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**ABSTRACT**

We analyze funeral arrangements following the deaths of 3,751 people who died between January 2003 and December 2005 in the Africa Centre Demographic Surveillance Area. We find that, on average, households spend the equivalent of a year's income for an adult's funeral, measured at median per capita African (Black) income. Approximately one-quarter of all individuals had some form of insurance, which helped surviving household members defray some fraction of funeral expenses. However, an equal fraction of households borrowed money to pay for the funeral. We develop a model, consistent with ethnographic work in this area, in which households respond to social pressure to bury their dead in a style consistent with the observed social status of the household and that of the deceased. Households that cannot afford a funeral commensurate with social expectations must borrow money to pay for the funeral. The model leads to empirical tests, and we find results consistent with our model of household decision-making.

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## **1. Introduction**

Since 1990, many countries in East and southern Africa have seen a reversal in the trend toward greater life expectancy, largely as a result of the AIDS crisis. In South Africa, 1.8 million lives have been lost to AIDS since the pandemic took hold (UNAIDS 2008). In one site in South Africa that has been under demographic surveillance since the early 1990s, life expectancy among females has fallen by 12 years, and among males by 14 years (Kahn et al. 2007).

Economic research focusing on the long-run effect of AIDS finds, if the crisis results in lower population growth, that AIDS could “endow the economy with extra resources which ... [will] raise the per capita welfare of future generations.” (Young, 2005). This earlier research, however, assumes a constant savings rate over the life of the crisis, in order to focus on the effect of a potential fertility decline. To the extent that productive resources are diverted into expensive funeral celebrations, earlier predictions that the pandemic will benefit future generations economically are less likely to come to pass. The financing of burials has implications for a household’s ability to maintain a stock of productive assets, to stake migrants in urban areas until they find work, to finance schooling, and more broadly to provide adequate nutrition and a healthy environment within which to raise children.

This paper documents funeral costs and financing for deaths that occurred between 2003 and 2005 in a demographic surveillance site in northern KwaZulu-Natal, South Africa. Specifically, we analyze funeral arrangements following the deaths of 3,751 people who died between January 2003 and December 2005 in the Africa Centre Demographic Surveillance Area. We find that, on average, households spend the equivalent of a year’s income for an adult’s funeral, measured at median per capita African (Black) income. Approximately one-quarter of all

individuals had some form of insurance, which helped surviving household members defray some fraction of funeral expenses. However, an equal fraction of households borrowed money to pay for the funeral.

We also examine how households determine appropriate spending for funerals. To do so, we set out a model, consistent with ethnographic work in this area, in which households respond to social pressure to bury their dead in a style consistent with the observed social status of the household and that of the deceased. Households that cannot afford a funeral commensurate with social expectations must borrow money to pay for the funeral. The model leads to empirical tests, and we find results consistent with our model of household decision-making.

The next section introduces the data we use to quantify funeral behavior. Section 3 discusses funeral costs in more detail. Section 4 presents a model of household decision-making, and tests the model using our data. Section 5 offers some thoughts on the sustainability of the current burial practices, and the implications of current practices for the future wellbeing of household members.

## **2. Data**

In 2000, the Africa Centre for Health and Population Studies began demographic surveillance of approximately 11,000 households in the Umkhanyakude District in northern KwaZulu-Natal. The surveillance site includes both a township and a rural area administered by a tribal authority. At six month intervals, every household is visited and demographic and health information is collected on all household members. Individuals may be resident in the Demographic Surveillance Area (DSA), or may be non-resident members of households that claim them as

members. Approximately two-thirds of all persons under demographic surveillance are resident in the DSA at any one time. (See Tanser et al. 2007 for details on the Africa Centre site and surveillance protocols.)

Upon learning of the death of a household member, a verbal autopsy nurse is sent to interview the deceased's primary caregiver.<sup>1</sup> Symptoms and health seeking behavior of the deceased are recorded, and sent to two clinicians, who independently assess the information and, where possible, assign a cause of death. For deaths between January 2003 and December 2005, information was also collected on the costs associated with the illness, and with the funeral. This information, from the *Illness and Death (IAD) Survey*, forms the basis of our analysis.

