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Demographic Trends in Sub-Saharan Africa

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DEMOGRAPHIC TRENDS IN SUB-SAHARAN AFRICA

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ABSTRACT

The study of demographic trends in sub-Saharan Africa though crucial in the assessment of the impact of population size and growth on the overall socio-economic development in the region, has received the least attention due to lack of reliable data for most of the countries. This paper focuses on the utilization of available data secured through population censuses and demographic surveys particularly the World Fertility Survey to ascertain trends in fertility and mortality. The estimates derived from the above sources should be interpreted with caution since they suffer from diverse deficiencies in the data base particularly coverage, content and consistency. It is apparent, though debatable, from the available estimates that fertility has increased in some countries--Kenya and Cameroon; has remained almost stable in Benin, Ivory Coast and Lesotho; and has slightly declined in Ghana. The underlying factors with regard to the apparent increase hinge on the improvement in the socio-economic indicators i.e education and health services; relaxation of traditional controls i.e breastfeeding and post-partum abstinence; and a reduction in the level of sterility. As far as trends in mortality are concerned, the estimates posit a decline in both infant and child mortality in Kenya, Benin and Ivory Coast; infant mortality in Cameroon; and child mortality in North Sudan and Senegal. Overall mortality levels are high in Western and Central Africa and low in Eastern and Southern Africa.

Introduction

The measurement of trends in fertility and mortality normally entails the availability of data on vital events and on the population at risk at several points in time. When that is available, it also requires a high degree of consistency in the way specific demographic variables have been measured during the period under study. The basic requirements that would allow an accurate assessment of trends have not been satisfied in sub-Saharan Africa. None of the countries in the region possesses a vital registration system with even minimal claim to completeness and accuracy. Where there are several censuses or demographic surveys, the variations in their content, coverage and quality are such that it has been almost never possible to get a full set of comparable demographic measures at several points in time. In the best of cases, the estimates are not timely, and they do not provide evidence on short-term fluctuations.

The absence of data has never prevented international agencies specializing in the compilation and publication of yearly estimates from producing conventional demographic indices for all the countries listed in their tables. For Africa, the fertility estimates are timeless, and the reference dates given in the tables are fictional. In all but a few countries, the estimates are derived from one old census or survey, the dubious accuracy of which has been tempered by the accumulated wisdom of several cohorts of estimators. As the latter have been trained in the same schools, use the same methods, and often work in

close contact, the fertility estimates are as reliable as possible. Their extrapolation to the date appearing in the heading of the table is predicated on the widely accepted view that fertility does not change much over time in sub-saharan Africa. This means, in passing, that we "know" fertility trends for an overwhelming majority of African countries only to the extent that we can legitimately assume that they are unchanging. The assessment of mortality levels and trends is much more haphazard. Two different analysts who must estimate the crude death rate or the expectation of life at birth in Guinea as of 1980, for example, on the basis of an isolated demographic survey taken in 1954-55, are not likely to reach the same result.

The main objective of this paper is to integrate estimates generated by various sources particularly the United Nations, World Bank, Population Reference Bureau, World Fertility Survey program (WFS) and reports by national institutions to ascertain trends in fertility and mortality. The recent data collected through WFS constitute the backbone of the data utilized in this analysis. The paper starts with a review of the estimates generated by the above agencies and highlights the basic assumptions that have been deployed. This is followed by detailed investigation of the trends in fertility and mortality. As far as trends in proximate determinants of fertility are concerned the discussion has been limited to sterility and age at marriage. Other proximate determinants i.e polygyny, breastfeeding and post-partum abstinence which are of crucial importance in

sub-Saharan Africa are not discussed in greater detail due to lack of time series data as well as an inbuilt problem of disentangling their effects from age and other cohort changes. The section on mortality focuses mainly on infant and child mortality. The estimation of mortality in childhood has benefited greatly from indirect techniques which utilize data on child survival collected in cross-sectional studies and accord a specification of a time period to which the estimates refer.

The paper therefore, consolidates estimates from various sources into a comprehensive scenario on trends. It also gives a critical appraisal of the assumptions and techniques that have been utilized in the estimation of fertility and mortality. The ultimate conclusion emerging from the results presented in this paper is that sub-Saharan Africa deserves special consideration as far as the generation of reliable time series data is concerned. Hence the estimates presented in this paper constitute an initial endeavour in our relentless pursuit of coming to grips with the demographic evolution in the region.

Review of Existing Estimates

Table 1 illustrates, for seven countries, the procedures involved in the computation of yearly estimates. The upper part of the Table gives the crude birth rate, and the lower part the crude death rate, at two different dates, according to various estimates. The very first column gives the estimates derived in The Demography of Tropical Africa (Brass et al., 1968) or their update by Adegbola (1977), using methods of indirect estimation which have since become standard in the field. The U.N. estimates, extracted from the Demographic Yearbook are, in four cases out of seven based on the same data. For Kenya and Ghana, several censuses have been used over time. The drop of the birth rate in Burundi originates in the use of another source, a new survey. The precision suggested by the decimal points, is probably a concession to national pride. The two estimates by the World Bank, given in the same volume of the World Report (1982) exhibit unexplainable, but minor "trends". The World Population Data Sheet (Population Reference Bureau, 1982) from which the last column borrows its rates, states in small print that its estimates for various years "should not be used as a time series". Changes in data from year to year often reflect improved and revised estimates incorporated in successive editions."

The indices in the lower half of Table 1 illustrate, more than anything else, the belief that the trend in mortality should always be downwards. Since increased mortality could be inter-

preted as an indictment of the government, the natural bent of
 estimating agencies is to steadily raise the expectation of
 life. The U.N., in a review of Levels and Trends of Mortality
since 1950 (New York 1982) schizophrenically admits the diffi-
 culty. The authors note that most estimates of mortality in
 Africa rely on indirect estimation. "In these circumstances, the
 measurement of trends is particularly difficult." (91) The most
 usable estimates pertain only to a narrow range of ages, and must
 be supplemented by models to yield more general measures such as
 the expectation of life at birth. Even so, "estimates for two
 points in time are available for only six countries...and only
 four of the six pairs of estimates display credible trends." (92)
 As we shall see below, this assessment is excessively pessimis-
 tic. The recent publication of WFS data has provided new points
 on the trend lines.

