No. 97
June 1983

# Center for Policy Studies

## Working Papers



# INFERTILITY IN SUB-SAHARAN AFRICA

Odile Frank

THE POPULATION COUNCIL
One Dag Hammarskjold Plaza • New York • New York 10017 • U.S.A.

## Abstract

Anticipated future increases in the rates of growth of African populations would be heigthened by declines in the levels of infertility. Infertility accounts for 60 percent of variation in total fertility and is associated with a loss of one child per woman on average in 18 sub-Saharan countries with relevant data. The single major cause of infertility in these countries, in all probability, is gonorrhea through tubal infection and occlusion in women. Failure to address the problem of infertility in the near term can ultimately delay Africa's fertility transition, because uncertainty in childbearing inhibits response to intrinsic and extrinsic pressures to reduce fertility goals.

POPULATION COUNCIL LIBRARY CATALOGUING-IN-PUBLICATION DATA

Frank, Odile
Infertility in Sub-Saharan Africa / Odile Frank. —
New York : The Population Council, June 1983.
p. — (Population Council. Center for Policy Studies.
Working paper; 97)

1. Fertility, Human - Africa, Sub-Saharan. 2. Infertility.
I. Title. II. Series.

HB882.P66 no. 97 [HB1072.4] 6.83.hnz

Odile Frank is Associate, Center for Policy Studies, The Population Council.

A brief of this paper was published in Population and Development Review 9, no. 1, March 1983.

Against the broad decline in the rate of growth of the world population, sub-Saharan Africa stands out in high relief, the one vast region with a rate of growth well above the world average and which has yet to undergo its era of highest growth. The region now commands attention to raise awareness of population issues among governments, as a new frontier for family planning activities, and as a new arena for critical observations of population and development interactions. Kenya, which has reached an annual rate of population growth of almost 4% with an estimated birth rate of 53/1000 and death rate of 14/1000 demonstrates the potential, if not the most likely, future demographic course of the continent.

Changes in the future pace of growth of this region will most probably result largely from declines in mortality, from rates of 20/1000 and over to levels such as Kenya's. But a rise in fertility is also possible, and, indeed, rising fertility probably played a role in the increase in the rate of growth of Kenya's population. Increased fertility is attributed largely to decreased breastfeeding, erosion of customs regulating postpartum sexual behavior, and increased fecundity primarily due to the reduction of involuntary infertility. There is ample evidence that the potential impact of all these factors is great in sub-Saharan Africa; both sides of the birth-death differential may well contribute to faster population growth in Africa in future years.

Although the phenomenon of extraordinary infertility in Africa has been documented and carefully studied in a few cases, the dimensions of the problem on a regional scale have been largely ignored. Most succinct statements of the demographic prospects for Africa simply omit reference to infertility, either as a depressant of current fertility or as a potential contribution to growth if alleviated.[1] The prospect of an inevitable era of rapid population growth in this region as it finally reaps the benefits of mortality transition, given already high fertility, understandably dwarfs any concern with unrealized or unfulfilled fertility. However, regional analysis of prevalence estimates, patterns of variation and possible causes of infertility suggests that infertility in sub-Saharan Africa may have political, demographic and public health implications which could exert important effects on the eventuality and timing of an African fertility transition. This paper reviews the data on infertility in the region, assesses the factors responsible for infertility, and explores the implications of its alleviation, persistence, or possible aggravation.

## Data and Measurement

African demographic data are notoriously poor both in quantity and quality. The available data on infertility do not allow nor are they intended to provide a basis for rigorous quantitative analyses, for reasons which will become clear. They do, however, present an essentially coherent picture, one which certainly provides a base for an inferential analysis of infertility in Africa, and for some rudimentary calculations.

National, subnational and ethnic group data on fertility and infertility

are presented in the Appendix table. Twenty-four countries are covered, but these data range over a time span of 40 years, so that comparisons among countries for the same years are seldom possible. The primary intention here, however, is to highlight geo-ethnic patterns which have often been stressed as the essential framework for the study of African infertility (Demeny, 1968; Romaniuk, 1968a; WHO, 1975a; Page and Coale, 1972). For this purpose it seems reasonable to assume relative constancy in African demographic behavior over time.

A number of specific assumptions are also necessary in order to draw conclusions on infertility in Africa from the available data. These are as follows.

1) That except for some variation in the age at marriage, marriage considered in all of its African forms is universal.

2) That because of highly frequent and rapid remarriage following divorce and widowhood, women are exposed to the risk of pregnancy fairly continuously throughout their childbearing years.

3) That infertility is involuntary, children being universally and strongly desired.

4) That child-spacing is favored to enhance the health and development of each child. The earliest period is protected by breastfeeding with or without postpartum abstinence, and pregnancy is retarded by abstinence or lactational amenorrhea. Early next pregnancies are seen to threaten exclusive attention and to precipitate weaning.

5) That there are low, but measurable levels of contraceptive use and abortion that are related to behavioral norms rather than to fertility goals per se (for example, abortion among young urban women in the first open interval and contraception/abortion to maintain subsequent intervals within favorable and acceptable lower limits). Levels of both are assumed to have negligible effects on overall fertility.

6) That spousal separation due to male worker migration (particularly in southern Africa) can depress total fertility considerably. This is less so where a husband's period of absence customarily begins

when there is a new pregnancy and is intended to coincide with the birth interval.

Given these assumptions, it is possible to assemble estimates of levels of infertility in Africa by combining evidence from the substantial, but scattered, literature on the subject with data from other sources where the demographic picture is incomplete. Two major types of data are drawn on: fertility levels by region, administrative unit or ethnic group within a country - which could illustrate internal differentials based on more or less equivalent measurement conditions and uniform methods of estimation;[2] and estimated prevalence of childlessness observed for recorded age groups of women.

In demographic terms, childlessness is equivalent to having had no children ever born. The term is also used interchangeably with primary infertility, as distinct from secondary infertility, which refers to the inability to have additional children after a reasonably long period of exposure since the last birth. Both forms of infertility, primary and secondary, are generally understood to refer to the inability to conceive a pregnancy, but both can in fact be due to a history of pregnancy wastage. In medical terms, the distinction has obvious importance. In the demographic measurement of infertility in sub-Saharan Africa, however, distinctions between the actual conditions leading to childnessness and to the inability to have additional children are very difficult to make and infrequently made. Furthermore, in a strictly demographic sense, the distinction is not important.[3]

Although childlessness is thus an extreme form of infertility, its relative ease of measurement and comparability make it a valuable indicator

of infertility. In contrast, measurement of secondary infertility requires determination of what constitutes excessively long birth intervals or unduly low age-specific parities. Where estimates of secondary fertility have been attempted for African populations, nevertheless, the findings suggest that it accounts for more of overall infertility in all cases, and that the ratio of primary to secondary infertility ranges quite narrowly among samples. Together with the high positive correlations observed between childlessness and the incidence of low parities in Africa, and the very similar range in ratios of primary to secondary infertility reported in clinical series, these findings allow us to conclude that childlessness is also a good indicator of the magnitude of the overall infertility problem in sub-Saharan African populations, given the limited and uncertain quality of fertility data for those populations.[4]

The percent of women childless in age groups 25-29 and 45-49 are given in the Appendix table for most countries; data for the closest age group available were used otherwise. The estimates of women childless in these two groups allow for contrasts in the peak childbearing years and the ages when childbearing has ceased (terminal childlessness). Under constant conditions, the percent of women childless in their 40s represents the irreducible "hard core" of the infertility problem in a population, and is, therefore, the lowest percent for any age group of women. This is most often the case with the data in the Appendix table. In the few cases where the percent of women childless is markedly lower at 25-29 than at 45-49, this tends to indicate that the prevalence of infertility has declined between the two cohorts of women. This is the case for certain regions of Tanzania in 1973, the Bobo of Upper Volta in 1971, and Zaïre in 1975/76.

Involuntary childlessness occurs to some extent in all populations, so that it is important in discussing infertility to determine a standard level. Such a standard differentiates extraordinary levels of infertility from "normal" levels one could reasonably expect to occur in natural fertility populations in the absence of pathological infertility. A five percent level of childless women at older ages is often used as such a standard for natural fertility populations (Lorimer et al., 1954; Romaniuk, 1968a; Belsey, 1976; Sala-Diakanda, 1981). Data on childlessness not only from the Hutterites, but also from Bangladesh, Pakistan, Nepal and Kenya indicate that the percentage of women childless at the end of their childbearing years can be lower. As the data in Table 1 indicate, a level of 3 percent is an acceptable benchmark for natural fertility populations, even in the face of poor living conditions and medical care.[5]

In order to apply a standard for normally occurring infertility, some other considerations can be introduced regarding biases in the measurement of percent of women childless. Self-reported childlessness would tend to understate real levels in sub-Saharan Africa. This is principally because childbearing is highly valued and barrenness regarded as a misfortune for African women. Childlessness may be underreported also because there are different modalities for a woman to raise children who are not biologically her own in various societies of sub-Saharan Africa, and for whom self-attribution of motherhood is perfectly logical.

Use of residual categories of response to fertility questions in censuses, such as "unstated" and "not given" when entries are ambiguous also causes understatement of childlessness, as residual entries have been shown correctly to refer to a childless status in the large majority of cases

Table 1: Percentage of Ever-Married Women and of Currently Married Women Reporting Childlessness at Ages 45 and Over, Selected Populations

| Population | Year | Percentage 45 and over reporting no children ever born | |
|---|---|---|---|
| | | Ever-Married | Currently Married |
| Hutterites | 1950 | 3.0[a] | |
| Pakistan | 1975 | 2.0[b] | 2.0[b] |
| Nepal | 1976 | 4.5 | 2.6 |
| Bangladesh | 1975/76 | 2.7 | 2.1 |
| Kenya | 1977/78 | 2.8[b] | 2.5[b] |

a = ages 45-59

b = ages 45-49

Sources: Eaton and Mayer, 1954; Pakistan Fertility Survey, 1976; Nepal Fertility Survey, 1977; Bangladesh Fertility Survey, 1978; Kenya Fertility Survey, 1977-78.

(Vincent, 1946; El-Badry, 1961). As the frequency of these omissions is positively related to the level of childlessness, more understatement of childlessness may have occurred for African countries with higher levels of infertility (where census data were used). At the same time, although the understatement error occurs for all age groups of women, it tends to be lower among women in their forties than at younger ages, simply because the proportion of childless women tends to be lower.[6] Against this, in the case of several surveys, estimates of levels of childlessness have been made on the basis of fairly thorough cross-checking (Brass, 1968a; Demeny, 1968; van de Walle, 1968). In addition, in surveys where childlessness has been an important subject of enquiry (because high levels were suspected), the proportions childless were carefully estimated, so that the highest levels reported may be among the more accurate estimates available.

Finally, reported childlessness could be theoretically overstated by cases where a childless status is reported, but is due only to the death of all live-born children. In practice, the majority of demographic surveys used clarify the boundary by generally including questions on both births and deaths, although some underreporting of both inevitably occurs.

Available data from the Indonesian census of 1971 on childlessness alone due to deaths of all children indicate that only about 2 percent of all women 30 and over had experienced the death of all their ever-born children (which theoretically include stillbirths - see footnote 3), when overall childlessness among them was over 13 percent (Hull and Tukiran, 1976).[7] This suggests that the potential error of overstatement of childlessness (which would involve only a portion of all women childless due to mortality being incorrectly labelled as childless due to infertility) is likely to be far

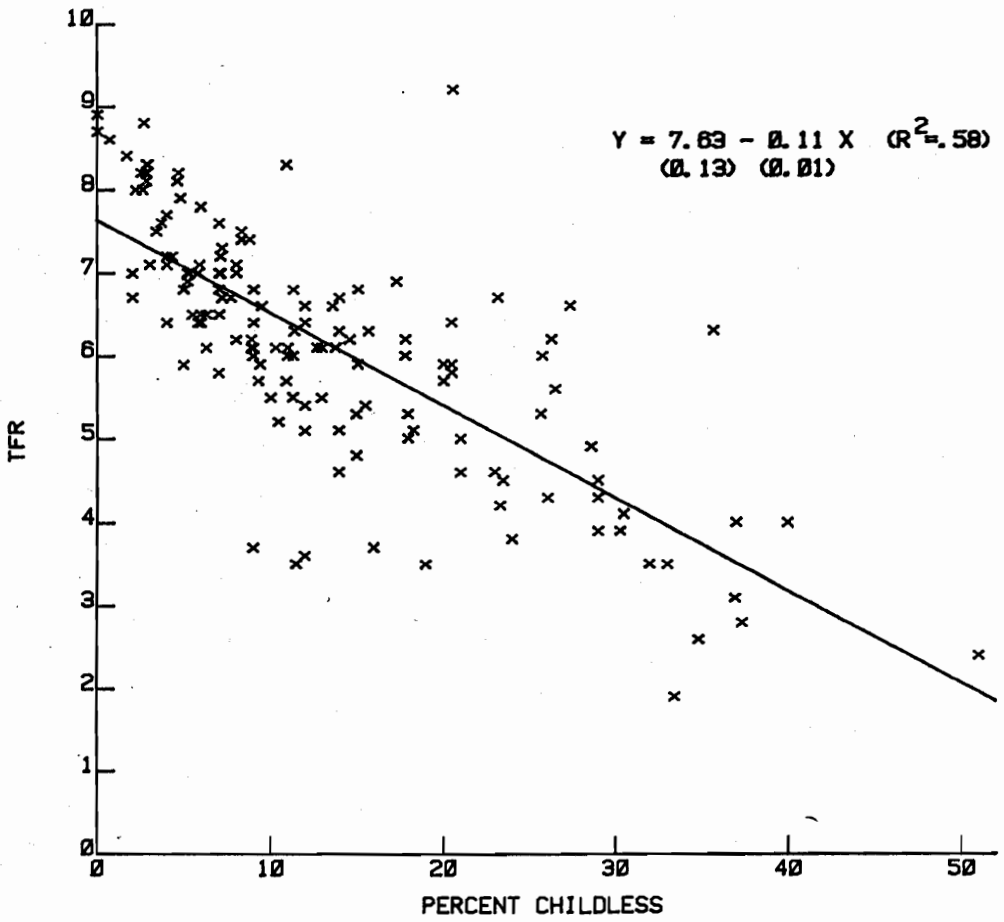
smaller than that of its potential understatement errors.[8]

In the light of the above considerations, for the purposes of this study, regions or ethnic groups experiencing infertility were taken to be those with reported levels of terminal childlessness above the standard of 3 percent in conjunction with crude birth rates and total fertility rates[9] below the national average (and, a fortiori, below the fertility of other regions or ethnic groups in the country).[10] Figure 1 displays the relationship between terminal childlessness and the total fertility rate in the 18 countries of sub-Saharan Africa in the Appendix table for which these data were available by region or ethnic group, or at the national level.

Nearly 60 percent of the variation in total fertility is accounted for by variations in infertility. The weighted mean level of childlessness of all regions, 12.1 percent, corresponds to a total fertility rate of 6.3, which is one birth per woman less than the total fertility of 7.3 associated with the standard of 3 percent childless. A total fertility of 5.3, a further birth per woman below the total fertility for the standard, follows from a level of terminal childlessness of just over 21 percent.[11]

The level of fertility associated with a standard level of infertility falls squarely in the range predicted by modeling the proximate determinants under African conditions in the absence of pathological infertility and of contraception. For example, assuming the level of marital exposure for Kenya in 1977-78, Bongaarts' model produces an estimated total fertility rate of about 7.4 for a duration of postpartum nonsusceptibility of around 15 months, which roughly corresponds to breastfeeding durations of 20-25 months,

FIGURE 1: **TOTAL FERTILITY RATE PLOTTED AGAINST PROPORTIONS OF CHILDLESS WOMEN AGED 45-49.** REGIONAL,ETHNIC, AND NATIONAL DATA (N=146), 18 COUNTRIES OF SUB-SAHARAN AFRICA.




or to shorter durations of breastfeeding in association with 15 months of postpartum abstinence.[12]

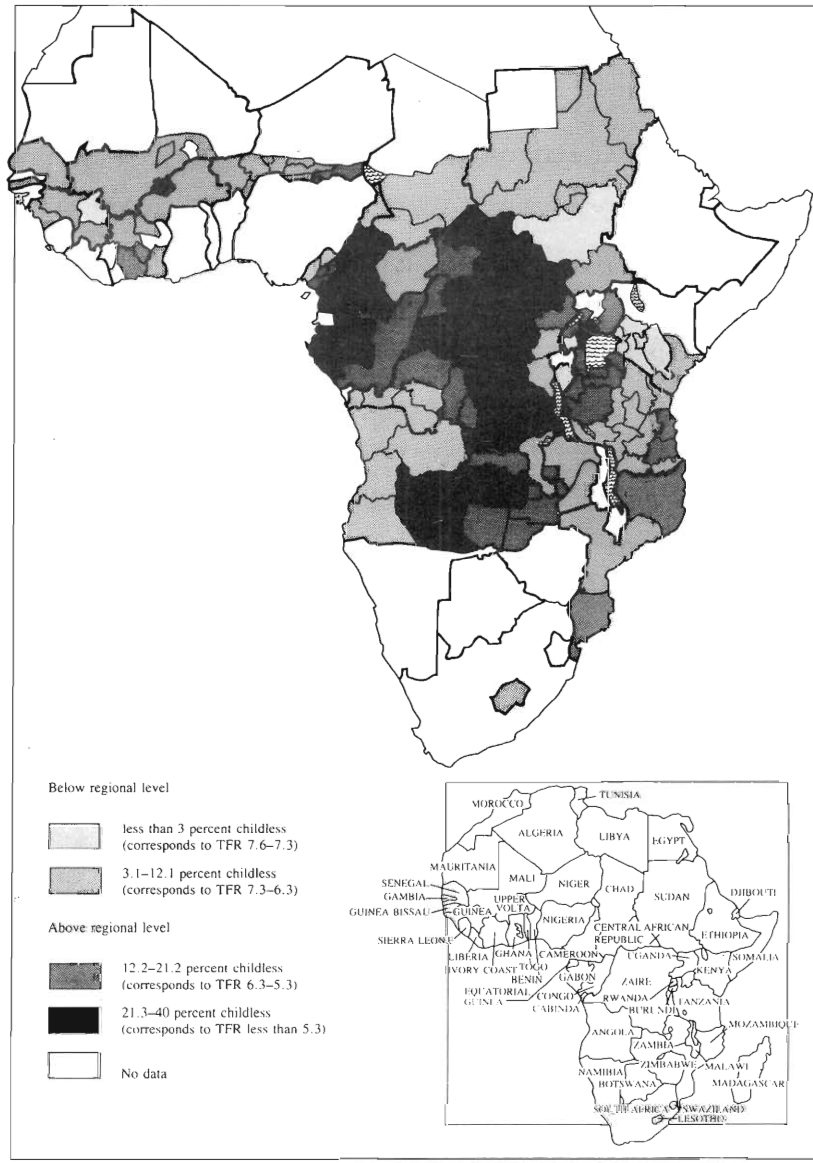
## The Prevalence of Infertility

If infertility in sub-Saharan Africa, as indicated by terminal childlessness, is mapped in as much detail as available data allow, three striking aspects of infertility emerge (see Figure 2). First, the prevalence of infertility is remarkably widespread: using the 3 percent standard for childless women, infertility is present in almost all areas. Second, infertility varies quite markedly and displays a wide range in prevalence of childlessness (up to 40 percent women recorded childless). Third, the pattern in the levels of prevalence, which are derived from the association between total fertility and the prevalence of terminal childlessness (see Figure 1), suggests gradients of infertility; there is a noticeable tendency for the high levels in Central Africa to be circumscribed by decreasing levels towards the outerlying Northern, Western and Eastern zones of sub-Saharan Africa.

The highest levels of childlessness are found for the largest part in three zones of contiguous regions in two countries: South-Western Sudan and North-Western Zaïre; Cameroon and Gabon; and South-Eastern Angola and North-Eastern Zambia. Along with one small area of Upper Volta and Buganda Province of Uganda, all these areas have reported levels of terminal childlessness ranging from over 21 percent to 40 percent.

Levels of childlessness that are lower, but still above the regional weighted average, are found in zones that are sandwiched between those of highest infertility (North-Western, South Western and Southern Zaïre, and

FIGURE 2 Levels of childlessness among women aged 45–49 (or closest age group) in 21 countries of sub-Saharan Africa, various years




NOTE: The ranges of fertility corresponding to levels of childlessness derive from the regression illustrated in Figure 1

Congo), that lie on the East Coast of Africa (in Tanzania and Mozambique), that are contiguous with areas of highest infertility (Zambia), and that surround Lake Victoria (North-Western Tanzania, Uganda and Easternmost Zaïre) and border Lake Chad (South-Eastern Niger and possibly the North-Eastern State of Bornu in Nigeria).

Levels of childlessness which are below the regional average but still above the standard are found in almost all the outerlying areas for which there are data.

According to this pattern, we would expect a number of the outermost areas to have the lowest levels of infertility, not only below the regional level, but also below the standard. As these are the areas for which there are in fact the fewest data, all that may be noted here is that very low infertility is recorded for Eastern Sudan, Central Kenya, Burundi and Ankole District of Uganda and Upper Guinea.

A country by country review highlighting geo-ethnic patterns and hence bringing this summary assessment more sharply into focus is presented in the Appendix.

## The Etiology of Infertility

Potential causes of infertility are numerous, but they clearly vary in their contribution to overall infertility. In developed countries, for example, genetic, metabolic, and psychological disorders have all been linked to infertility, but each of these accounts for only a small proportion of total infertility.

