THE RECENT DEMOGRAPHIC SURVEYSIN MALI AND THEIR MAIN FINDINGS

by

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THE RECENT DEMOGRAPHIC SURVEYS IN MALI AND THEIR MAIN FINDINGS

Introduction

The series of single round demographic surveys conducted in central Mali during 1981-2 by a team from the London School of Hygiene and Tropical Medicine have yielded a good deal of new information about the recent fertility and mortality levels of the main ethnic groups living in two ecologically very different zones of central Mali. Whilst the data are not nationally representative, they provide some valuable insights into the demography of an important part of the rural population of Mali and can be seen as an important addition to our knowledge of demographic trends since the 1956-8 surveys of the Niger inner delta or the 1960 national demographic survey. For some purposes, the data may be used in conjunction with the 1976 census results which unfortunately do not contain data on the lifetime fertility or mortality experience of adults or of children.

This paper is a summary of the main results of the 1981-2 surveys in a non-technical format. The aim is to display the principal contrasts in the demography of the three ethnic groups surveyed and the differences between the two areas in which the samples were chosen. Technical details of the surveys and their analysis are presented elsewhere. Other papers discuss the contrasts in mortality and fertility within the groups.

The surveys

The methodology used to collect the data is described in some detail by Hill, Randall and Sullivan (1982). Briefly, each survey consisted of an

interview for every head of a residential unit (defined differently for each ethnic group) followed by a separate interview with every woman aged 15-54 who was normally resident in the household. In the household interview, all the retrospective questions on children everborne and surviving, orphanhood and widowhood were included. For the women, the core of the interview was a full birth history which included full details of lifetime experience of all births and child deaths, including year and season of occurence. In this paper, the data are taken largely from the household interview data and have been analysed using indirect estimation techniques. More detailed direct estimates are expected when the analysis of the birth histories is completed.

The ethnic groups and areas surveyed

The survey programme began with a fairly full coverage of the Bambara villagers living in the arrondissements of Doura and Monnimpé on either side of the Canal du Sahel south of Niono and west of the Niger inner delta (Figure 1). In this semi-arid savanna zone, the main economic activity is cultivation of rain-fed cereals, principally millet. The villages vary widely in size but as far as possible, those within easy reach of the Office du Niger zone of irrigated, commercial agriculture were excluded from the survey. The Tamasheq (or Twareg) surveyed in the dry season were located either in the Niger inner delta or in the great bend of the Niger west of Gao known as the Gurma. The Tamasheq are herders of cattle and goats and to a lesser extent camels. They live in tents and move in camps of varying composition and size in a wide area, their location depending on the season and the rainfall. The delta Tamasheq are exeptional as far as the rest of the group are concerned in that they are able to use shallow ponds or lakes to water their animals in all seasons rather than having

to draw water from great depths as in the Gurma. They generally move out of the delta in the wet season. The Fulani in the survey were concentrated either in the Niger inner delta near Tenenkou or in the dry, Sahelian zone east of Mopti known as the Séno-Mango. Again, the contrast in life-style between the same ethnic group in the two areas is very striking. In the delta, the Fulani rely as always on their animals but the cultivation of flood rice by their erstwhile agricultural dependents is an important activity. In the Séno-Mango, rice cultivation is impossible and the main activity is livestock rearing with some cultivation of rain-fed cereal crops, mostly millet. The Gurma and the Séno-Mango are very similar in their physical geography although the Fulani prefer to live in straw huts or mud houses rather than the leather, cloth or matting tents of the Tamasheq. The Fulani of the Séno-Mango migrate en masse in the dry season but in the delta, it tends to be herd boys and young men who leave the family home in the dry season with the animals in search of water and grazing.

RESULTS

Numbers interviewed

As far as possible, we tried to cover about 5000-6000 individuals in each stratum for which we wanted separate demographic estimates. These numbers are dictated by the demands of the analysis techniques and the need to keep the standard errors of the estimates small. Ideally, larger samples would have been desirable but we had neither the time nor the financial resources for larger surveys. Table 1 summarizes the basic information about the size of each of the surveys. Although the number of women who were interviewed with the full birth history questionnaire falls below 1000 in one case, we feel numbers are sufficiently large to give

reasonable secure estimates for each of the strata shown on Table 1. Naturally, the quality of the data has a great deal to do with the reliability of the results and a feature of all the surveys is the inaccuracy of age reporting. In some cases, event calendars were used to improve dating of past events but in many cases when the respondents really had a very poor idea of the year in question, the event calendars produced their own pattern of misreporting because of the importance of certain reference years, such as the year of full Malian independence (1960). Cross-checking of the reports from women and from household heads reporting on the same events provided a valuable field check on the accuracy of reporting. The reporting of the total number of events (births and child deaths) seems to us fairly accurate for this reason, but ignorance of exact age proved an insurmountable problem in many cases. Reporting of the season of occurence of events was much more accurate than reporting of the calendar year of the event - a not unexpected finding given the marked contrast in climate and economic and social activities between seasons.

