

**The impact of HIV/AIDS on children's living
arrangements and migration in rural South Africa**

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Introduction

Households in rural South Africa are characterised by enormous social fluidity and high mobility of their members. The political and economic history of South Africa and its neighbouring countries has led to frequent physical separation of household members. The legacy of the Apartheid Group Areas Act and the labour migration system mean that many members of rural households spend considerable periods of time residing elsewhere, in order to be closer to their place of work, to accompany other labour migrants, to obtain care and support, or to attend school (1-6). Many authors have described the historical and contemporary consequences of the Apartheid policies that shaped black, adult circular labour migration between rural homelands and urban areas or other places of employment such as mines and farms. However, these studies have focused on adult labour migration. Information about children's migration and the consequences of adult migration on their living arrangements is scarce. Where child migration has been described it is primarily in the context of family or household migration. A review of the literature identified only two studies describing the migration experience of children in South Africa(1, 7).

Literature on migration in southern Africa tends to create an impression that, in contrast to adult labour migrants, children are relatively less mobile because they remain with rural households when adults migrate. However, in reality many children in rural South Africa migrate as a consequence of many of the same processes that stimulate adult migration, and in response to living arrangements that emerge due to adult migration. Whilst children's mobility will often be related to that of parents and carers, the physical and social environment in which they live and their experience of migration may be very different to that of adults.

Child mobility is an important feature of a wide range of social and demographic issues including fostering and adoption, education, and child health and well-being. There is a need to improve our understanding of the patterns and consequences of children's migration particularly to document the impact of the HIV epidemic in southern Africa. The movement of children between households has been identified as one of the coping strategies used by households to mitigate the impact of adverse events, such as the death of an adult household member(8-11).

However, children may also move for positive reasons such as to attend school or to accompany adult labour migrants. Thus, given the potential interest in child mobility, why have there been so few studies in southern Africa?

Datasets that provide detailed information about child migration are scarce. In South Africa, national surveys such as the October Household Survey (OHS) and the Labour Force Survey (LFS) collect detailed information only about labour migration. Although the census collects data about migration, it is restricted to the recent migration experience of those who are currently resident with the household, and is primarily collected for the purpose of estimating trans-provincial and trans-national migration rates. Thus, they do not provide migration histories from which frequent residential changes over relatively short distances can be observed. Such patterns may be more prevalent in children, for example, in the case of children that move between their paternal and their maternal household, or whose migrations are related to school attendance and holidays.

Another difficulty in using survey data to investigate child migration is their use of a *de facto* definition of households. In the census and most national surveys, household members are only enumerated if they are resident with the household at the time of the survey. The definition of a resident is defined in the OHS and LFS as a person who ‘normally reside at least four nights per week in this household’. Thus, information about non-resident household members is not collected. Such a definition of a household differs from the perception of people in communities with high circular migration, where non-residents may be considered to be members of the household. Non-resident members may maintain their social connection with households through remittances, return visits, or their kinship relationships to the other household members. The exclusion of these non-resident members limits the use of census and survey data for studies of living arrangements and migration.

Demographic surveillance systems (DSS) are a potentially valuable source of longitudinal data on migration and living arrangements of children because they are specifically designed to record in and out-migrations in a small, defined population. In South Africa, new DSSs such as the Africa Centre Demographic Information System (ACDIS), have adopted new

conceptual and methodological approaches in order to provide demographic data that permits the examination of complex social and residential dynamics, and to provide information about the socio-economic impact of the HIV epidemic on rural households(12, 13). Some of these conceptual and methodological issues related to household membership, residency and migration are described in this paper.

In this paper we profile the characteristics of children and households in a rural area of KwaZulu Natal, South Africa with a high HIV prevalence rate. We describe the living arrangements of children in the area, and the experience of children and their households with respect to migration, household dissolution and mortality in 2000. The paper also presents some detailed information about the migration patterns of children.

Study area

The study area is part of the rural district of Umkhanyakude in northern KwaZulu Natal. It is situated about 250km north of the provincial capital of Durban (Figure 1). The study area includes both land under tribal authority that was designated as a Zulu ‘homeland’ under South Africa’s former apartheid policy and a township under municipal authority. Homesteads in tribal land are widely dispersed with no village structure. Infrastructure is poor. In 2001 only 13% of households had access to piped or public tapped water. Although this is a rural area, there is little subsistence agriculture. Most households rely on waged income and pensions. Unemployment is high: 67% of women and 56% of men aged 16-59 were unemployed in 2001(14). Few local employment opportunities exist and consequently labour migration is high. Approximately 35% of female household members and 40% of men aged 18 years or more reside outside the area(13). Health services include a district hospital and a network of 10 community clinics and two mobile clinic teams.

KwaZulu Natal is the province of South Africa with the highest HIV prevalence rate among antenatal clinic attendees. An antenatal survey conducted in the study area in 1998 found that 41% (95% CI: 34.7-47.9) of pregnant women were HIV-infected(15). Mortality in the study

area rose sharply in the late-1990s. AIDS, with or without tuberculosis, was the leading cause of death in adulthood in 2000 (48%)(16). AIDS causes 73% and 61 % of female and male deaths respectively at ages 15-44.

Data sources

The Africa Centre Demographic Information System (ACDIS) started data collection on 1st January 2000. The study area was mapped and all households registered. The study population includes all household members, both resident and non-resident. Demographic and health information is collected every four months from all registered households and individuals. It includes reports of all births, deaths and moves between households as well as in and out of the area. The conceptual framework and rationales underlying the eligibility criteria and organization of the data are described in detail elsewhere(13). The following section summarizes some of these aspects.

Eligibility criteria for individual and household registration

In ACDIS, three primary subjects are observed longitudinally: physical structures (bounded structures), households and individuals. The conceptual framework for ACDIS is based upon the definitions, eligibility criteria, and relationships between these subjects. The concepts are illustrated schematically in Figure 1. Membership and residency, two features of individuals and households, are key concepts used to organize and maintain the temporal integrity of the longitudinal data.

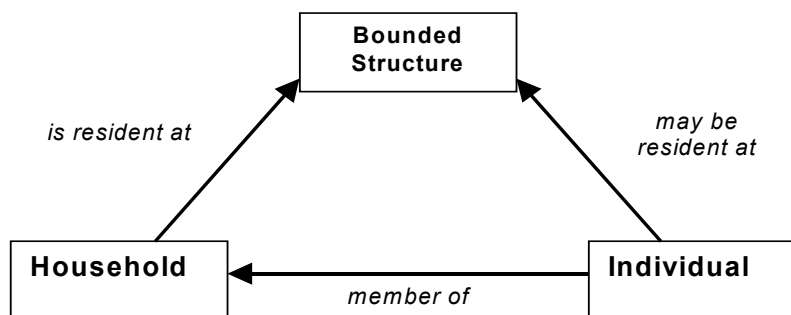


Figure 1. Membership and residency criteria relating the three main ACDIS subjects

Bounded structures

Given the complex social dynamics and mobility of the population in areas such as rural KwaZulu Natal, it is important to distinguish between a physical place (homestead/facility) and the social group (household) that is resident at that place. This distinction is also recognised by local communities with a household being called *umndeni* in Zulu and a homestead being called *umuzi*. ACDIS defines two types of physical place: homesteads whose intended main purpose is to provide accommodation, and facilities (schools, clinics, shops, churches) that provide services. The term ‘bounded structure’ is used to refer to both. Each eligible bounded structure is registered and mapped as identified by fieldworkers.

Households

All bounded structures are visited and data are collected about previously registered households, as well as new households that have either in-migrated or newly formed. A household is eligible for registration if it is resident at a bounded structure (where it must have at least one resident member). Changes in households' composition (members), place of residence (migration), and headship are updated at each round. Respondents are asked to list all the people that they consider to be members of their household. This includes any members who have died or otherwise ceased to be members in the four months prior to the visit. Each household is asked to report the person they consider to be the head of the household. Headship is an important feature of Zulu society, particularly in the tribal areas, and members rarely disagree.

Individuals and household members

In ACDIS, individuals are eligible for registration provided that they are considered to be a member of a household within the demographic surveillance area (DSA). Residence within the DSA is not a criterion, although information about residency is recorded. Eligible members must have spent at least one night in residence in the 12 months prior to registration¹. Routine demographic and health data are collected for both resident and non-resident members. The ‘one night’ rule excludes those with little or no exposure to the household group and consequently those for who proxy information may be of poor quality.

