DO WOMEN FORGET THEIR BIRTHS? A STUDY OF MATERNITY HISTORIES IN A RURAL AREA OF SENEGAL (NIAKHAR)

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SUMMARY

Five thousand and sixty-eight maternity histories were recorded among women aged 15-89 years in a rural area of Senegal. The quality of the estimates of fertility, child mortality and perinatal mortality was analysed for consistency. There was no evidence of any major underreporting of births, deaths or still births according to age, even among the oldest women. Estimates were compared with comparable values derived from a longitudinal demographic surveillance system (DSS) in the same area. The age patterns of cumulated fertility and mortality derived from the maternity histories were consistent with those of the DSS. Differences in the levels of fertility and mortality with respect to the longitudinal records could be explained by small differences within the selected villages, by selection biases and by recent trends in demographic parameters. Values of perinatal mortality were also equivalent to those recorded by the DSS. Women did not seem to forget their births to an extent large enough to produce strong biases, even at older ages. However, an analysis of differences by field workers revealed that some 2 per cent of the births and 4 per cent of the deaths may have been omitted, which gives an idea of the potential accuracy of maternity histories for the estimation of fertility and mortality levels.

INTRODUCTION

Birth histories have become increasingly popular for collecting demographic data in places where no reliable vital registration is available. Birth histories are easy to record, they can be done in a single-round survey, and they provide estimates of fertility levels and differentials. When the survival of ever-born children is recorded, the proportion of children already dead to women in a given age group can be converted into the probability of dying for those children—i.e., into the common life table functions $q(1)$, $q(2)$, $q(3)$,

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$q(5)$ etc. (Brass and Coale, 1968; United Nations, 1983). When information on the dates of birth and death of each child is recorded, direct estimates of child mortality can be made, by reconstructing period or cohort mortality from the retrospective data.

Although millions of births have been recorded this way over the past 30 years, not enough attention has been devoted to the quality of data obtained and to the various techniques of interviewing. In particular, it is often found that the average parity of women decreases at older ages, instead of staying constant, and that the proportion of chidren already dead to those women also decreases instead of increasing with maternal age. In other words, retrospective surveys tend to record fewer births and even fewer deaths than have, in fact, occurred. This is usually interpreted as a propensity for women to forget their earliest births, especially those which have ended in an early infant death (United Nations, 1971, p. 157; Selzer, 1973). This effect is so strong in some surveys that only the first few age groups of women are used for the estimates of fertility and mortality, usually from 20 to 35 years. Major recall errors were also found when retrospective data were compared to prospective data collected in multiround surveys (Vallin, 1976; Tabutin, 1981).

On the other hand, researchers working in the field often find that women remember quite clearly all the major events in their life, especially women living in societies with oral traditions where a good memory of events has great value and importance. Since a birth is a major event in a woman's life, it is unlikely that she will totally lose any trace of it in her memory. Hence, alternative explanations need to be proposed to explain the deficit in live births and deaths of children often found in demographic surveys. Survey techniques can be questioned as well as the relationship between the enumerator and the interviewed woman. Young interviewers who are recording birth histories may feel embarrassed asking older women detailed questions about childbirth, and older women may be reluctant to talk in detail about their reproductive lives to young interviewers the age of their children or even grandchildren. In traditional societies, age is often a major criterion for social status.

Several studies on the quality of birth histories have recently been published. Becker, Mahmud and Sarder (1982) and Becker and Mahmud (1984) compared birth histories recorded with a questionnaire similar in content to that of the World Fertility Survey (WFS) with registration data in Matlab, Bangladesh. They find that 2.3 per cent of the live births that occurred during the 16 years prior to the survey were missed when birth histories were recorded. They found little correlation between the quality of the reporting and the mother's education. They showed that the backward method—i.e., from the most recent to the oldest birth—performed better than the forward method—i.e., from the first birth to the last.