The populations surveyed were not homogenous even within the same zone. In the Bambara sample, the villages in the Monnimpé arrondissement were larger and richer because of their more southerly location, hence slightly heavier rainfall, and their proximity to the large commercial irrigated schemes close to the river Niger. The Fulani are differentiated into social status groups consisting of erstwhile nobles, called Fulbé here, and their former agricultural dependents, known in Mali as Rimaïbé. Since the numbers were too small for separate analysis, no attempt was made to collect data on the Fulani castes. The Twareg of both zones, the Delta and the Gurma, are similarly stratified although the stratification takes slightly different forms in the two areas. Here, we distinguish only the

so-called "free" Tamasheq consisting of the warrior, vassal, "Muslim believers" or blacksmith classes, and their former slaves known as Iklan or Bella. From Table 2, we see the numbers in each social class. For some sub-groups, a separate demographic analysis is difficult because of small number problems.

Mortality

Time and time again, attempts to ask directly about recent deaths in a survey have proved unrewarding because of the unreliability of the answers. Generally, good recording of vital events cannot be expected until a full registration system has been in operation for a number of years. This is clearly out of the question for some time in rural Mali so that we have to resort to indirect measures of mortality for the present.

The simplest indirect measures of child mortality, first of all, are the reports on children everborne and surviving, tabulated by age of mother. The proportions of all children dead, for women in the reproductive ages, are shown in Table 3. Overall, we obtain the impression of a high level of child mortality; at least 40 per cent of the children of older women are dead in all the populations surveyed. The child mortality experience of the delta Fulani stands out even from this high overall level and this is clearly a feature worth further detailed investigation. Interestingly, some data on the nutritional status of children collected by researchers for Fulani in the delta and in the Séno-Mango indicate much better levels of feeding in the delta compared with the Séno-Mango. Thus, the causes of the exceptionally high child mortality of the delta Fulani must be sought in other factors such as the ecological conditions of the delta with their greater opportunities for infection. The child mortality of the delta Twareg, however, who spend the dry season in the same area as

the Fulani of the delta but move out in the rainy season, is very much lower (cf. cols. 2 and 4 of Table 3).

A slight sophistication can be introduced into the examination of child mortality from retrospective reports on child survivorship by converting the proportions dead of children everborne into life table measures of mortality. The advantages of this step are that populations with different mean ages of child bearing can be directly compared and that the measures derived are reasonably standardized which facilitates comparison with data from other countries. Here, the Brass weighting procedure has been used throughout and the child mortality values located by extrapolation in the General Standard life table (see Brass, et al. 1968, for full details.)

On Table 4, the probabilities of dying before the first ($_1q_0$) and the fifth ($_5q_0$) birthdays are shown as rates per 1000. The upper panel can be considered as an estimate of the conventional infant mortality rate. Some irregularities are usually anticipated from the reports on child survival by younger women, both because of the small number of births and child deaths to these women, and because of selection effects. Women who marry and have children earlier than average normally experience exceptional child mortality levels. With this in mind, we can see that the infant and child mortality levels indicated on Table 4 are quite uniform when some allowance is made for age errors and some omissions. Roughly speaking, a quarter of babies die before their first birthday and a third die before their fifth birthday. Again, the delta Fulani stand out even from this high level with a third dying before age 1 and almost a half dying before their fifth birthday.

Since the reports by older women refer to mortality experience which is increasingly remote from the survey data we can estimate approximate

calendar dates to which each of the child mortality estimates by age of mother refer. In this way, we can look for major trends, upwards or downwards, in child mortality as well as searching for periods in the past when child mortality was markedly different from the general level. The results of these calculations are shown on Figure 2. In summary, there appear to be very few signs of a pronounced improvement in child mortality in the populations surveyed during the preceding 15 year period. There may be a suggestion of the effect of the 1973 drought on the child mortality of that period on Figure 2. More significantly, comparison with the data for the delta populations dating from the 1956-58 Mission indicates almost no improvement in child mortality over this longer period and possibly some worsening for the delta populations (see Hill, Randall and Sullivan, 1982, Figure 14).

The mortality levels of adults are probably more difficult to measure accurately than those for children both because there are fewer deaths to record and because a large proportion of the parents of adults will themselves be dead and therefore unable to answer questions about their surviving and dead children. Without doubt, parents will normally provide the best information about the survival of their children than any other of the children's relatives. To obtain some indication of the levels of adult mortality in the survey, we asked all respondents about the survival of their mothers and fathers, and all married men and women were asked about the survival of their first husbands or wives. Our data on widowhood have unfortunately proved an unreliable guide to mortality levels for several fairly obvious reasons. In a society with rather high levels of marital instability due to frequent divorce or high levels of widowhood, partners not in their first marriage can easily lose track of their first husband or wife. In addition, we suspect that some respondents preferred

to tell us that their first marriage had ended in widowhood rather than divorce since this seemed a more socially acceptable response. Finally, polygamy certainly complicates the picture since second wives are promoted to the position of first wives if the first dies.