¹ Any member who is reported to be the head of the household is exempt from the ‘one night’ criterion.

Household membership may change several times over a person's lifetime. Babies are usually considered to be members of their mother's household though they may also have other social connections, for example with their father's household in the case of unmarried parents. In adult life, individuals may join new households when they change their social allegiances and residence, for example, upon marriage. Household membership may also end without a change in residency, as in the case of a non-resident member who does not maintain contact with the household and is eventually excluded from the social group. By keeping membership and residency distinct, ACDIS can record a change in the status of one attribute independent of the other. Thus, one membership episode may overlap with one, several or no residency episodes. For example, a member can end their residency by out-migrating without also ending their membership of the household. In most other demographic surveillance systems (DSS), out-migration would end follow-up and therefore, if a member is non-resident for a time, no information would be available about this period.

Residency episodes for individuals and households are handled in a similar way within ACDIS. A resident individual or household must be resident at a bounded structure within the DSA. Household members self-report their place of residence. Typically this is the place where they keep their daily belongings and spend most nights. An individual can only be recorded as resident at one bounded structure at any point in time. At each fieldworker visit any change in residency (i.e. in- or out-migration) is recorded, together with information about the origin or destination and the date of the move. Self-defined intention to change residency is used to define the event. This approach differs from that of most other DSS sites, where a set period of presence or absence is required before a migration event is recorded. In order to generate consistent population estimates, any reported intention to change residency that is not realised within four months is reversed in the next round. Household residency is treated in a similar manner as individual residencies; a household is only recorded as resident at one bounded structure at a time and self-reports a change in its place of residence.

Migration events

When member has been identified as having in- or out-migrated, information is collected about the migration event. A migration notification form is completed that records whether the individual has moved alone, moved together with one or more other members of the household, or whether the household as a whole has migrated. For individuals to be considered to have moved together they should have moved between the same origin and destination places within one or two days of each other. In the cases where a person in-migrated from a place within the DSA, detailed information is collected so that ACDIS tracking staff can ensure that the matching out-migration event has been notified at the household from which the person moved. Tracking staff are responsible for verifying information from the migration forms and where needed, collect additional information from households, to ensure that residency episodes do not overlap. For external in- or out-migrations, information is collected about the origin and destination location (see Appendix A).

Multiple household membership

In ACDIS any individual who is a member of several households within the DSA simultaneously is recorded as a member of all of them. The rationale for this design is that this social phenomenon has been reported by ethnographic studies in both the Hlabisa district (12) and other parts of South Africa (6, 7, 17-19). Multiple memberships often arise in 'stretched household' arrangements where members reside in different places(20). Such individuals include rural-to-urban labour migrants, who continue to be members of rural households whilst forming or joining other households in an urban area. However, people can also have multiple household memberships within a relatively small area such as the DSA.

Different types of household members

A further refinement to the definition of households used by ACDIS is the distinction between full members and affiliated members. Affiliated members are people who, although resident with a household for extensive periods of time, were not considered to be a member by others in the household. Often the social distance reflects either an employee relationship or lack of close kinship. One such group is herd boys. These children graze the household's livestock

and often receive no income but do receive shelter, food and perhaps other support. For some herd-boys this arrangement is long-term and may continue into adulthood.

Verbal autopsy technique and case definitions

All notified deaths (of both residents and non-residents) are followed up by a verbal autopsy interview. It is conducted by a trained nurse with the closest caregiver of the deceased. The interview includes an open disease history, a checklist of signs and symptoms, and a structured questionnaire. The questionnaire was developed following local anthropological and clinical research.

Unlike much of sub-Saharan Africa, this area is characterised by fairly easy access to private and public health care. Thus, most people attend a clinic, hospital or a GP surgery prior to death, although only 40% die in hospital. In addition, the health district operates tuberculosis, malaria and chronic disease programmes. Informants are therefore often able to provide clinical or pathology records, or recall the diagnosis made by health professionals. Few patients have tested for HIV or disclosed their status to their carers(21).

Two clinicians with over 10 years of experience in Africa independently assigned the cause of death using the information collected in the verbal autopsy and their clinical judgment. Although the assessors were not restricted by an AIDS case definition, in only seven cases diagnosed as AIDS deaths (<2%) was the following profile absent: three major signs of the WHO definition¹⁶ (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, previous or current tuberculosis infection, shortness of breath, and pneumonia. Supportive evidence included the recent death of partners and young children due to AIDS or AIDS-related symptoms. Verbal autopsy diagnoses for individuals who died in the local district hospital were validated against their medical notes.

Methods

The analyses in this paper use a sample of 10,490 households in the DSA on 1st Jan 2000 and which had at least one household member on 1st Jan 2000. The population described in this paper is that of the members of these households on the 1st Jan 2000. Individuals with concurrent memberships of more than one household on 1st Jan 2000 therefore represent more than one member. The period of observation is one year, 1st Jan 2000 to 1st Jan 2001. Using members rather than households presents a complete profile for each household and represents the individual's characteristics in each of the households to which they belong. For example, a child may be a resident member in one household where the head is his/her mother, whereas in another household the same child may be a non-resident member where the head is his/her grandfather. The use of a population of household members also avoids the need to arbitrarily allocate an individual to a single household.

Mother-child and father-child relationships are recorded where both parent and child are members of the same household. The parental individual ID is linked to the child's individual ID. Therefore, if a child joins another household within the DSA independently of its parent we are still able to observe outcomes for both parent and child. Whilst it is conceptually possible to undertake complex analyses in which the parent and child membership and residency patterns are articulated in detail, both with reference to time and place, this is beyond the scope of this paper. In this analysis, a mother-child or father-child pair is identified as a pair where the parent was a member of a household in which the child was also a member on 1st Jan 2000. Whilst this does not distinguish for example, between parents who are not co-members but who are in contact with their children and those who have no contact with their children, it does identify children who have an intra-household relationship with one or both parents.

All child attributes such as age, residency status, and membership type are those recorded at the closest visit to 1st Jan 2000 unless otherwise stated. Socio-economic information including employment and education status of individuals was recorded in the ACDIS household socio-economic questionnaire administered in January to March 2001. This means that this information is an indicator but not a direct measure of children and head's education and employment on the

1st Jan 2000. For households that had a change in headship in 2000, education and employment will not refer to the head on the 1st Jan 2000. For most households that out-migrated or dissolved before 2001, socio-economic information is often missing. It is not missing in all such cases because some households migrated back into the DSA in 2001.

Results

Household characteristics

10,490 households were resident in the DSA on 1st Jan 2000. Information about the head of household was missing for 194 (2%) of these households. Table 1 presents the characteristics of households for whom headship data was available (n=10,296). 27% of households were female headed. 31 households (0.3%) were headed by a person less than 20 years of age. Only two were headed by a child under 15 years, one by a 13 year old boy and the other by a 14 year old girl. 37 (0.4%) of households had no working age adult member. 48% of households with children had more dependent members (children and elderly) than working aged adults.

Of these 10,296 households, 8,513 (83%) included at least one child <15 years old as a member on 1st Jan 2000. These are shown separately in Table 1. The profile of households with children are similar to other households with respect to economic and headship characteristics. However, they were significantly larger ($t=17.1$, $p<0.000$) and none were single person households.

The 194 households for which information about the household head was missing or was invalid are different to other households. They are smaller, with an average size of 6.4 members (SD=4.7) compared with 7.6 members (SD=4.6) for all other households ($t=3.7$, $p<0.000$). However, this may be due to the omission of a senior member. They were also more likely to have out-migrated or dissolved by 1st Jan 2001 (OR=1.2, 95% CI 1.1, 1.2). However, with respect to the experience of deaths, AIDS or all cause mortality in 2000, households for whom headship data were missing were not statistically different to other households. Therefore, excluding these households potentially reduces bias that might be introduced by other invalid data related to the headship relationship episodes.

Households experience of deaths in 2000

Table 2 summarizes the mortality experience in 2000 of households where household head is known. 993 of all households (10%) had at least one death in 2000. The experience of mortality in households with a child is very similar with respect to adult and AIDS specific mortality.

