

# The impact of adult mortality on the living arrangements of older people in rural South Africa

VICTORIA HOSEGOOD\*† and IAN M. TIMEUS†\*

## **ABSTRACT**

This paper examines changes in households with older people in a northern rural area of KwaZulu Natal province, South Africa, between January 2000 and January 2002. The focus is the impact of adult deaths, especially those from AIDS, on the living arrangements of older people. The longitudinal data are from the *Africa Centre Demographic Information System*. In 2000, 3,657 older people (women aged 60 years or older, men 65 years or older) were resident in the area, and 3,124 households had at least one older member. The majority (87%) of older people lived in three-generation households. Households with older people were significantly poorer, more likely to be headed by a woman, and in homesteads with poorer quality infrastructure than households without older members. By January 2002, 316 (8%) of the older people in the sample had died. Of all the households with an older person, 12 per cent experienced at least one adult death from AIDS. The paper shows that older people, particularly those living alone or with children in the absence of other adults, were living in the poorest households. They were also coping with an increasing burden of young adult deaths, the majority of which were attributable to AIDS.

**KEY WORDS** – older people, adult children, children, South Africa, mortality, household composition, HIV, AIDS.

## **Introduction**

Attention has been drawn to the lack of research on, and programmatic attention to, the health and welfare of older people in developing countries. This is particularly so in Africa where the demographic, economic and social changes resulting from the HIV/AIDS pandemic require older people to play new or expanded roles within households, as well as face the challenge of reduced support from their children and grandchildren

\* Africa Centre for Health and Population Studies, Mtubatuba, South Africa.

† Centre for Population Studies, London School of Hygiene & Tropical Medicine, UK.

(HelpAge International 2000; Bongaarts and Zimmer 2001; Dayton and Ainsworth 2002; Knodel, Watkins and VanLandingham 2003; Zimmer and Dayton 2003). Although they are at risk of being infected with HIV themselves (Wilson and Adamchak 2001), the major impact of the HIV epidemic on older people is indirect. Knodel, Watkins and VanLandingham (2003) identified seven pathways through which older people experienced the impact of the AIDS epidemic at the family or household level: caregiving, co-residence with an ill adult child, loss of the child, being a provider of financial or material support when the adult child was ill, paying for the funeral of the deceased child, fostering grandchildren, and negative community reactions.

The role of older people in the care of relatives with AIDS has been relatively well documented. Many of the empirical studies have been in the United States (Ellis and Muschkin 1996; Berk *et al.* 2003) and Thailand (Knodel and VanLandingham 2001; Knodel *et al.* 2001*a*, 2001*b*). Studies in Uganda, Tanzania and Zimbabwe have also shown, however, that older people play an important role in caring for their children affected by AIDS (Foster *et al.* 1995; World Health Organisation (WHO) 2002). In Uganda, 48 per cent of people with AIDS were cared for by a parent at least sometime during their illness (Ntozi and Nakayiwa 1999). There is widespread awareness in the media, research and programme arenas of the role of older people in fostering children orphaned through parental deaths from AIDS. Studies in Zimbabwe, Uganda and Kenya show that grandmothers, in particular, voluntarily care for both their orphaned grandchildren and other closely related children (Drew, Makufa and Foster 1998; Guest 2001; Nyambedha, Wandibba and Aagaard-Hansen 2003).

It remains the case, however, that few studies in Africa have examined the impact of HIV/AIDS on older peoples' own health and wellbeing. AIDS illness and death have short and long-term economic consequences for households and their surviving members, including reduced economic status (Rugalema 1999; Yamano and Jayne 2004). Since many older people in developing countries are dependent on financial and practical assistance from their children and grandchildren, the increased mortality of working-age adults weakens their support networks (Adamchak *et al.* 1991). The macro-level economic and social consequences of the HIV epidemic in Africa are also likely to have implications for older people, for example by worsening the availability and quality of health and welfare services (Barnett and Whiteside 1999, 2000).

In one of the only longitudinal studies in Africa that has investigated the impact of adult deaths on older household members, Dayton and Ainsworth (2002) found that, controlling for poverty, older people

underwent a significant decrease in their 'Body Mass Index' in the period immediately after the death of an adult (Dayton and Ainsworth 2002). In Zimbabwe, elevated levels of emotional and psychological stress among older care-givers have been reported (WHO 2002).

