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## Household dynamics and socioeconomic conditions in the context of incident adolescent orphaning in KwaZulu-Natal, South Africa

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### Abstract

We compared demographics, socioeconomic status, and food insecurity between households with and without recent orphans in a region of high HIV/AIDS mortality in South Africa. We recruited a cohort of 197 recent orphans and 528 non-orphans ages 9–15 and their households using stratified cluster sampling. Households were classified into three groups: orphan-only (N=50); non-orphan-only (N=377); and mixed (N=210). Between September 2004 and May 2007, households were interviewed three times regarding demographics, income and assets, and food insecurity. Baseline bivariate associations were assessed using chi-square- and t-tests. Longitudinal bivariate associations and multivariate models were tested using generalized estimating equations. At baseline, mixed households generally exhibited greater characteristics of vulnerability than orphan and non-orphan households. They were larger, had older, less educated household heads, and reported a much smaller annual per capita income. Orphan households were more likely to report a death in the previous year, and less likely to have an adult employed. These differences persisted over the study. Even non-orphan households exhibited characteristics of vulnerability, with 14% reporting a death one year before baseline, 45% of whom were prime-age adults. At baseline, a much smaller proportion of orphan households reported receiving the child support grant than the other household types, but notably, there were no differences among households in receipt of the grant by Round 3. Household food insecurity was highly prevalent: more than one in five orphan-only and mixed households reported being food insecure in the previous month. These findings suggest that the effects of HIV/AIDS only exacerbate existing high levels of poverty in the district, as virtually all households are vulnerable regardless of orphan status. Community-level programs must help families address a spectrum of needs, including food security, caregiving, and financial support, as well as better target social welfare grants and make them more accessible to vulnerable households.

### Keywords

orphans; HIV/AIDS; households; adolescents; socioeconomic status; food insecurity; South Africa

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### Conflicts of interest

The authors declare that they have no conflict of interest.

## INTRODUCTION

In South Africa, where 1.9 million children have been orphaned, it is not uncommon for one or both parents to die from AIDS while their children are young (UNAIDS 2010). The loss of a parent not only has an immense emotional impact on children but, for most families, also spells financial hardship (Collins and Leibbrandt 2007; F.L. Booysen 2004). The need to care for young children may put pressure on older relatives who become their primary caregivers; children may have to relocate from their familiar neighborhood; and siblings may be split apart. All of these events can harm a child's development. With institutional care arrangements lacking or not culturally normative in many countries heavily affected by the HIV/AIDS epidemic, orphans are often cared for by relatives, particularly grandparents (Kuo and Operario 2007; Meintjes and Giese 2006; Tamasane and Head 2010). The well-being of orphans living in households with many other dependent children being raised by caregivers who may be too overwhelmed to provide adequate care for them is likely fragile (Bachman DeSilva et al. 2008), with these children at risk of neglect, child labor, food insecurity, and dropping out of school (Nyambedha, Wandibba, and Aagaard-Hansen 2003; Booysen and Arntz 2002; Whiteside 2006). Moreover, households headed by older individuals, such as grandmothers, may have lower incomes or access to resources (Tamasane and Head 2010; Bledsoe and Brandon 1992). Many studies have examined household status of prevalent orphans in a particular region or area (Foster et al. 1995; Monasch and Boerma 2004), but we have identified no studies that have investigated households where newly orphaned children are living. Examining such "incident" orphan households permits the observation of direct and immediate effects of parental mortality on the demographic and socio-economic circumstances of newly orphaned children. To address this evidence gap, we compared demographics, socioeconomic status, and food insecurity between households with and without incident orphans. We categorized households as orphan only, non-orphan only, and mixed.

We sought to determine whether household size, composition, asset endowments, and levels and sources of income differed between incident orphan and non-orphan households. We also aimed to assess whether households of incident orphans were more likely to experience food insecurity. Finally, we sought to evaluate whether the socioeconomic situation of incident orphans was getting better or worse over time. In other words, we wanted to understand whether fostering orphans creates and/or increases household vulnerability, making families more likely to descend into poverty.

## METHODS

### Study site and population

The study was conducted in Amajuba District of KwaZulu Natal (KZN), where HIV prevalence for the district was estimated at 39.4% in 2007 (Department of Health 2008). The study population comprised school-going isiZulu-speaking children aged 9–15 years residing in the district and their households.

