

Causes, patterns, differentials and consequences of AIDS mortality in Northern Uganda

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Increased AIDS mortality in northern Uganda is worrying. This paper used data from a base line survey of three ethnic groups in northern Uganda, the Iteso, the Langi and the Lugbara. Mortality levels in northern Uganda are high among those under five (27%), young and middle-aged adults 20-39 years (26.7%) and adults aged 40 years and over (35.1%). The most important causes of death were malaria, diarrhoea, AIDS and AIDS-related diseases, and violence. Measles was a very important cause of death among children, but its prevalence declined significantly after 1989. AIDS and AIDS-related mortality was found to be rising between 1982 and 1997 and its rate of increase among females was nearly twice that among males. The most affected age groups were adolescents and young adults. All cause-specific mortality was significantly affected by age, sex, marital status, education, occupation, time periods, and ethnicity. The most important consequences of a death in the family were financial ruin, household conflicts and depression.

HIV is spreading rapidly despite the significant efforts to contain the epidemic. It is estimated that 2.4 million new infections occur each year among young adults (WHO 1992). The rate of spread of HIV/AIDS is most rapid in sub-Saharan Africa (Green 1988; Way and Stanecki 1991). By the end of 1997, 68 per cent of all HIV infections were in sub-Saharan Africa. For example, in Zambia an estimated 500 new people are infected daily with HIV (Webb 1996). In Nairobi, Kenya and Harare, Zimbabwe, HIV prevalence has been reported to be increasing; it is stable in Lusaka and Blantyre. The high rates of infection imply high levels of morbidity and mortality.

The level of the epidemic in sub-Saharan Africa has been reached almost entirely by heterosexual transmission, which explains most adult cases (WHO/GPA 1992; Goncalves 1994). In addition, perinatal transmission is a growing problem because large numbers of women in reproductive ages are seropositive. It has been estimated that a seropositive mother has about a 30 per cent risk of transmitting the virus to her baby (Abbas 1993).

Malaria, measles, diarrhoea, tuberculosis and respiratory infections remain major causes of death, especially among those under five years. In sub-Saharan Africa, 100 million clinical cases of these infections are reported every year, resulting in over one million deaths (Chukuezi 1995). However, fragmentary evidence now available from empirical studies support the view that HIV/AIDS is rapidly emerging as a leading cause of adult death and a substantial number of child deaths. HIV-infected children suffer from other severe infections like measles more than non-HIV-infected children (Walraven *et al.* 1996). HIV/AIDS also increases under-five mortality because of the diminishing care the children receive during the period of the parents' illness, as well as because of orphanhood.

There is evidence that the prevalence rate of HIV-infection is highest among the most advanced social classes. Webb (1996) argued that educated women were more likely to die of

AIDS than the uneducated because of their sexual networking. They are likely to have partners who are affluent, are engaged in formal employment and have greater access to other sexual partners. A study of seroprevalence in Kinshasa, Democratic Republic of Congo (former Zaire) revealed that the infection rate for executives was 5.3 per cent, as against 4.6 per cent for foremen, and almost double the 2.8 per cent rate for ordinary workers (Over 1992). In Tanzania, a woman's HIV risk increased with both her education and her male partner's education (Kapiga *et al.* 1994). Similar patterns have been observed in Uganda by Ntozi and Kirunga (1997) and Ntozi, Lubaale and Nakanaabi (1997).

In Uganda the first AIDS case was diagnosed in 1981 and by June 1994, a cumulative total of 43,875 clinical cases had been reported. By December 1995, the reported cumulative AIDS cases were 48,312 (STD/ACP 1996). The data from HIV infection sentinel surveillance sites have continued to show declining trends in some urban sites and stabilization in other urban sites as well as rural sites, but the rates in both cases are still unacceptably high (STD/ACP 1997). Of the 51,344 AIDS clinical cases, in March 1997 92.6 per cent were aged 12 years and above and 7.4 per cent were children below 12 years.

The majority of infected individuals are aged 15-49 years, the most economically productive ages. The rates for young women are higher than for males of comparable age. Topouzis (1994) reported that 80 per cent of those infected with HIV were aged 15-45 years, and a study in Rakai district placed the mean and median ages of seropositivity among women at 27 and 24 years, respectively. The corresponding ages for males were 33 and 28 years. Although the surveillance reports in Uganda have shown almost equal numbers of clinical cases reported in men and women, other studies (Berkley *et al.* 1990; Miiro 1994; Nalwanga 1998) have shown that women are more likely to be HIV-infected than men.