The orphanhood data, however, appear to give more reliable results, as can be seen on Table 5. There, the measure of mortality used is the expectancy of life in years beyond the fifteenth birthday, $\overset{\circ}{e}_{15}$, a life table measure of survival which is independent of the level of child mortality. The estimation method itself is not without its difficulties since a model life table has to be employed (here the General Standard life table used for the child mortality estimates above) and parameters such as the mean age of fathers at the birth of their children have to be indirectly derived. Nonetheless, the consistency of the results shown on Table 5 is most encouraging, given that our expectation is to find no marked change in adult mortality in the pre-survey period.

The results themselves are not simple to interpret. On the one hand, the adult mortality of the Gurma Twareg appear to be much worse than for the other populations, including the Fulani of the Séno-Mango, who live under broadly comparable ecological conditions. Indeed, the Fulani of the Séno-Mango appear to have the best adult mortality of all the groups. Between the Bambara and the Fulani of the delta, there is little to choose in terms of adult mortality levels, but the delta Twareg adults may be worse off than the delta Fulani and the Bambara. It is difficult to generalize further about adult mortality levels across the five sample populations since the indirect estimation techniques which have perforce been used, do not yield an age-specific set of adult mortality rates. The age pattern of mortality in a population tells us more about possible

causes of death than any other single piece of demographic information. All we can say is that the lack of a clear trend in the life expectancies from age 15 shown on Table 5 shows that now major improvements in adult mortality have taken place in the pre-survey period. Recently, Brass and Bamgboye (1981) have shown how the estimates of adult mortality derived from respondents of different ages can be dated with reasonable accuracy. As with child mortality, the reports from younger men and women are closer to the survey in time; on average, the figures on Table 5 for the central ages of respondents refer to a point in time 10-15 years before the interview.

From the child mortality estimates shown on Table 4 and the adult mortality levels indicated on Table 5, it is technically possible to produce a complete hybrid life table for each population. One possibility would be to use the logit life table system in conjunction with some standard life table and to join the two parts (estimated independently for adults and children) using the two- or four- parameter models (see Zaba, 1979, for details). These results are not presented here but what comparison of the data on Tables 4 and 5 with any model life table system indicates, is that in all the samples, the mortality levels of adults are very much better than those for children. This is the usual finding for most of West Africa but there are differences between the groups in the degree to which child mortality is worse than the corresponding level of adult mortality in the model life table chosen for comparison. This is a complicated topic which will need fuller exploration elsewhere.

Fertility

Once again, the simplest measure of fertility in the populations surveyed is provided by the reports on the total number of children everborne alive.

These reports, especially by older women, are often an underestimate of fertility because some births are not reported. Dead children and grown-up children living away from home are the most likely to be overlooked. In our data, omissions of this kind appear to have been minimized because we were able to check the cumulated totals of children everborne against the more detailed information available in the birth histories. For this reason, the commonly observed tendency for the reported average numbers of children everborne amongst older women to decline rather than to increase with age does not appear to be a feature of our data.

If we accept the reported numbers of children everborne as a good guide to fertility levels in the pre-survey period, then it is clear from Table 6 that there are sizeable differences in fertility between the groups and the areas covered. The differences between the completed fertility of Bambara versus Twareg women is almost 2½ children. Interestingly, the Fulani both of the delta and of the Séno-Mango have a fertility level intermediate between the other two groups but closer to the Twareg. The data on Table 6 certainly confirm our expectations concerning the higher fertility of farmers relative to pastoralists or agro-pastoralists.

To obtain some indication of the age pattern of current fertility, the data on children everborne can be combined with the reports on children born in the 12 month period before each survey to give corrected age-specific period fertility rates for each group and area. These results are shown on Table 7. The general magnitude of the differentials remains about the same as judged either from the total fertility rates (roughly equivalent to the average number of children born to women at the end of their child-bearing age span) or from the crude birth rates. For the Bambara and the Fulani of both areas, the mean age of child-bearing occurs earlier

than for the Twareg and this is undoubtedly due to the different age patterns of marriage. As Winter and Randall show in an accompanying paper, the Bambara marry early and within a narrow age range so that by age 25, almost every Bambara woman is married. In both the Fulani and the Twareg groups, marriage is not only later and less universal but takes place over a much broader range of ages. The high age-specific fertility rates for older Bambara women are also attributable to differences between the marriage patterns. In both the Twareg and the Fulani groups, high widowhood and divorce rates produce a sizeable pool of women who are not living with a man in a sexual union at any given moment. The Bambara, by contrast, ensure that older widows or divorced women, whether pre-menopausal or not, are quickly re-allocated to new husbands.

Given the importance of marriage in the determination of fertility levels, it is worth calculating marital fertility by age for the study populations. These data are shown on Table 8. There, we see a narrowing of the fertility differentials seen on Tables 6 and 7 and some re-arrangement of the groups in terms of fertility levels. Although the results are an attempt to standardize for the effect of different patterns of marriage on fertility, in fact there are some aspects of the marriage patterns which are not included in the simple calculations of marital fertility. First, amongst the Bambara and the low status Twareg, young women are sometimes pregnant at marriage and extra-marital births are not unknown. Secondly, the Twareg tend to be monogamous as do the Fulani of the Séno-Mango but elsewhere, a proportion of the marriages are polygamous. Finally, Bambara couples probably spend proportionately more of their married life together than do the other groups. In both Fulani and

Twareg society, herd-boys and young men generally tend to be away with the animals or on business connected with animals whereas the only periods when Bambara couples are separated occur during the dry season when wives will often return to their parents for visits or to give birth.