### Cohort construction and sampling procedures

The starting sample included the 637 households of 157 incident orphans and 480 non-orphans. The selection procedure used school- and age-based stratified cluster sampling and was child-based; this and other field methods have been described in detail elsewhere (Bachman DeSilva et al. 2011). Incident orphans were defined as children who had experienced a parent's death due to any cause within a four month period between March and August 2004. For each orphan, three non-orphan children were selected randomly from the same school, grade, and age group to assure sufficient size of the comparison group

considering high rates of ongoing orphaning in the district (Badcock-Walters, Heard, and Wilson 2002). Figure 1 summarizes the sample selection process and distribution of children by household type.

Households were defined based on the orphan/non-orphan status of resident non-study children, and were categorized into the following three types. Orphan-only households are households where the incident orphan study child resides with other orphans (siblings or others). Non-orphan-only households are those where the non-orphan study child resides with other non-orphans. Finally, mixed households are those where the incident orphan study child resides with other non-orphan children or, alternatively, where the non-orphan study child resides with orphan children. The surveys were administered by *isiZulu*-speaking research assistants. Informed consent and assent processes were conducted in *isiZulu* with adult and child respondents. The Boston University Medical Center Institutional Review Board and the University of KwaZulu-Natal Ethics Committee provided ethical approval for the study.

#### Household Classifications

##### Orphan-only household

where an incident orphan study child resides with other orphans (siblings or others).

##### Non-orphan-only household

where a non-orphan study child resides with other non-orphans.

##### Mixed household

where

1. an incident orphan study child resides with other non-orphan children
- OR**
2. a non-orphan study child resides with orphan children.

#### Data collection procedures

Between September 2004 and June 2005, 637 households were interviewed at baseline. The household head was identified by the adult household members present and was asked to complete the interviewer-administered household questionnaire. The survey was repeated at two annual intervals. In Round 2 (September 2005–June 2006), 598 households were re-interviewed; in Round 3 (September 2006–June 2007), 568 households were re-interviewed, an overall retention rate of 89.2%.

#### Instruments and measures

The household survey included an inventory of resident members, questions on income sources and amounts, and an asset index. Income and asset questions were taken from the household expenditures sections of the South African 2001 Census, the South Africa Integrated Household Survey (World Bank 1999), the UNICEF Multiple Indicator Cluster Survey (MICS), and the South African Survey of Time Use (Statistics South Africa 2001). To assess income, household heads were asked: “In the past 12 months, did your household obtain income or support from any of the following sources?” They could then name income sources from a list of 22 possibilities that was read to them (e.g., paid wages, stokvel, government grant). If the respondent answered in the affirmative for any source, he/she was then asked to provide an estimate of how much money was received from the source per month. If respondents affirmed that a member of the household received a government

grant, they were asked: “did you receive any money or other support from any of the following government sources?” (e.g., old age pension, child care grant, unemployment fund (UIF), waiver of school fees, etc.). They were also asked to estimate the amount received from each source per month. Asset ownership was assessed by asking “Does the household own any of the following (in working condition)?” A list of 11 possible items (e.g. farm animals, computer, car, etc.) was then read aloud. In Round 2, three questions adapted from the Food and Nutrition Technical Assistance Project (FANTA) were added to the household survey to screen for household-level food insecurity: number of meals taken by household in previous day; number of days in previous month household without enough food; number of months in previous year household without enough food (Coates, Webb, and Houser 2003).

### Statistical analysis

The analysis includes the households of the 157 incident orphan and 480 non-orphan study children interviewed at baseline (total N=637), divided into orphan-only (N=50), non-orphan only (N=210), and mixed households (N=377). We conducted both baseline cross-sectional and longitudinal analyses. Households lost to attrition and households in which the study child’s status changed (e.g., a non-orphan becoming an orphan) are included in the analysis for rounds before they exited the study or the study child’s status changed. The analytic sample for the longitudinal analysis included 1724 observations, with up to three observations per household. We used binary measures of income sources and food security as outcomes; income and the asset index were used as continuous outcome variables. The income variable was positively skewed, so we transformed this logarithmically before regression.

