Sumve Survey on Adult and Childhood Mortality Tanzania, 1995

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In-depth Study on
Estimating Adult and Childhood Mortality
in Settings of High Adult Mortality

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The Demographic and Health Surveys (DHS) program assists government and private agencies with the implementation of surveys in developing countries. Funded primarily by the U.S. Agency for International Development (USAID), DHS is administered by Macro International Inc. in Calverton, Maryland, USA. The main objectives of the DHS program are to (1) provide decisionmakers in survey countries with databases and analyses useful for informed policy choices, (2) expand the international population and health database, (3) advance survey methodology, and (4) develop in participating countries the skills and resources necessary to conduct high-quality demographic and health surveys.

The 1995 DHS In-Depth Survey in Tanzania, *Sumve Survey on Adult and Childhood Mortality (SACM),* is part of the worldwide Demographic and Health Surveys (DHS) program. Additional information about the study may be obtained from: DHS, Macro International Inc., 11785 Beltsville Drive, Suite 300, Calverton, MD 20705 (Telephone 301-572-0200; Fax 301-572-0999).

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FOREWORD

Since the late 1980s, the Demographic and Health Surveys (DHS) project has considered conducting the type of study discussed in this report. Adult mortality rates were presumably on the rise in many areas of sub-Saharan Africa due to the growing AIDS pandemic. A basic premise underlying the quality of DHS birth histories and demographic estimates—i.e., that the DHS samples of women's reproductive histories are representative—would require reevaluation. Alternative data collection strategies would need to be considered. In this methodological context, the DHS project chose to study the problem of "mother's survival bias" resulting in one of five in-depth studies under the DHS-III project.

The Sumve Survey on Adult and Childhood Mortality (SACM) was fielded from May to October 1995 and was intended to test the hypothesis that reasonably complete and reliable birth history information could be collected through proxy interviews. It was envisaged that, should the new method of data collection prove feasible, information on deceased women could be obtained from surviving relatives. This report contains (1) a detailed description of the SACM methodology, (2) the health and socio-demographic profile of the SACM study population, and (3) results and discussion regarding the SACM experience with proxy birth history reporting.

The SACM was implemented in Kwimba District of northwestern Tanzania and involved a genuinely collaborative effort amongst many organizations, which are to be thanked and congratulated: the Tanzania Bureau of Statistics (BOS), the National Institute of Medical Research (NIMR), Sumve Designated District Hospital (SDDH), the Mwanza Regional Medical and Nursing Offices, and Muhimbili College at the University of Dar es Salaam (Department of Epidemiology and Biostatistics). The DHS project also wishes to thank the USAID mission in Dar es Salaam for their help in facilitating this inter-institutional collaboration.

The DHS project and the authors in particular are grateful to all of the committed persons who were involved in the SACM fieldwork and data processing activities (see Appendix B). Difficult work was made easier and gratifying by the hard work of Messrs. Aboud, Ndaki, and Masaba from the BOS who led the fieldwork teams and helped administer project disbursements, by all of the wonderful nurses from the Mwanza Regional Nursing Office who formed the backbone of field operations, and by the tightly-knit data processing unit at NIMR who provided high-quality data entry and editing. Special thanks goes to Dr. J. Ties Boerma who was instrumental in bringing together the key institutions and individuals involved in the SACM, Dr. Gijs Walraven and his colleagues at the SDDH who allowed the SACM field operations to be based at their facilities, Dr. Gabone of the NIMR who permitted the data processing unit to operate out of his institution in Mwanza town, and Dr. A.S.A. Gavyole who facilitated the assistance of Mwanza regional nurses for the five months of fieldwork. We also wish to thank Dr. Elisabeth Sommerfelt for her helpful insights in the analysis of the cause of death information. We hope that the results of the SACM study justify the good will and cooperation demonstrated throughout the course of the study.

Finally, we want to gratefully acknowledge Dr. Ann Blanc for her helpful insights in reviewing this document, and Trina Yannicos, Kaye Mitchell, and Jonathan Dammons for their production assistance.

EXECUTIVE SUMMARY

During May to October 1995 in the Mwanza Region of northwestern Tanzania, an in-depth survey on adult and childhood mortality estimation was conducted. Entitled the "Sumve Survey on Adult and Childhood Mortality" (SACM), the study was implemented by the Tanzanian Bureau of Statistics (BOS) and the Demographic and Health Surveys (DHS) program with assistance provided by several local institutions. The primary objective of the SACM was to establish whether data useful for the estimation of childhood mortality rates (birth histories) could be collected by proxy from the mothers' sisters. The proxy data on deceased sisters—that is, women *not* interviewed in a routine demographic survey—could be used to adjust estimates of childhood mortality where adult mortality is on the rise due to the AIDS pandemic. This type of data collection had not been attempted in Africa. Aside from the methodological aims of the SACM, the study was also intended to provide descriptive information on the demographic situation and use of basic maternity service utilization in the study area for purposes of local program evaluation.

The SACM was a two-phase data collection exercise conducted in the Kwimba District of Mwanza Region which lies on the southern boundary of Lake Victoria. This is an area where approximately 100,000 persons, of predominantly Sukuma ethnic origins, reside. Very little modern sector development has occurred in the study area and the large majority of the population relies on subsistence agriculture and some cash cropping to make a living. Educational levels are very low: the SACM results show that about 40 percent of women age 15-49 had never been to school, and only 1 percent had reached secondary school. Most of the study population falls in the catchment area of the Sumve primary health care (PHC) program, which aims to provide health education and basic maternal and child health services through outreach and referral programs. The PHC program is (and the SACM study was) based in Sumve where a relatively large hospital serves much of the district's tertiary care needs as well.

In Phase I of the SACM, a representative sample of 1,488 households and 2,130 women age 15-50 were interviewed. In these interviews, full birth histories of the respondents ("own" reports) and full sibling histories were collected. Based on information in the latter, all sisters born 15-50 years ago were identified and full birth histories were collected on all of these sisters ("proxy" reports). In Phase II of the SACM, conducted a month after Phase I, all living sisters age 15-50 living in an expanded study area were "tracked" with 2,123 of 2,223 eligible sisters (96 percent) eventually interviewed. From Phase II respondents was elicited essentially the same information as was obtained from Phase I respondents. These data allow comparisons of own-reported and proxy-reported birth histories. One drawback of the design is that the SACM sister-pairs are not representative of all sister-pairs since they live closer to each other than the average sister-pair (i.e., by design, the Phase II sisters live in roughly the same area as Phase I respondents).

The SACM found that nearly all women (99 percent) who gave birth in the five years before the survey had received some kind of antenatal care during their last pregnancy, with the majority of services provided by nurses, midwives, and maternal and child health (MCH) aides. Only 2 percent of the women received care by a doctor. Unfortunately, the data indicate that over 90 percent of these women did not initially receive services before the second trimester, and 15 percent did not before the third trimester, which indicates that the full benefits of antenatal care are not being realized for most women around Sumve. The SACM also found that 62 percent of deliveries still occur outside of health facilities. Nearly all of these home deliveries are assisted by relatives and friends. Thirty-nine percent of deliveries were assisted by a trained health professional; in 4 percent of deliveries, a doctor assisted. Previous use of antenatal services and advice by a health professional to deliver in a health facility is positively correlated with subsequent delivery in a hospital or clinic. Of women not delivering in a health facility, the most commonly reported reason for nonuse of a facility was transport- or distance-related; 61 percent said that it was "too far," and 44 percent said that no transport was available.

The Phase I SACM data provided an opportunity to establish representative estimates of fertility and mortality. Women living in the Sumve area bear, on average, 7.4 children during their lifetime, and nearly 60 percent have begun their reproductive lives before reaching age 20.

The under-five mortality rate was estimated to be 134 deaths per 1,000 live births, meaning that about 1 in 7 children in this area do not survive to their fifth birthday. Infant mortality stands at 83 deaths (under age 1) per 1,000 live births. The risk of dying in early childhood is closely linked to the length of the birth interval. Infant mortality is about twice as high among children with short intervals (less than 24 months) than among children born after long intervals (48 or more months).

Adult mortality is high in the study area. The mortality rate for adult females (age 15-49) is estimated to be 4 per 1,000 person-years and male mortality (age 15-49) is 5 per 1,000 person-years. While high, these mortality levels indicate that AIDS has not yet impacted significantly on adult mortality during the 0-13 year period before the survey (circa 1982-1995). A measure of female mortality attributable to maternity-related causes, the maternal mortality ratio, was calculated using the SACM. The maternal mortality ratio for the Sumve area was found to be around 500 maternal deaths per 100,000 live births.

Phase II of the SACM provided for linkage of 2,711 own-reported birth histories with 3,719 proxy-reported birth histories (1.37 proxy reports per own report). The analyses of proxy reports vis-a-vis own reports demonstrate that women are familiar with their sisters' experience regarding childbearing and child deaths. The quality of the proxy information is, in some respects, surprisingly good. Yet the study identified some important problems related to proxy reporting. The precision of dating of births was significantly worse in the proxy reports, and substantial birth date displacement was evident. Most importantly, a considerable 14 percent fewer non-surviving births were reported in the proxy birth histories than in the own reports.

These data quality problems had some impact on demographic estimates. The directly-estimated total fertility rate for ages 15-39 (TFR) in the five-year period before the survey was estimated to be 6.7 children per woman from the own data, but 5.9 children per woman from the proxy data. While the own and proxy data produce similar childhood mortality rates for the five years before the survey (due to offsetting underreports of surviving and nonsurviving births), the proxy effect resulted in a 23 percent underestimate of under-five mortality 5-9 years before the survey, and a 31 percent underestimate 10-14 years before the survey. Trend estimates from the proxy data thus produce a picture of rising mortality, whereas own data indicate falling or stable mortality. These results suggest that *routine* implementation of a methodology to correct for mother's survival bias involving use of proxy data is not realistic at this time. However, in settings where moderate to severe bias is expected (five-fold or greater increases in adult mortality), careful adjustment to mortality estimates based on proxy data, while difficult to support empirically, may be an improvement over no adjustment at all. The adjustment would need to involve estimation of a "proxy effect" as well as estimation of the substantive correction parameter that reflects the survival bias.

Evaluation and quantification of the biases influencing childhood mortality estimation in sub-Saharan Africa should be undertaken. In this study, the children of recently deceased women had significantly elevated mortality relative to children of survivors: under-five risk was more than doubled (340 versus 143 per 1,000 live births). Additional information on the fertility-inhibiting impact of HIV/AIDS and current levels and trend in adult HIV/AIDS-related mortality needs to be garnered. These data should be population-based and refer to a recent time period in order to be useful for program and policy purposes.

CHAPTER 1

INTRODUCTION

1.1 Rationale

Typically, estimates of childhood mortality produced from survey data are based on the own-reported birth histories of a sample of women of reproductive age—more to the point, they are based on samples of *surviving* women. The basic methodology admits that, in the aggregate, some births will not be represented in the retrospective data because the mothers died before the survey date. Whether the exclusion of this "unobserved" experience results in a significant level of bias in childhood mortality estimation will relate to three factors: (1) the level and age pattern of female adult mortality, (2) the antemortem fertility of deceased women, (3) and the risk of death among the children of now deceased women relative to that of survivors' children. Since the early 1970s, over 100 national-level demographic surveys have been conducted in the context of the World Fertility Survey and Demographic and Health Surveys (DHS) programs. Over this period, it has routinely been assumed that this bias was negligible, largely because of relatively low adult death rates. In parts of sub-Saharan Africa where recent and rapid rises in HIV prevalence and AIDS-related mortality are being observed, a ten-fold or greater increase in adult mortality now appears conceivable (Gregson et al., 1994; Stoto, 1993; Way and Stanecki, 1994), and the question of (mother's) "survival bias" in the sample of birth histories is being reconsidered. The AIDS pandemic is also expected to put an upward pressure on mortality rates during childhood through both direct and indirect causal pathways (Nicoll et al., 1994). The measurement of these effects, superimposed on the otherwise encouraging demographic impact of improved delivery and greater utilization of basic child health services, is key to information-based health program evaluation and policy development in Africa.

That childhood mortality estimates are potentially compromised, i.e., downwardly biased, under existing or incipient conditions becomes a troubling possibility, especially since, at present, alternative data collection or analytical methods to overcome the problem do not exist. Given the lack of complete vital registration systems in much of the developing world, the only feasible approach to routine empirical assessment of (and correction for) this potential bias is through the use of proxy interviews; that is, collection of birth histories of deceased women through interviews with surviving relatives (e.g., sisters). In practical terms, the method would involve collection of birth and survival information from an individual respondent at three levels: (1) her "own" birth history, (2) the birth history of her natural mother (i.e., sibling history to identify sisters), and (3) the birth history of each deceased sister. Based on typical data use needs (i.e., level and trend estimation), the analysis of such data would focus on a recent time period, such as the 10- or 15-year period immediately prior to the survey.

The last 25 years of experience in survey research has demonstrated that reasonably complete and accurate "own" birth histories can be collected from women and that levels and trends of childhood mortality can be directly estimated with a good deal of precision, even in settings of poor educational attainment and where cultural factors operate against good reporting of an individual's demographic experience (Cleland and Scott, 1987; Sullivan et al., 1994; Arnold and Bicego, 1995; Curtis, 1995).

Sibling histories, on the other hand, require knowledge of events that occurred when the respondent was not yet born, when she was a small child, or after she left her mother's household (i.e., births and deaths of brothers and sisters). Several DHS surveys have collected sibling histories with the principal purpose of estimating maternal mortality. The quality of these data is still being evaluated, but preliminary results from a few countries in Africa and elsewhere indicate very plausible fertility and mortality patterns for recent time periods at least.

The quality of birth histories on respondents' sisters (i.e., proxy birth histories) is yet more uncertain. The authors know of no studies that have to date looked empirically at this issue. Presumably, the completeness and precision of these data will vary in relation to characteristics of the population under study, especially migration, fertility, and other factors that determine the level and quality of recent contact and communication between siblings. These factors are highly variable in the developing world, both within and among population groups.

The principal objective of the study reported on here was thus to assess whether reasonably complete and accurate birth histories could be collected by proxy interview. The vehicle used to address this question was the Sumve Survey on Adult and Childhood Mortality (SACM), undertaken in northwestern Tanzania by the Tanzanian Bureau of Statistics (BOS) and the DHS program from May to October 1995. The SACM was a two-phase survey designed to allow comparison of birth histories collected from the mother herself ("own" reports) with those collected from the woman's living sisters ("proxy" reports).

This report serves a number of purposes. First, it provides the background and methodological details of the SACM. Second, the report gives a description of the study area and population in terms of its demography, use of health services, and socioeconomic situation. This aspect of the report is principally intended to serve the evaluation needs of health and social programs in and around the study area. It also provides a demographic and social context within which the primary methodological findings of the study may be usefully interpreted. Lastly, this publication presents and discusses some of the methodological findings of the SACM pertinent to the feasibility of proxy interviewing in the rural African context. More detailed analyses of the data with regard to estimation methodology and adjustment procedures are planned for later publication.

1.2 Geography, Demography, and Health of the Study Population

The SACM was conducted in the Kwimba District of Mwanza Region, which is situated on the southern shores of Lake Victoria. An area comprised of 12 contiguous rural wards[1] of Kwimba District was chosen as the survey site, largely on the basis of its remoteness (to minimize problems associated with out-migration), expected high mortality levels, and the logistical advantages related to affiliations with local institutions in the area.

The population of the study area is comprised predominantly of members of the Sukuma ethnic group, although some traders and government employees from other ethnic groups have immigrated in small numbers from neighboring districts and towns to settle along the few and unpaved roads that traverse the district. The vast majority of the population make their living from agriculture on small land holdings, growing maize, cotton, cassava, millet, and rice. In this part of Tanzania, rainfall may occur throughout the year, but is most dependable during the March to May period. The local temperature in Kwimba District averages 25 degrees Celsius.

According to the most recent World Bank Development Report, Tanzania is one of the poorest countries in the world with a per capita GNP of around US$140 (World Bank, 1996). Based on the 1991/1992 Tanzania Demographic and Health Survey (TDHS) (Ngallaba et al., 1993), the population of Mwanza Region in particular fares worse than the overall national average, as reflected in many health and social development indicators. For instance, in 1992, only 2 percent of currently married women in this area were using a modern method of contraception; however, by the time of the 1994 Tanzania Knowledge,

[1] Based on the 1988 Census, these 12 wards had a total population size of 102,003 persons. Using an assumed annual population growth rate of 2.6 percent, the 1995 population would have been 122,360 persons.

Attitudes, and Practices Survey (TKAPS) (Weinstein et al., 1995), modern contraceptive use had risen to 7 percent, still only about half the national level of 13 percent. Fertility is very high in the western part of Tanzania (Mwanza Region included) with 6.2 births per woman in the 1994 TKAPS survey, which is higher than the national level of 5.6 children.

Based on the 1992 TDHS data, under-five mortality was 169 per 1,000 live births and infant mortality was 108 per 1,000 in the "Lake" Zone which includes the Mwanza Region. A previous study undertaken in the same area as the SACM found a maternal mortality ratio of 297 maternal deaths per 100,000 live births using the (indirect) sisterhood method (Walraven et al., 1994). Health problems commonly recorded at the health facilities in and around Sumve (base of SACM operations) indicate high prevalences of malaria (resulting in a high prevalence of infant anemia), diarrhea, malnutrition, schistosomiasis, tuberculosis, acute respiratory infection, meningitis, and sexually transmitted diseases (Walraven, 1993). While no estimate of HIV prevalence for this particular area is available, an adjacent population studied during the period 1992-94 had a prevalence of 4 percent, although it is now probably higher (Grosskurth et al., 1995).

Persons living in the study area have some access to health services provided through a Primary Health Care (PHC) team that involves village health workers, village health commitees, traditional healers, and birth attendents as well as health professionals based in the hospitals and other health facilities in and around the small towns of Sumve and (to a lesser extent) Ngudu. Outreach efforts have focused in a number of areas, most notably, immunization services, nutrition rehabilitation and education programs, and services aimed at improving perinatal outcomes. Unusual for a setting of this type, the hospital in Sumve provides a relatively high level of tertiary care unavailable in most other rural areas of Tanzania.

1.3 Organization of the Report

Chapter 2 of this report describes in some detail the design of the study and the methods used to implement the survey, including the sampling strategy and sample results. Chapter 3 presents results of the SACM regarding characteristics of the sampled households and the individual women interviewed. Also, the concluding section of this chapter describes patterns in the utilization of maternal health services by women in the study who recently gave birth. In Chapter 4 of the report, demographic estimates are presented including fertility, childhood mortality, and adult mortality. Estimates of maternal mortality are also given here. Chapter 5 is methodological in nature presenting results emanating from the analysis of the reliability of proxy birth history reporting.

CHAPTER 2

METHODOLOGY AND SAMPLE RESULTS

2.1 Study Design

The SACM was conducted in two phases. In the first phase, a random sample of women age 15-50 was interviewed in their households. A complete sibling history was collected from these respondents which included detailed locator information for all living sisters age 15-50. After Phase I was completed, the sibling histories and associated data were used to draw up a roster of all living sisters age 15-50 of the Phase I respondents. All sisters listed who lived in the expanded Phase II study area were eligible for Phase II interview.

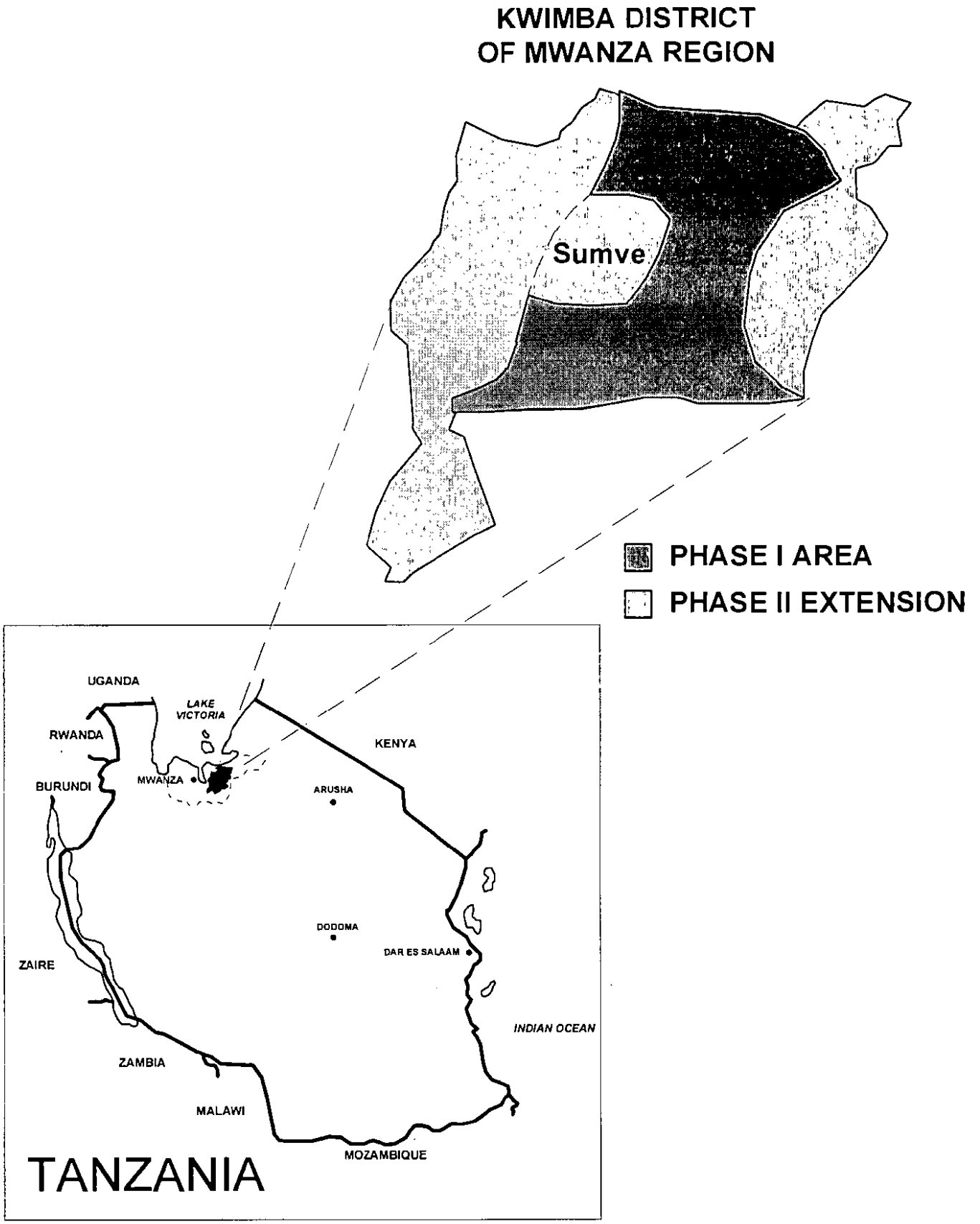
Phase I of the SACM was conducted in the six wards of Kwimba District that surround the community of Sumve: Bungulwa, Mantare, Mwabomba, Mwaniko, Ngulla, and Walla (Figure 2.1). The six wards comprise a total of 57 enumeration areas (EA) designated and mapped during the 1988 national census. A complete remapping and household listing of these 57 EAs were conducted prior to the SACM study by permanent staff of the Tanzania Bureau of Statistics (BOS) who had been trained in SACM household listing and cartographic methods by a demographer of the DHS project. A systematic random sample of 1,511 households was selected from the new listing. All women age 15-50 in the selected households were eligible for the Phase I individual interview. This approach to sampling, in both materials and methods, is identical to that used routinely in DHS surveys, except that the first phase of the typical two-stage cluster sampling was dropped since all EAs (i.e., all clusters) were included in the study. In other words, no area within the contiguous area defined as the SACM survey area was excluded; therefore, every household and woman in the study area had a nonzero probability of being sampled.

The study area was expanded for Phase II of the SACM so as to maximize the "take" of sisters, but not so much as to make it impractical to locate and contact respondents. The final compromise solution included the six original wards plus the six contiguous wards of Koromije, Misasi, Missungwi, Mwagi, Nyambiti, and Sumve (Figure 2.1). All living sisters age 15-50 reported by Phase I respondents who lived in these 12 wards were eligible for the Phase II interview.

A primary consideration in the selection of this area of Kwimba District for the study was its remote rural location which would result in relatively low out-migration of sisters. This feature of the population greatly facilitated the location of sisters for interview during Phase II of the study. In addition, the area was expected to have relatively high adult mortality due to both the general level of underdevelopment and to the increasing HIV/AIDS problem in the area. However, it is important to note that the select nature of the population limits the generalizability of the results of the survey. In particular, the use of a restricted geographic area in Phase II of the study, while logistically necessary, means that sisters interviewed in the SACM live closer to each other than is the case in the general population.

The upper limit of the age range for eligibility for the individual survey is 49 in most DHS surveys. In the SACM, this upper limit was extended to 50 to attempt to reduce elimination of women from the sample through age displacement (both intentional and unintentional) to age 50. This is particularly relevant for identifying sisters for Phase II of the study because Phase I respondents may have only an approximate idea of their sister's age and may tend to heap their ages on preferred numbers such as those ending in a zero or a five. However, many of the analyses of the SACM data are restricted to women age 15-49 to allow comparison with standard demographic indices.

Figure 2.1
Phase I and Phase II Survey Areas of the 1995 Sumve Survey on Adult and Childhood Mortality



2.2 Survey Instruments

The SACM employed three questionnaires: the Household Questionnaire (Phase I only), the Phase I Individual Questionnaire, and the Phase II Individual Questionnaire (see Appendix C). The Household Questionnaire was used to list all the usual members and visitors of the sample households primarily in order to identify women who were eligible for the individual interview. In addition, some basic information was collected on the characteristics of each person listed including his/her age, sex, and relationship to the head of the household.

The Phase I Individual Questionnaire included questions on the following topics:

- Background characteristics (age, education, household possessions)
- Sibling history (i.e., birth history of the respondent's natural mother)
- Locator information for living sisters age 15-50
- Respondent's "own" birth history
- Antenatal and delivery care for the most recent birth (for local program evaluation purposes)
- "Proxy" birth history on each sister born in the 50 years before the survey who survived to at least age 15.

