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THE SAMPLE REGISTRATION SYSTEM: A MICROCOMPUTER SYSTEM FOR MONITORING DEMOGRAPHIC DYNAMICS AND HEALTH AND FAMILY PLANNING SERVICE OPERATIONS IN RURAL BANGLADESH

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ABSTRACT

The literature on techniques for demographic analysis has mphasized the development of methods for the estimation of emographic rates from incomplete or defective data. Relatively ittle attention has been addressed to developing data collection nd processing systems which minimize the possibility that efects will arise. This paper presents the design of a icrocomputer based system, known as the Sample Registration ystem (SRS). The SRS design is addressed to the need for low ost, user oriented systems for demographic data collection and nalysis that serve a variety of needs, yet do not require ophisticated technical skills to implement and use.

The SRS has been implemented in four rural sub-districts of angladesh by the International Centre for Diarrhoeal Disease esearch, Bangladesh (ICDDR,B) to assess the impact of the MCH-FP xtension Project, a collaborative rural health and family lanning field experiment of the ICDDR,B and the Ministry of ealth and Population Control (MOHPC). The Extension project is esigned to determine whether strategies of the Matlab Family lanning Health Services Project (FPHSP) can be adapted to the OHPC system, introduced with replicable resources, and improve he quantity and quality of services provided by MOHPC workers. he project will ascertain whether the Government can replicate, ith usual MOHPC resources, the success of the FPHSP in reducing ertility and mortality in Matlab.

The SRS provides information on the intensity of domicillary ervices, the quality and content of services, and the effect of ervices on health and family planning behaviour and demographic ynamics. The paper reviews the SRS relational data base design nd features of this system that contribute to data quality. ata are edited at the time of entry, and queries are fed back o interviewers within a few days of data collection for orrective action. Continuous interaction of the processing ystem with the field system is posted to be an important esource in maintaining data quality. Comprehensive cross linkage f data permits use of data for a variety of practical pplications without delays in processing and analysis.

Examples of the use of the SRS for the analysis of emographic dynamics and service operations are briefly reviewed. he versatility of the SRS suggests that this approach may be ppropriate for a variety of study designs in settings where nalyses of the determinants of demographic dynamics are equired.

ACKNOWLEDGEMENTS

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I. INTRODUCTION

Despite the need for demographic data for health research and economic planning in developing countries, techniques for collecting complete and accurate data have received less attention in the demographic literature than techniques for the analysis of incomplete and defective data. Thus findings from demographic research are often the subject of qualification owing to the assumptions that must be employed in the course of demographic estimation. Direct methods of demographic estimation, such as retrospective surveys, census data collection, and vital statistics systems typically follow the rules and logic that applied to manual systems of the 1950s. There is thus a need to develop data systems that are inexpensive, comprehensive, and robust to the problems that typically produce defective data in developing country settings.

Recent developments in computer hardware technology have enhanced the availability of low cost, versatile, and powerful computer equipment. Moreover, new software concepts permit the design of continuous flow data management with rapid feedback of errors to the field. Data feedback systems, if carefully designed to meet field needs, can therefore permit utilization of the editing system to strengthen supervision. Finally, data storage and retrieval systems can be designed to enhance the scope of demographic research through routine linkage of data on demographic dynamics with information on posited exogenous determinants, such as social and economic status, with posited endogenous determinants, such as household preference indicators, and through linkage of all such indicators with proximate

determinants of mortality, such as morbidity, or fertility, such as contraceptive use dynamics. The policy relevance of research can be strengthened by incorporating information on the quality and quantity of services offered to households among the endogenous determinants of demographic dynamics. Thus the application of new computer technology can not only improve the quality of data, through better feedback of processed information to data collectors, but it also enhances the power of statistical inference and the broadens the scope of analysis.

This paper reviews the design of the Sample Registration System (SRS), a microcomputer based system for demographic data collection and processing developed at the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) for the longitudinal monitoring of demographic events, service provided, and health and family planning behaviour among members of a cohort of 7429 sample households in four rural sub-districts of Bangladesh located in the central districts of Sirajganj and Tangail and in the south-western districts, Jessore and Khulna.[1]

That new approaches to data collection are needed is demonstrated, not only by the needs of a particular field study in Bangladesh, but also by emerging research priorities elsewhere in South Asia and in Subsaharan Africa where mortality and fertility levels are high and unchanging. Rural cohort studies of large samples are likely to become increasingly important resources for policy development. Two observations support this view:

1) The study of mortality determinants will become

more important in the future than they have been in the past because of renewed donor agency and developing country government concerns about health policy development will be more important than mortality measurement. The causal inferences required from research can only derive from longitudinal data on large populations. Cross-sectional demographic data collection methods are inappropriate for most health research needs. Demographic events of interest, such as neonatal, post-neonatal, child and maternal mortality are sufficiently rare as to require precise information on the events of interest and the population at risk. Recall biases seriously compromise the utility of data for decision-making. Moreover, cross-sectional survey techniques, so widely used in fertility research are ill-suited to mortality studies: i) Longitudinal data are required because the proximate determinants of mortality --morbidity, nutrition, tactional behaviour, etc. are either intervening events or longitudinal processes that can only be effectively studied in concomitant event history analyses. ii) Proximate mortality determinants are rare, synergistic, and intermittent--features requiring hazards modeling for the analysis of effects. iii) Health service interventions designed to improve child health are themselves time conditional in their effects--with impact deriving not only from the timing of interventions relative to the age of children but also deriving from the timing of service interventions relative to seasonality of adversity and specific episodes of illness. 4) Finally, the objective of mortality research is to develop predictive models encompassing not only

intervention technologies, but also the social, economic and behavioural determinants of child survival. The rare events of interest must be explained by models incorporating parameters within the control of policy-makers and health planners. Predictive models thereby become health policy development tools, not merely academic exercises.ii) Evidence that programmes can have net effects on family planning use and fertility will enhance the importance of operations research on services, since the supply of services are demonstrably important fertility determinants. These changing priorities for research have implications for data system development needs.

2. **Longitudinal data will become increasingly important to research on the efficacy of family planning programmes.** Data which show that service proximity, or respondent recall of services are likely to be of little use in developing research systems for decision-making. Services are likely to be developed incrementally over time. Thus current research must address the question of whether this or that strategy has contributed to improved programme performance, not merely whether prevalence has been changing. Programmes work, but their efficiency and effectiveness may be improved. Evaluating policy options will require careful studies of the relationship between service strategies aimed at improving the quality and quantity of care, and individual behaviour--an objective best served with longitudinal study designs.

This report reviews the objectives of the project in Bangladesh that the SRS is designed to address the limitations

of existing demographic systems in Bangladesh for meeting study aims. Next it reviews the steps in creating the SRS data base, the design of the master file, the field systems for maintaining the SRS, and examples of the types of analyses that can be performed with SRS data. Finally, the implications of the SRS design for future work are discussed.

THE MCH-FP EXTENSION PROJECT DESIGN AND SRS OBJECTIVES.

The Sample Registration System (SRS), was implemented in October of 1982 in four rural sub-districts (or "upazila") of rural Bangladesh where special service activities are being undertaken by the Bangladesh Ministry of Health and Population Control (MOHPC) and the ICDDR,B. In 1986 a new project field design was introduced that required two additional upazila. Thus, there are currently six rural upazilas in the SRS sample area, of which the combined sampling frame represents a population of approximately 900,000.

The SRS is the demographic evaluation system for the MCH-FP Extension Project, a collaborative project of the MOHPC and the ICDDR,B. The Extension Project is designed to test the replicability of a successful ICDDR,B field experiment in the Matlab known as the Family Planning Health Services Project (FPHSP)[2]. The FPHSP delivers comprehensive family planning services to women in their homes and provides MCH services in nearby clinics. In the first three years of the FPHSP contraceptive use rose dramatically in service areas. Fertility and mortality subsequently declined demonstrating that demographic change can be the outcome of sustained intensive

service delivery in a rural impoverished population. In 1982 the Government of Bangladesh requested the ICDDR,B to conduct a replication experiment to test the transferability of the FPHSP service approach to the MOHPC system elsewhere in rural Bangladesh. Accordingly, a study was designed which focuses not only on health and family planning technology, but also on the operational barriers to effective service delivery.

The Extension Project design has been characterized as an experiment in "organization development." Its primary goal is to test whether service approaches developed in a non-governmental organization, with special resources and administrative capabilities, can be transferred to the MOHPC where resources and administrative flexibility are severely constrained. The goal of the project is thus to research the utilization of research in a public sector programme and to foster greater understanding of barriers to effective programme performance among senior officials. The application of microcomputer technology in this experiment permits timely feedback on both operational changes and demographic dynamics. An objective of the computer component of the project is to demonstrate the use of low cost computer equipment to this end.