In sub-Saharan Africa, however, the single major immediate cause of primary and secondary infertility, in all probability, is gonorrhea through tubal infection and occlusion in women.[13] The evidence in favor of a gonoccocal etiology is still incomplete, but as yet provides the best working hypothesis on the origin of African infertility. The prevalence of gonorrhea has been shown to be associated with infertility in Uganda, Upper Volta and Zaïre (Griffith, 1963-64; Retel-Laurentin, 1973; Romaniuk, 1967 and, 1968a; Arya et al., 1980), and fallopian tubal occlusion has been shown to be the primary cause of infertility among women in Ghana, Gabon and Kenya; as many as 78 percent of infertile women in clinic samples have this reproductive dysfunction (Meuwissen, 1966; Chatfield et al., 1970; Mati et al., 1973; Languillat et al., 1978). What cannot yet be determined under African conditions and at a population level is the risk of tubal infection from gonorrhea, and the risks of tubal occlusion following gonoccocal infection and other types of tubal infection. At present, these risks are known only for developed country samples in Sweden and the United States.[14] An important obstacle to arriving at such estimates in Africa is the absence of an analytic procedure for determining past infection with gonorrhea among women who have occluded tubes (WHO, 1975a). The problem is further compounded because gonorrhea is most often symptomless for women when the infection is active. Some evidence of the role of gonorrhea in infertility is provided by a few known cases where penicillin campaigns aimed at controlling either venereal disease, or yaws and pinta (pian and bejel), treponemal infections akin to syphilis, have resulted in increased fertility (Lessa and Myers, 1961-62; Leridon, 1970; Ring and Scragg, 1972; Retel-Laurentin, 1974a; Central Statistical Office of the Republic of Zambia, 1975; Retel-Laurentin,

1978; Sala-Diakanda and Lohlé-Tart, 1980).

Other pathological sources have been suggested, such as tuberculosis, microfiliarasis and syphilis (Modawi, 1965; Retel-Laurentin, 1973), but these have been shown to have a minor impact at a population level (Chatfield et al., 1970; Belsey, 1976; Languillat et al., 1978, pp.248-9). Furthermore, the associations found between syphilis and infertility at the population level are considered to be spurious because the effect of syphilis is not only self-limiting in the life-time of a woman, but is also limited to foetal wastage[15] (Romaniuk, 1968a; WHO 1975a; WHO, 1975b; Belsey, 1976). The associations between syphilis and infertility are more likely to be due to the high association between the prevalence of syphilis and that of gonorrhea. Finally, the possibility that non-gonoccocal infections subsequent to abortion and delivery are a major cause of tubal occlusion and infertility is no more likely a priori in African women than, say, among Bangladeshi women, who demonstrate very low levels of infertility, and there is nothing to indicate that African women demonstrate a higher incidence of induced abortion.

Very few reliable data on the incidence or prevalence of gonorrhea and other venereal diseases are available for Africa, although 25 African countries have reported cases to the World Health Organization (WHO, 1975b). While the actual numbers of cases reported cannot be accepted as reliable estimates of the incidence, if one assumes that the degree of underreporting is roughly the same (or at least is not systematically related to fertility levels), it is useful to see how the rates of reported cases relate to levels of fertility. Table 2 assembles relevant data for the 13 countries covered in this study for which WHO data were available. One can see from the Table

Table 2: Number of Cases and Rate of Reported Gonorrhea and Crude Birth Rate, Selected African Countries, Various Years

| | Year of Report | Population 1970 (thousands) | Gonorrhea: Number of Cases Reported | Gonorrhea: Rate of Reported Cases (per 1,000) | Crude Birth Rate (per 1,000) Av. 1965-1970 |
|---|---|---|---|---|---|
| Angola | 1965 | 5,588 | 8,397 | 1.5 | 49 |
| Nigeria | 1970 | 56,346 | 86,772 | 1.5 | 51 |
| Mozambique | 1967 | 8,140 | 22,134 | 2.7 | 46 |
| Upper Volta | 1970 | 5,413 | 14,783 | 2.7 | 48 |
| Rwanda | 1972 | 3,573 | 10,002 | 2.8 | 50 |
| Burundi | 1965 | 3,485 | 16,209 | 4.7 | 46 |
| Mali | 1969 | 5,362 | 27,666 | 5.2 | 49 |
| Tanzania | 1967 | 13,300 | 101,611 | 7.6 | 47 |
| Chad | 1971 | 3,643 | 29,556 | 8.1 | 44 |
| Senegal | 1967 | 4,267 | 37,847 | 8.9 | 47 |
| C.A.R. | 1969 | 1,857 | 22,189 | 11.9 | 46 |
| Sudan | 1965 | 14,090 | 168,603 | 12.0 | 46 |
| Gabon | 1973 | 500 | 13,793 | 27.6 | 31 |

Sources: WHO, 1975b
U.N., 1981

that there is indeed a rough inverse relationship between crude birth rate and reported cases of gonorrhea.[16]

Finally, it should be noted that aside from the studies mentioned above, where the association between gonorrhea and infertility was the specific subject of research, venereal disease, in most cases gonorrhea, is mentioned as the most likely cause of infertility in the demographic literature for 12 of the 23 countries followed here.[17] This body of literature spans 30 years and comes from both French and English sources.

Although very little is known of the early history of venereal diseases in Africa, their introduction and spread probably began at least in the later stages of slavery when inland routes had become well established,[18] intensified with the rapid spread of colonization in the late nineteenth century and were aggravated by such factors as forced labor migration, the development of inland trade routes, and more generally the social dislocation of traditional communities . Reports of administrative concerns over "denatality" and population decline and medical concern over the spread of venereal diseases in Central Africa date to the late nineteenth and early twentieth centuries (Retel-Laurentin, 1974a, see especially pp. 50-62 and Blacker, 1961-62, p.266). Despite these concerns very little control of venereal disease was achieved before the Second World War, however. The availability of penicillin after 1945 made the control of venereal disease much more feasible. There are examples of intensive venereal disease control campaigns in the 1950s that have been clearly associated with increases in fertility, notably in the United Republic of Cameroon, Upper Volta, Zaïre and Zambia. More recently, the only evidence of reduced childlessness and increased fertility is from Zaïre; there the changes seem to be attributable

to the widespread availability of antibiotics in the local markets rather than to any organized campaign.[19] Romaniuk considers that the large-scale venereal disease control campaigns of the 1950s and the subsequent availability of antibiotics on a case basis, particularly in urban areas, can account in substantial measure for the fertility increases in Zaïre at least until 1962 (Romaniuk, 1980 - see especially pp. 303-304, 307).

Insofar as childlessness by age is an indicator of changes over time, the data on childlessness by age for Tanzania from the 1973 Demographic Survey suggest declines in the proportion childless among women in their 30s relative to older women, for the entire mainland and for certain regions and ethnic groups: the Zaramo of the Coast Region, the Ha of Kigoma Region, the Makonde of Lindi and Mtwara, and the Luguru of Morogoro. This would be consistent with the distribution of antibiotics in Tanzania in connection with broader efforts to provide social services since 1967.[20]

It is important to note, however, that any declines in infertility that may have occurred did not result from broadscale campaigns to control venereal disease other than those undertaken in the 1950s, and that any decline in childlessness due to reductions in the prevalence of venereal disease must be attributed to the overall availability of antibiotic treatment (whether specific to venereal disease or incidental to the treatment of many other pathologies). Furthermore, not all of the areas mentioned have shown systematic fertility increases. Romaniuk points out that the Lualaba district (contiguous to Bie Province in Angola) may have seen increases in childlessness since the 1955-58 Demographic Survey (Romaniuk, 1980). Also, some of the gains in fertility may have been lost in Upper Volta among the Bobo since the 1950s campaign, and evidence for the

direction that fertility has taken in the United Republic of Cameroon from the 1960s to 1976 is as yet unclear (Hill, 1981). In addition, in countries or regions where fertility increases over time are deduced from fertility levels alone in the absence of data on childlessness, it is difficult to determine if the data reflect changes in the quality of data collection on fertility over time (rather than true increases), changes in other phenomena associated with increasing fertility (such as declines in breastfeeding), or increases due to reductions in venereal pathology.

## The Social Context of Infertility

Various kinds of social behavior in African societies can be implicated in the spread or maintenance of high levels of gonorrhea. These factors include marital mobility, polygamy, prostitution, and postpartum abstinence. In the following discussion, we examine each of these factors and outline how, in combination, they very probably account for the extraordinary infertility of sub-Saharan African populations.

Marital Mobility and Polygamy. High divorce and remarriage rates and a high proportion of polygamous marriages characterize a number of African societies which have significant levels of infertility.[21] At the same time, both marital instability and polygamy have been shown to have a clear association with lower fertility and higher childlessness in many of these societies:

fertility is lower among women with more marriages and among women with one or more co-wives.[22]

The most obvious and immediate reason for this would be that both serial marriage and polygamy reduce the exposure to conception for women. Marriage factors have indeed been shown to be one of the major proximate determinants of fertility (Bongaarts, 1978). Marital factors probably account for fertility differentials to some degree in Africa, but they are unlikely to account for substantial differentials in fertility, infertility, and childlessness. Several characteristics of African marital behavior suggest this.

As was mentioned earlier, marriage is practically universal, and the percentage of never-married women over age 25 or 30, in the majority of African societies is negligible (Bourgeois-Pichat, 1965; Cohen, 1967; Hill, 1981; African World Fertility Survey national surveys, various years). The major exception to this generalization is the case of several nomadic groups, among whom marriage tends to occur at higher ages and a non-negligible proportion of women remain unmarried throughout life. Late marriage and celibacy have been documented among the Twaregs of Niger (Ganon, 1975) and of Mali (Hill et al., 1982), and among the nomads of Sudan (Henin, 1969). Even so, Henin has shown that less than half of the differentials in fertility between nomadic and settled groups can be attributed to marital factors when there are also significant differentials in childlessness (Henin, 1969, pp. 175-185).

Where marital instability is high, and following widowhood, re-marriage is generally very rapid (Enquête Sénégalaise sur la Fécondité, 1981; Hill, 1981; Hill et al., 1982; Richards and Reining, 1954; Olusanya, 1975). For

Senegal, where 27 percent of women 30 and over had been divorced at least once in 1978, it was calculated that Senegalese women had spent, on average, 94.5 percent of their life in a married state since contracting their first marriage (Enquête Sénégalaise sur la Fécondité, 1981, p. 4).

There is also evidence that exposure to childbearing is not limited to periods of recorded marriage. As Reyna points out, where the average interval between marriages is as long as 19 months among the Barma in Chad, divorced women are not expected to be celibate, and their sexual behavior carries few sanctions (Reyna, 1975). The social acceptability of sexual behavior on the part of divorced and widowed women has been observed among other groups, notably in Tanzania (Richards and Reining, 1954), Sudan (Henin, 1969), Uganda (Arya et al., 1973) and Zaïre (Romaniuk, 1967).

In a number of societies with high levels of childlessness, in addition to recorded formal and de facto marriages, a range of highly informal temporary unions and states of concubinage are noted. Examples are found among the Fulani nomads of Niger (Ganon, 1975), in Gabon (François, 1975), in Sokoto, Nigeria (Trevor, 1975), and in Uganda (Bennett, 1962). Pre-marital sex is also tolerated in some cases — for example, among the Nzakara (Retel-Laurentin, 1979b), and the Kanuri (Dankoussou et al., 1975), in Western Nigeria (Olusanya, 1969 and 1974), and among the Mongo-Nkundo (Romaniuk, 1967; Retel-Laurentin, 1974a).

An alternative interpretation of the role of marital instability and polygamy in African societies with appreciable levels of infertility is that this marital mobility is the vehicle of transmission of venereal disease, particularly gonorrhea.[23] In this context, it is notable that the acceptability of both extra-marital relations (principally for men) and

prostitution are widely reported for many of the groups with high infertility. Tolerance of extra-marital relations has been observed in the Central African Republic (Wilde, 1973), among both monogamous and polygamous men in Sudanese nomadic communities (Henin, 1969), among the Teso in Uganda (Bennett, 1964; Arya et al., 1973), and in the town Fulani in Northern Cameroon(Burnham, 1974). Similarly prostitution has been described in the Central African Republic (Wilde, 1973), in Niger (Dankoussou et al., 1975), among the Banna (Reyna, 1975), the Bakweri and the Fulani of Cameroon (Ardener et al., 1960; Burnham, 1974), and among Haya,[24] Toro, Ganda and Etesot women in Uganda (Richards and Reining, 1954; Bennett, 1962; Bennett, 1964).

Whether these marital and sexual behaviors fostered the dissemination of venereal disease or, rather, have arisen as adjustments to high levels of infertility is not completely clear. Marital instability caused by infertility[25] and the spread of venereal disease caused by marital instability and sexual mobility can form a vicious cycle (Retel-Laurentin, 1974a; Cohen, 1967; Reyna, 1975). The movement of abandoned or rejected barren women to urban prostitution has been noted in Niger (Dankoussou et al., 1975), Uganda (Bennett, 1964), and the Central African Republic (Retel-Laurentin, 1974a). Similarly, in many of these societies, marital and sexual mobility on the part of women is interpreted as a desperate attempt to become pregnant, and tolerance on the part of society as a means to maximize their chances of doing so. Illegitimacy is often acceptable; in some cases the fact of illegitimacy is not recognized, since paternity is sought or welcomed.[26] Romaniuk has shown that tolerance of illegitimacy and of extra-marital relations correlated negatively with the levels of fertility in

Zaïre in the 1950s (Romaniuk, 1967 and 1968a).

Both traditional behaviors of African societies and aspects of their modernization can be implicated in the spread of venereal disease and infertility. The requirement of a substantial bride-price and the need for additional resources for polygamous marriage induce the migration of young single men to urban areas for employment and the marriage of young women to much older polygamous (or monogamous) men. Increased exposure to gonorrhea is likely to result from both of these phenomena (Bennett, 1962; Arya et al., 1973; Nasah et al., 1974; Reyna, 1975; François, 1975). At the same time, temporary migration of males to urban areas for employment, the breakdown of traditional constraints in the ethnic mix of migrant neighborhoods in urban areas, and a trend toward "western" -style casual sexual unions can foster sexual mobility in urban areas -- and in rural areas among women deprived of either current or potential husbands (Richards and Reining, 1954; Roberts and Tanner, 1959-60; Bennett, 1962; Roussel, 1975).

While these marital practices and customs undoubtedly contribute to the spread of gonorrhea and resulting infertility, they alone cannot completely account for its spread. Liberal traditional customs surrounding marriage and sexual behavior are neither common to all African societies with high measurable levels of infertility, nor, obviously, exclusive to them.[27] For example, polygamy is common in far more African societies than those with appreciable infertility.[28] Furthermore, polygamy can be shown to be as much a viable institution in a society suffering from infertility as a practice which fosters the spread of venereal disease. Polygamy is viable in infertile societies because the wives who are childless are less likely to be repudiated and the community is less likely to be burdened by a surplus of

older women with no offspring. Married men benefit from polygamy in societies with high infertility by increasing their chances of paternity. Arya et al. argue that among the Etesot of Uganda, men must opt for polygamy in order to be assured of offspring (Arya et al., 1973). At the same time, polygamy fosters the spread of venereal disease, both because its practice is associated with male sexual mobility outside as well as inside the polygamous household, and because there are large age differentials where bride-price is high (Arya et al., 1973; Nasah et al., 1974).[29] Venereal disease can be introduced into a polygamous household by the husband or a new wife, and be re-circulated among the co-wives each time.

Postpartum Abstinence. The frequent occurrence of long periods of postpartum abstinence among groups with low fertility and high infertility suggests the possibility that postpartum abstinence, when it is longer than the non-susceptible period of postpartum amenorrhea due to breastfeeding, may significantly depress levels of fertility. Data on breastfeeding and postpartum abstinence in Africa are far too unreliable for any strict quantitative assessment. However, the information available on the ranges, differentials, and observance of postpartum abstinence among sub-Saharan African groups suggests that this important proximate determinant of fertility may have more significant indirect than direct effects on the incidence of low fertility in areas where gonorrhea is highly prevalent.

The major indirect effect of extended periods of postpartum abstinence is to encourage other sexual contacts by the husband during that period, thereby exposing him to the risk of infection. Sexual mobility may be high

at this time for monogamous husbands even in societies where other liberal sexual practices are not tolerated. For polygamous husbands, the taboo is easier to follow, but in groups dominated by polygamous practices, and where postpartum abstinence is institutionalized in association with polygamy, monogamous men and younger men not yet polygamously married may seek outside sexual experiences.

Of course, the length of postpartum abstinence is by no means short in all societies where infertility is absent or long in all societies with high levels of infertility,[30] but some suggestive examples can illustrate the role this taboo may play in promoting the diffusion of venereal disease.[31] In Uganda, the Teso who have an appreciable level of infertility, have a strict postpartum taboo for as long as 18-24 months, while the Bayankole, who have almost no infertility, observe a notably short period of abstinence of less than one month (Arya et al., 1973; Schoenmaeckers et al., 1981). Among the Bantu people of Kivu, Rwanda and Burundi who are largely cattle raisers and who appear to have very little overall infertility, there is a virtual absence of any postpartum taboo (Romaniuk, 1967; see also Ring and Scragg, 1973).

Where the prevalence of infertility has apparently decreased over time, (as evidenced by rising reported percentages of women childless with age), the decrease may be related to the rejection of long taboos among younger generations of women. Among the Sukuma women of Tanzania, for example, the lower percentage of childlessness among women 30-39 relative to women aged 40-49 in 1973 may be associated with the marked decline in postpartum abstinence noted among the younger women (Schoenmaeckers et al., 1981).

Finally it is interesting to note that references to the Nupe of Nigeria

emphasize (a) the importance of prostitution in their society and (b) a marked resistance to the weakening of the postpartum taboo. While neither venereal disease nor the incidence of childlessness is well documented for this ethnic group of Northern Nigeria, one can speculate on the consequences for fertility of such a combination of practices in the presence of venereal disease (Morgan, 1975; Schoenmaeckers et al., 1981).

From the discussion above, the interrelations of infertility, disease, and social custom may be broadly sketched for sub-Saharan Africa. Once venereal disease was introduced into a community with some degree of sexual or marital mobility, its diffusion might have been assured by the existing customs. However, this diffusion was probably helped by the emergence or introduction of customs which evolved as adaptation to the consequent infertility. For example, extra-marital mobility may have served as the vehicle of disease transmission, while the mobility itself was intensified in order to overcome the fertility effects. In other communities, marital instability may have bound the population into a similarly damaging cycle. In yet other cases, sexual mobility may have occurred principally during a strictly observed postpartum period; here one might expect a higher prevalence of secondary than primary infertility unless women were customarily married to older, polygamous men. These behaviors allowing the diffusion of venereal disease — pre-marital, extra-marital and marital sexual mobility, prostitution and enforced marital abstinence — may of course occur in various combinations and in varying degrees.

That infertility remained highly ethnically circumscribed is not

surprising in view of the fact that ethnic endogamy is widely reported as virtually complete (Bennett, 1962; Roussel, 1967; François, 1975; Podlewski; 1975; Lux, 1976a; Romaniuk, 1980). Where there is transmission of venereal disease across ethnic lines — for example, around Lakes Victoria and Chad and in many urban areas of Central and Eastern Africa — ethnic intermixing in extra-marital and sexual behavior is also reported.

## The Implications of Infertility for sub-Saharan Africa

Table 3 provides estimates of the total fertility shortfall corresponding to the level of infertility in 17 countries, in order of decreasing 1980 population. It can be seen that infertility is associated with a considerable fertility shortfall in several large countries (Zaïre, Tanzania, Mozambique, and the United Republic of Cameroon) and in several small ones (Central African Republic, Congo, and Gabon). The shortfall corresponding to the weighted mean level of childlessness for all countries is one birth per woman.

The shortfalls may be overestimates at present for Zaïre, where reduced childlessness is reported, and Tanzania, where reduced infertility may be inferred from the age pattern of childlessness. In the absence of large-scale programs to control disease, however, the social disruption in some countries (in Angola, Chad, Central African Republic and Uganda) and the poverty of both these countries and others (such as Congo, Niger, Mali, Mozambique, Sudan and Upper Volta) make it unlikely that most of them have experienced significant improvement in the level of infertility in the last

Table 3: Population Size, Infertility, and Fertility Shortfall In 17 sub-Saharan African Countries

| Country (1) | 1980 population (millions) (2) | Percent of women childless at end of childbearing (3) | Shortfall in total fertility due to infertility[a] (births per woman) (4) |
|---|---|---|---|
| Zaire | 28.3 | 20.5 | 1.9 |
| Sudan | 18.4 | 8.7 | .6 |
| Tanzania | 17.9 | 11.4 | .9 |
| Mozambique | 10.5 | 13.8 | 1.2 |
| Cameroon | 8.4 | 17.2 | 1.6 |
| Ivory Coast | 8.0 | 9.9 | .8 |
| Angola | 7.1 | 11.5 | .9 |
| Mali | 6.9 | 7.7 | .5 |
| Upper Volta | 6.9 | 5.9 | .3 |
| Zambia | 5.8 | 14.0 | 1.2 |
| Senegal | 5.7 | 4.0 | .1 |
| Niger | 5.3 | 8.9 | .6 |
| Guinea | 5.0 | 6.0 | .3 |
| Chad | 4.5 | 11.0 | .9 |
| Central African Republic | 2.3 | 17.3 | 1.6 |
| Congo | 1.5 | 20.5 | 1.9 |
| Gabon | .5 | 32.0 | 3.2 |
| Weighted mean, all countries | | 12.1 | 1.0 |

a. Estimated difference between total fertility rate associated with 3 percent women childless at end of childbearing and total fertility rate corresponding to percent of women childless in column (3), from the regression in Figure 1.