In some areas of Uganda half of the adult deaths are caused by AIDS. In Rakai, a rural district in southwestern Uganda, the mortality among HIV-positive persons aged at least 15 years was 18.4 per 1000 person-years which was substantially higher than in HIV-negative persons of the same age, 12.4 per 1000 person-years. The infant mortality among the offspring of HIV-infected mothers was almost double that of uninfected mothers (Sewankambo *et al.* 1994).

The pattern and consequences of AIDS mortality in northern Uganda are not adequately known. AIDS surveillance by the AIDS Control Program indicated that HIV/AIDS infection in northern Uganda is increasing (STD/ACP 1995). A study of 5057 in-patients, 3466 out-patients and 5438 pregnant women at St. Mary's Hospital, Lacor in Gulu District, showed high HIV prevalence rates between 1989 and 1996: 52-64 per cent for in-patients, 39-64 per cent for out-patients, and 12-27 per cent for pregnant women (Fabiani *et al.* 1997). Schopper *et al.* (1995) found a high level of HIV/AIDS knowledge in some sections of northern Uganda. This paper presents the causes, patterns, differentials and consequences of mortality in northern Uganda.

Methods

This paper used data from a single survey on 'Evolution of household composition and family structure under conditions of high mortality in Uganda'. This study was the extension of a national study made in six ethnic groups of the Eastern, Central, Western and South-Western regions of Uganda. The northern ethnic groups covered in this study include the Iteso in Soroti district, the Langi in Lira district and the Lugbara in Arua district. In each of these districts two counties were randomly selected and from each county two parishes were selected. From each selected village, 20 households where a death had occurred were probed. A total of 1206 households were investigated.

A structured questionnaire with eight sections was used to collect information on

household composition, mortality, patient care, orphanhood and orphan care arrangements, migration and behaviour patterns of widows and widowers, and attitudes towards illness and death in the community. This paper uses the information on mortality, age, sex, and background characteristics of the dead person. Information on the type of action taken before death and the place of death was also used, and the effect of the death on the household was assessed.

The data used in this study suffer from several limitations: first, the definition of AIDS and AIDS-related causes of death was in terms of symptoms and unlikely to give a true cause of death. This may lead to overestimation or underestimation of deaths resulting from HIV infection. Second, the most frequent cause of death was classified as non-AIDS-related. This classification was inevitable because of the large number of causes. Thirdly, the exposure time to death for individuals and households was assumed to be the same since respondents were not asked how long they had known of exposure to the risk of death.

Results

Cause of death

Seven main specific causes of death were identified as shown in Table 1. Malaria was the most important single cause of death and was responsible for 15.6 per cent of total deaths in northern Uganda. AIDS-related illnesses were the second most common cause of death, accounting for 14.9 per cent of deaths for both sexes. However, the proportion of AIDS-related deaths was higher among females (15.9%) than males (14.0%). The third most common cause of death reported was violence, which caused 11 per cent of total deaths, 14.1 per cent among males and 6.4 per cent among females. Most deaths classified as caused by violence were associated with the continuing social disruption in northern Uganda. Another major cause of death was measles which accounted for 7.8 per cent of male and 12.4 per cent of female deaths. Other causes were responsible for about 35 per cent of total deaths among males and 34.5 per cent among females. Overall there were more male deaths (60%) than female deaths (40%).

Table 1
Per cent distribution by cause of death and sex

Cause of death	Males	Females	Both
Diarrhoea	7.8	7.7	7.7
Malaria	14.6	17.0	15.8
AIDS+AIDS-related	15.9	14.0	14.8
Measles	7.8	12.4	9.7
Violence	14.1	6.4	11.0
Maternal factors	0.0	4.6	2.3
Abdominal disorder	4.1	4.1	4.1
Other	35.0	34.3	34.6
Total	60.0	40.0	100.0
Number	1547	1030	2577
X^2 19.1 p=0.000			

Cause of death by age

The per cent distribution of deaths by age is presented in Table 2, which shows that the majority of deaths occurred among children under five (29.8%), young and middle-aged adults (25%) and people 40 and over (34.2%). Deaths were least among children aged 5-9 years (5.3%) and adolescents aged 10-19 years (5.6%)