Evaluating of the Extension Project requires a system for assessing the demographic impact of the programme. This, in turn, requires maintaining a large population under surveillance, introducing a treatment design, and conducting longitudinal observation of demographic changes in areas served by the project and neighboring areas where no special interventions are introduced. The research system must not be the primary focus of

the Extension and must therefore be parsimonious. Sampling is therefore required. Despite the need for parsimony, however, this system, must be a multipurpose system because operations research entails multivariate analyses in which vital rates are dependent variables, operational interventions are the predictors, and characteristics of service clientele and their households are controls. Although this requires a complex design elements of the system should be replicable since research in an organization development context requires MOHPC ownership of both the research process and the utilization of its outcomes.

The principal dilemma to be addressed in the design of the SRS is the incompatibility of these goals. A system which is simple, parsimonious, and replicable must also be suited to complex research objectives. The Extension Project therefore has component data systems which are simple and management oriented, while other components are computer based and designed for research. The management component uses as its primary resource a couple record book (CRB) which is used by government village workers to record information normally compiled on loose sheets of paper.[4] The Extension Project has modified this MOHPC loose paper system to a handheld register so that all longitudinal service information is carried by the worker in the village over time. Each record book is handwritten and all household are covered. Every households is visited quarterly and the CRB is updated with requisite service information and vital event data. Service related data from the CRB are tabulated by hand at the union level staff meetings monthly for reviewing worker

performance and preparing a summary report for monthly supervisory meetings.

The computerized SRS is maintained by ICDDR,B workers on a sample of the CRB households. Thus two statistically independent systems exist: a non computerized manual system for program management, and the SRS research system which permits comparative analysis of the accuracy and completeness of each system and comprehensive demographic analyses from the SRS.

The SRS is a longitudinal data base derived from interviews conducted at 90 day intervals from a sample of villagers residing in 7428 households. Two rural upazilas are treatment areas of the Extension Project: Abhoynagar of Jessore District of Western Bangladesh, and Sirajgonj formerly in Pabna District of North Central Bangladesh. SRS comparison areas are in upazilas contiguous to Abhoynagar and Sirajgonj: Fultala and Gopalpur, respectively. Although Sirajgonj and Abhoynagar were selected by the MOHPC, sampling is otherwise designed according to procedures that produce an equal probability sample of households in the four study upazilas.[5] Recently a fifth study area in Jessore District has been added to the study to accomodate a revised study design objective.

The SRS component of the Extension Project research system assesses the demographic impact of the health and family planning services that ICDDR,B workers have transferred to the government workers. The SRS monitors changes in the size and composition of households and demographic dynamics. This involves monitoring data on deaths, the outcome of pregnancies, the incidence of

pregnancies, migration, changes in marital status, and changes in household structure.

The SRS is also used by researchers to answer policy questions regarding health and population policy by providing data for evaluating the efficiency of health care and family planning service systems. As such, it includes longitudinal observations on the frequency of household contacts between health and family planning workers and village women and the outcomes of those contacts. It also includes household characteristics needed for the analysis of service program efficacy. Microcomputers, in summary, can greatly enrich the quality of demographic research: Rapid feedback to data collectors improves supervision and enhances data quality, while improved software broadens the scope of research, and rapid dissemination of findings improves prospects for utilization of research for policy.

LIMITATIONS OF SEQUENTIAL FILE DATA SYSTEMS

In the planning of the SRS, several demographic data system in Bangladesh were reviewed. Each demographic data systems in Bangladesh are typically compiled in batches, and maintained in sequential files with demographic events often unlinked to any other data. Three problems impede utilization of data compiled in this manner for research:

1. Longitudinal data systems assess demographic dynamics only, to the exclusion of important covariates of demographic processes. Collection of demographic data is usually undertaken

for some purpose other than demographic analysis. Yet, critically important independent variables are often not available for data analysis. Researching the efficacy of service systems, the impact of family planning, the consequences of childhood morbidity or malnutrition, for example, not only require accurate and complete data on child survival and fertility, but also linked data on proximate determinants of demographic dynamics and the exogenous variables of interest. Intervention variables, such as immunizations, family planning, or other service indicators are required as covariates and control variables are required for exogenous, social, economic or ecological factors which can confound the interpretation of health service interventions. Carefully conducted longitudinal studies thus require linkage of records of the characteristics of households with longitudinal records of observations of service inputs and demographic outcomes.

Since demographic systems are oriented toward vital registration, however, demographic events are collected in batches and are compiled separately from household information. In theory, the data can be linked, but in practice linkages are not conducted continuously and unwidely batches of unprocessed data accumulate. Moreover, the scope of information on household characteristics is limited, mainly because successive household studies are maintained as separate data sets. By linking records continuously, however, it is possible to build a household data base over time with each field study augmenting previously available household information. Appropriate use of database

technology thus broadens the scope of inquiry from demographics alone to include a wide range of posited determinants and consequences of demographic dynamics.

Maintenance of cross-linked data is particularly relevant to policy research, because operational questions often arise piecemeal from policy makers. Requisite research involves only small amounts of incremental data collection if other relevant extant information is readily accessible. Maintenance of batch-mode sequential file systems require collection of repetitious data, often with delays in processing and analysis owing to the complex editing requirements and the redundant data. The absence of a timely response from researchers to requests for research impedes utilization of field research for policy.

Operations research, moreover, involves monitoring programmatic activities that change with time, and posited demographic events that respond to policy. the contribution of research to policy development is enhanced if the research system can link this crucial interface between programme effort and activity with individual behavior.

2. Vital events are often collected in batches by type of event with events unlinked to the individuals at risk. Since the events are not continuously cross-linked, the statistical analysis of individual level data is not possible. The use of demographic data for case control morbidity studies, research on the determinants of survival, the determinants of fertility and other issues require estimates of the population at risk of events. Aggregate unlinked data can be used to report vital

rates, but studies involving data on individuals require monitoring person days of observation. Migration, sample loss, and other sources of censoring, impair the analysis of individual level data unless the person days at risk of events are recorded in a common cross-linked file arranged by units of analysis.

The application of censored event data to policy research has received considerable impetus with the development of biometric methods for the regression analysis of censored event histories. That cohorts are incompletely observed need not impair the use of data for inference.

3. Editing of data requires comprehensive cross-checking since demographic events are logically interrelated. Recording errors often arise, however, which delay analysis. Infant mortality analysis, for example, requires analysis of deaths occurring within 12 months of life according to characteristics of mothers, attributes of their household, and the conditions prevailing at the time of birth. In Bangladesh, however, births often occur in the home of the mother's parents, with mothers returning to their husband's home in the post-partum period. Deaths can be erroneously registered in a household where there is no corresponding birth record, mother information, or household records. While such errors may be infrequent, correcting such errors retrospectively can be difficult and time consuming, particularly if data sets are large and processing capabilities are limited.

Continuous linking operations can be designed, not only to store data, but to check the logical consistency of events: Recorded out-migrants must be members to have been eligible to move out, births must have a mother, marriages must correspond to an individual [illegible] and deaths occur only to individuals known to be at risk in the household under observation. Microcomputer software can be designed so that editing, linking, and logical checking occur at the time of entry so that continuous cross-linking protects the quality of data from the time of collection.

Although process of continuous linkage can be used as a component of supervision, batch mode systems are typically maintained in the field without continuous links to the computer editing process. Data maintained separately in batches are not readily checked for problems that require changes in field supervision. With the appropriate computer diagnostics, however, errors are immediately flagged for supervisory action.

The use of database methods thus enriches the scope of demographic research. Analysis have greater flexibility in the design of data content, rates are more readily monitored, and editing is comprehensive and timely. These developments need not require sophisticated expertise in systems development, once the database is designed and routine file updating procedures are instituted.

In summary, the SRS addresses the need for data collection systems that are

- longitudinal, and capable of monitoring not only events, but the population at risk of events,
- accurate and complete, with minimal scope for internal logical inconsistencies to arise,
- extendable and flexible to include not only events, also modules related to proximate determinants and exongenous social and economic variables,
- simple, inexpensive and portable, pacing minimal technical demands on users,
- quickly implemented and quick to produce results,
- suitable for large populations, yet compatible with microcomputer hardware,
- compatible with both basic tabular and graphical presentation of data, yet compatible with statistically sophisticated techniques for longitudinal event history analysis.

We turn, next, to a discussion of a system which addresses these aims.

FEATURES OF THE SRS DESIGN WHICH ADDRESS THE LIMITATIONS OF SEQUENTIAL FILE SYSTEMS

The SRS data system design averts problems inherent in batch mode vital events systems by compiling data continuously into a household history file (HHF). The SRS has been developed in two stages: a prototype sequential file system, and a relational database. In the prototype SRS, this HHF was designed with the database approach as an ultimate product. Thus the HHF is

conceptually equivalent to a multi-dimensional matrix. individuals and their characteristics represent rows, events observed over time are columns, and characteristics of households or individuals are layers. A header record for each household provides keys to reading a given household history and the history of visit dates so that individual events that are recorded have a corresponding person days of observation associated with them. The HHF is also maintained manually by field workers in a handheld register called the Household Record Book (HRB). Software which prints the HRB permits rapid feedback of computerized data to interviewers and simple HRB entry rules permit rapid updating of the HHF. While the system is being converted to a database,* this conversion involves software only, and does not alter the field operation of data management tasks of SRS staff. The HHF design has several advantages over extant sequential file systems:

1. The scope for designing data content is highly flexible. While the demographic component of the SRS provides the basic structure of the SRS (household size and composition, interrelationships among members, member characteristics and their demographic events history) the information linked to the HHF can be either longitudinal histories or fixed entries of any form whatsoever. The SRS is designed, for example, to record in 90 day rounds each respondent's recall of service worker visits, the type of services received, and whether services were adopted. In addition to the routine longitudinal data special purpose "once only" modules are added in successive rounds. Each SRS

round thus has a theme such as socioeconomic status assessment, family planning knowledge attitude and practice assessment, health behavior assessment, perceptions of services, etc. Each special purpose module is added to the data base in successive 90 day rounds. The scope and content of these special modules is limited only by the time available for interviewing. Computer storage requirements are not a constraint since the SRS system can be maintained in small areal units.