The comparison of independent estimates made at different
 points in time is not, however, the only method available to
 ascertain trends in fertility and mortality. Two other
 techniques can be applied with caution. The first is based on
 the careful reconstitution of the past fertility history of
 individuals. Provided memory can be trusted, it is possible to
 go back in time and investigate the earlier fertility performance
 of women, so as to compare it, period by period, to that of the
 present. A similar logic suggests looking at the survival of
 infants and young children during successive periods before the
 survey. A second series of techniques relies on age-specific

Table 1
Crude Birth Rates and Crude Death Rates According
to Various Sources - Selected Countries

	D.T.A.	U.N.	World Bank	P.R.B.		
		1965-70	1975-80	1960	1980	1982
a) Crude Birth Rate						
Benin	49	50.9	48.8	51	49	49
Burundi	46	48.1	42.0	46	47	45
Ghana	46	46.6	48.4	49	48	48
Guinea	46	47.2	46.1	47	46	46
Kenya	50	47.8	50.8	52	51	53
Upper Volta	49	49.4	47.8	49	48	48
Zaire	45	44.4	46.2	48	46	46
b) Crude Death Rate						
Benin	33	25.5	19.1	27	18	19
Burundi	22	25.2	20.4	27	22	22
Ghana	-	17.8	17.2	24	17	17
Guinea	37	25.1	20.7	30	20	21
Kenya	-	17.5	12.4	24	13	14
Upper Volta	36	29.1	22.1	27	24	22
Zaire	26	22.7	18.7	24	18	19

Sources:

D.T.A.: Brass et al., 1968; Adegbola, 1977

U.N.: United Nations, 1970 and 1980

World Bank: 1982

PRB: Population Reference Bureau, 1982

data on stocks to infer past demographic levels on the basis of fundamental relations between time and age. Thus past cumulated fertility by cohort is deduced from average parity by age, and past mortality from the mean number of children dead by age of the mothers. These two approaches can be refined by separately considering the various components of the phenomena studied (e.g. the evolution by age of the proximate determinants of fertility) or the trends in independent variables that are known to affect them. Furthermore, a great deal of confirmatory evidence can be gained from comparisons over time of the same cohorts in more than one data source. In the next sections we shall successively apply these general principles to the study of fertility and mortality. The emphasis is laid on recent WFS data, as the study of trends has been built in their methodology.

Fertility Trends

In a number of countries, several independent censuses or surveys have allowed the measurement of fertility at different dates. The results have presented the analysts with an intellectual dilemma: should they accept the differences in levels as indications of change, or treat the estimates as different and imperfect readings of the same underlying reality, to be reconciled by assuming improvement (or deterioration) of the data collection? The dilemma is by no means easy to resolve. The quality of the information is never such that the existence of a trend in the fertility measures can be affirmed without risk of error. Most demographers would probably accept a

view that is anathema to anthropologists and sociologists:

unless there are strong proofs to the contrary it is best to assume the constancy of levels over time, as fertility in Africa is largely natural i.e. not subject to volitional control. The assumption of stability is tantamount to shifting the burden of the proof on those who claim there has been change.

Despite the general usefulness of the assumption of stability as a first approximation, there are good reasons to believe that fertility may change, either up or down, and there is a special interest in monitoring such changes. Even though the prevalence of contraception is not likely to have affected the birth rate, many countries at a similar stage of development in other continents have experienced drastic changes in nuptiality. This would tend to reduce fertility. An important hypothesis in the literature posits that the first stages of modernization often witness a rise in fertility, either because they lead to abandon traditional behavior in the areas of breastfeeding or post-partum abstinence, or because sanitation or medicine reduces the incidence of sterility. (Nag, 1980)

The hypothesis of a rise in fertility has received attention in several African countries. The most complete series of total fertility estimates is for Kenya (First Report, 1980):

1962 Census

- Direct 5.3

- Adjusted 6.8

1969 Census

- Direct 6.6

- Adjusted 7.6

1977 NDS

- Direct 7.7

1977/78 KFS

- Adjusted 8.1

- Direct 8.1

The report suggests that the trend "should not be accepted at face value" and that although each estimate represents the best that can be obtained from unreliable data for specific dates, the picture of trends deserves no confidence.

In Cameroon, on the contrary, the apparent rise in fertility revealed by successive estimates is thought to reflect a real trend. Total fertility measured in successive surveys and in the census is believed to have risen sharply (Cameroon, 1983, 73):

1964	4.9	(estimate)
1976	6.0	(adjusted using the 1976 Census)
1978	6.5	(direct)

The rise is explained by "better preventive health linked to the more developed socio-cultural level and the progressive disappearance of post-partum sexual taboos". (75)

It would seem in general that the better quality of the WFS resulted in higher estimates than were usually accepted before. This is true in Ghana (a total fertility estimated at 6.31 for the Ghana fertility survey compared to the 5.92 derived from the 1971 Supplementary Enquiry); in Senegal (7.15 in the 1978 SFS against 6.44 in the National Demographic Survey of 1970-71); and in the early results from Benin and Mauritania. One must turn to additional evidence to isolate the effect of better reporting from that of genuine change.

