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Fertility levels and trends in the face of the AIDS epidemic in Uganda *

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Abstract

The paper uses data on ever-married women interviewed in 1992 and 1995 surveys in six districts of Uganda. Total fertility rates declined during the inter-survey period from 7.3 to 6.0. Women in households that experienced AIDS-related deaths had lower fertility levels than women in non-AIDS-affected households in both 1992 and 1995. This pattern was true of women at older ages, in polygamous unions, the widowed and separated, and among the highly educated and the uneducated.

Concern has been expressed about the fertility of people infected with HIV, that on learning of their condition, they may attempt to accomplish unmet reproductive goals knowing that they will not live a normal life span (Setel 1995). As the AIDS epidemic advances, the question of the effect of HIV on fertility and reproductive decisions is becoming important.

In sub-Saharan Africa little is known about the impact of HIV/AIDS on fertility. As HIV/AIDS mostly affects people of ages 15 to 45 years, the presence of the disease may have a negative effect on fertility as females do not finish their reproductive career. Studies in Europe and Africa indicate that positive serostatus may lower fertility rates in all HIV-infected birth cohorts (Batter et al. 1994; Johnstone 1994). HIV infection and AIDS affect women's health, since those infected have significantly more negative pregnancy outcomes in the form of miscarriages, spontaneous abortions and stillbirths (De Cock et al. 1994; Temmerman, Chomba and Piot 1994); and in the later stage of the disease they may suffer from menstrual disturbances (Strecker et al. 1993). In addition, if condoms are used by most people in order to prevent HIV infection, fertility will decline. However, a survey conducted in Zaire in 1989 revealed that most condom users were the educated and middle class who have low fertility because they use other contraceptive methods to control fertility (Gregson 1994). If it is mostly the educated who are using the condom, overall fertility rates may not fall much since the educated form a small group and already have lower fertility than the uneducated.

Furthermore, persons who know or suspect they have HIV may decide to have fewer children or none at all for fear of leaving many orphans behind. Also couples who are not

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infected may limit their family sizes in order to care for orphans left behind by their dead relatives (Ntozi and Kirunga 1996).

It is possible for HIV/AIDS to have positive effects on fertility. Setel (1995) argues that the high rates of stillbirths, spontaneous abortion and infant and neonatal mortality will reduce or eliminate culturally prescribed periods of abstinence of HIV-infected women in sub-Saharan Africa who are trying to have children, thereby increasing fertility. In addition HIV/AIDS may increase fertility in the endemic areas where infant and child mortality is high, if couples decide to replace the dead children.

AIDS in Uganda

AIDS was first identified in 1982 in Rakai district (Serwadda et al. 1985) and since then it has spread all over Uganda. It is estimated that about 1.5 million people are infected with HIV, while a cumulative total of 48,312 AIDS cases had been reported by 31 December 1995 (STD/AIDS Control Programme 1996). Since the data on the numbers of AIDS cases are obtained from health reports and most people die outside medical units, the extent of the disease is much higher. Because HIV is transmitted primarily by heterosexual contact, it is not surprising that the highest rates of infection in Uganda are found among sexually active persons, especially young women.

Despite a high level of awareness of AIDS among the people of Uganda, the epidemic continues to grow. In 1992, a third of mothers delivering in Kampala hospital were HIV-seropositive and 60 per cent of ailments treated were related to AIDS (Konde-Lule 1995). A study in Rakai district reported that 24.8 per cent of the women interviewed were seropositive (Kirunga 1996).

The condom has been promoted as a preventive measure against HIV infection for about a decade in Uganda. However, its rate of current use, reported at 0.8 per cent among married women and 2.5 per cent among married men, is still low (Uganda Department of Statistics 1996). Konde-Lule, Musagara and Musgrave (1993), in a study of Rakai district, found people with misconceptions about the condom having small holes through which the disease may pass or getting lost inside the female partner, and other people claiming that it reduced sexual pleasure.

For a long time the fertility of Uganda has been high and fairly constant. The total fertility rate (TFR) was estimated at 7.1 in the 1969 and 1991 censuses; the 1995 Uganda demographic and health survey (UDHS) results showed a small decline to 6.9 (Uganda Department of Statistics 1996).