20 years. Indeed, data on childlessness in Sudan in 1979 showed virtually no improvement over the levels in 1955/56 (see Appendix). Therefore, the orders of magnitude of Table 3 can be taken as largely applicable at the present time.

These fertility shortfalls signal the importance of infertility for the future demographic course of sub-Saharan Africa. Moreover, this importance derives not only from the possible consequences of any decline in the levels of infertility, but also from the potential effects of persisting high levels of prevalence.

Declines in the levels of infertility would be a powerful source of increased population growth in sub-Saharan Africa: for the region as a whole, a reduction to the standard level, ceteris paribus, would result in a better than 15 percent increase in total fertility. However, the probable effect of persisting infertility on future population growth is paradoxical in that it would serve to prolong high fertility.

It is likely that under present conditions in sub-Saharan Africa, individual parents regard high levels of fertility as desirable and advantageous. For many of them, however, intentions to raise large families are unpredictably thwarted by infertility. This tends to weaken the conscious equation of intentions and outcome with regard to fertility strategies. To the extent that individuals must first see a strong causal link between their reproductive behavior and the fertility outcome in order to adopt fertility regulating practices when conditions favor smaller families, the ability to realize large-family desires may be a precondition to achieving smaller family goals when conditions change. If high infertility persists until it is reduced unintentionally by changes that tend

also to foster fertility decline (broad enjoyment of mortality decline, general improvements in living standards), the additional time required for individuals to take into account the gradual disappearance of infertility may delay both belief in control over fertility outcomes and response to the stimulus to lower fertility. Such a delay could be responsible for substantial extra population growth in the future.

## Prospects for Declines in Infertility

Certainly the serendipitous effect of antibiotics in some countries, regions and cities in sub-Saharan Africa will continue to have a beneficial impact on the prevalence of venereal disease, and levels of childlessness and infertility, but substantial decline in infertility in Africa and the eventual elimination of pathological infertility must await much more concerted public intervention.

The eventual control and elimination of venereal disease and consequent infertility depend on four sources of change: the evolution of health policy and health systems, the strengthening of political will, the course of urbanization, and the evolution of social customs.

Health Policy and Health Systems. Large-scale educational efforts and specific disease control campaigns are required in at least some of the countries that we have examined in order to reduce the level of infertility. Such programs require administrative and organizational capacity and human and material resources. Most sub-Saharan African countries are gravely short of such capacities and resources. However, even if such resources became

available, it is very unlikely, given the very poor health conditions of the region, that venereal disease would be assigned a high priority in any health system for a long time. Far more serious, life-threatening pathologies that require broad-scale public health intervention, such as malaria and measles, would most likely claim higher priority attention.

In other countries where economic growth is taking place, or where infertility appears to be relatively contained, the private if not the public health sector can provide some coverage which may lead to important reductions in the prevalence of venereal disease. However, even in these settings, the difficulties of tracing sexual contacts and high rates of sequential re-exposure (Bennett, 1962) reduce the prospects of eradication, and substantial levels of incidence are likely to persist in the absence of concerted public efforts.[32] The best scenario in such cases would be resolution of venereal disease diffusion to the levels of western urban areas, where incidence may be high in some cases, but where prevalence is controlled by the very high accessibility of treatment.

Political Will. Although low fertility and infertility are of concern in several African countries, the official population policies rarely address infertility explicitly:[33] the only expression of such concerns may be a general reluctance on the part of some countries to develop a population policy (e.g. Angola, Guinea, Ivory Coast, Niger, United Republic of Cameroon, and Upper Volta), or an explicit focus on the maternal and child health aspects of family planning services and the promotion of spacing in others (e.g. Sudan, Mali and Mozambique).

In principle, family planning services can include diagnosis and

treatment of infertility. Within that context, however, the emphasis is normally on a case by case treatment of women with an existing infertility problem, rather than on a large-scale public information and disease control approach.

There are several good reasons for the general invisibility of infertility in governmental statements or policies in the areas of health and population. The entire causal chain of infertility involving sexual mobility of some type and the diffusion of venereal pathology is a clear source of embarassment to any group of political leaders. Where fertility is truly low, the official position on population is more likely to be one of emphasizing the underpopulation of a territory or expressing satisfaction with the fertility level or rate of population growth, neither being deemed excessive (e.g. Angola, Guinea, Ivory Coast, Niger). Official statements from the United Republic of Cameroon cite the importance of choice and the social, economic and cultural conditions unfavorable to the concept of family planning as the limitation of births. In other cases, the health component of any family planning infrastructure is stressed, while in yet more cases, no population position is put forward. Outside offers to provide population assistance in these cases might be more often met with polite demurral than with requests for assistance in controlling venereal disease and reducing infertility.

Health policy statements similarly make little mention of infertility (see WHO, 1980, Part One, especially pages 129, 140 and 213). Only two of the 23 sub-Saharan African countries under discussion which reported to the WHO on their health situation in the 1970s mentioned venereal disease in their reports; Uganda reported a venereal disease decree in 1977 with no

further detail, and the United Republic of Cameroon reported a prevalence of venereal disease of 1.3 percent as one of their major communicable disease problems (WHO, 1980, Part Two, pp. 37 and 39). Clearly, venereal disease is a health problem that has been given very little weight in Africa.

Finally, and very importantly, the climate of global concern over rapid population growth, and the specific concern for the growth potential associated with the expected mortality decline in Africa, create a context which is largely unfavorable to policies and measures seeking to increase fertility, even if such a fertility increase could be shown to be of limited scope and duration. Yet giving infertility the attention it deserves is no less justified than giving emphasis to the reduction of infant mortality in situations where this too would accelerate population growth in the short run.

Urbanization. To the extent that measures of urban and rural fertility are reliable for sub-Saharan African countries, there appear to be no systematic urban-rural fertility differentials (Caldwell, 1975; Page, 1975; ECA Population Division, 1981). For example, urban fertility is lower than rural in Kenya (Kenya Fertility Survey, 1978), in Ghana (Caldwell, 1967), Ivory Coast (Roussel, 1975), in Chad (Reyna and Bouquet, 1975) and Niger (Dankoussou et al., 1975), while it is reportedly higher in Gabon (François, 1975), in Western Nigeria (Olusanya, 1969), and in Zaïre overall (Sala Diakanda and Lohlé-Tart, 1980).

Many possible factors may account for fertility being higher or lower in urban relative to rural areas. Among them, a higher prevalence of venereal disease and infertility may lower urban fertility in association with such

conditions as sex-ratio imbalances favoring males due to the patterns of migration, the migration of barren women to urban areas, the breakdown of traditional barriers to sexual mobility and exogamy, and the presence of prostitution. Conversely, urban fertility may be higher because of better health services for the treatment of both venereal disease and infertility in the urban areas. Again, urban fertility may be lowered because of exposure to modernizing influences such as education and urban employment, leading to a higher age at marriage, a lower desired number of children and use of contraception; but it may rise because of the relaxation of customs determining child-spacing such as breastfeeding and postpartum abstinence.

It can be seen that such factors would not necessarily operate simultaneously in any given urban area, and that the relative importance of any one could depend on the level of development of the urban area and pattern of its urbanization.[34] Thus, for example, where urbanization is associated with the development of a modern sector, a higher level of social infrastructure, and urban employment, it is more likely that fertility would decline from both an increase in the age of marriage and a decline in childbearing goals. This is more likely to explain lower urban fertility in countries such as Ivory Coast and Ghana. On the other hand it has been suggested that the lower fertility in Niamey (Niger), a far less developed urban area than those of Ivory Coast or Ghana, is due to the in-migration of older, barren women (many of whom became prostitutes) and the higher incidence of childlessness among the urban women, probably due also to the level of venereal disease (Dankassou et al., 1975). Similarly, the lower fertility and higher childlessness in N'Djamena (Chad) has been attributed to a high incidence of venereal disease (Reyna and Bouquet, 1975).

Where urbanization is accompanied by the development of a modern sector, fertility may increase, if only transitionally, with the erosion of traditional child-spacing practices and the introduction of breast-milk substitutes (Nag, 1980). Where urbanization entails little modernization, fertility may also be higher, but only because of the effect of higher level of exposure to antibiotics on the prevalence of venereal disease. It appears likely that both these sets of factors are associated with the higher fertility in some urban areas of Gabon and Zaïre. Olusanya has suggested that some urban areas of Western Nigeria have higher fertility principally due to the decline of traditional birth-spacing customs. On the other hand, he also reports that in at least two towns in Western Nigeria, Oyo and Ife, fertility is lower overall than in Ibadan city while still higher than in rural communities (Olusanya, 1969 and 1974). Although data on the recorded levels of childlessness do not permit any firm conclusions, from the level reported for Oyo (10.6 percent of the women aged 25-29 reported childless), one can speculate that differences in the prevalence of venereal disease underlie the fertility differentials between city, town and rural areas.

It is likely in some cases that the fertility-inhibiting effects of urban modernization work together with those of venereal disease to produce urban-rural fertility differentials. In Nairobi, for example, modern influences have very likely served to reduce fertility desires (16 percent of eligible women are reported to be using effective contraception according to the Kenya Fertility Survey [Mosley, et al., 1981]), while at the same time, the prevalence of gonorrhea is very high in the population (16 percent according to Guest [1978]).

Finally, data on changes in fertility over time in Zaïre demonstrate the

unpredictability and lack of uniformity in the evolution of urban-rural differentials in sub-Saharan Africa. Using estimates of the birth rates for provinces and districts of Zaïre from 1927 to 1962, and percentages childless among ever-married women of all age groups from 15 to 55 years and over, Romaniuk shows that fertility increased and childlessness decreased in two major urban areas (Kinshasa and Lubumbashi) as well as in several rural areas. The reverse occurred, however, in the Lualaba district of the former province of Katanga, which is highly urbanized (50 percent of the population being urban or semi-urban). He attributes this unexpected trend to the "rapid increase in sterility" in both a largely rural territory (Dilolo) and a highly urban territory of the district (Kolwezi) (Romaniuk, 1980).

Social Factors. The modification or disappearance of traditional behaviors and customs may have important consequences for levels of exposure to venereal disease and infertility in the future. Four clusters of behaviors are especially relevant in sub-Saharan Africa - endogamy, polygamy, breastfeeding and postpartum abstinence. The directions in which these practices can evolve with economic development and modernization do not, however, have uniform implications for trends.

1) In as much as ethnic endogamy has played an important role in containing infertility, any erosion in its practice (other things equal) would tend to contribute to the spread of venereal disease — as it has done in several urban areas that are ethnically heterogenous.

2) To the extent that polygamy increases,[35] it may contribute to increased infertility. There is little evidence with which to consider the possibility of polygamy increasing or decreasing in Africa, but it tends to be depressed by urbanization and modernization, while Islamization is associated with its institutionalization. Some evidence suggests that the spread of Islam might have played a role, possibly through polygamy, in the spread of infertility (Burnham, 1974; Nasah et al., 1974; Brass, 1968). However, it is difficult to assess the weight of institutionalized polygamy against that of the potential diffusion of the much shorter Islamic period of postpartum abstinence of 40 days, which could be argued to favor a reduction in infertility (see below). Where polygamy has become bound to high levels of infertility (to assure progeny to the husband, for example), little change in its prevalence can be expected.

3) To the extent that an extended period of postpartum abstinence is customarily tied to the length of breastfeeding, declines in breastfeeding due to education and exposure to western behavior and modernization[36] can contribute to the reduction of infertility through reductions in the practice of postpartum abstinence,[37] and, presumably, lower levels of extra-marital sexual mobility.

4) Where the observance of traditional postpartum abstinence per se is declining (as in Tanzania, for example), even in the absence of decreased periods of breastfeeding, some beneficial effect on

infertility could be expected to the extent that extra-marital sex diminishes.

Quite apart from African behavioral patterns, another consideration of some importance is the behavior of extraneous groups. The growth of tourism has been implicated by the World Health Organization as a factor to be reckoned with in evaluating the trends in the prevalence of venereal disease worldwide. Tourism to Africa and within Africa is growing. While the potential for spreading conventional strains of venereal disease is considerable from this source, the additional potential for the dissemination of the penicillinase-producing strains of gonorrhea which are penicillin-resistant (PPNG) could have far greater negative consequences; far better diagnostic and therapeutic capacities are required to treat these strains, and continuing conventional therapy (penicillin) in these cases ultimately serves only to increase their hold. These new strains of gonorrhea had already been identified by 1981 in 9 sub-Saharan countries of Africa: Ghana, Mali, Nigeria, Central African Republic, Gabon, Zaïre, Madagascar, Zambia and Senegal (CDC, 1982a).[38]

Prospects for Fertility Decline

In addition to the potential economic and social obstacles, the cultural barriers, and the high infant and child mortality which Africa will have eventually to overcome before making a full demographic transition, the presence of infertility poses an additional obstacle of some considerable magnitude for many parts of Africa. Along with low infant mortality,

increased control over childbearing (the ability to satisfy previously frustrated efforts) may well be a major demographic precondition. Little is known of the historical prevalence of infertility in areas of the world where the transition to low fertility has occurred, but it may be that in having what is in effect an additional potential constraint, sub-Saharan Africa stands alone.

Most clearly, reproductive goals, however determined, remain unsatisfied in many areas. Notable expressions of this are the numerous reports of the demand for medical services relating to infertility. From various parts of Africa, clinical studies report that 10 percent of all health service consultations by women and between 25 percent and 80 percent of gynecological consultations are related to infertility (Chatfield et al., 1970; Mati et al., 1973; Ampofo, 1977; Nasah, 1979; Leke and Nasah, 1981).[39] In Mozambique, where a family planning program has been very recently launched, physicians are said to report that far more women seek help to overcome infertility than seek contraceptive advice (Kalemba, 1982).[40]

Unsatisfied fertility goals are probably also expressed within the multiple forms of child redistribution which take place in several countries. The most benign forms concern the raising of other's children and the giving of children to infertile women, such as reported in Togo (Locoh, 1980), in Cameroon,[41] in Tanzania (Roberts and Tanner, 1959-60) and in Sokoto, Nigeria (Trevor, 1925).[42] However, the phenomenon may take on more dramatic forms, such as raids on neighboring tribes in Sudan (Modawi, 1965) and child-stealing in Kinshasa (Guest, 1978). To the extent that child redistribution is associated with smoothing disparities in childbearing due to infertility, these practices expose far more people to the reality of

infertility than the numbers of women or families who have to deal with its immediate impact. In addition, child redistribution practices greatly dilute any equivalence between childbearing (fertility) and childrearing (economic responsibility), so that not only are the individuals who experience low fertility unlikely to understand even the concept of fertility reduction, but the broader populations where infertility is prevalent are also less likely to conceive of any advantages to reduced fertility.[43]

As long as infertility remains prominent in Africa, large numbers of individuals and some entire populations will remain thwarted in their ambitions to bear and raise children, and even larger numbers may resist both intrinsic and extrinsic pressures for fertility limitation in the face of the risk to which they see others exposed. The most seriously affected will be the poor countries where high levels of infant and child mortality further jeopardize parental desires for surviving children, and where few resources exist to deal with the pathology of either infertility or childhood mortality. Parents and potential parents in these countries are especially unlikely to lower their sights until conditions are such that achievement of a large surviving family is visibly assured. Other regions may meet with greater success, where the growth of health facilities and medical care and growth in income substantially reduce the risks of infertility and child loss to individuals.

The necessity of resolving the problem of infertility along the way to eventual fertility regulation may or may not be recognized. Ultimately, the problem of infertility will inevitably have to be addressed if increases in fertility unexpectedly aggravate population growth under current population growth management policies. Where urban annual growth rates of 6 percent and

over are unaccompanied by urban development and the growth of employment opportunities, a growing widespread availability of antibiotics on the open market could leave large populations with high birth rates (and probably declining mortality), but with few incentives to lower their fertility, while the already grossly inadequate infrastructure becomes increasingly strained (World Bank, 1981). Recent studies suggest that female rural-urban migration is increasing in Africa (Thadani, 1982). Large numbers of women in their early childbearing years could experience much higher fertility than their mothers as a result of their migration into urban areas with lower incidence of infertility. To the extent that breastfeeding declines and the practice of postpartum abstinence disappears under similar conditions of social change, any benefits resulting from lower exposure to venereal disease could further increase fertility over and above the direct impact of the shortened birth intervals.

The implication is that long-term goals for the management of population growth will be served not only by policies to address population and development interrelations, but also by squarely addressing current problems of infertility - although the immediate effect may be a temporary increase in fertility and population growth rates. To invest heavily in contraceptive distribution and standard family planning delivery services at present, while ignoring the demand for medical services (and the need for public health services) that could ameliorate infertility, is thus shortsighted and may have the long-term effect of causing further delays in the fertility transition in sub-Saharan Africa.

Familiar calls for further research do little justice to the enormous scale of current problems related to venereal disease, infertility and

childlessness in Africa, or the likelihood of even greater problems of these kinds in the future. The World Health Organization has begun developing guidelines for epidemiological research (WHO, 1975a) and the International Planned Parenthood Foundation since 1977 has become involved in training and surveying African physicians (Guest, 1978). Efforts are needed in many other fields to determine better the scope of the infertility nexus, its causes and consequences, and the prospects for intervention at many levels. As a determinant of demographic behavior, infertility requires special attention, since it is a potential source of discontinuity in the future fertility of Africa.

The course of infertility can be influenced by government policies and resource allocations to this area. Moreover, policy must reflect not only the potential long-term benefits of controlling infertility but also the implications of reduced infertility for social and economic development policies aimed at the management of population growth. Without concerted efforts to direct research and resources to the problem, it may worsen. Even without such a worsening, current levels of infertility already represent a major obstacle to Africa's fertility transition because uncertainty in childbearing inhibits response to intrinsic and extrinsic pressures to reduce fertility goals. Infertility could remain a strong source of resistance even when other barriers to fertility regulation are coming down, since certain aspects of modernization (such as rapid urbanization and declines in endogamy) foster the diffusion of venereal disease. But there is the likelihood also that unanticipated declines in infertility will exacerbate the problems of population growth management. Early attention to infertility as a major health problem will likely result first in earlier acceleration of

population growth, but subsequently it can bring forward the timing of response to socioeconomic and other signals to limit childbearing.

Notes

1. See for example the editorial: "Africa's Demographic Crisis Ignored," in Pop Line, March 1982.

2. The majority of estimates of the crude birth rate and the total fertility rate are those derived by Page and Coale (Page and Coale, 1972) using Sullivan's (Sullivan, 1972) modification of the Brass technique (Brass, and Coale, 1968) to derive $1_2$ based on $D_2$ and selecting a model stable population (principally "west"; Coale and Demeny, 1966) based on the proportion under age 15 and $1_2$; the total fertility rate was estimated as 2.03 GRR, and the GRR on the basis of $\overline{m}$ from observation or parity ratios for the stable population selected. Where data were used from other sources of estimates, it is indicated in the sources of data by country in the Appendix.

3. While the distinction between these two sources of infertility is not important demographically, it is important to note the relative contributions of each and the changes with age. Available data from Kenya indicate that pregnancy loss is reported by a minority of childless women at all ages, and in proportionately fewer childless women with increasing age. This is consistent with the eventual elimination from childless groups of all but the "hard-core" infertility cases (childless women with a history of foetal loss, for example, eventually carry successfully to a live birth). Nevertheless, the distinction is heavily blurred in measurement by unrecognized early foetal loss and by underreporting of pregnancy wastage except in carefully designed and executed surveys, or within epidemiological or clinical research protocols. Moreover, the distinction is, of course, far from moot for medical research: it has important implications for determining the etiology of infertility and for the selecton of curative and preventive measure.

   Another distinction which is subsumed concerns stillbirths (foetal mortality after 28 weeks of gestation) which are generally more measurable. Demographically, the attribution of the "normal" incidence of 1-2% still- births (WHO, 1975a, p.21), or even of the 6% reported for Mauritius (WHO, 1970), to women's fertility histories as births (children "ever born"), or its omission (children "born live") makes very little difference. In medical research, the distinction may be useful, although the rate of stillbirths is rarely high relative to the spontaneous abortion and neo- natal death rates (see pp.257-258, Belsey, 1979). In any case, still- births per se are unlikely to be alone responsible for a childless status in any measurable way.

4. See Cantrelle and Ferry, 1979. Women childless ranged narrowly between 26% and 45% of all women aged 45 or 50 and over who were childless, of parity one and of parity two. The ratios of primary to secondary inferti- lity reported in clinical series provide findings fairly consistent with the Cantrelle and Ferry series: 43%:60% in Cameroon (Leke and Nasah, 1981; Guest, 1978); and 30%:70% in Kenya (Leke and

Nasah, 1981). See also Bourgeois-Pichat, 1965, p. 39, table VI.

5. See also the points raised by Brass in the discussion following Henry, 1963 (p. 93), and Bourgeois-Pichat, 1965 pp. 384, 397.

6. In addition, for information derived from censuses, women in their forties are in the ages very close to showing a combination of lowest errors for failure by enumerators to enter zero parity because women are "not at home," as compared to younger groups of women, and lowest memory error (a tendency to forget children who may have died in the past), as compared to older groups of women (El-Badry, 1961 p. 912). Furthermore, data on "not stated" fertility from the 1962 Kenyan and 1967 Tanzanian censuses do not show increases among women reported in their late forties. We assume here, therefore, that under- statement of childlessness still largely underlies cases of unstated fertility at these ages (Egero and Henin, 1973, p. 191).