In their analysis of tape-recorded interviews, Thompson, Nawab Ali and Casterline (1982) reported difficulties with the recording of pregnancy histories and births, especially with the age of mother and date of birth of the child. They found that in 24 per cent of the cases, the question whether any pregnancy or birth had occurred after the last child reported was not asked, whereas that question was explicitly stated in the questionnaire. In an earlier study,

Potter (1977) discussed missing events in birth histories, although he did not provide quantitative evidence for it. He also recommended the use of the backward method.

The aim of this article is to analyse in detail one case of recording birth histories of women above the age of 15 years, including women aged 80 or more, among the Sereer, a traditional society living in the Sine, Senegal, in the administrative region of Fatick.

DATA AND METHOD

The Office de la recherche scientifique et technique d'outre-mer (ORSTOM), a French research institution, has maintained a demographic surveillance system (DSS) in eight villages of a rural area in Senegal since December 1962 (Cantrelle and Leridon, 1971; Garenne and Cantrelle, 1991). The study area was extended in 1983 to 22 new villages, for research on nutritional status and mortality among children 0-5 years. Prior to further investigations, a census was taken in the extension area, which recorded 17,562 new residents. In addition to the census, maternity histories were recorded for all women born before 1968—i.e., aged 15 years and above. The maternity histories had several purposes: to record the current parity for women and the birth order for resident children, to check whether the extension area had the same fertility and mortality levels and trends as the former area, and to investigate child mortality differentials by place of residence and various socio-economic variables.

The technique of interviewing women was made as simple as possible. On a sheet of paper especially designed for the purpose, enumerators were asked to record all live births to women; for each live birth, the name of the child, the sex and the current residence or survival were recorded on the same line. For children who died before the naming ceremony, which occurs on the seventh day after birth, special mention was made (No Name). Still births and abortions were also researched systematically and recorded in the same way.

There were nine enumerators for this survey, all men. They had at least four years of secondary schooling—one of them, seven years. Four of them had extensive training in doing this type of survey, having worked with ORSTOM for 9-16 years in the same study area. The other five were recruited for this particular survey. After the aims and methods of the survey had been explained, the training was mostly practical. First, each enumerator had to accompany one of the professional enumerators in the field for three consecutive days. They changed companion every half working-day so that each new enumerator had at least half a day's training with each professional enumerator. Then, over the next three days, they practiced the interviews under the supervision of one of the professional enumerators or the principal investigator. They began interviewing by themselves during the second week of the survey. The principal investigator spent at least one half working-day with each of the enumerators during the first week. All but one were of Sereer origin; most of them were born in the study area or had relatives there. This

was of particular importance, for the vocabulary of ethnic groups is very specific and can vary from village to village. The study area was very homogeneous in this respect (96 per cent of residents being Sereer), although two slightly different historical calendars had to be used, in the eastern and western parts of the study area, which are contiguous but belong to two different administrative units (Niakhar and Diarere).

The enumerators were instructed to record birth histories by the backward method—that is, starting with the latest birth, then the previous birth and so on, up to the first live-born child. However, if the women preferred to speak in the opposite order, enumerators were free to question them accordingly. One of the enumerators preferred to follow the forward method, especially with older women. After each report of a live birth, the enumerator had to ask whether there was a previous child and whether he or she was born alive. In addition, a systematic check was made as to whether the mother had had another pregnancy, abortion or still birth between the two events. At the end, when all the births were properly recorded, birth orders were computed by reminding the woman what she had just reported. In some cases, the sequence of births had to be changed when inconsistencies were found.

Age had to be estimated from the mother's report, since only a few people in the study area had birth certificates. Very often, the women were able to provide accurate information which enabled the enumerators to compute their ages. For example, a woman might tell the enumerator that she did not know her age but that she was first married at age 16, that she never divorced and that she had spent nine years with her husband in the current household. In other cases, the women were able to recount an historical event or to locate their age with respect to the age of somebody else. When a first estimate of age was made, it was checked for consistency with the birth history.

