Attachment 1. Date 7/2/95

(FACE SHEET) ETHICAL REVIEW COMMITTEE, ICDDR,B.

Principal Investigator Dr. Omar Rahman Trainee Investigator (if any) _____

Application No. 95-003 Supporting Agency (if Non-ICDDR,B) _____

Title of Study Matlab Health and Socio-Economic Survey

Project status:
( ) New Study
( ) Continuation with change
( ) No change (do not fill out rest of form)

Circle the appropriate answer to each of the following (If Not Applicable write NA).

1. Source of Population:
   (a) Ill subjects — Yes (No)
   (b) Non-ill subjects — (Yes) No
   (c) Minors or persons under guardianship — (Yes) No
2. Does the study involve:
   (a) Physical risks to the subjects — Yes (No)
   (b) Social Risks — Yes (No)
   (c) Psychological risks to subjects — Yes (No)
   (d) Discomfort to subjects — Yes (No)
   (e) Invasion of privacy — Yes (No)
   (f) Disclosure of information damaging to subject or others — Yes (No)
3. Does the study involve:
   (a) Use of records, (hospital, medical, death, birth or other) — Yes (No)
   (b) Use of fetal tissue or abortus — Yes (No)
   (c) Use of organs or body fluids — Yes (No)
4. Are subjects clearly informed about:
   (a) Nature and purposes of study — (Yes) No
   (b) Procedures to be followed including alternatives used — (Yes) No
   (c) Physical risks — (Yes) No
   (d) Sensitive questions — (Yes) No
   (e) Benefits to be derived — (Yes) No
   (f) Right to refuse to participate or to withdraw from study — (Yes) No
   (g) Confidential handling of data — (Yes) No
   (h) Compensation &/or treatment where there are risks or privacy is involved in any particular procedure — (Yes) No
5. Will signed consent form be required:
   (a) From subjects — (Yes) No
   (b) From parent or guardian (if subjects are minors) — (Yes) No
6. Will precautions be taken to protect anonymity of subjects — (Yes) No
7. Check documents being submitted herewith to Committee:
   ___ Umbrella proposal - Initially submit an overview (all other requirements will be submitted with individual studies).
   ✓ Protocol (Required)
   ✓ Abstract Summary (Required)
   ___ Statement given or read to subjects on nature of study, risks, types of questions to be asked, and right to refuse to participate or withdraw (Required)
   ___ Informed consent form for subjects
   ___ Informed consent form for parent or guardian
   ___ Procedure for maintaining confidentiality
   ___ Questionnaire or interview schedule *

* If the final instrument is not completed prior to review, the following information should be included in the abstract summary:
1. A description of the areas to be covered in the questionnaire or interview which could be considered either sensitive or which would constitute an invasion of privacy.
2. Examples of the type of specific questions to be asked in the sensitive areas.
3. An indication as to when the questionnaire will be presented to the Ctte. for review.

We agree to obtain approval of the Ethical Review Committee for any changes involving the rights and welfare of subjects before making such change.

Omar Rahman
Principal Investigator

Trainee

SECTION 1-RESEARCH PROTOCOL

1.	TITLE OF PROJECT:	Matlab Health and Socio-Economic Survey.
2.	PRINCIPAL INVESTIGATOR	Dr. Omar Rahman, RAND
	CO-INVESTIGATORS:	Dr. Jane Menken, University of Pennsylvania; Dr. Paul Gertler, RAND; Dr. Andrew Foster, University of Pennsylvania; Nizam Khan, ICDDR,B.
3.	ANTICIPATED STARTING DATE:	1995
4.	COMPLETION DATE:	2 years after starting date
5.	TOTAL DIRECT COST:	US$279,003
	ALREADY FUNDED BY:	NATIONAL INSTITUTES OF HEALTH, U.S.A.
6.	SCIENTIFIC DIVISION:	This protocol has been approved by the Population and Family Planning Division

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Signature of the Division Director

Date: 5 Feb 95

FOR YOUR ATTENTION:

This note is to inform you that this protocol has been reviewed and approved by the National Institute on Aging (NIA), with a priority score of 112 (where the best possible score is 100,--- the lower the score, the higher the priority). Funding has already been awarded to RAND/ICDDR,B with regard to this protocol. Furthermore, this project has undergone stringent Human Subjects review at both RAND and NIA. Please find attached, the comments of the NIA review panel.

SITE VISITORS
APPLICATION NO: 1 P01 AG11952-01

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MATLAB HEALTH AND SOCIOECONOMIC SURVEY (MHSS), Dr. Omar Rahman

DESCRIPTION: The proposed Matlab Health and Socioeconomic Survey (MHSS) will be a multipurpose survey. Its object is to address the following areas of concern: the effect of socioeconomic and behavioral factors on adult survival, health status, and health care utilization; the linkages between elderly well-being, kin characteristics and intergenerational resource flows; and the impact of community services and infrastructure on adult health and other human capital acquisition. The survey will collect detailed (and perhaps retrospective) information on a comprehensive set of measures of health and nutritional status, health care utilization, pregnancy history, educational status and cognitive achievement, marital status and trajectories, family ties and living arrangements, and migration patterns. It will also collect information about the family economy, ranging from detailed data on agricultural inputs and outputs to detailed employment histories and time budgets. At the community level, it will gather data on the availability, access, content and quality of infrastructure and services related to health, water, sanitation, family planning, and education.

The survey will have four sample components. The Primary Sample will consist of 5,000 households within 2,717 baris, that is, clusters of households related by blood or marriage. This sample will cover 33 percent of the total number of baris in the Matlab surveillance area. A second sample will consist of a follow-up of 900 households of women who participated in the Determinants of Natural Fertility Study (DNFS) and for whom detailed retrospective family planning and pregnancy history data already exist. An Outmigrant Sample will consist of the households of 300 female and 300 male outmigrants who left households in the Primary Sample between 1982 and the date of the MHSS and have not returned. This sample represents about 10 percent of all outmigrants

(Continued)

from the area since 1982. Finally, a Community Sample will yield information on community infrastructure and services and detailed data on 500 health/family planning providers, and health, family planning, and education facilities potentially serving the households in the Primary Sample.

Within each household, all members aged 50 and over will be included; in the 15-49 age group, the household head and the head's spouse and one randomly chosen adult; and in the 0-14 age category, only children belonging to the adult respondents will be eligible for selection and only one of these children will be chosen.

CRITIQUE: The proposed survey is expected to build upon existing data collected from the Matlab area, resulting in a very rich set of panel data for use in the analysis of adult health, health care utilization, and transfer networks. It will be a major effort designed to fill in the gaps in information about socioeconomic background, adult health, and health care utilization from the previous surveys. A very useful aspect of the design of the survey is that previous information on, say, migration and pregnancies will be printed prior to the MHSS and will be used by interviewers to prompt respondents in their recall. This is expected to aid recall, reducing the time needed for responses and enhancing accuracy, and presumably also facilitating the linking of the existing databases with the new survey data. Moreover, this prior work with existing databases could be used to identify weaknesses and existing information and point to areas where redundancies in data collection should be built into the MHSS.

The limited geographical coverage of the study to Matlab has its benefits and costs, but the benefits outweigh the costs of having a non-representative area of Bangladesh. Among its benefits, as pointed out in the proposal, is that Matlab, with its externally induced variation in community services, provides an opportunity to estimate the impact of community effects on the health and well-being of the population without having to worry about the endogeneity of those community services. In addition, collecting economic data that will complement the unique panel of demographic data that now exist for the Matlab population will likely encourage and support a tremendously interesting and important body of research in the future.

Several questions about sample design and survey instruments were raised with respect to the original proposal, but the revised proposal has responded to those questions extremely well. (1) Basing the sample design explicitly on bari is culturally appropriate since it recognizes the close links among households related by blood or marriage. The revised proposal reflects a greater awareness of the complexities of bari structure and arrangements, and includes a budget for an anthropologist to be named who will help design, validate, and analyze aspects of the instruments regarding kin relationships and resource networks. By obtaining data from two related households in each bari, where possible, the MHSS will provide an opportunity to observe the households on both ends of a transfer circuit. This would have the advantage of providing bari-specific information, but especially, extensive data on the economic, demographic, and health characteristics of both receivers and

(Continued)

senders in a transfer network. In the sampling design in the original proposal, obtaining data from two households that are economically linked through transfers is not guaranteed because both households per bari will be randomly drawn; however, in the revised proposal, the second household chosen will be headed by either the father, mother, brother, or son of the head of the first household chosen, and only if these related households are not present will the second household be chosen randomly. (Some baris chosen, however, may consist of only one household since 16 percent of all baris are of this type.)

(2) The revised proposal considers more explicitly the issue of resource transfers between Matlab households and outmigrants. The original proposal did not indicate the size of the Outmigrant Sample, but the revised proposal states that the households of 300 females and 300 males who migrated out of sample baris since 1982 will be covered by the survey.

(3) Whereas the properties of the sample design were barely mentioned in the original proposal--simply stating that sample weights will be developed to adjust for the number of households per bari--the revised proposal contains a thoughtful discussion of sampling weights, especially for units within the bari; endogeneity issues related to bari and household formation; and the power of the sample design.

(4) A new section on survey instruments clearly lays out the expected number of observations for each sample component, the proposed modules of the questionnaire, and the types of variables that will be collected within each module. Also discussed are data collection instruments and the experience of past surveys with specific instruments. There is also a new section on the development of the survey instruments which describes field operations in detail, and another one on the treatment of human subjects which was missing in the original proposal.

With the completion of the MFLS 1 and 2 and the Jamaica survey, and with the Indonesia Family Life Survey currently on the field, RAND has accumulated extensive experience in designing and conducting surveys in developing countries. The collaboration with ICDDR,B and the fact that two of the three principal investigators have had field and research experience in Bangladesh should add to the efficiency of the project, especially the in-country operations. Being able to use the ICDDR,B's network of contacts to identify interviewers, for example, would be particularly useful.

ABSTRACT

We propose to design and field a major family and community survey in Matlab, a region of rural Bangladesh in which there is an ongoing prospective Demographic Surveillance System. These newly collected data will be linked to existing demographic surveillance information and other past studies in the Matlab area, resulting in a much enhanced, unique, database (the Matlab Health and Socio-economic Survey, or MHSS). The MHSS will address the following broad areas of concern to rural adults and the elderly: the effect of socio-economic and behavioral factors on adult survival, health status, and health care utilization; the linkages between elderly well-being, kin characteristics and intergenerational resource flows; and the impact of community services and infrastructure on adult health and other human capital acquisition.

The MHSS will consist of four distinct sample components:

(a) The Primary sample consisting of 5000 households, clustered in 2717 baris. This represents a 33 percent sample of the total number of baris in the Matlab Surveillance area.

(b) The Determinants of Natural Fertility Survey (DNFS) sample consisting of a followup of 900 households of women originally interviewed about their health and pregnancy status in the mid 1970s. This represents approximately a 40% sample of the surviving 2183 DNFS women.

(c) The Outmigrant sample consisting of the households of 300 female and 300 male outmigrants who have left the households of the primary sample between 1982 and the date of the MHSS and not returned to their original households or baris. This represents approximately a 10% sample of outmigrants who have left since 1982.

(d) The Community sample consisting of information on community infrastructure and services and detailed data on 500 health/family planning providers, and health, family planning and educational facilities potentially serving (in the opportunity set of) the primary sample households in the MHSS. This constitutes a census of schools, health and family planning clinics serving the study population and a sample of individual health/family planning providers.

The ultimate objective of this survey effort is to enter into the public domain a new and unique microlevel data set for research on aging, and life-cycle changes. In particular, these new data will support in-depth analyses—not possible with existing survey data—on interrelated topics having to do with life-cycle investments in the physical, economic and social well-being of adults and the elderly.

MATLABHEALTH AND SOCIO-ECONOMIC SURVEY

Principal Investigator-- Omar Rahman

A. SPECIFIC AIMS

We propose to design and field a major family and community survey in Matlab, a region of rural Bangladesh in which there is an ongoing prospective Demographic Surveillance System. These newly collected data will be linked to existing demographic surveillance information and other past studies in the Matlab area, resulting in a much enhanced, unique, database (the Matlab Health and Socio-economic Survey, or MHSS). This dataset will support a range of analyses on aging-related phenomenon, most of which is not possible with existing survey information.