   With respect to the declining proportions of women childless by age, there are not strong reasons a priori to assume a relationship in either direction for the possible confounding association between mortality and childlessness, i.e. selection factors operating on women because they are childless. Maternal mortality would inflate childlessness in the childbearing years (WHO, 1975a), but childless women may experience higher mortality through hardships such as abandonment associated with their infertility. Mortality directly related to the childless status i.e. the incidence of life- threatening disorders in adulthood which preclude childbearing would not be great, and, moreover, would be experienced more or less similarly everywhere. Lack of support from older children may have a larger effect on the selective mortality of childless women, but generally at older ages. However, measurable selection might occur where cultural treatment of barren women is particularly harsh, effectively depressing the representation of childless women already in the 45-49 year age group.

7. As a rough indication in applying the order of magnitude of the phenomenon to the African situation, infant mortality is estimated to have reached 135/1000 in Indonesia in 1967-69, the mortality rate in the first three years of life 194/1000 in 1967, and mortality in the first two years about 180/1000 in 1969 (McNicoll and Singarimbun, 1982, pp. 9-10). Mortality at older ages operates also, of course, particularly for the oldest groups of childless women.

8. An order of magnitude of the problem in Africa can be inferred from the African national fertility surveys. Women of parity one aged 45-49 who report no living children in Sudan, Kenya and Lesotho comprise 1.47 percent, 1.14 percent and 1.71 percent of all women 45-49 respectively. At parity two, the percentages fall to .49, .75 and .34 (Sudan Fertility Survey, 1979, 1982; Kenya Fertility Survey 1977-78, 1980; Lesotho Fertility Survey, 1977, 1981).

9. Where total fertility rates were not available or could not be derived, the average parity of women age 45-49 was retained, bearing in mind that

it generally under-estimates total fertility.

10. A priori, the combination of high levels of childlessness and low total fertility could signal gross underreporting of births alone. It is very unlikely, however, that underreporting of births among African women would take the form of gross overstatement of childlessness so much as understate- ment of total births. Nor is there any reason for underreporting of total births to occur substantially more in populations of women where there is a high level of childlessness. Finally, as discussed above in the text, understatement of childlessness is more likely to occur than overstatement of childlessness overall in Africa; in the case of censuses, underrecording of childless women is associated with inflation of total fertility, if total fertility is calculated for the women whose fertility was recorded (El-Badry, 1961).

11. Similar analyses of crude birth rate data indicate that mean childlessness corresponds to a CBR of about 46 per thousand, which is 6 points lower than the CBR associated with 3 percent childlessness (52 per thousand).

12. See Mosley et al., 1981, table 13 ($C_m$ = .81); Lesthaeghe et al., 1981a, pp. 7-8; Bongaarts, 1981a, table 1V, p. 126. As a rough indication, breastfeeding duration in the last closed interval have been estimated to average 20 months in Senegal and Lesotho and 16 months in Sudan (Enquête Sénégalaise sur la Fécondité 1978, 1981; Lesotho Fertility Survey 1977, 1981; The Sudan Fertility Survey 1979, 1982). For Kenya, average duration of breastfeeding in the last closed interval was estimated at 12 months, but further analysis suggests an average duration of 17 months as more accurate (Mosley et al., 1981). The three other surveys, however, probably did not yield closed interval data with as strong a bias toward shorter durations.

    It is interesting to note that Lorimer arrived at a hypothetical total fertility of 7.5 for natural fertility populations by arbitrarily selecting and then synthesizing the range of age-specific fertility rates from various populations which had fairly long durations of breastfeeding (Lorimer et al, 1954).

13. The effect of gonorrhea on physiological fertility in the male is very unclear. Associations between gonorrhea in males and childlessness or low fertility have been cited without clear indication of whether spouses or partners were also infected. But in a study in Uganda, only 5 of 665 males with gonorrhea (540 of these had acute gonorrhea, 97 for the first time, 243 for the second time and 124 for the third time) were sterile (one percent), and their sterility was confirmed physiologically (Kibukamusoke, 1965). It is likely that gonorrhea in males is associated with infertility largely through the high probability of pathology in their spouses or partners.

    Even though the WHO considers infertility in the woman as an indicator of couple infertility, in Africa infertility in the woman is more likely to be a reflection of her fertility status alone as there is strong evidence that African women experience a higher level of marital

mobility in an effort to bear children than say, in the United States, where an infertile couple may more often stay together and opt for other solutions, such as treatment, adoption, or childlessness.

14. Weström (1975) found the risk of tubal occlusion in a sample of Swedish women with acute pelvic infection to beat least one tenth after one episode, a one third after two episodes, and three fourths after 3 episodes. The majority of cases of pelvic infections and tubal occlusion in his sample were due to non-gonorrheal causes. He cautions, however, that that is largely due to the much greater susceptibility of gonorrhea to antibiotic treatment, and points out that tubal occlusion was more often due to gonorrhea than other causes of tubal infection in the "pre-antibiotic" era. Much recent research points up the increasingly preponderant role played by Chlamydia Trachomatis in the etiology of pelvic inflammatory disease and tubal occlusion in Western Europe and the United States (Weström, 1975; Weström and Mardh, 1975; Schachter et al., 1975; Schachter, 1978; Weström, 1980; Curran, 1980; Weström et al. , 1982). In Africa, the majority of cases of pelvic and tubal infection are probably still gonococcal and the majority of tubal occlusions due to gonorrhea: gonococcal etiology of pelvic inflammatory disease (salpingitis) was clearly documented in clinic samples in Cameroon in the late 1950s, in Uganda in the late 1960s, in Kenya in the early 1970s and in Zambia in the late 1970s (Merle and Peuch-Lestrade, 1960; Grech et al., 1973; Carty et al., 1972; Ratnam et al., 1980).

15. In addition, even the reported high rates of foetal wastage must be gauged against the naturally occurring rate, estimated to be at least 15- 20% in healthy populations (Bongaarts, 1981b).

16. The number of cases reported for the year between 1965 and 1973 with the largest number of cases was used throughout. This is because the yearly series showed trends in so few countries that the relative orders of magnitude seemed alone salvageable; in any case, gross underreporting may be assumed, at the very least if the incidence of gonorrhea is to adequately relate to the high prevalence of infertility in some African countries.

17. The countries where gonorrhea has been implicated in the research on infertility are: the Central African Republic, Chad, Gabon, Ghana, Kenya, Nigeria (where prevalence rates of 4.9% in Lagos [WHO, 1963] and 9.7% in Sokoto [Romanowski, 1952] have been recorded), Sudan (where reported cases of gonorrhea reached 1.4% in Equatoria and 5% in Khartoum in 1964/65 [Ministry of Health, 1964-65]), Tanzania, Uganda, Upper Volta, the United Republic of Cameroon (where a prevalence rate of venereal disease of .8% was reported in 1967 [Fleury, 1982] and 1.3% in the 1970s [WHO, 1980]), and Zaïre.

18. By the nineteenth century, slaves were collected from as far as the Congo, Chari and Zambesi river basins to be routed mainly to North Africa and the Middle-East. Dr. Livingstone documented the ravages of the ongoing slave-shipping from the Zambesi region as recently as in the 1860s.

(Retel-Laurentin, 1974a, Encyclopaedia Britannica, 1966).

19. See Sala-Diakanda and Lohlé-Tart, 1980. Although they dispute the role of venereal disease in infertility in fairly strong language (being justifiably concerned by the rather tasteless possibility of moralistic judgments emanating from such an hypothesis), they offer no alternative explanation, and fall back on the availability of antibiotics to explain fertility increases in Zaïre by 1975-76 (see footnote 54 p.47 and p.56).

20. Women 30 to 39 in 1973 were 24 to 33 in 1967, which are the peak childbearing years, while women 40 to 49 in 1973 were 34 to 43. Given that the number of episodes of gonorrheal infection after which tubal infection leads to definitive occlusion is not known for Africa (see footnote 14), we can speculate that women in the younger group received treatment early enough to avert occlusion and fewer of them were childless at the time of the survey. Among older women, however, there were already more cases of definitive occlusion in the late 1960s, which were not alleviated by any availability of antibiotic treatment. Some support for this possibility is afforded by examining the data for the 1967 Census of Tanzania. In 1967, the percentages of women who were childless was a little higher (around 13-14 percent in all age groups), based on adding the percent childless and the percent with fertility unstated (Egero and Henin, 1973, tables 12.5 and 12.6). But infertility in Tanzania may have been already on the decline for other reasons (such as declines in postpartum abstinence and decreased transmission of venereal disease) — the percent of women childless aged 46 and over is reported to have been 17 percent in mainland Tanzania in the 1948 East Africa census (Martin, 1953, p. 194).

21. Marital instability (frequent divorce and remarriage) has been documented among the Poular and Serer of Senegal (Enquête Sénégalaise Sur la Fécondité, 1981), the Barma of Chad (Reyna, 1975), the Mijikenda of Kenya (Kenya Fertility Survey, 1978), in the Bouake and Daloa regions of Ivory Coast (Roussel, 1965), among the Nzakara of the Central African Republic (Wilde, 1973; Retel-Laurentin, 1979b), the Fulani of Niger and of the United Republic of Cameroon (Ganon, 1975; Burnham, 1974), the Kanuri and the Fulani-Hausa of Nigeria (Cohen, 1974, Trevor, 1975), in several regions of Tanzania (Richards and Reining, 1954; Blacker, 1961-62; Roberts and Tanner, 1959-60, de Jonge, 1971; Henin (ed.), 1973 [Vol. VI]), among the Baganda and Teso of Uganda (Arya et al., 1973; Richards and Reining, 1954; Bennett, 1962) and among the Mongo-Nkundo of Zaire (Lorimer et al., 1954; Retel-Laurentin, 1974a; Romaniuk, 1967). Similarly, high polygamy has been noted for example in Gabon (François, 1975), among the Mijikenda (The Kenya Fertility Survey, 1978), in Mozambique (Kalemba, 1982), among the Nzakara in Central African Republic (Wilde, 1973), among the Fulani-Hausa in Sokoto, Nigeria (Trevor, 1975), among the Baggara and Blue Nile Nomads of Sudan (Henin, 1969).

22. Lower fertility among polygamous women has been found in Burundi (Dittgen and Guitton, 1975), Gabon (François, 1975), in Kenya (Mosley et

al., 1981) in Ivory Coast (Roussel, 1967), and among Nomads in the Sudan (Henin, 1969), while lower fertility with increasing numbers of marriage has been shown among the Barma in Chad (Reyna, 1975), in Ghana (Pool, 1968) and in Niger (Dankoussou et al., 1975). See also Page, 1975, pp.50- 52.

23. This interpretation has been extensively argued by both Romaniuk and Retel-Laurentin throughout their research. In one of the most reliable studies of infertility and gonorrhea, Arya et al. found the highest prevalence of gonorrhea among separated, widowed and divorced women, and among polygamous men (Arya et al., 1973).

24. Bahaya women are reported in both sources to travel back and forth between Bukoba District of Tanzania to the urban areas of Uganda, where their clients are largely Baganda. Richards and Reining report that 13% of Bahaya women were recorded as absent in Bahaya villages of Bukoba District in their 1952 survey (see p. 375, Richards and Reining, 1954).

25. Childlessness or barrenness of a marriage is cited as important grounds for divorce among the nomads in Sudan (Henin, 1969), the Barma of Chad (Reyna, 1975), the Buhaya (Richards and Reining, 1954) and among Africans in general (Romaniuk, 1968a).

26. See for example the case of the Bisisi child among the Buhaya (Richard and Reining, 1954, pp.374 to 377).

27. It is interesting to note in this regard for example that the Ruvuma Region of Tanzania has very low infertility overall, but has a profile of very high marital instability (Henin (ed.), 1973, Volume VI p.60); similarly, the Kenya Fertility Survey recorded 40% of women who married after age 20 among the women married 5-9 years prior to the survey as having at least one premarital birth (Mosley et al, 1981).

28. In fact, women from populations with high infertility are sometimes reported to divorce their husbands because the husband has taken another wife to bear children (Roberts and Tanner, 1959-60, see p. 77 and Richards and Reining, 1954, p.386).

29. Arya et al. have also shown that among Etesot women, the highest rates for active gonorrhea among polygamously married women are for subsequent wives, particularly the youngest (see Arya et al., 1973, pp.592-593).

30. It should be noted, however, that the reported length of postpartum abstinence may be irrelevant to the occurrence of extra-marital sex. Even short periods when strictly enforced and observed may lead to sexual mobility, while long but irregularly observed taboos, or those which provide for a number of ceremonial lapses could be associated with less sexual mobility.

31. Much of the specific data needed to begin to document the possible role of postpartum abstinence is "invisible" in the data available. For

example, among the Fulani group of Senegal (Poular), there are three sub-groups: Tukulor, Fulani and Foula. While both Tukulor and Fulani observe a short postpartum abstinence, the Foula were reported in 1968 to observe strictly a period of 18 months on average. While no data on childlessness are given for those groups, their lower fertility overall could be related to infertility in the one subgroup, in association with the extended postpartum abstinence. That the abstinence is not directly responsible for the lower fertility is suggested by other data on the Foula, who are a major Fulani group in Fouta-Djallon, Guinea. They have been found not only to observe similarly extended postpartum periods of abstinence in Guinea, but also to have had a level of childlessness of 7 percent among women 45-49. See Cantrelle and Ferry, 1979, pp.353-354 and Enquête Sénégalaise sur la Fécondité, 1981.

32. The realities of trying to control venereal disease in urban areas of Africa, some with even a considerable level of resources, are vividly portrayed in Guest, 1978.

33. In the 11th and most recent edition of the "Population and Family Planning Programs" Factbook, an explicit mention of infertility in a population policy appears: "anti-sterility" services are included in Zaïre's "Desirable Births" units (see Nortman and Fisher, 1982).

34. For the important distinction between urbanization with and without development, particularly for Africa, See World Bank, 1974, and 1981 (especially pp.114-117).

35. Polygamy is reported to be increasing in Senegal (see Enquête Sénégalaise sur la Fécondité, 1981). In general the level of polygamy seems to bear little relationship to its legal status in Africa.

36. See for example the Lagos Parity Study, in Lesthaeghe et al., 1981b, especially Table II, page 154.

37. Declines in breastfeeding in the absence of contraception lead to increases in fertility in any case , but this would not affect infertility in the absence of a mechanism linking the two.

38. Further information on PPNG in Africa suggests that a stronger strain of PPNG which is even more difficult to treat may have also been introduced into Africa, at least in Kenya (personal communication from Dr. Wiesner, Director, Venereal Disease Control Division, Centers for Disease Control). The registration of prostitutes and the issuance of public health booklets could introduce some control; but even in Senegal, where all the prostitutes are registered in Dakar, both the need for enforcement and unregulated prostitution make any real level of control doubtful (Fleury, 1982). Prostitutes are also being regularly registered and medically checked in Mombasa, Kenya (Guest,1978). An associated problem is that of neonatal conjunctivitis due to gonorrhea infection in the mother (gonococcal ophthalmia). Aside from whether

prophylaxis is practised or not, prophylactic treatment for conventional gonorrhea is known and reliable, while prophylaxis for PPNG ophthalmia remains undetermined; treatment of diagnosed PPNG neonatal ophthalmia is controversial. Little is available on the prevalence of gonococcal ophthalmia in Africa, but data from other developing regions suggest that its incidence rises steeply with increase transmission of gonorrhea. In São Paolo, Brazil, recorded incidence is reported to have risen from 8 to 256 per 100,000 from 1960 to 1976. Gonococcal ophthalmia is a cause of blindness (Fleury, 1982; CDC, 1982b).

39. The range of percentages makes some sense in terms of the estimated prevalence in various regions: 25% of consultations are reported in Accra, 40% to 70-80% in Yaounde, Cameroon and 50-70% in Nairobi, Kenya.

40. At the very least, attempts to introduce family planning in the presence of infertility would be greatly hindered by the demand for infertility treatment from any structure put in place. Adadevoh has expressed this possibility eloquently: "Whilst there is this lack of objective data for widespread infertility in a number of areas, the importance of sub-fertility and infertility in family welfare in Africa cannot be underplayed [sic]. The social stigma of childlessness (from infertility or other causes e.g. pregnancy wastage or child loss) in an African culture is well recognised. At the individual level, family planning clinics in Africa have constantly been besieged by women presenting them with the problem of 'wanting to have more babies'. On the other hand, the family planning services rendered at these clinics have been grossly inadequate in giving them such attention. The effect of the disappointment so experienced, on the overall acceptance and success of family planning activities varies no doubt from one area to another; but could be expected to be adversely significant where sub-fertility or infertility is suspected to exist" (Adadevoh, 1977, p.83).

41. Personal communication from Mr. Sama, UNFPA, Yaounde.

42. Trevor describes the custom of "riko" (a child to hold) in Sokoto, and shows that the number of these "sociological" children differs not only from the number of biological children a woman may have, but also from "economic" children for whom she has financial responsibility.

43. This is quite aside from the possibility that even in the absence of any infertility, the practices of child redistribution are likely to blur substantially the translation of fertility into economic responsibility for any individual.

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# A P P E N D I X

TABLE: Fertility measures, percent of women childless at various ages, percent of the total population, and average duration of postpartum abstinence for regions and ethnic groups, twenty-four selected sub-Saharan countries of Africa, various years.

Country Reviews and Data Sources

Fertility measures, percent of women childless at various ages, percent of total population, and average duration of postpartum abstinence for regions and ethnic groups, twenty-four selected sub-Saharan countries of Africa, various years.

| Country | Date | Region or *Ethnic Group* | CBR | TFR | Percent Childless 20-29 | 25-29 25-34 | 30-34 30-39 | 35-39 35-44 | 40-44 40-49 | 45-49 45-54 | 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Angola | 1940 | Whole Country | 45 | 5.5(1940/45) | | 19.6 | | | | 10.2 | | | |
| | | Benguela Province | 53 | 4.7 | | 16.1 | | | | 8.9 | | | |
| | | Bié | 39 | 2.9 | | 29.3 | | | | 15.1 | | | |
| | | Huila Province | 43 | 3.6 | | 22.9 | | | | 11.2 | | | |
| | | Luanda Province | 50 | 4.8 | | 14.4 | | | | 6.1 | | | |
| | | Malange Province | 45 | 3.7 | | 19.1 | | | | 9.2 | | | |
| | 1950 | Whole Country | 45 | 5.5(1940/45) | | 18.4 | | | | 12-14 | | | |
| | | Benguela Province | 53 | 4.6 | | 16.3 | | | | 10.1 | | | |
| | | Bié Province | 39 | 3.3 | | 27.3 | | | | 21.4 | | | |
| | | Huila Province | 40 | 4.0 | | 15.1 | | | | 9.6 | | | |
| | | Luanda Province | 51 | 5.2 | | 16.7 | | | | 7.6 | | | |
| | | Malange Province | 43 | 3.9 | | 17.4 | | | | 10.1 | | | |
| | 1960 | Whole Country | 47 | 6.2 | | | | | | | | | |
| | | Benguela Province | 55 | 6.7 | | | | | | | | 31 | |
| | | Bié Province | 44 | 5.7 | | | | | | | | 18 | |
| | | Huila Province | 43 | 5.7 | | | | | | | | 13 | |
| | | Luanda Province | 49 | 6.6 | | | | | | | | 23 | |
| | | Malange Province | 46 | 6.0 | | | | | | | | 15 | |
| Burundi | 1952-57 | Whole Country | 46 | 6.4 | | | | | | | | | |
| | 1970/71 | Women married monogamously | | | | 5,9 | | | | 2.5 | | | |
| | | Women married polygamously (Polygamy rate = 104) | | | | 15.5 | | | | 9.4 | | | |
| | 1973 | Bubanza and Tgozi Provinces | | 6.8 | | 5.3(15+) | | | | | | | |

| Country | Date | Region or *Ethnic Group* | CBR | TFR | Percent Childless 20-29 | 25-29 / 25-34 | 30-34 / 30-39 | 35-39 / 35-44 | 40-44 / 40-49 | 45-49 / 45-54 | 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Central African Republic | 1959/60 | Central (Centre Oubangui) *Banda* | 37 | 4.6 | | 26.0 | | | | 21.0 | | 20 | |
| | | West (Ouest) *Baya* | 50 | 6.4 | | 17.0 | | | | 12.0 | | 53 | |
| | | River (Fleuve) *Banda* and *Nzakara* | 30 | 3.8 | | 36.0 | | | | 24.0 | | 11 | |
| | 1958/60 | Eastern River and East *Nzakara* and *Azande (Zande)* | | 2.0 | | 50.0 | | | | 33.4(40+) | | ( 5) | |
| Chad | 1963/64 | "North" and "South" | 46 | 6.1 | | 15.0 | | | | 11.0 | | | |
| | | "North" | 43 | 5.5 | 21(15+) | 14.0 | | | | 10.0 | | 53 | |
| | | Ouaddai | 42 | 4.0 | 18(15+) | | | | | | | 10 | |
| | | Salamat | 40 | 4.8 | 19(15+) | | | | | | | 3 | |
| | | Batha | 35 | 4.7 | 20(15+) | | | | | | | 9 | |
| | | Guera | 35 | 4.5 | 20(15+) | | | | | | | 5 | |
| | | Chari-Baguirmi | 35 | 3.7 | 26(15+) | | | | | | | 12 | |
| | (1969/70) | *Barma, Central Sudanic* | | | 25(18+) | | | | | | | | |
| | | "South" | 48 | 6.6 | 21(15+) | 15.0 | | | | 12.0 | | 47 | |
| | | Moyen Chari | 45 | 4.6 | 20(15+) | | | | | | | 11 | |
| | | Logone Oriental | 44 | 5.1 | 25(15+) | | | | | | | 7 | |
| | | Logone Occidental | 43 | 5.1 | 18(15+) | | | | | | | 6 | |
| | | Mayo-Kebbi | 52 | 4.6 | 23(15+) | | | | | | | 7 | |
| | | Tandjile | 55 | 5.7 | 15(15+) | | | | | | | 15 | |
| | | N'Djamena | 44 | 4.0 | 27(15+) | | | | | | | 3 | |
| Congo | 1960/61 | Whole Country surveyed | 44 | 5.9 | | 23.9 | | | | 20.5 | | | |
| Gabon | 1960/61 | Whole Country | 27 | 3.5 | | 34.0 | | | | 32.0 | | | |