Table 2
Per cent distribution of deaths by age in Northern Uganda

Age	Number	Percentage	Age	Number	Percentage
0	262	10.5			
1-4	484	19.4	under 5	746	29.8
5-9	133	5.3	5-9	133	5.3
10-14	62	2.5			
15-19	78	3.1	10-19	140	5.6
20-24	107	4.3			
25-29	183	7.3			
30-34	174	7.0			
35-39	162	6.5	20-39	625	25.0
40-44	157	6.3			
45-49	136	5.4			
50-54	109	4.4			
55-59	96	3.8			
60-64	100	4.0			
65+	258	10.3	40+	856	34.2
Total	2500	100.0		2500	100.0
X ²	779.9	p=0.000	X ²	667.3	p=0.000

The age pattern of cause of death presented in Table 2 shows that overall childhood (0-9) mortality was responsible for over one-third of total deaths.

Table 3 shows that the most important causes of death in childhood were malaria and measles, followed by AIDS and AIDS-related causes and diarrhoea. More boys than girls died of malaria and diarrhoea; more girls than boys died of measles and AIDS.

Table 3 also shows that adolescent mortality was lower for both sexes. Among male adolescents, the main causes of death were violence (25.9%), malaria (13.6%) and AIDS (9.9%). Other causes of death accounted for 40.7 per cent of total male adolescent deaths. Among adolescent girls, the main causes of death were AIDS and AIDS-related diseases (20.3%), violence (15.3%), measles (15.3%) and malaria (10.2%). The rate of AIDS and AIDS-related deaths among females was more than twice that among male adolescents.

Among adults aged 20 to 39 years, AIDS and AIDS-related deaths were the main cause of death for both men (22.6%) and women (29.9%). Among middle-aged men, violence was the second most important cause of death, accounting for nearly 22 per cent of total deaths. Other unclassified causes were reported for 33.3 per cent of male deaths and 35.4 per cent of female deaths. For people over 40, other causes of death predominated. These causes were reported for 45.3 per cent of male deaths and 52.9 per cent of female deaths. In this age group, AIDS and AIDS-related diseases caused 14.1 per cent of male deaths and 12.3 per cent of female deaths; and violence was an important cause of death for men over 40 (17.1%).

The general age pattern of mortality is U-shaped even with AIDS, but the pattern of AIDS and AIDS-related cause of death is an inverted U. This shows that childhood and old age mortality are still dominated by non-AIDS causes in northern Uganda. Furthermore, AIDS in northern Uganda is a major cause of death in adolescence and young adulthood. AIDS and AIDS-related deaths are more common among females. AIDS mortality was found to decline significantly in old age for both men and women although the rate of decline appears to be higher among women.

Table 3
Per cent distribution of deaths by cause, age and sex

Cause	Children		Adolescents		Young adults		Adults 40+	
	M	F	M	F	M	F	M	F
Diarrhoea	10.7	8.9	1.2	3.4	6.8	7.7	7.1	6.5
Malaria	29.8	26.5	13.6	10.2	7.3	4.8	7.4	7.6
AIDS+AIDS R	10.9	12.0	9.9	20.3	22.6	29.9	14.1	12.3
Measles	19.1	25.2	3.7	15.3	2.3	3.0	2.6	3.6
Violence	3.3	3.6	25.9	15.3	21.8	6.6	17.1	8.7
Maternal factors	0.0	0.0	0.0	7.6	0.0	7.6	0.0	2.3
Abdominal disorders	2.5	1.3	2.5	3.4	4.8	5.5	5.5	6.9
Other	22.8	21.4	40.7	27.1	33.3	35.4	45.3	53.4
Number	486	393	81	59	354	271	580	276
X ²	Males	365.4		p=0.000				
X ²	Females	289.3		P=0.000				

Trends in mortality by cause

Table 4 shows that compared to other causes of death, AIDS has been increasing monotonically. The rate of increase has been greater among females than males. Between 1981 and 1989, AIDS and AIDS-related mortality increased from 8.6 to 14.6 per cent among females. This further increased by 35 per cent (from 14.6% to 19.7%) between 1989 and 1997. The rate of increase among males was also high, from 11 per cent between 1981 and 1989 to 71.8 per cent between 1989 and 1997. The sex pattern of deaths observed in this study is similar to that in other studies in Uganda which showed that women are more at risk of AIDS deaths than men. However, although the rate of increase in deaths due to AIDS has been higher among females, the number of deaths from AIDS and related causes has been higher among males in northern Uganda. Studies in other parts of Uganda found that AIDS mortality was higher among females (Ntozi *et al.* 1997; STD/ACP 1997; Nalwanga 1998). This high rate of infection and resultant mortality can be explained by the consequences of the overthrow of the Northern-backed regimes in February 1986. This led to three processes; first, large-scale return migration of northerners from the central and southern parts of Uganda; secondly, large-scale population displacements and large movements of soldiers mainly from the south to the north to fight insurgency; and thirdly, significant abuse of human rights by the belligerent forces.