Table 3 shows the risk factors for an adult AIDS death in 2000. The household experience of adult AIDS deaths was significantly associated with household heads being female, unemployed, and older. Female household heads are significantly older (mean=53, SD=15) than male heads (mean=47,SD=14). After adjusting for household head age, male household headship remained statistically significantly associated with the risk of AIDS death in the household, 0.8 (p=0.03). Households where information about the head's education, age and employment status was missing, are more likely to have experienced a death than the reference category for each of these variables.

The higher ratio of deaths in households where information about the head of household's education and employment is missing is mainly because socio-economic data was only collected in 2001. 31% of households for whom information about the head's education status was missing had outmigrated from the DSA or dissolved before the household socio-economic questionnaire was completed. Since outmigration and household dissolution are significantly higher in households that experience a death in 2000, those households for whom such socio-economic information is missing will have a higher ratio of deaths than households that remained within the DSA until 2001.

Household migration and dissolution in 2000

Of the 10, 490 households resident in 2000, 511 (5%) were not resident in the DSA one year later on 1st Jan 2001. 397 (78%) of these households had been recorded as having ended residency in the DSA through out-migration, and 93 (18%) households had dissolved (Table 4). 39 (41%) of the households that dissolved in the total household population were single person households. In ACDIS households that migrate out of the DSA are not followed. Households

that migrate within the DSA are tracked, and a new residency episode for the household is recorded.

Of the 8,657 households with a child <15 years old on 1st Jan 2000, 227 (3%) were no longer resident in the DSA by 1st Jan 2000. Households without a child were much more likely to have ended residency than households with children. 15% of households without a child, ended residency in 2000 compared with 2% of households with a child.

Table 5 shows the univariate association between household level variables and the end of residency for a household with a child (n=8,513) by 1st Jan 2001 (includes all reasons for ending residency). Household instability, as measured by dissolution and migration from the DSA by 1st Jan 2001, was significantly associated with younger household heads, female heads, and experiencing the death of a household member in 2000. Households living in parts of the study area with a higher proportion of households living on land that doesn't 'belong' to one of their members, were also significantly more likely to have migrated or dissolved during 2000.

Risk factors associated with household dissolution in the same sub-sample of households are presented in Table 6. Household dissolution during 2000 was associated with younger household heads, female heads, and experiencing the death of a household member in 2000 from any cause, or from an adult AIDS death. While migration and dissolution share several common risk factors, household dissolution is three times more likely to have occurred in households that experienced an adult AIDS death, whereas households that migrate have a higher risk of experiencing an AIDS death but that risk is not statistically significant.

Changes in household size in 2000

1,869 (18%) households became smaller between 1st Jan 2000 and 1st Jan 2001, 3,213 (31%) increased and 5,214 (51%) households remained unchanged. The impact of adult death on household size can be assessed for households that were still resident on the 1st Jan 2001. In 803 households with an adult death in 2000 the average household size decreased from 10.0 to 9.3 members, compared with an average increase from 7.6 to 7.9 in households with no adult death.

Characteristics of children and their parents

31,041 children <15 were members of 8,657 households on 1st Jan 2000. Table 7 presents the characteristics of these children. 91% of child members were resident with the household. 518 children (2%) were members of more than one household within the DSA on 1st Jan 2000. 4% and 11% of children <15 were maternal and paternal orphans respectively on 1st Jan 2000.

A large number of children belong to households to which their parents do not belong. Co-membership of mother/father and child is not synonymous with co-residency. For 81% of children, their mother was a member of at least one of the households to which the child belonged in the DSA. Less than 50% of children had a father who was a member of the same household. A substantial proportion of these co-member parents would be non-resident members, and for some parent-child co-members, both may be non-resident members of the household.

Younger children are more likely to be co-members of households with their mother. This pattern is slightly reversed for fathers. This may reflect the increased ease for children to be separated from their mothers once they are weaned, and the placement of children in households able to facilitate the child's attendance at school (care, finances, location). Girls are more likely than boys to be co-members of households with mothers (Pearson $\chi^2(1) = 9.9683$ Pr=0.002). The probability of a child being a co-member with the father was similar for both genders.

For children whose parents were not co-members of the child's household in the DSA, information about the survival status of parents was collected during the child's ACDIS registration (between Feb and May 2000). Of the 5,890 (19%) children whose mother were not co-members, in 24% the mother was dead, in 73% the mother was alive, and in 3% the respondent did not know whether the mother was alive or dead. For the 16,699 (54%) children whose fathers were not co-members, in 20% the father had died, in 75% the father was alive, and the father's survival status was unknown in 5%.

Change in child population during 2000

Of the 31,047 children registered on 1st Jan 2000, 135 (0.4%) died during 2000. 1,733 (5%) of the children ended their membership before 1st Jan 2000. Children who ended membership of any household in the DSA in 2000 are not follow-up and therefore we do not know whether they were still alive by 1st Jan 2001. For children who ended their membership of the household in 2000 but had not died, 446 (25%) migrated out of the DSA with the rest of the household, and for 99 (5%) the household had dissolved.

Mortality of parents and other household members in 2000

Information about the survival and migration of parents in 2000 is only available for those children whose parents were co-members of the child's household during the first round of data collection. Table 8 presents data about the survival and migration of mothers for the 25,157 children whose mothers were co-members. Table 9 presents similar data about fathers for 14,348 children whose fathers were co-members. 360 (1%) children experienced the death of a mother co-member in 2000, and 319 (2%) the death of a father co-member. 6 children lost both parents.

274 (76%) and 152 (48%) of these recent maternal and paternal orphans respectively, were due to AIDS. 13% of children who became paternal orphans in 2000 lost their father due to the violent or accidental death. In the ACDIS population in 2000, the relative contribution of AIDS to mortality is higher for women than men(Hosegood, Vanneste and Timaeus,2001). 20% of deaths in men 15-44 were due to violent deaths and accidents, compared to 5% in women of the same age.

For the 4,299 and 12,524 children whose mothers and fathers respectively were alive on the child's registration but did not have co-membership of a household in the DSA. For these children we do not know whether they experienced a parental death during 2000, nor is it known whether parents who are not co-members of households with their children have a higher or lower risk of AIDS mortality than other parents.

Children's mobility in 2000

5% (1,528) of children migrated either in or out of a household in the DSA at least once during 2000. 620 children started at least one new residency with a household in the DSA during 2000, i.e. they in-migrated to live with a household. 620 children started a new residency at a household in the DSA in 2000 when they either in-migrating into an existing household or joining a new household that was formed. Table 10 presents the circumstances under which children started new residencies. 68% of the children who started a new residency in 2000 had migrated between two households in the DSA (internal migration). Longer distance migration was less common in children; only 19% of children had migrated in from a household outside the DSA (external migration). Children are also more likely to migrate as a single individual or with one or two other people such as parents or siblings, that as part of a whole household migration. Of the 540 children who in-migrated (either externally or internally), only 15% had migrated with their household.

1,066 children ended a residency with a household in the DSA during 2000 either because they died or out-migrated to live with another household (Table 11). Of the 778 children that out-migrated, 56% had migrated to a household outside the DSA (external migration). As with children who in-migrated, the majority, migrated alone or with a few other people, and only 31% migrated with their household.

Of the 98 children who in-migrated into the DSA alone, 32% (31) came from other parts of the Hlabisa district not covered by surveillance system. The rest came in from other parts of the KwaZulu Natal province with the exception of 7 children who in-migrated from Gauteng province. 20 children in-migrated from outside the DSA with their household. Of these, 30% (6) moved in from other parts of the district, the rest from within the province. No household with a child aged less than 15 years moved in from outside the province.

278 children out-migrated from the DSA. Of these, 92 (33%) moved to a place within the Hlabisa district not covered by the DSA. With the exception of 8 (3%) who moved to Gauteng province, and one child who moved to Mozambique, all other children moved within the province. Of the 161 children who moved out of the district as part a household, 62 (39%)

moved to a place within the Hlabisa district not covered by the DSA. All other households moved to somewhere within the province with the exception of 1 that moved to Zimbabwe.

Risk factors for children's mobility in 2000

Table 12 shows the association between individual, parental and household risk factors with child migration during 2000. Given the complexity of migration we use an aggregated migration indicator in this analysis. A positive score is assigned to a child or parent who migrated at least once in 2000 either internally or externally. This provides an indicator of residency instability for each person during 2000. 30,552 children for whom information about the head of household is available are included in the analyses. Factors with a strong association with child migration include: multiple membership of households, child's own death in 2000, a parents' or another household members' death in 2000. Child migration is strongly associated with the dissolution and migration of the child's household. However, some children do not migrate when their household dissolves, instead, they may join other households living at the same homestead, usually those of close relatives. Older children and boys are less likely to migrate than girls.