Since the mid-1990s, South Africa has experienced a rapidly growing HIV epidemic that has substantially increased adult mortality (Dorrington *et al.* 2001). In contrast to other African countries, South Africa's older people are less dependent economically on their kin, because the majority are eligible for a means-tested, non-contributory state pension of 700 Rand per month.<sup>1</sup> This enables many of them to support financially other members of their households (Case and Deaton 1998; Case 2001). Moreover, South Africa's history of apartheid, with its restrictive labour and settlement laws, meant that, even before the HIV epidemic, older people had a well-established role as carers of children whose parents were working elsewhere (Van der Waal 1996; Madhavan 2004).

Demographic surveillance systems (DSS) that gather longitudinal observations on individuals and households create a powerful tool for analysis of the socio-demographic impacts of the HIV epidemic (Indepth Network 2002). This paper describes the demographic and socio-economic characteristics, living arrangements, and survival between 2000 and 2002 of 3,657 older people in a rural area of KwaZulu Natal. The impacts of adult deaths (at ages 18–59 years), in particular AIDS deaths, on the living arrangements of older people are also examined.

## **Methods**

This study defines older people as those of pensionable age, that is, women aged 60 years or older and men aged 65 years or older. The term 'younger adult' is used to refer to women aged 18–59 years and men aged 18–64 years. The term 'child' describes a person aged less than 18 years, except where specifically referring to the child-parent relationship (as in 'older people are supported by their children and grandchildren').

### *Study area*

The study area is part of the rural district of Umkhanyakude, which is about 250 km north of Durban, the provincial capital. The area includes land under tribal authority that was designated as a Zulu 'homeland' under South Africa's former apartheid policy, and a township under municipal authority. Although a rural area, there is little subsistence agriculture. Unemployment was high at the turn of the century: in 2001, 25 per cent of people aged 15–65 years reported that they were

unemployed and actively seeking work (Case and Ardington 2004). KwaZulu Natal has a higher HIV prevalence rate among antenatal clinic attenders than any other province of South Africa. An antenatal survey conducted in the study area in 1998 found that 41 per cent<sup>2</sup> of pregnant women were HIV-infected (Wilkinson, Connolly and Rotchford 1999). Mortality in the study area rose sharply during the late 1990s. By 2000, the probability of dying between the ages of 15 and 60 years was 58 per cent for women and 75 per cent for men. AIDS, with or without tuberculosis, was the leading cause of death in adulthood (48%) (Hosegood, Vanneste and Timæus 2004).

### *Data collection*

The *Africa Centre Demographic Information System* (ACDIS) started data collection on 1st January 2000. The demographic surveillance area (DSA) was mapped and all households registered. The study population includes all the reported household members, both resident and non-resident. Demographic and health information was collected every four months for all registered households and individuals. It included births, deaths, migrations and changes in household membership. Cause-specific mortality data were collected by verbal autopsy interviews for all notified deaths of both the resident and non-resident household members. The verbal autopsy was conducted by a trained nurse with the closest caregiver of the deceased. The interview included an open disease history, a checklist of signs and symptoms, and a structured questionnaire. The direct cause of death was assigned by two physicians. A diagnosis of AIDS required three major signs based on the WHO definition (WHO 1994).<sup>3</sup> Further details of the methods are described elsewhere (Hosegood, Vanneste and Timæus 2004). The period of the follow-up was 1st January 2000 to 1st January 2002. At the beginning of 2001, a socio-economic survey of all households and their members was conducted. Information collected included household variables (*e.g.* assets, utilities) and individual characteristics (*e.g.* education and employment).

### *Statistical analysis*

The data were analysed at both the individual and household levels. The characteristics of older women and older men were compared, as were those of the households with and without older people. The paper then examines changes between 2000 and 2002 in the structure of households in which older people lived. We also examine the changes in the living arrangements of older people who lived in households in which a younger

adult member died, and compare these with the changes in households where no such death occurred.<sup>4</sup>

## Results

Residential and survival data are available for 10,612 households resident in the DSA on 1st January 2000. Of these households, 3,124 (29%) contained a resident older person. The households had 80,437 members, which equates to a population of 79,354 because 1,009 individuals were concurrent members of more than one household. Older people constituted five per cent (3,657) of the population. The 79 older people who were members of more than one household were almost all men who headed multiple households.<sup>5</sup> By 1st January 2002, 316 older people (8%) had died and 95 others (3%) were no longer members of any household in the DSA. Seven older women and seven older men died of AIDS with or without tuberculosis. Of those people still belonging to a study household at the end of the follow-up period, most (88%) resided in the same household, 35 had outmigrated while retaining membership, and 28 had joined a new household. The characteristics of the resident older people are presented in Table 1.