For the baseline round, cross-sectional relationships between household type and household characteristics were assessed using Mantel-Haenszel chi-square tests for categorical variables and t-tests for continuous variables. To assess the relationship between household type and indicators over the three years of the study, we tested bivariate associations using generalized estimating equations (GEE) for binary outcomes, and general linear mixed models for continuous outcomes (Liang and Zeger 1986; Verbeke and Molenberghs 2000). We then constructed longitudinal multivariate models, with household outcomes as dependent variables and household type as the primary predictor. Other potentially confounding covariates significant in bivariate analysis (at the  $p < 0.20$  level) were considered for inclusion using a manual backward stepwise selection procedure. Interactions between household type and time were considered; an interaction was considered present if the score statistic for the product term was statistically significant at  $p < 0.10$ . Results for binary outcomes are expressed as odds ratios (OR) for each outcome with 95% confidence intervals (CIs). Results for continuous outcomes are expressed as means with standard deviations (SD). SAS software version 9.1 (The SAS Institute, Cary, NC) was used for all analyses. A probability of  $p = 0.05$  was the threshold for statistical significance.

## RESULTS

### Baseline comparison of orphan, non-orphan, and mixed households

Table 1 presents a demographic and socioeconomic profile of the study households at baseline. There was no difference in urban versus rural location of households. Mixed households were significantly larger than orphan-only and non-orphan households (9.1 persons vs. 5.1 and 6.7,  $p < 0.0001$ ). 13/50 (26%) of study children in orphan-only households were double orphans, and 30/210 (14%) of study children in mixed households were double orphans (see Figure 2a). A larger proportion of mixed households (76%) reported having a chronically ill adult, compared to 60% for orphan and 68% for non-orphan households ( $p = 0.0303$ ). As expected, a larger proportion of orphan and mixed households

reported the death of a member in the previous year compared to non-orphan households (100% and 61% vs. 14%,  $p < 0.0001$ ).

Households also differed in several socioeconomic characteristics. The heads of mixed households were on average older (55.8 years vs. 50.3 vs. 50.9,  $p = 0.0002$ ) and had fewer years of schooling than orphan and non-orphan households (5.4 years vs. 6.5 vs. 6.8,  $p = 0.0012$ ). Only 38% of orphan households had an adult employed, compared to 65% for non-orphan and 61% for mixed households ( $p = 0.0015$ ). Mixed households reported a much smaller annual per capita total household income than orphan and non-orphan households (2847 rand vs. 4268 rand and 4181 rand,  $p = 0.0260$ ). Nearly three quarters (74%) of all households reported receiving some sort of public assistance, yet a much larger proportion (87%) of mixed households compared to orphan (64%) and non-orphan households (68%,  $p < 0.0001$ ) reported receiving at least one public grant. A significantly smaller proportion of non-orphan households received the old-age pension compared to orphan and mixed households (39% vs. 53% and 54%,  $p = 0.0051$ ). A much smaller proportion of orphan households compared to non-orphan and mixed households (36% vs. 51% and 62%,  $p = 0.0011$ ) reported receiving a child support grant. Households did not differ remarkably in terms of assets at baseline.

Household food insecurity was highly prevalent in the sample, as more than one in five orphan-only and mixed households reported being food insecure in the previous month in Round 2 (>10 days without adequate food). One in seven non-orphan households reported food insecurity in the previous month. One in six non-orphan households, one in five orphan households, and nearly one in four mixed households reported food insecurity in the previous year (> 5 months without adequate food).

### Longitudinal comparison of households

A number of transformations occurred in the households over the course of the study. Overall, more than 10% (51/480) of initial non-orphans were orphaned during the two years of follow-up; and 24% (37/114) of initial single orphans became double orphans. Thirty percent (113/377) of the households that were non-orphan-only in Round 1 became either mixed (109/113) or orphan-only (4/113) by Round 3. There were no child-headed households in Rounds 1 or 2, but there were four (7% of orphan households) at Round 3. The majority of the 70 children and their households who dropped out between rounds did so due to relocation outside of the Amajuba study area; and much larger proportions of children lost to attrition came from non-orphan-only households (44%) and mixed households (47%) than from orphan-only households (9%) (not shown).

Table 2 presents key household demographics and the main household outcomes by study round, including bivariate odds ratios from longitudinal analysis. The cross-sectional baseline differences generally persisted over the three study rounds.