The marital fertility rates of all the groups are quite high overall, indicating little widespread difficulty with physiological sterility although there are indications in the birth history data that many women are forced to stop having children at an early age after having had one or two, despite remaining married to the same husband. This points to some secondary sterility arising from complications during delivery of previous children but there is no general evidence that sterility is above the average levels found in most human populations. The low marital fertility of the Fulani of the Séno-Mango and the high marital fertility of the delta Twareg (Table 8) is perplexing but the magnitude of the differences indicates that they are real rather than being purely an artifact of imperfect reporting.

In an attempt to standardize for some of the factors connected to marriage referred to above, the average numbers of children everborne to women currently married and in their first marriage at interview have been calculated. The data, taken from the women's interviews rather than from the household questionnaire, are shown on Table 9. These figures are higher than the parities for all women shown on Table 6. The differences between the two series of parities on Tables 6 and 9 are attributable to contrasts in the age and pace of entry into first marriage, to breakdowns in marriage due to widowhood and divorce, and to periods when the couple are separated for any reason. To facilitate comparison between the two tables, the ratios of the parities of all women aged 40-49 from Table 6

to the parities of the currently married in their first marriage in the same age group have been calculated and added to Table 9, last line. Interestingly, for both the Bambara and the two delta groups, Fulani and Twareg, the ratios are about the same indicating that the net effects of marriage or rather non-marriage are of about the same order in all three cases. These are certainly the three most "stable" populations in the sense that a substantial part of the population lives in one village for most of the year cultivating rice or millet. In the drier zone east of Mopti, the Séno-Mango and the Gurma, pastoralism is the dominant economic activity and this inevitably means the temporary separation of some household members at certain times of the year.

In a non-contracepting population, differences in the level of fertility within marriage are largely attributable to the length of the period between births. Henry (1953,1957) identified four factors which are responsible for the varying length of inter-birth intervals:

a. the post-partum infecundable period which is composed of two parts, the period of approximately 1.5 months of amenorrhoea experienced by every woman after the birth of a child, and an additional period which varies widely in duration depending on the intensity and duration of breast-feeding. According to McNeilly (1978), if suckling consists of at least five episodes and the child is at the breast for about 65 minutes in total per 24 hour period, then the mother is likely to remain infecund, possibly indefinitely.

b. the waiting time to conception which follows the return of the mother to the fecund state. The length of this period is mostly affected by coital frequency since the fertile period itself is not much longer than 48 hours within each menstrual cycle. Thus, a couple experiencing only 2 coital acts per menstrual cycle will have about 22 months to wait to

conceive even after the mother has passed beyond the post-partum infertile period. The normal waiting time to conception of between 5 and 10 months is associated with coital rates of between 4 and 11 per inter-menstrum (Bongaarts, 1982).

c. intra-uterine mortality which results in the premature termination of a significant number of pregnancies. Malaria, the pelvic inflammatory diseases and the venereal diseases can increase the wastage rate of pregnancies.

d. permanent sterility which can be a result of a variety of factors including complications during a previous delivery (secondary sterility).

In our surveys, only one of these four factors could be measured and that was the length of the period of post-partum amenorrhoea. Technically, amenorrhoea is not a perfect indicator of infecundability; indeed, some mothers become pregnant a second time without seeing an intervening menses. However, we could only ask about menstruation in the surveys. We also asked about duration of breast-feeding but this single question is an unsatisfactory way to measure the impact of breast-feeding on amenorrhoea. In a large survey it is difficult to obtain details on the frequency and intensity with which the infant is fed at the breast. Nonetheless, since the question was asked in the same way across all the samples, the mean or median durations of breast-feeding may provide some general indications about differences in infant feeding practices in the study populations.

On Table 10, some mean or median durations of post-partum amenorrhoea and of full breast-feeding are presented. In general, the length of breast-feeding seems to be remarkably constant across all five samples, averaging just over 20 months. This is in good general correspondence with the often quoted rule of 24 months; some respondents added that

this was the practice advocated by Islam. It is the Fulani of both areas who appear to breast-feed for a little longer than the average but the differences are not great, given the bunched nature of the original reports. The means and medians on Table 10 have been calculated from the proportions of women still amenorrhoeic or still breast-feeding tabulated by months since the last live birth. Inevitably, the months since the last live birth are not known with a great deal of accuracy although for the calculation, we have truncated the distributions at 24 months.

