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REPORTS

Premarital Fertility in Rural South Africa : A Challenge to Existing Population Policy

Michel Garenne, Stephen Tollman, and Kathleen Kahn

The age pattern of fertility in a rural area of South Africa under demographic surveillance (Agincourt subdistrict) was investigated over the 1992–97 period. The total fertility rate (TFR) averaged 3.3 births per woman of reproductive age over the period, a major drop from earlier estimates in the same area (6.0 births in 1970–74). Age-specific fertility rates showed an atypical bimodal pattern. They were decomposed into two components of similar magnitude: premarital fertility (among women aged 12–26) and marital fertility (among women aged 15–49). The decomposition revealed the two underlying modes: a mode of premarital fertility (among women aged 18–20) and a mode of marital fertility (among women aged 28–30). Premarital fertility accounted for 21 percent of all births and for 47 percent of births among women aged 12–26. This pattern of high premarital fertility appears to reflect a low incidence of contraceptive use before the first birth, especially among adolescents, a low prevalence of abortion, and a high contraceptive prevalence thereafter. This finding calls for a reorientation of the family planning policy, which until now has targeted married women and women who have been pregnant once, but has failed to address the contraceptive needs of young women before their first pregnancy, especially adolescents. (STUDIES IN FAMILY PLANNING 2000; 31[1]: 47–54)

Africa is undergoing major demographic changes, in particular in fertility and nuptiality patterns. Marriage for women, which was traditionally virtually universal and occurred early in sub-Saharan Africa, with median ages at first marriage often younger than 20 years, is changing rapidly, especially among those of the most recent generations. More and more data from the Demographic and Health Surveys (DHS) reveal that first marriage is now delayed in African countries, and that proportions of never-married women are increasing at any given age. This new behavior seems to be related to increasing levels of education, urbanization, and economic opportunity, and also to new attitudes and preferences among young women for later marriages and for remaining unmarried, preferences that seem to be prevalent in many parts of

the world. Fertility has also been declining over the past two to three decades in most countries of Africa for which data are available (Mboup and Saha 1998). The effectiveness of family planning programs has improved dramatically on the continent over the past three decades, at a rate of 1 to 2 percent change in contraceptive prevalence per year, but still the programs do not meet all the needs of all women (United Nations 1998; Westoff et al. 1991). Furthermore, sexual activity seems to have been increasing among adolescent women (Meekers 1993). This new situation of delayed first marriage, earlier sexual intercourse, and lack of access to family planning services leaves an increasingly wide window of susceptibility to unplanned or unwanted pregnancies for unmarried adolescents and young adults.

If marital fertility has been widely analyzed in sub-Saharan Africa, much less research has been conducted on fertility before the first marriage, probably because fertility rates for never-married women have been considered low by demographic standards. Marital fertility has been defined traditionally as “legitimate” fertility, that is as fertility occurring within marriage. This definition is derived from Western legal and religious conceptions of legality that do not translate easily into

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the African context (Bledsoe and Cohen 1993). The term "premarital fertility" has been used to designate fertility before the first marriage (Parr 1995). This concept seems to apply to Africa as well, since most first marriages of women, whether traditional or religious, are formal, even though no clear date defines the beginning of a traditional marriage, as it does in religious or civil marriages. A strong argument that this concept applies to Africa is that proportions of never-married women in African censuses and surveys show a clear pattern that can be fitted with regular models (Lesthaeghe et al. 1989). In this report, the term "premarital fertility" is used to designate fertility before the first marriage, whether the marriage is traditional (formal), religious (for monotheist religions), or civil in nature.

Issues around premarital fertility are closely linked to issues of teenage pregnancy (defined as fertility occurring among those in the 13–19 age group), and to issues of adolescent fertility (defined as fertility occurring from puberty to early adulthood and now often extended to those who are 21 years old), because many teenage and adolescent pregnancies are premarital. However, premarital fertility extends these two concepts, and a situation is described here in which premarital fertility covers pregnancies among those aged 12 to 26. Of course, premarital fertility has important economic and social consequences, because in most cases, young, never-married women have to rely on themselves and on extended family support systems to rear their children. A report from the National Research Council summarized what was known about adolescent fertility in sub-Saharan Africa by 1992 (Bledsoe and Cohen 1993). One of the main findings of this report was a rise in childbearing among unmarried adolescent women.