After many trials during the pilot study, the following instructions were given to the enumerators to estimate the age of women:

(*a*) If she has a birth certificate, use it;

(*b*) If she knows her age exactly, compute the date of birth;

(*c*) If she knows an event that occurred in the year of her birth, use the historical calendar;

(*d*) If she knows her age at first marriage and the number of years of marriage, compute her age and her date of birth;

(*e*) If she knows only the number of years since her first marriage, use the average age at first marriage (18 years) and proceed as above;

(*f*) If the date of birth of the first-born child is known (he or she was resident), estimate the age of mother at the time of first birth or use 19 years, then compute her date of birth;

(*g*) If she is a high-parity woman and the date of birth of the last child is known (he was resident) and if the birth occurred more than five years ago, use 45 years as the age at last birth;

(*h*) In desperate cases, use either the age of the husband or of somebody else in the family to estimate the date of birth.

Although this lengthy procedure may appear cumbersome, it worked efficiently. Enumerators used mainly the "duration of marriage" procedure. It seemed to be the most appropriate for this particular society. This is also what was found in Bangladesh (Thompson, Nawab Ali and Casterline, 1982). Furthermore, the search on age started an exchange between the enumerator and the woman, which seems to have been important for the subsequent search for births and deaths.

All the questionnaires were checked just after the survey by the principal investigator, usually on the same day. All inconsistencies were sent back to the field, usually at the end of the week. Most of them were corrected by re-interviewing the woman. They usually related to age of the mother, but some also related to missing births or deaths, quite obviously from holes in the maternity history. Questionnaires were sent back if births were reported for a mother younger than 15 or older than 49 years or if intervals of greater than four years were reported between births. In some cases long intervals between births proved to be real and were attributed to temporary sterility. Further checking was performed with a computer after the coding was finished. Some questionnaires were sent back again at that time, weeks after the end of the survey. The last inconsistencies in age were arbitrarily corrected, using the rule that no birth could have occurred outside the interval of 15-49 years of age.

RESULTS

Altogether, 5,068 birth histories were recorded, after 80 cases of "no answer" or "double counting" (women who were enumerated in two different households) were eliminated.

Fertility

Sereer women still have a natural fertility, with a mean parity of 7.4 children ever born to women aged 15-49 (table 1, fig. I). The pattern of increasing parity with age up to age 50, then constant above age 50, appeared consistent with the expected pattern. In particular, there was no evidence of declining parity with age, even among women aged 80 or more. A precise comparison of the cohort parity was made with the cumulated period fertility expected from age-specific fertility rates recorded in the demographic surveillance system in the eight villages from 1963 to 1982. There was no evidence that parity recorded in the maternity histories was underestimated, even above age 50 when random fluctuations were taken into account. The average parity of women above age 50 was 7.33 children ever born, which was 3 per cent higher than the expected value of 7.11 of the period total fertility rate (TFR) in the DSS. The difference between the two estimates was even significant at the $P=0.007$ level. The fact that the average parity was slightly higher than the TFR can be attributed to selection biases: women who survive and stay in the study area may be slightly more fertile than the average resident population. Sterile women may be more likely to out-migrate and women with poor health status more likely to die and have lower fertility at the same time. There was

TABLE 1. COMPARISON OF MEAN PARITY BY AGE OF MOTHER FROM MATERNITY HISTORIES RECORDED IN THE EXTENSION AREA (TOUCAR-DIOHINE, 1983) WITH CUMULATED FERTILITY FROM THE DEMOGRAPHIC SURVEILLANCE SYSTEM (NGAYOKHEME, 1963-1982)