Deaths from violence increased from 12.7 per cent before 1982 to 17.6 per cent in 1982-1989 and declined to 13.4 per cent by 1997 among males. Over the same period female mortality from violence declined from 8.6 per cent to 6 per cent. This reduction is likely to be the result of the end of civil war in Teso in 1991. On the other hand, Table 4 shows that

mortality from malaria, maternal causes and abdominal disorders remained almost constant with minor reductions between the period before 1982 and 1997. This is expected since malaria is an endemic disease in northern Uganda. It is also likely that its resistance to conventional and cheap malaria treatments using chloroquine may have contributed to this phenomenon. A consistent reduction in measles mortality was noted for both sexes during this time. This can be attributed to the large-scale expanded immunization program for children in Uganda between 1989 and 1997. The death rate from other causes remained relatively stable, but was higher among males.

Table 4
Per cent distribution of deaths by cause, year and sex

Cause	Time period and sex					
	Before 1982		1982-1989		1990-1997	
	M	F	M	F	M	F
Diarrhoea	6.3	4.3	5.3	6.6	9.2	8.9
Malaria	15.2	16.7	14.4	15.7	14.7	14.0
AIDS+AIDS-related	9.3	8.6	10.3	14.6	17.7	19.7
Measles	13.1	27.8	9.4	14.6	5.9	7.7
Violence	12.7	8.6	17.6	6.6	13.4	6.0
Maternal causes	0.0	5.1	0.0	6.6	0.0	5.0
Abdominal disorders	4.6	3.1	3.5	4.5	4.2	4.3
Other	37.6	27.8	37.6	33.3	33.9	36.3
Number	237	162	340	198	950	650
X ²	Male	41.2	p=0.000			
X ²	Female	63.8	p=0.000			

Differentials in mortality by cause and some background characteristics

Background characteristics including sex, age, ethnicity, district, marital status, level of education and occupation were not only significant determinants of mortality in northern Uganda, but also causes of differential AIDS and AIDS-related mortality. Tables 3 and 5 show that there were more AIDS and AIDS-related deaths among females than males. The tables also show that while AIDS was a major cause of death among adolescents and young and middle-aged adults, malaria was a more significant cause of death among children, and Other causes among older people. This is expected since adolescents and young adults are the most sexually active members of the population. On the other hand, children are more susceptible to malaria and other infectious diseases because of lack of immunity against these diseases. Old people also have low resistance to malaria, and they are more likely to be affected by degenerative diseases than other age groups.

Among the three major tribes and districts studied, AIDS and AIDS-related mortality was much higher among the Lugbara (26.2%) and in Arua (26.9%) than among the Iteso and in Soroti (9.9% and 9.7%), and the Langi and in Lira (12.6% and 12.5%). The death rate from malaria was highest among the Langi and Lira, followed by the Lugbara and Arua. Deaths from violence were most numerous among the Iteso and in Soroti (14.8% and 14.4%) followed by the Langi and in Lira (both 9.9%). Furthermore, the death rate from Other diseases was higher among the Langi and in Lira than among the Iteso and in Soroti, and the Lugbara and in Arua. In Arua, the prevalence of AIDS may be explained by the relative peace in the region between 1986 and 1994, which led to the promotion of trade and commerce

between the Democratic Republic of Congo, southern Sudan and Uganda. These activities attracted many people from outside the region, especially truck drivers, and made Arua a hub of commerce in northwestern Uganda. Miiro (1994) and Nalwanga (1998) showed that HIV was more prevalent in the major commercial centres and along the highways in Uganda. Deaths from violence were frequent in Soroti probably because of the insurgency in the area between 1986 and 1992.