Mixed households remained the largest, and their per capita income was much lower over the study; in fact, it decreased between Rounds 1 and 3. Both orphan and mixed households continued to be more likely than non-orphan households to contain a chronically ill adult member and to have had a member die in the previous year. Both orphan and mixed households were less likely to have an adult member employed than non-orphan households, with the strongest association for orphan households (OR: 0.52, 95% CI: 0.35–0.78). Orphan households were more likely to receive remittances or gifts than non-orphan households (OR 1.59, 95% CI: 1.02–2.50); no difference was apparent between mixed and non-orphan households. Over the study, orphan and mixed households remained more likely than non-orphan households to access public grants in general, and old-age pensions in particular. Mixed households were more likely to access child support grants than non-orphan

households (OR 1.41, 95% CI: 1.11–1.79); no statistical difference was evident between orphan and non-orphan households. A notable increase in receipt of the child grant over the three rounds of the study was observed for all household types.

Table 3 presents multivariate models of household income, receipt of key grants, and food insecurity over the three study rounds, using household type as the primary predictor. Orphan-only and mixed households were more likely to receive any public grant than non-orphan households (OR 1.74 (1.02–2.98) and OR 1.38 (0.97–1.95), respectively). Orphan-only and mixed households were also more likely to receive the government old-age pension than non-orphan households (OR 1.62 (1.04–2.53) and OR 1.37 (1.02–1.85), respectively). Notably, there were no differences among household types in receipt of the child support grant. Households were significantly more likely to receive a child grant in the two later rounds of the survey. Death of a household member in the previous 12 months, no employed adult, and a lower asset index were all associated with lower income. Very few households reported either income from the sale of assets (15 total events in 3 rounds) or receipt of the disability grant (also 15 total), which precluded longitudinal modeling of these indicators.

For the food insecurity measures over the two rounds in which they were measured, the general trend was for orphan and mixed households to report greater food insecurity than non-orphan households, but the only significant bivariate association was mixed households having 49% greater odds of reporting food insecurity in the previous year than non-orphan households (OR 1.49, 95% CI: 1.03–2.15) (see Table 2). Household type was not a significant predictor of food insecurity in longitudinal models; rather, various socioeconomic proxies were the strongest predictors (see Table 3). For example, larger household size, a chronically ill adult resident, no adult employed, being in the lowest income quartile, and having a lower asset index were all significantly associated with a higher likelihood of food insecurity both in the previous month and previous year. Having a female household head was associated with lower food insecurity in the previous month. Food insecurity was also much less prevalent in Round 3 than in Round 2.

## DISCUSSION

This paper reports cross-sectional and longitudinal household demographics, socioeconomic status, and food insecurity, comparing recent orphan households, households with both orphans and non-orphans, and non-orphan households. Leading up to and during the study period 2004–2007, HIV/AIDS antenatal clinic prevalence in Amajuba district was between 37% and 46%, with peak prevalence in 2006 (Department of Health 2008). Our study provides unique evidence of an average 17% orphan incidence per year for the district, with 10% of non-orphans becoming orphans and 24% of single orphans becoming double orphans over the two-year study period. Thirty percent of children who initially lived in non-orphan households were living in mixed or orphan-only households by the end of the study.

### Household vulnerability

All households exhibited some characteristics of vulnerability. Orphan-only households tended to be headed by females, were least likely to have any employed adults, and were less likely than mixed and non-orphan households to receive state child grants. They also had fewer members. Mixed households, in comparison, were much larger, had older, less-educated household heads, much lower per capita income, and were more likely to contain a chronically ill adult than the other two household types. Orphan and mixed households appear to be particularly disadvantaged in terms of demographic and socioeconomic characteristics. These households are bearing the responsibility for the care of orphans—absorbing children from other households—and experiencing increased socioeconomic vulnerability. Even non-orphan households showed evidence of vulnerability, as at baseline,



fifty-one (14%) non-orphan households reported a death in the 12 months before the baseline interview, and 23 (45%) reported that the deceased member was a prime-age adult (age 15–54 years) (data not shown). Eighteen (78%) of these prime-age deaths were reportedly due to illness, of which 11 (48%) were specified as either cancer or an infectious disease including HIV/AIDS, pneumonia, or tuberculosis. The large proportion of initial non-orphan households that changed to orphan or mixed status by the end of the study also suggests that even non-orphan households are experiencing adult illness from HIV/AIDS.