	Maternity histories (1983)				*DSS (1963-1982)*	
Age of mother (years)	*Number of women*	*Children ever born*	*Mean parity*	*Standard error*	*Mean cumulated fertility*	*Ratio parity/ cumulated fertility*
15-19 . .	721	216	0.30	0.021	0.48	0.63
20-24 . .	760	1 322	1.74	0.045	1.68	1.04
25-29 . .	649	2 138	3.29	0.060	3.23	1.02
30-34 . .	430	2 202	5.12	0.091	4.72	1.09
35-39 . .	379	2 451	6.47	0.119	5.91	1.09
40-44 . .	394	2 854	7.24	0.141	6.65	1.09
45-49 . .	354	2 629	7.43	0.166	6.99	1.06
50-54 . .	343	2 538	7.40	0.183	7.11	1.04
55-59 . .	285	2 194	7.70	0.169	7.11	1.08
60-64 . .	223	1 602	7.18	0.201	7.11	1.01
65-69 . .	182	1 289	7.08	0.244	7.11	1.00
70-74 . .	145	1 038	7.16	0.246	7.11	1.01
75-79 . .	112.	775	6.92	0.266	7.11	0.97
80+ . . .	91	688	7.56	0.361	7.11	1.06
TOTAL	5 068	23 936	4.72	0.050	4.52	1.05

virtually no difference in fertility between women of 15 and 30 years, ages at which selection biases were likely to be negligible. Differences above age 30 were small (3.5 per cent), and in any case there was no evidence of any important underestimation of live births, whatever the age of the mother. This indicates that Sereer women do not forget their live births to a significant extent and that, when properly conducted, birth histories can lead to valuable estimates of fertility, even for older women.

Mortality

Mortality was high among the offspring of these women: at age 45-49, women had lost 43.1 per cent of their live-born children (table 2, fig. II). The average proportion of children dead to women in given age groups had an expected pattern of increasing values with age, with a plateau between ages 35 and 55, which corresponds to the low mortality between ages 10 and 29 for children and a new rise after age 60. The curve determined by the proportion of children dead was compared to the $q(x)$ functions of the period life table derived from the demographic surveillance system, in the eight villages from 1963 to 1981. The $q(x)$ function was properly interpolated to match the exact age ($\hat{a}$) at which the proportion of children dead (D_i) corresponds to the equivalent value in the life table: $q(\hat{a})$. Computations were done by applying the standard formulae of the Brass method to the observed age-specific fertility and mortality rates in the DSS. Here again, the pattern of the proportion dead followed the pattern of the life-table function. This indicates that older women did not have a propensity to forget deaths to a large extent, and even women above age 80 reported a number of deaths among their children ever born close to the expected value.

Figure I. Comparison of mean parity with expected cumulated fertility
(Niakhar, 1983)