| Country | Date | Region or Ethnic Group | CBR | TFR | Percent Childless 20-29 | 25-29 25-34 | 30-34 30-39 | 35-39 35-44 | 40-44 40-49 | 45-49 45-54 | 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ghana | 1960 | Whole Country | 47 | 6.6 | | | | | | | | | |
| | | Greater Accra: | 45 | 6.6 | | | | | | | | 7 | |
| | | *Ga-Adangbe,Twi-Ewe* | | 5.8 | | | | | | | | | 3-9 |
| | | Ashanti Region: | 51 | 7.3 | | | | | | | | 17 | |
| | | *Asante,Twi-Akan* | | 7.3 | | | | | | | | | 0-8 |
| | (1952) | *Asante,Twi-Akan* | | 6.6 | | 7.6 | | | | 3.4(40-47) | | | 0-8 |
| | | Brong-Ahafo Region: | 53 | 7.5 | | | | | | | | 9 | |
| | | *Boron* and *Banda,Twi-Akan* | | 7.2 | | | | | | | | | 1-6 |
| | | *Ahafo,Twi-Akan* | | 7.3 | | | | | | | | | 1-6 |
| | | Eastern Region: | 49 | 7.2 | | | | | | | | 16 | |
| | | *Kwawo,Twi-Akan* | | 7.3 | | | | | | | | | 6 |
| | | *Akyem,Twi-Akan* | | 5.9 | | | | | | | | | 6 |
| | | *Akuapem,Twi-Akan* | | 5.2 | | | | | | | | | 6 |
| | | Northern and Upper Regions: | 40 | 5.5 | | | | | | | | | |
| | | Northern Region: | | | | | | | | | | 6 | |
| | | *Guan,Twi-Akan* | | 6.3 | | | | | | | | | |
| | | *Dagomba,Voltaic-Mole* | | 4.8 | | | | | | | | | 19 |
| | | *Konkomba,Voltaic-Gurma* | | 4.4 | | | | | | | | | |
| | | *Grusi,Voltaic-Grusi* | | 5.0 | | | | | | | | | 22 |
| | | *Mamprusi,Voltaic-Mole* | | 6.3 | | | | | | | | | 22 |
| | | Upper Region: | | | | | | | | | | 13 | |
| | | *Dagaba,Voltaic-Mole* | | 6.6 | | | | | | | | | |
| | | *Sisala,Voltaic-Grusi* | | 5.0 | | | | | | | | | 22 |
| | | *Builsa,Voltaic-Grusi* | | 5.1 | | | | | | | | | |
| | | *Frafra,Voltaic-Grusi* | | 4.0 | | | | | | | | | |
| | | *Kusasi,Voltaic-Mole* | | 5.2 | | | | | | | | | |
| | | Volta Region: | 46 | 6.1 | | | | | | | | 12 | |
| | | *Ewe,Twi-Ewe* | | 6.6 | | | | | | | | | 12-17 |
| | | *Central Togo Tribes,Twi* | | 6.4 | | | | | | | | | |
| | | Western and Central Regions: | 47 | 6.6 | | | | | | | | | |
| | | Western Region: | | | | | | | | | | 9 | |
| | | *Akan (All)* | | 6.6 | | | | | | | | | |
| | | *Wasa,Twi-Akan* | | 5.3 | | | | | | | | | |
| | | *Nzema,Twi-Lagoon* | | 5.2 | | | | | | | | | 3-9 |
| | | Central Region: | | | | | | | | | | 11 | |
| | | *Akan (All)* | | 6.6 | | | | | | | | | |
| | | *Fante,Twi-Akan* | | 6.5 | | | | | | | | | 3-9 |

| Country | Date | Region or Ethnic Group | CBR | TFR | Percent Childless 20-29 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guinea | 1954/55 | Whole Country surveyed | 50 | 6.4 | | 9.0 | | | | 6.0 | | | |
| | | Coast<br>*Susu, Nuclear Mande* | 48 | 6.2 | | 11.0 | | | | 8.0 | | 19 | |
| | | Forest | 46 | 5.9 | | 10.0 | | | | 5.0 | | 30 | |
| | | Fouta Djallon<br>*Fulani of Fouta-Djallon* | 53 | 6.8 | | 8.0 | | | | 7.0 | | 38 | |
| | | Upper<br>*Malinke, Nuclear Mande* | 52 | 7.0 | | 8.0 | | | | 2.0 | | 13 | |
| Ivory Coast | 1965 | Whole Country | 50 | | | | | | | | | | |
| | 1956/58 | First Agricultural Sector | 50 | 6.8 | | 10.0 | | | | 8.0 | | | |
| | 1963/64 | *Atie, Twi-Akan* | 50 | 7.1 | | | | | | | | | |
| | 1963/64 | Abengourou Region: | 52 | 6.8 | | 7.0 | | | | 7.0 | | 18 | |
| | | *Atie, Twi-Akan* | 50 | 7.1 | | | | | | | | 3 | |
| | | *Agni, Twi-Akan* | 52 | 7.3 | | | | | | | | 4 | 3-6 |
| | | *South-Eastern Malinke, Nuclear Mande* | 59 | 6.7 | | | | | | | | 7 | |
| | | *South-Eastern Voltaic* | 64 | 8.0 | | | | | | | | | |
| | 1962 | Bouake Region: | 49 | 6.7 | | 15.0 | | | | 14.0 | | 17 | |
| | | *Baoule, Twi-Akan* | 49 | | | | | | | | | 15 | 14 |
| | 1963/64 | Dalos-Gagnoa Region: | 49 | 6.3 | | 13.0 | | | | 14.0 | | 16 | |
| | | *Bete, Kru* | 48 | | | | | | | | | 7 | 14 |
| | | *Dida, Kru* | 50 | | | | | | | | | 3 | 14 |
| | | *Godie, Kru* | 33 | | | | | | | | | .5 | 14 |
| | | *Gouro, Peripheral Mande* | 50 | | | | | | | | | 2 | |
| | 1962 | Korhogo Region: | 45 | 5.8 | | 11.0 | | | | 7.0 | | 8 | |
| | | *Northern Senoufo, Voltaic-Senoufo* | 48 | | | | | | | | | 8 | 14 |
| | 1962 | Man Region: | 45 | 5.2 | | | | | | | | 12 | |
| | | *Mobe, Kru* | 35 | 4.1 | | | | | | | | } 4.5 | |
| | | *Guere, Peripheral Mande* | 43 | | | | | | | | | | 24-36 |
| | | *Dan, Peripheral Mande* | 48 | | | | | | | | | 6 | |
| | 1965 | Odienne Region: | 52 | 6.8 | | 5.0 | | | | 5.0 | | 12 | |
| | | *Senoufo, Voltaic-Senoufo* | 58 | | | | | | | | | 2 | |
| | | *Malinke, Nuclear Mande* | 46 | | | | | | | | | 10 | |

| Country | Date | Region or *Ethnic Group* | CBR | TFR | Percent Childless 20-29 | 25-29 30-34 | 30-34 35-39 | 35-39 40-44 | 40-44 45-49 | 45-49 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kenya | 1969 | Whole Country | 50 | 7.6 | 6.6 | | | | 4.2 | | | |
| | | Nairobi | 41 | 5.5 | 11.9 | | | | 9.4 | | 5 | |
| | | Central Province | 51 | 8.7 | 6.0 | | | | 3.1 | | 15 | |
| | | Coast Province | 42 | 5.6 | 11.8 | | | | 7.9 | | 9 | |
| | | Nyanza Province | 53 | 7.9 | 7.1 | | | | 3.8 | | 19 | |
| | | Rift Province | 44 | 6.6 | 5.4 | | | | 3.6 | | 20 | |
| | | Western Province | 54 | 8.6 | 5.9 | | | | 4.1 | | 12 | |
| | | Eastern Province | 44 | 7.6 | 4.4 | | | | 3.4 | | 17 | |
| | | North-Eastern Province | 41 | 6.6 | 7.8 | | | | 2.8 | | 2 | |
| | 1977/78 | Whole Country | 53 | 3.1 | 5.4 | | | | 2.8 | | | |
| | | Nairobi | | 6.1 | 9.6 | | | | 10.3 | | 5 | 3 |
| | | Central Region: | | 8.6 | 4.2 | | | | .7 | | 15 | 4 |
| | | *Kikuyu, Kenya Bantu* | | 8.4 | 4.4 | | | | 1.7 | | 15 | 4 |
| | | Coast Region: | | 7.2 | 7.0 | | | | 7.1 | | 9 | 3 |
| | | *Mijikenda, Coastal Bantu* | | 7.4 | 3.6 | | | | 8.8 | | 5 | 3 |
| | | Nyanza Region: | | 8.0 | 8.0 | | | | 2.6 | | 19 | 3 |
| | | *Luo, Nilotic* | | 7.6 | 11.5 | | | | 3.7 | | 12 | 3 |
| | | *Kisii, Interlacustrine Bantu* | | 8.7 | 3.7 | | | | 0.0 | | 6 | 3 |
| | | Rift Region: | | 8.8 | 4.2 | | | | 2.7 | | 20 | 6 |
| | | *Kalenjin* | | 8.9 | 3.6 | | | | 0.0 | | 11 | 5 |
| | | Western Region: | | 8.2 | 4.0 | | | | 2.8 | | 12 | 4 |
| | | *Luhya* | | 8.3 | 4.6 | | | | 2.9 | | 11 | 4 |
| | | Eastern Region: | | 8.2 | 2.9 | | | | 2.5 | | 17 | 5 |
| | | *Kamba, Kenya Bantu* | | 8.0 | 4.6 | | | | 2.2 | | 9 | 4 |
| | | *Meru/Embu, Kenya Bantu* | | 8.2 | 2.4 | | | | 2.8 | | 7 | 6 |
| | | North-Eastern Region: | | | | | | | | | | |
| | | *Taita* | | | | | | | | | 2 | |
| | | | | | | | | | | | .1 | |
| Lesotho | 1977 | Whole Country | 40 | 5.7 | 6.0 | | | | 4.1 | | | |
| | | *Basotho, Sotho Bantu* | | | | | | | | | | |

| Country | Date | Region or Ethnic Group | CBR | TFR | Percent Childless 25-29 / 20-29 | 30-34 / 25-34 | 35-39 / 30-39 | 40-44 / 35-44 | 45-49 / 40-49 | 50-54 / 45-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mali | 1960/61 | Entire Southern Half | 51 | 6.7 | 9.0 | | | | 7.7 | | | |
| | 1957/58 | Central Niger Delta (Mopti) | 51 | 7.0 | 12.0 | | | | 8.0 | | | |
| | | *Fulani* | | 6.1 | | | | | | | | |
| | | *Rimaibe* | | 7.4 | | | | | | | | |
| | | *Bambara, Nuclear Mande* | | 7.2 | | | | | | | | 24-36 |
| | | *Bozo, Nuclear Mande* | | 8.6 | | | | | | | | |
| | | *Marka, Intrusive Mande* | | 7.2 | | | | | | | | |
| | 1981 | *Bambara, Nuclear Mande* | 57 | 8.1 | | | | | | | | 24-36 |
| | | *Twareg (nomadic)* | 49 | 6-6.5 | | | | | | | | 40days |
| Mozambique | 1950 | Whole Country | 45 | 6.1 | 23.5 | | | | 13.8 | | | |
| | | North | 39 | 5.3 | 29.0 | | | | 18.0 | | 25 | |
| | | South | 40 | 5.3 | 24.3 | | | | 15.0 | | 36 | |
| | | Central | 54 | 7.4 | 17.3 | | | | 8.3 | | 39 | |
| Niger | 1960 | Southern Niger | 50 | 6.7 | 12.8 | 10.9 | | | 7.2 | | | |
| | | Stratum 1 *Kanuri, Sudanic Fringe* | 28 | 3.7 | | 29.5 | | | 16.0 | | 6 | 40days |
| | | Stratum 2 *Hausa, Sudanic Fringe* | 48 | 6.1 | | 15.5 | | 10(35-49) | 8.9 | | 20 | 24 |
| | (1971) | Maradi-Zinder Region *Hausa and Kanuri, Sudanic Fringe* | | | | | | 18(35-49) | | | | |
| | | Stratum 3 *Sonrai, Sudanic Fringe* | 54 | 7.3 | | 7.0 | | | 7.2 | | 14 | |
| | | Stratum 4 *Hausa, Sudanic Fringe* | 49 | 7.0 | | 8.4 | | | 5.3 | | 15 | 24 |
| | (1963/64) | Tahoua Area: | | | | | | | | | | |
| | | *Fulani - Bororo* | 41 | 3.7 | 5.9 | | | | 9.0 | | | |
| | | *Fulani - Farfarou* | | 7.7 | | | | | 4.0 | | | |
| | | *Twareg - Bouzou sed.* | 52 | 7.1 | 6.5 | 26.0 | | | 8 | 15.0 | | |
| | | *Twareg - Bouzou nomadic* | | 5.0 | | | | | 21 | | | |
| | | *Twareg* | | 6.4 | | | | | 9 | | | 40days |
| | | Stratum 5 *Hausa, Sudanic Fringe* | 52 | 7.6 | | 7.5 | | | 7.0 | | 13 | |
| | | Stratum 6 *Fulani Djerma and Songhay, Sudanic Fringe* | 51 | 7.0 | 9.0 | 7.9 | | | 5.2 | | 29 | |
| | (1970) | Djerma Songhay Region *Djerma and Songhay, Sudanic Fringe* | | 5.0 | 7.0 | 7.0 | | | 9.0 | | | 40days |
| | (1970) | Niamey | 49 | 4.0 | 15.0 | 13.0 | | | 29.0 | | 3 | |

| Country | Date | Region or *Ethnic Group* | CBR | TFR | Percent Childless 20-29 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nigeria | 1952-53 | Whole Country | 54 | 7.0 | | | | | | | | | |
| | | Eastern State | 57 | 7.4 | | | | | | | | 26 | |
| | | Bamenda | 55 | 7.1 | | | | | | | | 1 | |
| | | Cameroons | 45 | 5.7 | | | | | | | | 1 | |
| | | Calabar | 61 | 8.1 | | | | | | | | 5 | |
| | | Ogoja | 54 | 7.0 | | | | | | | | 3 | |
| | | Onitsha | 55 | 7.1 | | | | | | | | 6 | |
| | | Owerri | 61 | 8.1 | | | | | | | | 7 | |
| | | Rivers | 56 | 7.2 | | | | | | | | 2 | |
| | | Northern State | 51 | 6.5 | | | | | | | | 54 | |
| | | Adamawa | 55 | 7.1 | | | | | | | | 4 | |
| | | Bauchi | 50 | 6.4 | | | | | | | | 5 | |
| | | Benue | 49 | 6.2 | | | | | | | | 5 | |
| | | Bornu *Kanuri, Sudanic Fringe* | 46 | 5.8 | | | | | | | | 5 | 40days |
| | | Ilorin | 54 | 6.9 | | | | | | | | 2 | |
| | | Kabba | 51 | 6.5 | | | | | | | | 2 | |
| | | Kano | 50 | 6.4 | | | | | | | | 11 | |
| | | Katsina | 52 | 6.6 | | | | | | | | 5 | |
| | | Niger | 47 | 5.9 | | | | | | | | 2 | |
| | | Plateau | 50 | 6.3 | | | | | | | | 3 | |
| | | Sokoto | 55 | 7.1 | | | | | | | | 9 | |
| | | Zaria | 55 | 7.1 | | | | | | | | 3 | |
| | | Western State | 60 | 7.9 | | | | | | | | 20 | |
| | | Abeokuta | 54 | 7.0 | | | | | | | | 2 | |
| | | Benin | 61 | 8.0 | | | | | | | | 3 | |
| | | Colony | 47 | 6.0 | | | | | | | | 2 | |
| | | Delta | 54 | 7.0 | | | | | | | | 2 | |
| | | Ibadan | 71 | 9.7 | | | | | | | | 5 | |
| | | Ijebu | 51 | 6.5 | | | | | | | | 1 | |
| | | Ondo | 60 | 7.9 | | | | | | | | 3 | |
| | | Oyo | 62 | 8.1 | | | | | | | | 2 | |

| Country | Date | Region or Ethnic Group | CBR | TFR | Percent Childless 20-29 | 25-29 30-34 | 30-34 35-39 | 35-39 40-44 | 40-44 45-49 | 45-49 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 25-34 | 30-39 | 35-44 | 40-49 | 45-54 | | |
| Rwanda | 1952-57 | | 50 | 7.0 | | | | | | | | |
| Senegal | 1960/61 | Whole Country | 49 | 6.5 | | 12.0 | | | 6.0 | | | |
| | | Fouta-Toro (Moyenne Vallee du Senegal; Partially in Mauritania) *Tukulor; Fulani of Fouta-Toro* | 47 | 6.4 | | 18.2 | | 10.2 | | | | |
| | 1978 | Whole Country | 48 | 7.1 | | 4.1 | | | 3.5 | | | |
| | | *Tukulor; Fulani (Poular)* | | 6.9 | 14.3(15+) | | | | | | | 5-18 |
| | | *Wolof, Senegambians* | | 7.2 | 11.7(15+) | | | | | | | 60days |
| | | *Malinke, Nuclear Mande* | | 8.1 | 8.4(15+) | | | | | | | |
| | | *Serer, Senegambians* | | 7.8 | 8.0(15+) | | | | | | | 14 |
| | | *Diola, Senegambians* | | 6.3 | 9.0(15+) | | | | | | | |
| Sudan | 1955/56 | Whole Country | 49 | 6.3 | | | | | | | | |
| | | *Arab People* | 47 | 6.1 | | | | | 9.0 | | 39 | |
| | (1961/62) | *Kawahla settled, Baggara* | 57 | 8.2 | 3.8 | | 3.5 | | 4.7 | | | |
| | | *Kawahla semi-settled, Baggara* | 51 | 6.7 | 6.9 | | 3.1 | | 2.0 | | | |
| | | *Kawahla Blue-Nile Nomads, Baggara* | 33 | 3.6 | 23.5 | | 16.1 | | 12.0 | | 3 | |
| | | *Messeriya Humr and Rezigat settled, Bagg.* | 41 | 4.6 | 17.0 | | 7.5 | | 14.0 | | | |
| | | *Messeriya Humr and Rezigat nomadic, Bagg.* | 30 | 3.5 | 24.9 | | 15.5 | | 11.5 | | | |
| | | *Beja People, Sudanic* | 44 | 5.7 | | | | | 10.9 | | 6 | |
| | | *Central Southerners* | 58 | 8.3 | | | | | 2.8 | | 19 | |
| | | *Eastern Southerners* | 60 | 7.9 | | | | | 4.8 | | 5 | |
| | | *Nuba People* | 44 | 5.7 | | | | | 9.3 | | 6 | |
| | | *Nubiyin People, Nubian* | 47 | 6.1 | | | | | 6.3 | | 3 | |
| | | *Western Southerners, Sudanic and Azande, Eastern Nigritic-Equatorial* | 33 | 4.1 | | | | | 30.5 | | 5 | |
| | | *Westerners* | 46 | 5.9 | | | | | 9.4 | | 13 | 14 |
| | 1979 | North Sudan | | 6.9 | | 7.5 | | | 8.6 | | | |

| Country | Date | Region or Ethnic Group | CBR | TFR | Percent Childless 25-29 / 20-29 | 30-34 / 25-34 | 35-39 / 30-39 | 40-44 / 35-44 | 45-49 / 40-49 | 50-54 / 45-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tanzania | 1973 | Mainland | 47 | 6.3 | | | 10.0 | | 11.4 | | | |
| | | Arusha Region | 48 | 6.5 | 9.5 | | 5.8 | | 6.3 | | 5 | |
| | | *Iraqw,Cushite* | | *6.3* | | | 6.5 | | 6.7 | | 2 | |
| | | Coast Region (excluding Dar-Es Salaam) | 39 | 5.1 | 11.4 | | 13.8 | | 14.0 | | 4 | |
| | | *Zaramo,Coastal Bantu* | | *4.0* | | | 11.4 | | 15.8 | | 1 | |
| | | Dodoma Region | 48 | 6.7 | 8.9 | | 7.1 | | 7.2 | | 6 | |
| | | *Gogo,Tanganyika Bantu* | | *5.0* | | | 8.8 | | 7.1 | | 3 | |
| | | Iringa Region | 52 | 6.9 | 6.6 | | 4.4 | | 5.2 | | 6 | |
| | | *Hehe,Tanganyika Bantu* | | *6.0* | | | | | 5.0 | | 2 | 1-2 |
| | | Kigoma Region | 42 | 5.9 | 10.8 | | 9.7 | | 15.1 | | 3 | |
| | | *Ha,Interlacustrine Bantu* | | *4.1* | | | 10.6 | | 18.2 | | 3 | |
| | | Kilimanjaro Region | 46 | 7.0 | 12.8 | | 5.8 | | 5.8 | | 6 | |
| | | *Chaga,Kenya Bantu* | | *6.4* | | | 3.4 | | 3.9 | | 4 | |
| | | Lindi Region | 38 | 5.1 | 14.4 | | 13.9 | | 18.3 | | 3 | |
| | | *Mwera,Central Bantu* | | *3.9* | | | 14.9 | | 12.9 | | 2 | |
| | | *Makonde,Central Bantu* | | *4.8* | | | 7.5 | | 11.4 | | 1 | |
| | | Mara Region | 50 | 6.9 | 10.2 | | 12.6 | | 17.3 | | 5 | |
| | | *Kuria,Interlacustrine Bantu* | | | | | | | | | 1 | |
| | | *Luo,Nilotic* | | | | | | | | | 1 | |
| | | *Tita* | | | | | | | | | 1 | |
| | | Mbeya Region | 52 | 7.1 | 8.9 | | 5.8 | | 5.9 | | 8 | |
| | | *Nyakyusa,Tanganyika Bantu* | | *4.9* | | | 8.0 | | 7.0 | | 2 | 12 |
| | (1967) | Rungwe District | | 7.8 | 8.0 | | | | 6.0 | | | |
| | | *Nyakyusa,Tanganyika Bantu* | | 6.7 | | | 6.3(30-49) | | | | | |
| | | *Lakeshore Nyakyusa* | | 5.8 | | | 11.2(30-49) | | | | | |
| | | *Ukukwa Nyakyusa* | | 6.9 | | | 4.6(30-49) | | | | | |