Older men and women differed significantly ( $p < 0.01$ ) in all their measured characteristics. Men were more likely to be married, to be the head of the household, and to die during the follow-up period. Most (87%) of the older people lived in three-generation households, and very few (2%) lived in households with children and no younger adults, or lived alone or only with other older people (3%).

Table 2 compares the characteristics of households with one or more older resident members with those of households without a resident older member on 1st January 2000. The two groups of households differed significantly ( $p < 0.01$ ) in all of these characteristics. Households with older members were more likely to be headed by a woman and to have younger heads. They were larger, had poor quality environmental infrastructure (no piped water, no sanitation, no electricity), and the members were less likely to migrate, and owned fewer assets and luxury items than in the households without older resident members. The households with older people were more than twice as likely to have experienced the death of an adult aged 18 or more years than households without older people. In particular, 12 per cent of all households with an older person experienced at least one adult death from AIDS during the two-year period as opposed to seven per cent of other households. The deaths of young adults as well as older people contributed to this differential. Table 3 provides more details

TABLE I. *Characteristics of older people resident in the study area on 1 January 2000*

	All		Women <sup>2</sup>		Men <sup>2</sup>	
	Number	%	Number	%	Number	%
<b>Marital status</b>						
Currently married	1,362	37	722	26	640	71
Widowed/divorced/separated	1,858	51	1,761	64	97	11
Never married	425	12	267	10	158	18
Unknown	12	<1	10	<1	2	<1
<b>Education status</b>						
None	2,310	63	1,763	64	547	61
Primary only	743	20	587	21	156	17
Secondary and higher	205	6	143	5	62	7
Unknown	399	11	267	10	132	15
<b>Mean household assets<sup>1</sup></b>	7.4		7.2		7.6	
<b>Households owning a luxury item</b>	49		48		51	
<b>Household size</b>	9.9	5.4	9.9	5.3	9.8	5.6
<b>Living alone</b>	40	1	63	2	23	3
<b>Household composition</b>						
Living alone or with older people	113	3	65	2	48	5
Living with young adults only	271	7	199	7	72	8
Living with young adults and children	3,189	87	2,433	88	756	84
Living with children only	84	2	63	2	21	2
<b>Relationship to head of household</b>						
Head	1,783	49	986	36	797	89
Spouse or partner	655	18	641	23	14	2
Parent or parent-in-law	912	25	880	32	32	4
Other relative	169	5	130	5	39	4
Non-relative	45	1	32	1	13	1
Missing	93	3	91	3	2	<1
<b>Survival outcomes</b>						
Died	316	8	189	7	127	14
Alive and resident	3,211	88	2,483	90	728	81
Alive and non-resident	35	<1	24	<1	11	1
Ended all household memberships	95	3	64	2	31	3
<b>Mean age (years)</b>	70.4	7.7	69.6	7.9	72.8	6.4
<b>Sample sizes<sup>3</sup></b>	3,657		2,760		897	
<b>Sample sizes (for asset variables)</b>	3,492		2,696		863	

*Notes:* Numbers in italics are standard deviations 1. Information was collected on each household's ownership of 28 assets including a primus stove, refrigerator and car. The number of assets is the total for each household. All household variables are for 1 January 2000. 2. Women aged 60 or more years, men aged 65 or more years on 1 January 2000. The difference in means between women and men is statistically significant at  $p < 0.01$  for every variable. 3. Numbers of observations, except for 'number of household assets' and 'percentage with at least one luxury asset' for which there were missing values. The numbers of observations for these variables are given in the bottom row.

of the households in which older people lived. The poorest households appear to be those that comprised older people living alone or only with other older people. Only 13 per cent of such households owned a luxury item, compared with 52 per cent of three-generation households.