Southern Africa has long exhibited a pattern of later marriage than have other areas of the continent (van de Walle 1968; Lesthaeghe et al. 1989; Westoff et al. 1994). Later marriage obviously increases the risk of premarital fertility. Many observers have noticed the high prevalence of adolescent fertility in the black population of South Africa (Boult and Cunningham 1991; Cunningham and Boult 1996), in groups and situations as diverse as Kwazulu-Natal (Craig and Richter-Strydom 1983), Transkei (Bugu et al. 1996), and in cities such as Port Elizabeth (Boult and Cunningham 1991) and Cape Town (Nash 1990), where pregnancies among women aged 12–21 accounted for about one-third of all pregnancies. Preston-Whyte et al. (1990) noted that in the Kwazulu-Natal province, teenage pregnancy is so prevalent that it has become virtually institutionalized. A high prevalence of adolescent fertility, most of it premarital, must have a strong impact on age-specific fertility rates and on the shape of the fertility schedule.

This report describes a situation of high premarital fertility in a rural area of South Africa, the most developed country in sub-Saharan Africa. In many ways, South Africa's experience foreshadows what could happen elsewhere in other African countries in the future.

Data and Methods

Since 1992, a team from Witwatersrand University's Health Systems Development Unit (HSDU) has been following a population of some 60,000 individuals in the Agincourt subdistrict of Bushbuckridge, a rural region of the Northern Province, adjacent to South Africa's border with Mozambique. The Agincourt field site, formerly part of the Gazankulu homeland, is home to a population predominantly of the Shangaan ethnic group. The level of income is low by South African standards, and people live on income sent home by migrant workers, income from pensions, from jobs in the public service, and from local activities (employment on game and fruit farms, in the informal sector, and in trades). The level of education is close to the average for the black population of South Africa. First marriage for women is late by traditional African standards. Detailed information on the Agincourt study and on the study area can be found elsewhere (Tollman et al. 1995 and 1999).

Demographic data (births, deaths, in- and out-migration) are collected routinely as part of regular censuses conducted approximately every year and a half since the first census (1992), with the fifth round completed in October 1999. Births were recorded by updating maternity histories among all women of reproductive age (12–50 years). No evidence has been found of any substantial undercounting of births during the whole prospective period (1992–97). Marital status of the mother at time of birth was not asked routinely in the survey, so in order to estimate premarital fertility, a modeling exercise is used here. Marital status was available at the 1997 census, however. In this population, as in many others in Africa, women consider themselves married when their husbands have paid the traditional bride price (*labola*), a universal custom, irrespective of church or civil ceremony, which occurs in roughly half of the cases. In marriages in which the husband is an adolescent, the bride price may be purely symbolic, that is, a minimal amount of money that the man can afford.

Observed fertility rates were compared with models of marital fertility. Proportions of ever-married women were computed at the last census round (1997) by age of women, and were fitted with a model of marriage pattern, a parametric model developed from marriage patterns prevalent in Europe (Coale 1971; Coale and McNeil

1972). Age-specific fertility rates were computed by dividing age-specific number of births by age-specific number of person-years of women living during the same period. The resulting rates were compared with models of age-specific marital fertility rates (Coale and Trussell 1974 and 1978). Rates of premarital fertility were computed by subtracting fitted rates of marital fertility from observed fertility rates.

All computations were performed by single year of age, although some are presented here in five-year age groups for convenience. Age reporting was not always accurate for adults in this area, and evidence was found of age misreporting. Relevant to this study, age seemed overestimated in the 45–49-year age group particularly, and in the prospective period, a few births among women whose estimated age was older than 50 were observed.

