH ____ YEAR ____ YEARS AGO ____ MONTH ____	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS ____ YEARS ____ ASK THE NEXT PREGNANCY
05		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH ____ YEAR ____ YEARS AGO ____ MONTH ____	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS ____ YEARS ____ ASK THE NEXT PREGNANCY
06		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH ____ YEAR ____ YEARS AGO ____ MONTH ____	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS ____ YEARS ____ ASK THE NEXT PREGNANCY
07		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH ____ YEAR ____ YEARS AGO ____ MONTH ____	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY NO [2] (ASK 318)	MONTHS ____ YEARS ____ ASK THE NEXT PREGNANCY

.../...

PREGNANCY HISTORY TABLE

IF NOT A LIVE BIRTH				
319.In what Mth.and Yr. was that preg terminated? If 'D.K.' ask how many Yrs. ago?	320.How many months did that pregnancy last?	321.Did the baby show any sign of life (cried etc.) after its birth?	322.Was the baby a boy or a girl?	323.Did you or a doctor or someone else do anything to end the pregnancy?
Beng/Eng MONTHS..... YEARS...... YEARS AGO.. MONTH	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO.. MONTH......	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO.. MONTH......	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO.. MONTH......	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO MONTH	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO.. MONTH	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO.. MONTH.....	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.

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Appendix C

Pregnancy History (PH) - Backward

308. Interviewer: For each pregnancy use one line. The last pregnancy goes on the first line, the second to last goes on the second line .... and so on. List all pregnancies back to the first. For twins use a separate line of the PH list for each child, indicating twins with a second bracket on the left margin. For all pregnancies since her most recent birth ask the respondent the following questions in order.

Respondents having a live birth:

309 What is the name of your youngest child? ____________________(name)

310 Have you been pregnant since the birth of ____________________(name)?

Yes /1/ No /2/

If the answer is yes, for the last such pregnancy ask questions 319-323 of the PH list and continue these questions for each of these pregnancies in order going back to her youngest child. Now, write the name of the youngest child in 313 and ask questions 315-318.

Now, ask questions 313 and 314 and then depending on the pregnancy outcome ask either 315-318 or 319-323 proceeding backwards in time until the first pregnancy.

If the answer is no, write the name of the youngest child in column 313 of the PH list and ask questions 315-318. Now, ask questions 313 and 314 and then depending on the pregnancy outcome ask either 315-318 or 319-323 proceeding backwards in time until the first pregnancy.

Respondents with pregnancies but no live births:

311 Interviewer: For each pregnancy starting with the most recent and going back to the first fill in questions 319-323.

Respondents with no pregnancies:

Interviewer: Interview to be terminated.

.../...

(Appendix C contd.)

PREGNANCY HISTORY TABLE

312	313	314	IF A LIVE BIRTH			
			315	316	317	318
Pregnancy Order	What was the name of your last/previous baby born alive?	Before (name) and after (name) was born did you have any other pregnancies?	In what month and year was (name) born?	Was the baby a boy or a girl?	Is the child still living?	(If not alive) How long did this boy/girl live?
01		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH___ YEAR ___ YEARS AGO___ MONTH___	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY NO [2] (ASK 318)	MONTHS___ YEARS ___ ASK THE NEXT PREGNANCY
02		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH___ YEAR ___ YEARS AGO___ MONTH___	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS___ YEARS ___ ASK THE NEXT PREGNANCY
03		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH___ YEAR ___ YEARS AGO___ MONTH___	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS___ YEARS ___ ASK THE NEXT PREGNANCY
04		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH___ YEAR ___ YEARS AGO___ MONTH___	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS___ YEARS ___ ASK THE NEXT PREGNANCY
05		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH___ YEAR ___ YEARS AGO___ MONTH___	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS___ YEARS ___ ASK THE NEXT PREGNANCY
06		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH___ YEAR ___ YEARS AGO___ MONTH___	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY) NO [2] (ASK 318)	MONTHS___ YEARS ___ ASK THE NEXT PREGNANCY
07		YES [1] (SKIP TO 319) NO [2] (ASK 315-318)	Beng/Eng MONTH___ YEAR ___ YEARS AGO___ MONTH___	BOY [1] GIRL [2]	YES [1] (PROCEED WITH NEXT PREGNANCY NO [2] (ASK 318)	MONTHS___ YEARS ___ ASK THE NEXT PREGNANCY

.../...