The MHSS will be fielded in 1994 in conjunction with the ongoing Matlab Demographic Surveillance System (DSS) of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). The data collection will address the following broad areas of concern to the rural elderly: the effect of socio-economic and behavioral factors on adult survival, health status, and health care utilization; the linkages between elderly well-being, kin characteristics and intergenerational resource flows; and the impact of community services and infrastructure on adult health and other human capital acquisition. Although a wealth of studies have used the DSS data and information from associated small-scale specialized studies (Annotated Bibliography of ICDDR,B Studies, 1990) , much of the research has been hampered by the lack of socio-economic data on individuals and systematic data on communities.

The proposed survey is patterned after the Malaysian Family Life Surveys, (MFLS-1, 1976-77; and MFLS-2, 1988-89), and the Indonesian Family Life Survey (IFLS, 1993) but offers a number of features that distinguish it from these surveys and other similar data collection efforts. First, we will be able to take advantage of two decades of extensive prospective health and demographic information on the study population collected by the DSS and other specialized studies in the Matlab area (Table 1 and Summary Research Plan Tables 2 and 3). These existing data will greatly reduce the burden of new recall information that needs to be collected on mortality, pregnancy, migration, and marriage patterns. The prospective surveillance information will also provide a framework of dates and events that will help structure more accurate recall of new information (e.g., work histories, asset changes). In addition, from an analytic point of view, the prior data will allow us to take into account or control for past outcome measures such as health and nutritional status. Second, this survey will collect much more detailed information on health and nutritional status and health care utilization. Third, the existence of an exogenous, or externally determined, family planning and health intervention in the Treatment area of Matlab since 1978 allows us an unusual opportunity to study the impact of community services, especially those delivered in the home, on a variety of demographic and health outcomes without having to deal with the problems of selectivity of program placement. Finally, the availability of the MHSS data in combination with the Malaysian and Indonesian Family Life Survey information, will provide an unusual opportunity to investigate the determinants of the physical, social and economic well being of the elderly across a relatively wide spectrum of socio-economic development.

The survey will take place in the region covered by the DSS in Matlab, in south central Bangladesh; this DSS population is considered to be representative of rural Bangladesh (Map 1 in Summary Research plan). The Matlab area (described in the Summary Research Plan and the Background and Significance section of this proposal) has been surveyed since the mid 1960s as part of a long-term commitment to collect detailed information on the dates of all vital events; these data are available from 1974 on as part of a linked computer database. All residents of the area are surveyed twice monthly by professional interviewers for dates of births, deaths, migrations and marriages and for current household composition. The MHSS sample will be drawn from this population.

The MHSS will consist of four distinct sample components:

(i) The Primary sample consisting of 5000 households, clustered in 2717 baris. This represents a 33 percent sample of the total number of baris in the Matlab Surveillance area.

(ii) The Determinants of Natural Fertility Survey (DNFS) sample consisting of a followup of 900 households of women originally interviewed about their health and pregnancy status in the mid 1970s. This represents approximately a 40% sample of the surviving 2183 DNFS women.

(iii) The Outmigrant sample consisting of the households of 300 female and 300 male outmigrants who have left the households of the primary sample between 1982 and the date of the MHSS and not returned to their original households or baris. This represents approximately a 10% sample of outmigrants who have left since 1982.

(iv) The Community sample consisting of information on community infrastructure and services and detailed data on 500 health/family planing providers, and health, family planning and educational facilities potentially serving (in the opportunity set of) the primary sample households in the MHSS. This constitutes a census of schools, health and family planning clinics serving the study population and a sample of individual health/family planning providers.

For the primary sample, the initial sampling unit will be the **bari**, a cluster of rural households whose residents are in many instances related by blood or marriage, and who may share resources, and engage in joint decision-making to a certain extent (Note: baris may consist of only one household (16% in 1982) and there may be sub-clusters of households within baris with weak relational ties between the subclusters--Aziz, 1979; Makhlisur Rahman, 1986; **see detailed description of bari in Summary Research plan, pg 23**). Within each bari, upto two households will be selected and within each household specific household members will be chosen as respondents-(Details about the household and within household selection process are discussed in section D of this proposal in the sampling design subsection, and in the budget justification section, task 1b-"drawing the sample"). The following data will be collected in the MHSS primary sample:

- Initially, a bari level module, which will be administered to a knowledgeable person or persons in the bari, will collect certain key socio-demographic characteristics of all households in the bari which do not already exist in the computerized Matlab records, e.g., kin relationships, physical infrastructure and assets.
- In addition to the bari module, specific respondents in the two selected households in the sample baris will receive detailed questions about family life. These will include questions about overall household socio-economic characteristics; individual level information on health status and health care utilization, marital status, education, labor force participation, migration, economic status (including transfers), fertility and proxy information on characteristics of children. Here again we will supplement and not duplicate existing information from the Matlab computerized database.
- Finally, anthropometric measurements for all household respondents, objective health status measures for respondents aged 15+, weekly physical activity and 24hr dietary recall for 15-49 year old female respondents, and measures of cognitive achievement and ability for all household respondents will also be collected.

For the DNFS and outmigrant samples, while the same kind of household information as in the primary sample will be collected, bari level information will only be recorded for households in rural areas. In addition to the comprehensive household/family level information, the MHSS will also collect extensive community information on social infrastructure and services that will be linked to the family observations. As before, in all cases the data we collect will supplement and not replicate existing data.

A noteworthy feature of the MHSS is the richness of the health status measures that will be compiled. In addition to self-reported measures of health, directly observed indicators of physical functioning will be collected for all household respondents over 15. These measures have been tested in the elderly population in the US, and are being recommended for use in a series of international

Table 1
CHARACTERISTICS OF EXISTING DATA AND NEW DATA COLLECTIONIN MATLAB SURVEILLANCE AREA

Source of data	Available information	Areas covered (sample size)	Period of followup
Demographic Surveillance System (DSS)	Dates of births, pregnancies, deaths, migration, marriages.	Treatment (96,000) and Comparison (96,000)	1968 - present (linked file-1974 on)
Record Keeping System (RKS) -Mothers -Children present	Above plus monthly contraception pregnancy and lactation status, child nutritional and immunization status, symptoms monthly.	Treatment (96,000)	1978 - present
Censuses	Age, sex, education, household size and composition, occupation, religion and household assets, land remittances	Treatment (96,000) and Comparison (96,000)	1974 and 1982 cross-sectional
YETI	Linked data 1974-1982 Censuses and DSS		
Determinants of Natural Fertility Study (DNFS)	Weight, height for women (15-49) and children (under 6), monthly. Household composition and assets in 1975.	Women in Comparison area (2,373)	1975 - 1978
Community Level Study (CLS)	Community infrastructure, distance to facilities	Treatment and Comparison areas	1978
Knowledge, Attitudes and Practices Study (KAP)	Current contraceptive use women educational attainment of children <= 15	Women in Treatment and Comparison (8,500)	1990
MHSS - Bari and Household	Kin characteristics, consumption and assets, health status and utilization, adult mortality (1982-94), pregnancy history, marriage history, work history, education history, migration history (1982-94), anthropometrics, cognitive achievement.	Primary Sample (2717 baris/5000hh) DNFS (900 hh) Outmigrant (600hh) Treatment+Comparison + outside Matlab	1994
MHSS - Community	Community infrastructure and services	Treatment and Comparison + adjacent areas (500 fac./provid)	1994

studies on aging sponsored by the World Health Organization (WHO). However, they have not been collected systematically in a developing country setting, nor have they been tested in prime age adults--(exploratory work has been done using these measures in China, Sri-Lanka, and Barhain). Our experience in Bangladesh will provide valuable insight into their performance for the WHO and future studies.

Finally, we will thoroughly edit and document the resulting datasets for wide dissemination. This linking of individual, family, and community data will enable us to assess the effects of policies and programs that operate at the community level and to better understand how the conditions surrounding a family influence its behavior.

The ultimate objective of this survey effort is to enter into the public domain a new and unique microlevel data set for research on aging. In particular, these new data will support in-depth analyses—not possible with existing survey data—on interrelated topics having to do with life-cycle investments in the physical, economic and social well-being of the elderly.

B. BACKGROUND AND SIGNIFICANCE

In the coming decades, declining fertility and increasing life-expectancy will cause populations to age rapidly worldwide, but especially so in the (mostly rural) societies of the developing world (Martin, 1988; Ju and Jones, 1989; Kinsella, 1988). Despite the trend towards an older population, little empirical data has been collected to clarify how the old are faring and how their social and economic status will change as the population ages. Indeed, most sources of demographic information on developing countries exclude old people from the population in order to maximize efficiency for the primary task of estimating recent fertility and infant mortality rates. Also most of the information on the economic status of households comes from labor force surveys and household budget surveys, which often exclude old people.

Several notable surveys have examined aging populations in Asian countries. These include surveys by the University of Michigan, Population Studies Center (UM), the World Health Organization (WHO), the United Nations University (UNU), and the Association of Southeast Asian Nations (ASEAN). Although valuable, these surveys have certain limitations. The UM project (Hermalin et al, 1990) is by far the most ambitious attempt so far to assemble data on a wide range of topics which affect the physical and social well-being of the elderly in four different countries in Asia (Philippines, Taiwan, Thailand and Singapore). While this project is a significant advance over other more topically focused aging surveys, it provides limited economic information, particularly on non-coresident kin, and focuses entirely on the elderly without any data on prime age adults, thus limiting our ability to investigate life-cycle investments in well-being. Moreover it is focused on rapidly growing economies where family networks may be increasingly less important. The WHO project greatly advanced our ability to develop valid and reliable measures of health status, however, it does not provide adequate data for analyzing the socio-economic determinants of well-being (Andrews et al., 1986); the UNU project focused only on social support networks and had small sample sizes (300 persons over age 60); and the ASEAN project (Ju and Jones, 1989) had little information on family resource networks. While these surveys represent important first steps toward understanding the well-being of the older population, they typically do not contain enough information to assess the behavioral processes that must be analyzed for governments to develop fully informed policies.

With respect to Bangladesh, little data exists on the physical, social and economic functioning of the elderly. The MHSS will fill this gap. The MHSS will be multipurpose, collecting a broad array of socio-demographic information on individuals, families and communities. We are guided in this approach to data collection by a methodological framework that views families as making behavioral choices which affect the welfare of the elderly. This conceptual approach is quite broad and incorporates demographic and biological processes as being of critical importance. Central to our view of the family decision-making process is that families make choices rationally, given the resource constraints that they face and the information that they have. This view, described in the Summary Research Plan, has important implications for data collection; principal among them being the breadth of data needed to adequately analyze different influences on family behavior.

In recognition of the fact that decision-making and resource networks in developing countries (and particularly in rural Bangladesh) often span across conventionally designated households, the initial sampling unit (for the Primary Sample) in the survey is not the household but the extended family network, approximated in part by the bari in rural Bangladesh (Aziz, 1979; Caldwell et al., 1982; Makhlisur Rahman, 1986; Foster, 1993). Within each selected bari, we will collect information on bari-level relationships and resources. Additionally upto two households within the bari will be selected and specific household members chosen as respondents. All adult respondents from these households will be administered a detailed set of socio-economic and demographic questions. Several important dimensions of well-being—which are lacking from most surveys—will be collected by the MHSS (e.g., comprehensive measures of health and nutritional status, economic status, and family support network, including transfers). Proxy information for selected children aged 0-14 in the household will also be gathered. In addition we will collect anthropometric, health and cognitive ability data on all household respondents including children, adults and the elderly. We will build on RAND's extensive research experience in the United States, Jamaica, Malaysia, Indonesia and elsewhere, adapting indices of health and functional status and economic status that have proved to have desirable psychometric properties (replicability, external validity, and discriminatory power). By linking these individual level data with information obtained about the extended family, and the community in which the

family lives, we will build a comprehensive database that will enable researchers to examine in detail the physical, social and economic well-being of the elderly.