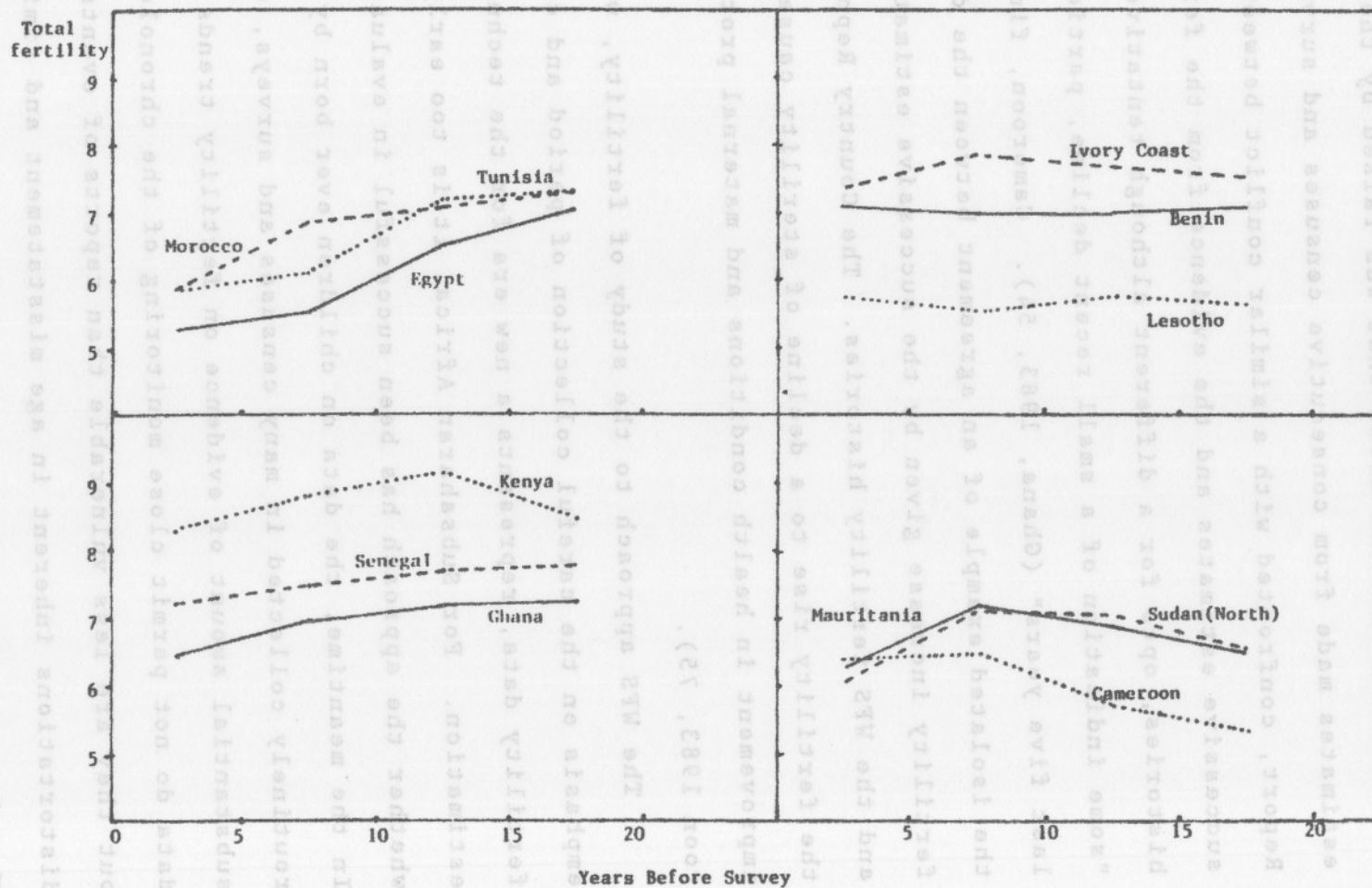
Figure 1 presents total fertility rates for various periods before the survey. These were reconstituted from fertility

histories collected in the WFS. For comparative purposes, other African countries which are not sub-Saharan (Morocco, Tunisia and Egypt) or whose geographical attribution is disputed (Mauritania and North Sudan) are also considered. The three north African countries exhibit a pattern of fertility decline, i.e. the computed total fertility rates become higher as one goes back in time. At least some of the decline may be genuine. The pattern appears also, however, for Senegal and Ghana; and in the three most recent periods, for Kenya. Since these three countries are not usually considered to be undergoing a fertility transition, this deserves careful scrutiny. J.E. Potter (1977) has shown how event misplacement may introduce systematic bias into estimates of fertility change, leading to suggest a pattern of fertility decline where none existed. Inversely, event misplacement may under certain circumstance simulate an increase in fertility.

Three African countries in Figure 1, Cameroon, Mauritania and North Sudan, exhibit an increase in fertility, whereas three more, Benin, Ghana and Ivory Coast show not clear trends in the calculated series of total fertility rates.

The Country Reports have examined the issue of fertility decline or increase on the basis of this evidence. The Kenya Report comes out openly in favor of event misplacement to account for the pattern. "The impression of an increase in fertility up until the mid-1960's, followed by a decline is almost certainly a reflection of errors rather than genuine trends (Kenya 1980, 91). According to the Report, "the important issue" remains that

Figure 1. Total Fertility in Periods Before the Survey
Selected WFS



of knowing "whether any increase in fertility in Kenya has taken place." This is the issue that was raised by the independent estimates made from consecutive censuses and surveys. The Ghana Report, confronted with a similar conflict between the trend in successive estimates and the evidence from the fertility histories, opts for a different although tentative conclusion: "some indication of a small recent decline, particularly in the last five years" (Ghana, 1983, 54). Cameroon, finally, offers the isolated example of an agreement between the diagnosis of fertility increase given by the successive estimates over time, and the WFS fertility histories. The Country Report attributes the fertility rise to a decline of sterility caused by an improvement in health conditions and maternal protection (Cameroon 1983, 75).

The WFS approach to the study of fertility, with its emphasis on the careful collection of period and cohort-specific fertility data, represents a new era for the techniques of estimation. For Sub-Saharan Africa, it is too early to judge whether the approach has been successful in evaluating trends. In the meantime, the data on children ever born by age of mother, routinely collected in many censuses and surveys, can provide a substantial amount of evidence on fertility trends. These stock data do not permit close monitoring of the chronology of changes, but they are less vulnerable than reports of events to the distortations inherent in age misstatement and timing errors. They have their own biases in the form of progressive omissions

with age, and must be treated with caution. They gain credence from consistency with similar data in other sources.

Another stock measure of fertility, the proportion of women with no child borne alive, may be less vulnerable to errors of recall, as it is fixed earlier in the life of women who have a first child, if at all, by their twenties in most instances.

Table 2 gives for selected regions, the percentage of ever-married women who had no live birth according to the Cameroon Fertility Survey. If these figures can be interpreted as a fossil record of the evolution of sterility by cohort, then it is clear that a spectacular decline has taken place. In most of the regions selected, the proportion childless is already smaller for women between 25 and 34 than for those who have reached the end of their childbearing years. Unfortunately there

Table 2: Percentage of ever-married women with no live-born child by age, Selected regions of Cameroon in 1978

	Centre- Sud	Est	Nord	Nord- Ouest	Sud- Ouest	Whole Country
15-24	27.7	32.0	30.0	25.7	20.8	27.7
25-34	9.6	10.2	16.3	3.4	6.3	10.3
35-44	15.8	11.8	17.0	3.5	2.3	11.1
45-54	28.1	18.3	28.7	6.2	0.0	19.0
Total	19.7	18.6	21.9	9.9	9.7	16.7

Source: Cameroon, 1983, p.81

may be a bias in the selection of women to be interviewed in the last age-group. We are warned that "age-misreporting may have happened more often for the more fertile women in order to decrease the interviewers' workload." (Vaessen 1984,7)

Instructive comparisons by cohort are occasionally possible when two data sources are available. Unfortunately this is not often the case with WFS data, since these surveys now constitute the most recent available evidence, and they are restricted to women in the childbearing ages. In Kenya, it is interesting to compare the experience of women enumerated as 30-34 in the 1962 censuses, and as 35-39 in the 1969 census, with that of the 45-49 in the Kenya Fertility Survey of 1977/78. (They do not strictly belong to the same cohort, but are close enough.)