2. The risk set is monitored. Recording the visit date and dates of movement into and out of households permits immediate calculation of rates. Simple to use software is available which accumulates, at the closure of an SRS visitation round, the person days of observation of each SRS individual. This provides denominators for vital rates.

3. Data are continuously and comprehensively edited. The SRS software includes a comprehensive editing sequence that checks the logical integrity of input data against all other data available in the HHF. In the prototype version 17 modules are developed for this purpose so that the continuous flow of data is accompanied by editing events in batches.[8] In the final database version, this modularized system is being integrated into a single on-line interactive entry and processing system.

SETTING UP THE SRS

Actual design of the SRS is complex, but the central concept is that data exist in a unified register in two places: the hand held register of field workers and the database on the computer. A system of dynamic interaction ensures that regular feedback of

editing errors occurs, so that workers at all levels are continuously involved in maintaining the integrity of data. Registers can be computer printed to save effort. Supervisors are alerted to lax field work. Checking, entry, and processing proceeds continuously so that the computer is never more than two to three weeks behind the field worker.

The SRS was functioning routinely within 180 days of the initial field work and was producing results within the subsequent quarter. Stages in setting up the system, a depicted in Figure 1 are as follows:

1. Listing: Vast areas of Bangladesh are enumerated annually by the Ministry of Health. While the size and composition of households is improperly registered, households are identified. The design of the Extension Project included temporary land (known as chars). Since these largely inaccessible areas are rarely visited by outsiders, and since economic conditions and ecological conditions are harsh, char land was included in the study.

The first stage involved household listing in 13 sample unions, each with a population of approximately 25,000. Listing involved identification of the name of household heads, the recording of the size of households, and mapping the area to facilitate subsequent work (labelled "1" in Figure 1).[9]

2. Sampling: Although the system is a sample systems, no particular requirement for sampling is inherent in the system.

3. Enumeration: Owing to the need to maintain continuous flow of field work in 90 day cycles, enumeration was kept as simple as possible with minimal requirements for coding. A socioeconomic status module was [illegible] at the time of enumeration, but processing was considered a low priority (See 3 in Figure 1).

4. Editing and Printing: Next, the house registration books were computer printed, bound, and distributed to field workers (4 in Figure 1). A sample HRB page appears in Figure 3. Although machine editing began at this stage, the printing process was little more than a reformatting of Figure 2 input data. Subsampling procedure ensured compliance with the location of sample points. Interview household members and code the HRB for vital events in the post enumeration period. Erroneous enumeration data was corrected in the HRB and entered on "Amendment forms" designed to correct enumeration data. HRB field registers are printed annually.

The cycle of updating the HRB and computerization of events began the third and final phase in SRS development (see Figure 4, 5). This phase has been repeated in regular 90 day cycles since October 1, 1982. First, visitation interviews focus on possible changes in household status and demographic events. Since the interviewer has a register that records previous SRS rounds, extensive probing and data checking is possible at the time of visitation. Each HRB entry generates a corresponding event form (see Appendix A, Phase 2) a regimen of logical editing of the events (see Figure 4, 7), and a subsequent series of checks of

the logical consistency of events with previous HRB records.[10] Modification of the HHI includes recording visitation dates, procedures based on reported visitation schedules. Data passing all tests are archived (12) and households failing logical tests are printed with error messages for field correction (8). Errors in the initial round exceeded 7 percent of the events reported but error rates declined to 3 percent in round 2 and less than 1 percent thereafter. Current field correction activities are complete within a week of closure of a round owing to a system of continuous processing of data from the time of collection. Thus households interviewed early in a round are first to receive error reports and in all rounds since 1982 the 90 day schedule has continued uninterrupted. Errors reported to the field require reinterview (9), correction of the erroneous data subset (10), re-editing (7) and finally archiving (12).

FIGURE 1

Tasks in SRS Development

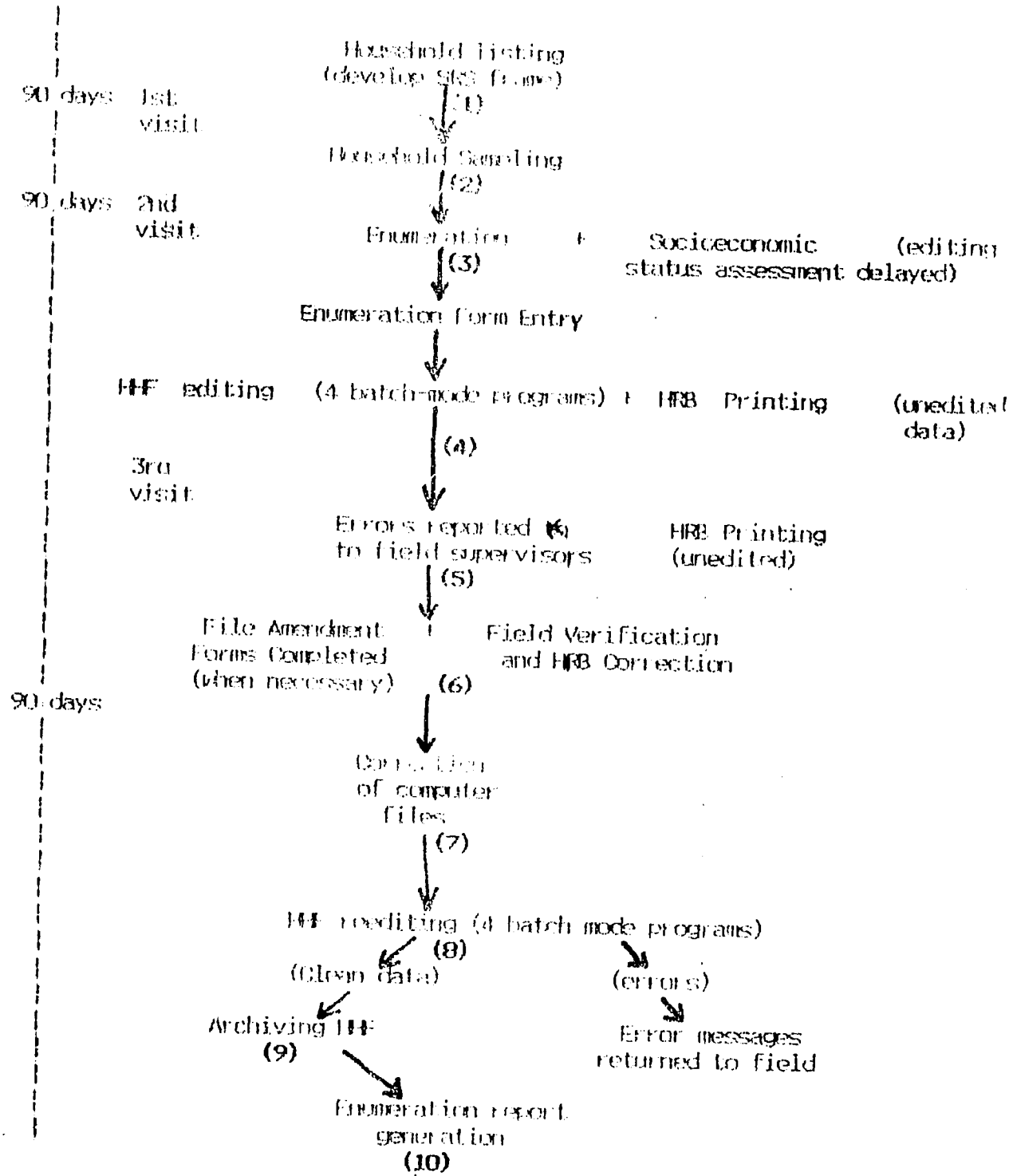


FIGURE-2

MCH-FP EXTENSION PROJECT
SAMPLE REGISTRATION SYSTEM
AMENDMENT REPORT FORM/ENUMERATION SURVEY

Head of Household : _____ Thana : _____ Union : _____ Mouza : _____ 1

Father's/Husband's Name : _____ Village Name : _____ Household Number : _____ 7

	01	02	03		04		05		06	07	08	09	10		
Ind No.	Sps No.	Mot. No.	Name	P/A	Relation to Head	Age	Date of Birth		Sex	Marital Status	Year of education	Main occupation	Religion	Amt type inc /Exc /Amt./Nmr Exp.	Area of Correction
13-14	15-16	17-18	19-38	39	40-41	42-43	D D M M Y Y	44-49	50	51	52-53	54-55	56	57	58-59 60-61 62-63 64-65