Children's migration is closely linked to the migration of their parents. Parental migration can only be established if a parent was a co-member of the child's household. In Table 13 we describe the association between the death and migration of mothers and children's migration in 2000, for 25,157 for whom information about the household head was available on 1st Jan 2000. In Table 14 similar data are presented with respect to paternal death and migration (n=14,348).

Both parental mortality and migration is significantly associated with child migration. Mother's death and migration is more strongly related to child migration than those of fathers. Migration of the parent is more strongly correlated with child migration than parental mortality. Children whose mothers migrated in 2000 were 42 times more likely to migrate, suggesting that many children are migrating with their parents. Whilst ACDIS data permits more detailed explorations about child-parent migration, for example, whether the timing and destination/origin of migration were similar, this is outside the scope of this paper.

Discussion

During 2000 there was a high level of household and individual mobility in the study area. 511 households (5%) were no longer resident in the DSA after one year. Of these households, 78% had migrated outside the area and 18% had dissolved. Household mobility is mirrored in the high level of child migration: 5% of children migrated during the year. Six percent of children ended membership of households for another reason than death. Two percent of children belonged to more than one household on the 1st Jan 2000.

In 2000, the ACDIS population had a net in-migration. The area is close to important centres of local employment including Mtubatuba, a town located just outside the DSA, and two large towns Richard's Bay and Empangeni that are within an hour's travel time. The availability of 'free' tribal land on which to build houses, and a large number of rooms that can be rented by labour migrants encourages people to move into the area from more remote and under-developed areas in northern KwaZulu Natal. Data documenting the origin and destination of children and household migration supports our earlier work on adult migration indicating that there is very little trans-provincial or trans-national migration(22). It is possible that some trans-national migration was not reported in cases where the migrant did not have legal status. For children, short distance migration is common with most children migrating within the Hlabisa district. Of the 540 children who in-migrated into a DSA, 473 (88%) had moved from within the DSA or from other parts of the district. The majority of children who out-migrated (55%) also migrated within the district but there was substantially more intra-provincial migration.

In an area where circular migration is common it is important to understand whether the definition of migration would include or exclude temporary changes in residence. About 23% of the ACDIS population (all ages) were non-resident on 1st January 2001(13). The proportion of non-residents is highest in working aged adults. 41% of adult men and 26% of women aged 25-29 are non-resident. 9% of children were non-resident at the first round visit in 2000. The ACDIS approach to identifying migration events uses self-reported changes in place of residence. Therefore, non-residents who have an established pattern of returning temporarily to

the household at weekends, month ends, occasional periods, or holidays would not be reported as having migrated. With respect to children, this approach means that ACDIS does not elevate migration rates among children who are living in one household during school term and another during the holidays. Therefore, we can assume that children reported to have migrated in 2000 had substantial changes in both their place and social arrangements.

5% (447) of households experienced at least one adult AIDS death in 2000. Adult AIDS deaths have an impact on several individual and household level outcomes, including household dissolution and child migration. Households that experienced the AIDS death of an adult member in 2000 were nearly three times more likely to have dissolved by the end of the year than other households (OR 2.8, 95% CI 1.5, 5.2). Household dissolution in this community would appear to be a more common consequence of adult death than found in other studies. In a four-year follow-up of rural households in Kisesa, Tanzania, households had dissolved only when the deceased was the head of the household(23). In this study, 245 households dissolved, of which 17 (7%) were households where the person who died from AIDS the head of household.

Combining migration and dissolution as an outcome adult AIDS deaths were not significantly associated with the probability that a household had ended residence in the DSA before 1st Jan 2001 (OR 1.6, 95% CI 0.9,2.6). Migration of the whole household may be a less common response to an adult AIDS death than migration of its members for several reasons. If the adult death is a critical shock to the household, when for example, the deceased was the sole income earner or the main carer for other household members; the household may cease to be a viable social unit. In this scenario the surviving household members will probably join other household(s), resulting in the household dissolving rather than migrating. In addition, there are many competing reasons why households migrate, many of them positive, such as the employment of one of the members, or the purchase or building of a house. Household migration has inherent costs, and AIDS affected households may be less able to migrate as a unit. Instead they may try to overcome the negative shock of the adult death by sending members away to live with other households. Overall households appear to be unable to replace members who die. Households that experienced an adult AIDS death in 2000 had decreased in size by an

average of 0.9 members compared with an average increase in size of 0.2 members for households that had not experienced a death ($t=16.6$, $p<0.000$). The members who leave to join other households further reduce the size of affected households. Similar patterns of household size changes related to adult deaths were found in Kenya (24), and Tanzania (23).

These interpretations are also supported by our finding that although adult AIDS death was not significantly associated with household migration, it is associated with the risk of child migration. Children in households where an adult died from AIDS in 2000 were 1.6 times more likely to migrate during the year (95% CI 1.4, 1.8). The risk of migration was stronger when the adult member who died was the child's mother or father. A child whose mother was a household co-member and died during 2000, had a two-fold risk of migrating in 2000 compared with children whose co-member mothers did not die (95% CI 1.2, 2.2). The risk of migration was slightly lower in children whose fathers died (OR=1.6, 95% CI 1.2, 2.2). For children who were co-members with their mother and/or father, parental migration was also strongly associated with the child's risk of migration. Children whose mothers were co-members were 42 times more likely to migrate in 2000 if their mothers also migrated (95% CI 36.4, 48).

Migration and mortality in children are strongly related. Children who died in 2000 were 78.9 times (95% CI 51.8, 120.1) more likely to have migrated prior to their death compared with children who survived. The return migration of ill members to rural households is frequently reported in the ACDIS verbal autopsy interviews, and in other studies in Africa(8, 23). A child that is living with its parents in an urban area, or with other foster carers, will often be sent to the maternal or paternal grand-parents rural household on falling ill in order to receive care and financial support for treatment. Given vertical transmission of HIV some mothers will become ill within a short time of their child's illness. In such situations the child may have migrated together with the mother when she returned to her parental household.

The profile of children in this population shows the large number of children whose mothers are not members of the same household. 19% and 54% of children are not co-members with their mother and father respectively. In another part of KwaZulu Natal, more than 25% of households were caring for a child in the absence of their mothers(25). The separation of social

spheres between children and their fathers is largely a consequence of the high rate of extra-marital births, low rate of marriage in this population, and the social prescription against co-habitation of unmarried couples. Approximately 50% of adult women aged 40-44 have never married(26). Only 30% of all women (7,628) and 34% of men (7,167) report being in a conjugal relationship (marital or sexual partnership) with another member of their household. Although Zulu cultural customs assign children of unmarried parents to their fathers' family, the mother and her family will usually raise such children when they are young. Children who are not co-members with a parent in the DSA may be those who have been sent to join rural households who can provide care, support or ensure attendance at school. Such children may have contact with their mother or father through visits to households outside the DSA, for example, at their parent's place of work. This group of children who are not co-members with their parents also include the 4% who are maternal orphans and the 11% who are paternal orphans. In subsequent work it will be important to distinguish between co-membership and co-residency of parents and children to understand more details of children's living arrangements with regards to their parents.

Households headed by women are much more likely to migrate, dissolve, or experience an adult AIDS death than households headed by men. Children living in female-headed households are also significantly more mobile than children of male-headed households. Female headship may be the result of widowhood or emerge in the absence of marriage. Preston-Whyte describes the common occurrence of matri-focal households in KwaZulu Natal(27, 28). In these households mothers, their daughters and grand-children are the core members. Such households often emerge when successive generations of women either do not marry, have unstable relationships with men, or are widowed. Their social and residential instability may stem from their lower socio-economic status and more tenuous 'ownership' of land and property(29). Where the head of the household is a woman over 60 years, many households in South Africa will be solely reliant on her old age pension for income(30, 31). The financial insecurity and high dependency ratio of such households may also be exacerbated by grandmothers fostering their orphaned grand-children or looking after their sick adult children.