Even though mixed households disproportionately report lower annual income, we found evidence of poverty among all household types. Per capita income in our sample was very low for all household types, as the overall mean in our household sample at baseline (South African Rand (ZAR) 3748) was only 11% of the national mean in 2005 of ZAR 33 390 (World Bank 2007). Amajuba District had an unemployment rate of 41.9% in 2007 with 52% of the population living in poverty (Amajuba District Municipality 2010). In our sample, nearly three quarters (74%) of all households reported receiving some sort of public assistance. But, as others have documented, public assistance grants appeared to be under-utilized by households caring for orphans, as a low proportion of orphan-only and mixed households reported receiving a child grant, for which all are eligible (Tamasane and Head 2010). This raises questions about the accessibility of these grants. The most common barriers to accessing grants are the lack of child birth certificates and parent death certificates (Cluver and Orkin 2009). Some previous research has also suggested that elder caregivers may have less knowledge about access to resources (Foster et al. 1996). In the absence of child grants for which households are eligible, the old age pension, which is determined primarily by age and means testing with women eligible at age 60 and men over 65, is likely being redistributed to support younger family members in many households (Case and Deaton 2001).

All household types experienced high levels of food insecurity. Our multivariate results suggest that, in this population, food insecurity is more proximally associated with low income and adult chronic illness than household type. In other words, HIV/AIDS in Amajuba District appears to exacerbate existing high levels of poverty. Other research suggests that household food insecurity occurs as a result of taking additional children into the family (Schroeder and Nichola 2006; Kuo and Operario 2007). In our sample, there was evidence from longitudinal multivariate models that mixed households with more members did not experience greater food insecurity, and that food insecurity was most strongly associated with adult unemployment and household income level. Limited evidence suggests that orphan households experience a decline in living standards after the death of a prime-age adult/parent (Bachmann and Booysen 2004; Beegle, De Weerd, and Dercon 2009). Specific temporal relationships between decline in living standards and orphan status cannot be directly drawn from our findings.

### Strengths and limitations

We believe that our consideration of the household living arrangements of children who have recently been orphaned is critical to understanding the impact of HIV on family and community stability (Watts et al. 2005). Nonetheless, this study carries several limitations. First, because our original sampling unit was the child, the primary predictor using household type resulted in two main problems: 1) there was a relatively small number of orphan-only households which resulted in limited power for multivariate regression for some outcomes; and 2) non-orphan comparisons sometimes lived in mixed households with orphaned non-study children who may or may not have been recently orphaned, and thus the mixed households cannot be considered truly an “incident” household type. These methodological difficulties are inherent to the reality of the fluidity of households in this geographic location (Hosegood and Timaeus 2001). Second, although school enrollment is

approximately 95% in the District, the sample is only representative of households of children enrolled in school who may be more advantaged than those who do not attend school. Third, in successive rounds of the study it is quite likely that households may have sought out information and/or access to resources as a response to participation in our study. This may well explain, for example, why households of all types were more likely to report receiving a child support grant in Rounds 2 and 3 than in Round 1.

### Implications of findings and recommendations

Our findings suggest that, in response to high levels of orphaning due to HIV, affected Amajuba households are transforming and evolving, either splitting apart or merging into new living arrangements for children. Very few households in this study sample are untouched by the need to respond to loved ones infected or affected by HIV/AIDS. HIV prevalence in KZN remains very high (roughly 39% in antenatal clinics over the last decade), and though new infections are slowly declining, the province will be dealing with the community, household, and individual effects of the epidemic for a very long time. Our findings suggest that evaluation of orphan and vulnerable child wellbeing must consider economic indicators and other household characteristics including food insecurity—in addition to orphan status—to identify, monitor and provide assistance to economically vulnerable households and communities. Improved access to child care grants and essential services, such as a registry of birth and death certificates, are critical for increasing income levels of affected households so that families caring for orphaned children can more easily access entitlements.

Future research and programmatic efforts should focus on how to follow and assist complex, fragile households in various stages of transition during and after the death of adult family members. Research is needed to monitor and assess the long-term impact of orphanhood on households caring for orphans, to examine the longer-term dynamics of household change over time after parental death, and to evaluate the ability of government and civil society interventions to strengthen households and thereby reduce their vulnerability. Community-level programs must help families address a spectrum of needs, including food security, caregiving, and financial support, as well as better target social welfare grants and make them more accessible to vulnerable households. Such responses may reinforce the foundations of struggling households and thereby bolster the ability of families to nurture the children in their care, including but not limited to children orphaned by HIV.