Interviewer _____ Date _____ 66-67 68-72

Supervisor's use : RI (1) Yes SI (1) Yes
_____ (2) No (2) No 73 74

Coder ID : _____ DET ID : _____ 75-76 77

Round # : _____ Form No. 1 1

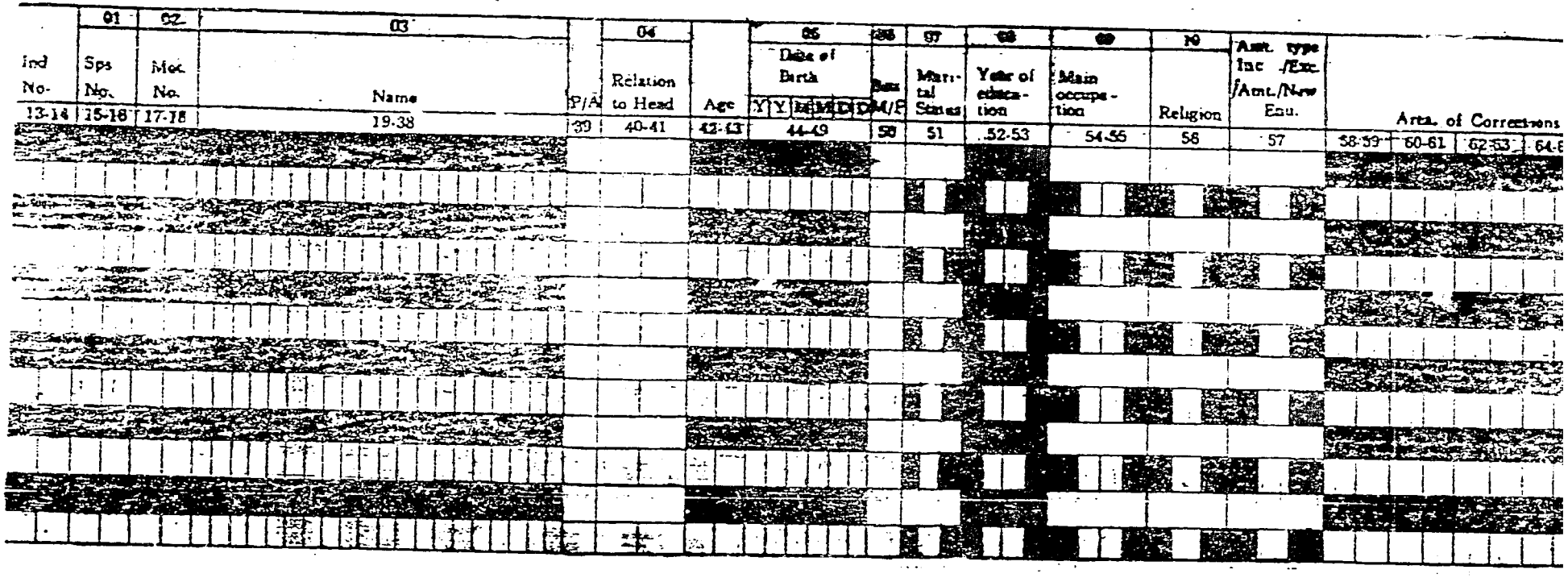

01
02
03
04
05
06
07
08
09
10
Ind No-
Sps No.
Mot. No.
Name
P/A
Relation to Head
Age
Date of Birth
Sex M/F
Marital Status
Year of education
Main occupation
Religion
Amt. type Inc./Exc./Amt./New Enu.
Area of Corrections
13-14
15-18
17-18
19-38
39
40-41
42-43
44-49
50
51
52-53
54-56
58
57
58-59
60-61
62-63

FIGURE-1

CURRENT ID :
THANA :SIRAJGONJ
UNION :BAGBATI
MOUZA :DATTABARI

INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH BANGLADESH
MCH-FP EXTENSION PROJECT-SAMPLE REGISTRATION SYSTEM
HOUSEHOLD RECORD BOOK

UNION/MOUZA:02019

HOUSEHOLD :100040

VILLAGE: AMIN PUR
HEAD OF HOUSEHOLD: RAHIM
FATHER/HUSBAND : ASGAR ALI

EDUCN: 03 OCCU:FARMER

LAST VISIT:84/10/1
RELIGION : ISLAM

IN NO.	SP NO.	SP NO.	MO NO.	NAME	S E X	REL TO HD	MAR STA	DATE OF BIRTH	YR OF SC	SUMMARY OF RD# 2 TO 7 JAN 83 TO OCT 84 EVT	DATE	RD# 10 INTERVIEW DATE 85/01/15 EVT	DATE	NO. OF LIVE BIRTH AND/OR REASON FOR MIGRATION.	BIRTH ATTENDANT/ TYPE OF DOCTOR/ SP.IND#	BIRTH PLACE/ DEATH PLACE/ PLACE OF DESTINATION	NOTE
01	03	00	02	RAHIM	M	SLF	MAR	58/03/30	03 FAR	MAR	83/05/15	DER	84/12/31	—	Kabiraj	Own home	
SPT.ID		UM:			THH#		IND#										
PER.ID		UM:02019			THH#100040		IND# 01										
02	00	00	00	ROKEYA	F	~~MIR~~ MIL WID		42/05/99	00 HOW			UHS	84/12/31	—	—	—	
SPT.ID		UM:			THH#		IND#										
PER.ID		UM:02019			THH#100040		IND# 02										
03	~~01~~ 00	00	00	AMINA	F	SLF WID ~~WIF MAR~~		63/07/27	00 HOW	MIN	83/05/15	LIB	84/12/11	One	Trained TBA 01	Own home	
												WID	84/12/31	—	—	—	
SPT.ID		UM:			THH#		IND#					UHS	84/12/31	—	—	—	
PER.ID		UM:02023			THH#100790		IND# 11										
04	00	00	03	ABUL	M	SON	UHR	84/12/11	00 DEP								
SPT.ID		UM:			THH#		IND#										
PER.ID		UM:02019			THH#100040		IND# 04										

THE LAYOUT OF THE HRB AND FIELD PROCEDURES

Figure 3 diagrams the routine field operation that results in the updating of the HRB and the HHF. The Figure 3 cycle of work not only prepares edited data files, it involves field staff in the data management process. Lax and inefficient workers generate data with logical errors that become immediately obvious to supervisors owing to SRS procedure of tabulating edit checks by worker. The continuous feedback of data and the periodic rotation of workers permits continuous checking, detection and correction of errors. This cyclical field system involving computer and field staff minimizes errors of demographic data collection:

1) Undercount is minimized owing to repeated visits and minimal reliance on recall of events in the distant past.

2) Age misstatement is problematic, but comprehensive logical edits minimize major errors and repeated visits permit extensive probing and HHF revisions as needed.

3) The editing system emphasizes to workers the logical interrelationships of demographic processes. This, in turn, averts mechanical and lax field work that generate data inconsistences.

The SRS is run in the field by 9 teams each comprised of one male and one female interviewer. There is one back-up team in each area to cover for leave and illness. On the average there are three interviewing teams for each supervisor, and one supervisor in charge of all field operations. The supervisors conduct spot checks on 5 percent of the households by observing interviewer in the field and conducts a random 5 percent

reinterview of the SRS sample each round. Supervisors are expected to direct field editing and to respond to computer editing output.

All field workers were trained for two weeks and subsequently receive a monthly orientation. The workers are primarily bachelor's degree holders, but a higher school certificate is the minimum qualification for the position. Each worker has an SRS field manual for definitions, procedures, and examples of how to run field operations.[11]