Several studies have reported that the highest rate of HIV infection is among sexually active women who are in their reproductive age. In a study in Rakai district, the women aged 20-24 years had a high rate of HIV infection of 42 per cent and the corresponding percentages for age groups 15-19, 25-29 and 30-34 were 20.4, 38.6 and 30.1 respectively (Kirunga 1996). These high prevalence rates of the disease among the reproductive ages have necessitated the study to examine the effect of HIV/AIDS on fertility in Uganda. This paper therefore compares the fertility of ever-married women in households affected by both AIDS and related causes of death and those affected by non-AIDS-related causes of death in Uganda.

Method

The data source of this paper is a multi-phase study entitled ‘Evolution of household composition and family structure under conditions of high mortality in Uganda’. The study was conducted in six districts of Uganda, which represent six big ethnic groupings comprising the Bagisu of Mbale, Basoga of Iganga, Baganda of Masaka, Banyankore of Mbarara, Bakiga

of Kabale and Banyoro of Hoima, and contribute over 50 per cent of Uganda's population (Republic of Uganda 1993).

The data are from two surveys that were conducted in 1992 and l995 using the same questionnaire. Both surveys covered the same area in order to monitor the change that had taken place in three years. The smallest administrative unit, which was the resistance council, now known as local council-LCl, equivalent to a village, was used as a sampling unit. From each LC1 households which had experienced mortality were picked and interviewed.

The questionnaire had eight sections, of which two provided data for this paper. The section on mortality was used to probe whether the death which had occurred in the household was due to AIDS or related disease or to a non-AIDS cause. Another section was on reproduction and gives the woman's reproduction history as well as the characteristics of the child. Information on age and the number of children born alive was collected on ever-married women aged 15-49 in the 1992 survey and all women aged 12 years and above in the 1995 survey.

In the 1992 survey, a total of 1797 households consisting of urban and rural samples were selected from the households which had experienced a death since their formation, mostly in the past ten years before the survey dating from 1982 when the first HIV case was identified in Rakai (Serwadda et al. 1985). A total of 2352 households including those in the 1992 study were interviewed in 1995. The extra households picked in the 1995 survey were those that had experienced a death in the inter-survey period.

The data have three limitations. First, the study looks at households which suffered death and misses out those that did not; this biases the data towards reproductive behaviour associated with high-mortality households. Secondly, the data do not allow the analysis of fertility of HIV-infected women and HIV-uninfected women. Instead, a proxy in the form of AIDS-affected households and non-AIDS-affected households is used. The assumption is that many women in AIDS-affected households are HIV-positive and others have seen AIDS death which has influenced their expectations and decisions on their reproductive outcomes. Thirdly, age errors, common in most African data, may affect the results since most analysis involves age patterns. It is, however, assumed that the use of five-year age groups eliminates most of the errors which are due to age heaping biases.

Background information

Out of 1797 households sampled in 1992, 1194 ever-married women were probed. The women were divided into two groups, those from households which had experienced AIDS or related causes of death accounting for 49.3 per cent, and those from households which had experienced death due to non-AIDS diseases, responsible for 50.7 per cent. In 1995, there were 2102 ever-married women aged 15 to 49 years and of these, 797 women were from households which had experienced death in the inter-survey period. Forty-two per cent of 797 ever-married women were from households that experienced AIDS and related deaths. In comparison with the 1992 survey, the share of deaths due to AIDS had started to decrease in 1995.

The age group 20-24 years had the lowest proportion of women from AIDS-affected households in 1992 while ages 15-19 had the lowest percentage in 1995. The highest proportion of women from AIDS-affected households in 1992 and 1995 were aged 25-29 and 40-44 years, respectively.

Table 1
Percentage of women in the households affected by AIDS and non-AIDS deaths by the background characteristics in 1992 and 1995 surveys