To express the effect of marriage and breast-feeding on fertility in a more quantitative way, the indices of these two intermediate fertility variables have been calculated following the methods recommended by John Bongaarts (1978). The index of non-marriage, C_m, and the index of lactational infecundability, C_i, are shown on Table 11. By far the easiest way of considering the indices is to regard $1-C_m$ or $1-C_i$ as the percentage reduction in potential fertility attributable to that factor. Hence, as we have already seen, marriage only reduces potential fertility by about 9 per cent amongst the Bambara, compared to about 35 per cent amongst both groups of Twareg (see line 2, Table 11). The effect of prolonged breast-feeding on fertility amongst the Fulani is clear; from Table 11, line 4, we see that breast-feeding durations of over 22 months produce a 40 per cent reduction in potential fertility, all other things being equal. Even for the Bambara and the Gurma Twareg, the effect of breast-feeding on fertility is pronounced, with a reduction of over 30 per cent attributable to this factor alone. The indices are a crude measure of fertility behaviour but they do allow us to make simple comparisons across populations and to anticipate the fertility outcome if marriage or breast-feeding habits change. Many of the complexities are omitted from the

scheme developed by Bongaarts, such as interaction between the variables such as breast-feeding and contraceptive use, but some new work by Hobcraft and Little (1982) circumvents some of these problems by allowing the calculation of the indices of the intermediate fertility variables at the level of the individual women. Further analysis of the birth history data along these lines is anticipated.

Conclusion

This brief summary of the findings from the five populations in central Mali surveyed in 1981-82 is sufficient to warn us against broad generalization about the demography of the populations of the Sahel without further knowledge. Two points emerge; one is that the very different life style of the different ethnic groups comprising the national population of any Sahelian country are likely to have characteristic patterns of mortality and fertility even though the physical environment may be roughly comparable between the groups. Secondly, the effect of a particular set of ecological factors, such as are found in the inner delta of the Niger in central Mali, can have a powerful effect on the mortality and possibly on the fertility of all groups despite their distinctive life style.

For the future, we obviously need the kind of data collected in central Mali during 1981-2 for most of the Sahelian populations, whose demography is extremely badly described by existing statistical sources. One of our strongest recommendations is that every future census or major survey in the Sahel should ask the centrally important demographic questions on children everborne and surviving, births in the 12 months preceding the survey or census, and the questions on orphanhood. These are reasonably straightforward questions to pose and to answer, although the most difficult part of the enquiry will always be the estimation of the age

of the respondent.

On a totally different level, we see the need for more detailed investigations of marriage, child care, patterns of illness and so on for selected villages and camps throughout the Sahelian countries. The comparative approach has much to recommend it and ideally, some sort of standardized approach would be most productive. In an investigation of the factors affecting fertility and mortality in a detailed way, it is probably unrealistic to expect investigators from different backgrounds working in different field situations to adopt identical approaches, but some loose co-ordination seems to us highly desirable. Perhaps the Sahel Institute is the organization best placed to initiate some comparative work on say, marriage and fertility on the one hand, and the causes of heavy child losses, on the other, in different communities of the Sahelian countries.

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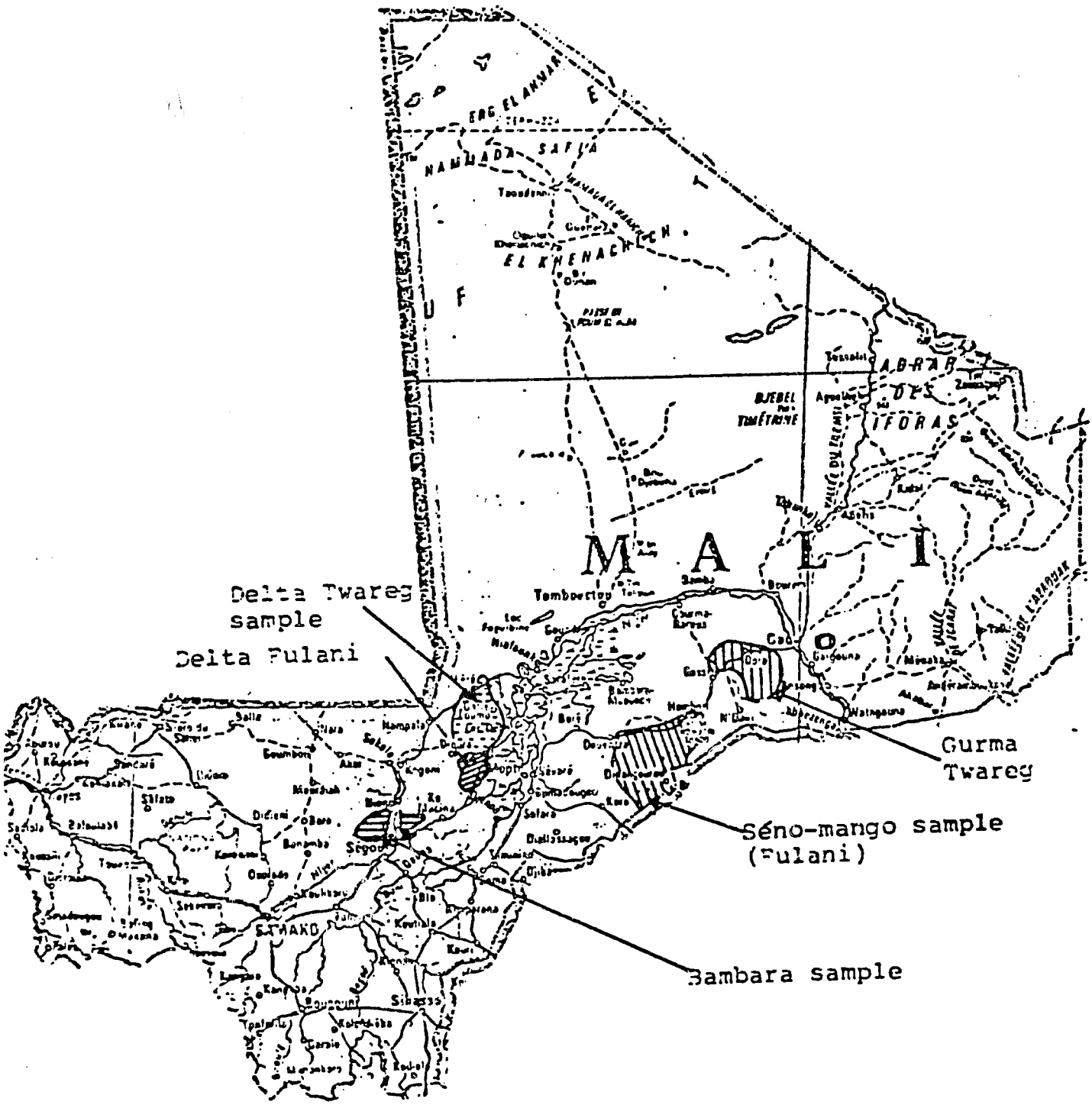
FIGURE 1: MAP OF MALI SHOWING THE AREAS INCLUDED IN THE 1981-82 DEMOGRAPHIC SURVEYS