	Children ever born	Proportion with 0 live births
30-34 in 1962 census	4.77	7
35-39 in 1969 census	6.00	4
45-49 in KFS	7.88	3

The increase in cumulated fertility between women in their thirties and their forties is somewhat implausible. It is possible that the apparent decline in sterility between 1962 and 1969 can be accounted for at least in part by the inclusion of non-responses as childless women in the census. This is a type of error that not infrequently affects the proportions with 0 live births, and it seems to account also, for example, for some

of the recorded increase in fertility between the Demographic Survey of 1964-65 and the National Fertility Survey of 1981 in Mauritania.

The drop in sterility that is invoked for Cameroon should show up conclusively from cohort-wise comparisons in successive data sets, if these were available. But as most Censuses in French-speaking Africa, the enumeration of 1976 omitted the question on children ever born. Several demographic surveys were taken in various regions of Cameroon between 1960 and 1964, but the territorial units of that time are not easily comparable with those of the Cameroon Fertility survey. As far as a superficial observer can judge, the survey of Centre and Est in 1962 covered roughly those regions called Centre-Sud and Est in 1978; Nord had the same name in both the 1964 demographic survey and the SFS; and Cameroun Occidental in 1964 coincided with the area covered by Nord-Ouest and Sud-Ouest. If this is correct, then

Table 3: Percentage of women with no live births by age, Demographic surveys of the sixties.

	Centre and Est 1962	Nord 1964	Occidental 1964
14-19	70	67	55.8
20-24	30	27	10.1
25-29	29	21	7.1
30-34		20	6.3
35-39	33	18	8.0
40-44		15	7.4
45-49	29	15	7.0
50-54		15	6.9
55-59	24	14	6.2
60-64		12	6.4
65-69	16	10	6.2
70+		11	10.1

Source: Cameroon, 1968

the data in Table 2 and Table 3 can be compared to some extent. We should not ask too much of the comparison, but the record is consistent with the thesis of a substantial decline of sterility.

Infertility in Africa has attracted a substantial amount of interest; and there is scattered evidence that the conditions that caused it may have declined since the 1960's. (Retel-Laurentin, 1979; Frank 1983). For Zaire, a comparison between the results of the 1955-58 Demographic Survey and the 1975-76 Demographic Survey in Western Zaire (EDOZA), demonstrates convincingly that sterility has gone down, and fertility up, in the regions that were most afflicted (Tabutin, 1978; Romaniuk, 1980). More light could have been shed on this question if questions on children ever born had regularly been asked in censuses and surveys throughout sub-Saharan Africa.

The WFS approach has been characterized by an attempt to decompose fertility into its proximate determinants. A look at the changes in these proximate determinants by age of the mother may provide yet another way to analyze temporal changes, if we can assume that the reports by age reflect a modification of the behavior of successive cohorts. One primary candidate for causing fertility changes is the age at marriage. In principle, if women in successive age groups were able to report faithfully on their age at marriage, it would be possible to identify trends in that variable which has proven an important factor in fertility changes elsewhere in the world. In Africa, however, it is a priori unlikely that women who do not know their ages, are

going to report accurately on their age at marriage. Figure 2 shows the evolution of mean age at first union reported by women by age. The clear slope of the curve in North Africa is probably the result of a rise in the age at marriage which is well documented for these countries. In sub-Saharan Africa, the absence of clear trend is explained either by the stability of marriage customs over time, or by the strength of norms about the age at which a woman should marry, even if actual behavior is different. That the latter may be the case is suggested by Figure 3, which plots the reported age at marriage for women aged 25 to 29, against the singulate mean age at marriage. Since the latter index reflects contemporary behavior more closely in populations where women marry at an early age, it is not surprising that the points for Egypt, Morocco and Tunisia are falling far from the 45 degree line; the distance is reflecting the change in behavior in recent years. But it is difficult to account for the position of the points in other countries that report little past changes in age at marriage. We are more likely to learn about changes in nuptiality from successive censuses and surveys than from retrospective reports.

Other proximate determinants whose change might be reflected by age-differential are the length of breastfeeding and the length of postpartum abstinence. The former variable is difficult to use in this way, because nursing is linked to age in ways that are difficult to disentangle from the cohort change. "What appears to happen is that younger women abandon

breastfeeding earlier than older women because of intervening pregnancies rather than differences in normative breastfeeding durations." (Smith and Ferry, 1983, 16). The duration of postpartum abstinence in general increases with women's ages. This is quite possibly a cohort effect. The effect on fertility deserves to be investigated. But recall problems are likely to be important, and it is not implausible that older women tend to rely on norms about what the duration of abstinence should be to supplement their failing memories.

Mortality

To study mortality trends, one disposes of fewer pieces of evidence, in time or space, than to study fertility. Paradoxically the information has produced more plausible results, perhaps because the problems of estimation have proven more amenable to elegant analytical solutions. As a process, mortality has proven considerably less messy than fertility. The data collected routinely in censuses and surveys were very fragmentary but relatively robust, and the resort to models has permitted to fill the gap. The composite picture, despite its obvious sketchiness, has proven consistent enough to yield conclusions about the evolution of mortality over time in the region.

Attempts to secure lists of deaths by age, either from vital registration or retrospective surveys, have generally been unsatisfactory in Sub-Saharan Africa. The effort continues in

Figure 2: Mean Age at First Union Reported by women married before age 25.