| Country | Date | Region or Ethnic Group | CBR | TFR | 25-29 / 20-29 | 30-34 / 25-34 | 35-39 / 30-39 | 40-44 / 35-44 | 45-49 / 40-49 | 50-54 / 45-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Morogoro Region | 43 | 6.0 | 10.4 | 11.1 | | | 11.3 | | 5 | |
| | | *Luguru, Coastal Bantu* | | *4.4* | | 8.8 | | | 13.9 | | 2 | 2-12 |
| | | Mtwara Region | 39 | 5.2 | 9.2 | 8.8 | | | 10.5 | | 6 | |
| | | *Makonde, Central Bantu* | | *4.8* | | 7.5 | | | 11.4 | | 2 | |
| | | *Mwera, Central Bantu* | | *3.9* | | 14.9 | | | 12.9 | | 1 | |
| | | *Makua, Central Bantu* | | *4.6* | | 10.8 | | | 11.1 | | 1 | |
| | | Mwanza Region | 49 | 6.6 | 14.4 | 14.0 | | | 13.6 | | 9 | |
| | | *Sukuma, Tanganyika Bantu* | | *4.7* | | 11.4 | | | 12.2 | | 6 | 2-5 |
| | | Ruvuma Region | 47 | 6.4 | 10.8 | 5.9 | | | 5.8 | | 3 | |
| | | *Matengo, Tanganyika Bantu* | | | | | | | | | 1 | |
| | | *Yao, Central Bantu* | | *4.7* | | 13.7 | | | 12.8 | | 1 | |
| | | Shinyanga Region | 49 | 6.4 | 13.6 | 13.8 | | | 20.5 | | 7 | |
| | | *Sukuma, Tanganyika Bantu* | | *4.7* | | 11.4 | | | 12.2 | | 5 | 2-5 |
| | | *Nyamwezi, Tanganyika Bantu* | | *4.0* | | 17.9 | | | 15.6 | | 1 | |
| | | Singida Region | 44 | 5.5 | 9.1 | 13.6 | | | 11.3 | | 3 | |
| | | *Turu, Tanganyika Bantu* | | | | | | | | | 2 | |
| | | *Iramba, Tanganyika Bantu* | | *4.1* | | 13.5 | | | 12.1 | | 1 | |
| | | Tabora Region | 40 | 5.4 | 13.7 | 17.0 | | | 15.5 | | 4 | |
| | | *Nyamwezi, Tanganyika Bantu* | | *4.0* | | 17.9 | | | 15.6 | | 2 | |
| | | *Sukuma, Tanganyika Bantu* | | *4.7* | | 11.4 | | | 12.2 | | 1 | 2-5 |
| | | Tanga Region | 47 | 7.0 | 6.1 | 6.0 | | | 7.0 | | 7 | |
| | | *Shambaa, Kenya Bantu* | | *6.6* | | 2.0 | | | 3.0 | | 3 | |
| | (1957/58) | Pangani District | | *5.0* | | 37.0 | | | 20.0(40+) | | | |
| | | West Lake Region | 43 | 6.8 | 9.5 | 10.3 | | | 15.1 | | 6 | |
| | | *Haya, Interlacustrine Bantu* | | *4.6* | | 10.6 | | | 16.4 | | 4 | |
| | (1952) | Bukoba District | | *4.3* | | | 21.2 | | | 18.3(45-59) | | |
| | | *Haya, Interlacustrine Bantu* | | | | | | | | | | |

| Country | Date | Region or *Ethnic Group* | CBR | TFR | 20-29 | 25-29 / 25-34 | 30-34 / 30-39 | 35-39 / 35-44 | 40-44 / 40-49 | 45-49 / 45-54 | 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Uganda | 1948 | Buganda, Eastern and Western Provinces | | 5.0 | | | | | | 18.0(46+) | | | |
| | | Buganda Province | | *3.7* | | | | | | 24.4(46+) | | | |
| | | Mengo Districts | | *3.2* | | | | | | | | | |
| | (1952) | *Baganda(Ganda),Interlacustrine Bantu* | | *3.0* | | | | | | 31.8(45-59) | | | 1-2 |
| | Various Years | Whole Country | 44 | 6.0 | | | | | | | | | |
| | | Buganda Province | 41 | 5.6 | | | | | | | | 28 | |
| | | Masaka District | 42 | *4.0* | | | | | | | | 7 | |
| | | Mubende District | 41 | *4.1* | | | | | | | | 3 | |
| | | East Mengo District | 38 | } *3.2* | | | | | | | | 12 | |
| | | *Baganda(Ganda),Interlacustrine Bantu* | | | | | | | | | | | 1-2 |
| | | West Mengo District | 42 | | | | | | | | | 5 | |
| | | *Baganda(Ganda),Interlacustrine Bantu* | | | | | | | | | | | 1-2 |
| | | Eastern Province | 42 | 5.7 | | | | | | | | 27 | |
| | | Bugishu District | 48 | *5.7* | | | | | | | | 4 | |
| | | Bukedi District | 50 | *5.7* | | | | | | | | 6 | |
| | | Busoga District | 43 | *5.4* | | | | | | | | 10 | |
| | | Teso District | 36 | *5.1* | 16.4 | | | | | | 21.2(49+) | 6 | |
| | | *Etesot,Nilotic* | | | | | | | | | | | 24-36 |
| | | Sebei District | | | | | | | | | | | |
| | | Northern Province | 51 | 7.3 | | | | | | | | 20 | |
| | | Acholi District | 55 | | | | | | | | | 5 | |
| | | Karamoja District | 53 | | | | | | | | | 3 | |
| | | Lango District | 50 | *7.0* | | | | | | | | 5 | |
| | | Madi District | 50 | *7.0* | | | | | | | | 1 | |
| | | West Nile District | 48 | *4.6* | | | | | | | | 6 | |
| | | Western Province | 46 | 6.4 | | | | | | | | 25 | |
| | | Ankole District | 53 | *7.0* | 2.8 | | | | | | 0.0(49+) | 9 | |
| | | *Bayankole (Nkole),Interlacustrine Bantu* | | | | | | | | | | | 1 |
| | | Bunyoro District | 42 | *4.6* | | | | | | | | 4 | |
| | | Kigezi District | 50 | *6.4* | | | | | | | | 7 | |
| | | Toro District | 44 | *5.2* | | | | | | | | 6 | |

| Country | Date | Region or Ethnic Group | CBR | TFR | Percent Childless 20-29 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| United Republic of Cameroon | 1962 | South-East (Centre et Est)(excluding Douala) | 33 | 4.3 | | 29.0 | | | | 29.0 | | | |
| | | North-West (Moyen Sud) | 37 | 4.8 | | | | | | | | | |
| | | *Bafia,Cameroon Highland Bantu* | | | | | | | | | | | |
| | | *Yambassa(Bassa),Northwestern Bantu* | | 6.1 | | 19.0 | | | | 13.0 | | | |
| | | *Kaka,Equatorial Bantu* | | | | | | | | | | | |
| | | *Baya,Eastern Nigritic-Equatorial* | | | | | | | | | | | |
| | | *Kozino(Kossi),Northwestern Bantu* | | 4.6 | | 28.0 | | | | 23.0 | | | |
| | | *Maka,Equatorial Bantu* | | | | | | | | | | | |
| | | South-East (Est) | 28 | 3.6 | | | | | | | | | |
| | | *Eton,Equatorial Bantu* | | 4.5 | | 29.0 | | | | 29.0 | | | |
| | | *Ewondo* | | | | | | | | | | | |
| | | *Boulou,Equatorial Bantu* | | 4.0 | | 33.0 | | | | 37.0 | | | |
| | | *Betis* | | | | | | | | | | | |
| | 1956 | Mbalmayo Subdivision | | 2.6 | | 46.4 | | | | 34.8 | | | |
| | 1958 | Ebolowa City | | 2.4 | | | | | | 51.0 | | | |
| | 1960 | North | 39 | 4.8 | | 21.0 | | | | 15.0 | | | |
| | | North Benoue | 41 | 5.1 | | 20.0 | | | | 12.0 | | | |
| | | Hill Pagan Areas *Kirdi Baggara* | 49 | 6.4 | | 12.0 | | | | 4.0 | | | |
| | | Plains Pagan Areas *Kirdi Baggara* | 48 | 6.0 | | 11.0 | | | | 9.0 | | | |
| | | Moslem Areas | 27 | 3.5 | | 35.0 | | | | 19.0 | | | |
| | | *Fulani of Adamawa* | | | | | | | | | | | |
| | | *Kanuri,Sudanic Fringe* | | | | | | | | | | | |
| | | South Benoue and Adamaoua | 31 | 3.9 | | 27.0 | | | | 29.0 | | | |
| | | *Laka,Eastern Nigritic-Adamawa* | | 1.7 | | | | | | | | | |
| | | *Baya,Eastern Nigritic-Equatorial* | | 4.7 | | | | | | | | | |
| | | *Fulani of Adamawa* | | | | | | | | | | | |
| | 1964 | West | 50 | 6.5 | | 7.0 | | | | 7.0 | | | |
| | | North | 54 | 7.2 | | 6.0 | | | | 4.0 | | | |
| | | South | 47 | 6.0 | | 8.0 | | | | 11.0 | | | |
| | 1957 | Victoria Division | | | | | | | | | | | |
| | | *Bakweri(Kpe),Northwestern Bantu* | | 4.5 | | | | 15.7 | | | 8.7(50+) | | |
| | 1965 | South-West | | | | 11.4 | | | | 16.9 | | | |
| | | *Bamileke,Cameroon Highland Bantu* | 49 | 6.3 | | 14.0(14-49) | | | | | | | |
| | | *Bamoun,Cameroon Highland Bantu* | 41 | 5.1 | | 22.0(14-49) | | | | | | | |

| Country | Date | Region or *Ethnic Group* | CBR | TFR | Percent Childless 20-29 | 25-29 30-34 | 25-34 35-39 | 30-39 40-44 | 35-44 45-49 | 40-49 50-54 | 45-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper Volta | 1960/61 | Whole Country surveyed | 50 | 6.5 | 7.2 | | | | 5.9 | | | | |
| | | *Mossi, Voltaic-Mossi* | 52 | 6.5 | 4.3(25+) | | | | | | | 47 | 18-24 |
| | | *Gourmantche, Voltaic-Gurma* | 50 | 5.2 | 4.5(25+) | | | | | | | 4 | 14 |
| | | *Gourounsi, Voltaic-Grusi* | 52 | 5.5 | 6.5(25+) | | | | | | | 5 | 22 |
| | | *Senoufo, Voltaic-Senoufo* | 51 | 5.7 | 12.1(25+) | | | | | | | 5 | 14 |
| | | *Lobi-Dagari, Voltaic-Lobi* | 47 | 5.6 | 5.0(25+) | | | | | | | 7 | |
| | | *Bobo, Voltaic-Habe* | 44 | 4.9 | 17.5(25+) | | | | | | | 7 | 19.5 |
| | (1971) | *Bobo-Oule/Bwa Kioyse* | 32 | 4.9 | | 13.2 | | | 28.6 | | | | |
| | | *Bobo-Oule/Bwa Kurusa* | 29 | 4.3 | | 15.6 | | | 26.1 | | | | 19.5 |
| | | *Bobo-Oule/Bwa Kademba* | 50 | 7.0 | | 6.3 | | | 7.1 | | | | |
| | | *Bissa, Intrusive Mande* | 52 | 6.4 | 3.2(25+) | | | | | | | 5 | |
| | | *Marka, Intrusive Mande* / *Samo, Intrusive Mande* | 49 | 5.9 | 6.5(25+) | | | | | | | 7 | |
| | | *Fulani* | 43 | 5.3 | 9.0(25+) | | | | | | | 10 | |

| Country | Date | Region or Ethnic Group | CBR | TFR | Percent Childless 25-29 / 20-29 | Percent Childless 30-34 / 25-34 | Percent Childless 35-39 / 30-39 | Percent Childless 40-44 / 35-44 | Percent Childless 45-49 / 40-49 | Percent Childless 50-54 / 45-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zaire (Congo) | 1955/58 | Whole Country | 44 | 5.8 | 20.9 | | | | | 20.5 | | |
| | | Leopoldville Province (Bandundu and Bas-Zaire) | 48 | 6.6 | 10.6 | | | | | 9.5 | 24 | |
| | | Leopoldville (Kinshasa) | 47 | 6.3 | 13.0 | | | | | 35.7 | 2 | |
| | | Lac Leopold II (Mai Ndombe) | 46 | 6.2 | 18.3 | | | | | 17.8 | 2 | |
| | | Kwilu | 46 | 6.2 | 12.9 | | | | | 8.9 | 9 | |
| | | Kwango | 53 | 7.5 | 6.2 | | | | | 3.4 | 4 | |
| | | Bas-Congo (Bas-Fleuve) | 51 | 6.8 | 9.5 | | | | | 9.0 | 3 | |
| | | *Bakongo, Central Bantu* | | | | | | | | | | 18 |
| | | Cataractes | 50 | 7.2 | 4.8 | | | | | 4.3 | 3 | |
| | | *Bakongo, Central Bantu* | | | | | | | | | | 18 |
| | | Equateur Province | 38 | 4.9 | 28.7 | | | | | 28.6 | 14 | |
| | | *Mongo-Nkundo, Mongo Bantu* | | | | | | | | | | 1 |
| | | Equateur | 31 | 4.0 | 37.7 | | | | | 40.0 | 2 | |
| | | Mongala | 42 | 5.6 | 21.9 | | | | | 26.5 | 4 | |
| | | Tshuapa | 27 | 3.5 | 43.5 | | | | | 33.0 | 3 | |
| | | Ubangi | 47 | 6.2 | 18.2 | | | | | 14.6 | 4 | |
| | | Orientale Province | 31 | 3.9 | 37.8 | | | | | 30.3 | 18 | |
| | | *Azande, Eastern Nigritic-Equatorial Mangbetu, Central Sudanic-Mangbetu* | | | | | | | | | | |
| | | Stanleyville (Kisangani) | 35 | 4.2 | 33.9 | | | | | 23.3 | 5 | |
| | | Ituri | 41 | 5.7 | 23.2 | | | | | 20.0 | 5 | |
| | | Bas-Uele | 21 | 2.8 | 49.8 | | | | | 37.3 | 4 | |
| | | Haut-Uele | 24 | 3.1 | 45.7 | | | | | 36.9 | 5 | |
| | | Kivu Province | 52 | 6.8 | 11.4 | | | | | 11.3 | 16 | |
| | | Sud Kivu | 60 | 8.1 | 7.0 | | | | | 4.6 | 7 | |
| | | Nord Kivu | 55 | 7.5 | 5.0 | | | | | 8.3 | 6 | |
| | | Maniema | 37 | 4.5 | 27.1 | | | | | 23.5 | 3 | |
| | | Katanga Province (Shaba) | 50 | 6.7 | 18.4 | | | | | 23.2 | 12 | |
| | | Elisabethville (Lubumbashi) | 63 | 9.2 | 13.3 | | | | | 20.6 | 1 | |
| | | Tanganika | 49 | 6.6 | 21.2 | | | | | 27.4 | 3 | |
| | | Lualaba | 47 | 6.0 | 21.2 | | | | | 17.8 | 3 | |
| | | Haut-Lomami | 46 | 6.0 | 18.6 | | | | | 25.8 | 4 | |
| | | Luapula-Muero | 58 | 8.3 | 12.5 | | | | | 10.9 | 1 | |
| | | Kasai Province | 46 | 5.9 | 21.6 | | | | | 20.0 | 17 | |
| | | Kabinda | 47 | 6.2 | 20.6 | | | | | 26.3 | 4 | |
| | | Kasai | 49 | 6.3 | 18.7 | | | | | 15.7 | 4 | |
| | | Lulua | 48 | 6.1 | 19.8 | | | | | 12.7 | 5 | |
| | | Sankuru | 41 | 5.3 | 27.7 | | | | | 25.7 | 4 | |

| Country | Date | Region or Ethnic Group | CBR | TFR | Percent Childless 20-29 | 25-29 30-34 | 30-39 35-39 | 40-44 45-49 | 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Zaire | 1975/76 | Whole Country | 44 | 6.1 | | 7.0 | | | | | |
| | | Western Half | 45 | 6.3 | | 5.6 | | | | | |
| | | Kinshasa | 55 | | 5.2 | | | | 11.4 | | |
| | | Bandundu | 44 | 6.1 | | | | | | | |
| | | Kwilu | 43 | 6.0 | 7.4 | 5.7 | | | 8.8 | | |
| | | Kwango | 43 | 5.9 | 5.6 | 4.1 | | | 1.4 | | |
| | | Mai-Ndombe | 46 | 6.4 | 6.3 | 6.0 | | | 12.2 | | |
| | | Bas-Zaire | 44 | 7.2 | | | | | | | |
| | | Bas-Fleuve | 43 | 7.2 | 3.3 | 3.1 | | | 8.5 | | |
| | | *Bakongo, Central Bantu* | | | | | | | | | |
| | | Cataractes | 43 | 7.2 | 5.3 | 3.9 | | | 2.6 | | |
| | | *Bakongo, Central Bantu* | | | | | | | | | |
| | | Equateur Region | | | | | | | | | |
| | | Equateur | 39 | 6.1 | 10.1 | 9.7 | | | 31.9 | | |
| | | *Mongo-Nkundo, Mongo Bantu* | | | | | | | | | |
| | | Tshuapa | 33 | 5.5 | 12.4 | 13.2 | | | 37.5 | | |
| | | *Mongo-Nkundo, Mongo Bantu* | | | | | | | | | |
| | | Kasai Occidental | 41 | 6.0 | | | | | | | |
| | | Kasai | 43 | 5.9 | 7.1 | 6.4 | | | 19.1 | | |
| | | Lulua | 36 | 5.8 | 5.0 | 4.5 | | | 12.3 | | |

| Country | Date | Region or *Ethnic Group* | CBR | TFR | Percent Childless 20-29 | 25-29 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | Percent of Total Population | Duration of Post-Partum Abstinence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 20-29 | 25-34 | 30-39 | 35-44 | 40-49 | 45-54 | | |
| Zambia | 1969 | Whole Country | 50 | 5.0 | | 15.0 | 14.0 | | | | | |
| | | Central Province | | 5.1 | | 15.0 | 13.0 | | | | 18 | |
| | | *Lamba, Central Bantu-Bemba* | | | | | | | | | | 1 |
| | | *Lala, Central Bantu-Bemba* | | | | | | | | | | |
| | | Copperbelt Province | | 5.0 | | 14.0 | 14.0 | | | | 20 | |
| | | *Aushi, Central Bantu-Bemba* | | | | | | | | | | |
| | | Eastern Province | | 5.6 | | 16.0 | 11.0 | | | | 13 | |
| | | *Chewa, Central Bantu-Maravi* | | | | | | | | | | |
| | | *Nsenga, Central Bantu-Maravi* | | | | | | | | | | |
| | | *Nyanja, Central Bantu-Maravi* | | | | | | | | | | |
| | | *Tumbuka, Central Bantu-Maravi* | | | | | | | | | | 24 |
| | | *Gomani, South Bantu-Ngoni* | | | | | | | | | | |
| | | *Mombera, South Bantu-Ngoni* | | | | | | | | | | |
| | | *Mpezeni, South Bantu-Ngoni* | | | | | | | | | | |
| | | Luapula Province | | 5.5 | | 14.0 | 13.0 | | | | 8 | |
| | | *Luapula, Central Bantu-Bemba* | | | | | | | | | | |
| | | Northern Province | | 6.5 | | 10.0 | 6.0 | | | | 13 | |
| | | *Mambwe, Central Bantu-Bemba* | | | | | | | | | | |
| | | *Bemba, Central Bantu-Bemba* | | | | | | | | | | 4 |
| | | *Bisa, Central Bantu-Bemba* | | | | | | | | | | |
| | | North-Western Province | | 3.4 | | 22.0 | 24.0 | | | | 6 | |
| | | *Lamba, Central Bantu-Bemba* | | | | | | | | | | 1 |
| | | *Kaonde, Central Bantu-Bemba* | | | | | | | | | | |
| | | Southern Province | | 4.6 | | 14.0 | 15.0 | | | | 12 | |
| | | *Tonga, Middle Zambesi Bantu* | | | | | | | | | | 24-36 |
| | | *Ila, Middle Zambesi Bantu* | | | | | | | | | | 24-36 |
| | | *Lenje, Middle Zambesi Bantu* | | | | | | | | | | |
| | | Western Province | | 3.6 | | 18.0 | 20.0 | | | | 10 | |
| | | *Ndembu, Central Bantu-Lunda* | | | | | | | | | | |
| | | *Luvale(Lwena), Central Bantu-Lunda* | | | | | | | | | | |
| | | *Lozi, Middle Zambesi Bantu* | | | | | | | | | | |

Note: Regions are in bold type, ethnic groups in italics. Indentation is used to indicate both geographic and ethnic sub-set data. Ethnic composition, or major ethnic group of a region is immediately below the region label. In some cases, a broader affiliation (people and/or cluster) follows the ethnic group. This is in order to highlight geo-ethnic consistency across borders. For the largest part, this information comes from Murdock (1959). Dates in parentheses apply to the region or ethnic groups indented to the right. Figures in italics under TFR column refer to the average parity of women aged 45 to 49 or equivalent. Where percentages of childless women are given for an age group other than the headings, the age group is indicated in the body of the table. Percent of total population was calculated for all regions and ethnic groups where it was possible. Ethnic sub-set data may or may not add up to the region or country total if smaller ethnic groups are excluded. Duration of postpartum abstinence is in months, unless otherwise stated.