	1992			1995		
Age	AIDS	Non-AIDS	Total	AIDS	Non-AIDS	Total
15-19	52.9	47.1	100	33.8	66.2	100
20-24	42.9	57.1	100	36.6	63.4	100
25-29	54.7	45.3	100	34.9	65.1	100
30-34	45.8	54.2	100	38.5	61.5	100
35-39	49.1	50.9	100	47.0	53.0	100
40-44	47.8	52.2	100	54.3	45.7	100
45-49	52.5	47.5	100	51.7	48.3	100
All	49.3	50.7	100	41.7	58.3	100
Marital status						
Mono union	47.1	52.9	100	41.3	58.7	100
Poly union	45.8	45.2	100	37.4	53.6	100
Widows/separated/ divorced	48.3	51.7	100	49.0	51.0	100
All	49.3	50.7	100	41.7	58.3	100
Level of education						
None	44.1	55.9	100	43.7	56.3	100
Primary	46.7	53.3	100	41.3	58.7	100
Post primary	53.9	46.1	100	40.9	59.1	100
All	47.1	52.9	100	41.8	58.2	100
Occupation						
Subsistence farmers	46.6	53.4	100	46.0	54.0	100
Tech/manual	40.9	59.1	100	26.3	73.7	100
Formal	47.4	52.6	100	51.6	48.4	100
Trading	57.4	42.6	100	42.9	57.1	100
Unemployed	75.0	25.0	100	35.0	65.0	100
Others	66.4	33.6	100	40.0	60.0	100
All	49.5	50.5	100	45.0	55.0	100
Ethnicity						
Bagisu	61.0	39.0	100	57.4	42.6	100
Basoga	47.0	53.0	100	37.0	63.0	100
Baganda	63.0	37.0	100	59.3	40.7	100
Banyankore	33.8	66.2	100	31.7	68.3	100
Bakiga	41.3	58.7	100	35.5	64.5	100
Banyoro	28.0	72.0	100	36.5	63.5	100
Others	63.7	36.3	100	34.7	65.3	100
All	49.3	50.7	100	41.7	58.3	100
District						
Mbale	60.2	39.8	100	56.8	43.2	100
Iganga	49.2	50.8	100	35.7	64.3	100
Masaka	74.8	25.2	100	58.1	41.9	100

Table 1 continued

Mbarara	32.5	67.5	100	32.7	67.3	100
Kabale	39.3	60.7	100	34.1	65.9	100
Hoima	30.1	69.9	100	33.9	66.1	100

All	49.3	50.7	100	41.7	58.3	100

The pattern of marital status was similar for the 1995 and 1992 surveys. The widowed, separated and divorced had the highest proportion of women from AIDS-affected households followed by those in monogamous unions. The smallest percentage of ever-married women from households that have experienced AIDS death was reported by the polygamously married.

The distribution of women classified by level of education shows that in 1992, the percentage of women from households affected by AIDS death increased with level of education. In contrast, the pattern is reversed in 1995 implying that the awareness of HIV/AIDS dangers and the inter-survey programs benefited the educated more than the uneducated.

Analysis of occupation is interesting. The percentage of subsistence farmers had slightly decreased from 46.6 in 1992 to 46.0 in 1995. In 1992, 75 per cent of unemployed women were from households that had experienced AIDS deaths in 1992 and this dropped to 35 per cent in 1995. A cross-tabulation between education and occupation showed that the majority of the unemployed had post-primary education, a result agreeing with the above observation that the most educated women were benefiting from the awareness programs.

Regarding ethnicity, the Baganda had the highest percentage (63%) of women from households affected by AIDS death, followed by the Bagisu (61%), while the Banyoro had the lowest percentage (28%) in 1992. In the 1992-95 intersurvey period all the different ethnicities recorded a decrease except the Banyoro who experienced an increase from 28.0 to 36.5 per cent. The results based on districts are similar to those of ethnicity.

Fertility levels and trends

Table 2 and Figure 1 show the age specific fertility rates (ASFR) and the total fertility rate estimated from the 1992 and 1995 data. Fertility was highest in age groups 25-29 in AIDS-affected households in 1992 and 20-24 years in non-AIDS-affected households; the corresponding ages for 1995 were 15-19 and 25-29 respectively. The change in the peak ages of fertility in the AIDS-affected households is consistent with the claim that HIV-infected women tend to speed up their fertility (Setel 1995).

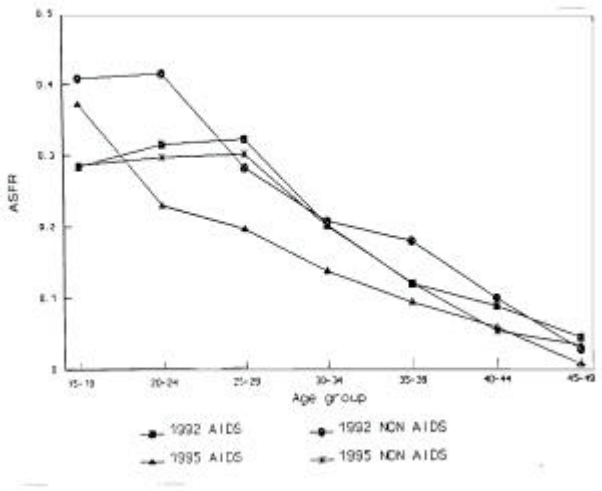
The 1995 survey, in comparison with the 1992 survey, shows a drastic decline in fertility from a total fertility rate of 7.3 to 6.0 in only three years. It is possible that the intensive HIV/AIDS prevention campaigns in the country in the late 1980s and early 1990s educated the population about the high risks of childbearing to the mother and child and hence influenced the reproductive decisions of couples towards avoiding pregnancies. It is worth noting that by 1992, AIDS-affected households had a lower fertility level (TFR of 6.8) than those households which had not experienced AIDS death (TFR of 8.0), implying that perhaps the rates of the former had started falling.