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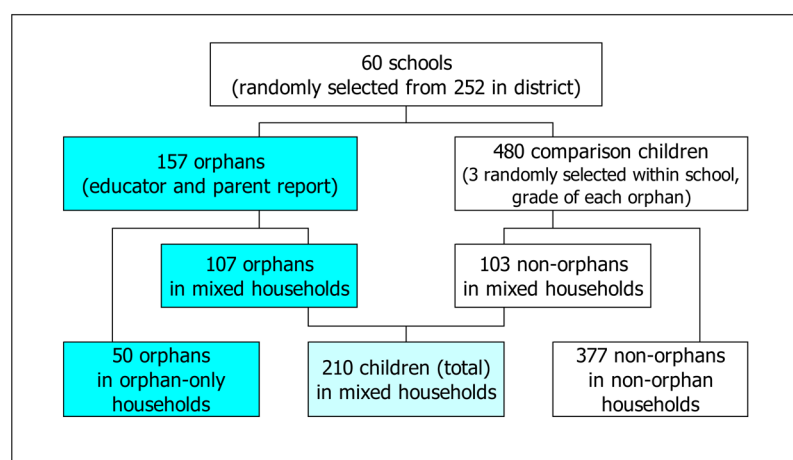
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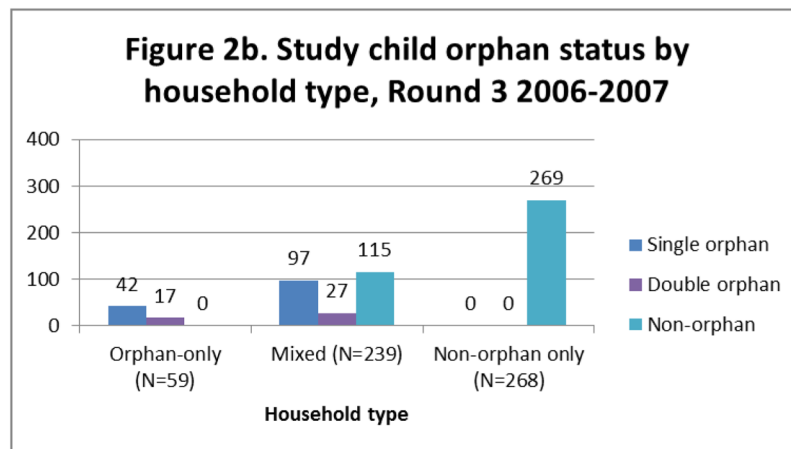
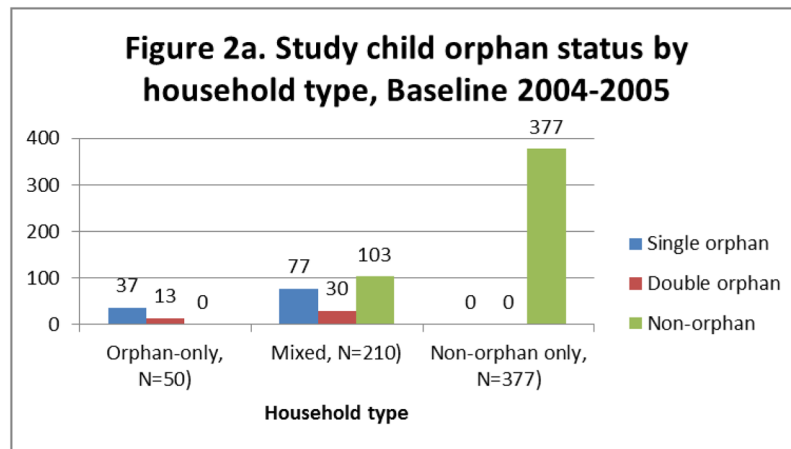


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**Figure 1.**  
Sample selection process



**Figure 2.**

Figure 2a. Study child orphan status by household type, Baseline 2004–2005

Figure 2b. Study child orphan status by household type, Round 3 2006–2007

**Note:** Figure 2b includes the initial non-orphans who changed status and were therefore excluded from analysis for the rounds after they changed status; they fall into either mixed or orphan-only households in Round 3.