As far as marital status is concerned, most AIDS deaths occurred among cohabiting couples (19.4%) followed by the never-married (18.9%). Couples in monogamous and polygamous unions experience similar, but lower levels of AIDS deaths. AIDS deaths were lowest among the widowed, separated and divorced (Table 5). The higher prevalence of AIDS mortality among cohabiting couples may be explained by unstable marriages which also involve multiple sexual partners. This is likely to happen since such couples may consider themselves unmarried and therefore relatively free in sexual matters. In most of Uganda, relationships which are not church or legal marriages, nor culturally approved through payment of bride price, are not seriously respected. Never-married persons are also at a greater risk of HIV in their search for partners. The only explanation for fewer AIDS deaths among monogamous and polygamous couples is 'zero grazing' (no extramarital sex). Table 5 shows that malaria was a common cause of death for all except those in the polygamous and never-married categories. Violence was a major cause of death for all marital-status groups.

It was found that while death rates from malaria and measles were lower among those who had at least primary education, deaths from AIDS and AIDS-related causes increased with the level of education. AIDS mortality was higher among those with secondary or higher education (15.2%) and slightly higher for those with primary education (11.9%) than those with no education (11.6%). This is probably because education increases the risk of HIV infection through liberal sexual attitudes and behaviour; the risk is probably from multiple sexual partners and casual sex. Mortality from violence was also higher among those with primary education and secondary or higher education (Table 5).

Occupation was categorized into three: peasants, those without any occupation and those with non-peasant occupations. The non-peasant occupations included all the formal-sector occupational groups. AIDS-related mortality was lowest among those with formal occupations (7.8%) followed by those without any occupation (12.2%); it was highest among those in Other occupations (26.3%). This category of occupations includes the high-risk groups of prostitutes, barmaids, truck drivers and casual workers. The pattern of deaths from violence showed the highest rate for peasant farmers (18%), followed by those in the formal sector (15.4%).

Table 5
Per cent distribution of deaths by cause and some background characteristics

	Cause of death							
	Diarrhoea	Malaria	AIDS	Measles	Violence	Maternal causes	Abdominal disorders	Others
District								
Lira	8.2	16.6	12.5	4.9	9.9	2.1	5.2	40.7
Soroti	3.9	11.8	9.7	20.9	14.4	2.1	2.8	34.3
Arua	11.6	16.3	26.9	2.8	8.0	2.1	4.2	27.8
X ²	334.8	p=0.000						
Tribes								
Iteso	3.4	11.9	9.9	20.5	14.8	2.0	2.9	34.6
Langi	8.3	16.8	12.6	4.9	9.9	2.0	4.8	40.6
Lugbara	11.7	16.0	26.2	10.0	8.4	2.2	4.5	27.7
Others	15.0	5.0	5.0	25.0	5.0	5.0	5.0	35.0
X ²	324.9	p=0.000						
Marital status								
Never married	5.5	6.9	18.9	16.6	17.5	2.3	2.3	30.0
Monogamous	7.0	11.7	12.8	4.3	15.3	2.2	4.7	41.9
Polygamous	3.4	4.3	12.3	3.4	15.7	3.8	7.2	49.8
Cohabiting	9.7	16.1	19.4	3.2	9.7	0.0	0.0	41.9
Wid-Sep-Div	16.3	18.5	5.4	13.0	6.5	0.0	5.4	34.8
X ²	122.8	p=0.000						
Highest level of education								
None	6.3	10.7	11.6	10.8	8.6	1.9	3.8	43.0
Primary	5.4	10.1	11.9	5.7	18.9	3.0	5.1	45.8
Secondary+	7.3	10.4	15.2	6.1	17.7	0.6	5.5	11.2
X ²	54.9	p=0.000						
Occupation								
Peasants	6.0	10.7	8.7	16.0	18.0	1.3	2.0	37.3
Formal sector	7.7	7.7	7.7	15.4	15.4	0.0	7.7	38.5
None	7.0	15.2	12.2	10.9	9.9	2.0	4.5	38.3

Others	0.0	31.6	26.3	0.0	10.5	5.3	5.3	<i>AIDS mortality in Northern Uganda</i> 147
X ²	31.3	p=0.069						21.1

Cause of death and duration of illness

Most deaths due to AIDS and AIDS-related diseases shown in Table 6 occurred after two or more years (56.7%) or one year (39.8%) of illness, because AIDS takes a long time to kill its victims, especially when they get treatment for secondary infections. Similarly deaths from abdominal disorders and Other unclassified causes occurred after two or more years of illness. This is expected since most of these illnesses are chronic and take a long time to cause death. The reported high frequency of deaths from malaria and diarrhoea after one, two or more years could be the result of reporting multiple episodes of these illnesses rather than reporting the duration of a single episode. On the other hand, most deaths from non-AIDS causes, except malaria, occurred within a year of illness.