Table 2
Fertility levels of ever-married women in households affected by AIDS and non-AIDS deaths for six districts in Uganda

	1992 Survey			1995 Survey		
Age group	AIDS households	Non-AIDS households	Total	AIDS households	Non-AIDS households	Total
15-19	0.284	0.408	0.337	0.372	0.286	0.318
20-24	0.314	0.414	0.363	0.228	0.296	0.271
25-29	0.320	0.280	0.301	0.194	0.299	0.261

30-34	0.199	0.204	0.198	0.133	0.197	0.172
35-39	0.115	0.175	0.140	0.089	0.116	0.105
40-44	0.083	0.094	0.088	0.053	0.048	0.053
45-49	0.038	0.021	0.030	0.000	0.027	0.012
TFR	6.8	8.0	7.3	5.3	6.3	6.0

Figure 1
Fertility levels of ever-married women in households affected by AIDS and non-AIDS deaths for six districts in Uganda



Between 1992 and 1995, the survey data reported a further decline of total fertility rates from 8.0 to 6.3 in non-AIDS-affected and 6.8 to 5.3 in AIDS-affected households, despite the low rate of use of contraception. This finding is consistent with recent studies on pregnancy, fertility and HIV/AIDS. For example, De Vincenzi (1996) found that the incidence of pregnancy decreased significantly among 279 HIV-positive women in Europe after HIV diagnosis and dropped dramatically in women diagnosed for more than six years. In two studies of Rakai district of Uganda, Gray et al. (1996) observed that HIV infection is associated with markedly reduced fertility.

Furthermore, with low contraceptive prevalence in the study districts, the fertility drop cannot be explained in terms of increased contraception. A more plausible reason is the high rate of pregnancy wastage resulting from HIV infection. Findings of a study in USA by Cohen et al. (1996) suggested that HIV-related disease progression influenced the occurrence of menstrual cycle abnormalities in women. De Vincenzi (1996) claimed that only a quarter of the pregnancies in European women infected by HIV resulted in a live birth. It is therefore possible that most pregnancies of the HIV-positive women in the study did not end in live births and hence were excluded from the calculation of fertility rates.

Table 3 and Figure 2 compare our study results with those of the 1991 Census and 1995 Uganda Demographic Survey (UDHSII) which were national. In order to have meaningful comparisons, the data of the 1991 Census and 1995 UDHSII for the six districts were used to calculate the fertility rates shown in the last two columns of Table 3. It is remarkable that the total fertility rates from the 1991 Census (7.4) and 1992 Survey (7.3) are very close, implying high reliability of the estimates. Secondly, the estimates from our survey of 1995 (6.0) and

UDHSII (6.2) are also close. Figure 2 shows a fast declining trend between 1991 and 1995 perhaps due to HIV-positive couples deciding to refrain from childbearing.

Table 3
Fertility levels in Uganda in 1991, 1992 and 1995

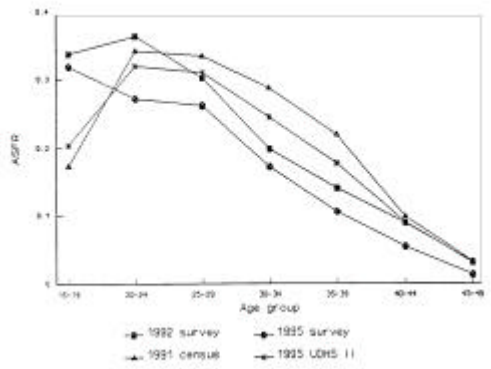
Age group	1992[a] Survey	1995[a] Survey	1991[b] Census	1995[c] UDHS
15-19	0.337	0.318	0.173	0.174
20-24	0.363	0.271	0.341	0.340
25-29	0.301	0.261	0.333	0.290
30-34	0.198	0.172	0.286	0.204
35-39	0.140	0.105	0.219	0.142
40-44	0.088	0.053	0.097	0.073
45-49	0.030	0.012	0.031	0.019
TFR	7.3	6.0	7.4	6.2