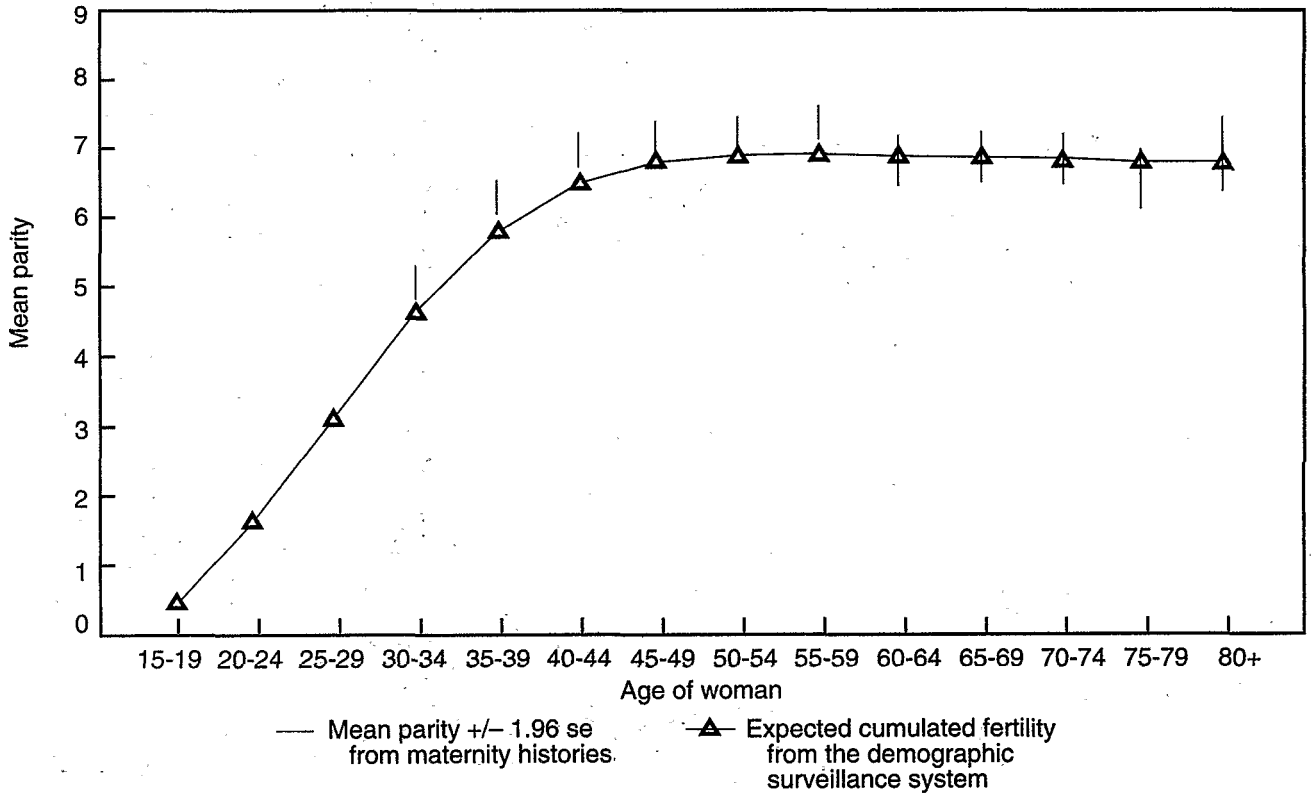

TABLE 2. COMPARISON OF MEAN PROPORTION OF CHILDREN DEAD BY AGE OF MOTHER FROM MATERNITY HISTORIES RECORDED IN EXTENSION AREA (TOUCAR-DIOHINE, 1983) WITH CUMULATED MORTALITY FROM THE DEMOGRAPHIC SURVEILLANCE SYSTEM (NGAYOKHEME, 1963-1982)

Age of mother (years)	*Maternity histories (1983)*				*DSS (1963-1982)*		*Ratio proportion dead/ cumulated probability of death*
	Number of children	*Number who died*	*Proportion dead/1,000*	*Standard error*	*Cumulated probability of death*	*Age to apply*	
15-19 . .	216	32	148	24.2	203	1.2	0.73
20-24 . .	1 322	340	257	12.0	309	2.2	0.83
25-29 . .	2 138	612	286	9.8	370	3.1	0.77
30-34 . .	2 202	783	356	10.2	404	4.0	0.88
35-39 . .	2 451	941	384	9.8	431	5.8	0.89
40-44 . .	2 854	1 179	413	9.2	454	9.6	0.91
45-49 . .	2 629	1 134	431	9.7	477	18.0	0.90
50-54 . .	2 538	1 129	445	9.9	497	24.2	0.90
55-59 . .	2 194	1 000	456	10.6	514	29.1	0.89
60-64 . .	1 602	745	465	12.5	533	34.1	0.87
65-69 . .	1 289	699	542	13.9	554	38.7	0.98
70-74 . .	1 038	505	487	15.5	576	43.9	0.84
75-79 . .	775	413	533	17.9	601	49.7	0.89
80+ . . .	688	397	577	18.8	649	57.3	0.89
TOTAL	23 936	9 909	414	3.2	468		0.88

The mean value of the proportions dead in the maternity histories was consistently lower than the expected value of the life table. There can be many reasons for this difference. First, data collected later revealed that there was a small difference in mortality between the former area and the extension area. The mortality of the eight villages was 3 per cent higher than the mortality of the 22 villages between 1983 and 1989 (difference not significant). Secondly and more important, there was evidence of consistent and marked mortality decline during the 1963-1982 period in the eight villages of Ngayokheme (Garenne and Cantrelle, 1991). In this context where child mortality has been reduced by more than one third, with most of the decline concentrated in the 10 years prior to 1983, accurate comparisons between period and cohort mortality are extremely difficult. Thirdly, there may also be selection biases operating: mothers who were at higher risk of mortality were more likely to have lost their children and less likely to be resident in 1983. Therefore, the 1983 sample may have induced a selection of lower-risk women. In any case, there was no evidence of any major differential underestimation with the age of the mother, and here lies the important point. Above age 30, the ratio of observed to expected values remained consistently around 0.90—that is, a 10-per-cent lower mortality in maternity histories in comparison with the 1963-1982 life table.