Scale of map : 1 cm. = 100 km.

FIGURE 2: CHILDHOOD MORTALITY ESTIMATES ($_5q_0$) FOR EACH ETHNIC GROUP FROM THE 1981-2 SURVEYS

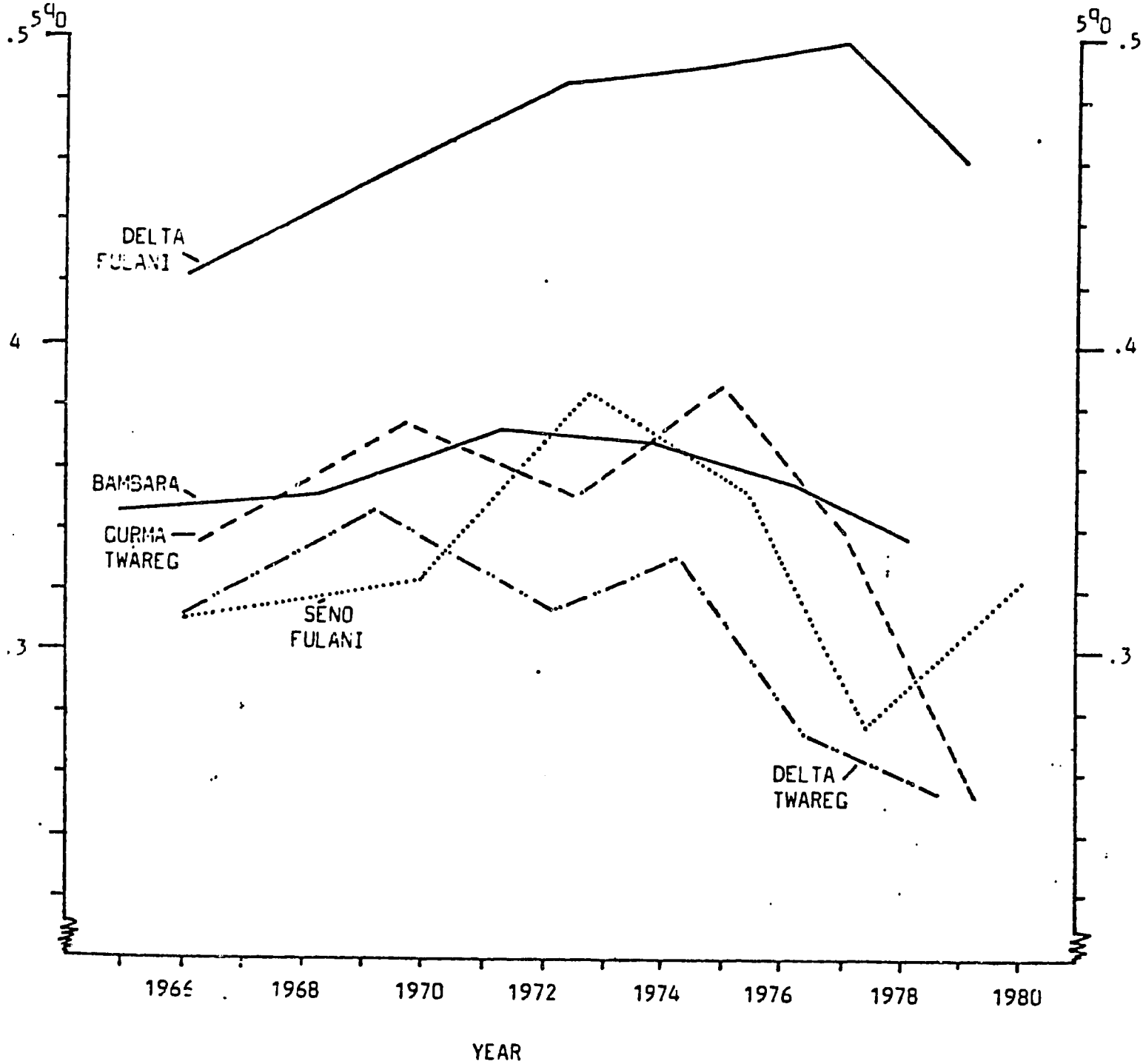


TABLE 1: THE COMMUNITIES SURVEYED IN MALI DURING 1981-2 BY ETHNIC GROUP AND ZONE

	BAMBARA	FULANI		TWAREG	
		DELTA	SÉNO	DELTA	GURMA
HOUSEHOLD QUESTIONNAIRE:					
TOTAL INTERVIEWED =	10159	6447	5684	6128	6523
OF WHICH, MEN =	4975	3267	2912	3029	3032
WOMEN =	5184	3180	2772	3099	3491
CHILDREN 0-14 AS A PER CENT OR THE TOTAL POPULATION =	45	35	41	42	42
WOMEN'S QUESTIONNAIRE:					
TOTAL WOMEN 15-54 INTERVIEWED =	1815	1329	951	1289	1505
TOTAL BIRTHS* REPORTED BY THESE WOMEN =	7805	4851	3522	3463	4270

* Includes live births, still births and abortions.

TABLE 2: THE COMMUNITIES SURVEYED BY ETHNIC SUB-GROUP AND ZONE

NIONO-SEGOU SAVANNA	NIGER INNER DELTA	SÉNO-MANGO GURMA STEPPE
BAMBARA	FULANI	FULANI
(N = 10159)	(N = 6447)	(N = 5684)
OF WHICH:	OF WHICH:	OF WHICH:
MONNIMPÉ	FULBÉ	FULBÉ
(N = 3262)	(N = 2693)	(N = 4151)
DOURA	RIMAÏBÉ	RIMAÏBÉ
(N = 6897)	(N =3754)	(N = 1533)
	TWAREG	TWAREG
	(N = 6128)	(N =6523)
	OF WHICH:	OF WHICH:
	ILLELAN	ILLELAN
	(N = 3514)	(N = 3648)
	IKLAN	IKLAN
	(N = 2614)	(N = 2875)

TABLE 3: PROPORTIONS (%) DEAD OF TOTAL CHILDREN BORNE ALIVE BY MOTHER'S AGE, ETHNIC GROUP AND ZONE

AGE OF MOTHER	BAMBARA	FULANI		TWAREG	
		DELTA	SÉNO	DELTA	GURMA
	(1)	(2)	(3)	(4)	(5)
15-19	12.6	40.2	25.7	23.2	20.3
20-24	28.1	41.7	24.8	21.6	21.8