a Includes all ever-married women in households where death had occurred

b These are arithmetic means of the census results for the six districts covered by the study

c Estimates for the six districts

Figure 2
Fertility levels in Uganda in 1991, 1992 and 1995



Fertility differentials

Table 4 shows the mean number of children ever born by selected fertility differentials. The fertility differentials are age of women, marital status, level of education, occupation, ethnicity and district of enumeration. The purpose of this analysis is to establish whether there is a difference between the fertility of women in AIDS-affected and non-AIDS-affected households. The analysis of variance (ANOVA) is used to compute the mean number of children ever born and uses the F statistic to test the level of significance for the different means.

The mean number of children ever born was higher in AIDS-affected than non-AIDS-affected households for women aged 15-24 years in both surveys; while in the higher ages the

mean number of children ever born to women in AIDS-affected households was lower than for women in non-AIDS-affected households. This result implies that the women in AIDS-affected households produce children at an earlier age than women in non-AIDS-affected households.

Results from the 1992 survey show that women in AIDS-affected households had lower fertility than those in the non-AIDS-affected households, irrespective of marital status. However, monogamously married women in AIDS-affected households had higher fertility than those in non-AIDS-affected households in 1995, in contrast to the polygamously married and the widows or separated with a reverse pattern. This result is not surprising since other studies such as Allen et al. (1991) on Rwanda, Kapiga et al. (1994) on Tanzania and Nunn (1989) on Burundi have found women in polygamous unions and those widowed and separated highly associated with HIV/AIDS. Fertility by marital status was significantly associated with the type of household (whether AIDS-affected or non-AIDS-affected) in 1995 but not in 1992 reflecting widening variations in fertility between the monogamous and other marital unions over time.

Table 4
Mean number of children ever born by the selected fertility differentials for ever-married women in households affected by AIDS and non-AIDS deaths

	1992 Survey				1995 Survey			
Age group	AIDS household	Non-AIDS household	Overall	Signif of F (p)	AIDS household	Non-AIDS household	Overall	Signif of F (p)
15-19	1.30	1.25	1.27		1.17	0.69	0.84	
20-24	2.38	2.35	2.36		2.35	2.08	2.34	
25-29	3.83	3.83	3.83		3.45	3.73	3.71	
30-34	4.60	5.40	5.06	0.075	4.55	5.06	5.10	0.602
35-39	5.96	7.15	6.56		5.67	6.11	6.18	
40-44	7.67	7.69	7.55		6.56	7.38	6.98	
45-49	8.23	8.09	8.20		7.09	7.29	7.40	
Total	5.13	5.40	5.21		4.61	4.29	4.69	
Marital								
Mono union	5.15	5.29	5.19		5.10	3.93	4.73	
Poly union	5.07	5.95	5.42		4.66	5.20	5.22	
Widowed/ separated	4.98	5.16	5.02	0.370	4.08	4.50	4.44	0.005
Not Stated	5.32	5.03	5.18		1.73	1.92	2.73	
Total	5.12	5.40	5.20		4.61	4.29	4.69	

Table 4 continued

Level of education								
None	5.24	5.96	5.66		4.74	5.45	5.39	
Primary	5.37	5.35	5.30	0.208	4.81	4.16	4.70	0.054
Post primary	3.93	4.62	4.08		4.11	3.53	3.91	
Total	5.09	5.43	5.21		4.67	4.33	4.75	
Occupation								
Farmers	5.16	5.50	5.28		4.86	4.46	4.92	
Technical	6.78	5.31	5.74		2.20	4.14	3.47	
Formal	4.15	5.13	4.54	0.584	3.36	3.47	3.76	0.498