## Country Reviews and Data Sources

### Angola

Very few data were available for Angola, beyond the 1940, 1950 and 1960 Portuguese censuses, and percentages of childless women were not available for 1960. Nevertheless, the fertility differentials which were associated with levels of childlessness in 1940 and 1950 are maintained in 1960, suggesting that infertility continued to be a problem at least as recently as 1960. Consistency is afforded in observing that the higher fertility and lower childlessness of Luanda and Malange Provinces (north-east) concur with the patterns in Cataractes, Bas-Congo and Kwango which are contiguous in south-western Zaïre, and that the higher infertility of Bie Province in the south-east is similar to that of Western Province in Zambia. No data were found for Cabinda, an Angolan district of Luanda Province which is separated from Angola by the panhandle of Zaïre; although unclear, Cabinda's circumstance indicates some ethnic continuity across the mouth of the Zaïre River. Cabinda has become a major oil-producing area in recent years.

CBRs and average parity of women 45 to 49 in 1940 are from Heisel (1968) tables 8.7 and 8.6, pp.458 and 455 respectively. CBRs and average parity of women 45-49 in 1950 are from Heisel (1968), idem. The TFRs for all Angola in 1940 and 1950 are from United Nations (1965) table 3.3, p.24, where the estimated GRR for 1940-45 is 2.7 (TFR=2.03 X GRR).

CBRs and TFRs for 1960 are from Page and Coale (1972), table 9.1 (a) p.57.

Percentages of women childless for 1940 and 1950 are from van de Walle (1968b), table 2.17, p.67. Note that the percentage of women childless aged 45-49 in 1950 is reported as 11.9, but as 14% in United Nations (1965), idem.

Percents of total population for 1960 are from Page and Coale (1972), idem.

Burundi

Data on Burundi are scarce, but an INSEE survey in 1970/71 has provided levels of childlessness by age for women by type of marriage. Marked infertility is present only among women in polygamous unions, but as the polygamy rate (number of married women per 100 married men) is 104, there appears to be little infertility overall (Dittgen and Guitton, 1975; McDonald et al., 1969). A 1973 survey of 2400 women in Bubanza and Ngozi Provinces corroborated a low level of infertility; only 5.3% of women (all ages) were childless (UNFPA, 1978). Burundi appears to be part of a high fertility-low infertility zone in the Interlacustrian region of central Africa, along with North and South Kivu in eastern Zaïre, Ankole District of Western Province in Uganda, and probably Rwanda.

CBR and TFR for 1952-57 are from Page and Coale (1972), table 9.1(a), p.57.
Percentages of women childless in 1970/71 are from Dittgen and Guitton (1975), p. III-109.
TFR and percentage of women childless in 1973 are from UNFPA (1978) p.26.
Polygamy rate is from McDonald et al. (1969), p.45

Central African Republic

All but the north-eastern and easternmost areas of the Republic have been surveyed. Although unmapped, the easternmost part probably has high levels of infertility because it is largely inhabited by the Azande, who are known to have high levels of infertility in north-eastern Zaïre (Bas-Uele and Haut-Uele), in south-western Sudan (Equatorial Province) and in surveyed areas immediately west in the Central African Republic. Aside from the demographic surveys, the Central African Republic has been one of the most

studied countries in research on infertility in Africa. The intensive surveys of the Nzakara and Zande (Azande) by Retel-Laurentin and more recently by Correa in the district of Bangassou offer substantial confirmation of high levels of infertility and childlessness (Retel-Laurentin, 1974b; Wilde, 1973).

CBRs and TFRs for 1959/60 are from Page and Coale (1972), table 9.1(a), p.57.
Percentage of women childless 25-29 in 1959/60 is from Brass (1968), table 7.4E, p.428; for women 25-34 and 45-49 from van de Walle and Page (1969), table 3, p.6.
TFR and percentages of women childless in 1958/60 (Nzakara and Zande) are from Retel-Laurentin (1974b), tables 4 and 5, pp. 10 and 12.
The 1959/60 survey excluded the populations of easternmost Central African Republic, of Bangui, and the nomadic population, which were estimated at 66,000, 80,000 and 40,000 (see van de Walle and Page, 1969, p.4, footnote a/ to table 1). Percent of total population is from Page and Coale (1972) idem, using a total population inclusive of the estimates for the uncounted areas and adding the population of Bangui to River. Parentheses on the percent in Eastern River and East indicate tentative applicability of the fertility and childlessness data for the entire easternmost region.
All the ethnic groups of the Republic are related, and are classified under Eastern Nigritic People, Equatorial Cluster in Murdock (1959).

Chad

Demographic data for Chad are available for the southern half of the country, the "north" being the north half of the south and the "south" the area bordering on the Central African Republic and the United Republic of Cameroon. Data on childlessness for the entire area indicate the presence of infertility, which is confirmed by the data on fertility in "north" Chad. For "south" Chad similar levels of childlessness are reported, but fertility is higher. These data are not available for specific age groups and allow for internal comparisons only. The higher infertility rate of Chari-Baguirmi Prefecture of the "north", which is peopled by Bornuans, Kanuri, Hausa, and Barma, has been confirmed in the survey work of Reyna on the Barma, who have

had long contact with both the Kanuri and Hausa (Reyna, 1975). Reyna found a rate of childlessness among Barma women of all ages in 1969-1970 on the same order of magnitude (a quarter of women of all ages childless) as was found in the INSEE survey of 1963-1964 for the whole prefecture (Reyna and Bouquet, 1975). The demographic picture for the "south" resembles that of contiguous areas in North Cameroon, where overall fertility measures obscure a variegated pattern of ethnicity and fertility. But the presence in the "south" of Bornuans and Kanuri as well as Hausa (for whom specific data are not available) may be associated with the lower fertility in Moyen Chari, Logone Occidental, Logone Oriental and Mayo-Kebbi, which are contiguous with North Benoue (see United Republic of Cameroon) and, especially, with Lake Chad, from the large Logone-Chad delta to the shores of the lake. The Kanuri west of Lake Chad in south-eastern Niger and the Bornuans of northernmost Cameroon immediately to the west of "south" Chad appear to have levels of infertility fairly similar to that of "south" Chad with a range of 12-16% terminal childlessness. The Kanuri of Bornu in north-eastern Nigeria bordering on the western coast of Lake Chad may also have a similar level of infertility.

CBRs and TFRs for North and South, North, and South are from van de Walle and Page (1969), table 5, p.8. CBRs and average parity of women of 50 and over by region are from Reyna and Bouquet (1975), table 27.1, p.576.

Percentages of women childless 25-29 and 45-49 are from van de Walle and Page (1969), table 3, p.6; for women 15+ by region from Reyna and Bouquet (1975), idem; and for Barma from Reyna (1975), p.57 (see page 64 for note on age in text).

Percent of total population is from Page and Coale (1972) table 9.1(a), p.57 and Reyna and Bouquet (1975), idem (see note on total population in text, page 578).

Congo

Very little is available on the demography of Congo, but whole country estimates of fertility and childlessness rates from a 1960/61 survey indicate an overall level of infertility very similar to the level prevailing in Zaïre in 1955/58. Western Zaïre, the Central African Republic, South-Eastern Cameroon and Congo comprise the usual core zone of concern with respect to infertility in sub-Saharan Africa.

CBR and TFR are from Page and Coale (1972), table 9.1(a), p.57; percentages of women childless are from van de Walle (1968b), table 2.17, p.67. Note that the 1960/61 survey of Congo excludes Brazzaville and Pointe Noire.

Gabon

The whole country data for Gabon clearly illustrate the extreme demographic profile of a country with high infertility (one-third of all women in all age groups over 24 childless, a crude birth rate below 30 and a total fertility rate under 4). The Fang who made up one-third of the population of Gabon in 1960-61 had an average parity at 45-49 below 3 and a general fertility rate estimated at 118/1000, equivalent to the national average (116/1000) (Cohen, 1967; François, 1975). Epidemiological research on infertility in Gabon in 1975 confirmed the high prevalence of infertility and childlessness in the south-eastern Gabon regions of Haut Ogooue and Ogooue-Iolo which are contiguous with Congo (Languillat et al., 1978). In Ogooue-Iolo, the crude birth rate was estimated to be 25 in 1960-61 with a general fertility rate of 80/1000. Sixty-five percent of the ethnic composition in these regions were Bateke, Obamba and Bandjabi people who represented over 20% of the total population of Gabon in 1960/61 (François, 1975). Although very few data on fertility by ethnic group are available,

the total fertility rate for all Ogooue was reported to be 3.6 in 1960/61. It appears, therefore, that despite a very heterogeneous ethnic composition and high endogamy, the Gabonese populaton as a whole is subject to quite uniformally high levels of infertility. Interestingly, the region of Gabon reportedly least afflicted is Nyanga (the crude birth rate in 1960/61 was estimated to be 52/1000 with a general fertility rate of 170/1000 [François, 1975]) which is the coastal zone immediately north of coastal Congo, then Cabinda, Bas-Zaïre, and Luanda in Angola. While fertility data for the coastal zone of Congo and for Cabinda are not available, Bas-Zaïre (Bas-Fleuve and Cataractes) and Kwango are known to have a lower prevalence of infertility, as is Luanda Province of Angola. These coastal areas, from Nyanga to Luanda, may form one pocket of lower infertility in Central Africa.

CBR and TFR are from Page and Coale (1972), table 9.1(a), p.57.
Percentages of childless women are from Cohen (1967), table 2, p.V-11.

Ghana

Ethnic data on fertility are available for Ghana from a survey in 1968, while data on childlessness are not (Gaisie, 1968-69). Nevertheless the fairly large ethnic differentials strongly suggest differential prevalence of infertility. Gaisie mentions a "relatively high proportion of older women reported as childless in the 1968 survey," but childless women are excluded in his analysis of the survey (Gaisie, 1968-69; Gaisie, 1976, pp. 85-86). Clinical studies do indicate a marked presence of infertility in Accra and even among the Boron and Ahafo for whom fertility is estimated to be very high (Busia, 1954; Meuwissen, 1966). In more recent studies of Ghanaian fertility differentials it has been suggested that large ethnic breastfeeding

differentials may be primarily, although not fully, responsible for the fertility differentials, at least between surveyed villages of Ewe, Dagomba and Asante (Gaisie, 1981a and 1981b). Interestingly, the ethnic groups for whom lower fertility has been recorded are mostly of the Mole, Grusi, and Gurma clusters of Voltaic peoples, which provides consistency with the data from some other Voltaic peoples: the Bobo in Upper Volta and the Senoufo of both Upper Volta and Northern Ivory Coast (Korhogo).

CBRs and TFRs by region are from Page and Coale (1972), table 9.1(a), p.57. TFRs by tribe are from Gaisie (1972), table 12.3, p.86. Attributions of tribes to regions was done on the basis of mapping of regions and tribes from Gaisie (1972) figure 12.1, p.85 and Gaisie (1981a), Map 1, p.287.

Average parity of Asante women 40-47 and percentage of childless women aged 25-29 and 40-47 in 1952 are from Busia (1954), tables 68 and 72, pages 344 and 347. It should be noted that the average parity includes miscarriages and stillbirths.

Percent of the total population is from Gaisie (1976), table 2.11, p.21. Data for 1960 were used. Durations of post-partum abstinence are from Schoenmaeckers et al. (1981), list 1, p.43, Gaisie (1981a) and Gaisie (1981b).

Guinea

Guinea displays the profile of a country which, on the whole, has very little infertility. While there are regional and ethnic differentials (Cohen, 1967), childlessness does not exceed 8% in the 45-49 year age group for any region.

CBRs and TFRs are from Page and Coale (1972), table 9.1(a), p.57.
Percentages of childless women are from Cohen (1967), table 1, p.V-11.
Percent of total population is from Page and Coale (1972), idem.
It should be noted that the 1954/55 survey excluded 3 urban areas.

Ivory Coast

Ivory Coast in the 1960s had fairly high overall fertility, but with marked differences in the levels of infertility. The level of childlessness in the south-east corner of the Ivory Coast has been confirmed in 3 subsequent surveys (First Agricultural Sector, and regional surveys of the Atie, and of Abengourou). Although complete data on childlessness are not available, the Godie of the Daloa-Gagnoa region (crude birth rate 33) may be disproportionately represented in the childlessness rates of 13% at 25-29 and 14% at 45-49 for the whole region. Similarly, in the absence of any data on childlessness for the Man region (see Roussel, 1967, p. 136), the crude birth rate and age-specific fertility rates for the Wobe are nevertheless strongly suggestive of an infertility problem. Finally, the Baoule of Central Ivory Coast, who inhabit the very large lake area, appear to have a proportion of childless women above the regional average, despite fairly high fertility.

CBR for all Ivory Coast in 1965 is from Roussel (1975), pp.659 and 670. CBR and TFR for the First Agricultural Sector are from Page and Coale (1972), table 9.1(a), p.57. CBRs and TFRs for all regions and ethnic groups are from Roussel (1967) tables 64, 65 and 66, pp.130 and 132.

Percentage of childless women for the First Agricultural Sector are from Brass (1968), table 7.4E, p.428, all others from Roussel (1967), table 70, p.136.

Percent of total population is from Roussel (1967), tables 1 and 3, pp. 22 and 25; attribution of tribes to regions was done from Roussel (1967), Cartes 1 and 4, pp.17 and 26. See also Roussel (1975), table 32.3, p.663.

Duration of postpartum abstinence is from Schoenmaeckers et al. (1981), list 1, p.43. Note that "when child walks" was equated to 14 months on the basis of reported data on age of walking in Adeokun (1981).

Kenya

The Kenya Fertility Survey (KFS) provides among the most recent data on fertility levels and childlessness. Infertility is evident in the populations of Nairobi and of the entire Coast province which includes

Mombassa. Some unreported level of induced abortion is suspected to occur in the urban areas, but medical research has clearly documented the presence of primary and secondary fertility and of gonorrhea, particularly in Nairobi (Chatfield et al., 1970; Mati et al., 1973). The Mijikenda, who inhabit the Coast Province exclusively (98.9% of Mijikenda were recorded living in Coast Province in the 1969 census) and comprise the overwhelming majority of the Province's population, have the lowest fertility of any ethnic group although they have the earliest age at marriage of all ethnic groups surveyed in the KFS.

It is regrettable that the Northeastern Province and the Northern districts of Rift Valley and Eastern Provinces were not included in the KFS. Although not densely populated, the districts of Turkana, West Pokot and Isiolo showed adjusted total fertility rates below 4 in the 1969 census (3.3, 3.4 and 3.7 respectively); similarly two of the three districts of North-Eastern province, Mandera and Wajir, showed rates just over 4 (4.2 and 4.3). These very low rates have some validity given that other districts in the same provinces registered rates in the expected range of 6-8. However, subsequent confirmation of these data is not available.

The Masai, a Nilotic people of the southern Rift Valley were unfortunately also largely excluded in the sampling of the KFS. Epidemiological research in 1950 among the Masai in the districts of Narok and Kajiado bordering Tanzania confirmed the high levels of gonorrhea and low fertility (possibly even below replacement) which had already been observed in 1931 (McKay, 1950).

In the absence of more recent data, we can speculate that the Masai could represent a case where without systematic sampling of ethnic groups,

small but entire populations who are at high risk for infertility are invisible in national data.

CBRs and TFRs in 1969 are from Ominde (1975), tables 2.23 and 2.29, pages 30 and 33.

Data for childlessness in 1969 are from Republic of Kenya (1976), table 4.13, pages 33-34. These data may represent substantial understatement. Anker and Knowles found the percent of women childless aged 40-49 ranged from about 3 (Nyandarua District of Central Province and Kisii District of Nyanza Province) to about 30 percent (Lamu and Tana River Districts of Coast Province) when women for whom parity was unstated were added to those reported childless. The weighted mean percent childless for women 40-49 in Kenya was then 8.9 (Anker and Knowles, 1982).

CBR is from Mott and Mott (1980). TFRs are from Kenya Fertility Survey (1980), volume 1, table 5.12, p.101.

Percentages of women childless are from Kenya Fertility Survey (1980), volume 2, table 2.1.5D, p.A-245 and table 2.1.5H, p.A-260.

Percent of total population was derived from Kenya Fertility Survey (1980), volume 1, table 1.8, p.14 in conjunction with Ominde (1975), table 3.15, p.54 (all are 1969 census data).

Duration of postpartum abstinence is from Kenya Fertility Survey (1980), volume 2, table 6.4.2, p.A-689.

## Lesotho

All data are from Lesotho Fertility Survey, 1977 (1981).

## Mali

Relatively low reported levels of childlessness and high fertility characterize Mali as a whole. Although proportions of women childless are available only for the entire sample in the Central Niger Delta, fertility differentials by ethnic group suggest that a large part of the overall prevalence of childlessness may be associated with higher infertility among the Fulani. High levels of fertility among the Bambara in this region of Mali have been very recently confirmed and data on the Twareg nomads from the

same study indicate that their level of fertility can be explained by significantly lower marital exposure, but no data on childlessness are available for these two groups (Hill, et al., 1982). Data for the Twareg of Niger indicate that marital exposure is indeed an important determinant of low fertility there, and that the nomadic Bouzou Twareg group in particular has high levels of childlessness, primarily due to high proportions of unmarried people (Cohen, 1967; Ganon, 1975).

CBR and TFR for 1960/61 from Page and Coale (1972), table 9.1(a), p.57. CBR and TFR for 1957/58 is from Brass (1968), table 7.10.E, p.434. TFRs for ethnic groups in 1957/58 are from Cohen (1967), table 10, p.V-39.

Percentages of women childless 25-29 in 1960/61 is from Cohen (1967), table 2, p.V-11, and for women 45-49 is from Cantrelle and Ferry (1979), table 16, p.357.

Percentages of women childless in 1957/58 are from Brass (1968), table 7.4.E, p.428.

CBRs and TFRs for 1981 are from Hill et al. (1982).

Duration of postpartum abstinence is from Schoenmaeckers et al. (1981), list 1, p.43.

Mozambique

While not very recent, data for Mozambique suggest a substantial prevalence of infertility, particularly in the North and South regions. More recent reports indicate that infertility problems may be a major complaint among women seeking health services (Kalemba, 1982). Data from the 1940 and 1950 censuses show that the proportion of women reported childless exceeds the proportion of women reported single in all the childbearing age groups (see Heisel, 1968, p. 465).

CBRs and TFRs are from Page and Coale (1972), table 9.1(a), p.57.

Percentages of women childless are from van de Walle (1968b), table 2.17, p.67.

Percent of total population is from Page and Coale (1972), idem.

Niger

The data for Niger present an especially clear picture of distinctively high and low levels of infertility occurring in one territorial population. Surveys from the 1960s and follow-up surveys in the 1970s have shown a high prevalence of infertility in the south-eastern corner of Niger (Stratum 1) bordering Lake Chad, among the Kanuri, and among the Kanuri and Hausa in south central Niger (Stratum 2) bordering on Nigeria to the south and the Kanuri of south-eastern Niger to the east. However, it should be noted that low marital exposure among the Twareg, and the high proportions of unmarried adults especially among the Bouzou can very possibly explain the levels of childlessness in the Tahoua region of Central Niger (Ganon, 1975; Hill et al., 1982). Nomadic groups in general have a marriage pattern which is distinctly different from that of the majority of African populations.

CBRs and TFRs for all six strata are from Page and Coale (1972), table 9.1(a), p.57. For the Tahoua area, CBRs are from Dankoussou et al. (1975), p.687, and TFRs are from Cohen (1967), table 10, p.V-39 and from GRRs in Ganon (1975), p.697 (TFR=2.03 x GRR).

Average parity of women 45-49 for Djerma-Songhay region and CBR for Niamey are from Dankoussou et al. (1975), tables 33.6, and 33.7, p.688.

Percentages of women childless aged 30-34 for the six strata are from Coale and van de Walle (1968), table 4.A.18, p.181, for women aged 45-49 from Dankoussou et al. (1975), table 33.4, p.687. Percentages of women childless for all age groups for the entire area surveyed of Southern Niger are from van de Walle (1968b), table 2.17, p.67; for women aged 35-49 in stratum 2 and the Maradi-Zinder region from Pool and Piché (1971), table 4, p.6; for women aged 40-49 in the Tahoua area from Cohen (1967), table 2, p.V-11; for all Twareg women aged 25-29 and 45-49 from Belsey (1976), table 1, p.321 (note that Twareg data are incorrectly given under Mali); and for women 25-29 in Stratum 6 and women of all age groups in Djerma-Songhay region and Niamey from Dankoussou et al. (1975), tables 33.5 and 33.6, pp.687 and 688.