General Study Site Background

Bangladesh (and in particular the rural sector) is a country with limited economic resources, high fertility, high mortality and morbidity and low educational attainment. Environmental hazards are high, community health and educational infrastructure is poorly developed and alternative sources of support, financial and otherwise (outside the family) are scarce. Bangladesh has a current population of 109.1 million (the seventh largest in the world) with a per capita GNP of US$180. The annual population growth rate is 2.2% and life expectancy at birth is 56.4 years for males and 55.4 years for females. Literacy rates are approximately 31.0 percent for males and 16.0 percent for females. Per capita public expenditure on health is about US$1 per annum, and there are an estimated 5762 persons per physician and 3347 persons per hospital bed. Relatively little economic growth has occurred in the last two decades, particularly in the rural areas where agriculture is the main economic activity, but an increasing portion of the population has no cultivable land (about 30% in 1981 according to the Bangladesh Bureau of Statistics, 1991).

In Bangladesh in 1988 there were 7.89 million people over the age of 55 (7.2% of the population) and 3.25 million individuals over the age of 65 (3.0% of the population). By the year 2020, the analogous figures will be 23.17 million over the age of 55 (11.5% of the population) and 9.07 million over the age of 65 (4.5% of the population). This translates into a growth of 59.7% for the proportion over 55 and 38.6% for the proportion over 65 (Kinsella, 1988). This aging of the population, an experience shared by other developing countries, has major implications for both families and government policies. Most government programs and infrastructures in Bangladesh (as in the rest of the developing world) are targeted largely toward children and young adults and are currently unable to meet the increasing needs of the older populations. Social security and pensions in Bangladesh (as in the case of other developing countries) cover a very small portion of society (Martin, 1988; Ju and Jones, 1989). By and large, older people will have to depend heavily on their families for financial support after retirement and for informal care during periods of illness.

Although the macro-level data give us a broad-brush picture of rural Bangladesh, little specific information exists about the elderly and their lives. One of the few studies to specifically focus on the state of the elderly in rural Bangladesh was conducted by Omar Rahman, one of the principal investigators of this Program Project. He used longitudinal data from the Matlab Demographic Surveillance System to show that marital status and family structure have a significant impact on elderly survival in rural Bangladesh. Specifically, the currently married live much longer than their widowed, divorced or single counterparts and the presence of a co-residing son significantly improves survival, somewhat more so for women than men (Omar Rahman, 1990; Omar Rahman, Foster and Menken, 1992). Despite controls for age, sex, marital status, household assets and the presence of a co-residing son, the currently married have a persistent and significant survival advantage, which remains unexplained. Further analysis of these mortality differentials was precluded by the lack of adequate data on socio-economic status, health status, presence of non-coresiding sons, family support networks, and information on socio-economic change associated with changes in marital status.

Other notable studies that have examined the lives of the elderly in rural Bangladesh include work by Mead Cain. Cain has used cross-sectional village level data to provide a descriptive picture of the state of the elderly (Cain, 1985; Cain, 1991). His recent work indicates that agricultural labor force participation rates for males fall off fairly sharply after the age of 50, which suggests that the elderly are increasingly dependent on others for support. This is consistent with his earlier work which suggested that elderly survival in rural Bangladesh is significantly affected by the presence of surviving adult sons who live in the same bari. Although these results are valuable and intriguing, due to the lack of specific information about the wide range of factors affecting elderly welfare (e.g. health status, financial status, educational attainment, family resource networks, community resources), and the absence of longitudinal data, they do not provide a comprehensive picture of the complexities of elderly well-being in Bangladesh. This necessitates the collection of detailed, longitudinal micro-level data (as we have proposed) to study the links between the demographic decisions of individuals, their families and the community at large.

Distinctive Features of the Survey Data

Cross-Country Comparisons. A singular characteristic of the proposed Bangladesh survey data is that in conjunction with the data collected in Malaysia (MFLS-1, MFLS-2) and Indonesia (IFLS), we will have the opportunity to explore aging related phenomenon across a relatively wide spectrum of socio-economic and demographic development. Bangladesh, Indonesia and Malaysia represent very different stages of economic and demographic transition, with different socio-economic environments. All three countries have significant Muslim populations which are influenced to varying degrees by Islamic cultural norms and notions about family responsibilities. Thus comparative studies of these societies promise intriguing results about how the elderly and their families adapt to different external constraints.

Matlab Demographic Surveillance System. A unique feature of this data collection effort is that it is being carried out in a population where there is an existing Demographic Surveillance System (DSS) which has been collecting prospective information on vital events (dates of birth/pregnancy, death, migration and marriage) for the last twenty years in the form of a linked computerized database. Every household in the surveillance area is visited on a fortnightly basis. We thus have access to precise, objective longitudinal information for many demographic events. This significantly reduces our reliance on subjective retrospective data which may suffer from recall biases. The availability of exact dates on various life transitions (births, deaths, marriages, migrations) also provides a structured calendar which will facilitate recall of new information on topics such as work histories, asset changes, details of migration decisions.

The association with an ongoing surveillance program offers several other distinct methodological advantages: an uncommonly clean sampling frame for our survey, an experienced field organization, and a respondent population that is accustomed to the rationale for participating in socio demographic research. One especially noteworthy aspect of this prospective surveillance data is that it will allow us (in subsamples), to validate retrospective recall of demographic events histories, which are increasingly being used in developing country surveys. The existence of prospective mortality and migration data also provides us an unusual opportunity to examine the impact of mortality and migration selection in confounding cross-sectional differentials in health status among various groups. Furthermore, the ongoing nature of the DSS allows us (in future research projects) to examine the impact of current indicators on demographic outcomes such as survival, fertility and migration without any future expenditure of data collection resources.

In addition to the surveillance information, we will use data collected in previous censuses (1974, 1982) and in specialized surveys of the surveillance population (Table 1). The existence of past census data on household assets, educational attainment and other indicators of socio-economic status in conjunction with data on health and nutritional status from specialized surveys will allow us the relatively rare opportunity to examine longitudinal trends in physical, social and economic well-being (Annotated Bibliography of ICDDR,B Studies, 1990;--see discussion of existing data in Matlab, and Tables 2 and 3 in Summary Research Plan).

One of the most novel features of our data collection in Matlab is the fact that 50% of the proposed study population was exogenously assigned to a family planning intervention area in 1978 (MCH-FP). This treatment/control experimental design has very significant implications for our ability to assess the impact of community interventions on demographic and health outcomes, an issue of enormous policy importance. In recent years a number of studies (including MFLS-1, -2, IFLS and The World Bank sponsored Living Standards Measurement Surveys) have collected extensive data on community infrastructure and services with a view towards investigating the impact of such public investments on the well-being of target populations. However, due to the possibility of non-random placement of community programs, estimation of pure community effects has been problematic. The Matlab study population, with its externally induced variation in community services, provides us a rare opportunity to estimate the impact of community effects on the health and well-being of the population without having to adjust for selectivity biases.

Specific Research Applications of Proposed Data Collection

Because the potential research uses of the data collected in this survey are a primary criterion for gauging the importance of the program project, we briefly describe some special and somewhat unique applications of the proposed data collection. These topics are discussed more specifically and in more detail

in the individual proposals.

Project 2 —Adult Ill Health and Health Care Utilization. A number of aspects of the data collection have special bearing on Project 2. We will obtain hitherto unavailable population level data on a variety of measures of adult health status: (i) directly observed measures of functional disability; (ii) self-reported measures of difficulties with activities of daily living (ADLs) and self reported general assessments of health; (iii) self reported duration of symptoms and days of illness. While the latter two types of health measures have been used in some recent aging surveys in Asia, little information exists about their applicability is assessing the health status of prime age adults. A distinctive feature of the health data collected in this survey is that we will be one of the few surveys to collect multiple observations on health status in the same family (parents, children, siblings), allowing us to control for family level heterogeneity.

We will collect extensive data on individual, household and family level measures of financial resources, inter-generational support and social networks. This level of detail on family networks and their economic resources, which has rarely been available in other studies, allows us to examine the impact of these factors on health outcomes and utilization.

Another special feature of the data collection is the detailed information on community health infrastructure availability, content and quality, as well as the data on time and money costs of transportation. These data will be used to examine health care utilization and health status. This marriage of community level and family level information provides us with a powerful tool to understand how decisions about health are made.

One final advantage of this data is that our access to prospectively collected data on mortality in the DSS will allow us an unique opportunity to correct for mortality selection in the examination of differentials in health status.

Project 3—Women's Health and Nutritional Status. Previous research on the relationship between fertility and women's health has been hampered by the lack of detailed socio-economic data, comprehensive measures of morbidity (or health status) and precise information on pregnancy and lactation histories. Project 3 will utilize a number of special aspects of our data collection:

- The wide variety of health status measures mentioned above in addition to the anthropometric data and estimates of time to sterility on females allows us to examine a greater range of women's health and nutrition outcomes than has been possible in earlier studies.
- Our access to prior measures of health and nutritional status for a subsample of women (described in detail in the sampling section) allows us to control for past health status, an important and rarely available determinant of current health status .
- The comprehensive information on pregnancy/lactation histories will help characterize the impact of pregnancy related processes on later health more precisely than has been possible in other studies. This is particularly true for 1/2 the primary sample for whom we have prospective data on pregnancy/lactation/morbidity since 1978--(see Summary Research Plan, Tables 2, 3).
- The detailed information on economic status of women and their families in this survey helps us control for socio-economic factors more completely than was possible in earlier studies of this issue.
- The presence of externally induced variation in family planning services in Matlab (through the institution of the family planning intervention project in 1978) provides a rare opportunity to examine program effects on health and demographic outcomes without having to worry about the potential selectivity of program placement.

Project 4—Human Capital, Migration and Inter-generational Transfers. Project 4 uses the extensive information that will be collected on child anthropometrics, cognitive achievement and educational attainment to examine inter-generational investments in health and education. The detailed data available on household structure also allows us to examine the impact of living arrangements on investments in health and education. Data of this type have not been available before. In addition the availability of extensive community level information on family planning, maternal and child health services allows us to control for community effects much more precisely than has been attempted prior to this analysis.

In addition to the above, the MHSS data will allow analysts to investigate other research topics concerned with family decision-making in developing countries, with particular relevance to the elderly.

These include: (i) a prospective investigation of the impact of initial health status on subsequent survival since. The currently collected information on health status will serve as a baseline or initial state and prospective information on deaths can be retrieved from the routine surveillance for difference periods of followup; (ii) a study of the determinants of elderly living arrangements and kin support, because the MHSS will have unusually rich data on kin characteristics and levels and amount of transfers; (iii) an investigation of the determinants of migration decisions and their consequences due to the detailed information available on dates and destinations of out- and in-migration and the characteristics of individuals involved in these processes.

The above examples are illustrative of the range of analyses that can be conducted using the MHSS. Given the richness of the data, we expect it to support a wide variety of research investigations.

C. PRELIMINARYSTUDIES

The Summary Research Plan of the Program Project Proposal in Section One includes biographies that describe in detail the research background and qualifications of project staff. In addition it describes both the institutional settings and resources that will support this project. We highlight below the relevant institutional and individual survey-related experience present in this Program Project.

Survey Research Experience at RAND:

Since the 1970s, researchers at RAND have invested heavily in collecting data and developing appropriate survey methodologies to permit quality research on household behavior. RAND staff have designed and conducted the First and Second Malaysian Family Life Surveys (**MFLS-1, MFLS-2--Jones & Spoelstra, 1978; Haaga et al., 1993**), which document in detail the characteristics and life histories of 1262 Malaysian families and describes the characteristics of their communities as well. Following in the tradition of MFLS 1,2, researchers at RAND are currently preparing to field the **Indonesian Family Life Survey (IFLS)** in conjunction with Lembaga Demografi at the University of Indonesia. This survey, (headed by Paul Gertler) and funded by the National Institute of Child health, will sample 7000 households across Indonesia. In the IFLS, all households will be interviewed regarding household composition and the socio-economic characteristics, economic activities, and income of selected household members. The data collected for the adult respondents will include detailed information on health status, retrospective histories of marriage, migration, household characteristics, work and training, education, family background and kin networks (including location and frequency of contact with relatives), and transfers to and from respondents' immediate family. In the case of ever-married female respondents, the questionnaire will provide a detailed retrospective pregnancy history with data on pregnancy outcomes, contraception, and child mortality. Anthropometric measurements (height and weight) will be taken for all household respondents including children, adults and the elderly.