The structure of the "own" and "proxy" birth histories was adapted with little change from the DHS core models. The SACM sibling history was essentially the same as the DHS maternal mortality module routinely used by the DHS project, except that additional information on cause of death was elicited, and instructions and questions were added to direct interviewers toward a compilation of various data on eligible sisters for Phase II location.

The Phase II Individual Questionnaire was essentially the same as the Phase I Individual Questionnaire but with the following differences: 1) no information on antenatal and delivery services use was collected (since the data could not, in any case, be referenced to a particular population); 2) locator information for living sisters age 15-50 was not collected; and 3) additional structural information was added to facilitate linkage back to Phase I sisters.

2.3 Personnel and Training

The SACM was implemented by the Tanzania BOS and the DHS project. Additional technical and logistical support were provided by the National Institute for Medical Research (NIMR) in Mwanza, Sumve Designated District Hospital, and Muhimbili College at the University of Dar es Salaam (Department of Epidemiology and Biostatistics). The Mwanza Regional Medical Office seconded nurses who served as SACM interviewers.

The SACM questionnaires were pretested in February 1995. Eight certified nurses were trained to implement the pretest during a 10-day training period. Three language versions of the questionnaires were produced: Kisukuma (the predominant local language), Kiswahili (lingua franca), and English. The pretest fieldwork was conducted over a one-week period in areas surrounding Mwanza, where both Kiswahili- and Kisukuma-speaking households could easily be identified. Approximately 130 pretest interviews were conducted, debriefing sessions were subsequently held with the pretest field staff, and modifications to the

questionnaire were made based on lessons drawn from the exercise. Pretest interviewers were retained to serve as field editors and team supervisors during the main survey.

Training of field staff for the main survey was conducted over a three-week period in May 1995. Staff from the BOS, the DHS project, and Muhimbili College trained 23 incoming interviewer trainees, all of whom were trained nurses. The training course consisted of instruction in general interviewing techniques, field procedures, a detailed review of items on the questionnaires, mock interviews between participants in the classroom, and practice interviews with real respondents in areas outside the SACM study area. Trainees who performed satisfactorily in the training program were selected as interviewers. During this period, field editors and team supervisors were provided with additional training in methods of field editing, data quality control procedures, and coordination of fieldwork.

A two-day training course was held at the end of July 1995 prior to the start of the second phase of fieldwork. The Phase II training focused on differences between the Phase I and the Phase II questionnaire and on field logistics for the second round. Particular emphasis was given to training supervisors in the field procedures for tracking respondents who had moved and locating respondents who could not be found where they were originally reported to live. Appendix B provides a list of personnel involved in the SACM study.

2.4 Fieldwork

The fieldwork for the SACM survey was carried out by four mobile interviewing teams, each consisting of one team supervisor, one field editor, and four or five female interviewers (Appendix B). Two permanent senior BOS staff members and one DHS project field demographer coordinated and supervised fieldwork activities. Phase I data collection took place over a 5-week period between May 20 and June 23, 1995. Phase II data were collected over a 3-month period from August 2 to October 20, 1995. The interim period between phases was used to compile rosters and itineraries for Phase II work.

2.5 Data Processing

All questionnaires were initially edited in the field for problems in consistency and completeness. The field-edited questionnaires were sent for computer data processing to Mwanza (NIMR) where a reliable electrical supply had been arranged. Four computers were employed in the entry, editing, and initial tabulation of the SACM data. Four data entry clerks entered the data, two persons were in charge of editing procedures, and one supervisor distributed and controlled all processing activities.

Processing of the SACM data was accomplished using the Integrated System for Survey Analysis (ISSA) which allows hierarchical data structures and is therefore suitable for the processing of multilevel data of the type collected in the SACM. The household represents a first level in the data, while individual women age 15-50 represent a second level, and their reports of sisters' birth histories represent a third level.

After Phase I data collection, a list of Phase II respondents (eligible living sisters of Phase I respondents) with their reported locator information was compiled. Phase I data therefore directed the "sample" of Phase II sisters.

Data entry was performed concurrently with fieldwork, and frequent tabulations were produced that facilitated ongoing data editing and data quality evaluation. The advantage of timely entry and editing is that quality problems (i.e., poor interviewing habits) can be detected early in the field, and field procedures for supervision, editing, or interviewing can be adjusted before they become very serious problems. Another obvious advantage is that within a short period after fieldwork ends, the data set will be ready for analysis. After the second round was completed, secondary editing was performed on the whole data set and date

values were imputed where necessary. Two weeks after fieldwork was completed, the first tabulations were run on the data set.

2.6 Sample Results

Table 2.1 shows response rates for the SACM. Of the 1,511 households selected, 1,493 were located and 1,488 were successfully interviewed yielding a response rate of 98.5 percent. The main reason for household nonresponse was that the household was absent for an extended period of time. A total of 2,209 women age 15-50 were identified in the interviewed households and 2,130 of these were interviewed in Phase I of the study (response rate of 96.4 percent). The majority of nonresponse among the Phase I respondents was due to the absence from home of the respondent each time the interviewer called (49 cases), or because the respondent had moved away from the household for an extended period of time (21 cases).

Table 2.1 Results of household and individual interviews

Number of households, number of interviews, and response rates, SACM 1995

Result	Total
Household interviews	
Households sampled	1,511
Number of households occupied	1,493
Number of households interviewed	1,488
Household response rate	**98.5**
Phase I individual interviews	
Number of eligible women	2,209
Number of eligible women interviewed	2,130
Phase I response rate	**96.4**
Phase II individual interviews	
Number of sisters to be interviewed	2,223
Number of sisters interviewed	2,123
Phase II response rate	**95.6**

The Phase I respondents identified 2,223 living sisters age 15-50 who lived in the Phase II study area, and complete interviews were obtained from 2,123 sisters of Phase I respondents (95.6 percent).

Table 2.2 Detailed results of Phase II interviews

Number of living sisters age 15-50 reported by Phase I respondents, by interview status in Phase II, SACM 1995

Result	Total
Total living sisters age 15-50 listed	**4,329**
Sisters living outside Phase II area	1,621
Residence information incomplete	149
Total sisters listed in Phase II area	**2,559**
Moved outside area	107
Deceased	7
Sister listed more than once	222
Total sisters to be interviewed	**2,223**
Not at home	4
Refused	2
Incapacitated	2
Not possible to locate respondent	35
Different mother	15
Other	17
Result code missing	25
Total sisters interviewed	**2,123**
Sisters interviewed in Phase I (same household)	478
Sisters interviewed in Phase II	1,645

Table 2.2 presents a more detailed analysis of the implementation of the sample of sisters in Phase II of the SACM. The Phase I respondents identified a total of 4,329 living sisters age 15-50. Of these 2,559 (59 percent) were reported to live in the 12 wards that comprised the Phase II study area. The implementation of Phase II of the study included some initial field screening of this sample of sisters, revealing that 107 sisters originally reported to live in the Phase II study area had moved outside the study area, 7 had died, and 222 of the sisters were listed more than once. The latter situation arises because some of the Phase I respondents were sisters themselves, and therefore, more than one Phase I respondent could report on the same sister. Each sister who was reported by more than one Phase I respondent was interviewed once, and each subsequent time she appeared in the sample she was coded as "already interviewed." Therefore, the final sample of sisters of Phase I respondents who were eligible for Phase II of the study was 2,223.

The main reason for nonresponse among the Phase II sisters was that it was not possible to locate the respondent, usually because the name or locator information provided by the Phase I respondent was inadequate (35 cases). There were 15 cases where the sister in Phase II was found not to have the same mother as the Phase I respondent who had reported her. This arose, for example, when the Phase I respondent included in the sibling history all children that she had grown up with, including paternal siblings and fostered children, rather than just maternal siblings.

One feature of the study design is that a Phase I respondent may also be a Phase II sister, particularly when two or more sisters live together in a household selected for Phase I of the survey. The Household Questionnaire and the Phase I Individual Questionnaire included a number of questions and instructions for the interviewers to enable sisters residing in the same household to be clearly identified and linked. These sisters are considered as Phase II respondents because they are eligible sisters of Phase I respondents, but they did not need to be reinterviewed during the second period of fieldwork. Of the 2,123 complete interviews conducted with Phase II sisters, 478 were interviews that were conducted during the first period of fieldwork with sisters who lived in the same household as the Phase I respondent who listed them. The remaining 1,645 complete Phase II interviews were new interviews conducted during the second period of fieldwork.

CHAPTER 3

CHARACTERISTICS OF HOUSEHOLDS AND RESPONDENTS

An understanding of the background characteristics of the households and women interviewed in the SACM is essential to understanding the demographic and social context in which the SACM was conducted. This chapter presents information on the age and sex structure of households interviewed in Phase I of the SACM, household composition, and characteristics of women interviewed in both Phase I and Phase II. In addition, the information on maternity service utilization collected from the scientific sample of women interviewed during Phase I of the survey is analyzed in the final section of this chapter.

3.1 Age-Sex Composition

Table 3.1 presents the age-sex distribution of the household population in Phase I of the SACM. The age structure of the population, depicted as a population pyramid in Figure 3.1, is one typical of a high fertility population, i.e., a wide-based pyramid indicating a large number of recent births relative to the adult population. This age structure is very similar to that of the 1994 rural population of Tanzania (Weinstein et al., 1995).

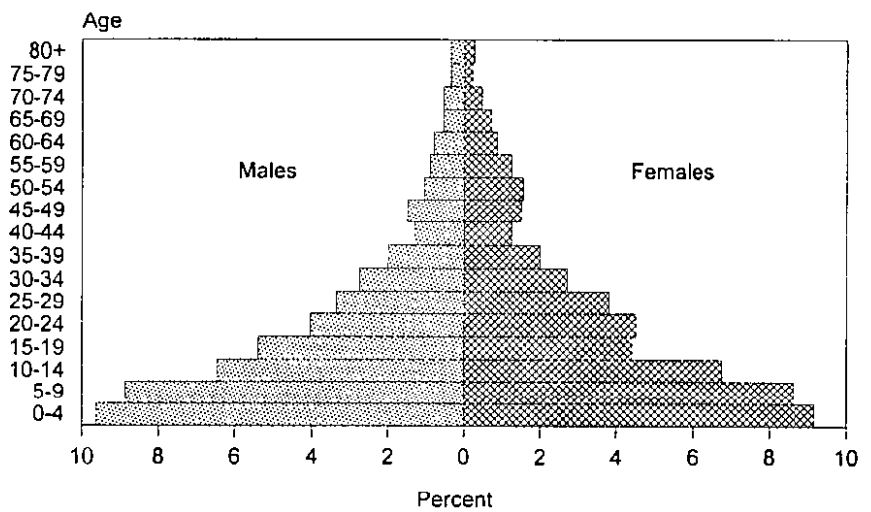
Table 3.1 Household population by age and sex

Percent distribution of the de facto household population by five-year age groups, according to sex, SACM 1995

Age group	Male	Female	Total
0-4	19.3	18.3	18.8
5-9	17.8	17.2	17.5
10-14	13.0	13.5	13.2
15-19	10.8	8.8	9.8
20-24	8.1	9.0	8.6
25-29	6.7	7.6	7.2
30-34	5.5	5.4	5.5
35-39	4.0	4.0	4.0
40-44	2.6	2.5	2.6
45-49	3.0	3.0	3.0
50-54	2.1	3.1	2.6
55-59	1.8	2.5	2.1
60-64	1.6	1.7	1.6
65-69	1.1	1.4	1.2
70-74	1.1	0.9	1.0
75-79	0.7	0.4	0.5
80+	0.7	0.5	0.6
Missing/Don't know	0.1	0.0	0.0
Total	100.0	100.0	100.0
Number	5,192	5,220	10,427

Note: Total includes 15 respondents whose sex was not reported.

Figure 3.1
Population Pyramid of Study Area for SACM



SACM 1995

3.2 Household Composition

Table 3.2 presents the percent distribution of households by sex of the household head, household size, relationship structure within the household, and presence of foster children.[1] Households are predominantly headed by males (83 percent). This is consistent with the findings of the 1994 TKAPS which found that 82 percent of households in rural areas were headed by men (Weinstein et al., 1995).

The average household size in the study area is seven persons, and 30 percent of households include nine or more members. This household size is somewhat larger than the national average in rural areas; the TKAPS reported a mean household size in rural areas of 5.5 persons and only 14 percent of rural households included nine or more members (Weinstein et al., 1995). Less than 3 percent of households in the study area are single-person households, compared to 6 percent in rural Tanzania generally. The large household size in the study population is also reflected in the relationship structure within households: while 34 percent of households contain two related adults of the opposite sex, 56 percent contain three or more related adults. Just under 30 percent of households include foster children which again is slightly higher than is found in rural Tanzania generally (24 percent).

Table 3.2 Household composition

Percent distribution of households by sex of head of household, household size, relationship structure, and presence of foster children, SACM 1995

Characteristic	Total
Household headship	
Male	82.5
Female	17.5
Number of usual members	
1	2.4
2	6.5
3	8.4
4	9.9
5	12.7
6	11.6
7	9.9
8	9.0
9+	29.6
Mean size	7.0
Relationship structure	
One adult	4.8
Two related adults:	
Of opposite sex	34.2
Of same sex	2.7
Three or more related adults	56.3
Other	2.0
Foster children[1]	28.6

Note: Table is based on de jure members; i.e., usual residents.
[1] Foster children are those under age 15 living in households with neither their mother nor their father living in the same household.

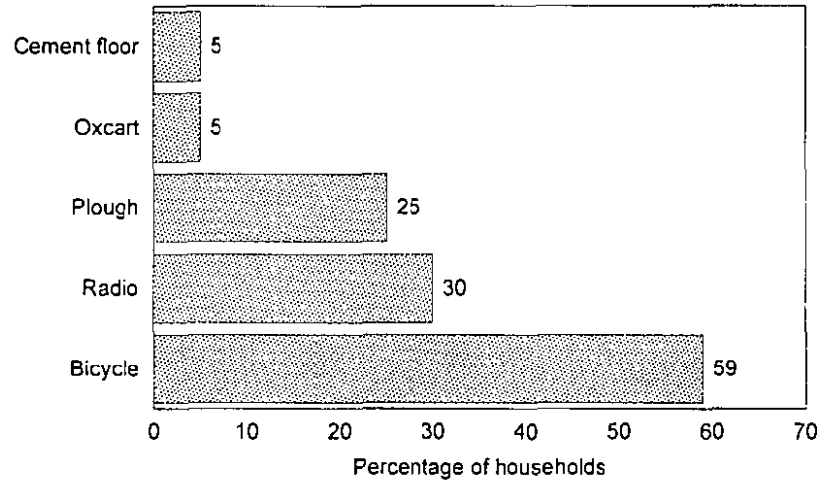
3.3 Household Characteristics

Data were collected from individual respondents about their household environment and about household ownership of durable goods. This information is useful in assessing the economic conditions in the study area and can be used as an indicator of the respondent's socioeconomic status. Figure 3.2 shows the percentage of households in the SACM sample with possession of various attributes, including a cement floor, bicycle, radio, oxcart, and plough. Since this information is collected from individual respondents, the distributions are based only on households in which there was at least one individual respondent.

The households in which the respondents live are extremely homogeneous in terms of their floor material—only 5 percent live in dwellings with a cement floor (the remainder have an earth or sand floor). The most commonly owned durable goods are bicycles, owned by 59 percent of households, followed by the radio (30 percent of households). One-quarter of households own a plough, but only 5 percent own an oxcart.

[1] A foster child is a child under age 15, neither of whose parents live in the same household.

Figure 3.2
Percentage of Households Possessing Various Household Items



SACM 1995

3.4 Background Characteristics of Respondents

Table 3.3 presents the distribution of Phase I and Phase II female respondents by selected background characteristics. The Phase I respondents are a random sample and, as such, are representative of women age 15-50 in the Phase I study area. The Phase II sample is a sample of sisters of Phase I respondents and is *not* representative of the general population of women age 15-50 in the study area, although the sample should resemble that of the general population.

The proportion of women in the Phase I sample declines as age increases which reflects the general age structure of the population (Figure 3.1). Sixty-two percent of the female respondents in Phase I were under 30 years of age. Approximately two-thirds of Phase I respondents were in a union, and almost all of these unions were reported as marriages rather than cohabitations. Less than 1 percent of respondents in the Phase I sample reported having secondary or higher education, while 60 percent reported at least some primary education and 39 percent reported no education. Nationally, the TKAPS reported that 34 percent of women age 15-49 in rural areas had no education, while about 65 percent had primary education (Weinstein et al., 1995); therefore, the level of education among respondents in the SACM is slightly lower than that of rural women on a national scale.

Table 3.3 also shows the percent distribution of Phase II women. An overlap occurs between Phase I and Phase II samples since some Phase II women (478) will have already been interviewed during Phase I due to residence in the same household. The aggregate profiles of the women in the two phases are very similar; however, Phase II women tend to be slightly younger, slightly less likely to have ever married, and slightly more educated.

Table 3.3 Background characteristics of respondents

Percent distribution of women by age, marital status, and level of education, according to Phase I or Phase II of the study, SACM 1995

Background characteristic	Phase I respondents		Phase II respondents	
	Percent	Number of women	Percent	Number of women
Age				
Under 15	0.0	0	1.6	35
15-19	21.5	458	19.9	422
20-24	22.0	469	22.9	486
25-29	18.4	391	20.3	432
30-34	13.2	281	13.8	292
35-39	10.1	215	10.9	231
40-44	6.1	130	4.9	103
45-49	7.8	166	4.3	92
50 and over	0.9	20	1.4	30
Marital status				
Not in union	32.7	697	35.4	752
Married	65.4	1,392	63.1	1,339
Living together	1.7	36	1.3	28
Missing	1.7	36	0.2	4
Education				
No education	38.6	822	34.8	739
Primary	60.4	1,287	64.1	1,361
Secondary	0.9	20	0.9	19
Higher	0.0	1	0.2	4
Total	100.0	2,130	100.0	2,123

Table 3.4 presents the distribution of Phase I and Phase II respondents by highest educational level attained according to age. The percentage of Phase I respondents with no education increases with age, particularly after age 30; 23 percent of respondents age 15-19 have no education compared to 78 percent among respondents age 45-49. This age pattern reflects an encouraging improvement in this indicator of women's status. However, even among the youngest respondents, very few women have attended secondary school suggesting continuing social and economic constraints in the ability of households to garner resources to allow their children to progress beyond a primary education. Very similar age (cohort) differences in educational attainment are seen among the Phase II respondents, as would be expected.

Table 3.4 Level of education

Percent distribution of women by highest level of education attended, according to age. Phase I and Phase II respondents, SACM 1995

Age group	Level of education: No education	Primary	Secondary	Higher	Total	Number of women
PHASE I RESPONDENTS						
Age						
15-19	22.9	75.5	1.3	0.2	100.0	458
20-24	21.5	77.0	1.5	0.0	100.0	469
25-29	24.0	74.9	1.0	0.0	100.0	391
30-34	47.3	52.0	0.7	0.0	100.0	281
35-39	69.3	30.7	0.0	0.0	100.0	215
40-44	71.5	27.7	0.8	0.0	100.0	130
45-49	78.3	21.7	0.0	0.0	100.0	166
50 and over	85.0	15.0	0.0	0.0	100.0	20
Total	38.6	60.4	0.9	0.0	100.0	2,130
PHASE II RESPONDENTS						
Age						
<15	28.6	71.4	0.0	0.0	100.0	35
15-19	22.0	75.6	1.7	0.7	100.0	422
20-24	17.7	80.2	2.1	0.0	100.0	486
25-29	18.8	81.0	0.2	0.0	100.0	432
30-34	47.6	52.4	0.0	0.0	100.0	292
35-39	67.1	32.5	0.4	0.0	100.0	231
40-44	73.8	26.2	0.0	0.0	100.0	103
45-49	77.2	21.7	0.0	1.1	100.0	92
50 and over	93.3	6.7	0.0	0.0	100.0	30
Total	34.8	64.1	0.9	0.2	100.0	2,123

3.5 Utilization of Maternal Health Services

In this section, results are presented on the utilization of maternity services by women living in and around Sumve, where the (Sumve) Designated District Hospital is located and where a Primary Health Care (PHC) program that serves the study population is based.[2] Over the past decade, increasing PHC program emphasis and effort has been placed on outreach programs, especially those aimed at improving antenatal and delivery services (Walraven, 1993). Previous studies conducted in this area point to improved maternity services—especially medically-supervised delivery of high-risk pregnancies—as a means to reduce both perinatal and maternal mortality and morbidity (Walraven et al., 1994; Walraven et al., 1995).

The presentation of results is divided into three parts: antenatal care, use of delivery services, and reported complications during delivery.

3.5.1 Antenatal Care

In the SACM, all women who ever gave birth were asked to name all persons they saw for antenatal care during their most recent pregnancy (that ended in a live birth). Table 3.5 shows the percent distribution

[2] These data were collected only during Phase I of the SACM. Collection of Phase II data was not designed to result in data representative of all women living in the study area (or any area).

Table 3.5 Antenatal care

Percent distribution of last births to women age 15-49 in the five years preceding the survey by person providing antenatal care, according to selected background characteristics, SACM 1995 (Phase I)

Background characteristic	Antenatal care provider[1]								
	Doctor/ medical assistance	Rural medical aide	Nurse/ midwife	Maternal and child health aide	Traditional birth attendant/ healer	Other	No one	Missing	Total
Mother's age at birth									
< 20	3.3	4.8	54.3	61.4	3.3	0.0	0.0	1.0	210
20-34	1.8	3.5	52.5	64.7	1.8	0.9	1.0	0.1	866
35+	1.8	5.0	48.4	68.8	1.8	0.5	1.4	0.0	221
Birth order									
1	2.0	2.4	52.9	65.9	2.0	0.0	0.4	0.4	255
2-3	1.1	3.7	50.8	64.9	1.1	0.5	1.1	0.5	376
4-5	4.0	4.3	50.4	64.7	4.0	1.1	1.1	0.0	278
6+	1.8	4.9	54.1	64.2	1.8	1.0	1.0	0.0	388
Mother's education									
No education	1.4	4.1	50.4	68.7	1.4	0.6	1.0	0.0	492
Some education	2.5	3.9	53.2	62.5	2.5	0.7	0.9	0.4	805
Marital status									
Not currently married	1.1	3.8	48.3	70.2	1.1	0.4	1.1	0.4	265
Currently married	2.3	4.0	53.1	63.5	2.3	0.8	0.9	0.2	1,032
Total	2.1	3.9	52.1	64.8	2.1	0.7	0.9	0.2	1,297

[1] Respondents may cite more than one provider, thus total exceeds 100 percent.

of women who gave birth in the five years preceding the survey by source of antenatal care received during their most recent pregnancy, according to selected characteristics. Since a substantial number of women received care from more than one source, the percentages presented in this table will sum to more than 100 percent.

The SACM results shows that nearly all women (99 percent) in this population received some kind of antenatal care. Most antenatal care was provided by maternal and child health (MCH) aides (65 percent) and trained nurses or midwives (52 percent). Only 2 percent of women report that a doctor provided the antenatal services.

In general, there was little variation in overall utilization of antenatal care across mothers' characteristics. Similarly, there are minimal differences between subgroups in the particular type of provider mentioned. This survey was conducted in a rural area of Tanzania typically served by a very small number of facilities which provide antenatal services. Most women are likely to have received antenatal services from the same or very similar facilities within the study area (i.e., there is little choice) which may explain the minimal variation in the type of provider mentioned by women from different socio-demographic backgrounds.

The principal aim of antenatal care is to monitor the course of pregnancy and identify any potential complications. To achieve this goal, it is recommended that pregnant women start attending antenatal clinic within the first three months of pregnancy (i.e., during the first trimester). In the SACM, women were asked to report "how many months pregnant" they were when they made their first visit and the number of

subsequent visits that were made before delivery. Table 3.6 shows that more than 90 percent of women do not attend clinic until after the first trimester; the majority (78 percent) made their first visit in the second trimester. The median duration of pregnancy at first visit was 4.7 months.

Table 3.6 and Figure 3.3 also indicate that around 10 percent of women who reported having attended clinic did so only once or twice during the course of the last pregnancy. Over one-half of women reported 3-4 visits, and more than one-third attended 5 or more times. The median number of visits to antenatal clinic was 3.5. In the SACM, over three-quarters (76 percent) of women reported that they were advised to deliver in a hospital/clinic during the provision of antenatal services.

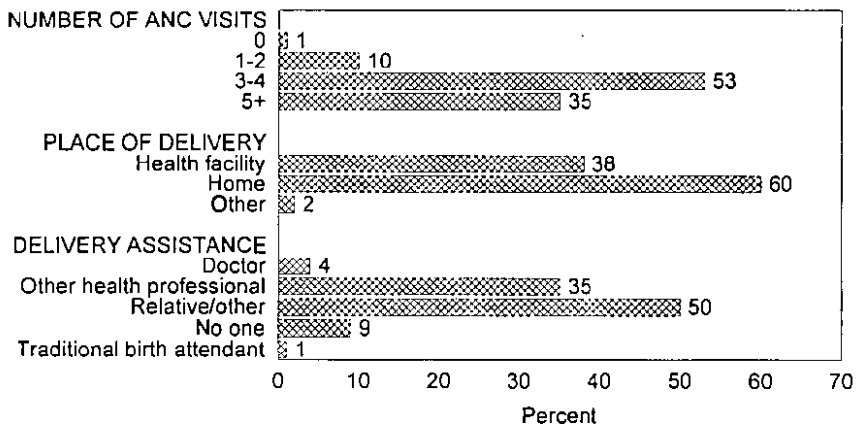
These results indicate that most women first attend antenatal clinic too late and make fewer than the recommended number of visits to clinic. This pattern may be due to delayed contact with outreach personnel which would lead to late booking for services at clinic. In any case, the "too late and too few" scenario means that women in this population do not receive the full benefits from antenatal care, and foreshadows problems in obtaining appropriate medical supervision during delivery.