Selected WFS

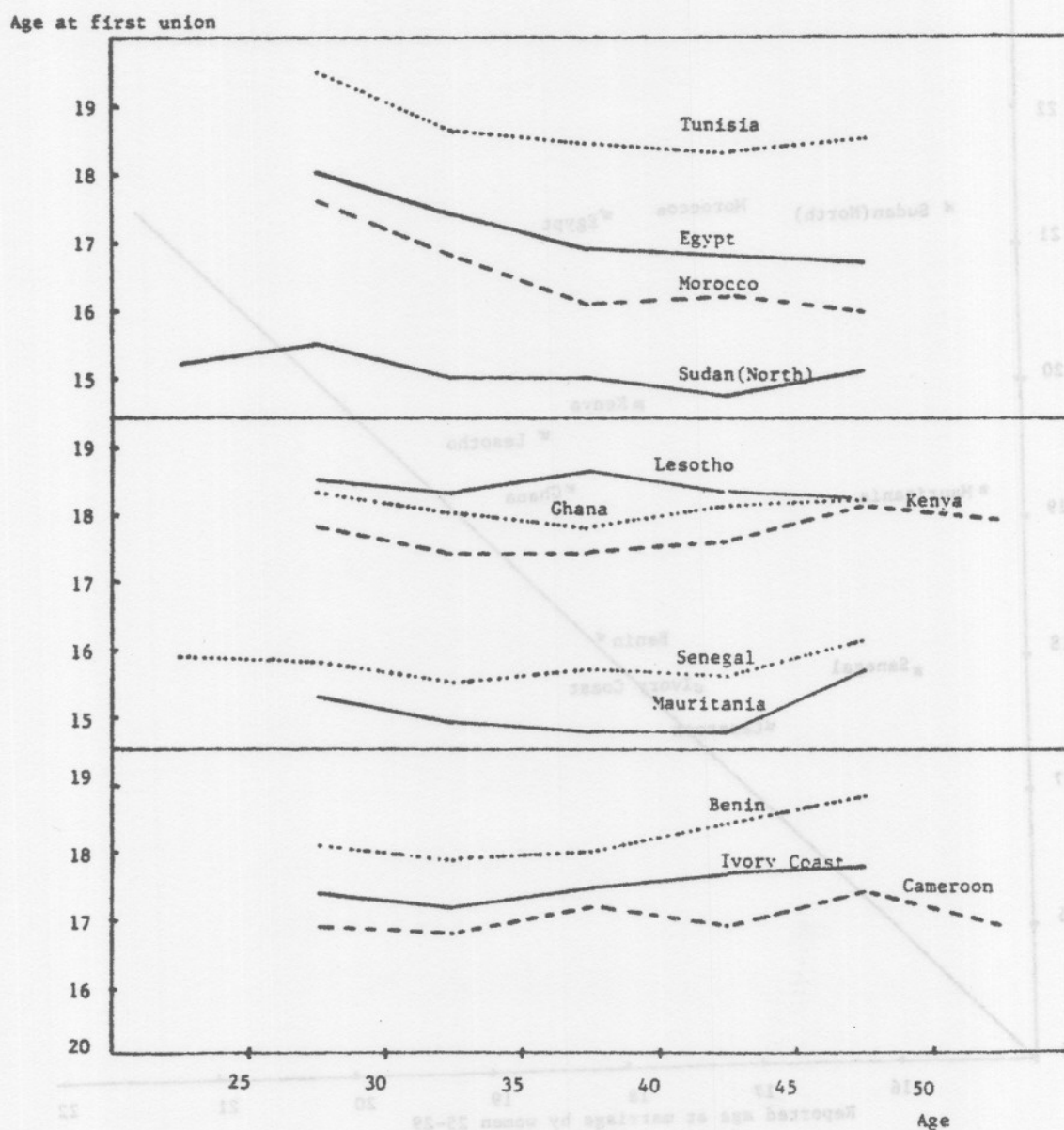
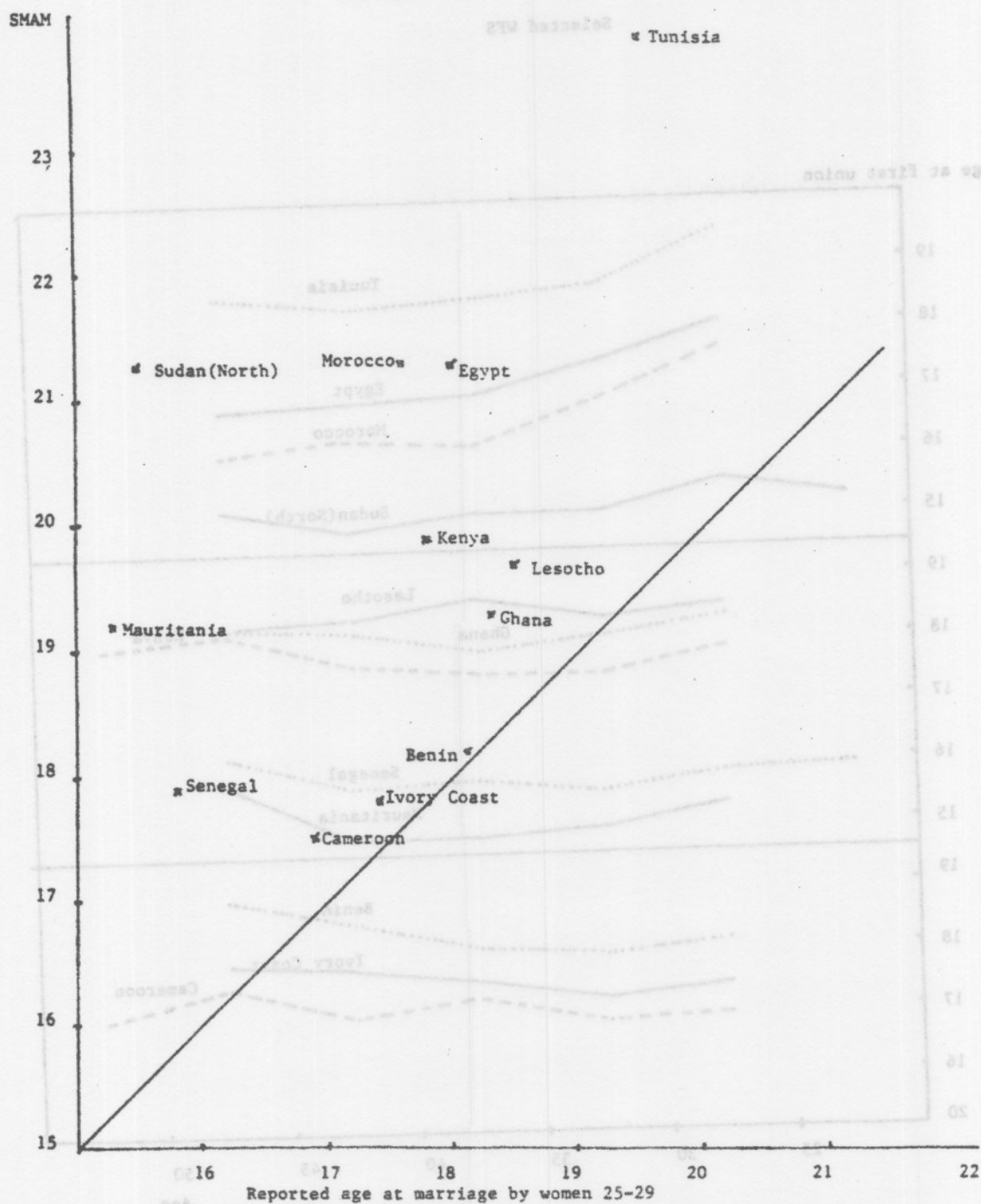