In addition to the household level data, extensive community-level information (both past and current) will be collected as part of the IFLS on health services and family planning clinics, contraceptive availability and use, educational facilities, community water supply and sanitation, and public utilities and transportation.

Apart from the IFLS, RAND is currently involved in the **Indonesian Resource Mobilization Study (IRMS)**, a major longitudinal, controlled randomized health care experiment, which examines the impact of price changes on health care utilization and outcomes in the Indonesian provinces of East Kalimantan and West Nusa Tengarra. IRMS has collected extensive data on a variety of measures of health status, socio-economic status, health care utilization, and the content and quality of community health care infrastructure and services.

Individual Experience:

The extensive individual and institutional experience accumulated at RAND via the conduct of comprehensive health and socio-economic surveys in a number of developing countries is a particular asset for the currently proposed data collection. RAND brings to this project staff members well versed in the complexity of such surveys.

Omar Rahman (MD, 1983, Northwestern University; MPH Health Policy, 1987, Harvard University; DSc Epidemiology, 1990, Harvard University) is a physician and a demographer with extensive experience with data from developing countries and particularly the Matlab surveillance area in rural Bangladesh, where the

proposed survey is to be conducted. His study of marital differentials in adult mortality in rural Bangladesh (using the same study population) is one of the first comprehensive analyses of adult mortality in a developing country setting. He is currently involved (as part of a Special Emphasis Research Career Award from the National Institute on Aging) in designing and fielding a survey of a 1000 elderly individuals in the same study area to examine the impact of family networks on the well-being of the Elderly. In addition he has successfully designed and fielded a pretest of a questionnaire that covers many of the same topics as the proposed survey on a group of approximately 200 elderly in the Matlab Surveillance area. Furthermore he is a native speaker of Bangla.

Paul Gertler (PhD Economics, 1985, University of Wisconsin) is an economist who has had extensive experience with surveys. As mentioned above he is the principal investigator of the IFLS and the IRMS. He has also headed major survey research projects on maternal and child health and the health status and health care utilization of the older population in Jamaica. He has been a key participant in the design and evaluation of the Living Standards Measurement Surveys, funded by the World Bank. In addition to the above, his research includes work on health care financing and utilization in Cote d'Ivoire, Peru, Pakistan, and China.

Theodore Downes-Le Guin (MA Applied Social Research, 1990, University of Michigan) of the RAND Survey Group is a survey methodologist with experience in questionnaire development, survey management and analysis. He is experienced in advanced questionnaire design and pretesting techniques and has overseen questionnaire development and data collection procedures for the IFLS and IRMS. For these studies he used cognitive interviewing techniques, behavior coding and focus groups to arrive at culturally-appropriate wording. In addition, he has worked with the data collection contractor to design field procedures and quality control to meet international standards for standardized personal interviews in Indonesia.

Christine Peterson (MA Economics, 1979, University of Southern California) is a senior quantitative analyst with extensive experience in data management and creation of public use data for complex files. Currently, Ms. Peterson is the associate director of a Data Core for an existing Program Project at RAND (Family in Economic Development), and has been responsible preparing, documenting and maintaining various databases for use by center projects and for public release. These databases include MFLS-2 and the IFLS. For the MFLS-2, Ms. Peterson has also conducted extensive data cleaning and verification as well as data quality analyses to examine recall bias, attrition bias and reported demographic trends versus vital statistics data.

John Adams (PhD Statistics, 1990, University of Minnesota) is a statistician with extensive experience in sampling issues in multi-purpose surveys. He is currently involved in designing the sampling scheme for the IFLS which shares many sampling design features with the proposed MHSS.

Ron D. Hays (PhD Psychology, 1984, University of California at Riverside) is a Senior Social Policy Analyst at RAND. He has developed and validated a large array of self-administered measures of health, health-related concepts, and styles of care. This work is documented in over 70 articles and book chapters.

Stephen Klein (PhD Industrial Psychology, 1965, Purdue University) has been a Senior Research Scientist at RAND for the last 18 years with a particular focus on education issues. Dr. Klein's educational research has included developing measures in several fields, such as art, law, science, and teaching. Dr. Klein is currently leading a $2.5 million project for the National Science Foundation that is studying alternative ways of measuring student achievement in science.

Anthropological Consultant: We will also consult an anthropological expert knowledgeable about kin networks in Bangladesh and in particular the role of the bari, the extended clan or "gushti" and their socio-cultural ramifications in the Matlab population (see Summary Research Plan, pg 40).

Survey Research Experience at the Population Studies Center at the University of Pennsylvania:

The Population Studies Center at the University of Pennsylvania has a long history of involvement in the design and analysis of data from developing countries, especially in Africa and Asia.

Jane Menken (PhD Sociology and Demography, 1975, Princeton University) , director of the Population Studies Center at the University of Pennsylvania, has carried out collaborative research involving Matlab and the DSS for over 20 years. She spends one to two months at ICDDR,B each year. She was a consultant on the design of two of the studies we plan to link to the MHSS: the DNFS in the mid-1970s and the 1990

KAP study. She has analyzed various aspects of fertility using the DNFS mortality data and child-survival using DSS data. Through her chairmanship of the ICDDR,B Social Science Advisory Council and the Expert Advisory Committee on the ICDDR,B-BRAC Collaboration, she has helped guide a variety of data collection and analysis efforts. Her experience and close ties to ICDDR,B will facilitate collaboration among the three institutions involved in this Program Project and help in the linkage of the various datasets that is crucial to the success of the Project.

Andrew Foster (PhD, 1988, University of California at Berkeley), an economist at the University of Pennsylvania, has extensive research experience in Bangladesh. He has been undertaking collaborative work with researchers at ICDDR,B since 1982 and has made six visits to ICDDR,B over that period. He also lived in the country for three years and can read and write Bangla. His experience with the analysis of longitudinal household survey data in Bangladesh and other developing countries provides a useful background for evaluating questionnaire design. Of particular relevance is his work with anthropometric and illness data from Bangladesh, India and the Philippines; on household partition in Bangladesh; and on adult mortality in Bangladesh. His experience with ICDDR,B data, including the 1974 and 1982 censuses, the contraceptive data from the MCH-FP program and the DNFS, will prove useful in insuring that the proposed survey can be combined with existing data to create a panel. He has contributed to a number different data collection efforts at ICDDR,B, both informally and as a member of the ICDDR,B Social Science Advisory Council.

Survey Research Experience at ICDDR,B:

The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) is the leading center of population research and training in Bangladesh, and one of the premier demographic Research Institutes in the developing World. ICDDR,B and its staff have considerable prior experience in all aspects of training, research, and survey design and implementation relevant to this project. The Matlab DSS organized under its aegis collects comprehensive prospective data on vital rates (dates of births, deaths, marriages, migration etc.) on a population of about 192,000 individuals,. This is the largest such system of its kind in the world. It has been in operation for over 25 years (with a linked computerized database covering approximately 20 years) and is the source of perhaps the highest quality population level data from a developing country setting.

In addition to the continuous demographic surveillance, numerous specialized surveys have been designed and fielded by the ICDDR,B staff. ICDDR,B has extensive field survey capabilities that are backed up by data management and computing facilities, that are at par with major research institutions in the US. The key staff at ICDDR,B who will be working on this project bring considerable expertise in survey design, questionnaire development and survey implementation in Bangladesh.

Mizanur Rahman (PhD Population Dynamics, 1990, Johns Hopkins University) is a senior staff demographer at ICDDR,B and will serve as the survey Director on behalf of ICDDR,B in Project 1. In addition he is also a co-investigator in Project 3. He has intimate knowledge of the Matlab DSS, and has designed, fielded, and analyzed numerous studies in the surveillance region, focusing particularly on gender differences in child mortality and birth interval dynamics. He has recently completed a post-doctoral fellowship (funded by the Hewlett Foundation) at RAND, and is now back at ICDDR,B. He is also currently the principal investigator in a project where he is collaborating with Julie DaVanzo from RAND on a separate survey in Bangladesh which investigates the impact of development programs on fertility and health.

Michael Strong (PhD Economics, 1980, Cornell University) will serve as an advisor to the Project. He is also a co-investigator on Project 2. He is currently the Associate Director of the Population Science Extension Division at ICDDR,B and is the director of the Matlab DSS. He has had extensive experience with data management and analysis of large data sets. Prior to his current position, he was a faculty associate of the Center for Population Studies at the University of Pennsylvania where he was involved in the 1910 US Census project. His research interests are in the area of adult health and its linkages with child health.

M. Sardar (BA Public Policy) who will co-ordinate the logistics of the field survey activities (interviewer recruitment, supplies etc.) for the MHSS in Project 1, is the current field data supervisor of the Matlab DSS, a post which he has held for the last 25 years. He is intimately familiar with all aspects of data collection in the field and is directly responsible for the logistics of the DSS. In addition he has supervised the fieldwork for the censuses of 1974 and 1982 and has been involved in numerous specialized studies.

Preliminary Work

Members of RAND, the Population Studies Center at the University of Pennsylvania, and ICDDR,B have undertaken substantial preliminary work to prepare for this survey. Omar Rahman has made several trips to Bangladesh to discuss the specifics of the survey with Strong and other ICDDR,B staff. Omar Rahman has also successfully designed and fielded a pretest of a survey of the elderly (with a more limited scope than the proposed data collection) in the fall of 1991, in the Matlab Surveillance area. Furthermore he will be in Bangladesh for a substantial period during the pretest and fielding of the survey. Mizanur Rahman, the survey project director from ICDDR,B has been heavily involved in the planning and conceptualization of the MHSS, during his tenure at RAND. Foster has also traveled to Bangladesh to discuss survey issues with the ICDDR,B researchers. Menken regularly spends one to two months each year at the Centre and chairs an advisory group for research collaboration between ICDDR,B and a non-governmental organization, the Bangladesh Rural Advancement Program (BRAC) that is beginning to work in the DSS area.

The project staff will receive assistance from an advisory group to be comprised of experts in the areas of family networks, inter-generational transfers, living arrangement, health status and health care utilization, and other aspects of the physical, social and economic well-being of the elderly, as well as experts on the Bangladesh setting.

D. EXPERIMENTALDESIGN AND METHODS

The MHSS has a number of characteristics that make it an important undertaking from both a scientific and policy perspective. These include: (1) a long recall period for many life events; (2) linkage of fertility, marriage, living arrangements, and other demographic data with detailed data on economic activities and incomes of all household respondents; (3) linkage of household-level data to community-level data on public services and economic infrastructure; (4) the collection of intergenerational data; and (5) linkage to a number of pre-existing prospective data sources from the Matlab area. This is particularly valuable as it allows us an opportunity to validate retrospective recall with prospective data.

The long recall period is important in examining the effects of changes over time in both intervention programs introduced either by the government or non-governmental organizations and household decisions and events. The older cohorts in the sample will be describing their lives in a world that predates, for the most part, demographic, epidemiologic, and economic transitions; the younger cohorts will be reporting on corresponding events and their decisions in a very different demographic and economic regime. This variation will make possible analyses of both persistence and change in the social and economic factors affecting a wide range of family decisions, from family formation and child health to labor market behavior and migration. Experience with MFLS 1,2 suggests that retrospective data can be successfully collected and shows trends and relationships like those in non-retrospective data for major outcomes of interest including, wages, assets, survival, fertility and migration. Recent evidence from contraceptive prevalence surveys in Bangladesh suggests that retrospective recording of fertility events fits well with prospective fertility information. Furthermore in the context of the MHSS, the data retrieval process is greatly facilitated by the presence of existing prospective information on many of the issues of interest in this study population.

Simultaneous collection of data on both demographic and economic characteristics considerably broadens the scope of analyses we can conduct. Surveys that have focused on a single topic, e.g., fertility, employment, or the elderly, or which collect primarily demographic data with little economic data or vice versa, are more limited. By collecting community-level data, we further expand the potential of these data for addressing policy issues. The communities where people reside present important constraints and opportunities for individuals. In addition, these community-level characteristics are often the factors most susceptible to influence by policy. By joining community and individual data, researchers can understand better how surrounding conditions influence family behavior and can assess the value of potential policy instruments that operate at the community level.

The collection of intergenerational data makes possible analyses of the relations between generations in the same family. Nearly all previous surveys of the elderly (for example, the ASEAN aging study in Indonesia), focus on the older population and do not collect much, if any, information about the

characteristics of their coresident or non-coresident kin. This drastically limits analyses that can be done concerning, for instance, transfers to the elderly or their health status.