The major field editing criteria that are applied are as follows:

a) Births where no mother is present (member of household)

b) Deaths to non-resident

c) Marriages to non-residents

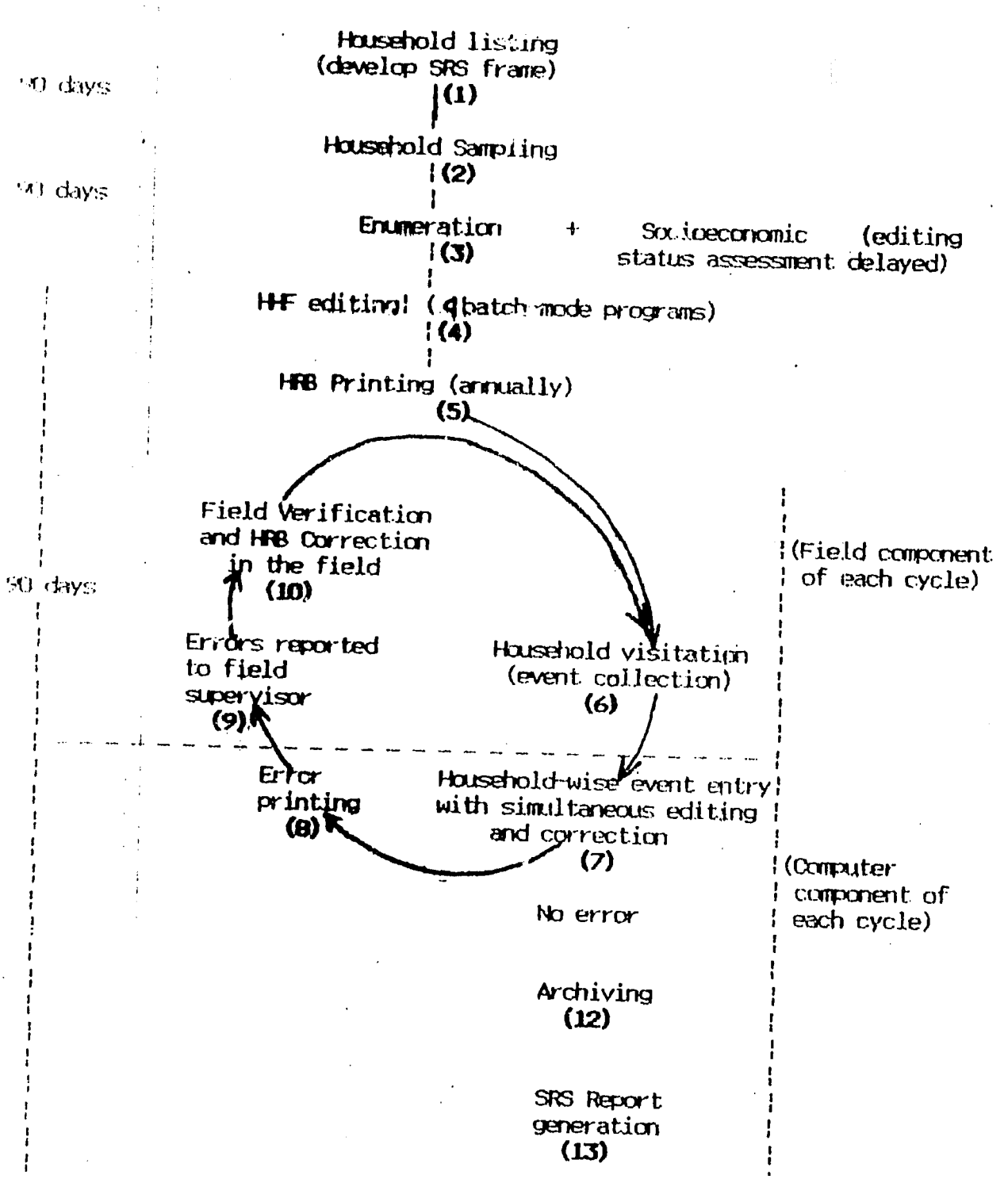
d) In-Migrants who are already present

e) Out-Migrant who are non-resident

f) Any identification code that does not match a corresponding sample individuals.

FIGURE 4

Tasks in Routine SRS Updating



THE DESIGN OF THE HHF

The HHF is presently a prototype line file, constructed from the enumeration data and seven subfiles, each of which is based on a form filled in the field: the amendment file, in and out migration files, marital status change files, the pregnancy termination file, the death records and the household status change file.

Each table has a corresponding consistency checking module. Updating the HHF proceeds by extracting the households with events, linking and editing events in the HHF subset, replacing and merging the updated and edited file and running a procedure which extracts visitation dates from field reports and adds the current visitation date to each household header record.[12]

Current work on the SRS aims to greatly simplify the batch mode procedures. All information on event reporting forms also exists on the HHF and the HRB. By redesigning procedures and software all forms can therefore be eliminated. The HRB for a village, once a completed, can be sent to the Dhaka office for updating. Software will be written to display the HHF in HRB format and procedures will be designed for a data manager to update the HHF screen display with current HRB information. Existing editing and linkage modules would be invoked automatically upon completion of data entry for a household. Thus a single step procedure is being developed which requires no coders, no forms, and only limited expertise in computer operation. Modules and data files are well within IBM-PC

limitations. Programs require less than 128K of storage and the total data base less than 8 megabytes if all available data are loaded simultaneously.

Planned changes in data management procedures will not affect existing HHF structure. Each household has a header record with the identification sequence, the name of household head, religion of head, and SRS visitation dates. Each individual household member has a corresponding record which contains 40 data elements. Elements specify the identification sequence and interrelationships among members as well as sex, marital status, education and occupation. Rules are specified for membership in a sample household and the type of entry into the HHF as a member is coded along with the date of entry to record the onset of observation. Similarly an exit code is specified along with type of exit to record the end of observation. Entry and exit dates define the risk set for all computations. Next events are coded in sequence by type and date with a field for descriptive information.

Two procedures permit restructuring the HHF: Amendment for data in the HRB found to be incorrect and household status changes for households found to have split or merged according to specified definitions.

The HHF provides the framework for all survey research in the Extension Project. Special studies of village women, intrafamilial communication, economic status and other issues are conducted with each round, linked to the SRS, and archived so that previously collected SRS data is accessible for any cross

sectional survey. While the structure of the HHF is fixed special purpose modules can follow any format whatsoever so long as the HHF linkage information is incorporated in the code layout. Machine edit checks that are applied for appears in Appendix A.

EXAMPLES OF SRS ANALYSES

Analysis of SRS is conducted by extracting workfiles from the HHF with special purpose software. Standard reports of demographic rates are produced quarterly and a summary report is produced annually.[13] More important, however are the special studies in progress that utilize SRS data. A few examples of ongoing SRS based studies are:

1. Mortality research

Infants born since 1982 have been observed over the October, 1982 to September, 1984 period. A hazards regression study has shown that sex of infant, economic status, and education of mother have no net effect on either neo-natal or post neo-natal mortality. Post neo-natal mortality is high in households where siblings have died. Given the high mortality in study areas, serial mortality in high risk households has important policy implications. Further research is needed on the behavioral causes of serial mortality, possible interventions, and the impact of strategies.[14]

SRS data also show that child mortality is high in study areas. The correlates and proximate determinants of child mortality are not well understood and can be researched with the SRS data.[15]

2. Fertility research

Areas served by the Extension Project have high and low fertility upazila. The socio-economic determinants of this areal variation are the subject of inquiry.

In study areas new approaches to family planning service delivery are being tested, and among them is the use of female village workers for injectable family planning service delivery. The net contribution of the introduction of this strategy to contraceptive use and ultimately, to fertility decline is a subject of SRS analysis. For example, an early finding from the SRS is the net importance of contact from female family planning workers on contraceptive adoption.

The Extension Project follows a treatment design involving training and counterpart support in experimental areas. The net effect of these interventions on fertility and mortality, controlling for characteristics of the population is a major focus of investigation.

3. Service operations research

Areas served by the Extension Project evince considerable variation in the quantity and quality of service delivery. The extent to which this variation is due to societal determinants versus relative operational deficiencies in the program is the subject of inquiry.

Whether services can be improved by project interventions and the effect of changing service activities on health and

family planning behavior is the subject of SRS based research.

All studies proposed for the SRS data, in summary, involve multivariate analysis of processes or their proximate determinants wherein characteristics of individuals, households, areas, services or workers serve as covariates.

CONCLUSION

Early evidence from the SRS suggests that a multipurpose demographic research system can function in rural Bangladesh that combines the advantages of sample surveys (parsimony, comprehensiveness, timeliness, and low cost) with the advantages of longitudinal surveillance systems (accuracy, power of inference, and relevance of researching seasonally related health and demographic processes). A low cost comprehensive research system has been instituted which can contribute to scientific knowledge about health and demographic problems and the appropriate operational strategies to solve them.

Preliminary success with the system suggests that SRS concepts hold considerable promise for future applications of microcomputers to the collection of data in environments where demographic data have been defective or lacking altogether.

FOOTNOTES

1

In 1983 the term Thana was abandoned by the Government of Bangladesh and former Thana were upgraded to Subdistricts or Upazila. Districts were subdivided according to areas formerly designated as Subdivisions. Thus Sirajgonj Subdivision became a District. One upazila of this new district is Sirajgonj upazila.

2

The design of the Matlab FPHSP is described in Bhatia et al., 1980.

3

The fertility impact of the FPHSP is reviewed by Phillips et al., 1982 and in a recent update by Chowdhury and Phillips, 1984.

4

This system was developed in Matlab and is described in Chakraborty and Phillips, 1984.

5

The Extension Project design is reviewed in Phillips et al., 1984. A documentation note of the project describes the sample design of the Extension Project (Phillips, et al., 1982). The study is a two stage cluster sample design aimed at creating clusters which are larger than the primary group of workers corresponding to study aims. This corresponds to a geographic and political unit of government known as the "Union," a contiguous cluster of approximately 20 villages, typically comprising a population of 25-30,000. In the first stage of sampling, unions were selected at random within study upazilas. Within each sample union a household listing operation was undertaken to provide a frame of households for the second stage of sampling. From this listing individuals households were selected for inclusion in the SRS. Thus the SRS is a two stage cluster sample for the longitudinal observation of demographic dynamics, service operations, and project outcomes in four rural upazilas. The design of the SRS is independent of sampling considerations, however. It is a household cohort design that is compatible with any sample design, including a total coverage (non-sample design) such as the system employed in Matlab.