Figure 3: Comparison of age at marriage reported by women aged 25-29 and singulate mean age at marriage. Selected WFS countries



those countries where the census includes a question on deaths during the previous year; but the majority of informed opinion is in favor of simply abandoning the approach, at least for the estimation of mortality above age five. The WFS methodology has invested heavily in the assumption that it is possible to estimate infant and child mortality by questioning mothers about births and deaths, specified by time and age. In the past, however, most of the more reliable national estimates for the region have been based on indirect estimation techniques. The analysis has generally relied on estimating the level of mortality among infants and children, using the reports of women on their children ever born and surviving. More recently, techniques have been developed to estimate the mortality of adults. Questions on the survival of the respondent's parents have been included in some censuses, and they are the basis for the so-called orphanhood technique of estimation. With the availability of consecutive censuses of comparable quality, it is also becoming possible to estimate mortality from age distributions. All these measures of mortality levels can be combined to estimate, at a point in time, a summary index of mortality such as the expectation of life at birth.

For the study of trends, however, as contrasted to levels, three approaches have been used. The first approach has consisted in stringing together estimates for different points in time. The second has used stock data in a single survey or census on the proportion of surviving children or of surviving

parents by age of the respondent, to estimate levels of mortality at various times prior to the survey. This has been made possible by the development of techniques that estimate the time period to which the estimates apply. Thus, the routine inclusion of "bereavement" questions in a census or survey permits transforming the one-shot estimate into a salvo of points. These can be strung together with similar salvos at earlier times. The third method which will be discussed later relies on the memory of women concerning the chronology of deaths among their children.

One of the most comprehensive series of censuses that for East Africa, has been analyzed by Ewbank and Kekovole (1984). They have used not only the estimates based on child survival, but also various computations on adult mortality, either from orphanhood questions included in the census, or from the comparison of age distributions. These diverse estimates can be pieced together into a coherent picture. The resulting expectation of life at birth for Kenya rises from 45 years in 1955, to 49 in 1965 and 52 in 1975. The rise in Tanzania and Uganda is parallel until 1965. The breakdown of public order in Uganda coincides with a lack of usable census data for the last period, whereas the last census results for Tanzania had not been published by the time of the analysis.

The essence of what has been called the Brass method, consists in estimating the mortality between birth and successive ages in childhood, from the proportions surviving among children

born to women in successive age-groups. This produces values of $q(2)$ (mortality between age 0 and 2), $q(3)$ (up to age 3), $q(5)$ (up to age 5) and so on. Since the estimates refer to a certain duration before the survey, it becomes possible, with the help of model life tables, to transform the q values into comparable indices indicative of levels of mortality. (Coale and Trussell, 1979). The validity of the method is predicated on the assumption of an age pattern of mortality. It can be shown, when reliable data on patterns are available that the inference of trends on this basis can lead to misleading results (Garenne, 1982). But patterns of mortality that are very different from those incorporated in the models may be the exception. An ongoing project at the World Bank has plotted on a graph all the available estimates of mortality based on this technique, for Subsaharan countries, (Hill and Isiugo-Abanihe, 1983). With very few exceptions, they suggest consistently that mortality levels were in the process of declining in the years prior to the survey or census in which they were collected. With very few exceptions again, whenever there were several series of estimates based on different sources for the same country and referring to different dates, they have tended to line up and thus confirm a general slope of decline.

Reports of cumulative events will remain at best ambiguous substitutes for direct information on patterns and therefore, on trends. Retrospective reporting is vulnerable to dating errors and event misplacement. In the present state of the art, it is

not yet possible to choose between the two approaches, and they must coexist. The WFS data permit direct computation of infant and child mortality rates on the basis of the detailed fertility histories. Table 4 presents these rates for various African countries. It will be apparent that the picture of continuous mortality decline is generally confirmed. It is interesting to compare these direct estimates with indirect estimates based on the Brass questions. This is possible in Kenya, where the fertility survey has gathered retrospective reports of women which are independent of the census results. The comparison is attempted in Figure 4. The downward trend is parallel, but the KFS estimates are consistently lower. It would be hard to draw a conclusion on the basis of Figure 4, since the estimates in both methods are subject to various biases and subject to substantial merging of approximation. The rates are not fully comparable; in the WFS figures, only deaths to women aged 20.29 are reckoned. Mott (1982) in his own review of the Kenya data concludes that the inconsistencies between direct and indirect estimates are tolerable. Preston (1983) concludes, in a general paper on the WFS experience in measuring childhood mortality that the direct question has "a clear edge" for the study of trends and patterns.

The Brass techniques are admittedly weakest with respect to infant mortality (i.e. below one year of age) and the values obtained rely on assumed relationships between mortality rates at different ages, as they have been incorporated in model life tables. The World Fertility Survey, with its reliance on direct

**Table 4: Infant and Child Mortality for Five-year Periods before the Survey
(mothers aged 20-29) Selected WFS countries**

Country	1q0 Infant mortality years prior to survey				5q0: Child mortality			
	0-4	5-9	10-14	15-19	0-4	5-9	10-14	15-19
Benin	101.8	126.2	139.4	156.0	196.1	240.3	254.1	(277.1)
Cameroon	95.0	96.0	137.2	149.5	177.5	194.6	239.4	216.8
Ivory Coast	101.3	133.3	154.2	169.8	147.8	209.8	228.6	272.3
Kenya	83.2	88.2	96.1	121.0	134.8	148.1	156.5	196.0
Lesotho	121.9	123.1	138.9	115.3	165.8	176.9	188.0	169.3
Senegal	102.0	113.7	115.2	105.7	250.6	269.7	293.7	267.9
Mauritania	82.0	69.8	68.0	111.9	188.5	166.3	163.3	(227.6)
Sudan (North)	66.6	72.2	71.3	49.1	129.4	123.0	140.4	(142.2)