TABLE 2. Characteristics of households with and without resident older people on 1 January 2000 and events during 2000 and 2001

Characteristics	With older person(s) <sup>1</sup>	Without older person <sup>1</sup>
	<i>Percentages</i>	
Headed by a female <sup>2</sup>	34	24
Headed by a <40 year old <sup>2</sup>	13	37
Owning a luxury item	48	55
With no sanitation	93	85
With no private or public water source	64	51
With no electricity supply	60	53
Missing socio-economic data	5	12
Experienced adult death of 18 or more years member	26	12
Experienced adult death(s) of 18–59 years-old member	17	11
Experienced AIDS death of 18 or more years member	12	7
Member experienced violent or accidental death	2	2
Household dissolved	1	2
Older person out-migrated	3	11
Mean household members (SD)	9.6 (5.2)	6.4 (3.9)
Mean household assets (SD)	7.3 (3.4)	7.6 (3.5)
Number of households <sup>3</sup>	3,124	7,488
Number of households (for asset variables)	2,969	6,558

Notes: SD Standard deviation. Numbers in italics are frequencies or counts. 1. Women aged 60 or more years, men aged 65 or more years on 1 January 2000. The difference in the means for the households with and without an older person is statistically significant at  $p < 0.01$  for every tabulated variable. 2. The variables age and sex of head, and the number of household members are for 1 January 2000. 3. Numbers of observations, except for the number of household assets, the percentage with at least one luxury asset, sanitation, water and mains electricity supply, for which there were missing values. The numbers of observations for these variables are given in the bottom row.

Of the 3,180 older people who survived the two years, 20 per cent had experienced the death of at least one younger adult in their household, and 12 per cent had experienced the death of an adult from AIDS. Table 4 shows the changes in household composition between 2000 and 2003, and distinguishes those that did and did not experience an adult death. Table 5 shows the percentage change in each household type between 2000 and 2002. The death of younger adults left 15 older people who had been living alone with children by 2002 (3%). Older people who in January 2000 lived alone or only with children could only experience the death of a young adult member during the two years if either one joined the household or a child reached adulthood shortly before dying. Of the 84 older people living with only older people and children in 2000, only 44 per cent were in the same arrangement in 2002, while seven per cent had been joined by a younger adult(s), and 12 per cent lived alone after the children had left to join other households. Among the households with an older person, the average size decreased by 18 per cent in those that experienced a young

TABLE 3. *Characteristics of households with older people on 1 January 2000 and events during 2000 and 2001*

Characteristics <sup>1</sup>	Household composition				
	Children, young adults and older people	Children and older people	Young adults and older people	Older people only	All with older people
	<i>Percentages</i>				
Headed by a female	29	56	33	39	30
Head a person aged less than 40 years	13	0	28	0	12
Owning a luxury item	52	37	29	13	49
With no sanitation	92	96	94	95	93
With no private or public water source	64	72	69	67	65
With no electricity supply	59	63	65	71	61
Death of member aged 18 or more years	28	13	25	16	27
Death(s) of member(s) aged 18–59 years	18	0	11	0	17
AIDS death at 18 or more years	14	<1	7	<1	12
Violent or accidental death	2	0	3	3	2
Missing socio-economic data <sup>2</sup>	4	6	7	14	5
Mean household members (SD)	<i>10.8 (5.0)</i>	<i>3.3 (1.4)</i>	<i>3.8 (2.0)</i>	<i>1.5 (0.6)</i>	<i>9.9 (5.4)</i>
Mean household assets (SD)	<i>7.7 (3.3)</i>	<i>5.5 (2.8)</i>	<i>5.5 (3.3)</i>	<i>4.0 (3.1)</i>	<i>7.4 (3.4)</i>
Total households <sup>2</sup>	<i>3,189</i>	<i>84</i>	<i>271</i>	<i>113</i>	<i>3,657</i>
Total households (for asset variables) <sup>2</sup>	<i>3,065</i>	<i>79</i>	<i>251</i>	<i>97</i>	<i>3,492</i>

*Notes:* SD Standard deviation. Numbers in italics are frequencies or counts. Older people are women aged 60 or more years and men aged 65 or more years on 1 January 2000. 1. The variables age and sex of head, and the number of household members, represent the status of the household on 1 January 2000. 2. Numbers of observations, except for the number of household assets, the percentage with at least one luxury asset, sanitation, water and mains electricity supply, for which there were missing values. The numbers of observations for these variables are given in the bottom row.

adult death, which compares with an eight per cent decrease in those with no young adult death.