Results

During the prospective period (1992–97), 8,634 births were recorded in the study area. The total fertility rate dropped from an estimated value of 6.0 births per woman of reproductive age in 1970–74, to 4.1 births per woman in 1992 and 2.8 births per woman in 1997, a 33 percent drop within the five years of the prospective study. The sex ratio of live births was 104, not significantly different from 105, the reference value of sex ratios at birth. An average of one pair of twins was delivered per 33 deliveries (one twin per 17 births, live or still), a high rate often found in sub-Saharan Africa.

The age pattern of fertility rates was surprising, with two visible modes (peaks): one at around age 20 and the other at around age 30 (see Figure 1). Such an atypical

pattern does not appear to have been documented elsewhere in sub-Saharan Africa. This remarkable pattern was further analyzed with standard models.

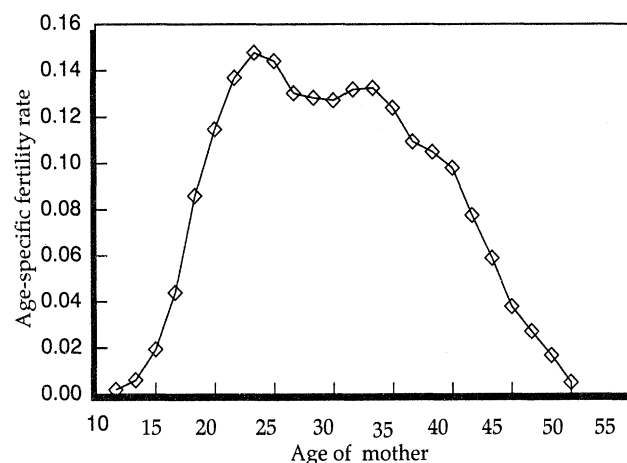
First, the proportion of ever-married women was fitted with a Coale-McNeil model. Parameters were fitted by iteration using the SOLVER module in EXCEL-97. Fitted values were $a_0 = 12.73$ (the earliest age at marriage), $k = 1.233$ (the speed of entry into marriage), and $C = 0.95$ (the proportion of ever-married women at age 50). The singulate mean age at marriage was 26.7 and the median age was 26.1 years. The goodness of fit is high, and the fitted values closely match the observed values throughout the curve between ages 13 and 49 (as shown in Figure 2).

Second, the age-specific fertility rates were fitted with a Coale-Trussell model by regression (as recommended by the authors of the method) on single-year age groups from age 25 to 44, the other points not being aligned. Serious disturbances are seen in the 45–49 age group because of age misreporting, and in the 15–24 age group for reasons that are discussed below (the second component of fertility). Fitted values of the parameters are $M = 0.53$ and $m = -0.38$.

When they are compared with empirical values of age-specific fertility rates, the model marital fertility rates fit accurately from ages 25 to 44 but are unable to approach the observed values at earlier ages. The ratio of observed to expected marital fertility rates is 10.7 at age 15, 4.5 at age 18, and 1.7 at age 21.

Premarital fertility is obtained by subtracting the model marital fertility rates from the empirical values, from ages 12 to 26 (see Table 1). The result clearly reveals the pattern of premarital fertility: a curve symmetrical at around age 18 to 19 years (as shown in Figure

Figure 1 Average age-specific fertility rates, Agincourt subdistrict, South Africa, 1992–97



Note: TFR = 3.36 children; mean age = 29.3 years.

Figure 2 Adjustment of proportions of ever-married women (Coale and McNeil model), Agincourt subdistrict, South Africa, 1997