**Table 1**  
Baseline demographic and socioeconomic characteristics of households by type (2004–2005)

Characteristic	No. (%)	Mean (SD)	No. (%)	Mean (SD)	No. (%)	Mean (SD)	p-value <sup>d</sup>
Household demographic characteristics							
Geographic location (urban)	33 (66.0)		109 (51.9)		220 (58.4)		0.1261
Household size		5.1 (2.0)		9.1 (3.2)		6.7 (2.8)	<0.0001
Number of adults in household		2.3 (1.4)		4.0 (1.8)		3.1 (1.6)	<0.0001
Number of children in household		2.8 (1.3)		5.1 (2.2)		3.6 (1.8)	<0.0001
Household head characteristics							
Gender (female)	36 (72.0)		133 (63.3)		186 (49.6)		0.0003
Age		50.3 (18.0)		55.8 (14.2)		50.9 (13.8)	0.0002
Years of schooling		6.5 (4.7)		5.4 (4.6)		6.8 (4.5)	0.0012
Education above primary	38 (76.0)		137 (65.2)		299 (79.3)		0.0009
Chronically ill adult resident	30 (60.0)		160 (76.2)		256 (67.9)		0.0303
Death of member in previous 12 months	50 (100.0)		128 (61.0)		51 (13.5)		<0.0001
Household socioeconomic characteristics							
At least one adult employed	19 (38.0)		128 (61.0)		243 (64.5)		0.0015
Dwelling type (modern)	43 (86.0)		164 (78.1)		290 (76.9)		0.3467
Household owns dwelling	50 (100.0)		208 (99.1)		354 (94.7)		0.0079
Main water source (piped/potable)	49 (98.0)		200 (95.2)		368 (97.6)		0.2556
Sanitation facility (flush toilet, N=626)	25 (50.0)		86 (41.0)		156 (42.6)		0.5092
Energy source for cooking (electricity or gas, N=633)	27 (54.0)		87 (41.8)		183 (48.8)		0.1573
Household income and assets							
Annual income per capita (South African Rand, ZAR)		4268 (6680)		2847 (3562)		4181 (6755)	0.0260
Income per capita excluding grants (ZAR)		1628 (2492)		2103 (2663)		2076 (3217)	0.5803
Receive income from remittances/gifts	17 (34.0)		54 (25.7)		79 (21.0)		0.0828
Amount received, previous month		376 (408)		367(267)		540 (525)	0.0596
Receive income from loans	4 (8.0)		31 (14.8)		43 (11.4)		0.3135
Amount received, previous month		525 (403)		1681 (3644)		1793 (4846)	0.8530

Characteristic	Orphan-Only (N=50)			Mixed (N=210)			Non-Orphan-Only (N=377)			p-value <sup>f</sup>
	No. (%)	Mean (SD)		No. (%)	Mean (SD)		No. (%)	Mean (SD)		
Receive income from sale of assets	2 (4.0)			2 (1.0)			4 (1.1)			0.1927
Amount received, previous month		40 (222)			21 (277)			25 (272)		0.9045
Public grants accessed	32 (64.0)			183 (87.1)			256 (67.9)			<0.0001
Total grant income, previous month		756 (568)			925 (562)			715 (494)		0.0002
Old-age pension (N=476)	18 (52.9)			99 (53.8)			100 (38.8)			0.0051
Amount received, previous month		379 (414)			436 (453)			343 (473)		0.1156
Child support grant	18 (36.0)			131 (62.4)			193 (51.2)			0.0011
Amount received, previous month		319 (364)			423 (356)			314 (207)		0.0028
AIDS grant	0(0.0)			5 (2.7)			2 (0.8)			0.1920
Amount received, previous month		0 (0.0)			320 (329)			151 (281)		0.9371
Asset index		4.1 (1.8)			4.5 (1.9)			4.3 (2.0)		0.2679
Household food insecurity (questions added in Round 2)										
Food insecure in previous month (> 10 days without adequate food)	13 (22.4)			47 (22.1)			45 (15.1)			0.0930
Food insecure in previous 12 months (> 5 months without adequate food)	11 (19.0)			50 (23.6)			50 (16.7)			0.1552

<sup>f</sup> P-values from chi-square tests for categorical variables, from t-tests for continuous variables