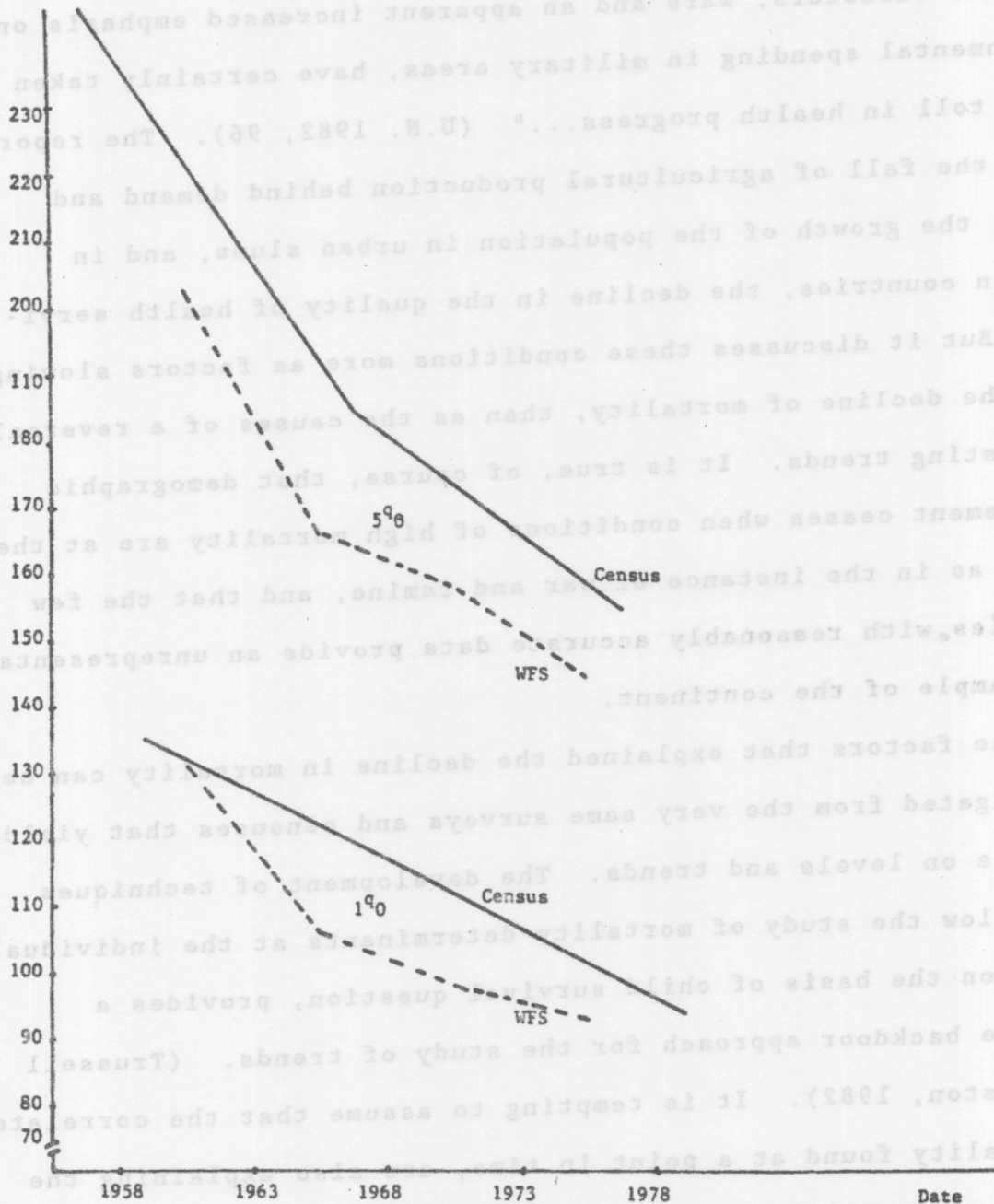
Source: Unpublished WFS tables

estimation, provides more strongly based indications of the relationship between ages 0 and 1-4. Unfortunately, it sheds no light on the mortality of adults, a major issue in the evaluation of levels and trends in expectation of life at birth. On the basis of the data in Table 4, we have computed $1q_4$, (mortality rates from age 1 to 4) and plotted them to show the relation between infant and child mortality in the WFS material, and its evolution through time. The estimates for 0-4, 5-9, 10-14 and 15-19 years before the survey have been linked to form (somewhat kinky) arrows, complete with feathers and head to indicate direction. With declining levels of mortality, we would expect the drop of $1q_0$ and $4q_1$, to follow along the 45 degree line, as indeed it does for Kenya, Benin and the Ivory Coast. In Sudan (North) and Senegal, the decline is restricted to child mortality; in Cameroon, to infant mortality. The position of the arrows can be compared to the relationship existing in the West and North model life tables (Coale and Demeny, 1966). Senegal (and Mauritania) are characterized by what Cantrelle (1975) has called the tropical pattern of mortality, with higher $4q_1$ than $1q_0$ but the pattern is by no means dominant in Africa, if the fertility histories are to be trusted.

The evidence on trends in mortality points overwhelmingly to a drop everywhere in Africa during the post-war period. Levels have remained higher in Western and Central than in Eastern and Southern Africa. The causes of the sustained decline are still not fully clear. A U.N. publication cited earlier lists reasons