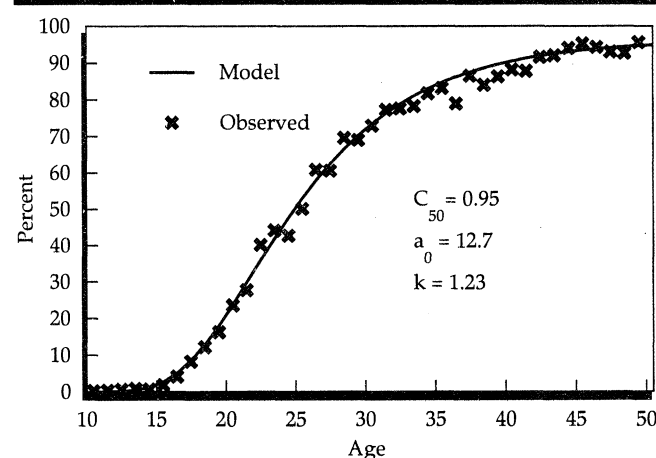


Table 1 Age pattern of fertility and its two components, Agincourt subdistrict, South Africa, 1992–97

Age group	Empirical data			Results from modeling		
	Person-years lived P(a)	Observed fertility rate f(a)	Proportion ever married G(a)	Marital fertility $f_m(a)$	Premarital fertility $f_p(a)$	Proportion of premarital fertility (percent)
13–14	8,005	0.013	—	—	0.013	100.0
15–19	18,016	0.104	0.094	0.019	0.085	81.7
20–24	15,570	0.132	0.358	0.081	0.051	38.7
25–29	12,744	0.130	0.621	0.122	—	—
30–34	10,816	0.120	0.786	0.127	—	—
35–39	8,655	0.098	0.874	0.104	—	—
40–44	6,953	0.055	0.919	0.051	—	—
45–49	4,653	0.028	0.941	0.007	—	—
Total	85,413	3.315		2.600	0.682	20.8

— = Not applicable.

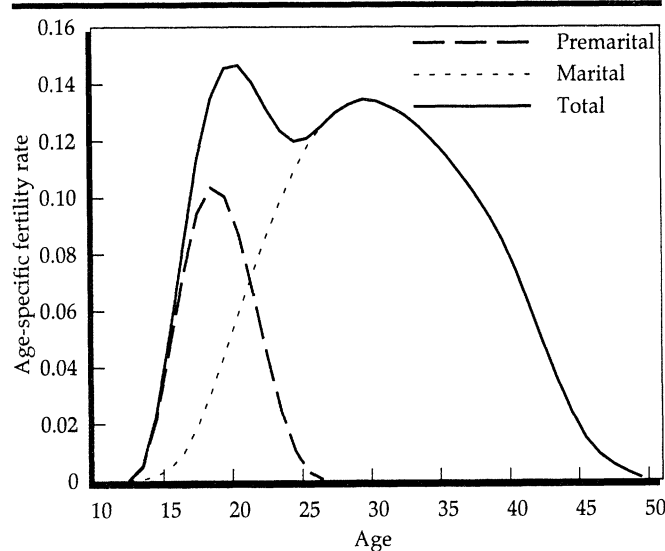
Note: Original computations were by single year of age, which were aggregated subsequently, explaining why sums do not add exactly to total.

3). The observed age pattern of fertility appears as the sum of two components of similar magnitude: a regular pattern of marital fertility, closely resembling European patterns, and an atypical pattern of premarital fertility. The mode of premarital fertility rates is almost as high (with a peak value of 0.11 at age 18) as that of marital fertility (with a peak value of 0.13 at age 30).

In a cohort, premarital fertility would account for 21 percent of total fertility. Given the high rate of population growth, this percentage is equivalent to about one-third of all births in a period, as found in other areas of South Africa (Nash 1990). Premarital fertility is particularly high at 15–19 years, and even exceeds marital fertility in the 20–24 age group, usually the highest in the marital fertility schedule. Premarital fertility accounts for virtually all births before age 15, 82 percent of births among women aged 15–19, and 39 percent of births among women aged 20–24. High proportions of pre-

marital births before age 20 have also been found in the United States, especially in the black population (Alexander and Guyer 1993).