**Table 2**  
Household demographics, income, grants, and food insecurity, by round and household type

Characteristic	Round 1 (2004–05)			Round 2 (2005–06)			Round 3 (2006–07)			<i>p</i> <sup>1</sup>
	No. (%)	Mean (SD)	No. (%)	Mean (SD)	No. (%)	Mean (SD)	No. (%)	Mean (SD)	OR (CI) <sup>1</sup>	
Household size										<0.0001
Orphan-only		5.1 (2.0)		5.1 (2.2)		5.0 (2.1)				
Mixed		9.1 (3.2)		8.9 (3.4)		9.0 (3.6)				
Non-orphan only		6.7 (2.8)		6.5 (2.9)		6.5 (2.9)				
Chronically ill adult resident										0.0079
Orphan-only	30 (60.0)		38 (65.5)		26 (60.5)		1.19 (0.78–1.82)			
Mixed	160 (76.2)		150 (70.4)		122 (59.8)		1.46 (1.15–1.86)			
Non-orphan only	256 (67.9)		181 (60.1)		134 (50.2)		1.00			
Death of member, previous 12 months										<0.0001
Orphan-only	50 (100.0)		10 (17.2)		5 (11.9)		8.64 (6.18–12.09)			
Mixed	128 (61.0)		45 (21.1)		32 (15.8)		4.82 (3.54–6.55)			
Non-orphan only	51 (13.5)		32 (10.6)		28 (10.7)		1.00			
At least one adult employed										0.0069
Orphan-only	19 (38.0)		28 (48.3)		22 (51.2)		0.52 (0.35–0.78)			
Mixed	128 (61.0)		113 (53.1)		120 (58.8)		0.85 (0.67–1.07)			
Non-orphan only	243 (64.5)		182 (60.5)		173 (64.8)		1.00			
Annual income per capita (S.A.Rand)										0.0004
Orphan-only		4268 (6680)		5226 (11105)		5739 (10683)				
Mixed		2847 (3562)		3025 (4294)		2678 (2433)				
Non-orphan only		4181 (6755)		4989 (14189)		4768 (11319)				
Receive income from remittances										0.1648
Orphan-only	17 (34.0)		17 (29.3)		10 (23.3)		1.59 (1.02–2.50)			
Mixed	54 (25.7)		50 (23.5)		40 (19.6)		1.02 (0.78–1.35)			
Non-orphan only	79 (21.0)		72 (23.9)		54 (20.2)		1.00			
Public grants accessed										<0.0001
Orphan-only	32 (64.0)		48 (82.8)		35 (81.4)		1.62 (0.93–2.83)			
Mixed	183 (87.1)		187 (87.8)		183 (89.7)		2.23 (1.62–3.07)			

Characteristic	Round 1 (2004–05)			Round 2 (2005–06)			Round 3 (2006–07)			<i>p</i> <sup>1</sup>
	No. (%)	Mean (SD)	No. (%)	Mean (SD)	No. (%)	Mean (SD)	No. (%)	Mean (SD)	OR (CI) <sup>1</sup>	
Non-orphan only	256 (67.9)		226 (75.1)		194 (72.7)		194 (72.7)		1.00	
Old-age pension										0.0037
Orphan-only	18 (52.9)		23 (46.9)		15 (40.5)		15 (40.5)		1.51 (1.00–2.27)	
Mixed	99 (53.8)		85 (45.2)		95 (50.5)		95 (50.5)		1.56 (1.20–2.03)	
Non-orphan only	100 (38.8)		69 (30.1)		52 (22.6)		52 (22.6)		1.00	
Child support grant										0.0029
Orphan-only	18 (36.0)		30 (51.7)		26 (60.5)		26 (60.5)		0.77 (0.50–1.17)	
Mixed	131 (62.4)		148 (69.5)		157 (77.0)		157 (77.0)		1.41 (1.11–1.79)	
Non-orphan only	193 (51.2)		187 (62.1)		167 (62.6)		167 (62.6)		1.00	
Food insecure, previous month <sup>2</sup>										0.1865
Orphan-only			13 (22.4)		6 (14.0)		6 (14.0)		1.63 (0.90–2.93)	
Mixed			47 (22.1)		18 (9.0)		18 (9.0)		1.32 (0.90–1.95)	
Non-orphan only			45 (15.1)		26 (9.8)		26 (9.8)		1.00	
Food insecure, previous 12 mos <sup>2</sup>										0.1154
Orphan-only			11 (19.0)		5 (11.6)		5 (11.6)		1.21 (0.67–2.19)	
Mixed			50 (23.6)		29 (14.4)		29 (14.4)		1.49 (1.03–2.15)	
Non-orphan only			50 (16.7)		27 (10.2)		27 (10.2)		1.00	

<sup>1</sup>OR and *p*-value for between-group differences from generalized estimating equation (GEE) models that include household type and time (round) as predictors.

<sup>2</sup>Food insecurity questions added in Round 2. Food insecure in previous month = >10 days without adequate food; food insecure in previous year = >5 months without adequate food.