Deaths per
1000

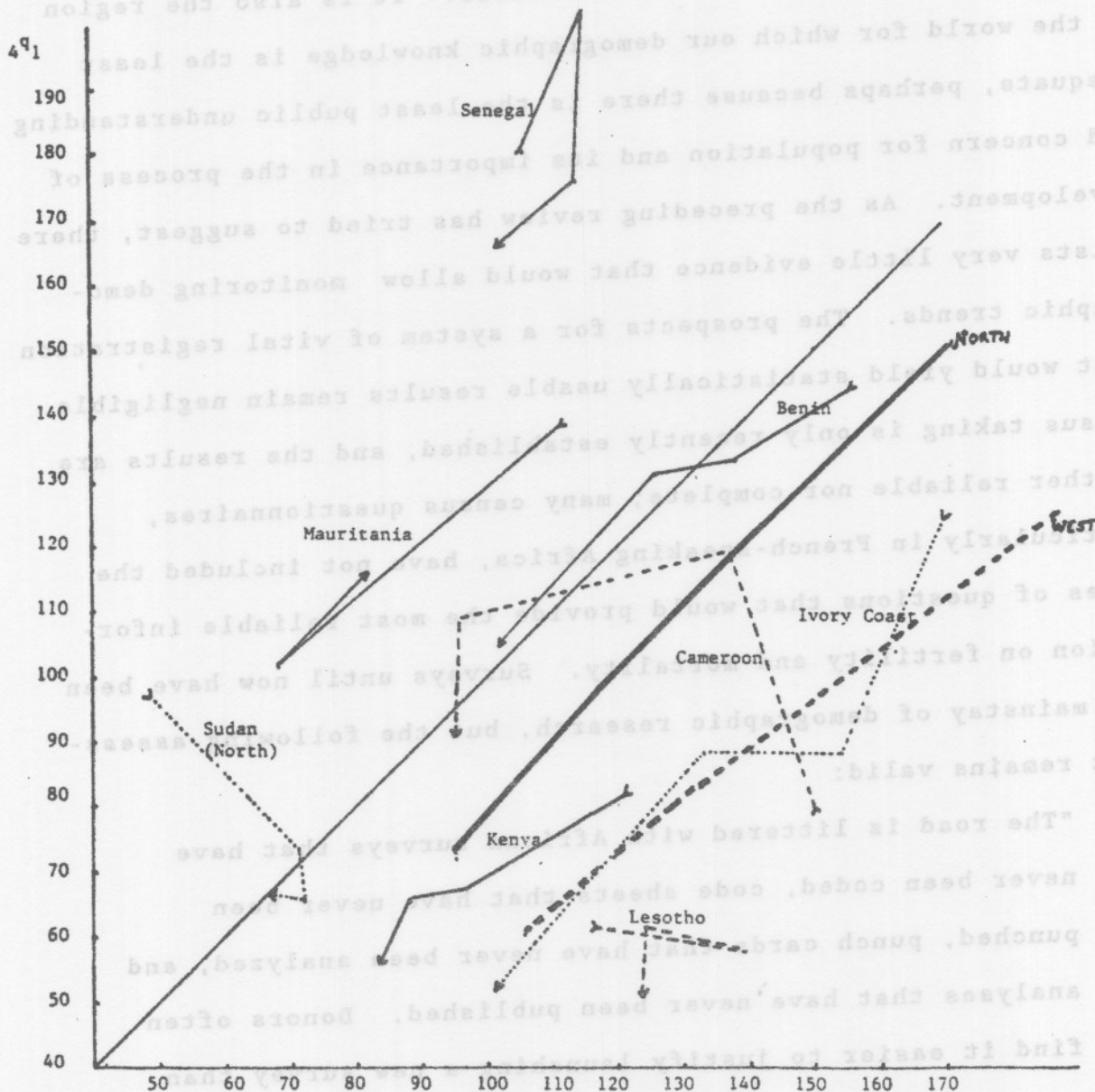
Figure 4: Infant and child mortality in Kenya



that could a priori have accounted for a stagnation of mortality trends. "A distinct lag in food production and economic growth, relative to population growth, coupled with rapid inflation, national disasters, wars and an apparent increased emphasis on governmental spending in military areas, have certainly taken their toll in health progress..." (U.N. 1982, 96). The report cites the fall of agricultural production behind demand and needs, the growth of the population in urban slums, and in certain countries, the decline in the quality of health services. But it discusses these conditions more as factors slowing down the decline of mortality, than as the causes of a reversal in existing trends. It is true, of course, that demographic measurement ceases when conditions of high mortality are at their worst, as in the instance of war and famine, and that the few countries with reasonably accurate data provide an unrepresentative sample of the continent.

The factors that explained the decline in mortality can be investigated from the very same surveys and censuses that yield evidence on levels and trends. The development of techniques that allow the study of mortality determinants at the individual level, on the basis of child survival question, provides a possible backdoor approach for the study of trends. (Trussell and Preston, 1982). It is tempting to assume that the correlates of mortality found at a point in time, are also explaining the changes of mortality over time. The strongest correlates of child survival turn out consistently to be parental education

Figure 5: Relation Between Infant and Child Mortality, WFS Countries



(and mother's education above father's). It is possible that the sustained progress in expectation of life, in the face of economic stagnation and the slow growth of public health, is accounted for by the progress of education on the continent.

Conclusion

Subsaharan Africa today probably retains the highest fertility and mortality rates in the world. It is also the region of the world for which our demographic knowledge is the least adequate, perhaps because there is the least public understanding and concern for population and its importance in the process of development. As the preceding review has tried to suggest, there exists very little evidence that would allow monitoring demographic trends. The prospects for a system of vital registration that would yield statistically usable results remain negligible. Census taking is only recently established, and the results are neither reliable nor complete; many census questionnaires, particularly in French-speaking Africa, have not included the types of questions that would provide the most reliable information on fertility and mortality. Surveys until now have been the mainstay of demographic research, but the following assessment remains valid:

"The road is littered with African surveys that have never been coded, code sheets that have never been punched, punch cards that have never been analyzed, and analyses that have never been published. Donors often find it easier to justify launching a new survey than

paying to complete an unfinished project. Census and survey organizations that are responsible for data gathering activities often lack the capacity to convert their data into information, and the data never reach those who could" (Farah and Preston 1982, 381).

The WFS has greatly enriched the record about fertility and even mortality in Africa. The example of a highly professional and successful enterprise, producing published results within a few months of field operations, and diffusing the information effectively in the world has had an enormous impact on the morale of African statistical offices, and set standards for future work. It has also vindicated the concept of careful surveys on a retrospective basis. Prior to the WFS, multi-round surveys had represented the dominant concept, even though the output has been disappointing.

The WFS has made its greatest contribution in the study of the determinants of fertility and mortality. It has not irrefutably demonstrated the value of the fertility histories for the study of trends. There is probably no singly valid approach that will accurately measure demographic changes. The careful collection and analysis of detailed fertility histories has a role to play, and the experience of several countries in Asia has demonstrated how much there is to learn from the periodic monitoring of changes in the proximate determinants of fertility. Short of that, inclusion of the Brass questions in censuses and multi-purpose surveys at every opportunity seems to offer a

relatively cheap alternative.

Until now, practically every country that has undergone a sustained decline of fertility through family limitation, also had the statistical ability to monitor the changes. The absence of that ability in Africa is a sign that the times are not ripe for the demographic transition. Inversely, it is possible that a resolute effort to collect and analyze data on demographic trends will result in the public awareness and resolve that would bring the birth rate down.

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