Note that adolescent fertility is high but not extremely so by world standards. The age-specific fertility rate at ages 15–19 is 104 births per 1,000 women, which is close to the average fertility rate for women aged 15–19 in Latin America and the Caribbean in 1979–80 (103 births per 1,000 women), and close to the average for a country like Mexico (104 births per 1,000 women), but far from a record high value such as that of St. Vincent (162 births per 1,000 women) (data from Wulf 1986). Cumulated fertility by age 20 (0.55) is much higher than in most developed countries (an average of 0.23 in 1971; 0.18 in 1979–80), but lower than record high values in subgroups such as the black population of the United States in 1971 (0.72) or the Arab population of Israel in 1971 (0.57) (data from Westoff et al. 1983). What seems to be the case here is a pattern of relatively high premarital fertility, especially among adolescents, compared with relatively low marital fertility, especially among young adults. Reasons for this pattern were investigated further.

Figure 3 Two components of fertility rates: premarital and marital fertility, Agincourt subdistrict, South Africa, 1992–97

Pattern of Contraception Before and After Birth

For all births reported during the prospective period, a series of questions was asked of the mothers, including whether the pregnancy was planned, what type of contraceptive was used before pregnancy, whether the birth was due to a contraceptive failure (as perceived by the respondent), and what type of contraception was practiced afterward. Although the data are not complete, because some of the women were interviewed shortly after the birth and had not had time to initiate contraception, results are informative.

The proportion of women who used contraceptives before giving birth was relatively low among adolescents and young women (4 percent at ages 12–16 and

10 percent at ages 17–21), and somewhat higher among older women (20 percent at ages 22–29 and 18 percent at ages 30–49). This pattern is reversed after birth in the youngest age groups, however (as shown in Table 2). Among the youngest groups, the proportion using contraceptives increased markedly after the birth (39 percent among the 12–16 year olds and among the 17–21-year-olds), whereas it changed considerably less among older women (30 percent among the 22–29-year-olds, and 20 percent among the 30–49-year-olds). Note that these percentages apply to women who gave birth and are not representative of contraceptive prevalence in the general population.

This pattern of low contraceptive use before delivery and high use after delivery among adolescents could explain the age pattern of fertility. Adolescents as a group are not connected to the health system, do not practice contraception, and are highly exposed to the risk of pregnancy, which explains the high fertility rates among them. The great majority (75 percent) delivered in a clinic or a hospital, however, and in doing so, became enrolled in the health system. They received family planning advice and were given access to and the opportunity to use contraceptives. Most of them did so, which indicates that they were motivated and explains why their fertility was reduced substantially thereafter.

The situation for older women was different: Most were married; in the large majority of cases, the pregnancy was desired and planned; and the incentive to use a contraceptive after giving birth depended on the desire for more children. Furthermore, a smaller proportion of older women delivered in a health facility (62 percent of those aged 30–49). The pattern of fertility rates among older women was also influenced by a cohort effect: These women probably maintained fertility behavior closer to natural fertility than did younger cohorts.

Note that a large majority of births among teenagers were obviously first births. No proper count of birth order by marital status is available, but 84 percent of births to women younger than 20 were first births, compared with 42 percent of births among women aged 20–24, 17 percent among women aged 25–29, and 7 percent

among women aged 30 and older (not shown). Most cases of higher parity (2+) among very young women (age <20) were clearly among those who were already married.

Discussion

In this study, evidence is presented of a remarkable pattern of premarital fertility in contrast with marital fertility at older ages. This pattern produces a bimodal fertility schedule, or a Bactrian camel pattern with two humps, quite different from the classic Arabian camel pattern with one hump. This pattern seems to be the consequence of a combination of circumstances: late first marriage, relatively high adolescent fertility associated with low contraceptive use, and relatively low fertility associated with higher contraceptive use among older women. The changing pattern of contraceptive use among women, primarily before and after their first birth, seemed to be the result of poor access and limited awareness of adolescents, compared with much better access and use of preventive services among older women.

The findings underline the need to take premarital fertility up to age 26 into account, and not to stop the analysis at age 19 as do most other studies of adolescent fertility.

Using a model for estimating marital and premarital fertility has several advantages. First, it helps in smoothing out irregularities due to age misreporting and small sample size. Second, and more important, it helps in sorting out the complex issue of when marriage starts and what constitutes a premarital birth in the African context. Given the striking difference between the peak age of premarital fertility and the mean age at first marriage (about seven years), as well as the clear pattern reflected in the figures, there is no doubt that the calculations given here are meaningful.