Percent of total population is from Page and Coale (1972), idem. Note that the 1960 survey excluded Niamey and the entire nomadic zone of the country. A 1967 estimate of 85,000 for the Niamey population was adopted from Dankoussou et al.(1975), table 33.7, p.688, but both numerators and denominators still exclude the nomadic zone. (See also table 33.1, p.684 and text, p. 688).

Duration of postpartum abstinence is from Schoenmaeckers et al. (1981),

list 1, p.43.

Nigeria

Data on childlessness in Nigeria are available only for small and unrepresentative samples. Nevertheless, given the generally high levels of fertility in Nigeria in 1952-53 and what evidence of infertility is available, circumscribed infertility problems appear likely to exist in regions where fertility estimates are low. The possibility that low fertility of a few regions in 1952-53 was associated with infertility is reinforced by other information. Cameroons became part of the United Republic of Cameroon along with Bamenda in 1961 and were surveyed as part of that country in 1964. The 1964 survey revealed levels and differentials in fertility similar to the 1952-53 data. This second survey also yielded data on childlessness, and the lower fertility levels of Cameroons (south of West Cameroon) were found to be associated with a substantially higher level of childlessness, while high fertility was matched with low levels of childlessness in Bamenda (north of West Cameroon). These finding lend some validity to the notion that low levels of fertility found elsewhere in Nigeria for 1952-53 are associated with problems of infertility. In particular, the likelihood of true low fertility and of the presence of infertility in Bornu is further reinforced by the ethnic and geographic situation of this region. Bordering on Lake Chad, Bornu is inhabited largely by Kanuri or Bornuans who also populate adjacent areas in Niger, northern Cameroon and south-western Chad. The Kanuri appear to have high levels of infertility in all these countries. A survey of Bornu Kanuri and of Bura

living in the Biu division of Bornu Province found a marked fertility differential, with the Kanuri having very low fertility and high infertility and childlessness (Cohen, 1974). Other surveys have shown an appreciable level of childlessness in Oyo town among the Yoruba of Western State, and among the Fulani-Hausa of Sokoto town in Northern State (Olusanya, 1974 and Trevor, 1975). Medical reports have suggested the presence of extraordinary infertility and of gonorrhea in urban Lagos and rural Illesha of Western State, and in Sokoto town, although estimates cannot be derived from these reports (Romanowski, 1952; Johnson, et al,. 1974; Osoba, 1974; Adadevoh, 1974; and Alausa and Osoba, 1978).

All data in table 1 are from Page and Coale (1972), table 9.1(a), p.57.

Rwanda

All data in table 1 are from Page and Coale (1972), table 9.1(a), p.57.

Senegal

There appears to be very little infertility in Senegal. Senegal provides an overall profile of a west African population with high fertility and substantial breastfeeding. The mean duration of breastfeeding for the last closed interval in the Senegal fertility survey (1978) was 20 months, which is associated with 14 months of postpartum infecundability (Enquête Sénégalaise sur la Fécondité, 1981). Data from the Senegal fertility survey suggest fertility and childlessness levels comparable to those produced from the 1960-1961 demographic survey, taking into account the likelihood of

improved estimates in 1978 over 1960-1961. Despite a relatively low prevalence of infertility in the population as a whole, there is some evidence of higher infertility among certain ethnic groups. The Poular, a group which includes the Tukulor of Senegal valley and the other Fulani groups of Fouta-Toro have lower fertility than all other Senegalese ethnic groups even after correction for marital exposure (see Enquête Sénégalaise sur la Fécondité, 1981, p.6). In the light of the earlier finding in 1960-61 of childlessness in Fouta-Toro, it seems likely that the Fulani groups of Senegal have relatively higher levels of infertility. Furthermore, recent epidemiological surveys in the Senegal River Valley region (the Senegal River demarcates Senegals's northern and north-eastern borders) indicate that since the mass treatment campaigns of 1957-60 to eliminate yaws, there has been a resurgence of syphilis, and the prevalence of gonorrhea reached levels of 10.6 percent and 18.7 percent in some areas between 1972 and 1975 (Ridet and Siboulet, 1975).

CBR and TFR for 1960/61 are from Page and Coale (1972), table 9.1(a), p.57. CBR and TFR for Fouta-Toro are from Brass (1968), table 7.10.E, p.434. CBR and TFRs for 1978 are from the Enquête Sénégalaise (1981), pp.9-10.

Percentages of women childless in 1960/61 for the whole country are from Cohen (1967), table 2, p.V-11 (Note that the same percentages are incorrectly given under Middle Senegal valley (Fouta-Toro) in van de Walle (1968b), table 2.17, p.67); for Fouta-Toro from van de Walle (1968c), table 5.3.1, p.233, and for 1978 from the Enquête Sénégalaise (1981), table 2.2.1a, p.107 (Note that the percentage for women 45-49 is incorrectly reported in the text of the Summary of Findings).

Percent of total population is from Lacombe et al. (1975), table 35.6, p. 710.

Duration of postpartum abstinence is from Cantrelle and Ferry (1979), table 15, p.353, and from Schoenmaeckers et al. (1981), list 1, p.43. Note that "when child walks" was equated to 14 months on the basis of reported data on age of walking in Adeokun (1981).

Sudan

Complete data for Sudan are available for ethnic groupings. The major groupings applied to the fertility estimates of the 1955 census revealed substantial differentials in Sudan, with high infertility among the Western Southerners, who include the Azande people of Equatoria Province, and lower levels among the Arab people, the Nuba and the Beja. Subsequent surveys of settled and nomadic Arab groups suggest that among these nomadic groups, lower fertility may be due to above-average levels of infertility much more than in the other nomadic groups discussed previously (Henin 1968, 1969). Medical research in Western Equatoria Province has provided additional documentation of the presence of infertility in this south-western region of Sudan (Modawi, 1965).

The Sudan Fertility Survey revealed that infertility levels in 1979 were substantially unchanged from those in 1955/56. The weighted mean percent of childless women 45 and over in 1955/56 for the regions of North Sudan that were included in the 1979 survey was 9.2, while the percent of childless women aged 45 and over for those regions in 1979 was 8.6 (The Sudan Fertility Survey 1979, 1982).

CBRs and TFRs for the country and major ethnic groups are from Page and Coale (1972), table 9.1(a), p.57. CBRs and TFRs for the five Baggara tribes are from Henin (1968), tables 2 and 5, pp.150-151.

Percentages of women childless for all the major ethnic groups are from Demeny (1968), p.493, and refer to women "past childbearing age"; and for the Arab sub-groups from Henin (1969), table 10, p.179.

Percent of total population is from Demeny (1968), table 9.2, p.475. Henin estimates that the samples of Arabs he surveyed in 1961/62 represented a total population of about 275,000 (see Henin [1968], p.148, footnote 5).

Duration of postpartum abstinence is from Schoenmaeckers et al. (1981), list 1, p.43. Note that "when child walks" was equated to 14 months on the basis of reported data on age of walking in Adeokun (1981).

Data for 1979 are from Sudan Fertility Survey, 1979 (1982).

Tanzania

The National Demographic Survey of Tanzania (TDS) in 1973 provides fairly complete data on Tanzanian fertility by region and ethnic group. In addition, a number of small-scale surveys have confirmed the presence of infertility and have provided some data on its prevalence in scattered areas of the country. Two aspects of the prevalence of infertility stand out in Tanzania; a variegated pattern in levels of infertility emerges, and apparent decreases in infertility may be inferred from data on childlessness by age for a few regions. The problem of infertility is generally recognized throughout the literature on Tanzanian fertility.

Broadly, the areas which have distinctly higher levels of infertility are the two coastal regions: the eastern seaboard area, and the western regions bordering particularly on Lakes Victoria and Tanganyika, including inland regions between those two shores. Interestingly, although the Mbeya Region, which borders on both lakes Tanganyika and Nyasa, as a whole does not display any significant level of infertility, the data for the populations living in the immediate vicinity of Lake Nyasa (in Rungwe district) are noticeably higher. The band of fertility without childlessness between the two coastal areas is continuous with a similar band north, in Kenya. Finally, while the 1957/58 survey of the Pangani District yields data which are very uncharacteristic for the Tanga Region as a whole (Roberts and Tanner, 1959-60), the data from the 1952 survey of Bukoba District highlight the infertility of the Haya Bantu throughout the West Lake Region which remained very evident in 1973 (Richards and Reining, 1954).

CBR and TFR for all Tanzania are from Ewbank (1973), pp.91-92. CBRs and TFRs for most regions are from Ewbank (1973), tables 5.8 and 5.15, pages 80 and 91. CBRs for the regions of Coast, Kigoma, Mara and West Lake were

selected by the author from the discussion of estimates in Henin, editor (1973), volume VI, Appendix 5.1, pp.300-303. Average parity of women 40-49 for all ethnic groups are from Henin (1973), table 10.1, p.167 and Henin, editor (1973), volume II, table 3012c p.116. TFRs for Rungwe district are from de Jonge (1971) cited in Cantrelle and Ferry (1979), tables 13 and 14, pp.347 and 349. Average parity of women over 40 for Pangani and over 45 for Bukoba Districts are derived from Roberts and Tanner (1959-60), table 7, p.68 and from Richards and Reining (1954), table 89, p.400.

Percentage of women childless aged 25-29 by region are from Hogan (1973), Appendix table 5.4.1, p.310, for women aged 30-39 and 40-49 by region from Ewbank (1973), table 5.4, p.75, and for women 30-39 and 40-49 by ethnic group from Henin (1973), table 10.1, p.167 and Henin, editor (1973), volume II, table 3012c, p.116. Percentages of women childless in Rungwe District are from de Jonge (1971) cited in Cantrelle and Ferry (1979), table 14, p.349 (Note that the applicable age group is derived from the equation of the percentage provided for all Rungwe with the percentages given for last four age groups in Cantrelle and Ferry (1979), table 13, p.347). For Pangani and Bukoba districts respectively, percentages of women childless 40 and over are derived from Roberts and Tanner (1959-60), table 7, p.68 and for women 45-59 from Richards and Reining (1954), table 88, p.400.

Percent of total population is from Henin, editor (1973), volume I, table 1020, p.1 in conjunction with Egero and Henin, editors (1973), volume VI, tables 10.5 and 10.6, pp. 166-167.

Duration of postpartum abstinence is from Schoenmaeckers et al. (1981), list 1, p.43.

Uganda

In order to render as complete a picture of Ugandan fertility as possible, data from various years (1959, 1962 and 1969) were compended because they were remarkably consistent. While few data on age-specific fertility were available, those on the average parity of women 45 and over varied sufficiently with the available crude rates to provide an overview of Ugandan differentials. These data were complemented by surveys specifically designed to study infertility. The data on childlessness from Teso and Ankole Districts in particular were derived from representative sampling, and may be used as prevalence levels for the entire District (Arya et al., 1973 and 1980). Very few other data on childlessness are available, although the

highly circumscribed 1952 study of the Baganda of Mengo Districts (Richards and Reinging, 1954) displays noticeable consistency with the 1948 census estimates and with the later estimates for Buganda Province and the Mengo Districts. It is likely that similar levels of infertility prevailed in these Districts later; the World Health Organization reported in 1980 that health legislation regarding infertility was enacted as recently as 1977. In the absence of more data on childlessness, it may be inferred that the prevalence of infertility is substantial in Buganda and Eastern Provinces, while it is probably negligible in Northern Province, but mixed in Western Province. This pattern is consistent with data from contiguous regions outside Uganda. The uniformly high fertility in Madi, Acholi and Karamoja Districts forms, with the high fertility and low levels of childlessness of the Eastern Southerners of Sudan, a second distinct pocket of lower infertility in Central Africa (see Gabon). Similarly, the high fertility in Ankole District is continuous with a higher fertility zone which includes eastern Zaïre (North and South Kivu), Burundi and most probably Rwanda. The districts with low fertility and higher infertility border on Lake Victoria, which is also bordered by populations with significant infertility in neighboring Tanzania, and on Lake Albert, which is peopled on the other side by the low fertility populations of Ituri in north-eastern Zaïre. The high prevalence levels of gonorrhea in both Teso distict east of Lake Kyoga in Eastern Province and Kampala, Uganda's capital, have been the subject of many articles in the African medical literature (Bennett, 1962; Griffith, 1963; Bennett, 1964; Kibukamusoke, 1965; Arya et al., 1973; Ongom et al., 1976; Lwanga, 1977; Arya et al., 1980).

TFR for all Uganda except Northern Province in 1948 is from Martin

(1953), table 5, p.194. CBRs and TFRs for the whole country and provinces are from Page and Coale (1972), table 9.1(a), p.57, and are for 1962. CBRs for the districts are from Taber (1972), table 8.2, p.43, and are for 1969. Average parity of women aged 45 and over by district is from Richards and Reining (1954), p.368, except for Ankole which is from Ominde (1975), p.13. Average parity of women 46 and over for Buganda, Mengo, and the Baganda in 1948-1952 is from Richards and Reining (1954), table 89, p.400.

Percentages of women childless in 1948-52 are from Richards and Reining (1954), tables 88 and 89, p.400 (See also Romaniuk [1968a], p.216 and Martin [1953], table 6, p.194), and for Teso and Ankole districts from Arya et al. (1980), table 1, p.930.

Percent of total population for each province and district is from Ominde (1975), table 5.3, p.79. The data are for 1969.

Upper Volta

Estimates of fertility levels and data on childlessness by ethnic group reveal sharp differentials in Upper Volta. The Mossi and most other Voltaic peoples have a very low level of infertility and high levels of fertility, while among the Senoufo, Bobo and Fulani, there appears to be considerable infertility. In the case of the Bobo, also a Voltaic people, the data by sub-group highlight sharp differentials and very high levels of infertility in certain sub-groups which may be due to a differential exposure to treatment campaigns in the past (Retel-Laurentin, 1973, 1979a). Estimates for Senoufo in Upper Volta are consistent with those for the Senoufo in northern Ivory Coast (In 1962, estimates for the region of Korhogo were total fertility of 5.8 and 7 percent women childless at 45-49). High levels of infertility in Upper Volta are highly circumscribed in a small proportion of the total population; but the case of Upper Volta illustrates once again the extent to which national estimates of fertility and proportions childless can mask large differentials in infertility (see Kenya).

CBR and TFR for the whole country are from Page and Coale (1972), 9.1(a), p.57. CBRs for the ethnic groups are from Belsey (1976), table 2, p.322. TFRs for the ethnic groups are from Clairin (1970), reported in

Cantrelle and Ferry (1979), table 10, p.340. CBRs for the three Bobo sub-groups are from Retel-Laurentin (1973), pp.798-800. TFRs for these three groups are from Retel-Laurentin (1979a), table 1, p.12.

Percentages of women childless for the whole country are from van de Walle (1968a), table 2.17, p.67, for the ethnic groups are from Clairin (1970) in Cantrelle and Ferry (1979), idem; and for the three Bobo sub-groups from Retel-Laurentin (1973), table III, p.798.

Percent of total population for the ethnic groups is from Belsey (1976), idem. Note that the total population estimate does include Ouagadougou, Bobo-Dioulassou, Gourcy and Yako, which were excluded from the 1960/61 survey (see also Courel and Pool [1975], table 37.1, p.738).

Postpartum abstinence is from Retel-Laurentin (1979b), p.388 and Schoenmaeckers et al. (1981), list 1, p.43.

United Republic of Cameroon

With few exceptions, but substantial internal variation, the prevalence of infertility is high throughout the United Republic and is consistent with its prevalence in the contiguous countries and regions of Gabon, Congo, Central African Republic, Chad and probably Nigeria. Low infertility is found in the north of West Cameroon (Bamenda in the pre-1961 data for Nigeria), in the "Pagan" (Baggara) population of North Benoue, and possibly among the Bamileke of South-West Cameroon, who form the largest ethnic group of the United Republic, with perhaps a sixth of its population (Ware, 1977).

Ethnic consistency emerges from the data for Cameroon, which is well illustrated in the case of the Baya. The Gbaya (Baya) of South Benoue have the highest fertility (Baya total fertility was 4.7 in 1963/64; Podlewski, 1975) and the lowest childlessness of this region with high infertility. An ethnic study of the Meiganga Subprefecture in 1968/70 confirmed differential fertility and infertility between the Fulani and Baya in the Subprefecture (Burnham, 1974). Similarly, the data for the Central African Republic show that the West, which is peopled essentially by Baya, also has higher

fertility and lower childlessness than do other regions and ethnic groups in the CAR. Thus although the Baya inhabit a region characterized by high infertility, and have a substantial level of infertility themselves, they have consistently higher fertility and less childlessness than do surrounding ethnic groups.

CBRs and TFRs for all the major survey areas are from Page and Coale (1972), table 9.1(a), p.57. TFRs for the ethnic groups in both zones of the South-East are from Cohen (1967), table 10, p.V-39. TFRs for Mbalmayo and Ebolowa are from United Nations (1965), table 3.3, p.24 (TFR=2.03 x GRR). TFRs for ethnic groups in South Benoue are from Podlewski (1975), pp.553-554, for the Bakweri from Ardener et al. (1960), pp.290-291, and CBRs and TFRs for the Bamileke and Bamoun from Podlewski (1975), table 26.11, p.554.

Percentages of childless women for South-East are from Cohen (1967), table 2, p.v-11, except for Mbalmayo which is from van de Walle (1968b), table 2.17, p.67 and Ebolowa, which is from United Nations (1965), table 3.3, p.24; for North from van de Walle and Page (1969), table 3, p.6, except for North Benoue and South Benoue for women aged 25-29 which are from Cohen (1967), idem. and percentages for the women aged 25-29 in the three North Benoue sub-groups, which are from Brass (1968), table 7.4D, p.413; for West from Cohen (1967), idem; for the Bakweri from Ardener et al. (1960), p.291; for South-West from Nasah (1974), table 1, p.66; and for Bamileke and Bamoun from Podlewski (1975), table 26.11, p.554.

Zaïre

The data on Zaïre provide one of the richest sources of information on the prevalence of infertility. A demographic survey of all Zaïre (then Congo-Léopoldville) in the 1950s provided a complete and impressive body of data which was largely responsible for bringing the problem of infertility in sub-Saharan Africa (Central Africa in particular) to the attention of the demographic community. The survey and its analysis made clear that infertility was involuntary in Zaïre, and that it could reach dramatic proportions. No province was spared from extraordinary infertility in the 1950s, and Equateur and Orientale Provinces were the most seriously affected.

The levels of infertility in 1955/58 are consistent with findings from later surveys in adjoining regions and countries, in the Central African Republic, Congo, Sudan and Angola. The low fertility and childlessness among the Azande in Zaïre, in particular, were echoed among the Azande of the Central African Republic and of Equatoria Province in Sudan. At the same time, the much higher fertility and very low levels of infertility in the western panhandle of Zaïre and in easternmost Kivu Provinces were continuous with the profile of neighboring areas in northern Angola (Luanda and Malange), and south-west Uganda, Burundi and Rwanda respectively.

A more recent survey (1975/76) indicates that a substantial decline in infertility has occurred over the two intervening decades in western Zaïre, although its prevalence had far from disappeared in Equateur and Tshuapa (EDOZA, 1978; Tabutin, 1982). There is not such recent information on levels of infertility in other parts of Zaïre, but Romaniuk has reported that fertility appears to have risen everywhere in Zaïre, at least up to 1962 (Romaniuk, 1980).

CBRs and TFRs for 1955/58 are from Page and Coale (1972), table 9.1(a), p.57. CBRs and TFRs for 1975/76 are from EDOZA (1978), tables 7.1.13, p.142.

Percentages of women childless in 1955/58 are from Romaniuk (1980), table 2, p.300 and refer specifically to ever-married women; for 1975/76, the percentages are from EDOZA (1978), tables 7.1.13 and A7.1.1., pp. 142 and 242. (Note that it is difficult to tell in the EDOZA data where urban data have been included or excluded in regional figures).

Percent of total population is from Romaniuk (1968b), table 6.5, p.254 and is based on the de facto population in 1955/58.

Duration of postpartum abstinence is from Schoenmaeckers et al. (1981), list 1, p.43.

Data for "Whole Country" in 1975/76 are from Tabutin (1982), table 1, p. 32.

Zambia

On the basis of the census data for 1969, infertility reaches quite high levels in all Zambia, with the exception of Northern Province. The lower infertility of Northern and Eastern Provinces is consistent with the levels in neighboring Luapula-Muero to the west in Zaïre, Central Mozambique to the south, and the central band of Tanzania to the north-east. The levels of infertility in North-Western and Western Provinces are also remarkably consistent with the levels in Bie Province of Angola: the percentage of women childless at older ages are on the order of 20-24% in all three cases, and the average parity of women aged 45-49 ranges from 3.3 to 3.6.

Although long-term migration of male labor might have played an important role in low fertility in the past in Zambia, this factor is reported to have been of very diminished importance by 1960. Furthermore, male out-migration had been high in Northern Province, which had the lowest levels of infertility in Zambia in 1969 (Central Statistical Office, 1975). De Jonge (1971) considers male worker migration to be relatively unimportant in the low fertility of the neighboring Lakeshore Nyakyusa in Tanzania: in this case pointing out that long marital separations among the Nyakyusa often took place after a new pregnancy so that the birth interval would coincide with the father's absence.

All the data for Zambia are from the Central Statistical Office of the Republic of Zambia (1975); see tables 5.1 and 5.2, page 10. The average parity of women aged 45-49 was used rather than the available TFRs, as these seemed highly implausible (See table 2.3, page 3).

Attribution of tribes to provinces was done on the basis of Central Statistical Office, Republic of Zambia (1975), and Murdock (1959). Percent of total population is from Sheikh (1975), table 4.11, p.36. The data are from the 1969 census.

Duration of postpartum is from Schoenmaeckers et al. (1981), list 1, p.43.

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