## Discussion

In the study area, older people constituted five per cent of the population, and 29 per cent of the households had at least one older person. These households were significantly poorer and had poorer living environments than the households without an older member. The differentials may partially reflect the advantaged economic status of the households that have moved into the area for work but had few or no dependants. Nearly one-in-five older people coped with the death of at least one young adult

TABLE 4. *Households with older people on 1 January 2000 and 1 January 2002 by death of a household member aged 18–59 years during 2000 and 2001*

Household composition in 2000	Household composition in 2002 <sup>1</sup>					Total
	AO	YA	YC	CO	Xt <sub>2</sub>	
	<i>Frequencies</i>					
<b>Households with a young adult death during 2000–01</b>						
AO Alone or with older people	0	0	0	0	0	0
YA With young adults	6	17	0	0	7	30
YC With young adults and children	1	10	465	15	80	571
CO With children only	0	0	0	0	0	0
Xt <sub>1</sub> Was not yet a member/not old enough	1	3	63	2	0	69
Totals	8	30	528	17	87	670
<b>Households without a young adult death during 2000–01</b>						
AO Alone or with older people	84	0	0	0	29	113
YA With young adults	11	180	2	0	48	241
YC With young adults and children	13	76	2,200	15	305	2,609
CO With children only	10	6	16	44	8	84
Xt <sub>1</sub> Was not yet a member/not old enough	18	51	382	8	0	459
Totals	136	313	2,600	67	390	3,506
<b>All households with older people</b>						
AO Alone or with older people	84	0	0	0	29	113
YA With young adults	17	197	2	0	55	271
YC With young adults and children	14	86	2,665	30	385	3,180
CO With children only	10	6	16	44	8	84
Xt <sub>1</sub> Was not yet a member/not old enough	19	54	445	10	0	528
Totals	144	343	3,128	84	477	4,176

Notes: 1. The household composition mnemonics are described in the row labels and as follows. Xt<sub>1</sub> Not a qualifying household on 1 January 2000. Xt<sub>2</sub> All older people in the household had left or died, or the household had dissolved or migrated out of the DSA by 1 January 2002.

household member during the two years' follow-up. The majority of young adult deaths were from AIDS, and 12 per cent of the households with older members experienced at least one adult AIDS death during the follow-up.

Very few (3%) older people lived alone or with other older people or children but no young adults. Despite the high levels of adult mortality in the area over the last decade, 'skipped-generation' households were rare.<sup>6</sup> In South Africa, the HIV epidemic does not appear to have resulted in large numbers of households comprising grandparents living with their grandchildren. Noubissi and Zuberi (2001) and Merli and Palloni (2004) have reported the living arrangements of older people based on data from the South African population census and *Demographic and Health Survey*. As from the ACDIS data, they found that the majority of older Africans lived in multi-generational households (extended and nuclear households), and

TABLE 5. *Transitions of households with older people between 2000 and 2002 by death of a household member aged 18–59 years during 2000 and 2001*

Household composition in 2000	Household composition in 2002 <sup>1</sup>					Total
	AO	YA	YC	CO	Xt <sub>2</sub>	
<i>Percentages</i>						
<b>Households with an adult death during 2000–01</b>						
YA With young adults	20	57	0	0	23	100
YC With young adults and children	0	2	81	3	14	100
Xt <sub>1</sub> Was not yet a member/not old enough	1	4	91	3	0	100
<b>Households without an adult death during 2000–01</b>						
AO Alone or with older people	74	0	0	0	26	100
YA With young adults	5	75	1	0	20	100
YC With young adults and children	0	3	84	1	12	100
CO With children only	12	7	19	52	10	100
Xt <sub>1</sub> Was not yet a member/not old enough	4	11	83	2	0	100
<b>All households with older people</b>						
AO Alone or with older people	74	0	0	0	26	100
YA With young adults	6	73	1	0	20	100
YC With young adults and children	0	3	84	1	12	100
CO With children only	12	7	19	52	10	100
Xt <sub>1</sub> Was not yet a member/not old enough	4	10	84	2	0	100

Notes: 1. The household composition mnemonics are described in the row labels and as follows. Xt<sub>1</sub> Not a qualifying household on 1 January 2000. Xt<sub>2</sub> All older people in the household had left or died, or the household had dissolved or migrated out of the DSA by 1 January 2002.

that few (<2%) lived alone with a grandchild aged less than 15 years in the absence of one of their own adult children. Even in Uganda, a country with a relatively mature epidemic, the prevalence of such households was less than one per cent in 1992 and only 1.6 per cent in 1995 (Ntozi and Zirimenya 1999).