In this interpretation, mixed period and cohort factors are taken into account, that is, the behavior of adolescents belonging to more recent cohorts is compared with that of older women belonging to earlier cohorts. Thus, the behavior described here does not necessarily

Table 2 Pattern of contraceptive use before and after deliveries, Agincourt subdistrict, South Africa, 1992–1997

Age of mother at time of birth	Number of births recorded	Percent of planned pregnancies	Percent of women using contraceptives before childbirth	Percent of women using contraceptives after childbirth	Percent of pregnancies due to contraceptive failure	Percent delivering in health facilities
12–16	609	24.6	3.6	39.3	47.4	83.7
17–21	2,291	44.7	9.7	39.3	20.5	78.7
22–29	2,849	68.2	20.2	29.8	12.6	69.4
30–49	2,670	73.0	17.6	20.1	11.9	61.8
Total	8,419	60.1	15.3	30.0	14.4	70.5

Note: Percentages were calculated from valid cases only (missing cases were ignored).

apply to older cohorts; nor does the description of behavior imply that these younger cohorts will marry later and reproduce as older women did. Retrospective data recorded in the Agincourt subdistrict do not permit the reconstruction of marriage patterns for older cohorts and, therefore, a full-period cohort analysis could not be conducted.

The pattern shown in this study seems to be recent, although adolescent fertility has been high and marriage has occurred late for a long time. Fertility rates computed from maternity histories for the 1970–86 period, although seriously affected by age misreporting, do not exhibit any bimodal pattern of fertility. The bimodal pattern became visible in the 1988–92 period. Furthermore, the bimodal pattern apparently strengthened during the five years of the prospective study, mostly as a result of a faster decline in fertility at ages 20–29 (–52 percent), seen against the decline in fertility at ages 15–19 (–33 percent) when compared with the baseline period (before 1992). This finding aside, family planning was virtually nonexistent in the Bushbuckridge region prior to 1970, and coverage was low prior to 1985. Therefore, earlier cohorts would have found it practically impossible to change their behavior following a first birth as more recent cohorts now do. The pattern shown in this study is certainly recent.

Various theories have been put forth in an attempt to explain high adolescent fertility in situations where preventive services are available. Among the most convincing are those that link potential social and psychological explanatory factors. In situations of economic hardship and social disruption, adolescents are less likely to mature psychologically and more likely to remain unaware or ambivalent for a longer time with respect to fertility control (Nash 1990; Singh 1986; Wulf 1986; McAnarney and Hendee 1989). The South African situation seems to fit this interpretation. The legacy of apartheid and the pervasive system of migrant labor (Timaues and Graham 1989) have eroded traditional patterns of social interactions and controls, family structures have been seriously disrupted, and fathers are often away for long periods of time. Adolescents, therefore, need more time to mature and respond to the challenges of life as they become adults. This situation has many similarities with that of African-Americans in the United States, where adolescent fertility remains high despite the use of effective birth control later in life (Alexander and Guyer 1993; Spitz et al. 1996). In South Africa, too, adolescent fertility does not seem to alter the later chances of efficient fertility controls, and the same girls who have given birth before age 20 are likely to use contraceptives thereafter and to have relatively low fertility.

From another perspective, the pattern of high premarital fertility in the Agincourt subdistrict reveals a weakness in South Africa's public health system. Although successful in many respects, and particularly in providing access to safe and effective contraceptive methods to experienced women, it fails to fulfill the needs of adolescents and young adults before their first pregnancy. Better access to contraception will require first a recognition of the special needs of adolescents (particularly the youngest), including the skills necessary to negotiate with male partners. Second, it will require providing them with appropriate and culturally sensitive information on reproductive health, including contraception, through various channels, such as schools, sports clubs, radio or television talk shows, and peer-education approaches. It will also require providing an appropriate range of contraceptive supplies and services in the clinics in order to meet the varied needs of adolescents and young women, and necessary training and attitudinal development of clinic staff, especially nurses. Male partners should be targeted explicitly in educational efforts, and condom use should be encouraged for preventing unwanted pregnancies and sexually transmitted diseases.