Table 3.6 Antenatal visits and advice on delivery

Percent distribution of women age 15-49 who had a birth in the five years preceding the survey by number of antenatal visits, stage of pregnancy at the time of the first visit, and whether the mother was advised to deliver in a hospital for their most recent birth, SACM 1995 (Phase I)

	Total	Number of women
Number of visits		
0	1.0	13
1-2	9.6	124
3-4	52.9	686
5+	35.2	456
Don't know	1.4	18
Total	100.0	1,297
Median number of visits	3.5	-
Stage of pregnancy at first visit		
No care	1.0	13
First trimester	6.4	83
Second trimester	77.7	1,008
Third trimester	14.4	187
Don't know	0.5	6
Total	100.0	1,297
Median duration (in months) of pregnancy at first ANC visit	4.7	-
Advised to deliver in hospital		
No antenatal care	1.0	13
No	22.3	289
Yes	76.1	987
Don't know	0.6	8
Total	100.0	1,297

Figure 3.3
Percent Distribution of Births by Antenatal Care (ANC) and Delivery Characteristics



Note: Based on last births in the five years preceding the survey.

SACM 1995

3.5.2 Place of Delivery

Women who had a birth in the five years preceding the survey were asked to name the place of delivery of their most recent birth. Table 3.7 and Figure 3.3 indicate that well over one-half (60 percent) of last births in this area were reported to have occurred at home and that most of the remainder (38 percent) occurred in a health facility. Based on a comparison with data from the 1991/1992 TDHS (Ngallaba et al., 1993), use of delivery services in the Sumve area is slightly lower than that for the Mwanza Region as a whole (43 percent) and significantly lower than the nation as a whole (53 percent).

The previous section showed that virtually all women receive some type of antenatal services by trained health personnel. Yet, a much smaller proportion of these women were able to follow through with a medically-supervised delivery raising the following question: What factors are related to delivery in a health facility? Table 3.7 shows that, on average, younger women and those giving birth for the first time are more likely to deliver in a health facility, although this relationship is not a strong one. Similarly, the link between educational status of mothers and their use of delivery services is not pronounced. Women with some formal education are 22 percent more likely to deliver in a health facility than women without any education. Marital status does not apparently influence the use of delivery services.

Previous contact with providers of antenatal care, on the other hand, is closely associated with subsequent delivery in a health facility. As the number of antenatal visits increases, so does the likelihood of health facility delivery—from less than 10 percent of women not receiving antenatal services to 45 percent of women making five or more trips to clinic. Also, if a woman was advised during an antenatal visit to deliver in a health facility, she was 2.6 times more likely to do so than her counterpart who attended antenatal clinic but was not similarly advised to deliver in a health facility.

Table 3.7 Place of delivery

Percent distribution of women age 15-49 who had a birth in the five years preceding the survey by place of delivery of their most recent birth, according to selected background characteristics, SACM 1995 (Phase I)

Background characteristic	Place of delivery				Total	Number of women
	Health facility	At home	Other	Missing		
Mother's age at birth						
< 20	46.2	50.0	2.9	1.0	100.0	210
20-34	35.8	62.0	2.2	0.0	100.0	866
35+	37.6	61.1	1.4	0.0	100.0	221
Birth order						
1	49.8	47.8	2.0	0.4	100.0	255
2-3	35.6	61.4	2.7	0.3	100.0	376
4-5	29.5	68.7	1.8	0.0	100.0	278
6+	37.9	60.1	2.1	0.0	100.0	388
Mother's education						
No education	33.3	64.0	2.6	0.0	100.0	492
Some education	40.5	57.4	1.9	0.2	100.0	805
Marital status						
Not currently married	38.5	59.6	1.5	0.4	100.0	265
Currently married	37.6	60.0	2.3	0.1	100.0	1,032
Number of antenatal care visits						
0	7.7	76.9	15.4	0.0	100.0	13
1-2	24.2	71.8	4.0	0.0	100.0	124
3-4	35.6	62.4	2.0	0.0	100.0	686
5+	45.4	53.1	1.5	0.0	100.0	456
Advised to deliver in hospital						
No antenatal care	7.7	76.9	15.4	0.0	100.0	13
No	17.0	80.6	2.4	0.0	100.0	289
Yes	44.2	53.9	1.9	0.0	100.0	987
Total	37.8	59.9	2.2	0.2	100.0	1,297

Note: Eighteen respondents did not report the number of antenatal visits, and eight did not report whether they were advised to deliver in a hospital.

The type of assistance provided during delivery is an important determinant of pregnancy outcome. To obtain this information, women were asked to report the persons who assisted them in the delivery of their most recent birth. As expected, the results closely parallel the preceding results, i.e., deliveries outside of health facilities are seldom attended by trained health personnel.

Table 3.8 shows that the majority of recent births in the Sumve area were delivered without medical supervision (60 percent): 50 percent by relatives or friends, 9 percent without any assisting person, and less than 1 percent by a traditional birth attendant.[3] Doctors attended only 4 percent of deliveries in this area, and other health professionals (nurses and trained midwives) provided assistance in another 35 percent of births occurring in the area (Figure 3.3).

[3] Respondents were asked to report all persons providing assistance during delivery, but in this presentation only the highest qualified person is considered. This allows the percentage total to equal 100.

Table 3.8 Assistance during delivery

Percent distribution of women age 15-49 who had a birth in the five years preceding the survey by assistance during delivery of their most recent birth, according to selected background characteristics, SACM 1995 (Phase I)

Background characteristic	Assistance during delivery[1]						Total	Number of women
	Doctor/ medical assistance	Other health profes-sional	Traditional birth attendant	Relative/ Other	No one	Missing		
Mother's age at birth								
< 20	2.4	44.3	0.5	49.0	0.5	3.3	100.0	210
20-34	3.9	32.9	0.7	52.7	9.1	0.6	100.0	866
35+	5.0	34.4	0.0	42.5	16.7	1.4	100.0	221
Birth order								
1	3.5	47.1	0.4	43.9	2.7	2.4	100.0	255
2-3	4.0	33.0	0.5	56.4	4.8	1.1	100.0	376
4-5	2.5	28.4	1.1	55.8	11.9	0.4	100.0	278
6+	4.9	33.8	0.3	44.8	15.2	1.0	100.0	388
Mother's education								
No education	4.1	30.9	0.6	51.4	12.2	0.8	100.0	492
Some education	3.7	37.5	0.5	49.7	7.1	1.4	100.0	805
Currently married								
No	3.0	37.4	0.8	50.9	6.0	1.9	100.0	265
Yes	4.1	34.4	0.5	50.2	9.8	1.0	100.0	1,032
Number of antenatal care visits								
0	0.0	15.4	0.0	61.5	15.4	0.0	100.0	13
1-2	1.6	22.6	1.6	62.9	9.7	1.6	100.0	124
3-4	3.8	32.5	0.4	54.4	8.2	0.7	100.0	686
5+	4.6	42.5	0.4	41.4	9.6	1.3	100.0	456
Advised to deliver in hospital								
No antenatal care	0.0	15.4	0.0	61.5	15.4	0.0	100.0	13
No	1.7	16.3	1.0	65.4	15.2	0.3	100.0	289
Yes	4.6	40.6	0.4	46.0	7.2	1.2	100.0	987
Total	3.9	35.0	0.5	50.3	9.0	1.2	100.0	1,297

Note: Eighteen respondents did not report the number of antenatal visits, and eight did not report whether they were advised to deliver in a hospital.

[1] If the respondent mentioned more than one attendant, only the most qualified attendant is considered.

Previous contact and consultation with the local health system during pregnancy increases the chance of medical supervision at delivery. The percentage of deliveries assisted by medical personnel (doctors plus "other" health professionals) rises from 15 percent among women not having received antenatal care to 47 percent of women having visited clinic five or more times during pregnancy.

Women who delivered their last births at home (n= 904) were asked further questions about their intention to deliver in a health facility and also to provide reasons for not delivering in a health facility. Table 3.9 shows that most women (84 percent) delivering outside a health facility did intend to deliver in a health facility. Far and away, the most commonly reported reasons for not eventually delivering in a heath facility were distance/transport related. Sixty-one percent of women reported that the hospital was "too far away," and 45 percent reported that they had "no transport." Twelve percent reported that it simply was not necessary to deliver in a health facility. All other reasons were much less frequently reported. These findings point clearly to the practical issue of physical access as the principal determinant of nonutilization of delivery services in the Sumve area.

Table 3.9 Reasons for non-utilization of delivery services

Among women whose last birth was not delivered in a health facility, the percentage who intended to deliver in a health facility, and the percentage who gave selected reasons for not delivering in a health facility, SACM 1995

Intention for delivery	Percent of women
Intended to deliver in health facility	84.1
Reason for not delivering in a health facility	
Too far away	60.7
Not necessary	12.4
No transport	44.5
No child care	0.3
Husband/family forbid	0.6
Poor services	0.8
Too expensive	2.9
Delivered on way to facility	3.5
Friends/relatives can assist	3.0
Other	10.4
Missing	1.5
Number of women[1] who did not deliver their last birth in a health facility	904

[1] Includes only women who had at least one birth in the last five years

3.5.3 Self-reported Complications of Delivery

With regard to their last live birth, respondents were asked if they had experienced any of the problems that were described aloud by the interviewer. Of the 1,297 women who had a live birth in the last five years, 168 (13 percent) reported that they had experienced at least one complication during the reference delivery (Table 3.10). The most frequently reported complications were prolonged labor (6 percent) and excessive bleeding (4 percent). Of those who reported at least one problem, 36 percent were advised to go to the hospital when they experienced the complication, while another 37 percent were already in the hospital at the time of the problem. The remaining 26 percent of cases were not advised to seek medical care at the hospital.

Table 3.10 Delivery complications

Percentage of women who had a birth in the five years preceding the survey who experienced selected complications during the delivery of their last live birth, and the percent distribution of women who experienced complications by whether they were advised to go to a hospital when they experienced complications, SACM 1995

Delivery complication/ advisement	Percent	Number of women
Any complication	13.0	168
Prolonged labor	5.9	77
Excessive bleeding	4.1	53
Fever and vaginal discharge	1.6	21
Convulsions	0.2	3
Other	5.5	71
Total	100.0	1,297
Advised to go to hospital		
Yes	35.7	60
No	26.2	44
Already at hospital	36.9	62
Total	100.0	168

CHAPTER 4

FERTILITY AND MORTALITY

4.1 Fertility

Contraceptive use in the Mwanza Region has risen from a very low level of 4 percent in 1991/1992 to 16 percent in late 1994.[1] Following increases in the use of modern contraception, levels of fertility are expected to fall. For this particular study area (Kwimba District), no estimates of the total fertility rate exist, although an estimate of 6.9 children per woman in the "Lake Region" of Tanzania (includes study area) was reported for the 1989-91 period.

Drawing from the own birth histories collected in the SACM,[2] this section begins with the description of fertility patterns, and is followed by a presentation of information regarding age of women at first birth and patterns of adolescent childbearing.

The fertility indices presented in this chapter are based on reports provided by women age 15-49 years regarding their reproductive histories. Each women was asked to provide information on the total number of sons and daughters to whom she had given birth who were living with her, the number living elsewhere, and the number who had died. In the birth history, women reported on the detailed history of each of their live births separately, including such information as name, month and year of birth, sex, and survival status. For children who had died, information on age at death was obtained.

4.1.1 Current Fertility

The most widely used measures of current fertility are the total fertility rate (TFR) and its component, age-specific fertility rates (ASFR). The TFR is defined as the number of children a woman would have by the end of her childbearing years if she were to pass through those years bearing children at the currently observed age-specific rates.[3]

Table 4.1 shows the age-specific and aggregate fertility measures calculated from the SACM data. The total fertility rate (TFR) for the SACM sample is 7.4 children per woman. Peak childbearing occurs during ages 20-24 and 25-29, dropping sharply after age 34. A comparison of the number of children ever born among women age 45-49 (7.7 children), which represents past fertility trends, with the current TFR (7.4) suggests that a small recent decline in the study area has occurred.

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[1] Estimates are from the 1991/1992 TDHS (Ngallaba et al., 1993) and the 1994 TKAPS (Weinstein et al., 1995) based on currently married women age 15-49.

[2] To maintain estimates that are representative for the geographic area covered in this study, only the birth histories of Phase I respondents are used in the calculation of demographic rates presented throughout this chapter.

[3] Numerators for the age-specific fertility rates are calculated by summing the number of live births that occurred in the 1-36 months preceding the survey (determined by the date of interview and birth date of the child), and classifying them by age (in five-year groups) of the mother at the time of birth (determined by the mother's birth date). The denominators of the rates are the number of woman-years lived in each of the specified five-year age groups during the 1-36 months preceding the survey.

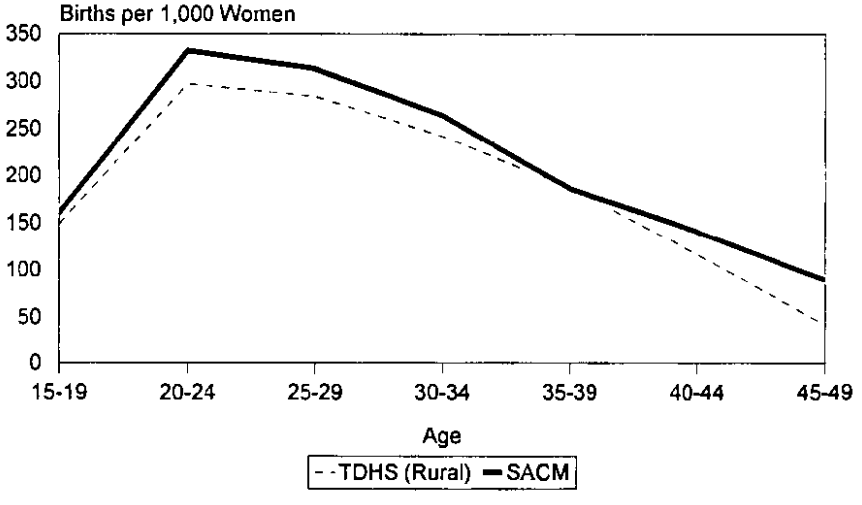
Table 4.1 Current fertility

Age-specific and cumulative fertility rates for the three years preceding the survey, and the mean number of ever born and living children, according to five-year age groups, SACM 1995 (Phase I)

Age group	Fertility rate	Mean number of children ever born	Mean number of living children
15-19	160	0.25	0.23
20-24	332	1.59	1.41
25-29	313	3.25	2.86
30-34	264	4.84	4.06
35-39	186	6.31	5.44
40-44	141	6.88	5.72
45-49	90	7.70	6.17
TFR 15-49	7.4		
TFR 15-44	6.9		
GFR	247		

Compared to the national-level rural TFR estimate of 6.6 children per woman (from the 1991/1992 TDHS survey which used the same estimation methodology), the present estimate for Kwimba District is nearly one child greater. Figure 4.1 shows that higher fertility in the Kwimba District is demonstrated at all ages of women.

Figure 4.1
Age-specific Fertility Rates
1991/1992 TDHS and 1995 SACM



4.1.2 Early Childbearing

Table 4.2 shows that the median age at first birth in Kwimba District is around 19.5 years, which is roughly the same as the national rural estimate from the 1991/1992 TDHS (19.3 years) for the same age group (the cohort currently age 20-34 years). When examining across age groups (cohorts) in the SACM data, it is observed that very little if any change has occurred in the median age at entry to childbearing over the past decade or so. While this broad index has apparently not changed over the last several years, a more detailed analysis of trends in age at first birth does reveal a decline in childbearing at very early ages (i.e., before age 15) from 6 percent of women currently age 30-34 to 1 percent of women age 15-19.

Table 4.2 Age at first birth

Percent distribution of women age 15-34 by age at first birth, according to current age, SACM 1995 (Phase I)

Current age	Women with no births	Age at first birth						Total	Number of women	Median age at first birth
		<15	15-17	18-19	20-21	22-24	25+			
15-19	78.4	1.1	14.3	6.2	NA	NA	NA	100.0	447	a
20-24	16.0	2.6	30.2	27.4	21.3	2.4	NA	100.0	465	19.4
25-29	3.9	4.0	24.7	28.5	24.4	11.3	3.1	100.0	385	19.5
30-34	2.5	5.8	27.3	23.5	21.5	14.1	5.2	100.0	277	19.4

NA = Not applicable
[a] Omitted because less than 50 percent of the women in the age group x to $x+4$ have had a birth by age x

The issue of adolescent fertility is an important one on both health and social grounds. Children born to very young mothers are at increased risk of sickness and death. Adolescent mothers themselves are more likely to experience adverse pregnancy outcomes and, in any case, are more constrained in their ability to pursue educational and economic opportunities than their counterparts who delay childbearing. The slow but steady decrease in very early childbearing discussed earlier may reflect positively on efforts to keep younger women in school to complete more advanced levels, and improve their social and economic prospects.

Table 4.3 looks at the issue of adolescent fertility in more detail, providing the percent distribution of women (age 15-19) who are mothers or are pregnant with their first child at the time of the survey, according to single years of age and educational level. The proportion of teenagers who are already mothers is 22 percent, and another 7 percent are currently pregnant. The proportion of adolescents already on the family formation pathway rises very rapidly with age from 5 percent at age 15 years to 58 percent at age 19 years (Figure 4.2). As expected, adolescents without education start childbearing much earlier than those who have attended school.

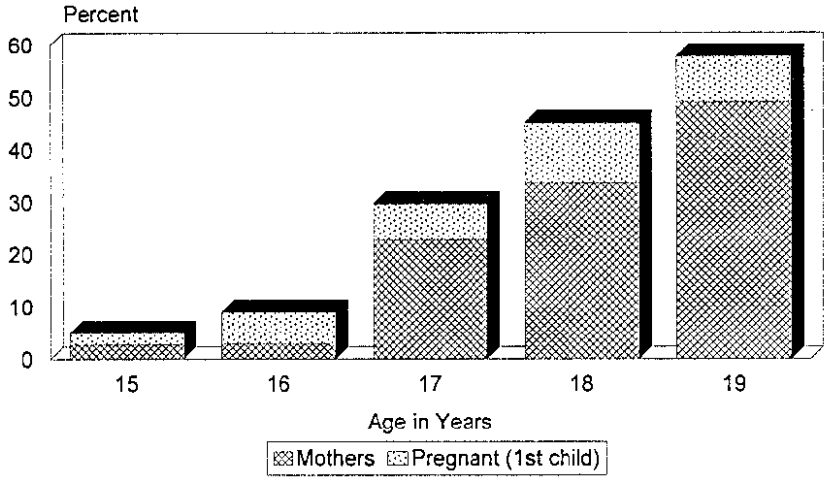
Table 4.3 Adolescent fertility

Percentage of women 15-19 who are mothers or pregnant with their first child, by age and educational status, SACM 1995 (Phase I)

Background characteristic	Percentage who are: Mothers	Pregnant with first child	Percentage who have begun child-bearing	Number of women
Age				
15	2.8	2.3	5.1	89
16	3.0	6.1	9.1	99
17	22.8	7.0	29.7	79
18	33.7	11.6	45.2	100
19	49.1	8.7	57.8	81
Education				
No education	29.8	11.5	41.3	104
Some education[1]	19.4	5.9	25.3	343
Total	21.6	7.2	28.8	447

[1] All but seven girls had not reached secondary school.

Figure 4.2
Percentage of Women 15-19 Who Are Mothers or Pregnant with Their First Child, by Age



SACM 1995

4.2 Childhood Mortality

This section presents information on mortality patterns of children under five years of age in the SACM study area; specifically, estimates are presented on levels, trends and differentials in neonatal, postneonatal, infant, and child mortality. This information is relevant for both the demographic assessment of the population and the evaluation of health policies and programs. Estimates of infant and child mortality

may be used as inputs into population projections, particularly if the level of adult mortality is known or can be inferred with reasonable confidence. Information on mortality of children also serves the needs of organizations providing health services by identifying sectors of the population which are at high mortality risk.

The mortality rates presented in this chapter are defined as follows:

- **Neonatal mortality (NN):** the probability of dying within the first month of life,
- **Postneonatal mortality (PNN):** the arithmetic difference between infant and neonatal mortality,
- **Infant mortality** (${}_1q_0$)**:** the probability of dying between birth and the first birthday,
- **Child mortality** (${}_4q_1$)**:** the probability of dying between exact ages one and five,
- **Under-five mortality** (${}_5q_0$)**:** the probability of dying between birth and the fifth birthday.

All rates are expressed as deaths per 1,000 live births, except child mortality which is expressed as deaths per 1,000 children surviving to the first birthday.

The mortality rates presented in this chapter are calculated from information drawn from the questions asked in the "own" birth histories of the representative sample of Phase I women. Details of the mortality estimation methods are given in Appendix A.

It is important to note that any method of measuring childhood mortality that relies on mothers' reports (e.g., birth histories) rests on the assumption that adult female mortality is not very high or, if it is high, that there is little or no correlation between the mortality risks of mothers and their children. In countries with high rates of adult female mortality, these assumptions will often not hold and the resulting childhood mortality rates will be understated to some degree. Of course, this inherent problem in survey data was the basis for implementing the present study and is discussed in the next chapter which is largely methodological in nature. Here, the intention is simply to provide the "best" estimates of childhood mortality for this study area with the aim of informing, in a substantive way, policy supporting improved child health and welfare.

4.2.1 Levels and Trends in Early Childhood Mortality

Table 4.4 presents childhood mortality rates for periods 0-4, 5-9, and 10-14 years before the survey. Under-five mortality for the period 0-4 years before the survey (circa 1991-1995) is 134 deaths per 1,000 births; this means that, currently, roughly 1 in 7 children do not live to their fifth birthday. This is similar to the under-five mortality rate of 141 per 1,000 estimated for the period 1988-1992 from the 1991/1992 TDHS national survey.

About one-fifth of under-five deaths occur during the first month of life, two-fifths occur during the postneonatal period (1-11 months), and the remaining two-fifths occur during ages 1-4 years. The infant mortality rate stands at 83 deaths per 1,000, and child mortality stands at 55 per 1,000 live births. Breaking down infant mortality into its component parts, the neonatal mortality rate is estimated to be 25 per 1,000 and postneonatal mortality is 58 per 1,000.

Table 4.4 Infant and child mortality

Neonatal, postneonatal, infant, and child mortality rates by five-year periods preceding the survey, SACM 1995 (Phase I)

Years preceding survey	Neonatal mortality (NN)	Postneonatal mortality (PNN)	Infant mortality ($_1q_0$)	Child mortality ($_4q_1$)	Under-five mortality ($_5q_0$)
0-4	25.4	57.7	83.1	55.0	133.5
5-9	21.5	76.6	98.1	63.7	155.5
10-14	12.8	56.3	69.1	89.8	152.7
0-9	23.6	66.0	89.6	58.8	143.2
0-14	21.1	63.8	84.9	66.0	145.3

The 1995 SACM data indicate that under-five survival has improved modestly over the period 1986-1990 to 1991-1995. Mortality before age five has fallen from 156 to 134 per 1,000 over this period and infant mortality from 98 to 83 per 1,000. However, the under-five mortality estimate for the period 10-14 years before the survey (circa 1981-85) is nearly the same as the 1986-1991 estimate, but may be understated due to the apparent shortfall of reported deaths in the neonatal period (see next chapter). Thus, a plausible interpretation of this pattern is that the under-five rate for the period 10-14 years before the survey is in fact slightly higher than that reflected in these data and that rates have been falling in a rather slow but uninterrupted fashion over the last decade in this population.

A significant finding from the SACM is the rather pronounced drop in mortality between ages 1 and 4 years specifically, from 90 to 55 per 1,000 (i.e., 39 percent decline). These are the ages most impacted by successful immunization programs, improvements in prevention and especially treatment of childhood infections.

4.2.2 Socio-demographic Differentials in Early Childhood Mortality

Differences in the risk of childhood death across mothers' socio-demographic characteristics are important to identify since they underscore points of potential program intervention to improve the survival chances of high-risk children. In this section, differentials in mortality by sex of the child, age of the mother at birth, birth order (rank), birth interval length, and educational status of the mother are examined. The mortality estimates are calculated for a 10-year period before the survey so that the rates are based on a statistically sufficient number of cases in each population subgroup.

Typically, male children encounter higher mortality risk than females during early childhood, due largely to heritable factors that lead to greater frailty at birth; this pattern is demonstrated in the SACM data (Table 4.5). Boys experience a 15 percent higher under-five mortality rate than girls (154 versus 134 per 1,000) (Figure 4.3). The male disadvantage in survival is seen at every age group.

The relationship between childhood mortality and mother's age at birth shows the expected U-shaped pattern with children of the youngest and the oldest women experiencing the highest risk of death. The excess risk associated with young maternal age is especially pronounced during ages 1-11 months—a period when supplementary foods are being introduced to the infant child. Older maternal age elevates risk sharply at all ages under five years. A similar but less pronounced pattern occurs regarding birth order of the child. First-order births and those of birth order 7 or more are observed to have higher mortality rates than their counterparts of birth orders 2-6.

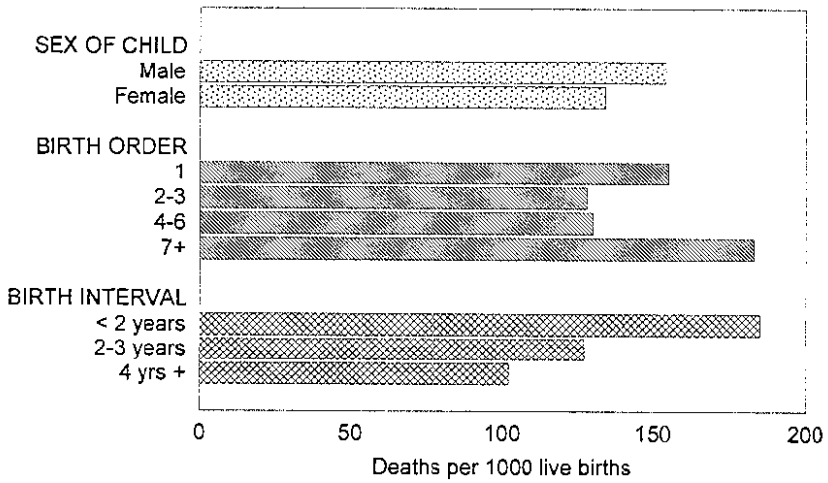
Table 4.5 Infant and child mortality by socio-demographic characteristics

Neonatal, postneonatal, infant, and child mortality rates for the 10-year period preceding the survey, by selected socio-demographic characteristics, SACM 1995 (Phase I)

Socio-demographic characteristic	Neonatal mortality (NN)	Postneonatal mortality (PNN)	Infant mortality ($_1q_0$)	Child mortality ($_4q_1$)	Under-five mortality ($_5q_0$)
Sex of child					
Male	26.2	69.2	95.4	65.2	154.4
Female	20.9	62.8	83.7	52.3	131.6
Mother's age at birth					
< 20	23.1	83.3	106.4	59.8	159.8
20-29	23.1	61.8	84.9	51.1	131.7
30-39	25.0	56.3	81.3	59.2	135.7
40-49	25.1	91.2	116.4	155.9	254.1
Birth order					
1	22.9	81.3	104.2	56.6	154.9
2-3	20.4	64.9	85.3	45.4	126.8
4-6	23.6	52.6	76.2	58.0	129.8
7+	30.3	72.0	102.3	86.7	180.1
Previous birth interval					
< 2 yrs	33.8	81.3	115.1	73.6	180.2
2-3 yrs	20.4	55.4	75.7	53.9	125.6
4 yrs or more	18.7	44.6	63.3	48.6	108.8
Education					
No education	23.0	66.9	89.9	62.3	146.6
Some education[1]	24.1	65.4	89.5	56.1	140.6
Total	23.6	66.0	89.6	58.8	143.2

[1] Less than 1 percent of mortality-risk exposure was to children of women with more than primary school education.