Finally the availability of pre-existing data sources allows us to analyze current outcomes, with controls for past characteristics of individuals, households and communities.

Overview of Survey Design

As discussed above, the goal of the proposed survey is to build upon and complement the DSS, RKS and other Matlab datasets. Existing databases will allow us to:

- reconstruct detailed life histories without collecting the data over again;
- prompt respondent recall of events in new domains with events from other domains (e.g., using pregnancies to help recall employment status at different times); and
- conduct small-scale studies of recall bias by re-collecting DSS/RKS data and comparing previous and current reports.

Where computerized Matlab data are available, we will not collect duplicative data (except for the validation exercises mentioned above). Instead, we will use the computerized data to provide a baseline on top of which we will collect enhanced information and to prompt recall in new life history domains. The existing Matlab computerized database information will be pre-printed on questionnaires before interviewers enter sample baris/households and interviewers will use previous responses as a prompt. For example, interviewers will come prepared with a listing of migration events for household members and will simply collect additional data above and beyond the dates and basic information recorded in the computerized database.

The MHSS will be similar in scope to RAND's family life surveys in Malaysia (MFLS-1 and -2) and Indonesia (IFLS and IRMS), except that, as described above, we will have the benefit of an extant, up-to-date sampling frame recording household composition, migration history, and statistics on age, sex, current marital status and pregnancy histories of all respondents. This survey will significantly enhance the current Matlab database by incorporating newly collected detailed information at the individual, household, bari and community levels. This resulting dataset will yield an enriched source of data for a wide variety of analyses.

The substantive content of the MHSS will include at the bari, household and individual levels the following types of information: (cf subsequent section on SURVEY INSTRUMENTS for further details).

- a bari level module, which will be administered to knowledgeable persons in the bari, and will collect certain key socio-demographic characteristics of all households in the bari, e.g., kin relationships, physical infrastructure and assets. While the bari information will always be collected for the primary sample, for the DNFS and outmigrant sample it will only be collected for households in rural areas.
- a household level module, which will be administered to the household head/spouse and will collect basic demographic characteristics of all household members, total household consumption, income and assets;
- an individual health module which will collect health information, including self-reported ability to perform activities of daily living (ADLs), symptoms experienced during the last four weeks, and health care utilization for all household respondents aged 15 years and older;
- an individual life-history module which will collect information on marriage, migration, education, employment, transfers and individual finances for all household respondents aged 15 years and older;
- an individual fertility module which will collect fertility histories for all ever married female household respondents;
- an individual child characteristic module which will collect, for all household respondents younger than 15 years, proxy information (from mothers and caregivers) on education, child care, morbidity and health care utilization;
- an objective health status module which will administer physical performance tests of gait, balance and strength to all household respondents aged 15 years and above.
- an anthropometric module which will measure anthropometrics for all household respondents;
- a cognitive testing module which will administer tests of general cognitive ability and culture specific verbal and mathematical achievement to all household respondents

- a physical activity and dietary module which will collect information on average weekly physical activity and 24 hr dietary recall for all female household respondents aged 15-49 years;

SAMPLE DESIGN

Overview: The Matlab Surveillance area has a total population of approximately 192,000 individuals in 149 villages, encompassing an area which is 18 miles wide and 11 miles long, about 45 miles south east of Dhaka the capital of Bangladesh. Since the late 1960s, ICDDR,B has operated a demographic surveillance system (DSS) in this area. Linked computerized records however are available from 1974 on. ICDDR assigned blocks of contiguous villages in the DSS area to be in either a (i) comparison area, which receives government family planning and health services; or (ii) a treatment area, which, since 1978, has had family planning interventions and, since 1982, expanded maternal and child health service. The treatment and comparison areas are comparable in size, with roughly 96,000 individuals in each. In addition to the regular population surveillance in both areas, additional data have been collected on contraceptive use and continuation, pregnancy status as assessed by presence of menstruation, and lactation status for all women ages 15 to 49 in the treatment area only.

The compact nature of Matlab makes a simple sampling design practical and efficient. The small geographical area, compared to more dispersed study regions, removes the need for any kind of multiple stage cluster sampling. The **primary sample** of the MHSS (as opposed to the other three components of the MHSS, the DNFS followup sample, the Outmigrant sample and the Community sample) will consist of a probability sample of 2717 baris in the Matlab surveillance area in both the treatment and comparison areas. The bari is the basic unit of social organization in rural Bangladesh and in Matlab in particular. Baris usually consist of a cluster of households linked in many instances in a kin network-(note however that about 16% of baris consist only of a single household and even in multi-household baris, kin networks may exist only for sub-clusters of households). Sampling baris rather than households provides a better representation of family networks, a major focus of the program project, and gives us the opportunity to collect data on common bari resources. Within each bari, we will select upto two households for detailed interviews and within households we will interview selected respondents.

Key features in the proposed sample design for the **primary sample** are as follows:

- The sampling design will be a stratified random sample with the bari as the primary sampling unit (PSU). The allocation of sample size to strata will be proportional to the number of baris in the strata. The Matlab region will be divided into two roughly equal strata (in terms of households and baris): (1) Matlab treatment area; (2) Matlab comparison area. For bari level analyses the sample will be self-weighting.

  The sample of baris will be drawn from the DSS 1994 sample frame. Baris will be randomly sampled from the treatment and comparison frame. In each bari we will obtain information on bari-level characteristics from a knowledgeable member or members of the bari (we recognize the possibility that there may be subclusters of households within the bari, and we may need the help of more than one individual to get the core bari information).

  In addition to getting bari level information, we will sample up to two households in each bari. The net (interviewed) sample will thus consist of 2717 baris and 5000 households.
- As noted above, within the bari we will select up to two households. For baris with two or fewer households, all households will be chosen. For baris with greater than two households, the first household will be chosen at random; the second household will be selected from the bari in order of preference as follows: (i) The household of the father and/or mother of the head of the first sampled household (ii) A randomly chosen household containing a brother of the head of the first sampled household (iii) A randomly chosen household containing a son of the head of the first sampled household (iv) A second randomly selected household.
- Once the two households in the bari are selected, respondents within each household will be chosen in three age strata. (i) **All** household members 50 years and above will be chosen as respondents. (ii) From the pool of household members aged 15-49, if there are two or less we will pick all. If there are more

than two, the following strategy will be employed: If an individual is the household head or the wife of an household head, then that individual will always be chosen. In addition to the household head and or spouse, another individual 15-49 will be chosen at random along with their spouse if present. At this stage if we have two 15-49 year old respondents we will stop. However if we have only one respondent in the 15-49 age group and there are other 15-49 year old individuals in the household, we will pick another at random along with their spouse if present. (This will lead to a maximum of 4 adult respondents in the 15-49 age group); (iii) Among the pool of children in the household aged 0-14 years, all those sharing a parent will be pooled together in the same sibling group. Only sibling groups whose parent has been selected in rounds 1 or 2 above are eligible for selection as child respondents. From those eligible, one sibling group will be chosen at random and from within that group upto two siblings will be chosen. If that group has only one child, then another sibling group from the eligible pool will be chosen. Here again upto two siblings will be chosen. (This will lead to a maximum of 3 child respondents aged 0-14 years).

This within bari and within household sampling scheme is designed to achieve two objectives: (i) First, it will oversample elderly individuals for whom we have a complete set of covariates; (ii) Second, it will oversample the most important resource networks for individuals in this population, that of parent-child and of siblings. In addition the rationale for the within household sampling scheme is based on (i) resource constraints (interviewing all household respondents will not be feasible based on IFLS pretests and recent surveys done in Matlab by the Bangladesh Rural Advancement Committee [BRAC]); (ii) the desirability of getting an enriched sample of the elderly (50+) within the household; and (iii) the desirability of getting spouse pairs and parent child pairs within the household . The latter consideration is based on our desire to investigate pooling of family resources and family level heterogeneity in health anthropometric and cognitive achievement and ability.

Given the relative complexity of the within bari and within household sampling schemes described above, it is important to note that, the interviewers will not have to deal with sampling procedures and will have the appropriate baris, households and household respondents already identified before going to the field. The existing Matlab database already has a complete within household relationship roster. As the first stage of our sample definition, after drawing the bari sample, we will conduct a survey of relationships between heads of all households in the sample baris using the regular surveillance schedule of fortnightly visits. This between household head link in conjunction with the within household relationship roster will allow us to completely define the list of potential respondents from which we will draw our sample.

Sample size simulations by age group based on the above sampling scheme (i.e picking two related households within the bari and interviewing only selected household members are shown below in table 2. The resulting figures are contrasted with a decision rule which picks two random households and selects all household members as respondents. As table 2 shows, choosing related households which focus on parents and within household sampling results in a substantial increase in the numbers of 50+ individuals (44.5 percent increase in the number of 50+ males and 33.6 percent increase in the number of 50+ females). For the younger respondents, the changes are minor.

In addition to the primary sample, the MHSS will also collect household information for two other study samples--(i)the DNFS sample and (ii) the outmigrant sample. For both these samples we will be surveying specific (pre-identified) individuals and the households they live in. Within the household, the same sampling scheme as described above for the primary sample will be used with the following additional caveat. For the DNFS sample, the surviving DNFS woman will always be one of the household respondents and for the outmigrant sample, the selected outmigrating individual will always be one of the household respondents.

For the DNFS sample we plan to survey the households of 900 women out of an estimated 2183 surviving members of the DNFS study which interviewed 2373 currently married women between 1975-1978 and collected extensive longitudinal health and nutritional measures on them and their children. Of the estimated 2183 survivors, 1872 are expected to be still within the Matlab DSS and 311 outside (Riley, 1992). We plan on following up 750 of 1811 within DSS households and 150 of the outside DSS households.

Finally, we intend to survey the households of 300 females and 300 males who have migrated out of sampled baris (in the primary sample) since 1982 and not returned. This represents approximately 10% of

outmigrants and includes for example, daughters who have married out, sons who have left the area looking for work in Dhaka, and in some cases elderly parents. These individuals form an important component of bari's resource networks. For example, in 1982, 21% of households reported they received remittances from out-migrants. Fortunately for the fieldwork, the majority of outmigrants remain relatively near the Matlab area (e.g., Dhaka for work-related migration and nearby villages for marriage-related migrations). In addition, the existing DSS data provide detailed and current information as to the location of outmigrants since 1982.

Table 2. Number of Individuals in Sample Under Two Designs for 2717 baris and 5000 households: (A) Two Random Households/all HH members chosen; and (B) Two Related Households/Some HH members chosen .

	A		B-- Currently Proposed	
Age	Male	Female	Male	Female
0-14	3863	3657	3849	3614
15-49	4290	4610	4388	4779
50+	1965	1742	2840	2328
Total	10,118	10,009	11,077	10,721

Properties of Sample Design

The development of weights for sub-bari data elements: The proposed primary sampling units are the baris. Sampling proportional to number of baris within the two family planning regions (treatment and comparison) produces a self weighting sample for bari level analysis. As we consider the sampling stages within the bari the weights get a bit more complicated. The first stage of within bari sampling is the selection of households. The second stage is the selection of adults within households. The third stage is the selection of children of the adults. The calculation of sampling probabilities is facilitated by the detailed Matlab household rosters.

The probability of selecting a particular household is the sum of the probabilities of selecting the household first and second. For example, in baris with more than two households every household has a probability of 1/(number of households) of being selected first. The probability of a household being selected second is a more complicated. It is a function of the relationships between the households and the sampling rules. For example, if you are the father of the first sampled household's head you are sampled with conditional probability one given the first household was sampled. However, you could also be sampled second if another household is sampled first by the same or a different sampling rule. All of the probabilities of the ways you could be sampled second must be added up and then added to the probability that you are sampled first to get your household's overall sampling probability. Although a bit complicated these probabilities can be calculated from the bari rosters. In summary, the probability of selecting any given household is p(selecting the bari)*p(selecting the household given the bari is selected). Weights for household level analysis are proportional to the reciprocal of this probability.