Attempts to improve adolescents' control over their own fertility have been successful in a range of settings (McAnarney and Hendee 1989; Nash 1990). Clearly, the situation can be improved in rural areas of South Africa as well. A pilot program concerning adolescent reproductive health, based on peer education, involving collaborative links between local schools and clinics, and supported by a coalition of local community groups, was introduced in 1997 into five villages of the Agincourt study area. The program appears to have been well received by local communities and health-service providers. This pilot study could be extended to a larger population and its impact evaluated. If not successful, alternative strategies based on experiences gained elsewhere should also be tested in the field and evaluated.

The distinct pattern shown here of premarital and marital fertility has many demographic implications: First, it has an impact on population growth as a result of the reduced mean age at childbirth (which would be two years older without such high levels of premarital fertility, that is 31 years instead of 29 years, given the mean age of 19 for premarital fertility), and increased fertility (the TFR would be 22 percent lower without premarital fertility, that is, 2.6 instead of 3.3 children ever born, given that adolescents and young women have, on average, 0.7 children ever born before their first marriage).

Second, premarital fertility reveals the frequent occurrence of high-risk behavior including unprotected

sexual intercourse, which may well have important consequences in the context of the HIV/AIDS pandemic. HIV prevalence is already high in South Africa and is increasing rapidly: Incidence among pregnant women ranges from 2 percent to 3 percent a year depending on the province being considered. No population-based estimate of HIV prevalence is available for 1997 in the study area. At that time, however, 16 percent of pregnant women attending antenatal clinics were HIV positive in neighboring Mpumalanga province. A large proportion of new cases of HIV infection seems to occur among women younger than 25. This finding will have important consequences for the spread of HIV, including vertical transmission to newborns and the potential infection of future husbands or partners of women infected early in life.

The Cairo International Conference on Population and Development held in 1994 and the follow-up conference five years later in New York drew attention to integrated approaches to reproductive health. A neglected component in sub-Saharan Africa to date has been that of premarital reproductive health. This study underlines the importance of paying special attention to the needs of adolescents and young women, both to avoid unwanted pregnancy and also to prevent the spread of sexually transmitted diseases.