The household sample in 2000 included only two households headed by a child under 15 years of age. This extremely small number of child-headed households in an area with very high AIDS mortality is at variance with public concern about the emergence of child-headed households as a consequence of AIDS. However, in this area child headed households do not appear to be occurring in any substantial numbers. In a four-year follow-up study of households in rural Tanzania, Urassa et al (2001) identified no child headed household(23). There are several reasons child-headed households may not form following an adult AIDS death. In a rural area where many children are living in extended households, someone other than their parent may be the head of the household. In these households, the death of one adult would not result in a child-headed household, at least in the short-term. In addition, in rural KwaZulu Natal where waged-income and government pensions are the primary sources of income for most households, children who are orphaned would have limited ability to secure their food or financial needs without the support of an adult. Therefore, children who are orphaned would need to seek support from other households if their own household could no longer meet these needs. Given the household dynamics that existed prior to the epidemic in rural South Africa, the movement and fostering of children is a common strategy in response to difficulties with financial and physical care(7, 18, 20). In an ethnographic study of households in the study area that are coping with adult HIV/AIDS we find that smaller, nuclear households may send children to live with other households during their parent's illness. Thus, when the adult dies, the household will dissolve rather than continue to exist with only child members. An alternative scenario has also been observed, in which on the death of an adult, relatives outside the household, will send an adult, often a young woman, to join the household to care for the children to secure the land and property. This adult, or another adult relative even if living somewhere else, would be considered to be the household head whilst male children are young.

Another reason why child-headed households are reported lies in the definition of household used in ACDIS that includes both resident and non-resident members. This definition differs from the *de facto* definition used by the census and most other community surveys in which only resident members are included in the household roster. A *de facto* definition will elevate the proportion of child-headed households in cases where the head of the household and

other adult members are non-resident. The proportion of female-headed households will also be increased and the mean size of households reduced(13).

We would therefore argue that a child-headed household is a poor indicator of potentially vulnerable children in the general population. Instead we would suggest that researchers also consider who children are living with and under what circumstances. There will be households in the DSA for example, where during the week children will have to look after themselves and younger siblings because adult household members are working or living elsewhere. Thus data on co-residency patterns of members of the household, as well as involvement of neighbours would be informative. Detailed data about the caregivers of children would also be of interest but is not available in ACDIS.

In addition, there is a need to follow-up children in this area. Whilst children may be fostered by relatives and therefore not appear to live on their own, they may experience considerable social and physical instability during their childhood. In a context of high adult AIDS mortality and household reliance on old age pensions, many foster children will also experience the death of a foster parent or a financial provider(8).

An important limitation of this study in assessing individual and household level impact of AIDS deaths is the short duration of follow-up, one year. For households experiencing a death late in 2000, outcomes of interest such as household migration and dissolution may not have occurred by the beginning of 2001. In Kagera, Ainsworth et al (1992) showed that the effects of an adult death could be detected up to 18 months before and 30 months after the death. ACDIS began data collection in 2000 and we have no retrospective information about households. Further analyses will extend the period of follow-up to 1st Jan 2002. This will enable us to look in more detail at the consequences of adult deaths on other household outcomes such as household structure and socio-economic status.

This short period of observation also has implications for the choice of suitable control groups with respect to the experience of deaths in 2000. By choosing a cohort of households resident in the DSA in 2000 we are able to identify whether members died or the household was

lost to follow-up. However, households that did not experience a death in 2000 may be the product of previous experiences of AIDS mortality. These previous experiences may have altered their size, structure, or socio-economic characteristics compared with households that have no history of adult AIDS deaths. A household can also be affected by HIV/AIDS even when none of its own members dies, for example, by fostering children or taking in other dependents who have been bereaved in other related household. A next phase in exploring the ACDIS data would be to use hazard analyses and event history analyses approaches to explore the sequence and timing of mortality, migration and household dissolution. It would also be interesting to examine the social relationships between households and how they facilitate the inter-household transfer of members in response to illness and death.

ACDIS has several features that can ensure that the quality of the data is higher than cross-sectional survey data. Most importantly, the continued revisiting of households every 4 months ensures that errors or missing information captured in a previous round can be corrected and updated. Household refusal rates are less than 1% of all households, and no household refused to participate in a verbal autopsy interview in 2000. However, the enormous physical and social mobility of the study population means that despite a large dedicated team of trackers, internal migrations may be only reconciled after a few rounds of data collection. In addition, complex household events such as dissolution, merging and reformation, may only become evident to both the respondents and fieldworkers after some time has passed. This paper is the first to analyse the ACDIS household and membership data longitudinally.

Table 1. Characteristics of all households resident on 1st Jan 2000 (n=10,296) and households with a child<15 years (n=8,513). Households without headship data on 1st Jan 2000 are excluded.

		All households (n=10,296)		Households with a child <15 years (n=8,513)	
		n	%	n	%
Household size		Mean 7.6 (SD 4.5)	1,52	Mean 8.7 (SD 4.2)	2,52
Household head sex	Female	2,777	27	2,277	27
	Male	7,519	73	6,236	73
Household head residency status ²	Non-resident	2,763	27	2,494	29
	Resident	7,533	73	6,019	71
Household head education	None	3,081	30	2,665	31
	Primary	2,957	29	2,609	31
	Secondary	1,662	16	1,416	17
	Matric	711	7	547	6
	Higher degree	442	4	327	4
	Don't know	186	2	162	2
	Missing	1,255	12	787	9
Household head employment	Full	4,432	43	3,752	44
	Part-time	366	4	314	4
	None	4,243	41	3,662	43
	Missing	1,255	12	785	9
Household head age	<20 years	31	0.3	16	0.2
	20-29	749	7	396	5
	30-39	2,265	22	1,848	22
	40-49	2,757	27	2,416	28
	50-59	1,977	19	1,707	20
	60-69	1,464	14	1,266	15
	70-79	799	8	656	8
	80+	242	2	200	2
missing	12	0.1	8	0.9	
Household water source	Piped (private/public)	4,021	39	3,363	39
	Borehole, well,	2,552	25	2,217	26
	rainwater	2,596	25	2,291	27
	River, dam	1,127	11	642	8
	Missing				
Sanitation	Flush toilet	705	7	528	6
	VIP / chemical	437	4	380	4
	Open pit latrine	4,531	44	3,912	46

² Headship membership status at the first round of data collection in 2000.

³ Dependency ratio = children<15 + women>=60 + men >=60 / women 15-59 + men 15-64. Ratio <1 means more working age mbrs than dependent mbrs. Ratio >=1 means equal or more dependents than working age mbrs.

	None	3,584	35	3,117	37
	Missing	1,039	10	576	7
Connected to mains electricity	No	4,591	45	3,998	47
	Yes	4,666	45	3,939	46
	Missing	1,039	10	576	7
Number of deaths in the household in 2000	0	9,303	90	7,621	89
	1	925	9	825	10
	2	59	0.6	58	0.7
	3+	9	0.09	9	0.1
Single person household	No	9,674	94	8,513	100
	Yes, single person	622	6	0	0
Dependency ratio ³	No working aged mbrs	131	1	37	0.4
	All working aged mbrs	1,335	13	0	0
	>=1	4,199	41	4,064	48
	<1	4,631	45	4,412	52

Table 2. Profile of mortality experience in households resident on 1st Jan 2000. All households (n=10,296) and households with a child <15 years old (n=8,513). Households without headship data on 1st Jan 2000 are excluded.

Household characteristic	All households		Households with child <15 year old	
	N	%	n	%
	10,296		8,513	
Households with a death in 2000				
0	9,303	90	7,621	90
1+	993	10	892	10
Households with a death in 2000, frequency				
0	9,303	91	7,621	90
1	925	8	825	10
2	59	0.4	58	0.7
3	8	0.06	8	0.09
4	1	0.01	1	0.01
Households with an adult death in 2000, frequency				
	9,414	91	7,732	91
0	834	8	734	9
1	41	0.4	40	0.5
2	6	0.06	6	0.07
3	1	0.01	1	0.01
4				
Households with an AIDS death in 2000, frequency				
	9,808	95	8,070	95
0	458	4	414	5
1	28	0.3	27	0.3
2	2	0.02	2	0.02
3				
Households with an adult AIDS death in 2000, frequency				
	9,859	96	8,121	95
0	414	4	370	4
1	23	0.2	22	0.3
2				

Table 3. Frequency of adult AIDS death among households with a child <15 (n=8,513). Households without headship data on 1st Jan 2000 are excluded.