6

Since its inception as the Cholera Research Laboratory (CRL) in the 1960s and also since 1978 as an international centre, the ICDDR,B has operated a Demographic Surveillance System (DSS) in its Matlab research station that is known to be an accurate and complete longitudinal demographic archive which records demographic dynamics. Through periodic censuses and the recording of intercensal vital events, the DSS covers a rural population of nearly 200,000 villagers. Despite the intrinsic value of this system for demographic research, fundamental limitations in the management of data nevertheless impede utilization of the DSS for

analysis. These limitations arise from the fact that computers have only recently become available in Bangladesh, microcomputers were introduced only in 1984. Structural problems with the DSS extant data are being addressed through the installation of a new mainframe computer and the restructuring of archival data, but this difficult and costly data management task can be avoided for new prospective studies through the appropriate application of microcomputer technology. Lessons from the DSS experience have been invaluable in designing the SRS, since the limitations of the DSS as a longitudinal demographic systems informed the SRS design. Moreover DSS field innovations could be readily adopted as components of the SRS. Thus the SRS represents a development that follows from nearly 20 years of experience at the ICDDR,B with field systems for longitudinal demographic data collection. The DSS field design have been discussed elsewhere.[17] Since limitations in the DSS data management system typically apply to other longitudinal demographic data systems we shall review them briefly. Mortality effects of the FPHSP were assessed by Chen et al., 1983 and are currently under investigation in an update of the Chen et al., analysis.

7
Socio-economic status modules are documented in a recent paper by Hossain et al., presents a multidimensional scaling of the data.

8
See Islam et al., 1983 which presents a detailed description of the SRS computer system together with FORTRAN program listings.

9
Listing rules and procedures appear in Rahman et al., 1982.

10
SRS field operations are documented by Mozumder et al.,1983. Coding and other operations are documented in the MCH-FP Extension Project Documentation Note Series (see Phillips, 1982; Rahman et al., 1982; Fogarty et al., 1982; Hossain et al., 1983a and b; Mozumder et al., 1983; Mozumder et al., 1984).

11
See Islam et al., 1983, Op. Cit.

12
See Islam et al., 1983 Op. Cit.

13
See routine vital statistics report of Mozumder et al., 1983a-e and Mozumder et al., 1984.

14
See Mozumder et al., 1984.

15
See Mozumder et al., 1984.

16
See D'Souza and Chen, 1981.

REFERENCES

Banu, Hasina: Deborach DeGraff; J.F. Phillips and M.A. Koenig
1985 "Baseline Social Economic and Demographic Differentials in Contraceptive behaviour for study and compariosn areas of The MCH-FP Extension Project" ICDDR,B, Dhaka.

Bhatia, S.; W.H.Mosley, A.S.G.Faruque, and J.Chakraborty
1980 "The Matlab Family Planning Health Services Project," Studies in Family Planning, 11(6):202-212.

Chakraborty, J. and J.F.Phillips
1984 "The Matlab Management Information System: A field based system for health and family planning service information," (unpublished manuscript).

Chowdhury, A.I.; J.F.Phillips and J.Chakraborty
1984 "Recent trends in contraceptive use prevalence and fertility in Matlab: Possible implications of recent demographic dynamics for policy," Paper prepared for presentation at the Ninth Annual Contributor's Conference of the Bangladesh Fertility Research Programme (forthcoming).

D'Souza, S. and L.C.Chen
1981 "Population laboratories for studying disease processes and mortality: The Demographic Surveillance System, Matlab, Bangladesh," Paper presented at the seminar on Methodology and Data Collection in Mortality Studies, Dakar Senegal, July 7-10.

Fogarty, C.; U.Rob, and J.F.Phillips
1982 "The Sample Registration System" Documentation Note 7, MCH-FP Extension Project, ICDDR,B, Dhaka.

Hossain, M.B.; U.Rob and J.F.Phillips
1983 "Code plan for Enumeration and SES data", Documentation Note 11, MCH-FP Extension Project, ICDDR,B, Dhaka.

Hossain, M.B.; U.Rob and J.F.Phillips
1983 "Frequency distribution for socio-economic status variables by area and treatment" Documetation Note 13, MCH-FP Extension Project, ICDDR,B, Dhaka.

Hossain, Mian Bazle and J.F.Phillips
1984 "A factor analysis of economic status indicators from four rural thanas of Bangladesh," Paper presented at the Annual Meeting of the Bangladesh Population Association in Dhaka (August).

Koblinsky, M.; J.F.Phillips, Md.Yunus, and R.Simmons
1984 "Barriers to implementing an effective national MCH-FP programme," Paper presented at the Annual Meeting of the National Council for International Health, Washington, D.C. (June 10-13).

Islam, N.; D.Lenn, J.F.Phillips
1985 "A computerized sample registration system for monitoring household demographic dynamics, service operations, and contraceptive use -- Part I: The demographic data component," Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh (mimeographed).

Mozumder, K.A.; U.Rob and J.F.Phillips
1983 "English language revised field instructions to interviewers for the demographic data component of the sample registration system." Documentation Note 10, MCH-FP Extension Project, ICDDR,B, Dhaka.

Mozumder, K.A., M.B.Hossain and J.F.Phillips
1983 "Baseline demographic rates for the experimental treatments of the four thanas of the MCH-FP Extension Project over the October 1, 1982 - December 31, 1982 period." SRS Documentation Note 1, MCH-FP Extension Project, ICDDR,B, Dhaka.

Mozumder K.A., M.B.Hossain and J.F.Phillips
1983 "Coding plan for vital event and other SRS event reporting forms" Documentation Note 14, MCH-FP Extension Project, ICDDR,B, Dhaka.

Mozumder K.A., M.Koblinsky, R.Simmons and J.F.Phillips
1984 "Sample Registration System procedures for interviewing and recording data on contacts between MOHPC workers and eligible women" Documentation Note 16, MCH-FP Extension Project, ICDDR,B, Dhaka.

Mozumder, K.A., M.B.Hossain and J.F.Phillips
1984 "Demographic rates for the experimental treatments of the four thanas of the MCH-FP Extension Project over the January 1, 1985 - December 31, 1985 period." SRS Documentation Note 16, MCH-FP Extension Project, ICDDR,B.

Mozumder, K.A.; J.F. Phillips
1984 "Baseline vital events reports for four upazilas of the MCH-FP Extension Project for 1983 as reported by a new data base system of demographic assessment." Paper for symposium on the use of Microcomputer for management and service application & policy directions, Colombo, Srilanka, November 04-10.

Phillips, J.F.; W.Stinston, S.Bhatia, M.Rahman and J.Chakraborty
1982 "The demographic impact of the Family Planning Health Services Project in Matlab, Bangladesh," Studies in Family Planning 13(5):131-140.

Phillips, J.F.
1982 "Final version of the project protocol, MCH-FP Extension Project, ICDDR,B.

Phillips, J.F. and M.A.Koblinsky
1984 "MCH-FP research for programme development: A briefing paper prepared by the International Centre for Diarrhoeal Disease for the Bangladesh Ministry of Health and Population Control," (manuscript).

Phillips, J.F.; R.Simmons, G.Simmons and Md.Yunus
1984"Transferring health and family planning service innovations to the public sector: An experiment in organization development in Bangladesh," Studies in Family Planning 15(2):62-73.

Phillips, J.F.; K.A. Mozumder
1984 "A multivriate analysis of social and economic determinant of neonatal and infant mortality in four rural thana of Bangladesh." A paper presented at the annual meeting of the Population Association of America in Minneapolis, Minnesota.

Rahman, M.M.; James F. Phillips and P.Claquin
1982 "Household listing in selected unions of MCH-FP Extension Project areas: Procedures and definitions" Documentation Note 6, MCH-FP Extension Project, ICDDR,B, Dhaka.

Appendix-A

PHASE I: VALIDITY AND PRELIMINARY CONSISTENCY CHECKS

1. In this phase the Validity of each data field and preliminary consistency checks are made, as per definition for the event records.

There are 9 modules in this phase catering for Amendment, In-migration, Majital Status Change, Pregnancy Termination, Out-migration, Death and Household Status Change.

In each module the variables in each record are checked against their defined values. If there is any error, the erroneous record and column number and the code is printed out.