25-29	32.3	48.6	25.6	25.4	32.2
30-34	33.7	50.1	33.5	33.7	39.2
35-39	37.8	51.8	40.6	33.8	37.6
40-44	40.7	52.2	36.9	38.5	43.5
45-49	44.2	51.5	38.8	38.6	41.7

Source: Household interview

TABLE 4: LIFE TABLE MEASURES OF CHILD MORTALITY BY ETHNIC GROUP AND ZONE

AGE OF RESPONDENTS	BAMBARA	FULANI		TWAREG	
		DELTA	SÉNO	DELTA	GURMA
		A). $1000._1q_0$			
15-19	153	367	248	220	187
20-24	229	336	196	168	167
25-29	245	370	181	180	230
30-34	256	363	228	225	270
35-39	258	359	269	212	240
40-44	242	333	219	235	263
45-49	237	301	213	211	228
		B). $1000._5q_0$			
15-19	235	496	359	325	281
20-24	336	462	293	255	254
25-29	356	499	274	272	337
30-34	369	492	334	330	386
35-39	371	487	384	314	350
40-44	351	459	323	344	378
45-49	346	423	315	312	334

Source: Household interview

TABLE 5: ADULT MORTALITY MEASURES ESTIMATED FROM REPORTS ON ORPHANHOOD BY ETHNIC GROUP AND ZONE

AGE OF RESPONDENTS	BAMBARA		FULANI				TWAREG			
			DELTA		SÉNO		DELTA		GURMA	
	M	F	M	F	M	F	M	F	M	F
					$_{o}e_{15}$					
5-9	46	48					43	44	33	33
10-14	44	46					42	45	30	32
15-19	44	45					42	44	32	35
20-24	43	46	43	44	50	49	43	43	30	36
25-29	43	46	40	41	47	46	40	41	29	34
30-34	40	44	40	44	44	48	38	38	31	36
35-39	48	45	38	42	44	48	34	39		35
40-44	38	45	39	44	47	48	48	38		35
45-49	46	45	35	43	43	49	47	43		
50-54				44		49				
55-59				44		52				
MEAN	44	46	39	43	46	49	42	42	31	34

Source: Household interviews, using reports on orphanhood from respondents of both sexes.