Cause of death and type of action

For most illnesses reported including AIDS and AIDS-related diseases, the type of action taken was treatment in a health centre. The use of traditional healers was also reported for all illnesses. No treatment was reported for 22.1 per cent of AIDS-related illnesses. This is quite a large proportion considering that AIDS patients take a long time to die. The proportion of patients who received home care was 11.5 per cent for AIDS and AIDS-related diseases. The obvious pattern is that most patients were given some kind of modern health care regardless of cause of death. A large proportion of people who died from violence (57.4%), maternal causes (52.0%), abdominal disorders (53.1%), Other causes (35.2%) and malaria (24.1%) had not been taken for treatment. This can be explained by the effects of the northern civil war which not only caused direct deaths, but also disorganized the social and economic infrastructure in the area, making it difficult for people to get modern medical care.

Furthermore, Table 6 shows that for all causes of death including AIDS, most deaths occurred at home. Deaths in health centres accounted for only 36 per cent of diarrhoea deaths, 38 per cent of deaths from malaria, 28 per cent from AIDS, 31 per cent from measles, 50 per cent from maternal causes, 31 per cent from abdominal disorders and 25 per cent from Other diseases.

Table 6
Per cent distribution of deaths by cause, duration, type of action taken during illness and place of death

	Cause of death							
	Diarrhoea	Malaria	AIDS	Measles	Violence	Maternal causes	Abdominal disorders	Other
Duration of illness								
< 1 year	2.6	11.5	3.5	47.1	47.1	60.0	2.8	15.9
1 year	50.0	46.2	39.8	29.4	23.9	40.0	41.7	29.5
2+ years	47.4	42.3	56.7	23.5	28.2	0.0	55.6	54.5
Number	38	26	201	17	71	10	36	308
X ²	125.0	p=0.000						
Action about illness								
Health centre	53.7	44.7	44.2	63.6	17.8	32.0	21.9	32.0
Trad. healer	16.7	21.3	22.1	15.9	9.5	4.0	9.4	17.1
Homecare	13.0	9.9	11.5	3.8	15.4	12.0	15.6	15.7
No treatment	16.7	24.1	22.1	16.7	57.4	52.0	53.1	35.2
Number	54	141	104	132	169	25	32	381
X ²	138.6	p=0.000						
Place of death								
Health centre	35.9	37.5	27.5	31.3	18.7	50.0	30.8	25.4
Home	63.6	60.9	72.2	67.1	73.0	48.1	64.4	72.9
Trad. healer	0.0	0.0	0.3	0.0	0.4	0.0	0.0	0.6
Other places	0.5	1.6	0.0	1.6	7.9	1.9	4.8	1.0
Number	198	381	396	246	252	54	104	861
X ²	105.8	p=0.000						

Relative incidence of AIDS and AIDS-related causes of death in northern Uganda

In Table 7 the results of logistic regression are presented. In this analysis dying of AIDS and AIDS-related diseases was the dependent variable; sex, age, marital status, educational level and year of death were the independent variables.

Table 7 shows that females were nearly 1.4 times as likely to die of AIDS and AIDS-related causes as males. A number of studies attribute this to the structure of the female genitals, as well as to women's low social status, which makes them more susceptible than men to HIV (Berkley *et al.* 1990).

Age was also found to be an important determinant of the risk of dying of AIDS, which was greater for young and middle-aged adults and adolescents than for children and older adults. This age pattern of AIDS mortality was noted, in a number of studies in sub-Saharan Africa, to have significant socio-economic effects (Topouzis 1994), because these age groups are the most productive as well as sexually active.

A third factor which remained an important determinant of AIDS and related mortality was marital status. Table 7 shows that AIDS-related mortality was higher among never-married and cohabiting people. The risk of AIDS death was three times as high for people in cohabiting relationships, and twice as high for the never-married, as for the widowed, separated and divorced. Cohabiting and never-married people may be involved in unstable and multiple sexual relationships thereby increasing their risk of acquiring HIV.

People with secondary and higher education were 1.3 times as likely to die of AIDS as those with no education: the former are more exposed to HIV because of their liberal attitude towards sex.

The last important determinant of AIDS deaths in northern Uganda was the time period. It was found that AIDS mortality was three times as high between 1990 and 1997, and twice as high between 1982 and 1989, as it was before 1982. This shows that the rate of HIV infection in northern Uganda has been increasing over the years. It is also an indication that the threshold of AIDS and AIDS-related mortality may have not been reached in northern Uganda. This is a result of the slow preventive response to AIDS (Tanne 1992) despite the fact that it was already well known in many parts of Uganda.