Figure 4.3
Under-five Mortality by
Selected Characteristics



Note: Rates refer to a 10-year period preceding the survey.

SACM 1995

A striking relationship exists between the pace of childbearing and the risk of early childhood mortality. The SACM data indicate that a short interval between births significantly reduces a child's chance of survival. Children born less than two years after their preceding siblings are almost twice as likely to die in infancy than those born four or more years after their preceding siblings (115 versus 63 per 1,000). The interval-mortality relationship is slightly attenuated, but still quite pronounced, after the infant period. During ages 1-4 years, children born after a short interval are 51 percent more likely to die than their counterparts born after a long interval (74 versus 49 per 1,000). These findings point to the potential for childhood mortality reduction that could result from successful efforts to improve and maintain adequate birth spacing in Kwimba District.

Little or no difference is observed between the survival chances of children born to women with some education and children of women with no education. This may in part be due to the very limited advancement in school for those women who do attend (see Chapter 3); less than 1 percent of children's exposure to mortality risk is associated with mothers who reached secondary school.

4.3 Adult and Maternal Mortality

In this section, the SACM data is used to examine patterns of adult and maternal mortality in the study population. First, a brief evaluation of the sibling history data is provided. Following this, the male and female deaths reported in the survey are examined with regard to their reported "cause" and where the reported deaths took place. The bulk of attention is, however, focused on the final two sections where rates of adult mortality (male and female) and then maternal mortality are presented and discussed.

4.3.1 Data Collection

Data were collected in the SACM that allow estimation of adult male and female mortality rates, including maternal mortality. Each respondent was first asked to give the total number of her natural mother's live births. Then the respondent was asked to provide a list of all of the children born to her mother starting with the first-born, and whether or not each of these siblings was still alive at the survey date. For living siblings, current age was collected; for deceased siblings, age at death and years since death were collected. When a respondent could not provide precise information on age or time passed, interviewers were instructed that an approximate quantitative answer was acceptable. For sisters who died at ages 12 years or older, the three following questions were used to determine if the death was maternity-related: "Was [NAME OF SISTER] pregnant when she died?" and if negative, "Did she die during childbirth?" and if negative, "Did she die within six weeks of the birth of a child or pregnancy termination?" A positive answer to any one of these three questions defined a maternal death.

For both brothers and sisters who died at 12 years of age or older, respondents were asked an additional series of four questions intended to establish the cause of death in broad categories; in particular, deaths related to AIDS or HIV infection. First, in two questions, respondents were asked whether the deceased sibling was "very sick for more than 2 months before his/her death" and "very thin in the two-month period before his/her death (wasted)." Next, the respondent was asked to report, in their own opinion, what the cause of the sibling's death was. Lastly, if the open-ended response did not mention AIDS or HIV, the respondent was asked whether the sibling "had AIDS when he/she died." Finally, for all deaths at 12 years of age or older, the respondent was asked "where did the death of [NAME] take place?"

The estimation of adult and maternal mortality by either direct or indirect means requires reasonably accurate reporting of the number of sisters and brothers the respondent ever had, the number who have died, and the number of sisters who have died of maternity-related causes. There is no definitive procedure for establishing the completeness or accuracy of retrospective data on sibling survivorship. Table 4.6 shows the

Table 4.6 Data on siblings

Number and percentage of siblings reported by female survey respondents and completeness of reported data on sibling age, age at death (AD) and years since death (YSD), SACM 1995

Survivorship status	Sisters		Brothers		All siblings	
	Number	Percent	Number	Percent	Number	Percent
All siblings	19,229	100.0	19,293	100.0	38,521	100.0
Living	16,496	85.8	16,211	84.0	32,708	84.9
Dead	2,717	14.1	3,063	15.9	5,780	15.0
Missing survival information	15	0.1	19	0.1	34	0.1
Living siblings	16,496	100.0	16,211	100.0	32,708	100.0
Age reported	16,480	99.9	16,203	100.0	32,683	99.9
Age missing	16	0.1	8	0.1	24	0.1
Dead siblings	2,717	100.0	3,063	100.0	5,780	100.0
AD and YSD reported	2,696	99.2	3,024	98.7	5,720	99.0
AD or YSD or both missing	22	0.7	38	1.2	60	1.0

number of siblings reported by the respondents and the completeness of the reported data on current age, age at death, and years since death.

The sex ratio of enumerated siblings (the ratio of brothers to sisters) was 1.00,[4] which is slightly low for this population and could be due to undereporting of male births by the respondent. In very few cases (< 0.1 percent), sibling's ages were not reported by the respondent. In the case of deceased siblings, complete reporting of age at death and years since death was also nearly universal. More than 99 percent of deceased siblings have both age at death and years since death reported. Rather than exclude the small number of siblings with missing data from further analysis, information on the birth order of siblings in conjunction with other information was used to impute the missing data.[5] The sibling survivorship data, including cases with imputed values, were used in the direct estimation of adult and maternal mortality.

4.3.2 Reported Cause of Death

It should be emphasized at the outset of this section that a detailed verbal autopsy was not included in the SACM questionnaire. Aside from the standard series of three maternity-related questions, these data were not expected to yield information that would allow reliable cause-specific mortality rate calculation. Frank reports of AIDS- and HIV-related deaths were of interest as was a broad classification of "causes" that

[4] From Table 4.6, the ratio is calculated as follows: 19,293 reported males/19,229 reported females = 1.003.

[5] The imputation procedure is based on the assumption that the reported birth ordering of siblings in the sibling history is correct. The first step is to calculate birth dates. For each living sibling with a reported age and each dead sibling with complete information on both age at death and years since death, the birth date was calculated. For a sibling missing these data, a birth date was imputed within the range defined by the birth dates of the bracketing siblings. In the case of living siblings, an age was then calculated from the imputed birth date. In the case of dead siblings, if either the age at death or years since death was reported, that information was combined with the birth date to produce the missing information. If both pieces of information were missing, the distribution of the ages at death for siblings for whom the years since death was unreported but age at death was reported, was used as a basis for imputing the age at death.

would be reported in an open-ended format feasible within a large DHS-type national survey effort. The open-ended responses were analyzed by two physicians associated with the study and classified with an eye towards informing the research and evaluation community in Tanzania about the utility of this simple type of data collection.

The SACM sibling histories uncovered a total of 495 deaths at ages 15 years and above (261 males and 234 females) (Table 4.7). For 10 percent of the male deaths and 5 percent of the female deaths, no useful information was provided by the respondent that would allow cause-of-death classification.[6] Presumably, the information on females was more completely reported for two reasons: (1) some maternal deaths in particular were more readily defined since a set of three questions are initially and directly put to the respondent on these specific causes, and (2) the respondents were female and therefore may have been more familiar with the circumstances surrounding their sisters' deaths than those of their brothers' deaths.

Table 4.7 Reported cause of death

Percent distribution of adult male and adult female deaths in the 15 years before the survey, according to reported cause of death, SACM 1995 (Phase I)

Reported cause of death	Female (n = 234)	Male (n = 261)
Maternal deaths	33	--
Non-maternal deaths	67	100
AIDS/HIV	6	6
Tuberculosis	9	10
Malaria/Fever[1]	12	9
Other infectious disease	14	13
"Pains" of various types	25	17
Accideuts/Trauma	5	8
"Bewitched"	2	3
Other unspecific	22	25
Don't know/missing	5	10
Total	100	100

[1] For both females and males, if unspecified "fever" is removed, this category would be reduced to 3 percent.

Nearly one-third (33 percent) of all female deaths were maternity-related, which is barely in the range (25-33 percent) typically reported for developing countries (Royston and Lopez, 1987; Graham et al., 1989), but much higher than the 14 percent reported by Walraven et al. (1994) for the same general Kwimba District population, using Brass-type data (i.e., aggregate-level information).

Of the remaining (non-maternal) female deaths, 6 percent were AIDS-related,[7] 9 percent were reported as due to tuberculosis, 12 percent to malaria/fever, 14 percent to "other" specific (named) infectious diseases, 5 percent to traumatic events including accidents and murder, 25 percent to reported "pain" (mainly "abdominal pain"), and 22 percent to "other" causes that included unspecific signs such as "swelling" and "bleeding." Two percent of nonmaternal female deaths were reported to have been caused by "bewitchment."

The distribution of male deaths by reported "cause" is similar to the non-maternal female cause-of-death distribution, except that deaths associated with various "pains" and malaria/fever were less commonly reported and those related to traumatic events, bewitchment, and other unspecified causes were more commonly cited amongst the male deaths.

Some lessons can be drawn from these findings. The most important result of this exercise is that a high proportion of all female deaths in this population (33 percent) is related to maternity-related

[6] These include missing and "don't know" responses on the open-ended question, "In your opinion, what was the cause of [NAME]'s death?" but only if the death had not already been classified as maternal based on the three standard "maternity-related" questions.

[7] These include only those reported as due to AIDS or HIV infection, and does not include others where symptoms may have pointed to AIDS or HIV infection. The estimate of AIDS proportionate mortality reported here is therefore a lower bound estimate. When looking at the responses to the questions on long-term illness and wasting (2 months or longer), they were found to be highly sensitive (all but one of the reported AIDS deaths were also reported as having had a long-term illness and wasting), but highly unspecific (5-6 times as many non-AIDS deaths were also reported to have experienced these two "symptoms"), thereby demonstrating the questions' limited utility in estimating AIDS-related mortality rates.

causes—much higher than previously reported for this population (14 percent) (Walraven et al., 1994). It seems likely that a full sibling history, which allows probing on causes of deaths for specific (named) sisters, produces better results than the sisterhood method that relies on aggregate-level data collection.

Aside from maternal death ascertainment, this type of simple data has limited use. Over half of all nonmaternal deaths (54 percent of female deaths and 55 percent of male deaths) could not be placed in a biomedically useful category.[8]

4.3.3 Place Where Death Occurred

Table 4.8 shows the distribution of male, maternal, and non-maternal female deaths by the reported place where the death occurred. Overall, 22 percent of adult deaths took place in the hospital and another 6 percent on the way to the hospital. Over half of deaths (54 percent) took place at the person's home, 7 percent at the traditional healer's home, and 5 percent elsewhere. For 7 percent of deaths, the respondent either did not know the location of the sibling's death or the response was not given or not recorded (i.e., missing data).

Maternal deaths were much more likely than other deaths (male or female) to have occurred in the hospital (36 percent) or on the way to the hospital (12 percent)—a finding which is not surprising since 38 percent of deliveries in this population occur in the hospital (see Chapter 3). Female non-maternal deaths are more likely than male deaths to have occurred at home (64 percent); male deaths are more likely than female deaths to have taken place at the traditional healer (10 percent).

Table 4.8 Reported place of death

Percent distribution of adult deaths in the 15-year period before the survey by reported place where death occurred, according to sex, SACM 1995 (Phase I)

Place of death	Male	Female maternal death	Female non-maternal death	Total
Home	51.3	40.8	63.9	53.7
Traditional healer	10.0	5.3	2.5	6.9
Hospital	18.8	35.5	19.6	21.6
On way to hospital	5.0	11.8	4.4	5.9
Other	6.5	2.6	3.2	4.8
Missing	8.4	3.9	6.3	7.1
Total	100.0	100.0	100.0	100.0
Number	261	76	158	495

4.3.4 Adult Mortality

Direct estimates of adult mortality were calculated from the sibling history data using the approach developed for the DHS project by Rutenburg and Sullivan (1991). The method maximizes use of the available data, using information on the age of surviving siblings, the age at death of siblings who died, and the number of years ago the sibling died. This permits the data to be aggregated to determine the number of person-years of exposure to mortality risk and the number of sibling deaths occurring in defined calendar

[8] This is the best scenario in that deaths associated with unspecified "fever" are placed together with malaria (see footnote at bottom of Table 4.7).

periods. Age-specific, period-specific rates of adult mortality are obtained by dividing the number of deaths by person-years of exposure.[9]

Table 4.9 presents the age-specific rates of male and female mortality (15-49 years) for the 14-year period before the survey, calculated through direct procedures. Since the numbers of deaths on which the rates are based are not large (180 female and 197 male deaths), the estimated rates for five-year age groups have large *relative* standard errors and should be interpreted with this in mind.

In Table 4.9 and in Figure 4.4, the observed age-specific rates are compared with model mortality schedules for males and females. Embodied in a model life table is the relationship between mortality during

Table 4.9 Adult mortality rates

Direct estimates of male and female adult age-specific mortality rates for the period 0-9 years before the survey, SACM 1995, and model life table rates, by age

MALES

Age	Deaths	Exposure	SACM mortality rates	Model Life Table Rates[1] Coale-Demeny WEST (55 years)	Coale-Demeny SOUTH (56 years)
15-19	14	11,875	1.18	3.50	2.15
20-24	31	11,239	2.76	4.99	3.26
25-29	33	9,394	3.51	5.43	3.29
30-34	53	6,858	7.73	6.21	3.88
35-39	26	4,578	5.68	7.50	4.46
40-44	24	2,759	8.70	9.54	5.95
45-49	16	1,486	10.77	12.31	7.96
15-49	197	48,187	4.51[a]	5.61	3.49

FEMALES

Age	Deaths	Exposure	SACM mortality rates	Model Life Table Rates[1] Coale-Demeny WEST (56 years)	Coale-Demeny SOUTH (61 years)
15-19	27	12,213	2.21	3.34	1.73
20-24	38	11,438	3.32	4.29	2.30
25-29	32	9,351	3.42	5.06	2.66
30-34	31	6,808	4.55	5.77	2.89
35-39	30	4,315	6.95	6.55	3.38
40-44	18	2,577	6.99	7.58	4.12
45-49	4	1,327	3.02	9.15	5.03
15-49	180	48,029	3.84[a]	4.92	2.58

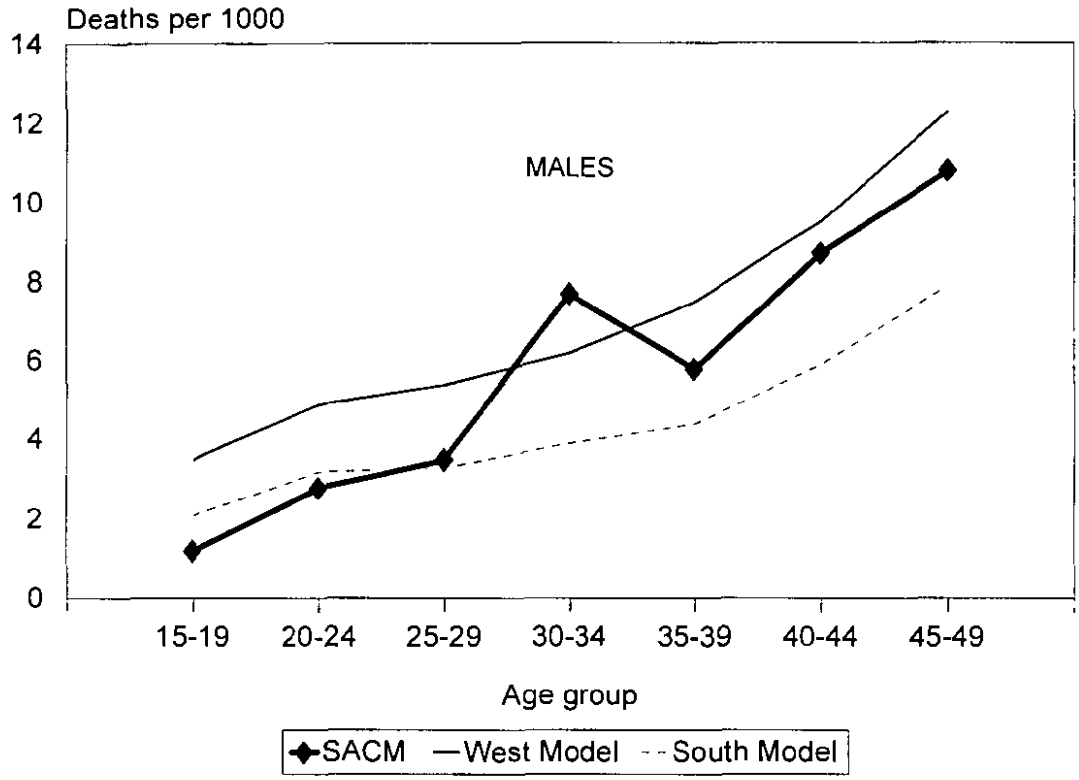
[a] Age-adjusted rates

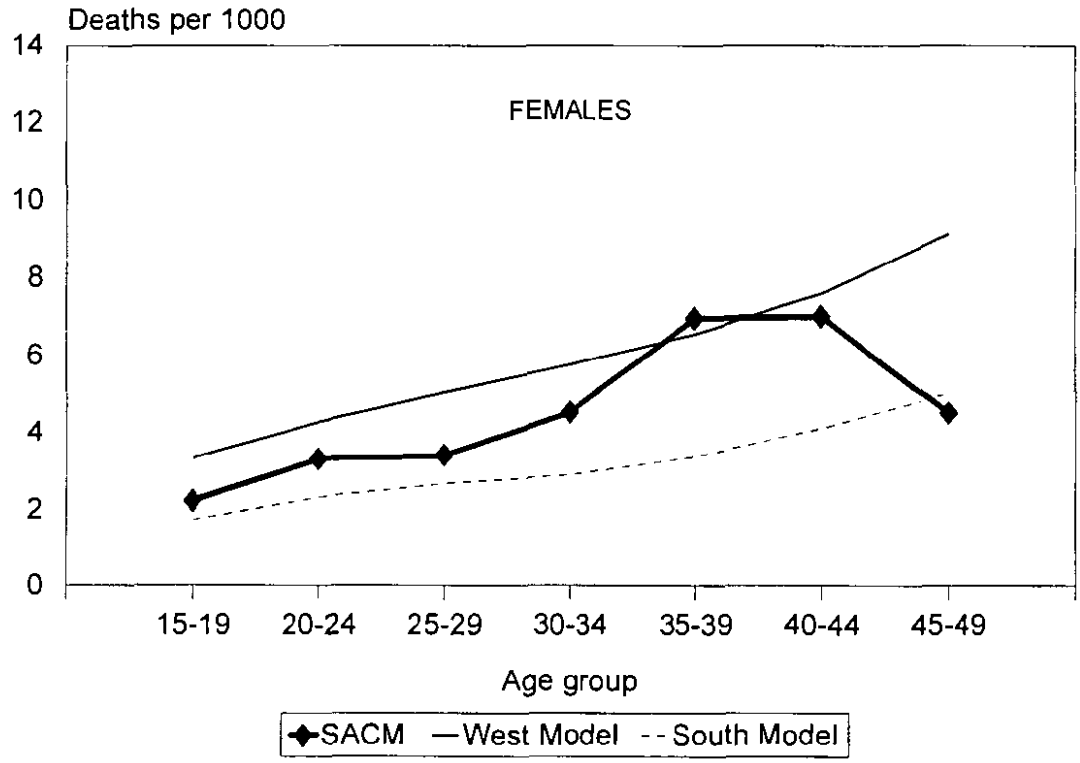
[1] Model life tables were selected at a level of mortality approximately corresponding to a sex-specific probability of dying between birth and age 5 for the period 0-9 years before the survey (i.e., 154 per 1,000 for males, 134 per 1,000 for females). Mortality rates are expressed per 1,000 population. Life expectancies at birth are given in parentheses.

Source: Coale and Demeny, 1966

[9] Unlike "rates" of childhood mortality which are calculated as life table *probabilities*, the rates of adult mortality are true *rates*, i.e., deaths per person-*year*.

Figure 4.4
Adult Mortality by Age Group, for the Period 0-13 Years Before the SACM, and Two Model Life Tables





childhood and mortality during later years. Some models posit high child mortality relative to adult mortality levels, while others describe low child mortality relative to adult mortality. Therefore, by selecting model mortality schedules based on an observed under-five mortality level, one can assess whether estimated adult rates are "too low" or "too high" due to data quality problems, although deviations from models can occur as the result of real, if atypical, changes in the population under study. In this analysis, the SACM under-five mortality estimates of 154 per 1,000 for males and 134 per 1,000 for females (from Table 4.5) are used to enter the West and South families of Coale-Demeny's model mortality schedules (Coale and Demeny, 1966).[10]

While there is clearly some effect of sampling variation, the adult mortality rates derived from the SACM data are surprisingly stable, showing expected increases in both male and female rates with increasing age. However, the rates produced for males under age 25 and for females at ages 45 and over appear to be underestimated as they fall below the lower bounds described in the models. In the case of the female data, any measurement errors in the age group 45-49 years will, however, have only a very limited effect on overall mortality for ages 15-49 since this age group contributes so little weight to the overall exposure. For ages 15-44, the data for females are plausible and, within this age range, a rather steep rise in mortality rates between ages 25-29 and 35-39 is indicated. For males above age 25, mortality climbs very rapidly, and conforms roughly with model expectations in that male mortality levels are well above female levels. For all ages combined, the rate of male mortality (4.5 per 1,000) exceeds female mortality (3.8 per 1,000) by some 17 percent; if ages 15-24 are ignored, the difference is 30 percent.

These findings demonstrate moderate to high adult mortality in this population of northwestern Tanzania, but not so high as to suggest the manifold increase in rates predicted by modelers of the AIDS impact. The most parsimonious explanation for this rather unexceptional mortality *level* and *pattern* is that the trajectory of the AIDS epidemic in rural Kwimba is still in its early stages, and that significant mortality impact per se may only be observed in later years. A reported HIV prevalence of only 4 percent in adjacent populations (Grosskurth et al., 1995) is consistent with this interpretation. Alternatively, the SACM respondents may have omitted large numbers of both male and female deaths at all ages, but this appears unlikely given the patterns exhibited in the data. An analysis of trends in adult mortality would be a useful extension to this line of inquiry; unfortunately, the sparseness of the data will not support a statistically reliable look across the relevant calendar periods.

4.3.5 Maternal Mortality

Age-specific estimates of maternal mortality from the reported survivorship of sisters are shown in Table 4.10 for the 14-year period before the survey. The number of maternal deaths (57) is small, so that age-specific rates have large associated *relative* sampling errors, and should thus not be overinterpreted; the preferred approach is to calculate one estimate for all childbearing ages (15-49 years).

Table 4.10 Direct estimates of maternal mortality

Direct estimates of maternal mortality for the period 0-13 years before the survey, SACM 1995

Age	Deaths	Exposure	Mortality rates[1]
15-19	12	12,213	0.98
20-24	17	11,438	1.49
25-29	9	9,351	0.96
30-34	13	6,808	1.91
35-39	4	4,315	0.93
40-44	2	2,577	0.78
45-49	0	1,327	0.00
15-49	57	48,029	1.12
General Fertility Rate (GFR)			0.241
Maternal Mortality Ratio (MMR)[2]			463

[1] Expressed per 1,000 woman-years of exposure
[2] Per 100,000 live births; calculated as the maternal mortality rate divided by the general fertility rate

[10] The West and South families essentially encompass the plausible range for estimates of the relationship between adult and child mortality.

For the period circa 1981-1995, the rate of mortality due to causes related to pregnancy and childbearing years is 1.1 maternal deaths per 1,000 woman-years of exposure. As mentioned earlier, maternal deaths represent approximately 33 percent of all deaths to women age 15-49.

The maternal mortality rate can be converted to a maternal mortality ratio and expressed per 100,000 live births by dividing the rate by the general fertility rate of 0.241 calculated for the same time period. In this way, the obstetrical risk of pregnancy and childbearing is underlined. By direct estimation procedures, the maternal mortality ratio is estimated as 463 maternal deaths per 100,000 live births during 1981-1995.

The indirect approach to estimation of maternal mortality, or the sisterhood method, has simpler data requirements than the direct method. None of the information on dates and ages related to the respondent's sisters is used, and the data on all sisters are used to estimate the lifetime risk of maternal death. As the estimates pertain to the lifetime experience of respondents' sisters, a well-defined calendar reference period is not derived, but rather the derived estimates represent mortality conditions over the past 45-50 years or so. Assuming changes in mortality over time are linear, the reference period can be considered to be centered about 12-13 years before the survey date (Graham et al., 1989). In a previous study of two villages in the present study area, a maternal mortality ratio of 286 was estimated (Walraven et al., 1994).

The indirect estimates of maternal mortality are given in Table 4.11. When aggregating the data over all respondents, the lifetime risk of maternal death in this population is 0.039, reflecting a 1 in 26 risk of dying from maternal causes. The lifetime risk of maternal mortality can be converted to an estimate of the maternal mortality ratio (MMR) by using the formula shown in Table 4.11. This procedure gives an estimated MMR of 480 maternal deaths per 100,000 live births, applicable to a period centered around the year 1982.

Given the consistency of the direct and indirect estimates and admitting the possibility of an underestimate of mortality at ages 45-49 years, a cautious reading of the SACM findings is that the maternal mortality ratio over the last 10-15 years is around 500 maternal deaths per 100,000 live births.