Characteristic	Household did not experience adult AIDS death in 2000	Experienced adult AIDS death in 2000	OR	95% CI
Household head age			1.01	1.0, 1.01 (p=0.000)
Household head age				
<39 years	2,171 (96)	89 (4)	1.0	
40 years and older	5,943 (95)	302 (5)	1.2	0.9, 1.6
Missing	7 (87)	1 (12)	3.5	1.4, 2.5 (p=0.000)
Household size on 1 st Jan 2000			1.09	1.06, 1.1 (p=0.000)
Household head sex				
Female	2,149 (94)	128 (6)	1.0	
Male	5,972 (96)	264 (4)	0.7	0.6, 0.9 (p=0.007)
Household head education				
None	2,537 (95)	128 (5)	1.0	
Primary	2,512 (96)	97 (4)	0.8	0.6, 1.0
Secondary	1,357 (96)	59 (4)	0.9	0.6, 1.2
Matric	526 (96)	21 (4)	0.8	0.5, 1.3
Higher degree	323 (99)	4 (1)	0.2	0.09, 0.7
Missing	866 (91)	83 (9)	1.9	(p=0.006)
				1.4, 2.5 (p=0.000)
Household head employment				
No employment	3,476 (95)	186 (5)	1.0	
Full or part-time	3,941 (97)	125 (3)	0.6	0.5, 0.7 (p=0.000)
Missing	704 (90)	81 (10)	3.8	2.8, 5.1 (p=0.000)
Household's place of residence ⁴				
Low % tenant area	4,474 (96)	200 (4)	1.0	
High % tenant area	3,647 (95)	192 (5)	1.2	0.96, 1.44
Total	8,121 (95)	392 (5)		

⁴ This indicator is based on the 2001 household socio-economic data. For each isigodi (tribal sub-areas under the authority of a headman) were calculated the percentage of households resident in the area that were not living on land which was 'owned' by a member of the household. Many of these households will pay rent to someone else and/or are vulnerable to being displaced. Izigodis with more than 3% of households where the 'owner' is not a household member were classified as 'High % tenant area', these were: KwaMsane Township, KwaMsane reserve, Mapheleni, Nkombose, Nqopheni, and Nsolweni. All other izigodis were classified as 'Low % tenant area'.

Table 4. Reasons for household ending its residency in the DSA during 2000, all households (n=511) and households with a child <15 years old (n=227)

	All households		Households with a child <15 years	
	N	%	N	%
Migration ⁵	397	78	186	82
Household dissolution	93	18	32	14
Missing reason	21	4	9	4
Total	511	100	227	100

⁵ HMG included in out-migration.

Table 5. Household residency on 1st Jan 2001 in households with a child less than 15 years old (n=8,513). Households without headship data on 1st Jan 2000 are excluded.

	Household resident on 1 st Jan 2001	Household not resident on 1 st Jan 2001	Adjusted odds ratio	95% confidence limits
Household head age			0.9	0.93,0.95 (p=0.000)
Household head age				
<39 years	2,134 (94)	126 (6)	1.0	
40 years and older	6,159 (99)	86 (1)	0.2	0.9,1.5
Household head sex				
Female	2,190 (96)	87 (4)	1.0	
Male	6,111 (98)	125 (2)	0.5	0.3,0.6 (p=0.000)
Household head employment				
No employment	3,641 (99)	21 (0.4)	1.0	
Full or part-time	4,043 (99)	23 (0.6)	0.9	0.5,1.8
Household head education				
None	2,655 (99.6)	10 (0.4)	1.0	
Primary	2,591 (99.3)	18 (0.7)	1.8	0.8,4.0
Secondary	1,408 (99.4)	8 (0.6)	1.5	0.6,3.8
Matric	545 (99.6)	2 (0.4)	0.9	0.2,4.5
Higher degrees	323 (99)	4 (1)	3.2	1.02, 10.5
Household's place of residence				
Low % tenant area	4,606 (99)	68 (1)	1.0	
High % tenant area	3,695 (96)	144 (4)	2.6	1.9, 3.5 (p=0.000)
Household experienced a death in 2000				
No	7,440 (98)	181 (2)	1.0	
Yes	861 (97)	31 (3)	1.4	1.0, 2.1 (p=0.04)
Household experienced an adult AIDS death in 2000				
No	7,875 (97)	195 (2)	1.0	
Yes	426 (96)	17 (3)	1.6	0.9, 2.6

Data are number (%) unless otherwise indicated

Table 6. Household dissolution by 1st Jan 2001 in households with a child less than 15 years old (n=8,513).

Households without headship data on 1st Jan 2000 are excluded.

	Household resident on 1 st Jan 2001	Household not resident on 1 st Jan 2001	Adjusted odds ratio	95% confidence limits
Household head age			0.9	0.95, 0.98 (p=0.000)
Household head age				
<39 years	2,221 (98)	39 (1.7)	1.0	
40 years and older	6,193 (99)	52 (0.8)	0.5	0.3, 0.7
Household head sex				
Female	2,242 (98)	35 (2)	1.0	
Male	6,180 (99)	56 (0.9)	0.6	0.3, 0.8 (p=0.01)
Household head employment				
No employment	3,639 (99)	23 (0.6)	1.0	
Full or part-time	4,040 (99)	26 (0.6)	1.01	0.5, 1.7
Household head education				
None	2,645 (99)	20 (0.7)	1.0	
Primary	2,594 (99)	15 (0.5)	0.8	0.3, 1.4
Secondary	1,408 (99)	8 (0.5)	0.8	0.3, 1.7
Matric	544 (99)	3 (0.5)	0.7	0.2, 2.4
Higher degrees	326 (99)	1 (0.3)	0.4	0.05, 3.0
Household's place of residence				
Low % tenant area	4,629 (99)	45 (1)	1.0	
High % tenant area	3,793 (99)	46 (1)	1.2	0.8, 1.8
Household experienced a death in 2000				
No	7,553 (99)	68 (1)	1.0	
Yes	869 (97)	23 (3)	2.9	1.8, 4.7 (p=0.000)
Household experienced an adult AIDS death in 2000				
No	7,991 (99)	79 (1)	1.0	
Yes	431 (97)	12 (3)	2.8	1.5, 5.2 (p=0.001)

Data are number (%) unless otherwise indicated

Table 7. Characteristics of children <15 years old on 1st Jan 2000. Children without headship data on 1st Jan 2000 are excluded.

Characteristic	0-4 years	5-9 years	10-14	All children
n	9804	10503	10740	31047
Sex ratio	97.6	101.1	97.4	98.7
Residency status ⁶				
Resident	8,887	9,683	9,727	28,297 (91)
Non-resident	(91)	(92)	(97)	2,745 (9)
Missing	915 (9)	820 (8)	366 (3)	5 (0.02)
	2 (0.02)	0	3 (0.03)	
Member of more than one household on 1 st Jan 2000				
No	9,612	10,385	10,532	30,529 (98)
Yes	(98)	(99)	(98)	518 (2)
	192 (2)	118 (1)	208 (2)	
Membership status ⁷				
Full household member	9,633	10,278	10,371	30,282 (98)
Affiliated household member	(98)	(98)	(97)	760 (2)
Missing	169 (2)	225 (2)	366 (3)	5 (0.02)
	2 (0.02)	0	3 (0.03)	
Household head sex				
Male	7,527	7,801	7,946	23,004 (74)
Female	(74)	(74)	(74)	7,548 (24)
Missing	2,396	2,531	2,621	495 (2)
	(24)	(24)	(24)	
	151 (2)	171 (2)	173 (2)	
Living in a household headed by a person <15 years of age				
No	9,653	10,332	10,565	30,550 (98)
Yes	(98)	(98)	(98)	2 (0.01)
Missing	0	0	2 (0.02)	495 (2)
	151 (2)	171 (2)	173 (2)	
Mother's survival status on 1 st Jan 2000				
Alive	9,637	10,008	9,968	29,613 (95)
Dead	(98)	(95)	(93)	1,279 (4)
Respondent doesn't know	140 (1)	448 (4)	691 (6)	151 (0.5)
Data missing	25 (0.2)	45 (0.4)	81 (0.8)	4 (0.01)
	2 (0.02)	2 (0.02)	0	
Father's survival status on 1 st Jan 2000				
Alive	9,142	9,127	8,614	26,883 (86)
Dead	(93)	(87)	(80)	3,351 (11)
Respondent doesn't know	500 (5)	1,110	1,741	809 (3)
Data missing	161 (2)	(11)	(16)	4 (0.01)
	1 (0.01)	264 (3)	384 (4)	
		2 (0.02)	1 (0.01)	

⁶ Residency status recorded at fieldwork visit closest to 1st Jan 2000.