Another control for evaluating to what extent women properly reported early deaths was performed by computing the proportion of births that have ended in a death prior to the naming ceremony. This ratio is equivalent to the "early neonatal mortality rate"—i.e., the probability of dying between 0 and 1 week. Results are shown in table 3. Here again, despite random fluctuations,

Figure II. Comparison of mean proportion dead with life-table values
(Niakhar, 1983)

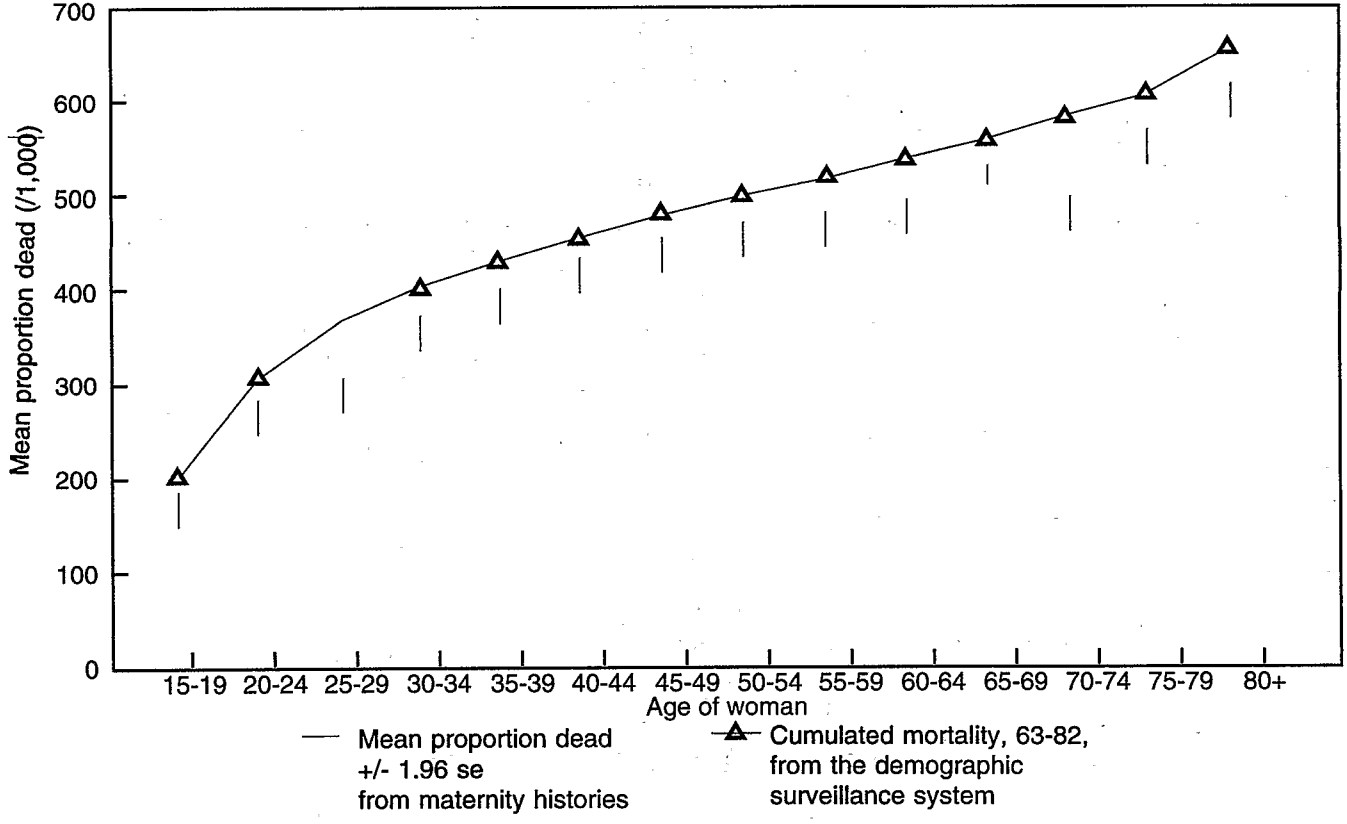

TABLE 3. MEAN PROPORTION OF EARLY NEONATAL DEATHS AND OF STILL BIRTHS BY AGE OF MOTHER, FROM MATERNITY HISTORIES RECORDED IN EXTENSION AREA (TOUCAR-DIOHINE, 1983)

Age of mother (years)	*Number of children ever born*	*Number who died before naming*	*Proportion early neonatal/ 1,000*	*Standard error*	*Number of still births*	*Proportion still births/ 1,000*	*Standard error*
15-19 . . .	216	6	28	11.2	15	69	17.3
20-24 . .	1 322	45	34	5.0	78	59	6.5
25-29 . .	2 136	59	28	3.5	94	44	4.4
30-34 . .	2 202	73	33	3.8	90	41	4.2
35-39 . .	2 451	82	33	3.6	107	44	4.1
40-44 . .	2 854	89	31	3.3	111	39	3.6
45-49 . . .	2 629	84	32	3.4	119	45	4.1
50-54 . .	2 538	87	34	3.6	112	44	4.1
55-59 . . .	2 194	75	34	3.9	91	41	4.3
60-64 . .	1 602	40	25	3.9	59	37	4.7
65-69 . .	1 289	42	33	4.9	52	40	5.5
70-74 . .	1 038	26	25	4.9	36	35	5.7
75-79 . .	775	27	35	6.6	36	46	7.6
80+ . . .	688	36	52	8.5	29	42	7.7
TOTAL	23 934	771	32.2	1.1	1 029	43.0	1.3