The probability of selecting a particular adult given that their household was selected is a similar calculation to the household sampling probability calculation. We need to enumerate all of the ways that a particular adult could be sampled. These are either through sampling with certainty, random sampling from a stratum, or through the kinship rules. The overall probability that a household will be selected can then be calculated from the conditional probabilities of the various ways that the household could be sampled. In summary, the probability of selecting any given adult is p(selecting the bari)*p(selecting the household given the bari is selected)*p(probability of selecting the adult given that the household is selected). Weights for individual adult level analysis are proportional to the reciprocal of this probability.

Sampling probabilities for the children is a similar calculation to the adult calculation although a bit simpler due to the simpler sampling rules. Given the selection of a sibling group, the probability that a particular child is chosen is inversely proportional the number of siblings in the group. The only complication is the possibility that a child is sampled in a second stage because the first sibling group only had one child. These probabilities can be calculated from information on the roster. In summary, the probability of selecting any given child is p(selecting the bari)*p(selecting the household given the bari is selected)*p(probability of selecting the adult given that the household is selected)*p(selecting the child given that the child's adult was selected). Weights for individual child level analysis are proportional to the reciprocal of this probability.

Every member of the bari has a well described and non-zero probability of being sampled. The probabilities are a bit difficult to work out due to the importance of the family structures and interconnections. This is, however, an unavoidable consequence of the importance of collecting data that will inform the effects of family relationships on the outcomes of interest.

Endogeneity issues in household formation: We recognize the important but difficult issues surrounding the endogeneity of bari or household level variables due to bari and household formation decisions (or perhaps more accurately the decision not to subdivide). For example the use of bari size as an explanatory variable in an analysis of health outcomes is troublesome because some elements of the bari have decided to stay or leave. There is no universal solution to this problem from the sampling tradition. For some purposes re-weighting the sample to reflect the outmigration from the bari may be useful. This can be done in the fashion of traditional non-response adjustments in survey sampling. But we must recognize that this kind of adjustment assumes an exchangeability between those that left and those that stayed. Clearly this is a bad assumption for many analyses. For some analyses there may be no need to adjust beyond recognizing that the sampling frame is a current snapshot. This is appropriate for analyses where the endogeneity can be addressed by treating the endogenous variables as endogenous but predetermined.

Ultimately the issue of endogeneity must be addressed as a modeling issue rather than a sampling issue. The non-response adjustment can be thought of as a very crude selection model. Clearly more sophisticated selection models are needed for many questions. Likewise real endogeneity in analyses where the endogenous variables can not be treated as predetermined requires careful modeling. Support of these modeling efforts are an important part of sample design . In particular the collection of information about outmigrants is useful. In addition items that may help identify selection equations (e.g. wages in other areas, distance to alternative locations) must be collected.

Power of the sample design: The simplest level at which to examine the power of this design is for bari level analyses. There are no clustering or design effects for analyses at this level. It is, however, the level at which we have the smallest sample size. This makes bari level power calculations useful "worst case" calculations.

We will consider the power of the primary sample alone. The power with the DNFS/outmigrant sample incorporated will be even larger when such an incorporation is appropriate. From our experience with the IRMS, we have selected an outcome measure to explore the power of this design, general health status (GHS). For adults in IRMS GHS had a mean of 1.9 and a standard deviation of .64. If we wish to detect a difference in GHS for two groups that split the population roughly equally, for example treatment area vs comparison area, the power to detect a difference of .05 (or less than 1/12 of a standard deviation) is 38%. At a difference of .1(or less than 1/6 of a standard deviation) the power is up to 96%. The effective sample size for other levels of analyses are larger but must be adjusted for design effects. For example, the sample will have almost twice as many households as baris. However with a large clustering effect (rho=.25) the effective sample size would be only 60% larger. Never-the-less the power would still be larger than the already substantial bari level power. Multivariate modeling will typically reduce the clustering by the inclusion of explanatory variables resulting in even larger effective sample sizes.

SURVEY INSTRUMENTS

Bari and Household Questionnaires

Table 3 summarizes the modules of the questionnaire to be administered at the bari, household and individual levels. In the subsequent paragraphs we describe in detail the content of the different modules of the questionnaire.

Table 3. Expected Number of Observations and Questionnaire Modules in Primary Sample

	Sample baris	Sampl ehhs	0-14	15-49 Male	15-49 Female	50+ Mal e	50+ Female
Expected # of respondents	2717	5000	7463	4388	4779	2840	2328
Control Card	X	X					
Bari Module	X						
Household Module		X					
Health & Physical Performance				X	X	X	X
Life History-(mstat,educ,work, inc,mig,nres-kin)				X	X	X	X
Fertility					X		X
Child Characteristics					X		X
Anthropometrics			X	X	X	X	X
Cognitive Ability			X	X	X	X	X
Physical Activity & Diet					X		

**Note:In addition to the primary sample above, 900 households will be interviewed as part of the DNFS sample and 600 households as part of the Outmigrant sample. In both the DNFS outmigrant samples, the same within household selection procedure will be followed, with the caveat that the DNFS woman and the outmigrant individual will always be selected. The bari questionnaires will be administered only where applicable (i.e. in rural areas).

Control Card. There will be one control form for every sample bari and for every subsampled household with sample baris. All variables will be completed by the interviewer. The Control Card will provide sample identification and track the progress of the case (visits, appointments made, interview outcomes), detail the required questionnaires and their disposition. Certain items on the control card will be pre-printed (e.g., sample identification numbers, location and name of head of sample households) based on the DSS data. Interviewers will be given controls cards as their daily assignments; data from the control cards will be used during fieldwork to track progress while in the field and, in analysis, to calculate response rates and interviewer productivity.

Bari Module. The primary respondent for the bari level information will be a knowledgeable individual or individuals in the bari. As noted above, we recognize the possibility of subclusters of households within the bari and the possible need for multiple bari respondents. This module will record (i) relationships between all households heads in the bari (as within household relationships to household heads are already recorded

this will allow us to get a complete picture of individual inter-relationships in the bari); (ii) basic demographic characteristics such as age, sex, marital status, education, occupation of individual bari members, (iii) bari characteristics and infrastructure which have potential health, sanitation or water quality impacts (source of water for drinking and other uses, toilets, solid and liquid waste disposal, presence of stagnant water, presence of granaries, number of rooms in different households of the bari, and type of material used in walls, floors and roofs); (iv) Total bari assets such as land, livestock, agricultural equipment and grain stores. Because not all bari assets are equally divided among members, we will attempt to assign ownership shares and to obtain some information about how the asset entered the bari's ownership. Furthermore we will attempt to identify what proportion are owned at the bari level, shared among bari households and individually owned to quantify bari-level wealth and intra-bari transfer opportunities. A significant advantage of using the DSS sample is that we will already know the basic demographic characteristics of the bari (total number of bari members, age, sex, marital status, levels of education, occupation, household assets and infrastructure in 1974 and 1982).

Household Module. The household section of the questionnaire (answered by the household head or person most knowledgeable about household affairs) will supplement the bari section by providing more detailed information for the two subsampled households. This module will record (i) basic demographic characteristics of all household members (including age, sex, marital status, relationship, education, occupation); the interviewers will only update information in the existing computerized database;(ii) an inventory of household consumption as a proxy for long run income, listing purchases, quantities and prices for foods, personal care and household items and durable goods. For items produced for self-consumption, quantities and source will be detailed--(Note, this submodule will be built on the IRMS questionnaire which takes only 15 minutes to complete) (iii) current household income built up from market wage income, self-employment income and other sources such as share-cropping; (iv) value of household assets (e.g. land, livestock, jewelry, various sentinel items). We will attempt to get information on changes in major household assets since the last census in 1982 where the last asset information was recorded. In addition we will include quality measures (e.g. type of land, value of jewelry) and assign ownership shares where relevant.

Individual income and assets will be collected in subsequent sections of the questionnaire. While individual income will be estimated through questions about employment in subsequent sections of the questionnaire, the household economy questions will focus on the characteristics of household-owned agricultural and non-agricultural businesses. Net returns to family labor, capital, and land, from self-employment activities will be obtained. Since our focus is on income and its sources, not on the production processes themselves, we will not collect detailed data on inputs, which would be very time consuming, particularly for obtaining reliable data on family labor. Instead, we will follow the example of the World Bank's Living Standards Measurement Surveys. For agricultural activities we will collect information by cropping season on the quantities and value of production and inputs--[In terms of a commonly accepted village classification four seasons can be identified: (i) Monsoon-- July-September corresponding to the Aus rice harvest; (ii) Autumn--October-November corresponding to the Aman rice harvest; (iii) Dry Winter--December-February and (iv) Hot dry--March-June]. Non-agricultural net incomes will be collected in a similar way, distinguishing values of production from input expenses by type.

Health Status and Health Care Utilization Module and Physical Performance Module. We intend to measure current health status for adults (all household respondents 15+) using subjective and objective measures as follows (Liang and Whitelaw, 1987; Guralnik et al., 1989): (a) objectively by directly observed measures of physical deficiencies in gait, balance, and strength--Physical Performance Tests; (b) functionally, through self-reported questions about the ability to perform various activities of daily living (ADLs); (c) medically, through questions about the presence of disease symptoms and impairments; and (d) subjectively, through self-assessments. In addition to our experience developing these measures in Indonesia, extensive field testing will be employed to make sure that the questions are culturally and epidemiologically valid in Bangladesh, as well as to establish the appropriate time frame. RAND is well-equipped based on its experience with the Malaysian, Indonesian and domestic surveys to develop and validate subjective measures of health and functioning. In his field test of a modified IFLS questionnaire with elderly (60+) respondents in Matlab, Omar Rahman found that the basic protocol for ADLs implemented in RAND's Indonesian

projects adapts well to Bangladesh. The MFLS-2 included activities of daily living and self-assessment questions for physical health that were adapted to the Malaysian context, and both the IRMS and IFLS included extensive questions about health, well-being and absence from daily activities. RAND's experience is built on the Medical Outcome Study (Stewart et al., 1988), which developed and clinically validated a standard set of questions for measures of physical and mental health which have been adapted in many contexts. In addition, we will use non-overlapping questions from the WHO and ASEAN surveys to expand the universe of potential questions. Omar Rahman is using these instruments in his smaller-scale survey of the elderly; this experience will contribute significantly to the MHSS.

To supplement self-assessment and ADL questions for sample household seniors and prime age adults, we will conduct objective observational tests of respondents ' gait, balance and strength using protocols designed as part of the WHO's international protocol for creating "objective, directly measured" tests of functional disability as a determinant of healthy aging. Interviewers will be trained in a highly structured protocol which allows them to measure respondents' ability to complete a variety of physical functioning exercises, including side-by-side, semi-tandem and tandem stands, measured walks, standing from chair sitting, functional reach and vision. The protocols, developed by the Demography and Biometry Program of the National Institute on Aging and used in the National Health and Nutrition and Examination Survey, round III (NHANES III), instruct the interviewer in determining the advisability of administering the exercise (for impaired respondents), provide a scripted set of instructions for the respondent, and detail the measurement techniques and equipment necessary to provide accurate data. The NHANES III protocol consists of a 7 items scale which has good construct validity, reproducibility and reliability (Cronbach's alpha $>= 0.85$). The only equipment required is a chair-height cube, tape measure and a stopwatch. Modifications of this protocol have been piloted on the elderly in a number of countries in the developing world (China, Sri Lanka, Bahrain) and moreover have been tried out under the sponsorship of WHO on prime age adults in China.

In addition to health status measures, a number of indicators of curative and preventive health care utilization will be asked. These include from whom and from where medical care was received (including self-treatment, traditional and modern providers), how much it cost, how far the respondent traveled, and whether drugs were purchased. Again, the most problematic point will be the recall period and the ability to tie curative health utilization to previous episodes of illness. In Indonesia we have successfully used a four week reference period for acute illnesses and a one year reference period for utilization, and Omar Rahman successfully pretested recall of symptoms questions using a four-week recall period in Matlab in 1991. In Matlab we will place special emphasis on home delivery because of the MCH-FP program.

Life History. The most detailed section of the questionnaire will be devoted to detailed current and retrospective questions to be administered to all household respondents age 15 and older in the two selected households. These questions will focus on marriages and unions, education, labor force participation, migration, individual assets and transfers, and the characteristics and living arrangements of non-coresident family members.