employment								
Trading/ Business	4.68	5.09	4.76		5.25	4.38	4.66	
Unemployed	5.00	6.00	5.25		0.29	1.08	0.28	
Others	5.26	4.83	5.09		2.30	3.47	3.50	
Total	5.12	5.40	5.21		4.61	4.29	4.69	
Ethnicity								
Bagisu	5.20	5.21	5.19		3.47	5.12	4.48	
Basoga	5.00	5.49	5.16		4.94	4.83	4.74	
Baganda	5.43	5.38	5.42		6.09	4.90	5.52	
Banyankore	5.26	6.16	5.65	0.906	4.31	4.22	4.72	0.047
Bakiga	4.88	5.25	5.04		4.15	3.46	4.28	
Banyoro	4.63	4.96	4.82		3.71	3.84	4.71	
Others	5.15	5.27	5.11		4.59	3.75	4.25	
Total	5.12	5.40	5.21		4.61	4.29	4.69	
District								
Mbale	4.58	5.25	4.83		3.95	5.95	4.57	
Iganga	5.35	5.65	5.35		5.09	4.59	4.72	
Masaka	6.08	5.18	5.84		6.26	4.55	5.59	
Mbarara	5.36	6.07	5.62	0.332	4.12	4.28	4.63	0.027
Kabale	4.65	5.25	4.94		4.11	3.47	4.25	
Hoima	4.85	4.83	4.82		3.71	3.96	4.62	
Total	5.12	5.40	5.20		4.63	4.28	4.70	

Women from AIDS-affected households had lower fertility than those from non-AIDS-affected households for two of the three categories of education in 1992. Those with primary education had about the same level of fertility for the two different types of households. It appears from these results that the most educated and the uneducated responded to the AIDS deaths in households in a similar way, to produce fewer children perhaps in order to avoid leaving behind suffering orphans. However, in 1995, women with post-primary education in the AIDS-affected households were estimated to have higher fertility than those in non-AIDS-affected households, probably because the epidemic was stabilizing and there was a need to replace those who had died. In contrast during the inter-survey period the uneducated women in the AIDS-affected households reduced their fertility and by 1995 their fertility was lower than that of women in non-AIDS-affected households. This implies that this group of women responded negatively to the AIDS deaths in their households. Overall, there was no significant difference by level of education between the fertility in AIDS-and non-AIDS-affected households.

According to Table 4, fertility was lower for women in the AIDS-affected households for most of the types of occupation in both surveys, except that the pattern is different. In both surveys there was no significant association between fertility, type of household and occupation.

The fertility of women in AIDS-affected households was lower than in non-AIDS-affected households for all ethnic groups except the Baganda in 1992. In 1995 fertility of women in AIDS-affected households was higher for the Basoga, Baganda, Banyankore and Bakiga than the others; and there was a significant difference in fertility in the AIDS and non-AIDS-affected households by ethnicity. As with ethnicity, there was a significant difference in fertility of women in AIDS-affected households and non-AIDS-affected households by district of residence in 1995 but not in 1992, reflecting a widening variation as the epidemic

progressed. The fertility of women in AIDS-affected households showed a similar pattern to that of ethnicity except in Kabale in 1992 and Mbarara in 1995. Fertility of women in AIDS-affected households declined in 1995 as compared to 1992 except in Masaka where it increased. This is also shown by ethnicity. Masaka district having suffered the epidemic for a longer time than other districts, the majority of the women were from households that had suffered AIDS deaths and it is possible that the women had more children to replace those that had died of the AIDS epidemic.

Conclusion

The results of this study show a decline in mean number of children ever born between 1992 and 1995. The AIDS-affected households had generally lower fertility than non-AIDS-affected households for both surveys. The differences between AIDS-affected and non-AIDS-affected households were not significant in 1992 but were significant in 1995. These findings imply that fertility declined in the AIDS-affected households more than in the non-AIDS-affected, as the epidemic advanced from 1992 to 1995. The results also reflect the negative effect of the epidemic on fertility. Although at present there is no evidence of a high prevalence of contraception in Uganda, the currently high rates of HIV/AIDS may have forced the past persistent high fertility levels in the country to start declining fast.

There is need for Government and non-government agencies to start intervention programs in order to counsel the HIV-seropositive and discordant couples about the implication of bearing children and the expected risks to the children. Before the intervention there should be a study comparing women or couples who are HIV-positive with those who are negative to better understand the effect of HIV on fertility. Such a study will need laboratory tests of HIV serostatus to be carried out on the respondents to separate the seropositive and seronegative from those who are discordant and evaluate the reproductive intentions and actions of the three groups.

References

Allen, S., Philippe Van de Perre, A. Serufilira et al. 1991. Human Immunodeficiency Virus and malaria in representative sample of childbearing women in Kigali, Rwanda. *Journal of Infectious Diseases* 164,1:67-71.