there was no evidence that older women reported fewer early neonatal deaths than younger women. The rate was 31.3/1,000 among women less than 45 years old and 32.8 among women above age 45, the difference being not statistically significant at the 0.05 level. Similarly, the still-birth rate, defined as the number of reported still births per live birth, was as high among older women as it was among younger ones (43.0/1,000). The level of perinatal mortality was also consistent with that reported by the demographic surveillance system: during the 1983-1989 period, early neonatal mortality was estimated to be 31.9/1,000, which is virtually identical to the 32.2/1,000 found in the maternity histories. Comparison of the still-birth rates was more difficult, since there was no attempt to record the duration of pregnancy in the maternity histories. However, the reported value of 43.0/1,000 was again consistent with the estimate of 43.2/1,000 for still births of the third trimester recorded in the 30 villages over the 1983-1989 period.

This indicates that valuable estimates of mortality levels can be obtained from women of all ages in traditional societies. In the present study, older women did not seem to forget births or deaths to a larger extent than did younger ones.

DISCUSSION

Data collected in tropical Africa are known to be "imperfect". There is much evidence that birth histories recorded in Niakhar also show some of the defects common to most demographic data. At the individual level, checking conducted after the end of the survey or for other purposes has revealed that some births or deaths were missing in certain birth histories. For instance,

TABLE 4. AGE-STANDARDIZED PROPORTION OF CHILDREN DEAD, BY ENUMERATOR, FROM MATERNITY HISTORIES RECORDED IN THE EXTENSION AREA (TOUCAR-DIOHINE, 1983)