TABLE 6: AVERAGE NUMBER OF CHILDREN BORN ALIVE BY AGE AND ETHNIC GROUP OF WOMEN AND ZONE

	BAMBARA	FULANI		TWAREG	
AGE GROUP		DELTA	SÉNO	DELTA	GURMA
15-19	0.31	0.32	0.28	0.26	0.32
20-24	1.90	1.69	1.49	1.28	1.45
25-29	3.35	3.05	2.96	2.49	2.66
30-34	5.31	4.26	4.42	3.97	3.56
35-39	6.21	5.33	5.37	4.63	4.03
40-44	7.06	5.59	5.35	5.22	4.79
45-49	7.56	6.29	6.46	5.20	5.28
TOTAL NUMBER OF WOMEN 15-49	2288	1630	1234	1412	1691

Source: 1981-2 surveys, household questionnaire.

TABLE 7: AGE SPECIFIC FERTILITY ESTIMATED BY THE P/F RATIO METHOD, BY ETHNIC GROUP AND ZONE

(Rates per 1000 women)

	BAMBARA	FULANI		TWAREG	
AGE GROUP		DELTA	SÉNO	DELTA	GURMA
15-19	183	141	168	117	154
20-24	351	334	282	228	263
25-29	323	306	274	282	254
30-34	271	234	258	268	171
35-39	303	205	187	221	107
40-44	130	115	93	117	64
45-49	61	68	48	72	47
ADJUSTED TOTAL FERTILITY RATE	8.1	7.0	6.6	6.5	5.3
CRUDE BIRTH RATE (PER 1000)	57	55	45	49	47

Source: 1981-2 surveys, household questionnaire

TABLE 8: MARITAL FERTILITY BY AGE, ETHNIC GROUP AND ZONE

AGE OF WOMEN	BAMBARA	DELTA	SÉNO	DELTA	GURMA
15-19	.309	.418	.299	.351	.348
20-24	.373	.379	.323	.357	.361
25-29	.327	.312	.291	.396	.335
30-34	.272	.244	.275	.333	.230
35-39	.305	.219	.200	.305	.160
40-44	.136	.128	.104	.149	.116
45-49	.064	.073	.055	.123	.088
TOTAL MARITAL FERTILITY RATE	8.9	8.9	7.7	10.1	8.2

TABLE 9: AVERAGE NUMBER OF CHILDREN BORN TO CURRENTLY MARRIED WOMEN IN THEIR FIRST MARRIAGE WITH THEIR HUSBAND PRESENT, BY AGE AND ETHNIC GROUP

	BAMBARA	FULANI		TWAREG	
AGE GROUP		DELTA	SÉNO	DELTA	GURMA
15-19	0.7	0.9	0.4	0.5	0.7
20-24	2.0	1.9	1.5	1.7	1.7
25-29	3.7	3.2	3.4	3.2	2.9
30-34	5.8	4.8	4.6	4.4	4.0
35-39	6.7	5.4	6.1	5.9	4.9
40-44	8.1	6.5	5.8	6.3	5.6
45-49	8.4	6.6	7.9	5.0	6.2
RATIO OF PARITIES OF 40-49 YEAR OLDS FROM TABLE 6 TO THOSE OF 40-49 YEAR OLDS ABOVE	.89	.91	.86	.92	.85

Source: 1981-2 surveys, women's questionnaire.

TABLE 10: COMPONENTS OF THE INDICES OF THE INTERMEDIATE FERTILITY VARIABLES BY ETHNIC GROUP AND ZONE

	BAMBARA	FULANI		TWAREG	
		DELTA	SÉNO	DELTA	GURMA
% OF WOMEN 15-49 CURRENTLY MARRIED	90	81	84	73	64
MEDIAN LENGTH OF BREAST FEEDING (MONTHS)	18.5	21.3	22.5	19.4	20.4
MEAN LENGTH OF POST-PARTUM AMENORRHOEA (MONTHS)	11.5	15.3	17.5	12.3	10.0

Source: 1981-2 surveys, household and women's questionnaires.

TABLE 11: ESTIMATES OF THE INDICES OF THE INTERMEDIATE FERTILITY VARIABLES BY ETHNIC GROUP AND ZONE

	BAMBARA	FULANI		TWAREG	
		DELTA	SÉNO	DELTA	GURMA
ESTIMATED TOTAL FERTILITY RATE	8.1	7.0	6.6	6.5	5.3
C_m	.91	.79	.86	.64	.65
TOTAL MARITAL FERTILITY RATE	8.9	8.9	7.7	10.1	8.2
C_i	.67	.59	.56	.65	.70
TOTAL NATURAL MARITAL FERTILITY RATE	13.3	15.1	13.7	15.5	11.7

Notes: (1) Total fertility was calculated from the birth histories using Brass's P/F correction.
(2) The proportions married were taken from the household questionnaire.
(3) The index of post-partum infecundability, C_i, was calculated using the proportions amenorrhoeic since last birth.