Table 4.11 Indirect estimates of maternal mortality

Estimates of maternal mortality using the indirect method, SACM 1995

Age	Number of respondents (a)	Number[1] of sisters 15+ (b)	Number of maternal deaths (c)	Adjustment factor (d)	Sister units of exposure to risk (e)=(b)x(d)	Lifetime risk of maternal death (f)=(c)/(e)
15-19	458	1,131	5	0.107	121	0.0434
20-24	469	1,158	10	0.206	239	0.0419
25-29	391	965	19	0.343	331	0.0583
30-34	281	728	17	0.503	366	0.0455
35-39	215	554	12	0.664	368	0.0326
40-44	130	320	5	0.802	257	0.0205
45-49	166	437	11	0.900	360	0.0250
15-49	2,130	5,256	78	--	2,041	0.0386

TFR 1982-86	7.88 children per woman
MMR	480 per 100,000 live births

TFR = Total fertility rate
MMR = Maternal Mortality Ratio = $(1 - [(1 - \text{Lifetime risk}]^{1/TFR}) \times 100{,}000$, where TFR represents the total fertility rate 10-14 years preceding the survey.
[1] Adjusted for age distribution of respondent's sisters (see Graham et al., 1989)

CHAPTER 5

PROXY BIRTH HISTORY REPORTING

The principal objective of the SACM study and the primary aim of this chapter is methodological in nature—the empirical assessment of the quality of birth histories reported by proxy. Essentially, it is thought that one potentially viable means to evaluate and correct for biases in demographic rate estimation caused by mother's survival bias is to measure the "missed" reproductive experience of women deceased by the survey date through collection of birth histories from surviving sisters (see Chapter 1). The SACM was designed so as to permit matching of independently-collected "own" and "proxy" birth histories from living sister-pairs. It also permits—although to a more limited degree because of data sparseness—living sisters' reports on the birth histories of deceased sisters to be evaluated from the standpoint of selectivity related to the sister's survival status.

5.1 Data Structure and Analytical Considerations

The results of two types of analyses are reported here. The first is based on comparisons of the respondents' "own" birth histories with the same birth histories as reported by their (living) sisters, i.e., proxy reports. These are called *own-proxy comparisons*, and will be examined on an individual matched sister-pair basis and also by comparing aggregate own and proxy reports among matched pairs. Own reports, in this analysis, are not examined if not matched with a proxy report (see section 5.2.1). In order to avoid overrepresentation of proxy reports from large groups of sisters, in the aggregate analyses, each proxy report is weighted by the inverse of the number of sisters providing a proxy report. The objective of the own-proxy comparison is to evaluate the "proxy" effect, that is, whether and in what ways birth histories obtained from the mother's sisters are different from those obtained from the mother herself. It is reasoned that if women cannot accurately report the birth histories of their living sisters, accurate reporting on deceased sisters is unlikely.

A working assumption in this analysis is that the own report is valid and, therefore, discrepancies between own and proxy reports are a measure of the level of proxy misreporting and underreporting. It is acknowledged that own reports may also contain errors of omission and age/date incompleteness and imprecision. Therefore, strictly speaking, this analysis evaluates a type of asymmetrical inter-observer reliability, with one of the two observers (the mother herself) having first-hand exposure to the events under study.

The second type of analysis looks at the birth histories of deceased women collected from living sisters interviewed in Phase I. The proxy histories are analyzed in the aggregate and compared with Phase I proxy reports on living sisters and Phase I own reports. These comparisons are made difficult by two facts. First, the number of deceased women on which this analysis is based is small and thus the data will inevitably include some small number fluctuation. Second, the interpretation of patterns in these data must encompass both substantive and data quality phenomena. On one hand, lower antemortem fertility and higher childhood mortality may be predicted from the birth histories of deceased women, while on the other hand, the quality of event reporting and dating of events may well be negatively affected relative to the reports on surviving women.

From the standpoint of child survival policy evaluation, the value of demographic estimates hinges in part on the recency of the estimates. For this reason, most analyses will focus on the 15-year period before the survey, divided (where feasible) into three 5-year periods.

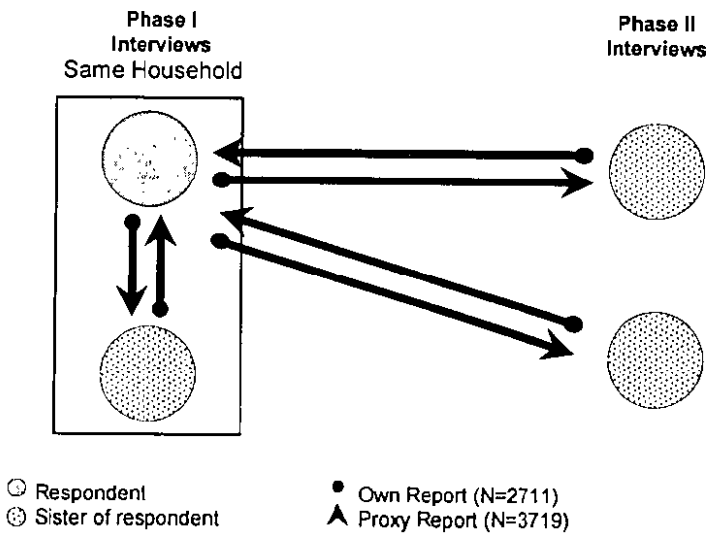
5.2 Comparison of Proxy and Own Birth Histories

5.2.1 Matching of Sisters

The SACM study design allows three types of links between individual living sisters: Phase I proxy report with Phase II own report, Phase II proxy report with Phase I own report, and Phase I own report with Phase I proxy report (Figure 5.1). The last link type involves sisters living in the same household.

In total, 2,711 own reports (birth histories) were linked with 3,719 proxy reports (i.e., 1.37 proxy reports per own report). In the own-proxy analyses that follow, only linked (or matched) own and proxy reports are examined.

Figure 5.1
Schematic Diagram Showing the Linkages Between Interviews of Phase I and Phase II

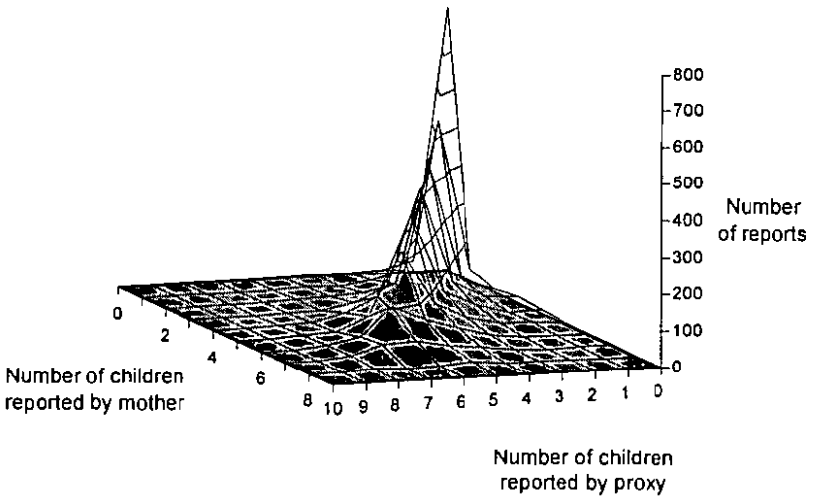


5.2.2 Discrepancies Between Matched Own and Proxy Reports

The direct comparison of the self-reported and proxy-reported birth histories of a woman provides valuable insights into the quality of the proxy reports. In this section, the consistency of proxy versus own reports is examined based on several demographic variables drawn from birth history data for the period 0-14 years before the survey.

Figure 5.2 displays the joint distribution of own and proxy reports on the number of children born in the 15 years preceding the survey. There is clearly strong agreement in the two reports as illustrated by the pronounced ridge along the diagonal of the X-Y plane. However, the discordance in the two reports increases as the number of children born increases. Where discrepancies exist, there is a tendency for the proxy reports of sisters to include fewer births than the mother's own report, particularly as the number of children born increases.

Figure 5.2
Joint Distribution of Own and Proxy Reports
on the Number of Children Ever Born



SACM 1995

Table 5.1 shows that nearly one-third of proxy reports disagree with the own report on the number of children the woman had in the 15-year period, and 13 percent disagree by more than one birth. In more than half of these discrepant own-proxy sister-pairs, the number of children ever born reported by the proxy is less than that reported by the mother, confirming the tendency seen in Figure 5.2 for proxy reports to omit (as opposed to adding) births relative to the report of the mother. There is not a strong difference in the consistency of reporting by sex of the child.

Only 19 percent of own-proxy sister-pairs disagree on the number of dead children, compared with 25 percent who disagree on the number of living children. However, much of the agreement for dead children occurs when no deaths are reported by the reference woman. Among sister-pairs who report at least one dead

Table 5.1 Discrepancies between matched own and proxy reports

Indices of discrepancy between self-reported and proxy-reported birth history events for the period 0-15 years before the survey, SACM 1995

Fertility/ mortality variable	Percent discrepant	Percent discrepant by more than one event	Percent of discrepant cases in which proxy less than own report	Percent discrepant when at least one event is reported
Number of children born	32.3	13.0	57.6	40.1
Number of daughters born	23.3	6.5	54.5	33.8
Number of sons born	25.3	7.0	59.3	37.3
Number of living children	24.5	9.2	54.7	31.0
Number of dead children	18.8	4.6	62.8	57.3
Number of under-five deaths	18.5	4.5	61.1	57.8
Number of infant deaths	17.8	3.2	61.8	69.9
Number of neonatal deaths	6.4	1.0	56.3	84.2

child, 57 percent disagree on the number of dead children (column 4); among sister-pairs who report at least one living child, disagreement on the number of living children is only 31 percent. In addition, discrepant proxy reports of the number of dead children are more likely than discrepant proxy reports of the number of living children to include fewer children than the own reports (column 3). This suggests that underreporting in the proxy reports compared with the own reports is more severe for children who died than for children who survived—a finding that is revisited in later sections.

Overall, proxy reports of the number of neonatal deaths are more consistent with the own reports than are the proxy reports on infant deaths and under-five deaths. However, the consistency in the reporting of neonatal deaths largely reflects the relative rarity of this event. Of those that reported at least one neonatal death, 84 percent are discrepant.

These results show that proxy-reported birth histories are frequently inconsistent with the reports of the mother herself (i.e., own reports), and that, in general, proxy reports tend to underreport births relative to own reports, especially when the child died later. However, these findings should not be interpreted entirely in terms of omission of births by proxy respondents. In some special studies, own reports of birth histories taken at different points in time have been demonstrated to display considerable unreliability (Curtis and Arnold, 1994; O'Muircheartaigh, 1984a, 1984b; McDonald et al., 1978) and may erroneously include births such as foster children or step children. Further, a substantial minority of discrepant proxy reports include more births (or child deaths) than the own report, and some of the discrepancies may be due to errors in reporting other than omission of births, such as displacement of births outside of the 15-year period, misreporting of survival status (especially if a death was relatively recent), or age at death misreporting.

5.2.3 Aggregate-level Data Quality

The quality of age and calendar period-specific estimates of childhood mortality depend in part on the precision with which respondents are able to report dates of birth and, for those who have died, ages at death. In DHS-type "own" birth histories, the ideal of complete and accurate dating of events is seldom if ever entirely met. However, measurement errors in dating, to the extent that they are random, will tend to cancel out in the aggregate, and consequently, the errors will have a smaller impact on demographic rate estimates than would be expected based on individual-level discrepancies. The following analyses will compare the aggregate own- and proxy-reported distributions of key indices expected to influence mortality rate estimation: precision of date of birth reporting, age at death reporting, and the spread of births (by survival status) across time since the survey date.

Date of Birth Reporting

In this section, differences between own and proxy reports regarding the extent to which the month of a child's birth is unreported are examined. According to DHS procedures, should a month of birth be missing, it is imputed over the 12-month range delineated by the reported year of birth or current age—a necessary procedure which may nonetheless disturb trend estimation by moving births across reference calendar periods. Perhaps more importantly, when large percentages of reported births lack a reported month of birth, it indicates that even "year of birth" (although reported) may be arrived at through guesswork, and thus represents a more general and potentially serious but unmeasurable problem with correctly locating events and the derived rates in calendar time.

Table 5.2 and Figure 5.3 show the percentage of births in the last 15 years for which the respondent was unable to report a month of birth[1] for own and proxy respondents, according to five-year periods before

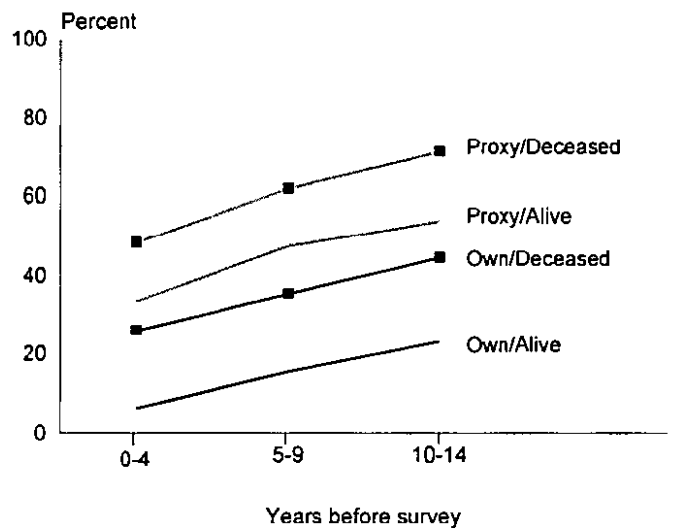
[1] For 6 births reported in own histories and 11 in proxy histories, no *year* of birth was provided. These are included as missing month of birth, but not tabulated separately.

Table 5.2 Completeness of reported date of birth

Percentage of births for which a month of birth was not reported, by five-year periods before the survey for own and proxy reports of birth histories, according to survival status of the births, SACM 1995

	0-4 years			5-9 years			10-14 years			0-14 years		
	Own	Proxy	Difference	Own	Proxy	Difference	Own	Proxy	Difference	Own	Proxy	Difference
All births												
Percent	8.4	33.3	24.9	18.8	49.4	30.6	26.9	56.2	29.3	16.2	44.5	28.3
Number	3,150	2,915		2,542	2,617		1,661	1,715		7,353	7,247	
Surviving births												
Percent	6.4	31.5	25.1	15.5	47.6	32.1	23.2	53.9	30.7	13.1	42.5	29.4
Number	2,839	2,614		2,121	2,280		1,376	1,492		6,336	6,386	
Non-surviving births												
Percent	26.0	48.5	22.5	35.4	61.9	26.5	44.6	71.2	26.6	35.1	59.8	24.7
Number	311	301		421	337		285	224		1,017	861	

Figure 5.3
Percentage of Births with Missing Reported Month of Birth, by Report Type and Survival Status of Birth



SACM 1995

the survey date and survival status of the birth. Birth dating is greatly affected on all three dimensions examined in this analysis. The precision of dating deteriorates rapidly as time before the survey increases for both own and proxy reports. For instance, own-reported births 10-14 years before the survey are more than three times as likely to lack a month of birth (27 percent) than own-reported births 0-4 years before the survey (8 percent). Survival status also impacts birth date precision. Even in the 5 years before the survey, the birth dates of deceased children are imprecisely reported in 26 percent of own-reported cases compared with only 6 percent of own-reported surviving births.

Table 5.3 Reported age at death

Distribution of deaths in the 15-year period before the survey reported in own and proxy birth histories by reported age at death (month or years), SACM 1995

Age at death (months/years)	Own report				Proxy report			
	Report in days	Report in months	Report in years	Total	Report in days	Report in months	Report in years	Total
0	138	0	0	138	118	0	0	118
1	7	20	0	27	12	8	0	20
2	0	62	0	62	0	47	0	47
3	0	67	0	67	0	60	0	60
4	0	62	0	62	0	38	0	38
5	0	57	0	57	0	50	0	50
6	0	68	0	68	0	58	0	58
7	0	47	0	47	0	31	0	31
8	0	60	0	60	0	40	0	40
9	0	41	0	41	0	25	0	25
1	0	14	0	14	0	24	0	24
10	0	20	0	20	0	21	0	21
12 (or"1 year")	0	57	14	71	0	70	18	87
13	0	9	0	9	0	15	0	15
14	0	20	0	20	0	16	0	16
15	0	17	0	17	0	12	0	12
16	0	7	0	7	0	10	0	10
17	0	5	0	5	0	4	0	4
18	0	24	0	24	0	27	0	27
19	0	5	0	5	0	1	0	1
20	0	9	0	9	0	4	0	4
21	0	1	0	1	0	1	0	1
22	0	4	0	4	0	4	0	4
23	0	12	0	12	0	6	0	6
24 (or "2 years")	0	3	59	62	0	4	49	53
28	0	1	0	1	0	0	0	0
30	0	1	0	1	0	0	0	0
34	0	1	0	1	0	0	0	0
"3 years"	0	0	46	46	0	0	37	37
"4 years"	0	0	22	22	0	0	23	23
"5 years"	0	0	13	13	0	0	11	11
"6 years"	0	0	6	6	0	0	3	3
"7 years"	0	0	8	8	0	0	2	2
"8 years"	0	0	2	2	0	0	5	5
"9 years"	0	0	4	4	0	0	2	2
"10 years"	0	0	1	1	0	0	3	3
"11 years"	0	0	1	1	0	0	0	0
"12 years"	0	0	0	0	0	0	3	3
"13 years"	0	0	1	1	0	0	0	0
"14 years"	0	0	1	1	0	0	0	0
Missing	0	0	0	0	0	0	0	1
All deaths	145	694	178	1,017	129	575	155	861

The effect of proxy reporting on birth dating is to add imprecision to the rather expected effects already described. In all calendar period/survival status groups, proxy dating of births is significantly less precise than reports by the mother herself. Even in the best case (surviving children born in the period 0-4 years before the survey), the proxy reports lack a reported month of birth nearly one-third of the time compared with only 6 percent of own-reported births. Looking at nonsurviving births 10-14 years before the survey, birth dating imprecision is amplified from 45 percent (own reports) to 71 percent (proxy reports).

In sum, proxy reporting will introduce (additional) imprecision in locating events in calendar time, which can potentially distort age exposure and reference date parameters used in direct estimates of childhood mortality rates.

Age at Death Distribution

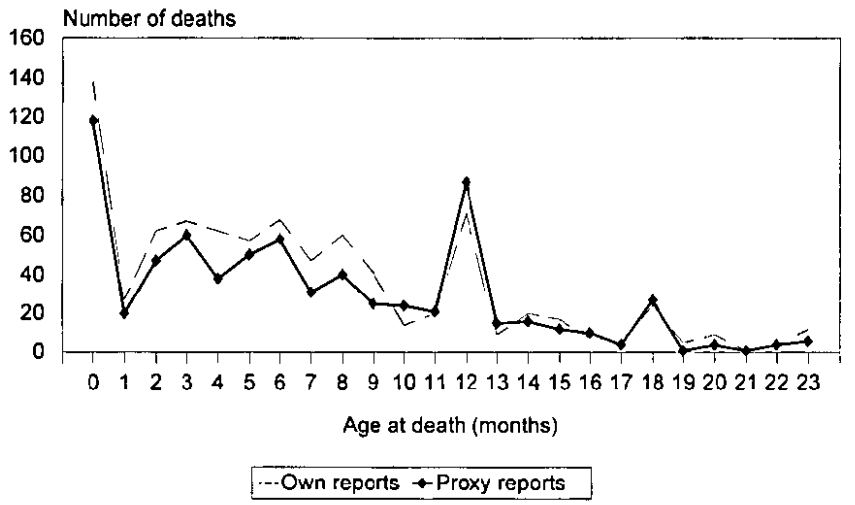
SACM interviewers were instructed to collect age at death data so as to maximize precision in the reporting of deaths occurring at the youngest ages. For deaths occurring in the first month, the age at death is elicited and recorded in units of "days," from 1 to 23 months in units of "months," and from the second birthday onwards in units of "years." A common feature of birth history data is the heaping of ages at death at increments of 6 months. Heaping at "12 months" is especially problematic in direct estimation of mortality rates because it marks the boundary between infant mortality (0-11 months) and child mortality (12-59 months). If some of the deaths reported at "12 months" (or "1 year", implicit 12-23 months) actually occur during, for example, months 9, 10, and 11 (as is indicated by a shortfall of deaths in those months), then directly-estimated rates of infant mortality will be biased downward and child mortality rates upward (Sullivan et al., 1990; Curtis, 1995).

Table 5.3 shows the distribution of deaths to children born in the last 15 years by age at death, according to whether the information was obtained from own- or proxy-reported birth histories. The most obvious and important finding is that, overall, about 14 percent fewer under-five deaths were reported in the proxy birth histories than in the own reports. The deficit in proxy reporting was about 20 percent during infancy (0-11 months) and 6 percent during months 12-59.

Figure 5.4 presents the age at death distribution of deaths through the first 23 months of life for own and proxy data. Both report types display the same general pattern of a displacement of deaths from 1 to 0 months, declining numbers of deaths throughout the first year of life, a large heap at 12 months, small heap at 18 months, and rather few deaths after month 18. Unexpectedly, the proxy shortfall is no greater in the neonatal period than in the postneonatal period; indeed, the aggregate deficit in deaths is much greater during months 1-9 than elsewhere in the distribution. Part of this proxy deficit in the postneonatal period is almost certainly due to a displacement in deaths from the late postneonatal period to the 12-23 month period, especially to month 12. Whereas only 8 percent of own-reported under-five deaths were reported at 12 months (or "1 year"), 12 percent of proxy-reported deaths were reported as such.

Based on this analysis, proxy reporting appears to result in both an overall shortfall in reported deaths (especially during infancy), and a displacement of deaths out of the infant period and into the 12-59 month period.

Figure 5.4
Deaths Under Age Two in the 15 Years Before the Survey, by Age at Death, Own and Proxy Reports



Distribution of Births by Year of Birth Before Survey

Direct estimates of mortality are typically calculated and presented as a series of rates, time-referenced by duration since the survey date. The DHS project has most often used a series of three 5-year rates which allows an assessment of trends over the 15 years before the survey. Data before this 15-year period are suspect from a data quality standpoint and are seldom used. As a preliminary step towards assessment of proxy effects on rate estimation, this section examines the aggregate distribution of births across this 15-year period by single reported year before the survey and survival status of the birth (Table 5.4).

The overall number of births reported in the last 15 years is nearly the same in the own (7,353) and proxy (7,246) reports, but the distribution of births across time and survival status differs in important ways. A general feature common to both report types is a surplus of births in the year before the survey which appears to be drawn from a deficit of births in the previous year (see Figure 5.5). The distortion is, however, much greater in the proxy reports, and the number of births in the 5-year period before the survey is much lower than reported in the own data. Also, common to both report types is a heaping of births 5 years before the survey, which appears to be drawn largely from year 4. The net result of these patterns is a shifting of births backwards in time from 0-4 to 5-14 years before the survey, especially in the proxy reports.

The patterns previously described are driven largely by births reported as surviving at the survey date. A clear excess of proxy surviving births is seen fairly uniformly across the 5-14-year period and a deficit in the 0-4-year period. These roughly offset so that the overall number of proxy births surviving (6,386) is nearly the same as own births surviving (6,336).

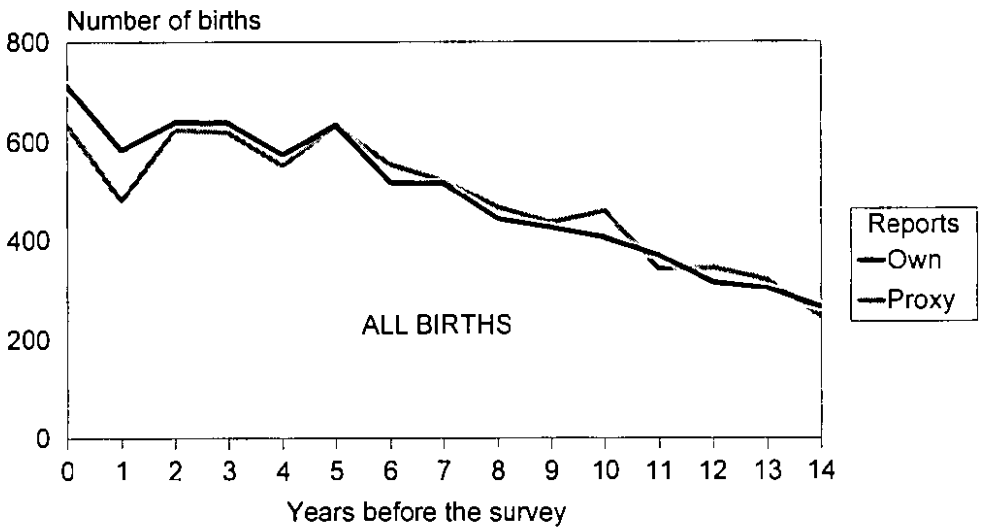
The most important proxy effect is observed with regard to the births reported as deceased by the survey date. Fifteen percent fewer non-surviving births were reported in the proxy birth histories than in the own reports: 1,017 versus 861 non-surviving births. (Note: 97 percent of deaths were at ages under 5 years.)