(Appendix C contd.)

PREGNANCY HISTORY TABLE

IF NOT A LIVE BIRTH				
319. In what mth. and Yr. was that preg terminated? If 'D.K.' ask how many Yrs. ago?	320. How many months did that pregnancy last?	321. Did the baby show any sign of life (cried etc.) after its birth?	322. Was the baby a boy or a girl?	323. Did you or a doctor or someone else do anything to end the pregnancy?
Beng/Eng MONTHS..... YEARS...... YEARS AGO.. MONTH.....	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO. MONTH.....	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO.. MONTH.....	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO MONTH.....	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO MONTH.....	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO. MONTH.....	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.
Beng/Eng MONTHS..... YEARS...... YEARS AGO MONTH.....	LESS THAN 7 [1] (SKIP TO 323) 7 OR MORE [2] (ASK 321)	YES [1] (ASK 322) NO [2] (PROCEED WITH NEXT PREG)	BOY [1] GIRL [2] PROCEED WITH NEXT PREG.	YES [1] NO [2] PROCEED WITH NEXT PREG.

Procedure for maintaining confidentiality

Though it is stated in the draft protocol that the respondent's name would be coded, for confidentiality reasons, this will not be done. Instead a list will be prepared of the respondents and a serial number assigned (for the non-DSS sample) and census numbers will be used in the DSS area. The lists will be kept by the investigators and the field and coding supervisor and used by other personnel in the project only under direction by the investigators.

The numeric identifying information will be retained for matching purposes in the computer but will have no other uses.

Introductory Statement for pregnancy history respondents (DSS area)

The ICDDR,B in Matlab is conducting research to determine the accuracy of estimates of births and deaths in the population, based on survey questions. To do this we are taking this survey and will compare the results with our records in Matlab. We have selected you and other women in this village to be in the survey so that we will have 2,000 interviews in all. We will be asking you to tell us about pregnancies you have had since the time you were married.

If you have any questions for us please ask at any time. If you wish to stop the interview you may do so at any time. The services of the of the Matlab hospital for diarrhoea are not dependent on your participation in this study. All of the information will be kept confidential.

Introductory Statement for pregnancy history respondents (Non-DSS area)

The ICDDR,B in Matlab is conducting research to determine the accuracy of estimates of births and deaths in the population, based on survey questions. To do this we are taking this survey and will compare the results with our records from the Matlab area. We have selected you and other women in this village to be in the survey so that we will have 2,000 interviews in all. We will be asking you to tell us about pregnancies you have had since the time you were married.

If you have any questions for us please ask at any time. If you wish to stop the interview you may do so at any time. All of the information will be kept confidential.

Introductory Statement for short questionnaire (DSS area)

The ICDDR,B in Matlab is conducting research to determine the accuracy of estimates of births and deaths in the population, based on survey questions. To do this we are taking this survey and will compare the results with our records in Matlab. We have selected you and other women in this village to be in the survey so that we will have 2,000 interviews in all.

If you have any questions for us please ask at any time. If you wish to stop the interview you may do so at any time. The services of the Matlab hospital for diarrhoea are not dependent on your participation in this study. All of the information will be kept confidential.

Introductory Statement for short questionnaire (Non-DSS area)

The ICDDR,B in Matlab is conducting research to determine the accuracy of estimates of births and deaths in the population, based on survey questions. To do this we are taking this survey and will compare the results with our records from the Matlab area. We have selected you and other women in this village to be in the survey so that we will have 2,000 interviews in all.

If you have any questions for us please ask at any time. If you wish to stop the interview you may do so at any time. All of the information will be kept confidential.