References

- Alexander, Cheryl S. and Bernard Guyer. 1993. "Adolescent pregnancy: Occurrence and consequences." *Pediatric Annals* 22(2): 85-88.
- Bledsoe, Caroline and Barney Cohen (eds.) 1993. *Social Dynamics of Adolescent Fertility in Sub-Saharan Africa*. Washington, DC: National Academy Press.
- Boult, B.E. and P.W. Cunningham. 1991. "Black teenage pregnancy: An African perspective." *Early Child Development and Care* 74: 103-107.
- Buga, Geoffrey A., Donald H. Amoko, and Daniel J. Ncayiyana. 1996. "Adolescent sexual behaviour, knowledge and attitudes to sexuality among school girls in Transkei, South Africa." *East African Medical Journal* 73(2): 95-100.
- Coale, Ansley J. 1971. "Age patterns of marriage." *Population Index* 25(2): 193-214.
- Coale, Ansley J. and D.R. McNeil. 1972. "The distribution by age of the frequency of first marriage in a female cohort." *Journal of the American Statistical Association* 67(340): 743-749.
- Coale, Ansley J. and James T. Trussell. 1974. "Model fertility schedules: Variations in the age structure of childbearing in human populations." *Population Index* 40(2): 185-257.
- . 1978. "Technical note: Finding the two parameters that specify a model schedule of marital fertility." *Population Index* 44(2): 203-207.
- Craig, A.P. and L.M. Richter-Strydom. 1983. "Unplanned pregnancies among urban Zulu schoolgirls. Community research as preparation for intervention." *South African Medical Journal* 63(12): 452-455.
- Cunningham, P.W. and B.E. Boult. 1996. "Black teenage pregnancy in South Africa: Some considerations." *Adolescence* 31(123): 691-700.
- Lesthaeghe, Ron J. 1989. *Reproduction and Social organization in Sub-Saharan Africa*. Berkeley, CA: University of California Press.
- Lesthaeghe, Ron J., Georgia Kaufmann, and Dominique Meekers. 1989. "The nuptiality regimes in sub-Saharan Africa." In *Reproduction and Social Organization in Sub-Saharan Africa*. Ed. Ron J. Lesthaeghe. Berkeley, CA: University of California Press. Pp. 238-337.
- McAnarney, Elizabeth R. and William R. Hendee. 1989. "Adolescent pregnancy and its consequences." *Journal of the American Medical Association* 262(1): 74-82.
- Mboup, Gora and P. Saha. 1998. "Fertility Levels, Trends and Differentials." *Demographic and Health Surveys, Comparative Study No. 28*. Calverton, MD: Macro International.
- Meekers, Dominique. 1993. "Sexual Initiation and Premarital Childbearing in Sub-Saharan Africa." *Demographic and Health Surveys, Working Paper No. 5*. Columbia, MD: Macro International.
- Nash, Eleanor S. 1990. "Teenage pregnancy—need a child bear a child?" *South African Medical Journal* 77(3): 147-151.
- Parr, N.J. 1995. "Pre-marital fertility in Liberia." *Journal of Biosocial Science* 27(1): 1-10.
- Preston-Whyte, E., M. Zondi, G. Mavundla, and H. Gumede. 1990. "Teenage pregnancy, whose problem? Realities and prospects for action in Kwazulu/Natal." *South African Medical Journal* 77(3): 11-20.
- Singh, Susheela. 1986. "Adolescent pregnancy in the United States: An interstate analysis." *Family Planning Perspectives* 18(5): 210-220.
- Spitz, Alison M., Petr Velebil, Lisa Koonin et al. 1996. "Pregnancy, abortion and birth rates among US adolescents—1980, 1985 and 1990." *Journal of the American Medical Association* 275(13): 989-994.
- Timaeus, Ian and Wendy Graham. 1989. "Labor circulation, marriage and fertility in Southern Africa." In *Reproduction and Social Organization in Sub-Saharan Africa*. Ed. Ron J. Lesthaeghe. Berkeley, CA: University of California Press. Pp. 365-400.
- Tollman, Stephen M., Kobus Herbst, and Michel Garenne. 1995. *The Agincourt Demographic and Health Study: Phase I*. Johannesburg: South Africa. Department of Community Health. University of the Witwatersrand.
- Tollman, Stephen M., Kobus Herbst, Michel Garenne, John S.S. Gear, and Kathleen Kahn. 1999. "The Agincourt Demographic and Health Study: Site description, baseline findings and implications." *South African Medical Journal* 89(8): 858-864.
- United Nations. 1998. *World Contraceptive Use*. (wall chart). New York: UN/DESA/Population Division.
- van de Walle, Etienne. 1968. "Marriage in African censuses and inquiries." In *Demography of Tropical Africa*. Ed. W. Brass et al. Princeton: Princeton University Press. Pp. 183-238.
- Westoff, Charles F., Gérard Calot, and Andrew Foster. 1983. "Teenage fertility in developed nations: 1971-1980." *Family Planning Perspectives* 15(3): 105-110.

- Westoff, Charles F. and Luis H. Ochoa. 1991. "Unmet Need and the Demand for Family Planning." *Demographic and Health Surveys Comparative Study* No. 5. Calverton, MD: IRD/Macro International.
- Westoff, Charles F., Ann Blanc, and Laura Nyblade. 1994. "Marriage and Entry into Parenthood." *Demographic and Health Surveys Comparative Study* No. 10. Calverton, MD: Macro International.
- Wulf, Deirdre. 1986. "Teenage pregnancy and childbearing in Latin America and the Caribbean: A landmark conference." *International Family Planning Perspectives* 12(1): 17–22.

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