Table 7
Logistic regression estimates of the relative risk of dying of AIDS and AIDS-related causes

Variable	B	S.E.	Sig	R	Exp(B)
Sex					
Male ^a					0.0000
Female	.3318	.2372	.1618	.0000	1.3935
Age					
Child ^a					0.0000
Adolescent	.0705	.6281	.9106	.0000	1.0731
Young adult	.7388	.4416	.0943	.0352	2.0934
Older adult	.1623	.4596	.7239	.0000	.8502
Marital status					
Never married	.8341	.5784	.1493	.0111	2.3027
Monogamous	.3415	.5501	.5347	.0000	1.4071
Polygamous	.5812	.5871	.3222	.0000	1.7883
Cohabiting	1.1670	.7300	.1099	.0293	3.2123
Wid.-Sep.-Div. ^a					0.0000
Education					
No education ^a			.0965	.0324	
Primary	-.3564	.2612	.1725	.0000	.7002
Secondary +	.2795	.3454	.4183	.0000	1.3225
Time period					
Before 1982 ^a	0.0000		.0103	.0894	
1982-89	.6224	.4916	.2055	.0000	1.8634
1990-97	1.1531	.4411	.0089	.0866	3.1679
Constant	-4.0460	.7666	.0000		

^a Reference category.

Consequences of death for the household

Death is an unwelcome but inevitable phenomenon. Death is seen as a deprivation of the household as well as the society in general. The social consequences of death are an accumulation of the effects of death on individuals and households. In this study the effects of a death on the household were reported by cause, sex and age.

For all causes of death, the most important consequence for the household was reported to be financial ruin followed by household conflict and depression. However, Table 8 shows that the financial and conflict effects of death in the household were greatest for deaths from AIDS and AIDS-related diseases, followed by deaths from malaria and violence. However, while the effects of malaria deaths were much the same for both sexes, the financial, depression and family-conflicts effects of AIDS mortality on the household were greater for female mortality than for male mortality. This suggests that the financial contributions of women to the household are either greater than those of men or at least significant and consistent; it demonstrates the effects of social disruption in northern Uganda where most households have been run by women in the past ten years. Malaria is by far the greatest single cause of death for both males and females and all ages in northern Uganda. The fact

that all household members are susceptible to the risk of malaria deaths means that much money is regularly spent on treatment, and lost when adult members die. Furthermore, it was found that all the effects on the household of death from violence were greater for male mortality than for female mortality. Collectively, the effects of deaths from Other causes on the household are far greater than the effects of malaria and AIDS-related deaths combined. For these causes of death, the effect of male mortality on the household was greater than that of female mortality.

Table 8
Cause of death by effect of death on household by sex

Cause	Financial ruin		Depression		Family conflicts		Other	
	M	F	M	F	M	F	M	F
Diarrhoea	9.3	8.6	6.7	6.4	5.9	9.4	3.7	6.6
Malaria	16.5	14.5	12.8	12.8	9.8	20.3	16.0	15.8
AIDS+AIDS-related	16.8	19.2	11.7	13.2	9.8	18.8	14.7	17.5
Measles	4.0	8.6	12.8	20.8	11.8	7.8	11.7	14.2
Violence	14.6	6.0	14.8	5.2	17.6	15.6	6.7	5.0
Maternal factors	0.0	4.2	0.0	5.2	0.0	1.6	0.0	7.4
Abdominal disorders	4.0	5.4	4.7	3.2	2.9	3.1	4.4	0.8
Other	33.7	34.8	35.5	34.8	42.2	23.4	39.3	35.8
Total	57.8	55.3	24.3	25.7	6.9	6.6	11.1	12.4
Number	852	537	358	250	102	64	163	120
X ² Male	72.0	p=0.000						
X ² Female	49.7	p=0.000						

Apart from cause and sex differential of effects of deaths, Table 9 shows that the effect of a death on the household varies with age at death and cause of death. The effect of Other causes of death was found to be greater at all ages, but it was greatest at old age and least at childhood. The leading age specific effect of death was financial ruin followed by depression and other effects.