The modules included in this phase are:

(a) EXT12A Valid code checks for SRS Amendments
(b) EXT12B Valid code checks for SRS In-migrant data
(c) EXT12C Valid code and Preliminary consistency checks for marital status change data
(d) EXT12D Valid code and preliminary consistency checks for pregnancy termination data
(e) EXT12E Valid code and preliminary consistency checks on Out-migrant data
(f) EXT12F Valid code and preliminary consistency checks for Death Report data
(g) EXT12G Valid code and consistency checks for Household Status Change data
(h) EXT12W Preliminary consistency checks on SRS Amendment data
(i) EXT12X Preliminary consistency checks on SRS In-migrant data

Following preliminary consistency checks are carried out in this phase:

(a) Preliminary consistency checks on Amendment data (EXT12W):

i. Interview date on or before birth date;
ii. No field for change are specified in cols. 58-64;
iii. Having no spouse inconsistent with relation to head;
iv. Having spouse not consistent with marital status change;
v. Age not consistent with date of birth;
vi. Years of education not consistent with age;
vii. Sex not consistent with relation to head;

(b) Preliminary consistency checks on In-migration data (EXT12X). In this module error types checked for the following:

i. Interview date inconsistent with event date and reason;
ii. Event date less than or equal to two months after birth date;
iii. Having no spouse inconsistent with relation to head;
iv. Having spouse not consistent with marital status;
v. Age not consistent with date of birth;
vi. Years of education not consistent with age;
vii. Sex not consistent with relation to head;
viii. Occupation code 14 (dependent) not consistent with age;
ix. Permanent identification code not consistent with itself or with migration from code.

(c) Preliminary consistency checks for marital status change data (EXT12C).

i. Interview date before event date;
ii. Event year same as or before birth year;
iii. Inconsistency between event type and prior marital status;
iv. Inconsistency between event type and spouse identification code completion;
v. Inconsistency between event type and spouse move code;
vi. Inconsistency between spouse move code and completion of last part of form.

(d) Preliminary consistency checks on Pregnancy Termination data (EXT12D). This module checks for the following error types:

i. Interview date before event date;
ii. Inconsistency between result code and litter sequency number code;
iii. Inconsistency between result code and born alive code;
iv. Inconsistency between result code and sex code;
v. Inconsistency between result code and baby identification number code;
vi. Inconsistency between multiple birth result code and data on following record.

(e) Preliminary consistency checks on Out-migration data (EXT12E). This module checks for the following error types:

i. Consistency check between birth date before event date;
ii. Consistency checks between interview date before event date;

iii. Event date less than 2 months after birth date;
iv. Interview date inconsistent with event date and reason.

(f) Preliminary consistency checks for death data (EXT12F). This module checks for the following error types:

i. Consistency check between birth date and event date;
ii. Consistency checks between interview date and event date;

(g) Preliminary consistency checks for household status change data (EXT12G). This module checks for the following error types:

i. Event year before birth year;
ii. Interview date before event date;
iii. No change areas flagged or some are flagged twice;
iv. Type of household report not consistent with change areas;
v. Area 1 flagged not consistent with other data;
vi. Area 2 flagged not consistent with other data;
vii. Area 3 flagged not consistent with other data;
viii. Area 4 flagged not consistent with other data;
ix. Area 5 flagged not consistent with other data;
x. Data included for area not flagged for change.

2. Extraction of Household History Work File

In this phase the module EXTN13 extracts household history work file from Household History (Master File) for updating

First update data files are determined i.e. amendment, in-migration, marital status change, pregnancy termination, out-migration, death and household status change.

Then for each update data file record, records from the master file (Household History) for that household are extracted. Matching is done on Thana, Union, Mouza and household number.

3. Phase II: Consistency checks and linkage editing

This section provides further details of the Phase II consistency checks and linkage editing.

In this phase consistency checks are made on the data fields as per definition and at the same time updated in the required fields are made. For this, update data files, and the extracted subfile master file is accessed and updates are made by matching identification numbers.

This phase has got two main parts. First part consists of the following modules:

(a) EXT14A Consistency checks on SRS Amendment updates
(b) EXT14B Consistency checks for In-migration updates
(c) EXT14C Consistency checks for marital status change updates
(d) EXT14D Consistency checks for pregnancy termination
(e) EXT14E Consistency checks for Out-migration updates
(f) EXT14F Consistency checks for Death updates
(g) EXT14G Consistency checks on Household Status Change updates

Consistency checks are made only on the individual level, not in relation to the rest of the household (see Phase III).

The second part updates the header card of the affected household (if there is any change in information stored in the header card). The module is EXT14H.

Details of the EXT14 modules follows.

Each type of event is processed separately. The order of their processing is amendment, in-migration, marital status change, pregnancy termination, out-migration, death and household status change. The likelihood of occurrance of the events in the above order has been determined on the basis of the experience of demographic studies.

While checking the consistency of the birth date an error of 1 year is allowed, for children 5 or under, and 5 years for older people. For an In-migration following an out-migration, a marital status change, a pregnancy termination, or a change in household status or relationship, including splits.

(a) Module EXT14A

The module EXT14A carries out consistency checks on SRS amendment updates. This module caters for the consistency checks on inclusion, exclusion and modifications.

The inclusion phase, error messages is given if the individual record already exists in the history file. Otherwise, the member is accepted for inclusion.

In the exclusion phase, error messages are given when,

i. the individual in question is not in the history file;
ii. sex in amendment file is not same as in history file;
iii. birth date in amendment file not consistent with history file;
iv. the individual is not active in the household;
v. amendment date before household entry date.

Otherwise, the individual in question is excluded.

In the modification phase, error messages are given for the same checks as exclusion, and also of the modifications would cause:

i. spouse number inconsistent with relation to head;
ii. having spouse inconsistent with marital status
iii. years of education inconsistent with age;
iv. sex inconsistent with relation to head;
v. modification would cause occupation code inconsistent with age (when under 14).

When there is no inconsistency as mentioned above, the records are accepted for modifications.

(b) Module EXT14B

This module carries out consistency checks and updating for SRS in-migration reports. The module accesses the in-migration file and Household History subset file.

Following consistency checks are made in this module whether:

i. individual ID (in-migrant) is same as ID of active member or member who died;
ii. history file permanent ID is not same as event permanent ID.(if individual previously out-migrated);
iii. sex in history file is not same as sex in event file;
iv. age in history file inconsistent with age in event file;
v. event date occurred after exit date; (if any)

If any of the above mentioned flagged inconsistencies are found, corresponding error messages are given. Incomplete permanent IDs are also flagged. Error free records are added to the subset file as per format. A flag is placed on in-migrant records who come in as household heads for later header adjustments.

(c) Module EXT14C

Consistency checks and then updating of SRS marital status change reports are done in this module. The marital status change file and the household history subfile are accessed in this module. Following checks are made;

i. the individual record is in the history file (subset);
ii. sex in history file is same as sex in event file;
iii. birthdate in history file is consistent with birthdate in event file;
iv. the individual is active member;

v. prior marital status in event file is same as current status in history file;
vi. old spouse number in event file same as in history file;
vii. event date is after the entry to household;
viii. date of change of marital status in event file consistent with date of any other events in the history file;
ix. previous marital status change, if any, is consistent with marital status change report.

If any of the above inconsistencies are found corresponding error messages are given. Otherwise updating of marital status in the subset file is made.

(d) Module EXI14D

This module carries out consistency checks and then updating of pregnancy termination reports. The pregnancy termination and history subset file is accessed for this purpose. The following consistency checks are made in this module:

i. individual is in the history file;
ii. individual is active member of household;
iii. birthdate in history file is consistent with birthdate in event file;
iv. marital status is consistent;
v. event date is after the individual's birth date;
vi. event occurs after entry to household;
vii. pregnancy termination event and date is consistent with events in the history file.

If any of the above mentioned inconsistencies are met, corresponding error message is issued. Otherwise records are updated in the history subset file.

(e) Module EXI14E

This module carries out consistency checks and the updating of out-migration data. The out-migration file and the subset files are accessed for this purpose. The following consistency checks are made:

i. the individual is on the household history file;
ii. sex in event file is same as sex in household history file;
iii. birth year in event file is consistent with birth year in household history file;
iv. individual active in household;
v. out-migration occurs after entry to household;
vi. date of out-migration is consistent with event dates in the history file.

If any of the above inconsistency exists, then error messages are issued. Otherwise records are updated for out-migration.

(f) Module EXT14F

This module checks for the data consistency in linking and then updates for deaths. The death file and the subset file is accessed for this purpose. The following consistency checks are made:

i. the individual is present on the history file;
ii. sex in death file is same as the sex in history file;
iii. birth year in death file is consistent with the birth year in history file;
iv. the individual is active member;
v. death does not occur before household entry;
vi. date of death is consistent with other event dates in history file.

If any of above inconsistencies are found, corresponding error message is issued. Otherwise records are updated for death report.

(g) Module EXT14G

This module carries out consistency checking and then updating for household status changes. The household status change file and the subset file is accessed for this purpose. The following consistency checks are made:

i. the individual is present in the history file;
ii. sex in event file is same as sex in history file;
iii. birth date in event file is consistent with birth date in history file;
iv. individual is active member;
v. status change occurs after entry date into household;
vi. date of household status change is consistent with other event dates in master file;
vii. HSC would not cause spouse number inconsistent with relation to head;
viii. HSC would not cause having spouse inconsistent with marital status;
ix. HSC would not cause sex inconsistent with relation to head

If any of the above mentioned inconsistencies are found, error messages are given. Otherwise the records are updated for household status change.

(h) Module EXIT4H

This module updates the header record for new heads and at the same time some checks are carried out. The following checks are made:

i. all the households have a header card;
ii. the household has religion entered;
iii. household header has a name entered;

If any of the above are found, error messages are printed; otherwise information in the header cards is updated, as applicable.