Batter, V.B., B.M. Matela, M. Nsuami, et al. 1994. HIV-1 incidence in young women masked by stable overall seroprevalence among child bearing women in Kinshasa, Zaire: estimating incidence from serial seroprevalence data. *AIDS* 8,6:811-817.

Cohen, M., R. Greenblatt, H. Minkoff, S. Burkan, D. Burns, R. Dunenberg, M. Young and A. Levine. 1996. Menstrual abnormalities in women with HIV infection. Eleventh International Conference on AIDS, Vancouver, 7-12 July. Abstract Mo.B.540.

De Cock, K.M., F. Zadi, G. Adjorlolo, et al. 1994. Retrospective study of maternal HIV-1 and HIV-2 infection and child survival in Abidjan, C"te d'Ivoire. *British Medical Journal* 308,6923:441-443.

De Vincenzi, I. 1996. Incidence of pregnancy in a European cohort of HIV infected women. Eleventh International Conference on AIDS, Vancouver, 7-12 July. Abstract Mo.B.542.

Gray, R., M.J. Wawer, F. Wabwire-Mangen, et al. 1996. Reduced fertility among HIV-infected women. Results of cross-sectional and prospective studies in rural Uganda. Eleventh International Conference on AIDS, Vancouver, 7-12 July. Abstract Mo.B.541.

Gregson, S. 1994. Will AIDS become a major determinant of fertility in sub-Saharan Africa? *Journal of Development Studies* 30,3:650-679.

Johnstone, F. 1994. HIV and fertility. *British Journal of Family Planning* 20,2:45-46.

Kapiga, S.H., J.F. Shao, G.K. Lwihula and D.J. Hunter. 1994. Risk factors for HIV infection among women in Dar-es-Salaam, Tanzania. *Journal of Acquired Immune Deficiency Syndromes 7*,3:301-309.

Kirunga, C.T. 1996. Socio-economic determinants of HIV serostatus: a study of Rakai District. MA (Demography) dissertation, Makerere University, Kampala.

Konde-Lule, J.K. 1995. The declining HIV seroprevalence in Uganda: what evidence? Pp. 27-33 in *The Third World AIDS Epidemic*, ed. I.O. Orubuloye, J.C. Caldwell, P. Caldwell and S. Jain. Supplement to *Health Transition Review* 5. Canberra: Australian National University.

Konde-Lule, J.K., M. Musagara and S. Musgrave. 1993. Focus group interviews about AIDS in Rakai district of Uganda. *Social Science and Medicine* 37,5:679-684.

Ntozi, J.P.M. and C.T. Kirunga. 1996. Family planning and HIV/AIDS prevention in sub-Saharan Africa: trends and strategies. Background paper for IUSSP workshop on Interface between Contraception and HIV/AIDS Prevention, Nairobi, 2-4 October.

Nunn, P. 1989. Acquired Immunodeficiency Syndrome and Human Immunodeficiency Virus infection in Bujumbura, Burundi. *AIDS Technical Bulletin* 2.

Republic of Uganda. 1993. *The 1991 Population and Housing Census. Preliminary Estimates of Fertility and Mortality*. Entebbe: Ministry of Finance and Economic Planning.

Serwadda, D., R.D. Mugerwa, N.K. Sewankambo, et al. 1985. Slim disease: a new disease in Uganda and its association with HTLV-III infection. *Lancet* 2,8460:849-852.

Setel, P. 1995. The effects of HIV and AIDS on fertility in East and Central Africa. Pp. 179-189 in *The Third World AIDS Epidemic*, ed. I.O. Orubuloye, J.C. Caldwell, P. Caldwell and S. Jain. Supplement to *Health Transition Review* 5. Canberra: Australian National University.

STD/AIDS Control Programme. 1996. HIV/AIDS surveillance report of March 1996. Entebbe: Ministry of Health.

Strecker, W., L. Gurtler, M. Binibangili and K. Strecker. 1993. Clinical manifestation of HIV infection in Northern Zaire. *AIDS 7*,4:597-598.

Temmerman, M., E.N. Chomba and P. Piot. 1994. HIV-1 and reproductive health in Africa. *International Journal of Gynecology and Obstetrics* 44,2:107-112.

Uganda Department of Statistics and Macro International. 1996. *Uganda Demographic and Health Survey 1995*. Calverton MD: Macro International Inc.