⁷ ACDIS distinguishes two types of household members. *Full members* are those considered by the household and themselves to be a member. They may be resident or non-resident with the household. *Affiliated members* are individuals who, although are not considered to be a member of the household, reside with the household and are involved intimately with it.

Mother co-member of child's household	No	1,219	2,042	2,629	5,890 (19)
	Yes	(12) 8,585 (88)	(20) 8461 (80)	(24) 811 (76)	25,157 (81)
Father co-member of child's household	No	5,487	5,531	5,681	16,699 (54)
	Yes	(56) 4,317 (44)	(52) 4,972 (47)	(53) 5,059 (47)	14,348 (46)
Mother's status on 1 st Jan 2001	Dead	221 (2)	592 (6)	826 (8)	1,639 (5)
	Alive	8,504	8,317	7,976	24,797 (80)
	Not known, mother was not a household member	(87) 1,079 (11)	(79) 1,594 (15)	(74) 1,938 (18)	4,611 (15)
Father's status on 1 st Jan 2001	Dead	585 (6)	1,225	1,860	3,670 (12)
	Alive	4,232	(12)	(17)	14,029 (45)
	Not known, father not a household member	(43) 4,987 (51)	4,857 (46) 4,421 (42)	4,940 (46) 3,940 (37)	13,348 (43)
Child died during 2000	No	9,693	10,490	10,729	30,912 (99)
	Yes	(99) 111 (1)	(99) 13 (0.1)	(99) 11 (0.1)	135 (0.4)
Child migrated during 2000	No	9,223	10,039	10,257	29,519 (95)
	Yes	(94) 581 (6)	(96) 464 (4)	(96) 483 (4)	1,528 (5)

Data are number (%) unless otherwise indicated

Table 8. Maternal survival and migration during 2000 for children who were co-members of their father's household (25,157)

Maternal characteristic	0-4 years	5-9 years	10-14	All children
N	8,585	8,461	8,111	25157
Mother died during 2000				
No	8,504 (99)	8,317 (98)	7,978 (98)	24,797 (99)
Yes	81 (1)	144 (2)	135 (2)	360 (1)
Cause of mother's death in 2000				
AIDS with or without TB	62 (77)	115 (80)	97 (72)	274 (76)
Violent death and accidents	3 (4)	3 (2)	7 (5)	13 (4)
Other causes	16 (20)	26 (18)	31 (23)	73 (20)
<i>Total</i>	<i>81 (100)</i>	<i>144 (100)</i>	<i>135 (100)</i>	<i>360 (100)</i>
Mother migrated in 2000				
No	8,060 (94)	7,970 (94)	7,746 (96)	23,776 (95)
Yes	525 (6)	491 (6)	364 (4)	1,381 (5)

Data are number (%) unless otherwise indicated

Table 9. Paternal survival and migration during 2000 for children who were co-members of their mother's household (14,348)

Paternal characteristic	0-4 years	5-9 years	10-14	All children
n	4,317	4,972	5,059	14,348
Father died during 2000				
No	4,232 (98)	4,857 (98)	4,940 (98)	14,029 (98)
Yes	85 (2)	115 (2)	119 (2)	319 (2)
Cause of father's death in 2000				
AIDS with or without TB	40 (47)	64 (56)	48 (40)	152 (48)
Violent death and accidents	17 (20)	14 (12)	12 (10)	43 (13)
Other causes	28 (33)	37 (32)	59 (50)	124 (39)
<i>Total</i>	<i>85 (100)</i>	<i>115 (100)</i>	<i>119 (100)</i>	<i>319 (100)</i>
Father migrated in 2000				
No	4,121 (95)	4,795 (96)	4,908 (97)	13,824 (96)
Yes	196 (5)	177 (4)	151 (3)	524 (4)

Data are number (%) unless otherwise indicated

Table 10. Profile of reasons for starting a new residency for children <15 years in 2000 (n=620).

Origin	Characteristics	No	%
Internal in-migration	Individual	360	58
	Household	62	10
External in-migration	Individual	98	16
	Household	20	3
	Household formation	79	13
	Missing	1	0.1
Total		620	100

Table 11. Profile of the reasons for ending a residency for children <15 years in 2000 (n=1,066).

Destination	Characteristic	No	%
Internal out-migration	Individual	255	24
	Household	84	8
External out-migration	Individual	278	26
	Household	161	15
	Death	108	10
	Missing	180	17
Total		1,066	100

Table 12. Migration of children less than 15 years old during 2000. Households without headship data on 1st Jan 2000 are excluded.

	Child did not migrate in 2000	Child migrated in 2000	Adjusted odds ratio	95% confidence limits
Child's age in 2000			0.9	0.8, 0.9 (p=0.000)
Child's age in 2000				
0-4	9,223 (94)	581 (6)	1.0	
5-9	10,039 (96)	464 (4)	0.7	0.6, 0.8 (p=0.000)
10-14	10,257 (96)	483 (5)	0.7	0.7, 0.9 (p=0.000)
Child's sex in 2000 ⁸				
Female	14,587 (95)	797 (5)	1.0	
Male	14,479 (95)	689 (5)	0.8	0.8, 0.9 (p=0.01)
Child is a member of multiple households				
No	28,662 (95)	1,385 (5)	1.0	
Yes	405 (80)	100 (20)	5.1	4.0, 6.4 (0.000)
Mother alive on 2000				
Yes	27,865 (95)	1,434 (5)	1.0	
No	1,202 (96)	51 (4)	0.8	0.6, 1.09
Father alive on 2000				
Yes	25,938 (95)	1,434 (5)	1.0	
No	1,202 (96)	51 (4)	1.03	0.9, 1.2
Child died				
No	29,039 (95)	1,380 (5)	1.0	
Yes	28 (21)	105 (79)	78.9	51.8, 120.1 (p=0.000)
Child died from AIDS				
No	29,056 (95)	1,437 (5)	1.0	
Yes	11 (19)	48 (81)	88.2	45.7, 170.2 (p=0.000)
Head of household sex				
Female	7,090 (94)	458 (6)	1.0	
Male	21,977 (96)	1,027 (4)	0.7	0.6, 0.8 (p=0.000)
Head of household age			0.99	0.98, 0.99 (p=0.000)
Household head employment				
No employment	12,987 (96)	540 (4)	1.0	
Full or part-time	14,001 (96)	519 (4)	0.9	0.8, 1.0 (p=0.07)
Missing	2,079 (83)	426 (17)	5.2	4.6, 5.9 (p=0.000)
Adult death in child's household in 2000				
No	26,166 (95)	1,287 (5)	1.0	
Yes	2,901 (91)	198 (6)	1.4	1.1, 1.6 (p=0.000)
Adult AIDS death in child's household in 2000				
No	27,404 (96)	1,133 (4)	1.0	
Yes	91 (18)	395 (81)	2.0	1.7, 2.4 (p=0.000)
Household dissolved or migrated in 2000	29,428 (96)	1,133 (4)	1.0	
Household head information is missing	91 (19)	395 (81)	114.4	89.7, 145.8 (p=0.000)
No	29,067 (95)	1,485 (5)	1.0	
Yes	452 (91)	43 (9)	1.9	1.4, 2.6

Data are number (%) unless otherwise indicated

⁸ One child is missing sex, therefore separate missing category not shown for this bivariate analysis (n=30,551)

Table 13. Migration of children <15 years old whose mothers were co-members on 1st Jan 2000 (n = 25,157)

Maternal characteristic	Child did not migrate in 2000	Child migrated in 2000	Adjusted odds ratio	95% confidence limits
Mother died in 2000				
No	23,699 (96)	1,098 (4)	1.0	
Yes	323 (90)	37 (10)	2.5	1.7, 3.5 (p=0.000)
Mother migrated in 2000				
No	23,287 (98)	489 (3)	1.0	
Yes	735 (53)	646 (47)	42.0	36.4, 48.4 (p=0.000)