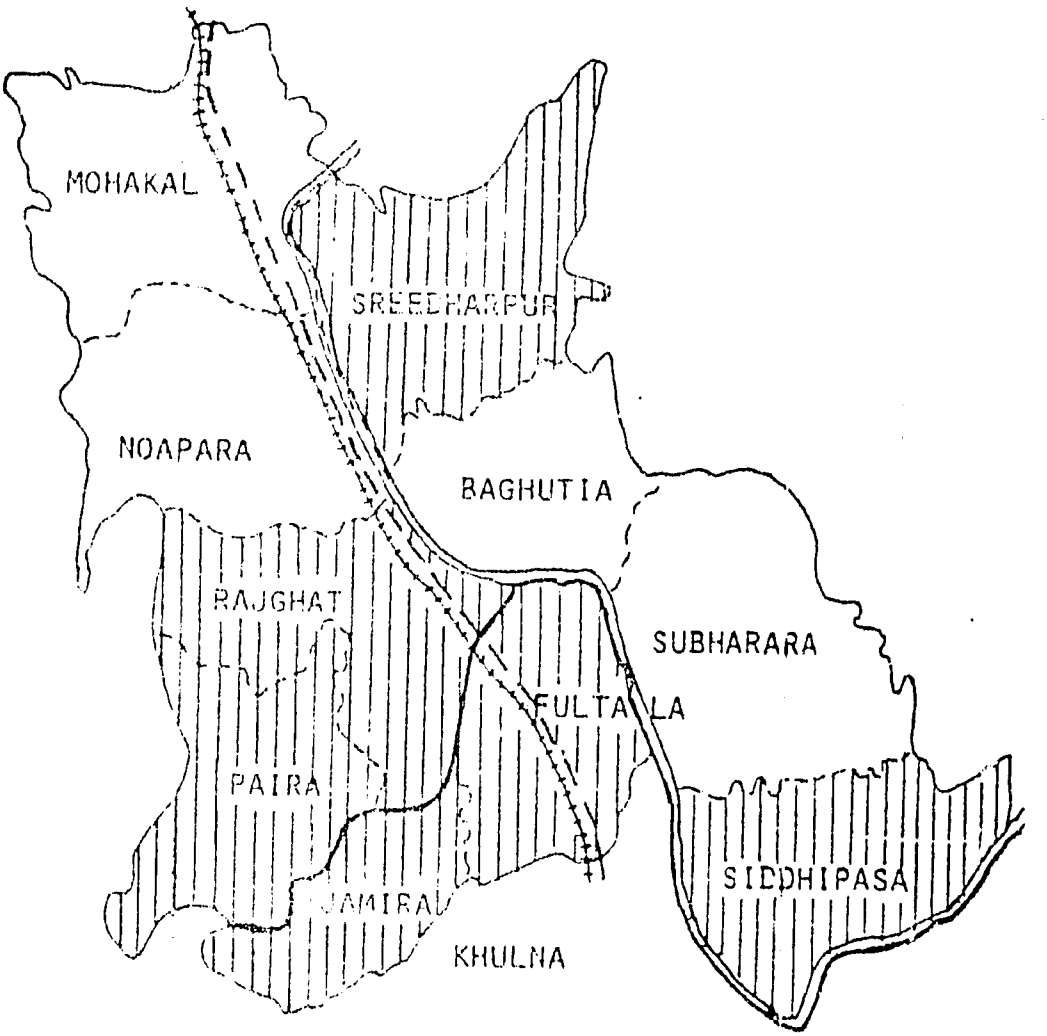
4. Phase III

This phase carries out consistency checks on updated Household History subfile. Checks here are on the household level. The error types (logical) searched for are:

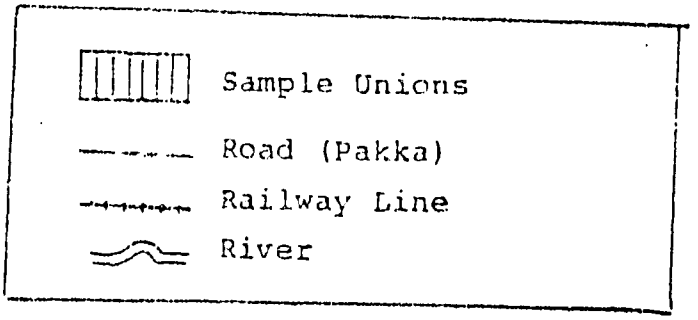
(a) Duplicated ID numbers in household.
(b) No head or more then one head currently resident.
(c) Spouse serial number not in household.
(d) Spouse having same sex as individual.
(e) Spouse of spouse not this individual.
(f) Individual relation to head inconsistent with spouse relation to head.
(g) Mother serial number not in household.
(h) Mother not female.
(i) Individual relation to head inconsistent with mother relation to head.
(j) Individual age inconsistent with mother age.
(k) Relation to head not consistent with age or age of head
(l) Relation to head not consistent with head mother number.
(m) Relation to head not consistent with head spouse number.
(n) Household with only one record.

ABHOYNAGAR
UPAZILA

Scale 1" = 7 miles

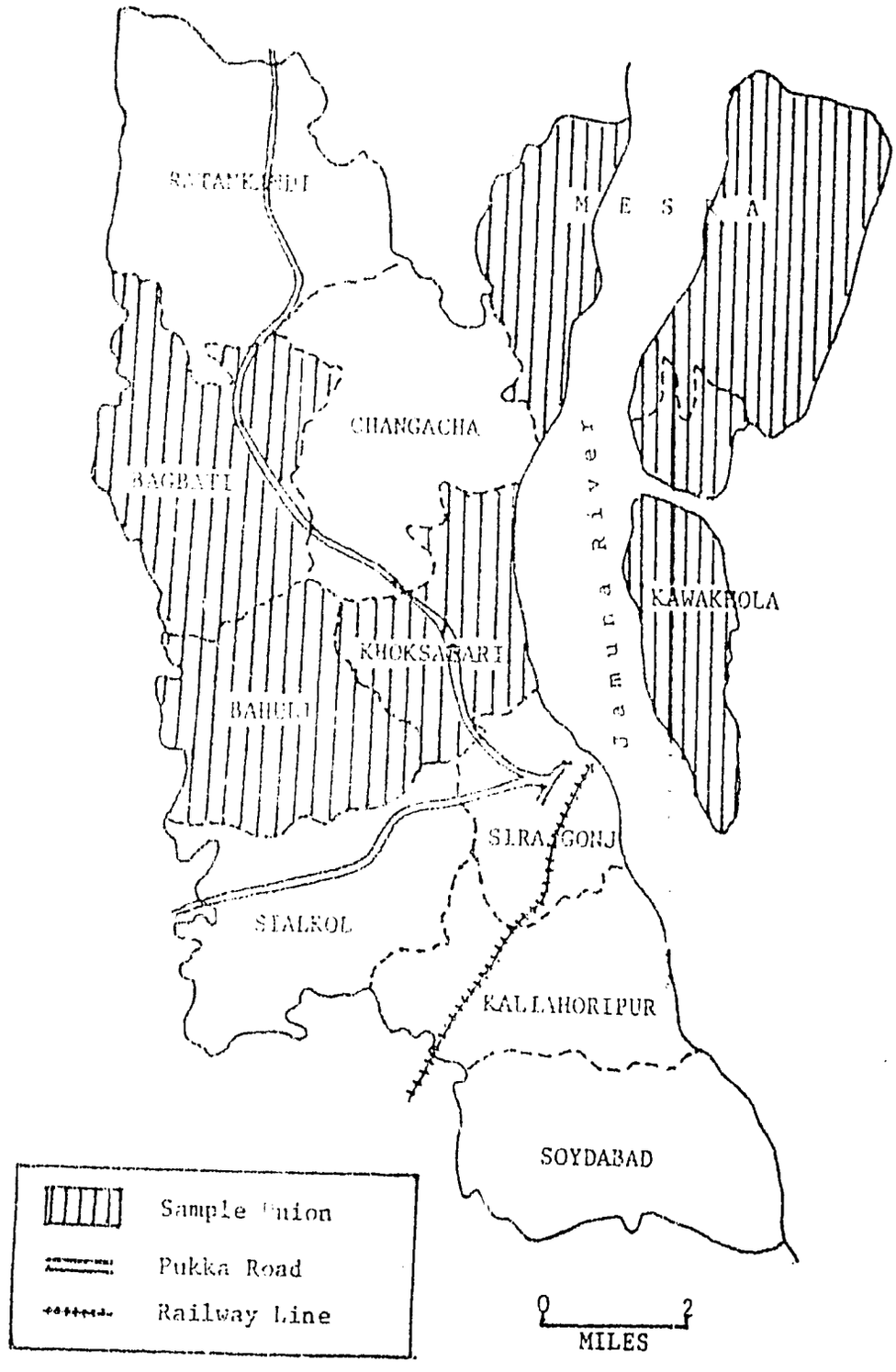


LEGEND



APPENDIX-B

SIRAJGONJ UPAZILA



GOPALPUR UPAZILA