On the other hand, as a direct consequence of one or more young adult deaths, 15 older people in the study population experienced the change from a three-generation household in 2000 to living only with children in 2002. Thus, skipped-generation households occurred but many were short-lived, because other adults joined the household, children moved out, the older person died, or the household dissolved. Another paper has shown that the households that experienced a young adult death were more likely to dissolve than households that did not experience such deaths (Hosegood *et al.* 2004). The risk of dissolution was relatively low in the larger, wealthier, male-headed households; older people living in such households were less likely to experience changes in the structure of their household.

Most (89 %) older men were the head of their household. This role is associated with social and economic responsibilities towards the dependants in the household. The data show that living in households with children but no young adult members was not exclusive to older women. The same percentage of older men and older women (3 %) lived with children in the absence of young adults. Qualitative research in the study area has identified households in which men had the sole or a major responsibility for children, and found that government and voluntary agencies were less active in assisting men than women, particularly mothers and grandmothers (Montgomery 2004). The differential in assistance is mirrored by the uptake of government child-support grants in the area. In 2002, only three fathers or grandfathers had applied for these grants in comparison to 3,317 women, most of whom were mothers (87 %) and grandmothers (10 %) (Case, Hosegood and Lund 2003).

Another reason why concern about the impact of the AIDS epidemic should not only focus on older women in skipped-generation households is that most older people (87 %) lived in three-generation households with children, younger adults and other older people. These households included three-generation 'shared-care' living arrangements, in which older people were the primary carers for children because the younger adults worked or were non-resident (or both). Unfortunately, it is not possible to identify shared-care households solely from the household composition (additional information about care-giving is required). Nevertheless, if one takes all three-generation households that experienced an adult death, the mean size decreased. Most would have suffered a short-term, if not long-term, reduction in economic status. As a consequence, the older household members may have needed to provide more physical help, and/or use their pension to support other household members. In turn, fewer human and financial resources will have remained for their own care-giving, health care and nutrition needs.

The relatively short follow-up period imposes limitations on this study. No data were available for households before 2000. The living arrangements of many of these older people were the consequence of adult deaths before 2000. The households that experienced adult mortality have been shown to have a relatively high risk of dissolution (Hosegood *et al.* 2004). Therefore, some of the older people observed in 2000 will previously have been members of different households from the one in which they experienced an adult death.

Another limitation is that this study, for two good reasons, employed a definition of older people based on the ages of eligibility for a state pension. The pension income is clearly important for older people and their households, and the definition enables comparisons with previous studies

of older people in South Africa. Nevertheless, the young adult age group includes people aged in the fifties and men aged 60–64 years, some of whom had similar health and social problems as ‘older people’. Lowering the old age threshold to 50 or 55 years would have increased the proportion of households with an older person and decreased the proportion that experienced a young adult death. During the two years’ follow-up, there were 83 deaths of women aged 50–59 years (of which 29% were AIDS deaths), and 170 deaths of men aged 50–64 years (of which 19 per cent were AIDS deaths). Finally, this study has examined only one consequence over two years of adult deaths in the household, changes in their living arrangements. Further research is required to measure directly the impact on the health and wellbeing of older people who have to cope with AIDS mortality and morbidity.

### Acknowledgements

The authors gratefully acknowledge the contribution of other members of the Africa Centre population studies group and *Africa Centre Demographic Information System* (ACDIS) staff in the collection and processing of data. We also thank the anonymous reviewers for their comments on an earlier version of this paper. This work was supported by *The Wellcome Trust*, UK, through grants to ACDIS (#65377), the Africa Centre (#50534), and Timæus/Hosegood (#61145).

### NOTES

- 1 The pension was R700 as of 23 February 2004, equivalent to £56.11 sterling.
- 2 95% confidence interval (CI) 34.7–47.9.
- 3 The assessors were not restricted by an AIDS case definition in making a diagnosis, but in only two per cent of the cases was the following profile absent: three major signs of the WHO definition (severe weight loss, chronic diarrhoea and prolonged fever) plus a combination of the following: Kaposi sarcoma, pruritic dermatitis or shingles, severe thrush with dysphagia and other mouth infections, severe neurological impairment including cryptococcus meningitis and cerebral lymphoma, lymphadenopathy, recent or current tuberculosis infection, shortness of breath, and pneumonia (WHO 1994). Supportive evidence included the recent death of partners and young children due to AIDS or AIDS-related symptoms.
- 4 Student’s *t*-test and the chi-squared test were used to assess the significance of bivariate differences wherever appropriate. The *STATA* package was used for statistical analyses.
- 5 Approximately five per cent of older men were polygynously married. They may have headed several households; each formed around one wife and her children. These households may or may not have shared the same homestead.
- 6 The term ‘skipped-generation household’ is generally applied to the households in which a grandparent and grandchild co-reside but no parent is present. Some authors include in this category households with young adult members if they are not the progeny of an older household member (Knodel, Watkins and VanLandingham 2003).