Marriages and unions. We will work from the DSS data on marriage history to obtain detailed histories of respondents' unions, including characteristics of former or non-coresident spouses, dowries and bride prices, marriage arrangements, relationship prior to marriage, number of children produced and living from unions, current relationships with former spouses, and assets at the time of a union-terminating event.

Schooling, training and labor force participation. Respondents will be asked to give complete retrospective accounts of their education and job training, occupations, weeks worked and usual weekly hours of work, earnings, and distance to work (for both primary and secondary jobs). In order to include female respondents, 'work' will be defined broadly to include both formal and informal sector, full-time and part-time, and seasonal (during major rice harvests) and year-round activities. This complete work history will begin at age 15 (or age of marriage, whichever is earlier), and go to the time of the interview with varying levels of detail. Major changes of occupation will be asked in 5 year intervals and will also be keyed to migration data. Time allocation for the past week's main income generating activities will be collected for all adult household members.

Migration. As part of the life history, the survey will determine the extent of geographic mobility of individuals and families, and ascertain the causes and consequences of families' migratory movements, including short-stay and circulatory migration. Again, the DSS data provide quite complete migration records with dates of in- and out-migrations for the household and basic descriptors of the reasons for migration and destination- (Note in terms of the Matlab computerized database, only migration durations greater than six months are counted). The instrument will expand on these data, focusing on the motivation for moving, distance moved, economic support received before and after moving, and employment status after moving.

Financial status. Information on current incomes from all sources and assets for all adults will be obtained by asking detailed questions about market labor earnings (including in-kind payments and fringe benefits) and time worked. Income from gifts and other transfers will be collected, distinguishing categories such as land rental, pensions, support from relatives (cataloging the exact relationship and location of the giver), inheritances, and dowries or wedding gifts. These data were also obtained in both Malaysian surveys and in Indonesia, and in Matlab will be repeated with a special focus on the financial status of elderly household members. Also in Matlab, the questionnaire will emphasize detailed information on inter-generational resource transfers both within the sample bari and from outside of the bari. Transfers of both cash and goods and services will be collected by source and tied to specific events (e.g., illness, education). The characteristics of individuals who could potentially provide time or monetary support (as well as those who did) will be collected so that a measure of the complete transfer choice set is created. In addition, we will measure transfers out to allow for measure of net transfers to the household.

Characteristics of non-coresident immediate family. Detailed information on the location and socio-demographic characteristics of non-coresident (i.e., outside the household) immediate kin (parents, siblings and children) will be collected. The primary purpose of these questions will be to provide information on social support networks for household members, particularly the elderly. The socio-demographic characteristics of non-coresident family members (age, sex, relationship, educational attainment, health status, occupation, and ages at death if dead) will be collected in addition to frequency and nature of contact. In addition, these questions will provide further information to allow tracking of recent out-migrants.

Fertility Questionnaire. Contrary to the conventional procedure for selecting female respondents 15-49 for fertility and family planning questions, we intend to interview all female respondents 15+ in the two selected households. By focusing on all 15+ females rather than the 15-49 group, we will be able to investigate the cumulative effect of pregnancies on women's health over the life cycle and particularly at older ages. The Matlab DSS records provide detailed data on dates and outcomes of live birth pregnancies for all ever married women in the treatment and comparison area since 1974. In addition to the DSS, the RKS data provide information on menstrual, lactation and contraception status on a month by month basis for the treatment area women since 1978. Our goal is not to duplicate these data but to provide recall of pregnancy events not in the Matlab computerized database, and to provide more detailed recall of certain events. Interviewers will enter households with pre-printed pregnancy records from the DSS/RKS databases. Each respondent will be asked about outcome, sex of the child, contraceptive use, duration of postpartum amenorrhea, the practice of postpartum abstinence, and ages at menarche and menopause.

We note the unusual opportunity to compare these newly collected data to the longitudinal record-keeping of the RKS/DSS record keeping systems. In a pretest, a subsample of ever-married female respondents in the comparison and treatment areas will be administered the retrospective questionnaire without reference to the existing longitudinal Matlab database. This will allow us to judge how use of the existing data enhances recall and to estimate the rate of recall decay without the existing Matlab data in this domain.

Characteristics of children and child health and survival. All household members 15+ will be asked to report by proxy on characteristics of their ever born children, regardless of survival and co-residence. If the respondent is male and has a spouse present, the spouse will answer for the children belonging to the couple. Otherwise the father or "best guardian" (usually older sibling, aunt etc) will respond. Respondents will be asked about:

- Socio-demographic characteristics: age, sex, birth order, approximate size and weight at birth, ages of

parents at time of birth of child, educational attainment, occupation,location and frequency of contact for non-coresident children, and for dead children, age of child and age of both parents at time of death;

- Morbidity (only for currently alive children 0-14 years): short-term recall of diarrhea, respiratory infections, measles plus long-term recall of neonatal tetanus;
- Health care utilization (only for currently alive children 0-14): antenatal care and birth attendance; immunizations; participation in village health and nutrition programs; treatment of diarrhea; attendance at hospitals, clinics, or health posts; use of private or traditional health care.

Anthropometrics. A separate data recording card will be issued to measurement specialists to record anthropometric data. The measurement specialist will collect data on all household respondents - infants, children, adults and the elderly - on height and weight following accepted international standards (United Nations, 1986). We will use trained female anthropometrists for the most part and will make sure that all measurements are validated and weighing scales calibrated regularly. Furthermore anthropometrists will be checked for bias, precision and accuracy--it is worth noting that ICDDR,B has extensive institutional experience in collecting anthropometric information. Jean Pierre Habicht (from Cornell University) and R. Bairagi (from ICDDR,B) two internationally known experts on anthropometrics will be consulted on these measurement protocols.

These weight and height measures enable us to study an age-independent measure of nutritional status. Weight-for-height is a standard measure of children's acute nutritional status. When measuring heights in field conditions, it is usual to measure recumbent length for children under two years old, and height for children older than two and for adults. For children under two years the most common way to take weights is to use Salter scales, which can be hung from structures such as trees; in Matlab , however, we plan to use an electronic (Seca) scale in which the child is placed in a bassinet. The electronic scale is easier for the measurer, less intimidating to the child and accurate to a higher precision.

Given our within household sampling scheme we will be measuring anthropometric data for child sibling pairs and parent child pairs. This will allow us to examine family level heterogeneity in health status for parent-child and sibling-sibling relationships, and may provide some sense of the household disease environment. For example, recent studies have established the usefulness of controlling for parental heights when examining the determinants of children's heights or weight to height, partly to control for genetic factors and partly to control for unobserved family background characteristics (see Thomas, Strauss, and Henriques, forthcoming).

Cognitive Ability. We will assess cognitive ability for all household respondents age 6+ on two dimensions, intellectual capacity/cognitive sophistication, and level of intellectual skills necessary to daily functioning. The cognitive sophistication test will take the form of a culturally-neutral, nonverbal test such as Raven's Progressive Matrices tests or another image-based test. These types of tests can only be interpreted normatively, however normative scores for different age groups are available for Raven's tests and similar tests are widely available. Of particular relevance is the experience with Raven's tests which have been successfully administered in a number of developing countries and particularly in Pakistan, in many ways a culturally similar population. In order to get more objective measures, we also will present some basic verbal and quantitative exercises that center on activities necessary for daily living, such as making change, treating diarrhea with home made oral rehydration solutions. We will adapt a test used by the Bangladesh Rural Advancement Committee (BRAC) which measures levels of knowledge, literacy, comprehension and basic math. Its advantages are that is does not require literacy to complete, it has been thoroughly tested for 11-12 year olds in Bangladesh and successfully administered to children 8+, and given low levels of schooling in Bangladesh, it can be easily adapted to the testing of adults. A particular advantage of these types of functioning tests are that they can be used as baselines for children for later data collection.

Physical Activity and 24 hour diet recall: In order to assess cross-sectional variation by socio-economic status in women's adaptive responses to the nutritional and health stresses of pregnancy and lactation, all female household respondents 15-49 will be interviewed about their physical activity in the week prior to the interview and their diet in the 24 hrs prior to the interview.

For the physical activity module, we will modify appropriately protocols used in the IFLS and the Cebu

Longitudinal Health and Nutritional Study surveys. We will measure allocation of time during the past week in various tasks: main and secondary jobs, home-based income generating activities and work around the house. A list of activities will be generated from pre-tests and focus groups. In addition we will explore the literature for use of measures on posture and activity specific energy expenditures.

For the 24 hr dietary recall, we will adapt the protocol used in the Cebu Longitudinal Health and Nutritional study. We will record information on timing of meals, names of dishes, amounts, preparation method/location, amounts of ingredients. Pretests will determine a common list of dishes (and those proscribed during pregnancy), common measures of quantities and common ingredients.

Community Questionnaire. Along with the household/bari sample described above, we also plan to survey 500 facilities / providers (including, schools, health and family planning clinics, and individual health/family planning practitioners) serving the Matlab surveillance population. Our primary objective is to obtain information on the quality of facilities/providers and their impact on health and educational outcomes and service utilization for the household respondents in the primary sample. Our survey will result in a census of all educational, health, and family planning institutions of any significant size and a select sample of individual health and family planning providers, both modern and traditional, including those who provide services in the home (as in the ICDDR,B program). **The set of facilities/providers to be surveyed will be drawn from a list of facilities/providers that household respondents (in the primary sample) claim to know about, regardless of actual use. The important thing to note is that we are establishing the characteristics of facilities/providers in the opportunity set of our primary sample household respondents and not just those they mention having used (an important bias in several previous community surveys).** In addition to the facility/provider component of this community survey we will also collect community level information on water supply and sanitation, transportation, basic infrastructure, economic activities and food supply and prices from knowledgeable individual (village elders, government officials). Where possible, we will attempt to merge in existing secondary datasets to provide infra-structural information, including information on Matlab project facilities.

During the fieldwork, specially designated interviewers will approach knowledgeable persons in the community (such as the school principals, and clinic administrators) to collect the following data:

- The number, type, location, staffing, and service hours of family planning clinics and health clinics serving the community, methods and services available and their prices, typical waiting times, and when clinics were established or expanded. Similar information will be obtained for private practitioners and traditional healers.
- The number of private outlets in the community where contraceptives and medicines are sold, prices, and approximate volume of sales by product.
- The location, staffing, and enrollment of local elementary and secondary schools, including religious and other private schools, and fees charged.
- Community water supply and sanitation, electrification, roads and public transportation.
- Instrument development and fieldwork planning for the community survey will be conducted in tandem with the household survey, and all facility identifiers will be linked to facilitate analysis.

The major source of community level variation within the Matlab surveillance area results from the experimental nature with which different health and family planning programs and interventions were introduced into the treatment and comparison areas (for example the treatment comparison dichotomy, the timed introduction of health services in different "blocks" within the treatment area--cf Summary Research Plan, Tables 2, 3). However evidence from a prior community survey in 1978 (Makhlisur Rahman, 1986) suggests that there is considerable village level variation in terms of a number of other community characteristics such as: time and distance to school, presence of government officials, presence of agricultural co-operatives, presences of temples/mosques, presences of post office or bank and proximity to roads and rivers.

DEVELOPMENT OF SURVEY INSTRUMENTS

The basis for the data collection instruments will be the questionnaires developed by RAND for use in Indonesia. While we plan to adopt major content and formatting conventions from these experiences, we will

revise these instruments to fit specific conditions in Matlab and to correspond to the specific focus of projects proposed in the Program Project that will use the data. As we have successfully done in Malaysia and Indonesia, we will assemble an informal advisory group of substantive experts from the US, Bangladesh and other countries. This group will be sent interim drafts of the questionnaire during development and will provide guidance regarding the content of the questionnaire. Questionnaire development will be guided by RAND's Survey Research Group, which has extensive experience in designing, testing and fielding surveys in the US and in developing countries. **The schedule for questionnaire development is included in the overall Project time-line (Budget Justification).**

RAND places a strong emphasis on thorough testing of survey instruments and field procedures before fieldwork begins. Although the development process can seem lengthy, we have found that it invariably improves the instrument and quality of field procedures and leads to considerable cost savings by averting last-minute changes in content and protocol. In addition, questionnaire development takes on a special importance when a team of researchers is working in a culture to which not all are indigenous. RAND's experience in Malaysia and Indonesia has repeatedly demonstrated the value of following an explicit program of questionnaire design, testing and field procedure testing. Because the survey instrument will be complex, we will use a wide array of development techniques, including small-scale pilot interviews, focus groups, and larger pretests; Omar Rahman and Downes-Le Guin will participate in all phases. One considerable advantage is that Omar Rahman, is a native speaker of Bangla and has extensive experience working with data from the Matlab area. (please see the Budget Justification for further details).