Enumerator number	*Number of births*	*Age-standardized proportion dead*	*Standard deviation*	*Ratio enumerator (1+2+3)*
1	3 982	0.444	0.008	1.03
2	4 254	0.424	0.008	0.98
3	1 989	0.421	0.011	0.98
4	2 963	0.405	0.009	0.94[a]
5	2 030	0.400	0.011	0.93[a]
6	2 926	0.399	0.009	0.93[a]
7	3 175	0.397	0.009	0.92[a]
8	917	0.392	0.016	0.91[a]
9	1 700	0.390	0.012	0.90[a]
TOTAL	23 936	0.414	0.003	0.96[a]

[a] $P < 0.05$

in the case of a woman registered in two different compounds during the first census (she had moved between the time of the survey in the first village and the time of the survey in the second village), a difference of one birth between the two recorded birth histories was noticed. However, individual discrepancies did not seem to affect the estimates of fertility at the aggregate level.

Another way to investigate possible misreporting in birth histories is to compare the results by enumerator. For each of the nine enumerators, an age-standardized proportion of children dead was computed by taking the mean age distribution of women. The age-standardized proportion of children dead varied significantly by enumerator (table 4); for example, enumerator number 9 recorded on the average 11 per cent fewer deaths than the three best enumerators (numbers 1, 2, 3). Although differences were small and despite the high consistency in the data, this result suggests that probably 4 per cent of deaths and 2 per cent of the corresponding live births were missing. But at an aggregate level, this can be considered as an acceptable degree of accuracy for demographic data, even in developed countries.

It is difficult to evaluate the reasons behind the differences in the enumerators' reports. Differences were not closely associated with individual cleverness, although a small correlation existed. What seemed to be more important was the relationship between the enumerator and the interviewed woman. Number 1 was, by far, the most polite enumerator of the team, the most careful and respectful when talking with older women, the one who made the greatest effort to explain why the survey was important and why women should do their best to report births and deaths correctly. On the other hand, number 9 was the least at ease with adults and was the youngest on the team.

A major determinant of the quality of the data seems to be the relationship between the enumerator and the interviewee. The fact that the enumerators were male rather than female did not seem to be a handicap in the Sereer society. However, this situation may be peculiar to West Africa, where relationships between the sexes are rather open.

The quality of the recording of birth histories is of particular importance in evaluating the levels and trends of mortality in children in developing countries. Birth histories have been used recently for evaluating child survival interventions (Becker, Diop and Thornton, forthcoming). Research to improve the quality of birth histories in developing countries is a worthwhile pursuit. The selection of enumerators, their training in interviewing techniques, systematic checking of their work, and a formal post-enumeration survey could be done more systematically in the future.

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Explanatory notes

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The term "billion" signifies a thousand million.

Annual rates of growth or change refer to annual compound rates, unless otherwise stated.

A hyphen between years (e.g., 1984-1985) indicates the full period involved, including the beginning and end years; a slash (e.g., 1984/85) indicates a financial year, school year or crop year.

A point (.) is used to indicate decimals.

The following symbols have been used in the tables:

Two dots (. .) indicate that data are not available or are not separately reported.

A dash (—) indicates that the amount is nil or negligible.

A hyphen (-) indicates that the item is not applicable.

A minus sign (−) before a number indicates a deficit or decrease, except as indicated.

Details and percentages in tables do not necessarily add to totals because of rounding.

PREFACE

The purpose of the *Population Bulletin of the United Nations*, as stipulated by the Population Commission, is to publish population studies carried out by the United Nations, its specialized agencies and other organizations with a view to promoting scientific understanding of population questions. The studies are expected to provide a global perspective of demographic issues and to weigh the direct and indirect implications of population policy. The *Bulletin* is intended to be useful to Governments, international organizations, research and training institutions and other bodies that deal with questions relating to population and development.

The *Bulletin* is prepared by the Population Division of the Department of International Economic and Social Affairs of the United Nations Secretariat and published semi-annually in three languages—English, French and Spanish. Copies are distributed widely to users in all States Members of the United Nations.

Although the primary source of the material appearing in the *Bulletin* is the research carried out by the United Nations Secretariat, officials of governmental and non-governmental organizations and individual scholars are occasionally invited to contribute articles.