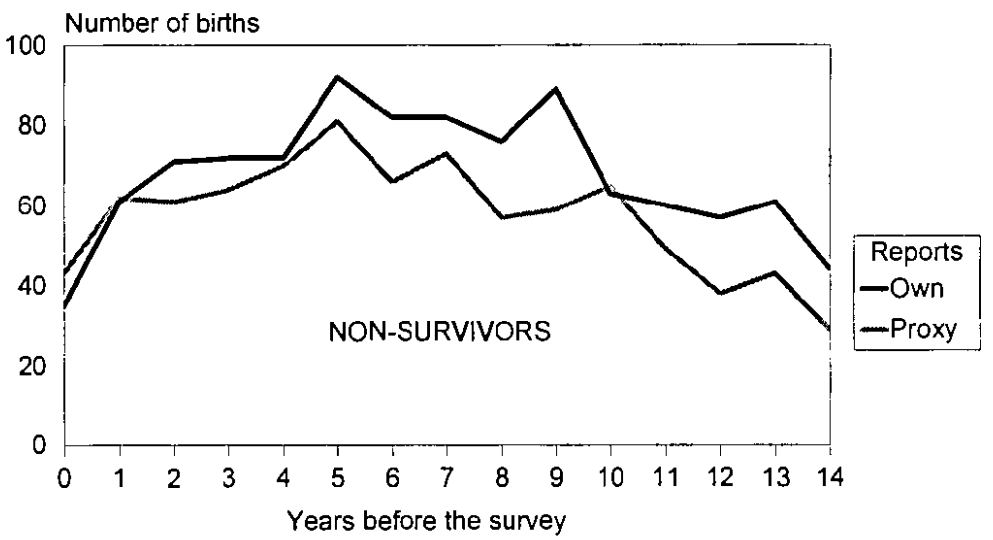
Table 5.4 Births by year of birth and survival status

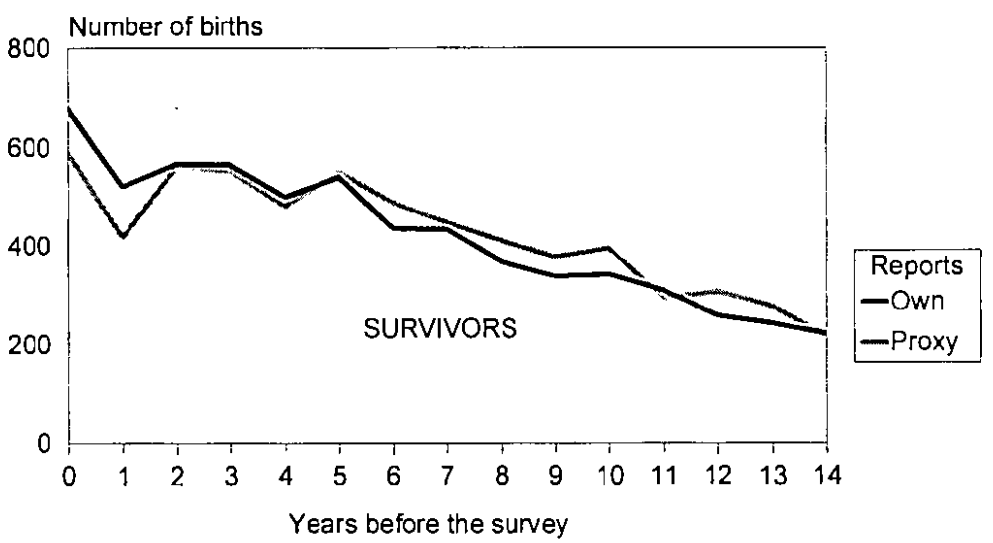
Distribution of births in the 15 years before the survey; by single year of birth before the survey and survival status, obtained from own and proxy reports, SACM 1995

Years before survey	All births		Survivors		Non-survivors		Non-survivors (under 5)	
	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number
OWN REPORTS								
0	9.7	714	10.7	679	3.4	35	3.6	35
1	7.9	584	8.3	523	6.0	61	6.2	61
2	8.7	640	9.0	569	7.0	71	7.2	71
3	8.7	638	8.9	566	7.1	72	7.3	72
4	7.8	574	7.9	502	7.1	72	7.3	72
5	8.6	634	8.6	542	9.0	92	9.3	91
6	7.1	519	6.9	437	8.1	82	8.4	82
7	7.0	517	6.9	435	8.1	82	8.1	79
8	6.1	445	5.8	369	7.5	76	7.6	74
9	5.8	427	5.3	338	8.8	89	8.6	84
10	5.5	406	5.4	343	6.2	63	6.2	61
11	5.0	369	4.9	309	5.9	60	5.5	54
12	4.3	316	4.1	259	5.6	57	5.0	49
13	4.1	304	3.8	243	6.0	61	5.8	57
14	3.6	266	3.5	222	4.3	44	3.9	38
0-14	100.0	7,353	100.0	6,336	100.0	1,017	100.0	980
PROXY REPORTS								
0	8.8	635	9.3	592	5.0	42	5.2	42
1	6.6	481	6.6	419	7.2	62	7.4	62
2	8.6	625	8.8	564	7.1	60	7.3	60
3	8.5	619	8.7	554	7.5	64	7.7	64
4	7.6	553	7.6	483	8.2	70	8.5	70
5	8.7	632	8.6	552	9.4	80	9.5	78
6	7.7	555	7.7	489	7.7	66	7.8	65
7	7.2	522	7.0	448	8.5	73	8.7	72
8	6.5	468	6.4	411	6.6	57	6.6	55
9	6.0	437	5.9	378	6.9	59	6.8	56
10	6.4	460	6.2	395	7.6	65	7.4	61
11	4.7	342	4.6	293	5.7	48	5.5	45
12	4.8	345	4.8	307	4.4	38	4.3	35
13	4.4	320	4.3	276	5.0	43	4.7	38
14	3.4	247	3.4	218	3.3	28	2.7	22
0-14	100.0	7,246	100.0	6,385	100.0	861	100.0	832

Figure 5.5
Distribution of Births in the 15 Years Before the Survey, by Year of Birth Before Survey and Survival Status







SACM 1995

Two reporting phenomena appear to be operating here. The pattern of excess survivors in the same periods as a shortfall in non-survivors indicates that sisters may have had knowledge of births but failed to receive knowledge (or at least to report knowledge) about these children dying. This may explain about half of the proxy deficit of reported non-survivors. The remainder would be outright omission of non-surviving births (e.g., never knew of the births, perhaps because they died at very young ages).

5.2.4 Demographic Rate Estimation

Given the patterns of (mis)reporting exhibited in the proxy data, it is expected that fertility and childhood mortality indices would capture corresponding effects. In this section, own- and proxy-reported birth histories covering the last 15 years are used to examine "proxy effects" on directly-estimated measures of fertility and childhood mortality.

Fertility Estimates

Age-specific and total fertility rates (TFR) are calculated using conventional direct techniques. Age-specific fertility rates (ASFR) are derived from dividing births in a 5-year maternal age group/calendar period by the number of women-years of exposure in the same age/period category.[2] The TFR is a synthetic cohort (i.e., period) measure and is interpreted as the number of children a woman would have by the end of her childbearing years if she were to pass through those years bearing children at the currently observed age-specific fertility rates. In this analysis, to allow for evaluation of trends, an upper age range of 39 is used to avoid truncation of exposure to older age groups in moving to less recent time periods. To control for potential differences in maternal age reporting, own reports of the mother's age are used in fertility rates calculated from both own- and proxy-reported birth histories.

Table 5.5 and Figure 5.6 show the ASFRs by time period for own and proxy reports. For the most recent period (0-4 years before the survey), both own and proxy data show peak fertility at ages 20-24, after which the rates decline somewhat uniformly. As reflected previously in the birth year distributions, however, the proxy histories contain a shortfall of births that, according to the ASFRs, increases in severity with increasing age of the reference woman from 4 percent shortfall among women age 15-19 to 20 percent among women age 35-39.

Table 5.5 Fertility rates

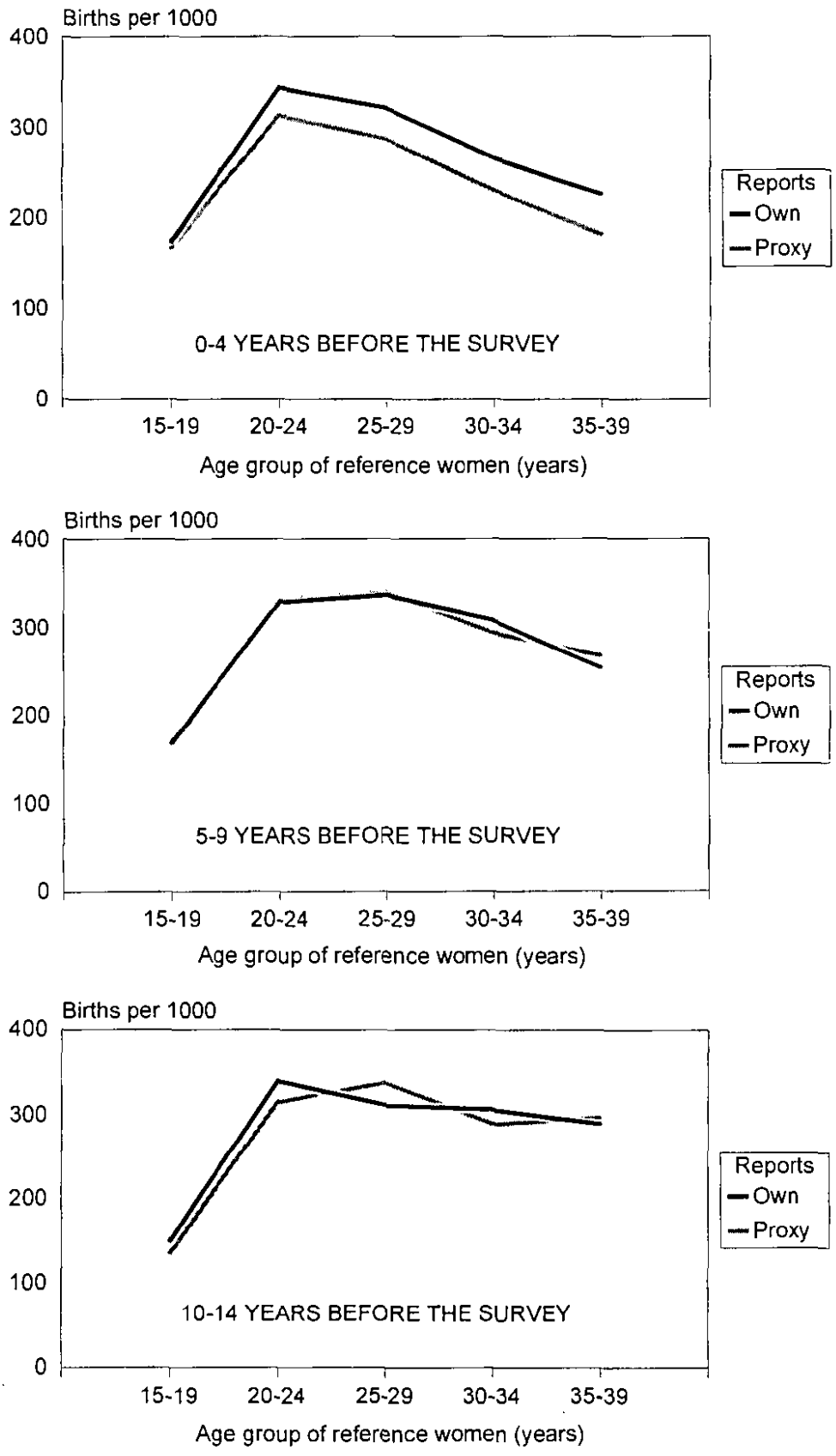
Age-specific fertility rates and total fertility rate (TFR) by five-year periods before the survey, obtained from own and proxy reports, SACM 1995

	0-4 years before survey			5-9 years before survey			10-14 years before survey		
	Births per 1,000		Percent[1]	Births per 1,000		Percent[1]	Births per 1,000		Percent[1]
Age group	Own	Proxy	difference	Own	Proxy	difference	Own	Proxy	difference
15-19	173	166	4.0	169	166	1.8	150	136	9.3
20-24	344	313	9.0	329	332	-0.9	341	316	7.3
25-29	321	287	10.6	337	340	-0.9	312	339	-8.7
30-34	266	230	13.5	308	294	4.5	307	290	5.5
35-39	225	181	19.6	253	267	-5.5	290	298	-2.8
TFR 15-39	6.65	5.89	11.4	6.98	6.99	-0.1	7.00	6.90	1.4

[1] (own-proxy)/own

[2] Here, a 5-year reference period is used as opposed to the 3-year period used in Chapter 4 and in most substantive DHS reports. The principal reason for this is so that the quality of calculated fertility rates can be referenced to the same time period as the 5-year period rates of childhood mortality presented in the next section.

Figure 5.6
Age-specific Fertility Rates for Periods 0-4, 5-9, and 10-14 Years Before the Survey, Obtained from Own and Proxy Reports

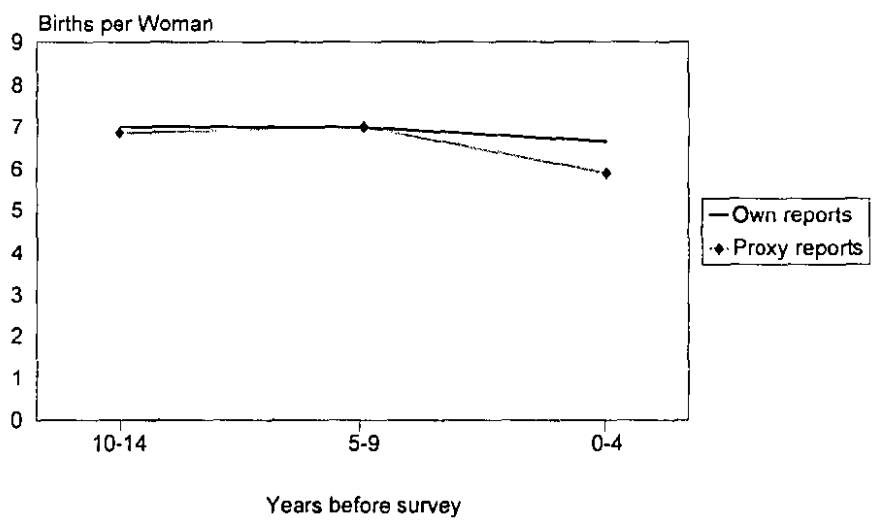


SACM 1995

Looking at the ASFRs in the previous two time periods, the same age pattern emerges except that at ages 25 and above fertility was previously at higher levels, a trend in the age pattern which is consistent with a population in the early stage of fertility decline. While differences exist between own- and proxy-reported ASFRs, the differences are rather small; proxy reporting does not *appear* to result in a consistent pattern of under- or overestimation.

Figure 5.7 shows the trends in the own-reported and proxy-reported TFRs. Both own and proxy reports estimate fertility of about 7 children per women in the periods 5-9 and 10-14 years before the survey. In the 0-4 year period before the survey, the own TFR of 6.7 represents a modest decline of about one-third of a child, while the proxy TFR for the same period is much lower (5.9 children), thus implying a sharp recent decline of over 1 child per woman.

Figure 5.7
Total Fertility Rates (Age 15-39) by Five-year Periods Before the Survey, Own and Proxy Reports



Childhood Mortality Estimates

The childhood mortality rates presented here are calculated using the standard DHS methodology described in Chapter 4 and Appendix A. The rates are not true rates but life table probabilities of death between two exact ages, ${}_nq_x$.[3]

Table 5.6 shows the rates and the percentage discrepancy between rates calculated from own and proxy data. The similarity in own and proxy rates produced for the 0-4 year period before the survey is rather puzzling. Not only is overall under-five mortality nearly identical (131 deaths per 1,000 live births), but component own and proxy age-specific rates are within about 3 percent of each other in every case. Large differences do, however, emerge when looking at earlier time periods. Proxy reports underestimate under-five mortality by 23 percent in the period 5-9 years before the survey and by 31 percent in the period 10-14

[3] The exception to this occurs in calculating the postneonatal mortality rate (ages 1-11 months), which is simply the arithmetic difference between infant (0-11 months) and neonatal (0 months) mortality rates.

Table 5.6 Childhood mortality

Neonatal, postneonatal, infant, child, and under-five mortality rates by five-year periods before the survey, obtained from own and proxy reports, SACM 1995

	0-4 years before survey			5-9 years before survey			10-14 years before survey		
	Deaths per 1,000		Percent[1]	Deaths per 1,000		Percent[1]	Deaths per 1,000		Percent[1]
	Own	Proxy	difference	Own	Proxy	difference	Own	Proxy	difference
Neonatal mortality	21.7	22.4	-3.2	18.7	12.1	35.3	15.5	11.4	26.5
Post-neonatal mortality	63.4	63.2	0.3	95.7	65.8	31.2	65.4	42.3	35.3
Infant mortality	85.1	85.6	-0.6	114.4	77.9	31.9	80.9	53.7	33.6
Child mortality	49.8	49.5	0.6	65.3	59.8	8.4	80.3	53.7	30.7
Under-five mortality	130.6	130.9	-0.2	172.3	133.0	22.8	154.7	106.3	31.3

[1] (own-proxy)/own

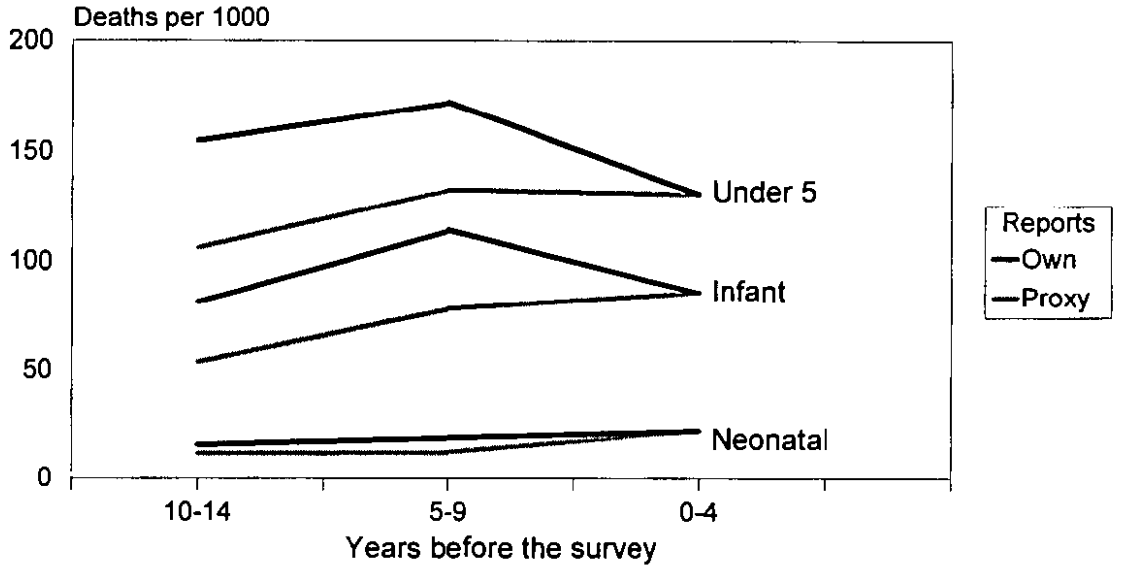
years before the survey. Infant mortality and component neonatal and postneonatal mortality show significant proxy effects on the order of 27 to 35 percent underestimation. Underestimation of child mortality (12-59 months) is less severe (8 percent) in the period 5-9 years before the survey, but rises to 31 percent in the period 10-14 years before the survey.

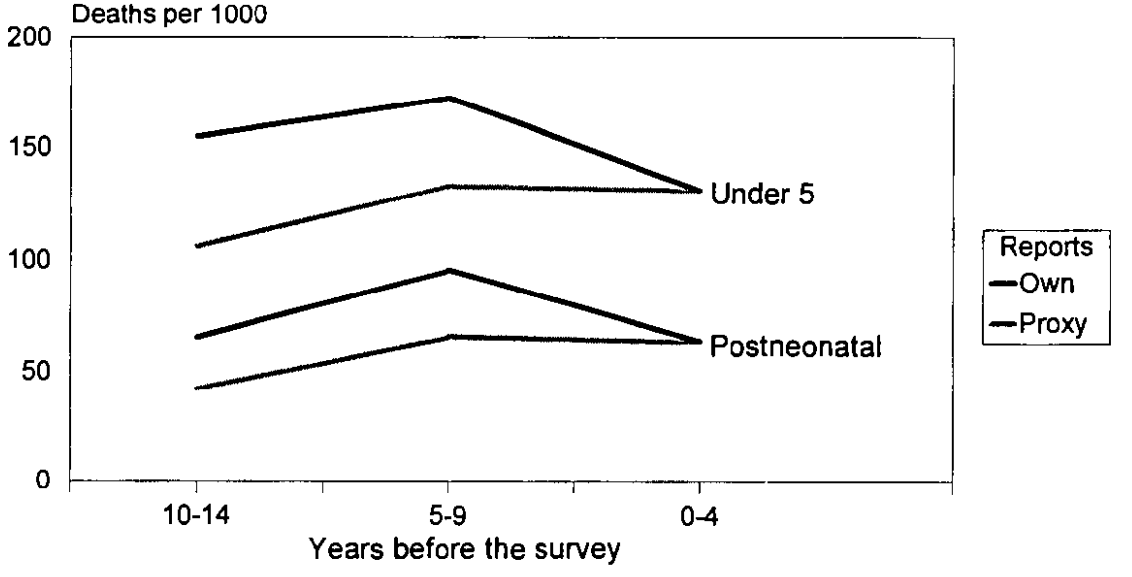
Figure 5.8 shows the effect that proxy data has on level and trend estimation. The own data produce a picture of overall decline in under-five mortality during the last 15 years from 155 to 131 per 1,000, with a rise to 172 midway through the period. The result of proxy underreporting on mortality indices in the periods 5-9 and 10-14 years before the survey is that trend estimation is distorted, causing the appearance of increasing under-five mortality risk from 106 to 131 per 1,000. In the period 5-9 years before the survey, most of the proxy shortfall in under-five deaths occurs during the postneonatal period; in the period 10-14 years before the survey, a large shortfall in the age segment 1-4 years is also observed.

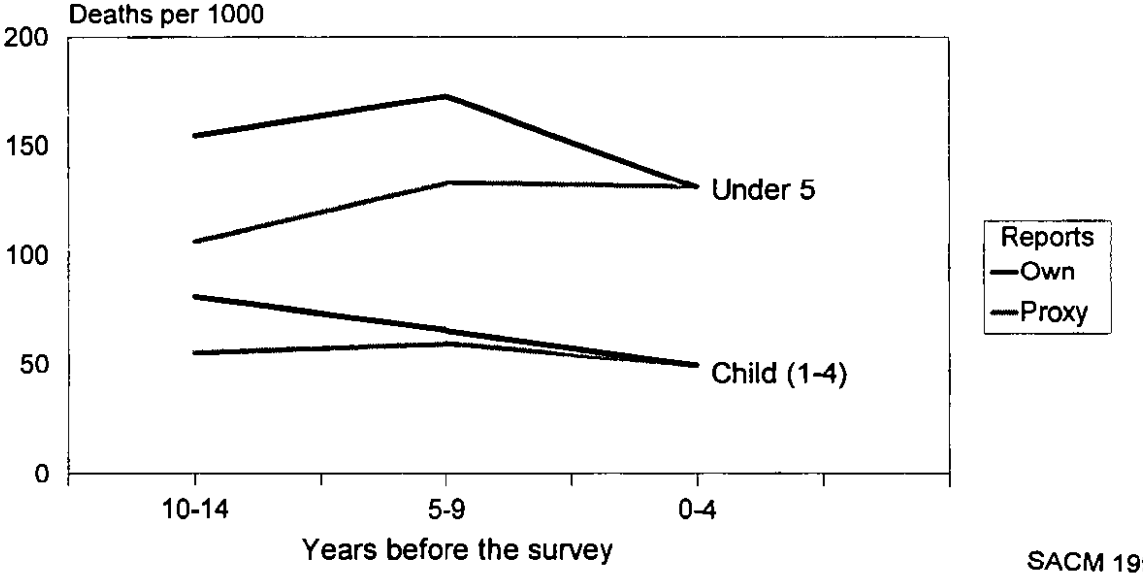
While the proxy underreporting of neonatal mortality is marked when expressed as a percentage of own neonatal mortality (i.e., around 30 percent lower), its biasing effect on under-five rates is relatively small due to its limited contribution to overall under-five mortality. It should be mentioned, however, that even in the own data, neonatal mortality may be understated in the periods 5-9 and 10-14 years before the survey. In the period 0-4 years before the survey, about one-quarter of own under-five mortality occurs in the neonatal period (a plausible proportion at this mortality level), but by the period 10-14 years before the survey, this percentage drops to about 10 percent. Given the historical context of very poor maternal health and pregnancy outcome in this population, the accuracy of the latter finding is questionable. A more tenable interpretation of these results is that the own data underreport neonatal deaths, and that the underreporting is further amplified by proxy reporting.

In summary, proxy reporting of birth histories results in a significant underestimate in childhood mortality at all ages under 5 years. In this experiment, the bias is limited to the periods of more than 5 years before the survey, and is most problematic for the infant period, especially the postneonatal age segment (1-11 months). Consequently, estimates of both mortality trends and the age pattern of mortality are conspicuously distorted relative to the own-reported data. The fact that own and proxy estimates are nearly the same in the period 0-4 years before the survey is coincidental, being the result of a roughly proportionate underreporting of both surviving and non-surviving births.

Figure 5.8
Under-Five, Child, Infant, Postneonatal, and Neonatal Mortality, by Five-year Period Before the Survey, according to Own and Proxy Reports





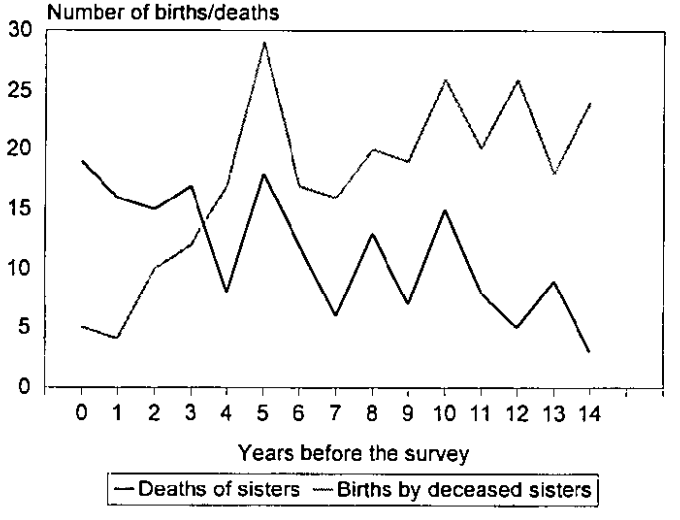


SACM 1995

5.3 Mortality of Children of Deceased Women

In the first phase of the SACM, respondents reported 170 (unique) sisters age 15-49 who died in the 15-year period before the survey. The distributions of these women's deaths and their 261 antemortem births by year before the survey are shown in Figure 5.9. Both distributions show evidence of significant year of birth/death heaping, especially at year 5 before the survey. Still, a pattern of rising numbers of adult female deaths and falling numbers of births is clearly observed, which is expected since these births can occur only before the deaths of the mothers. Even if it is considered that some of the births reported at year 5 in fact occurred in the period 0-4 years before the survey, the numbers of births to deceased sisters in the most recent period is quite small.