While malaria mortality in childhood was a very important cause of financial ruin and household conflict, AIDS mortality in young adulthood and older ages was a significant cause of financial ruin and depression, probably because of the slow and long deterioration in the health of patients. AIDS is long-lasting and incurable so that by the time death occurs the household is not only deprived of the financial support of its adult members who have died, but also drained of the financial resources available.

Table 9 shows that deaths from violence also had significant effects on the household. Of deaths among young and older adults, financial ruin, depression and family conflict were the main effects. More important effects of deaths of adolescents were family conflict, social disruption and other effects.

Table 9
Cause of death by effect on household and age

Cause	Financial ruin	Depression	Family conflicts	Other
Under 5				
Diarrhoea	13.6	9.0	12.0	4.4
Malaria	35.9	23.0	26.0	30.0
AIDS+AIDS-related	13.9	10.0	6.0	10.0
Measles	13.3	27.1	28.0	24.4
Violence	2.3	2.3	8.0	0.0
Maternal causes	0.0	0.0	0.0	0.0
Abdominal disorders	1.2	2.3	0.0	2.2
Other	18.3	24.9	20.0	26.7
Numbers	345	221	50	90
X ²	48.9	p=0.001		
5-9				
Diarrhoea	7.0	7.0	0.0	0.0
Malaria	26.3	9.3	11.1	6.3
AIDS+AIDS-related	12.3	2.3	11.1	12.5
Measles	7.0	9.3	11.1	6.3
Violence	11.8	40.2	33.4	31.1
Maternal causes	0.0	0.0	0.0	0.0
Abdominal disorders	1.8	4.7	0.0	6.3
Other	22.8	25.6	33.3	43.8
Numbers	57	43	9	16
X ²	18.9	p=0.589		
Adolescents				
Diarrhoea	3.7	0.0	0.0	5.0
Malaria	11.1	10.9	14.3	15.0
AIDS+AIDS-related	20.4	8.7	14.3	10.0
Measles	5.6	10.9	0.0	10.0
Violence	13.0	30.4	42.9	15.0
Maternal causes	3.7	2.2	0.0	10.0
Abdominal disorders	3.7	2.2	0.0	0.0
Other	38.9	34.8	28.6	35.0
Numbers	54	46	14	20
X ²	18.8	p=0.594		
Young adults				
Diarrhoea	7.9	5.6	6.7	7.4
Malaria	5.8	5.6	6.7	9.3
AIDS+AIDS-related	26.8	22.4	22.3	33.3
Measles	1.4	4.5	0.0	5.6
Violence	14.2	16.0	22.0	11.1
Maternal causes	3.2	5.6	0.0	3.7
Abdominal disorders	4.5	6.4	8.9	3.7

Others	36.1	33.6	33.3	25.9
Numbers	380	125	45	54
χ^2	20.2	p=0.502		

Table 9 (cont.)
Cause of death by effect on household and age

Cause	Financial ruin	Depression	Family conflicts	Other
Older adults				
Diarrhoea	7.6	5.5	6.7	5.6
Malaria	8.3	2.8	8.4	9.0
AIDS+AIDS-related	14.6	12.4	13.3	14.6
Measles	1.9	5.5	0.0	5.6
Violence	15.4	15.2	13.3	6.7
Maternal causes	1.1	0.0	0.0	2.2
Abdominal disorders	7.0	5.5	2.2	3.4
Other	44.0	53.1	55.6	52.8
Numbers	527	145	45	69
X ²	29.6	p=0.100		

Conclusion

Contrary to what has been found in the other parts of Uganda, AIDS is not yet a major cause of death in northern Uganda. However, this study found that AIDS and AIDS-related mortality in northern Uganda rose from 9 per cent before 1982 to nearly 18.5 per cent in 1997. This is an indication that the northern region is yet to reach its threshold of AIDS mortality. The rate of increase in AIDS mortality has been greater among females than males for the three ethnic groups studied. Prevalence rates were higher among the Lugbara than the Iteso and the Langi. Adolescents and young and middle-aged adults were found to be the age groups most affected by AIDS and AIDS-related mortality. Financial ruin and depression were identified as the principal effects of AIDS mortality. These effects were severe when death occurred to young and middle-aged adults and to females. The age and sex pattern of AIDS calls for strong intervention programs among adolescents and women if a major morbidity and mortality crisis, as experienced in other parts of Uganda, is to be averted. Malaria was the leading single cause of death at all times, for all ages and sexes. Violence was the third most frequent cause of death in northern Uganda. The effects of malaria and violence deaths on households were found to be similar to those of AIDS and AIDS-related mortality.

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