## References

- Adamchak, D. J., Wilson, A. O., Nyanguru, A. and Hampson, J. 1991. Elderly support and intergenerational transfer in Zimbabwe: an analysis by gender, marital status and place of residence. *South African Journal of Gerontology*, **31**, 505–13.
- Barnett, T. and Whiteside, A. 1999. *HIV/AIDS and Development: Case Studies and a Conceptual Framework*. Available online at <http://www.und.ac.za/und/heard/papers/1999/EJDR.pdf>
- Barnett, T. and Whiteside, A. 2000. *Guidelines for Studies of the Social and Economic Impact of HIV/AIDS*. UNAIDS, Geneva.
- Berk, M. L., Schur, C. L., Dunbar, J. L., Bozette, S. and Shapiro, M. 2003. Short report: migration among persons living with HIV. *Social Science and Medicine*, **57**, 1091–7.
- Bongaarts, J. and Zimmer, Z. 2001. *Living Arrangements of Older Adults in the Developing World: an Analysis of 'Demographic and Health Survey' Household Surveys*. Policy Research Division Working Paper 148, Population Council, New York.
- Case, A. 2001. *Does Money Protect Health Status? Evidence from South African Pensions*. National Bureau of Economic Research, Cambridge, Massachusetts.
- Case, A. and Ardington, C. 2004. Socioeconomic factors. In Population Studies Group (ed.), *ACDIS Monograph*. Africa Centre for Health and Population Studies, Mtubatuba, South Africa, 68–78.
- Case, A. and Deaton, A. 1998. Large cash transfers to the elderly in South Africa. *Economic Journal*, **108**, 1330–61.
- Case, A., Hosegood, V. and Lund, F. 2003. Child-support grant study findings. *Children First*, **51**, 45–9.
- Dayton, J. and Ainsworth, M. 2002. *The Elderly and AIDS: Coping Strategies and Health Consequences in Rural Tanzania*. Policy Research Division Working Paper 160, Population Council, New York.
- Dorrington, R., Bourne, D., Bradshaw, D., Laubscher, R. and Timæus, I. M. 2001. *The Impact of HIV/AIDS on Adult Mortality in South Africa*. Medical Research Council, South Africa.
- Drew, R. S., Makufa, C. and Foster, G. 1998. Strategies for providing care and support to children orphaned by AIDS. *AIDS Care*, **10**, 1, 9–15.
- Ellis, M. and Muschkin, C. 1996. Migration of persons with AIDS – a search for support from elderly parents? *Social Science and Medicine*, **43**, 1109–18.
- Foster, G., Shakespeare, R., Chinemana, F., Jackson, H., Gregson, S., Marange, C. and Mashumba, S. 1995. Orphan prevalence and extended family care in a periurban community in Zimbabwe. *AIDS Care*, **7**, 1, 3–17.
- Guest, E. 2001. *Children of AIDS: Africa's Orphan Crisis*. University of Natal Press, Pietermaritzburg, South Africa.
- HelpAge International 2000. *Ageing Issues in Africa: A Summary*. HelpAge International, London.
- Hosegood, V., Vanneste, A. and Timæus, I. 2004. Levels and causes of adult mortality in rural South Africa. *AIDS*, **18**, 663–71.
- Hosegood, V., McGrath, N., Herbst, K. and Timæus, I. M. 2004. The impact of adult mortality on household dissolution and migration in rural South Africa. *AIDS*, **18**, 1585–90.
- Indepth Network 2002. Core concepts of DSS. In Indepth Network, *Population and Health in Developing Countries*. Volume 1, *Population, Health, and Survival in INDEPTH Sites*. International Development Research Centre, Ottawa, 7–20.
- Knodel, J. and VanLandingham, M. 2001. *Return Migration in the Context of Parental Assistance in the AIDS Epidemic: The Thai Experience*. Institute of Social Research, University of Michigan, Ann Arbor, Michigan.
- Knodel, J., Saengtienchai, C., Im-em, W. and VanLandingham, M. 2001a. The impact of AIDS on parents and families in Thailand: a key informant process. *Research on Ageing*, **23**, 633–70.