PREPARING FOR AND FIELDING THE SURVEY: A major advantage of working with ICDDR,B is that in addition to their existing field staff, ICDDR,B maintains a pool of experienced part-time interviewers used for specialized surveys. All are area residents with a high school education (or higher) and have an existing rapport with the sample population.

In addition to Omar Rahman and Downes-Le Guin who will observe and participate in training and quality control, ICDDR,B will combine its existing field and new employees to provide the following personnel. There will be 24 teams in the field responsible for collecting household/bari/community level information for the primary sample, the DNFS sample, the outmigrant sample and the community sample. Each team will consist of a male interviewer, a female interviewer, a measurement specialist (this individual will be responsible for all anthropometrics, physical performance tests and cognitive tests), and a porter to help carry equipment. There will be a total of six junior supervisors (one for every four teams) and three senior supervisors (one for every eight teams). In addition the field co-ordinator-(Mr Sardar) will oversee the field operations. Thus there will be a total of 106 field staff of which 48 are interviewers, 24 are measurement specialists/testers, 24 are porters, and 10 are supervisors (with 6 junior, 3 senior and 1 overall field-coordinator). The high supervisor to team ratio is justified by the burden of quality control, editing and assignment of households that will be placed on supervisors.

We estimate that each interviewing team will on average be able to complete two households a day (the project schedule is included in the Budget Justification). Because of the bari-level clustering, small travel distances and the experienced field staff we believe this is a reasonable goal. In many cases we expect that the interview will require more than one visit to the household. Because of bari-level clustering, however, interviewing teams will be able to work efficiently by rotating among households in a bari until all interviews are complete, thereby reducing travel time between revisits. **Our plans for selection and training of field staff, quality control and production monitoring are described in the Budget Justification.**

DATA ENTRY, PROCESSING, AND DOCUMENTATION: It is important that the data produced by the survey be available at the earliest possible time. Computer-assisted data entry will allow immediate checks on the data for consistency and logic, thereby reducing lag time between data collection and data processing. Completed questionnaires will be sent on a daily basis from the field office to the central ICDDR,B office in Dhaka (there are two trips every day in each direction) where the data will be entered on PCs, checked, batch-edited and prepared for analysis. This daily transfer will ensure that the data entry process is continuous, so that errors can be caught early on. Peterson will assist in developing basic cleaning and editing routines that will permit early detection of most errors so that they can be handled while the survey is still in the field. Further data file preparation, particularly the processing of life histories, will be undertaken at RAND. Bari-level, household-level and individual-level identifiers will be linked, allowing for demographic

and economic analyses of family relationships, such as transfers.

An important aspect of the data cleaning and documentation process is the assessment of the reliability of the data. We will perform descriptive analyses of data quality, focusing especially on the retrospective data. These will include analyses of representativeness and non-sampling errors such as recall bias. Performing these analyses will enable us to better document the data and alert users to potential quirks. We will also investigate which types of respondents have high rates of item non-response (e.g., those with no schooling). This will alert users to the possibility that non-response is selective with respect to variables of interest in a particular analysis.

Finally, the project will produce documentation for the MHSS consisting of several publications. A codebook, including questionnaires and interviewer instructions, and a user's guide will be prepared describing the data. We will also produce: (1) a technical report describing sampling and survey methods and response rates, (2) a report presenting basic descriptive results for the major survey topic areas along with analyses of sample selectivity and response error. **Further information on data entry and documentation is found in the Budget Justification.**

E. HUMAN SUBJECTS:

It should be noted that this research project has already undergone human subjects review at RAND and has been approved on condition of an approved Data Safeguarding Plan and further Human Subjects Protection Committee (HSPC) review if funded. The HSPC serves as RAND's Institutional Review Board to review federally funded research involving human subjects, as required by 15 federal departments and agencies, including the Departments of Health and Human Services (HHS), Justice, Education, and Defense. RAND's "Multiple Project Assurance of Compliance" (#M1031) with HHS regulations (45 CFR 46) also serves as our assurance of compliance with the regulations of the other federal departments and agencies. (Please refer to IRB number and approval date on face page).

The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) will perform the proposed data collection (in this research project) under subcontract to RAND. While RAND is the primary grantee, the Center for Population Studies at the University of Pennsylvania will also be involved in the research project.

1) We propose to design and field a major household and community survey in Matlab, a region of rural Bangladesh that forms part of an ongoing Demographic Surveillance System. This survey, the Matlab Health and Socio-economic Survey or MHSS will be linked to existing demographic surveillance information and other past studies in the Matlab area. The data collection will address the following broad areas of concern : the effect of socio-economic and behavioral factors on adult survival, health status, and health care utilization; the linkages between elderly wellbeing, kin characteristics and intergenerational resource flows: and the impact of community services and infrastructure on adult health and other human capital acquisition.

The MHSS will consist of four distinct sample components:

(i) The Primary sample consisting of 5000 households, clustered in 2717 baris. This represents a 33 percent sample of the total number of baris in the Matlab Surveillance area.

(ii) The Determinants of Natural Fertility Survey (DNFS) sample consisting of a followup of 900 households of women originally interviewed about their health and pregnancy status in the mid 1970s. This represents approximately a 40% sample of the surviving 2183 DNFS women.

(iii) The Outmigrant sample consisting of the households of 300 female and 300 male outmigrants who have left the households of the primary sample between 1982 and the date of the MHSS and not returned. This represents approximately a 10% sample of outmigrants who have left since 1982.

(iv) The Community sample consisting of information on community infrastructure and services and detailed data on 500 health/family planing providers, and health, family planning and educational facilities potentially serving (in the opportunity set of) the primary sample households in the MHSS. This constitutes a census of schools, health and family planning clinics serving the study population and a sample of individual health/family planning providers.

Respondents in the MHSS will include representation from all age, gender, and ethnic/religious groups relevant to this population. Pregnant women and children will be interviewed as part of this survey as one of the major foci of this survey is fertility outcomes and human capital investments in children.

The key socio-demographic characteristics of the primary sample of the MHSS are presented in Table 2 and 3 of the Project 1 proposal and are summarized below in Table 4;

Table 4.
Number of Individuals in Primary Sample:
5000 households in 2717 baris

Age	Male	Female
0-14	3849	3614
15-49	4388	4779
50+	2840	2328
Total	11,077	10,721

The age and gender distribution of the DNFS followup sample and the outmigrant sample are difficult to estimate precisely. However there is sure to be adequate representation of both genders and all age groups. In addition to the household/family sample this survey will also collect information by questionnaire on community infrastructure and services and health, family planning, and educational facilities and providers.

2) We will accumulate data on the human subjects through the following means:

(i) questionnaires as part of the survey;
(ii) measurements (anthropometrics, cognitive tests and physical performance tests) as part of the survey; and
(iii) linking of pre-existing computerized data-records from the Matlab surveillance system.

The survey (including the measurements) is expected to take about four hours per household to complete. All the data collected as well as the pre-existing data incorporated into the MHSS will be used for exclusively research purposes.

3) Human subjects will be recruited from a study population which is followed by the Matlab Demographic Surveillance System, under the aegis of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). ICDDR,B is a non-profit research organization funded by 14 countries, with the largest sponsor being the United States. The Matlab Demographic Surveillance System has been collecting bi-weekly information on vital events (births, deaths, migrations and marriages) for approximately 192,000 individuals in about 40,000 households since the mid 1960s-- (a computerized linked file is available since 1974). In addition there is also computerized information available from two censuses in 1974, 1982 and a host of specialized studies conducted on sub-groups of this study population-- (see Summary Research Plan, Tables, 2, 3).

Signed consent forms in Bangla, will be obtained by interviewers from all community, bari and household respondents, with parents/guardians acting as proxies for respondents below the age of 15. The consent form will briefly outline the nature of the questions and the objectives of this data collection effort; it will specify that participation is completely voluntary with no penalty for not consenting to the interview and that respondents may choose not to answer/or participate in any section of the survey if it makes them uncomfortable ; it will emphasize that the information will be completely confidential and will be used only for research purposes; it will inform the respondents that certain prior basic demographic data collected by the Matlab surveillance system and by other specialized studies about the respondents may be incorporated into this dataset; and finally that respondents may be involved in followup interviews-(for which separate consent will be taken).

It is important to note that there will be absolutely no element of coercion for the MHSS. We expect high response rates based on a number of factors. First there is excellent rapport between the interviewers and the respondents as the interviewers are all locally recruited. Second, the questions are unlikely to be

considered sensitive and will (if history is any guide) be perceived to be of some possible value in indirectly affecting the future welfare of individuals in general. Third, there is a general sense of good feeling towards ICDDR,B (the parent organization of the Matlab Demographic Surveillance System) as it provides an array of health and family planning services free of charge to this study population. **Moreover access to and use of these services is explicitly not contingent on cooperation with the surveillance.** Fourth, the study population is used to being interviewed as part of the surveillance system. A recent baseline survey carried out in connection with the ICDDR,B-BRAC collaboration had a response rate of over 99%.

Finally, this research project will have to undergo human subjects review at RAND (mentioned above) and at ICDDR,B if it is funded. The review guidelines at ICDDR,B are modeled after the Health and Human Services(HHS) guidelines in the United States.

4 and 5) While there is the possibility of some social embarrassment, in this kind of comprehensive survey, it is very unlikely as no really sensitive information will be elicited. Similar questions have been successfully asked in this population without any problems. Furthermore individuals will be informed of their right to refuse to answer any portion of the questionnaire that they are uncomfortable with. Respondents will also be informed of the confidentiality of their responses.

An important concern in the release of any public-use data set is the protection of respondents' privacy. We will take extensive precautions to ensure that respondents are unable to be identified. Confidentiality will be strictly maintained at ICDDR,B, the proximate survey group. In addition identifiers on public release data will not be the original ICDDR,B 'ids'. A second set of 'ids' will be created that map to the original ICDDR,B 'ids'. This mapping will be maintained in the strictest privacy (including restricted access to data files and keeping hard copy in locked files) at RAND, the University of Pennsylvania and ICDDR,B, the institutions involved in the survey. No identifying information will be released to any private or government group. Finally survey protection policies will have to approved and monitored by the Human Subjects Committee independently at ICDDR,B and at RAND.

The Physical Performance Tests which involve measurements of gait, balance and limb strength have potentially some risk of physical injury from falling as a result of going-off balance. This risk however is minimal. A strict screening protocol will be followed,which ensures that the measurement specialist gauge the ability of the respondent (both by questions and tester's assessment) to successfully complete the tests, before they are administered. The nature of the tests (sitting up from a chair height cube, standing, walking) are such that minimal physical discomfort is involved. At no time will the respondent be at any risk of physical injury or risk. Survey team members will make sure that no respondent is in any danger of falling or hurting themselves in any way. As mentioned before, all respondents will be explicitly queried as to their understanding of the test procedures and their ability to comply without discomfort. Respondents will be reminded of the voluntary nature of the tests and their right to refuse to participate without any penalty. Extensive interviewer training in ensuring respondent safety will be carried out.

6) The risks (as described in sections 4 and 5) to the respondent population are minimal and very reasonable vis a vis the expected benefits from this data collection which will yield hitherto unavailable information on individual, household and family decision making in a resource poor environment. This knowledge has applications beyond this study population.

F. VERTEBRATEANIMALS:

Not Applicable

G. CONSULTANTS:

The Consultants on this project are:

Anthropologist	ICDDR,B
John Adams	RAND
Andrew Foster	UPENN
Ron Hays	RAND
Stephen Klein	RAND
Jane Menken	UPENN
Christine Peterson	RAND
Mizanur Rahman	ICDDR,B
Michael Strong	ICDDR,B
M. Sardar	ICDDR,B

Their time on this project has been included in the budget. For further details, see project description and budget justification.

H. CONTRACTUALARRANGEMENTS:

See Summary Research Plan section I.

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