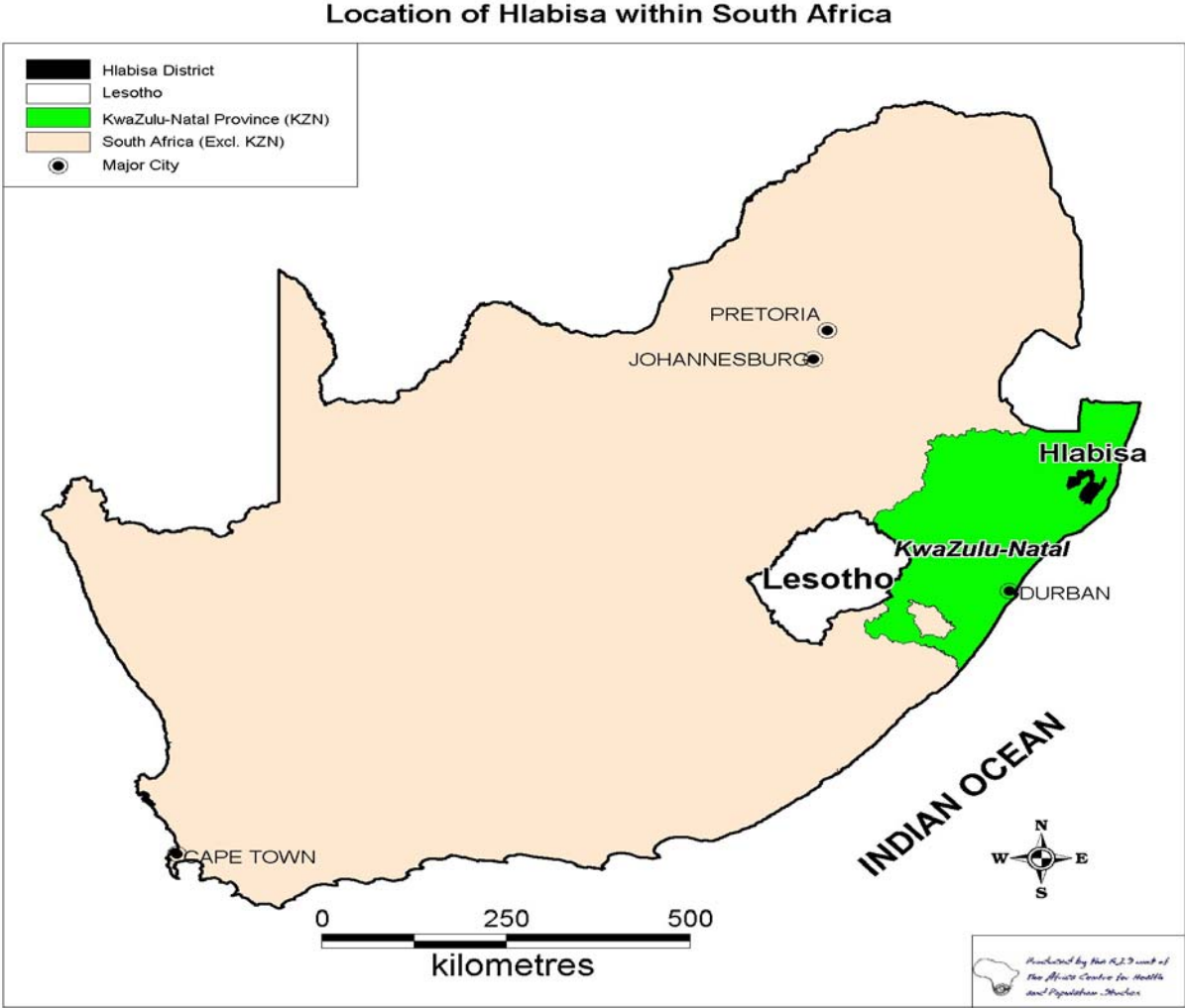
Data are number (%) unless otherwise indicated

Table 14. Migration of children <15 years old whose fathers were co-members on 1st Jan 2000 (n = 14,348)

Paternal characteristic	Child did not migrate in 2000	Child migrated in 2000	Adjusted odds ratio	95% confidence limits
Father died in 2000				
No	13,543 (97)	486 (3)	1.0	
Yes	295 (92)	24 (8)	2.3	1.5, 3.5 (p=0.000)
Father migrated in 2000				
No	13,508 (98)	316 (2)	1.0	1.0
Yes	330 (63)	194 (37)	25.1	20.3, 31.0 (p=0.000)

Data are number (%) unless otherwise indicated

Figure 1. Location of the Hlabisa district and the Africa Centre Demographic Information System



Appendix A.

Location codes used in ACDIS for the destination or origin of residence for members who externally in- or out-migrate.

Code		Name	Comments
MT A		Mpukunyoni Tribal Area	In the Mpukunyoni Tribal Area, including Kwamsane township and KwaMsane reserve
	DSA	Demographic Surveillance Area	In the Demographic Surveillance Area – southern half of the Mpukunyoni area
	NOS	Northern Sector	Outside the Demographic Surveillance area – northern half of the Mpukunyoni Tribal Area.
HLD		Hlabisa District	In the Hlabisa Magisterial District (do not use if location is in the Mpukunyoni tribal area)
	HLT	Hlabisa Tribal Area	In the Hlabisa tribal area specifically
	MP B	Mpembeni Tribal Area	In the Mpembeni tribal area
	MD L	Mdletshe Tribal Area	In the Mdletshe tribal area.
	MT B	Mtubatuba	In and around the town of Mtubatuba
	DK D	Dukuduku Forest	In the Dukuduku forest
	SLU	St. Lucia	In and around St. Lucia
	<i>HLH</i>	Hluhluwe	In an around Hluhluwe

	HLE	Hlabisa District (elsewhere)	Other parts of the Hlabisa district not listed above (e.g. Monzi, Nordale, 121 battalion).
KZN		KwaZulu-Natal	In KZN, but not in the Hlabisa Magisterial District;
	JER	Jozini / Empangeni Region	In the Jozini / Empangeni region of KZN but not in the Hlabisa Magisterial District
	UNH	Ubombo / Ingwavuma Health District	In the Ubombo and Ingwavuma health district – NE KwaZulu, on the Mozambique border
	EMP	Empangeni Area	In or around Empangeni
	RBA	Richards Bay Area	In or around Richards Bay
	<i>LUF</i>	Lower Umfolozi (elsewhere)	In the Lower Umfolozi Health District, but not in the Hlabisa district and not in or around Empangeni or Richards Bay
	ENH	Eshowe / Nkandla Health District	In the Eshowe / Nkandla Health District
DBN		Durban Region	Durban area (including Lower Tugela / Stanger
ULN		Ulundi Region	Ulundi area; not further specified or elsewhere (other than those listed below)
	NGM	Nongoma Area	In or around Nongoma
	NGT	Ngotshe Area	In the Ngotshe Area (Magisterial District)
	PON	Pongola Area	In or around Pongola

NCS		Newcastle Region	In the Newcastle region
LDS		Ladysmith Region	In the Ladysmith region
PM B		Pietermaritzburg Region	In the Pietermaritzburg region
PKR		Port Shepstone / Kokstad	In the south coast region of KwaZulu-Natal

Locations (Continued)

	Code	Name	Comments
RSA		Republic South Africa (elsewhere)	RSA, but not in KwaZulu-Natal
	GA U	Gauteng	Gauteng Province, incl. Johannesburg Area
	MP U	Mpumalanga	Mpumalanga Province
	FST	Free State	Free State Province
	ECP	Eastern Cape	Eastern Cape Province, incl. Transkei, Port Elizabeth, East London
	WC P	Western Cape	Western Cape Province, incl. Cape town
	NW S	North-West RSA	Northern Province, North West Province and Northern Cape
FRG		Foreign Country	Outside RSA (not further specified)
	MZ B	Mozambique	e.g. Maputo
	SW Z	Swaziland	e.g. Mbabane
	LES	Lesotho	e.g. Maseru
	ZI M	Zimbabwe	e.g. Harare
	BO T	Botswana	e.g. Gaborone

	NM B	Namibia	e.g. Windhoek
	AF R	Sub-Saharan Africa (elsewhere)	In an other country or city in sub-Saharan Africa
	OT H	Outside Sub-Saharan Africa	Europe, Asia, etc.
RFS		Refused	Informant refuses to answer the question
DK N		Don't know	Does not know or cannot provide an answer.

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