Figure 5.9
Number of Deaths of Sisters and Births to Now Deceased Sisters by Year of Occurrence Before the Survey



SACM 1995

In this analysis, childhood mortality among births to women who died in the last 15 years (as reported by Phase I respondents) is presented in comparison with the mortality among births to:

- Phase I respondents (i.e., based on own reports), and
- Living Sisters of Phase I respondents who reside in the same geographic area (i.e., in the Phase I area, as reported by Phase I respondents).

Age-specific mortality estimates were calculated for the 10-year period before the survey, which was a compromise between focusing on the period 0-4 years before the survey (which was judged to comprise too few birth history events for dead sisters), and the inclusion of the period 10-14 years before the survey (which included data of significantly diminished quality). The mortality rates are given in Table 5.7.

Since the rates for deceased women are based on small numbers of births, it is necessary to interpret the mortality estimates cautiously. The most striking result is the enormously elevated level of mortality among children of deceased women. Compared with reports on living sisters (own or proxy), the risk of death among these children was five times higher during the neonatal period, more than two times higher in

Table 5.7 Reported childhood mortality by survival status of mother

Neonatal, postneonatal, infant, child, and under-five mortality rates (per 1,000) for the period 0-9 years before the survey, based on own birth histories reported by Phase I respondents, proxy birth histories on living sisters reported by Phase I respondents, and proxy birth histories on dead sisters reported by Phase I respondents, SACM 1995

	Phase I respondents (own reports)	Phase I living sisters who reside in same area as respondents (proxy reports)	Phase I dead sisters (proxy reports)
Neonatal mortality	23.6	22.1	112.4
Postneonatal mortality	66.0	62.9	147.8
Infant mortality	89.6	85.0	260.2
Child mortality	58.8	58.5	108.5
Under-five mortality	143.2	138.5	340.4

the postneonatal period, and about twice as high in the 1-4 year age segment. Over one-third of orphaned children died before their fifth birthday (under-five mortality at 340 per 1,000). The fact that the relative risk is highest in the neonatal period is consistent with female deaths related to maternal causes.

Since this is a high fertility population, Phase I respondents will be a roughly representative subsample of all adult sisters (i.e., all women) who reside in the same area and would thus have a chance to be sampled. Their birth histories should therefore produce comparable demographic estimates, which is indeed the finding shown in Table 5.7. Use of Phase I own data results in an infant mortality rate of 90 per 1,000,[4] a little higher than the estimate produced from proxy data on sisters living in the same area as respondents (85 per 1,000). The child mortality rates (1-4 years) calculated from the two data types are nearly identical (59 per 1,000).

5.4 Summary and Discussion

It is important to emphasize what this study was and was not intended to accomplish. The SACM was not designed to measure the level of bias in childhood mortality rate estimation related to rising rates of adult (female) mortality. Indeed, this would have required a much larger sample size, and would have been more effectively accomplished using a longitudinal design so as to allow validation of adult and childhood deaths. In any case, establishing the level of bias in one population would not have served the general purpose of developing a practical method to routinely measure and adjust for this phenomenon outside this context. Rather, given that it is known that there exists the potential for a significant level of bias in populations with high adult mortality, the study was aimed at determining whether an alternative means to incorporate the experience of woman not interviewed (i.e., proxy reports on birth histories of deceased women) was feasible in a rural African setting.

This study's findings based on comparisons of own- and proxy-reported birth histories indicate that women are familiar with their sisters' experience regarding childbearing and child deaths. The quality of that information is, in some respects, surprisingly good. Yet, the study identified a number of important problems in the proxy data. The analysis of childhood mortality indicates that trends in mortality at all ages were

[4] The childhood mortality rates produced from Phase I own reports were previously presented in Chapter 4.

distorted by proxy reporting. Specifically, the proxy data for time periods five years or more from the survey date were suspect; the under-five mortality rate was underestimated by 23 percent in the period 5-9 years before the survey, and underestimated by 31 percent in the period 10-14 years before the survey, relative to estimates produced from own data. Own and proxy estimates for the most recent period (0-4 years before the survey) were curiously similar, but this can be explained by offsetting underreports of both surviving and non-surviving births.

Three types of problems in proxy reporting were identified: (1) a substantial deficit of reported births, especially surviving births, in the 0-4 years before the survey; (2) much greater overall imprecision in dating of births; and (3) a substantial shortfall of non-surviving births throughout the 15-year period before the survey, especially severe for *more than* 5 years preceding the survey. The latter finding, when considered in light of an excess of surviving births during the same 5-14-year period suggests that while some non-surviving births are not reported at all in the proxy histories, survival status per se may be misreported in many cases—a reporting pattern that is implausible when the data are collected from the mother herself.

This study was intentionally undertaken in a setting where birth history information would be difficult to obtain (i.e., low educational levels, poorly developed modern sector economy, etc.), which is typical for rural sub-Saharan Africa. On the other hand, a number of other characteristics of the study's design and implementation procedures operated to produce results that might be *better* than could be expected in routine application of proxy birth history collection. Principal among these is the geographic proximity to the reference sister(s) of women who provided proxy information. Additionally, the level of probing used in the SACM proxy interviewing would probably not be practicable in a methodology adapted to *routine* DHS-type survey implementation.

Given the considerable problems in the data and demographic estimates produced from this closely-supervised experiment implemented under favorable design conditions, it seems incautious at this time to recommend *routine* use of proxy reports in addressing the problem of (mother's) survival bias in demographic surveys in sub-Saharan Africa. One could argue, however, that in settings where survival bias is expected to be moderate to severe, even an inferior correction may be better than no correction. In its simplest application, the data inputs for such a correction procedure include: (1) an estimate of the relative mortality risk of children of deceased women relative to children of surviving women, and (2) an estimate of the relative amount of "missed" exposure to mortality risk, which is a function of recent adult female mortality and the antemortem fertility of the recently deceased women.

Thus, further empirical assessment needs to be done regarding the factors affecting survival bias. The SACM study did provide findings of a strong positive association between a mother's death and her children's subsequent mortality risk. In these (albeit sparse) data, under-five mortality was twice as high and infant mortality three times as high among children of deceased women compared with children of women surviving to the survey date. These findings confirm that survival bias is a problem of *underestimation* in childhood mortality if no correction is made in the estimates. The extent of underestimation due specifically to the relative mortality risk dimension will presumably vary in a considerable way from setting to setting, depending on both biomedical and social factors operating in the population that modify a child's chances of dying once the mother has died (or becomes sick before death). The prevailing HIV/AIDS situation and how the society is responding to the consequences of the epidemic are certainly two of the principal factors.

The experience of deceased women regarding antemortem fertility is not completely understood (Gregson, 1994). The results of this preliminary look at the fertility of deceased women in the SACM suggest that, *in this particular setting*, the aggregate-level exclusion of births through mortality of women would be small for the most recent time period. However, the reliability of this substantive result is qualified by the knowledge that the true number of births may be underreported by proxy interview. Further, with rates of

AIDS mortality expected to rise, the proportion of births "missed" in routine samples of surviving women would rise to a level well above that observed here.

An appreciation of adult mortality levels and trends in sub-Saharan Africa is also key to the assessment of survival bias, yet the current availability of such data is very limited and, when available, the data are seldom able to provide sufficient detail in trends over a recent period of interest (Timæus, 1993). Such information is urgently needed. To maintain policy and program relevance, the data need to be population-based and yield estimates of *recent* levels and trends for age groups of men and women where significant AIDS impact is expected. Sibling history data, if containing high quality date and age information, can potentially satisfy these requirements (Bicego, 1997). This study found that while HIV/AIDS cases apparently exist in the population, relatively few cases were reported by SACM respondents (approximately 6 percent of adult deaths). The levels of both male and female adult mortality, while high, are not nearly as elevated as predicted by modelers of the demographic impact of AIDS in sub-Saharan Africa (Way and Stanecki, 1994). It may be that this rural area of Tanzania is still on the upward trajectory of the epidemic and that adult mortality rates have not yet been significantly affected. Further analysis of the SACM data is planned that will focus on the quality of the sibling history data for the estimation of sex-specific adult mortality.

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APPENDIX A

CALCULATION OF SYNTHETIC COHORT PROBABILITIES OF DYING

APPENDIX A

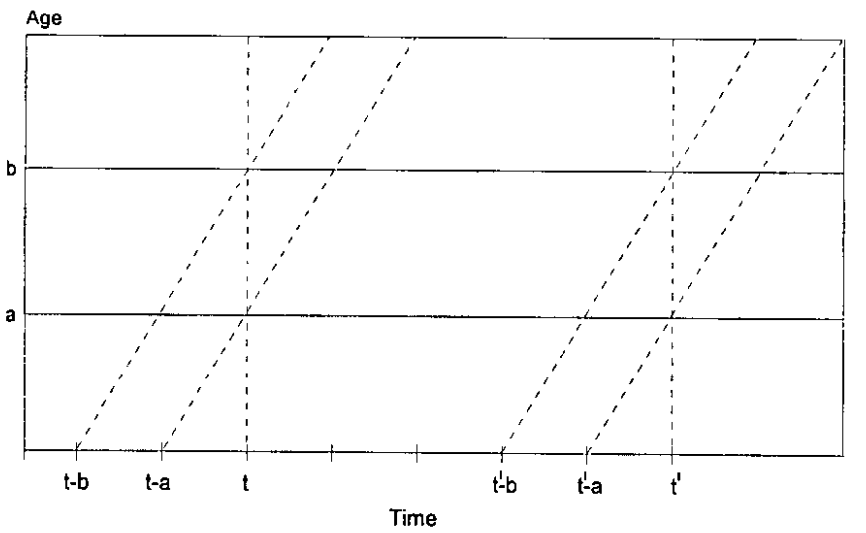
CALCULATION OF SYNTHETIC COHORT PROBABILITIES OF DYING

The procedure for calculating synthetic cohort probabilities of dying is based on the procedure first developed by Somoza (1980) and modified by Rutstein (1984). Probabilities of dying are built up from probabilities calculated for specific age intervals: less than 1 month, 1-2 months, 3-5 months, 6-11 months, 12-23 months, 24-35 months (2 years), 36-47 months (3 years), and 48-59 months (4 years). The probability of dying is the result of dividing the number of deaths occurring in the relevant age interval for children who were exposed to death within the calendar period, by the number of children exposed in the same age/calendar period.

Figure A.1 shows that there are three groups of children who are exposed to death between ages *a* and *b* during the time *t* to *t'*:

(1) children born between *t-a* (age *a* at time *t*) and *t'-b* (age *b* at time *t'*),
(2) children born between *t-b* and *t-a*, and
(3) children born between *t'-b* and *t'-a*.

Figure A.1
Cohorts Used to Calculate Synthetic Rates, Demographic and Health Surveys, 1990-1994



Children in the first group were exposed during the entire period in question, while children in the latter groups have been exposed during only part of that period. Due to the short length of the intervals used to code age at death, it can safely be assumed that in the latter case half of both the deaths and the exposure occurred in the relevant period. The numerator thus becomes the sum of all deaths at ages *a* to *b* among children born between *t-a* and *t'-b*, plus half of the deaths among children born between *t-b* and *t-a*, plus half of the deaths among children born between *t'-b* and *t'-a*. Similarly, the denominator becomes the number of children born between *t-a* and *t'-b* who survived to age *a* plus half of the children born between *t-b* and *t-a* who survived to age *a*, plus half of the children born between *t'-b* and *t'-a* who survived to age *a*.

An exception must be made for the period immediately before the survey since all deaths recorded for children exposed during this period must have occurred before the date of the survey. Therefore, all the deaths (rather than half) are counted for children born between t'-b and t'-a, although the children have been exposed on average for half of the time.

To calculate the conventional probabilities of dying, which are presented in the tables in this report, the authors first calculated the probability of surviving through the subinterval by subtracting the probability of dying (the quotient given above) from one. Then they multiplied together the subinterval survival probabilities included in the conventional age limits and, finally, subtracted this product from one to give the probability of dying within the conventional limits:

$$ {}_nq_x = 1 - \prod_{i=x}^{i=x+n} (1-q_i) $$

where ${}_nq_x$ is the conventional probability of dying between ages x and $x+n$ and q_i are the subinterval probabilities of dying.

The conventional postneonatal mortality rate is defined differently from conventional rates. Although it refers to the age interval between 1 and 11 months (completed), it is not a probability, but rather is the arithmetic difference between the infant mortality rate (the probability of dying in the first year of life) and the neonatal mortality rate (the probability of dying in the first month of life).

APPENDIX B

PERSONNEL INVOLVED IN THE 1995 SUMVE SURVEY ON ADULT AND CHILDHOOD MORTALITY

APPENDIX B

PERSONNEL INVOLVED IN THE 1995 SUMVE SURVEY ON ADULT AND CHILDHOOD MORTALITY

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APPENDIX C

QUESTIONNAIRES

SURVEY ON ADULT AND CHILDHOOD MORTALITY

HOUSEHOLD SCHEDULE

IDENTIFICATION	
VILLAGE NAME_____	
NAME OF HOUSEHOLD HEAD _____	
SACM LISTING NUMBER (ON STRUCTURE).....	☐☐☐
CLUSTER NUMBER.....	☐☐
HOUSEHOLD NUMBER.....	☐☐

INTERVIEWER VISITS				
	1	2	3	FINAL VISIT
DATE	_____	_____	_____	DAY ☐☐ MONTH ☐☐ YEAR ☐☐
INTERVIEWER'S NAME	_____	_____	_____	NAME ☐☐
RESULT***	_____	_____	_____	RESULT ☐
NEXT VISIT: DATE TIME	_____ _____	_____ _____		TOTAL NUMBER OF VISITS ☐

***RESULT CODES:
1 COMPLETED
2 NO HOUSEHOLD MEMBER AT HOME OR NO COMPETENT RESPONDENT AT HOME AT TIME OF VISIT
3 ENTIRE HOUSEHOLD ABSENT FOR EXTENDED PERIOD
4 POSTPONED
5 REFUSED
6 DWELLING VACANT OR ADDRESS NOT A DWELLING
7 DWELLING DESTROYED
8 DWELLING NOT FOUND
9 OTHER _____ (specify)

TOTAL IN HOUSEHOLD ☐☐

TOTAL ELIGIBLE WOMEN ☐☐

LINE NO. OF RESP. TO HOUSE-HOLD SCHEDULE ☐☐

LANGUAGE OF QUESTIONNAIRE.....ENGLISH 3

LANGUAGE OF INTERVIEW..... ☐

LANGUAGE CODES: 1 KISUKUMA 2 KISWAHILI 3 OTHER

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY
NAME_____ ☐☐	NAME_____ ☐☐	☐☐	☐☐
DATE_____	DATE_____		

H1/E

HOUSEHOLD SCHEDULE

Now we would like some information about the people who usually live in your household or who are staying with you now.

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD*	RESIDENCE		SEX	AGE	PARENTAL SURVIVORSHIP AND RESIDENCE FOR PERSONS LESS THAN 15 YEARS OLD**				ELIGIBILITY	SISTERS IN HOUSEHOLD SCHEDULE --(ONLY FOR ELIGIBLE WOMEN)--		
	Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household.	What is the relationship of (NAME) to the head of the household?	Does (NAME) usually live here?	Did (NAME) sleep here last night?	Is (NAME) male or female ?	How old was (NAME) at his/her last birthday?	Is (NAME)'s natural mother alive?	IF ALIVE: Does (NAME)'s natural mother live in this household? IF YES: What is her name? RECORD MOTHER'S LINE NUMBER	Is (NAME)'s natural father alive?	IF ALIVE: Does (NAME)'s natural father live in this household? IF YES: What is his name? RECORD FATHER'S LINE NUMBER	CIRCLE LINE NUMBER OF WOMEN ELIGIBLE FOR INDIVIDUAL INTERVIEW	Does (NAME) have any sisters who have the same mother and who usually live in this household or are currently visiting this household? IF NO: SKIP TO NEXT LINE. IF YES: Who is the eldest amongst the sisters who usually live in this household or who are visiting? RECORD LINE NUMBER AND NAME OF ELDEST SISTER IN Q.14 AND Q.15. IF (NAME) IS ELDEST THEN RECORD HER LINE # and NAME		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
			YES NO	YES NO	M F	IN YEARS	YES NO DK		YES NO DK			YES NO	LINE NO	N. ELDEST S.
01			1 2	1 2	1 2		1 2 8		1 2 8		01→	1 2		
02			1 2	1 2	1 2		1 2 8		1 2 8		02→	1 2		
03			1 2	1 2	1 2		1 2 8		1 2 8		03→	1 2		
04			1 2	1 2	1 2		1 2 8		1 2 8		04→	1 2		
05			1 2	1 2	1 2		1 2 8		1 2 8		05→	1 2		
06			1 2	1 2	1 2		1 2 8		1 2 8		06→	1 2		
07			1 2	1 2	1 2		1 2 8		1 2 8		07→	1 2		
08			1 2	1 2	1 2		1 2 8		1 2 8		08→	1 2		
09			1 2	1 2	1 2		1 2 8		1 2 8		09→	1 2		
10			1 2	1 2	1 2		1 2 8		1 2 8		10→	1 2		

HOUSEHOLD SCHEDULE CONTINUED

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
			YES NO	YES NO	M F	IN YEARS	YES NO DK		YES NO DK			YES NO	LINE NO	N. ELDEST S.
11			1 2	1 2	1 2		1 2 8		1 2 8		11→	1 2		
12			1 2	1 2	1 2		1 2 8		1 2 8		12→	1 2		
13			1 2	1 2	1 2		1 2 8		1 2 8		13→	1 2		
14			1 2	1 2	1 2		1 2 8		1 2 8		14→	1 2		
15			1 2	1 2	1 2		1 2 8		1 2 8		15→	1 2		
16			1 2	1 2	1 2		1 2 8		1 2 8		16→	1 2		
17			1 2	1 2	1 2		1 2 8		1 2 8		17→	1 2		
18			1 2	1 2	1 2		1 2 8		1 2 8		18→	1 2		
19			1 2	1 2	1 2		1 2 8		1 2 8		19→	1 2		
20			1 2	1 2	1 2		1 2 8		1 2 8		20→	1 2		

TICK HERE IF CONTINUATION SHEET USED ☐

TOTAL NUMBER OF ELIGIBLE WOMEN ☐☐

Just to make sure that I have a complete listing:

1) Are there any other persons such as small children or infants that we have not listed? YES ☐→ ENTER EACH IN TABLE NO ☐

2) In addition, are there any other people who may not be members of your family, such as domestic workers, lodgers or friends who usually live here? YES ☐→ ENTER EACH IN TABLE NO ☐

3) Are there any guests or temporary visitors staying here, or anyone else who slept here last night that have not been listed? YES ☐→ ENTER EACH IN TABLE NO ☐

* CODES FOR Q.3
RELATIONSHIP TO HEAD OF HOUSEHOLD:

01= HEAD	05= GRANDCHILD	09= OTHER RELATIVE
02= WIFE OR HUSBAND	06= PARENT	10= ADOPTED/FOSTER CHILD
03= SON OR DAUGHTER	07= PARENT-IN-LAW	11= NOT RELATED
04= SON-IN-LAW OR DAUGHTER-IN-LAW	08= BROTHER OR SISTER	98= DK

** These questions refer to the biological parents of the child. Record 00 if parent not member of household.

H3/E

HOUSEHOLD SCHEDULE CONTINUED

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
			YES NO	YES NO	M F	IN YEARS	YES NO DK		YES NO DK			YES NO	LINE NO	N. ELDEST S.
11			1 2	1 2	1 2		1 2 8		1 2 8		11→	1 2		
12			1 2	1 2	1 2		1 2 8		1 2 8		12→	1 2		
13			1 2	1 2	1 2		1 2 8		1 2 8		13→	1 2		
14			1 2	1 2	1 2		1 2 8		1 2 8		14→	1 2		
15			1 2	1 2	1 2		1 2 8		1 2 8		15→	1 2		
16			1 2	1 2	1 2		1 2 8		1 2 8		16→	1 2		
17			1 2	1 2	1 2		1 2 8		1 2 8		17→	1 2		
18			1 2	1 2	1 2		1 2 8		1 2 8		18→	1 2		
19			1 2	1 2	1 2		1 2 8		1 2 8		19→	1 2		
20			1 2	1 2	1 2		1 2 8		1 2 8		20→	1 2		

TICK HERE IF CONTINUATION SHEET USED ☐

TOTAL NUMBER OF ELIGIBLE WOMEN ☐☐

Just to make sure that I have a complete listing:

1) Are there any other persons such as small children or infants that we have not listed? YES ☐→ ENTER EACH IN TABLE NO ☐

2) In addition, are there any other people who may not be members of your family, such as domestic workers, lodgers or friends who usually live here? YES ☐→ ENTER EACH IN TABLE NO ☐

3) Are there any guests or temporary visitors staying here, or anyone else who slept here last night that have not been listed? YES ☐→ ENTER EACH IN TABLE NO ☐

* CODES FOR Q.3
RELATIONSHIP TO HEAD OF HOUSEHOLD:

01= HEAD	05= GRANDCHILD	09= OTHER RELATIVE
02= WIFE OR HUSBAND	06= PARENT	10= ADOPTED/FOSTER CHILD
03= SON OR DAUGHTER	07= PARENT-IN-LAW	11= NOT RELATED
04= SON-IN-LAW OR DAUGHTER-IN-LAW	08= BROTHER OR SISTER	98= DK

** These questions refer to the biological parents of the child. Record 00 if parent not member of household.

H3/E

SURVEY ON ADULT AND CHILDHOOD MORTALITY

FEMALE QUESTIONNAIRE
FIRST ROUND

IDENTIFICATION

VILLAGE NAME _____

NAME OF HOUSEHOLD HEAD _____

SACM LISTING NUMBER (ON STRUCTURE) .....

CLUSTER NUMBER .....

HOUSEHOLD NUMBER .....

FULL NAME AND LINE NUMBER OF WOMAN _____

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE				DAY
				MONTH
				YEAR
INTERVIEWER'S NAME				NAME
RESULT***				RESULT
NEXT VISIT: DATE				TOTAL NUMBER OF VISITS
TIME				

***RESULT CODES:
1 COMPLETED
2 NOT AT HOME
3 POSTPONED
4 REFUSED
5 PARTLY COMPLETED
6 INCAPACITATED
7 OTHER _____ (specify)

NUMBER OF SISTERS BORN 15-50 YEARS AGO .....

LANGUAGE OF QUESTIONNAIRE.....ENGLISH 3

LANGUAGE OF INTERVIEW.....