- Knodel, J., VanLandingham, M., Saengtienchai, C. and Im-em, W. 2001b. Older people and AIDS: quantitative evidence of the impact in Thailand. *Social Science and Medicine*, **52**, 1313–27.
- Knodel, J., Watkins, S. C. and VanLandingham, M. 2003. AIDS and older persons: an international perspective. *Journal of Acquired Immune Deficiency Syndromes*, **33**, 2, 153–65.
- Madhavan, S. 2004. Fosterage patterns in the age of AIDS: continuity and change. *Social Science and Medicine*, **58**, 1443–54.
- Merli, G. M. and Palloni, A. 2004. *The HIV/AIDS Epidemic, Kin Relations, Living Arrangements and the Elderly in South Africa*. Paper presented to the National Academy of Sciences Aging in Africa workshop, University of Witwatersrand, Johannesburg, 27–29 July.
- Montgomery, C. 2004. The Impact of HIV/AIDS on Men's Living Arrangements in Rural KwaZulu-Natal, With Particular Reference to Family Care. Unpublished M.Sc. thesis, London School of Hygiene and Tropical Medicine, London.
- Noumbissi, A. and Zuberi, T. 2001. *Household Structure and Aging in South Africa: A Research Note*. Paper presented at the African Census Analysis Project *African Households: An Exploration of Census Data* virtual conference, 21–24 November. Available online at [www.pop.upenn.edu/africahh/NoumbissiZuberi.pdf](http://www.pop.upenn.edu/africahh/NoumbissiZuberi.pdf).
- Ntozi, J. P. and Zirimenya, S. 1999. Changes in household composition and family structure during the AIDS epidemic in Uganda. In Orubuloye, I. O., Caldwell, J. C. and Ntozi, J. P. M. (eds), *The Continuing HIV/AIDS Epidemic in Africa: Responses and Coping Strategies*. Health Transition Centre, Canberra, 193–209.
- Ntozi, J. P. M. and Nakayiwa, S. 1999. AIDS in Uganda: how has the household coped with the epidemic? In Orubuloye, I. O., Caldwell, J. C. and Ntozi, J. P. M. (eds), *The Continuing HIV/AIDS Epidemic in Africa: Responses and Coping Strategies*. Health Transition Centre, Canberra, 155–80.
- Nyambedha, E. O., Wandibba, S. and Aagaard-Hansen, J. 2003. Changing patterns of orphan care due to HIV epidemic in western Kenya. *Social Science and Medicine*, **57**, 301–11.
- Rugalema, G. 1999. It is not only the loss of labor: HIV/AIDS, loss of household assets and household livelihood in Bukoba district, Tanzania. In Mutangadura, G., Jackson, H. and Mukurazita, D. (eds), *AIDS and African Smallholder Agriculture*. SIFAIDS, Harare, Zimbabwe.
- Van der Waal, C. S. 1996. Rural children and residential instability in the Northern Province of South Africa. *Social Dynamics*, **22**, 31–54.
- Wilkinson, D., Connolly, C. and Rotchford, K. 1999. Continued explosive rise in HIV prevalence among pregnant women in rural South Africa. *AIDS*, **13**, 740.
- Wilson, A. O. and Adamchak, D. J. 2001. The grandmothers' disease: the impact of AIDS on Africa's older women. *Age and Ageing*, **30**, 8–10.
- World Health Organisation (WHO) 2002. *The Impact of AIDS on Older Persons in Africa*. WHO, Geneva.
- Yamano, T. and Jayne, T. S. 2004. Measuring the impact of working-age adult mortality on small-scale farm households in Kenya. *World Development*, **32**, 1, 91–119.
- Zimmer, Z. and Dayton, J. 2003. *The Living Arrangements of Older Adults in Sub-Saharan Africa in a Time of HIV/AIDS*. Policy Research Division Working Paper 169, Population Council, New York.

*Accepted 12 January 2005*

*Address for correspondence:*

Victoria Hosegood, Centre for Population Studies,  
London School of Hygiene and Tropical Medicine,  
Keppel Street, London WC1E 7HT, UK.

e-mail: [vicky.hosegood@lshtm.ac.uk](mailto:vicky.hosegood@lshtm.ac.uk)