LANGUAGE CODES: 1 KISUKUMA 2 KISWAHILI 3 OTHER

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY
NAME _____	NAME _____		
DATE _____	DATE _____		

F1/E

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP TO
101	RECORD THE TIME.	HOUR..... ☐☐ MINUTES..... ☐☐	
105	In what month and year were you born?	MONTH..... ☐☐ DK MONTH.....98 YEAR..... ☐☐ DK YEAR.....98	
106	How old were you at your last birthday? COMPARE AND CORRECT 105 AND/OR 106 IF INCONSISTENT.	AGE IN COMPLETED YEARS..... ☐☐	
107	Have you ever attended school?	YES.....1 NO.....2	→110
108	What is the highest level of school you attended: primary, secondary, or higher?	PRIMARY.....1 SECONDARY.....2 HIGHER.....3	
109	How many years did you complete at that level?	GRADE..... ☐☐	
110	Is your natural mother still alive?	YES.....1 NO.....2 DK.....8	
111	What is (was) your mother's name ? IF RESPONDENT DOES NOT KNOW MOTHER'S NAME, RECORD "DON'T KNOW"	FIRST NAME _____ SURNAME _____	
112	Is your natural father still alive?	YES.....1 NO.....2 DK.....8	
113	Are you currently married or living with a man?	YES, CURRENTLY MARRIED.....1 YES, LIVING WITH A MAN.....2 NO, NOT IN UNION.....3	

F2/E

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP TO
114	Do you usually live in this household?	YES.....1 NO.....2	→119
115	Does your household have a radio?	YES.....1 NO.....2	
116	Does any member of your household own: A bicycle? An oxcart? A plough?	YES NO BICYCLE.....1 2 OXCART.....1 2 PLOUGH.....1 2	
117	What is the total number of cows owned by your household? IF NONE RECORD '00' What is the total number of goats owned by your household? IF NONE RECORD '00'	NUMBER OF COWS..... NUMBER OF GOATS.....	
118	MAIN MATERIAL OF THE FLOOR. RECORD OBSERVATION.	EARTH/SAND.....11 WOOD PLANKS.....21 PARQUET OR POLISHED WOOD.....31 CERAMIC TILES.....32 CEMENT.....33 OTHER_____ 41 (SPECIFY)	→201
119	Now I would like to ask about the household in which you usually live. Does your household have a radio?	YES.....1 NO.....2	
120	Does any member of your household own: A bicycle? An oxcart? A plough?	YES NO BICYCLE.....1 2 OXCART.....1 2 PLOUGH.....1 2	
121	What is the total number of cows owned by your household? IF NONE RECORD '00' What is the total number of goats owned by your household? IF NONE RECORD '00'	NUMBER OF COWS..... NUMBER OF GOATS.....	
122	Could you describe the main material of the floor of your home?	EARTH/SAND.....11 WOOD PLANKS.....21 PARQUET OR POLISHED WOOD.....31 CERAMIC TILES.....32 CEMENT.....33 OTHER_____ 41 (SPECIFY)	

F3/E

SECTION 2. SIBLING MORTALITY

201 Now I would like to ask you some questions about your brothers and sisters, that is, all of the children born to (NAME OF NATURAL MOTHER), including those who are living with you, those living elsewhere, and those who have died.
How many children did your mother give birth to, including you?
NUMBER OF BIRTHS TO NATURAL MOTHER..... ☐☐

202 CHECK 201: TWO OR MORE BIRTHS ☐ ↓ ONLY ONE BIRTH (RESPONDENT ONLY) ☐→ SKIP TO 301

203 How many of these births did your mother have before you were born?
NUMBER OF PRECEDING BIRTHS..... ☐☐

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
204 What was the name given to your oldest (next oldest) brother or sister?	----------	----------	----------	----------	----------	----------	----------
205 Is (NAME) male or female?	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2
206 Is (NAME) still alive?	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [2]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [3]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [4]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [5]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [6]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [7]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [8]
207 How old is (NAME)?	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
208 Does (NAME) live in this household? IF NO: Did (NAME) sleep here last night? IF NO: RECORD '00' IF YES TO EITHER QUESTION RECORD LINE NO. FROM HOUSEHOLD SCHEDULE.	☐☐ GO TO 222	☐☐ GO TO 222	☐☐ GO TO 222	☐☐ GO TO 222	☐☐ GO TO 222	☐☐ GO TO 222	☐☐ GO TO 222
209 How many years ago did (NAME) die?	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
210 How old was (NAME) when she/he died?	☐☐ IF DIED BEFORE 12 YEARS, GO TO [2]	☐☐ IF DIED BEFORE 12 YEARS, GO TO [3]	☐☐ IF DIED BEFORE 12 YEARS, GO TO [4]	☐☐ IF DIED BEFORE 12 YEARS, GO TO [5]	☐☐ IF DIED BEFORE 12 YEARS, GO TO [6]	☐☐ IF DIED BEFORE 12 YEARS, GO TO [7]	☐☐ IF DIED BEFORE 12 YEARS, GO TO [8]
211 CHECK 205	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216
212 Was (NAME) pregnant when she died?	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214
213 How many months pregnant was (NAME) when she died?	☐☐ Months (GO TO 216)	☐☐ Months (GO TO 216)	☐☐ Months (GO TO 216)	☐☐ Months (GO TO 216)	☐☐ Months (GO TO 216)	☐☐ Months (GO TO 216)	☐☐ Months (GO TO 216)

	NAME [1]	NAME [2]	NAME [3]	NAME [4]	NAME [5]	NAME [6]	NAME [7]
214 Did (NAME) die during childbirth?	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2
215 Did (NAME) die within six weeks after the end of a pregnancy or childbirth?	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2
216 Was (NAME) very sick for more than 2 months before her/his death?	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2
217 Was (NAME) very thin in the two-month period before his/her death?	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2
218 In your opinion, what did (NAME) die from?							
219 CHECK 218	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221
220 Did (NAME) have AIDS when he/she died?	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2
221 Where did the death of (NAME) take place?	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)
222 CHECK 205-207 AND 209-210	ELIGIBLE GO TO [2]	ELIGIBLE GO TO [3]	ELIGIBLE GO TO [4]	ELIGIBLE GO TO [5]	ELIGIBLE GO TO [6]	ELIGIBLE GO TO [7]	ELIGIBLE GO TO [8]

F5/E

204 What was the name given to your oldest (next oldest) brother or sister?	[8]	[9]	[10]	[11]	[12]	[13]	[14]
205 Is (NAME) male or female?	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2	MALE.....1 FEMALE.....2
206 Is (NAME) still alive?	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [9]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [10]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [11]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [12]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [13]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [14]	YES.....1 NO.....2 GO TO 209 DK.....8 GO TO [15]
207 How old is (NAME)?							
208 Does (NAME) live in this household? IF NO: Did (NAME) sleep here last night? IF NO: RECORD '00' IF YES TO EITHER QUESTION RECORD LINE NO. FROM HOUSEHOLD SCHEDULE.	GO TO 222	GO TO 222	GO TO 222	GO TO 222	GO TO 222	GO TO 222	GO TO 222
209 How many years ago did (NAME) die?							
210 How old was (NAME) when she/he died?	IF DIED BEFORE 12 YEARS, GO TO [9]	IF DIED BEFORE 12 YEARS, GO TO [10]	IF DIED BEFORE 12 YEARS, GO TO [11]	IF DIED BEFORE 12 YEARS, GO TO [12]	IF DIED BEFORE 12 YEARS, GO TO [13]	IF DIED BEFORE 12 YEARS, GO TO [14]	IF DIED BEFORE 12 YEARS, GO TO [15]
211 CHECK 205	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216	IF MALE GO TO Q.216
212 Was (NAME) pregnant when she died?	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214	YES.....1 NO.....2 GO TO 214
213 How many months pregnant was (NAME) when she died?	Months (GO TO 216)	Months (GO TO 216)	Months (GO TO 216)	Months (GO TO 216)	Months (GO TO 216)	Months (GO TO 216)	Months (GO TO 216)

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	NAME [8]	NAME [9]	NAME [10]	NAME [11]	NAME [12]	NAME [13]	NAME [14]
214 Did (NAME) die during childbirth?	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2	YES........1 GO TO 216 NO.........2
215 Did (NAME) die within six weeks after the end of a pregnancy or childbirth?	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2
216 Was (NAME) very sick for more than 2 months before her/his death?	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2
217 Was (NAME) very thin in the two-month period before his/her death?	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2
218 In your opinion, what did (NAME) die from?							
219 CHECK 218	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221	IF "AIDS" GO TO 221
220 Did (NAME) have AIDS when he/she died?	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2	YES........1 NO.........2
221 Where did the death of (NAME) take place?	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)	HOME.......1 TRADIT. HEALER.....2 HOSPITAL...3 ON WAY TO HOSPITAL...4 OTHER......5 (SPECIFY)
222 CHECK 205-207 AND 209-210	ELIGIBLE GO TO [9]	ELIGIBLE GO TO [10]	ELIGIBLE GO TO [11]	ELIGIBLE GO TO [12]	ELIGIBLE GO TO [13]	ELIGIBLE GO TO [14]	ELIGIBLE GO TO [15]

223	CHECK COLUMNS 14 AND 15 IN HOUSEHOLD SCHEDULE. FOR EACH SISTER RECORDED IN COLUMNS 14 AND 15, VERIFY THAT 208 IS CORRECT AND CONSISTENT

224	CHECK 208, FOR EACH LIVING SISTER AGED 15-50 IF NOT '00', VERIFY RECORD IN HOUSEHOLD COLUMNS 14 AND 15. IF '00', VERIFY NO RECORD IN HOUSEHOLD COLUMNS 14 AND 15

CHECK 222: TOTAL NUMBER OF ELIGIBLE SISTERS

COLUMN NUMBER OF FIRST ELIGIBLE SISTER

F7/E

LIST OF SISTERS EVER BORN WHO REACHED AGE 15 AND WHO ARE (OR WOULD BE) AGE 50 OR LESS NOW

NAME OF SISTER	COL.NO. OF SISTER	FULL NAME OF SISTER			SURVIVAL OF SISTER AND WHETHER IN HOUSEHOLD LIST	SISTER'S USUAL RESIDENCE						
		SURNAME/ FAMILY NAME	FIRST NAME	COMMON NAME		DISTRICT	VILLAGE	KITONGOJI/ ADDRESS	10-CELL LEADER	HEAD OF HOUSEHOLD	MARITAL STATUS	
CHECK: Q.222 TRANSFER NAMES OF EACH SISTER REACHING AGE 15-50 BEGIN WITH FIRST BORN	CHECK: Q.204 RECORD COL. NO. OF EACH SISTER IN 225	Please give me the full name of (NAME) starting with her surname.	PROBE: Does/did (NAME) have a first name?	PROBE: What is/ was the familiar name that (NAME) commonly goes/went by?	CHECK 206 AND 208: IF DEAD: RECORD 98 IF LIVING, COPY LINE NUMBER FROM Q.208	What is the name of the district where (NAME) usually lives?	What is the name of the village/ town where (NAME) usually lives?	What is the name of the kitongoji/ address where (NAME) usually lives?	What is the name of (NAME)'s 10-cell leader in her village/ town?	What is the name of the person who is the head of the household where (NAME) usually lives? RECORD FULL NAME OF HEAD OF HOUSEHOLD	Is (NAME) currently married or living with a man?	What is the full name of (NAME)'s husband?
(225)	(226)	(227)	(228)	(229)	(230)	(231)	(232)	(233)	(234)	(235)	(236)	(237)
	⎕⎕				⎕⎕ IF=00 ⟶ ELSE⟶ 225	KWIMBA...1 MAGU.....2 OTHER....3 DK.......4	⎕⎕ ----------	---------- ----------	---------- ----------	---------- ----------	YES.......1 NO........2 GO TO 225	---------- ----------
	⎕⎕				⎕⎕ IF=00 ⟶ ELSE⟶ 225	KWIMBA...1 MAGU.....2 OTHER....3 DK.......4	⎕⎕ ----------	---------- ----------	---------- ----------	---------- ----------	YES.......1 NO........2 GO TO 225	---------- ----------
	⎕⎕				⎕⎕ IF=00 ⟶ ELSE⟶ 225	KWIMBA...1 MAGU.....2 OTHER....3 DK.......4	⎕⎕ ----------	---------- ----------	---------- ----------	---------- ----------	YES.......1 NO........2 GO TO 225	---------- ----------
	⎕⎕				⎕⎕ IF=00 ⟶ ELSE⟶ 225	KWIMBA...1 MAGU.....2 OTHER....3 DK.......4	⎕⎕ ----------	---------- ----------	---------- ----------	---------- ----------	YES.......1 NO........2 GO TO 225	---------- ----------
	⎕⎕				⎕⎕ IF=00 ⟶ ELSE⟶ 225	KWIMBA...1 MAGU.....2 OTHER....3 DK.......4	⎕⎕ ----------	---------- ----------	---------- ----------	---------- ----------	YES.......1 NO........2 GO TO 225	---------- ----------
	⎕⎕				⎕⎕ IF=00 ⟶ ELSE⟶ 225	KWIMBA...1 MAGU.....2 OTHER....3 DK.......4	⎕⎕ ----------	---------- ----------	---------- ----------	---------- ----------	YES.......1 NO........2 GO TO 225	---------- ----------
	⎕⎕				⎕⎕ IF=00 ⟶ ELSE⟶ 225	KWIMBA...1 MAGU.....2 OTHER....3 DK.......4	⎕⎕ ----------	---------- ----------	---------- ----------	---------- ----------	YES.......1 NO........2 GO TO 225	---------- ----------

FB/E

SECTION 3. REPRODUCTION OF RESPONDENT

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP TO
301	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	YES.....1 NO.....2	→306
302	Do you have any sons or daughters to whom you have given birth who are now living with you?	YES.....1 NO.....2	→304
303	How many sons live with you? And how many daughters live with you? IF NONE RECORD '00'.	SONS AT HOME..... DAUGHTERS AT HOME.....	
304	Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?	YES.....1 NO.....2	→306
305	How many sons are alive but do not live with you? And how many daughters are alive but do not live with you? IF NONE RECORD '00'.	SONS ELSEWHERE..... DAUGHTERS ELSEWHERE.....	
306	Have you ever given birth to a boy or a girl who was born alive but later died? IF NO, PROBE: Any baby who cried or showed signs of life but survived only a few hours or days?	YES.....1 NO.....2	→308
307	How many boys have died? And how many girls have died? IF NONE RECORD '00'.	BOYS DEAD..... GIRLS DEAD.....	
308	SUM ANSWERS TO 303, 305, AND 307, AND ENTER TOTAL. IF NONE RECORD '00'.	TOTAL.....	
309	CHECK 308: Just to make sure that I have this right: you have had in TOTAL ____ births during your life. Is that correct? YES ☐ NO ☐ → PROBE AND CORRECT 301-308 AS NECESSARY		
310	CHECK 308: ONE OR MORE BIRTHS ☐ NO BIRTHS ☐		→325
311	Now I would like to ask about the place that you lived when you gave birth for the first time. Did you live in this village? IF YES: CIRCLE '00' IF NO: In which district did you live at that time? IF DK DISTRICT PROBE TO OBTAIN THE REGION. IF MWANZA REGION RECORD '18'. IF OUTSIDE MWANZA REGION RECORD '28'	SAME VILLAGE.....00 DISTRICT_____ DK.....98	→313
312	Did you live in a town or in the countryside at the time of your first birth?	TOWN.....1 COUNTRYSIDE.....2	

F9/E

313 Now I would like to talk to you about all of your births, whether still alive or not, starting with the first one you had.
RECORD NAMES OF ALL THE BIRTHS IN 314. RECORD TWINS AND TRIPLETS ON SEPARATE LINES.

314 What name was given to your (first/next) baby? (NAME)	315 Were any of these births twins?	316 Is (NAME) a boy or a girl?	317 In what month and year was (NAME) born? PROBE: What is his/her birthday? OR: In what season was he/she born?	318 Is (NAME) still alive?	319 IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COMPLETED YEARS.	320 IF ALIVE: Who is (NAME) now living with?	321 IF DEAD: How old was (NAME) when he/she died? IF '1 YR.', PROBE: How many months old was (NAME)? RECORD DAYS IF LESS THAN 1 MONTH; MONTHS IF LESS THAN TWO YEARS; OR YEARS.	322 FROM YEAR OF BIRTH OF (NAME) SUBTRACT YEAR OF PREVIOUS BIRTH; IF 4 YRS. OR MORE, ASK: Were there any other live births between the birth of (NAME) and (NAME OF THE PREVIOUS BIRTH)?
01	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO NEXT BIRTH	DAYS....1 MONTHS..2 YEARS...3	
02	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
03	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	OAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
04	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
05	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
06	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
07	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2

	314 What name was given to your next baby? (NAME)	315 Were any of these births twins?	316 Is (NAME) a boy or a girl?	317 In what month and year was (NAME) born? PROBE: What is his/her birthday? OR: In what season was he/she born?	318 Is (NAME) still alive?	319 IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COMPLETED YEARS.	320 IF ALIVE: Who is (NAME) now living with?	321 IF DEAD: How old was (NAME) when he/she died? IF '1 YR.', PROBE: How many months old was (NAME)? RECORD DAYS IF LESS THAN 1 MONTH; MONTHS IF LESS THAN TWO YEARS; OR YEARS.	322 FROM YEAR OF BIRTH OF (NAME) SUBTRACT YEAR OF PREVIOUS BIRTH; IF 4 YRS. OR MORE, ASK: Were there any other live births between the birth of (NAME) and (NAME OF THE PREVIOUS BIRTH)?
08		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
09		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
10		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
11		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
12		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 321	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 322	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2

323	SUBTRACT YEAR OF LAST BIRTH FROM 1995. IF 4 YRS. OR MORE, ASK: Have you had any live births since (NAME OF LAST BIRTH)?	YES.....1 NO.....2

324 COMPARE 308 WITH NUMBER OF BIRTHS IN HISTORY ABOVE AND MARK:

NUMBERS ARE SAME ☐ ▼ NUMBERS ARE DIFFERENT ☐→ (PROBE AND RECONCILE)

CHECK: FOR EACH BIRTH: YEAR OF BIRTH IS RECORDED.

FOR EACH LIVING CHILD: CURRENT AGE IS RECORDED.

FOR EACH DEAD CHILD: AGE AT DEATH IS RECORDED.

FOR AGE AT DEATH 12 MONTHS OR 1 YR.: PROBE TO DETERMINE EXACT NUMBER OF MONTHS. ☐

F11/E

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP TO
325	Are you pregnant now?	YES.....1 NO.....2 UNSURE.....8	 →327 →327
326	How many months pregnant are you? RECORD NUMBER OF COMPLETED MONTHS.	MONTHS..... ☐☐	
327	CHECK 314: ONE OR MORE BIRTHS ☐ NO LIVE BIRTHS ☐ →(SKIP TO 401) RECORD THE NAME OF LAST BORN CHILD NAME_____		
328	Now I would like to ask you some questions about the pregnancy that resulted in the birth of (NAME). When you were pregnant with (NAME), did you see anyone for antenatal care for this pregnancy? IF YES: Whom did you see? Anyone else? PROBE FOR THE TYPE OF PERSON AND RECORD ALL PERSONS SEEN.	HEALTH PROFESSIONAL DOCTOR/MEDICAL ASST.....A RURAL MEDICAL AIDE.....B NURSE/MIDWIFE.....C MCH AIDE.....D OTHER PERSON VILLAGE HEALTH WORKER.....E TRADITIONAL HEALER.....F TRADITIONAL BIRTH ATTENDENT....G RELATIVE.....H OTHER_____ X (SPECIFY) NO ONE.....Y (SKIP TO 332)	
329	How many months pregnant were you when you first received antenatal care?	MONTHS..... ☐☐ DK.....98	
330	How many times did you receive antenatal care during this pregnancy?	NO. OF TIMES..... ☐☐ DK.....98	
331	During your antenatal visits, were you ever advised by a health professional that you should deliver (NAME) in hospital?	YES.....1 NO.....2	

F12/E

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP TO
332	Where did you give birth to (NAME)?	HOME YOUR HOME.....11 OTHER HOME.....12 HOSPITAL SUMVE DES. DIST. HOSPITAL.....21 OTHER HOSPITAL.....22 HEALTH CENTRE.....31 DISPENSARY/CLINIC.....41 TRADITIONAL HEALER'S HOME.....51 TRAD. BIRTH ATTENDENT'S HOME.....52 ON WAY TO HOSPITAL/CLINIC.....61 OTHER_____ 96 (SPECIFY)	
333	Who assisted with the delivery of (NAME)? Anyone else? PROBE FOR THE TYPE OF PERSON AND RECORD ALL PERSONS ASSISTING.	HEALTH PROFESSIONAL DOCTOR/MEDICAL ASST.....A RURAL MEDICAL AIDE.....B NURSE/MIDWIFE.....C MCH AIDE.....D OTHER PERSON VILLAGE HEALTH WORKER.....E TRADITIONAL HEALER.....F TRADITIONAL BIRTH ATTENDENT....G RELATIVE.....H OTHER_____ X (SPECIFY) NO ONE.....Y	
334	CHECK 332: DELIVERED IN A HOSPITAL? NO ☐ YES ☐ → (SKIP TO 337)		
335	Did you intend to deliver (NAME) in the hospital?	YES.....1 NO.....2	
336	What was the reason that you did not deliver (NAME) in the hospital? Any other reason? RECORD ALL RESPONSES	TOO FAR AWAY.....A NOT NECESSARY.....B NO TRANSPORT.....C NO CHILDCARE.....D HUSBAND/FAMILY FORBID.....E POOR SERVICES AT HOSPITAL.....F TOO EXPENSIVE.....G DELIVERED ON WAY TO HOSPITAL.....H TBA CAN MANAGE.....I RELATIVES/FRIENDS CAN MANAGE.....J OTHER_____ X (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP TO
337	Around the time of the birth of (NAME), did you have any of the following problems: Long and active labor, that is, did your regular contractions last more than 12 hours? Excessive bleeding that was so much that you feared it was life threatening? A high fever with bad smelling vaginal discharge? Convulsions not caused by fever? Any other serious problems?	YES NO LABOR MORE THAN 12 HOURS.....1 2 EXCESSIVE BLEEDING.....1 2 FEVER/BAD SMELLING VAGINAL DISCHARGE.....1 2 CONVULSIONS.....1 2 ANY OTHER.....1 2	
338	CHECK 337: "YES" TO ANY QUESTION ☐ "NO" TO ALL QUESTIONS ☐ → (SKIP TO 401)		
339	When you experienced that (those) problem(s), were you advised that you should go to hospital?	YES.....1 NO.....2 WAS ALREADY IN HOSPITAL.....3	

SECTION 4. REPRODUCTION OF SISTERS
(one completed for each sister listed in Q.225)

☐☐ OF ☐☐ TOTAL SISTERS

401 CHECK 204: (COLUMN NUMBER) ☐☐ | CHECK 227-229: NAME (Sister) _____ | CHECK 207: AGE (LIVING SISTER) _____ yrs; CHECK 209+210: WOULD-BE AGE (DEAD SISTER) _____ yrs

402 CHECK 206: SISTER STILL ALIVE?
NO, DECEASED ☐ | YES, SURVIVING ☐ → 405

403 Now I would like to ask about the place that (NAME) lived at the time of her death. In what district did (NAME) live at that time?
IF DK DISTRICT PROBE TO OBTAIN THE REGION. IF MWANZA REGION RECORD '18'. IF OUTSIDE MWANZA REGION RECORD '28'
DISTRICT _____ ☐☐
DK.....98

404 Did (NAME) live in a town or in the countryside at the time of her death?
TOWN.....1
COUNTRYSIDE.....2

405 Now I would like to ask about all the births (NAME) has/had ever given birth to (before her death). Has(had) she ever given birth?
YES.....1
NO.....2 → 410

406 Has(did) (NAME) had(have) any sons or daughters who are now alive?
YES.....1
NO.....2 → 410

407 How many of her sons are now alive? SONS ALIVE ☐☐
How many of her daughters are now alive? DAUGHTERS ALIVE ☐☐
IF NONE RECORD '00'.

408 CHECK 206: SISTER STILL ALIVE?
YES, SURVIVING ☐ | NO, DECEASED ☐ → 410

409 How many of her sons are now living with (NAME)? SONS LIVING WITH SISTER ☐☐
How many of her daughters are now living with (NAME)? DAUGHTERS LIVING WITH SISTER ☐☐
IF NONE RECORD '00'.

410 Has (did) (NAME) ever given birth to a boy or a girl who was born alive but later died?
IF NO, PROBE: Any baby who cried or showed signs of life but survived only a few hours or days?
YES.....1
NO.....2 → 412

411 How many of her boys have died? BOYS DEAD ☐☐
And how many of her girls have died? GIRLS DEAD ☐☐
IF NONE RECORD '00'.

412 SUM ANSWERS TO 407 AND 411, AND ENTER TOTAL.
IF NONE RECORD '00'.
TOTAL ☐☐

413 CHECK 412:
Just to make sure that I have this right: (NAME) had in TOTAL _____ births during her life. Is that correct?
YES ☐ | NO ☐ → PROBE AND CORRECT 405-412 AS NECESSARY

414 CHECK 412:
ONE OR MORE BIRTHS ☐ | NO BIRTHS ☐ → GO TO 402 (NEXT SISTER)

415 Now I would like to ask about the place that (NAME) lived when she gave birth for the first time. In what district did (NAME) live?
IF DK DISTRICT PROBE TO OBTAIN THE REGION. IF MWANZA REGION RECORD '18'. IF OUTSIDE MWANZA REGION RECORD '28'
DISTRICT _____ ☐☐
DK.....98

416 Did (NAME) live in a town or in the countryside at the time of her first birth?
TOWN.....1
COUNTRYSIDE.....2

417 Now I would like to talk to you about all of (NAME)'s births, whether still alive or not, starting with the first one she had.
RECORD NAMES OF ALL THE BIRTHS IN 418. RECORD TWINS AND TRIPLETS ON SEPARATE LINES.

418 What name was given to the (first/next) baby? (NAME)	419 Were any of these births twins?	420 Is (NAME) a boy or a girl?	421 In what month and year was (NAME) born? PROBE: What is his/her birthday? OR: In what season was he/she born?	422 Is (NAME) still alive?	423 IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COMPLETED YEARS.	424 IF ALIVE: Who is (NAME) now living with?	425 IF DEAD: How old was (NAME) when he/she died? IF '1 YR.', PROBE: How many months old was (NAME)? RECORD DAYS IF LESS THAN 1 MONTH;MONTHS IF LESS THAN TWO YEARS; OR YEARS.	426 FROM YEAR OF BIRTH OF (NAME) SUBTRACT YEAR OF PREVIOUS BIRTH; IF 4 YRS. OR MORE, ASK: Were there any other live births between the birth of (NAME) and (NAME OF THE PREVIOUS BIRTH)?
01	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO NEXT BIRTH	DAYS....1 MONTHS..2 YEARS...3	
02	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
03	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
04	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
05	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
06	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
07	SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2

	418 What name was given to the (first/next) baby? (NAME)	419 Were any of these births twins?	420 Is (NAME) a boy or a girl?	421 In what month and year was (NAME) born? PROBE: What is his/her birthday? OR: In what season was he/she born?	422 Is (NAME) still alive?	423 IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COMPLETED YEARS.	424 IF ALIVE: Who is (NAME) now living with?	425 IF DEAD: How old was (NAME) when he/she died? IF '1 YR.', PROBE: How many months old was (NAME)? RECORD DAYS IF LESS THAN 1 MONTH; MONTHS IF LESS THAN TWO YEARS; OR YEARS.	426 FROM YEAR OF BIRTH OF (NAME) SUBTRACT YEAR OF PREVIOUS BIRTH; IF 4 YRS. OR MORE, ASK: Were there any other live births between the birth of (NAME) and (NAME OF THE PREVIOUS BIRTH)?
08		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
09		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
10		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
11		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2
12		SING...1 MULT...2	BOY...1 GIRL..2	MONTH.. YEAR...	YES..1 NO...2 → 425	AGE IN YEARS	MOTHER...1 FATHER...2 G'MOTHER.3 OTHER....4 GO TO 426	DAYS....1 MONTHS..2 YEARS...3	YES.....1 NO.....2

427 SUBTRACT YEAR OF LAST BIRTH FROM 1995.
IF 4 YRS. OR MORE, ASK:

SISTER LIVING: Has (NAME) had any live births since the birth of (NAME OF LAST BIRTH)?

SISTER DEAD: Did (NAME) have any live births between the birth of (NAME OF LAST BIRTH) and her death?

YES.....1
NO.....2

428 COMPARE 412 WITH NUMBER OF BIRTHS IN HISTORY ABOVE AND MARK:

NUMBERS ARE SAME ▼

NUMBERS ARE DIFFERENT → (PROBE AND RECONCILE)

CHECK: FOR EACH BIRTH: YEAR OF BIRTH IS RECORDED.

FOR EACH LIVING CHILD: CURRENT AGE IS RECORDED.

FOR EACH DEAD CHILD: AGE AT DEATH IS RECORDED.

FOR AGE AT DEATH 12 MONTHS OR 1 YR.: PROBE TO DETERMINE EXACT NUMBER OF MONTHS.

→ NEXT SISTER OR 501

501	RECORD THE TIME.	HOUR..... ☐☐ MINUTES..... ☐☐
502	RECORD WHETHER OR NOT ALL OR PART OF THE INTERVIEW WAS TRANSLATED BY AN INTERPRETER.	FULLY TRANSLATED.....1 PARTIALLY TRANSLATED.....2 NOT TRANSLATED.....3

INTERVIEWER'S OBSERVATIONS

To be filled in after completing interview

Comments about Respondent: _____

_____

_____

Comments on Specific Questions: _____

_____

_____

Any Other Comments: _____

_____

_____

SUPERVISOR'S OBSERVATIONS

_____

_____

_____

Name of Supervisor: _____ Date: _____

EDITOR'S OBSERVATIONS

_____

_____

_____

Name of Editor: _____ Date: _____