We augment these data with information that was collected on household socioeconomic status in two rounds of data collection. *Household Socio-Economic Survey 1 (HSE1)* was conducted in 2001, and *Household Socio-Economic Survey 2 (HSE2)*, between January 2003 and June 2004. When possible, we assign household SES information from HSE1, in order to quantify the economic and demographic characteristics of the household prior to the death.

#### *Characteristics of the Demographic Surveillance Area and of those who died*

Column 1 of Table 1 presents information on individuals followed by the Africa Centre Demographic Information System (ACDIS) in 2001, at the time of HSE1. Just over half of all individuals followed by ACDIS are female. The population under surveillance is young, with a mean age of 23 years. Employment opportunities in the area under surveillance are quite limited, and many household members migrate to find work. This is reflected in reports that only 34

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<sup>1</sup> In order to respect households in mourning, the verbal autopsy visit occurs with a lag of at least 6 months. For details on the protocol, visit <http://www.africacentre.ac.za>.

percent of adults resident in the DSA worked for money in 2001, in contrast with 58 percent of non-resident adults. Individuals in the DSA live in large households, with an average of 10 members, 7 of whom are resident in the DSA.<sup>2</sup>

Column 2 presents information on individuals followed by ACDIS who died between 2003 and 2005. Household characteristics of those who died are similar to those of all persons followed by ACDIS. Household sizes (10.08 vs. 10.35 members), number of working adult members (1.96), and number of children (4.58 vs. 5.00) are all quite comparable. Employment for adults who died between 2003 and 2005 are similar to reports for resident members as a whole, with 32 percent of the deceased reported to have been working before they fell ill.

Age at death over this period was 38 years, on average. This reflects the large AIDS burden that this region is shouldering. Verbal autopsies diagnose that 48 percent of all deaths in the DSA from 2003 to 2005 were due to AIDS, which is associated both with high infant mortality and with death in middle age.

Individuals old enough to have gone to school at HSE1 (ages 6 and older) who subsequently died had a half year less education than other individuals followed in ACDIS, on average. However, given changing educational attainment between cohorts and differences in the age profile of those who died and others followed in ACDIS, this difference is much reduced when one controls for age and age squared at HSE1 (so that those who died, age adjusted, had attained 0.18 fewer years of education at HSE1).

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<sup>2</sup> These numbers are presented at the level of individuals within the DSA, in order to compare their information with that from people who died. At the level of the household, average household size is 7.6, with 5.5 resident members.

### **3. Funerals in the DSA**

It would be difficult to exaggerate the importance of funerals in South African life. Funerals serve to honor the dead, who are entering a new life as ‘ancestors.’ In addition, funerals mark the deceased’s status (and that of his family) within the community. They also strengthen ties with neighbors and extended family, who may travel long distances to attend the funeral. More than any other single rite of passage – births, graduations, marriages – funerals provide a focal point for family and community life. (See Roth 1999 for discussion.)

For some or all of these reasons, funerals are elaborate, and expensive. In addition to expenses for a coffin, traditional burial blankets, and (often) a tent for the funeral, immediate family must pay to entertain mourners. After a death, extended household members may arrive for a lengthy visit. It is expected that the immediate family of the deceased will feed mourners who have come for the funeral, for as long as they choose to stay. In addition, animals are slaughtered to honor the dead. Precise customs vary from place to place, but in KwaZulu-Natal, when an adult male dies, general custom is to kill a cow, and to use its meat to feed all present. This is an expensive proposition: cattle during this period sold for approximately 2000 Rand a head.<sup>3</sup> With median per capita income among Africans (Blacks) approximately 400 Rand a month, the cow represents more than a third of a year’s income for half the African population. When an adult female dies, a goat is slaughtered. While less expensive than a cow, this is still a considerable expense for the household.

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<sup>3</sup> Prices are those reported by survey respondents during the 2003-2005 period of data collection. These are consistent with other reports for this period. King (2004) reports sale prices for a cow fluctuated between R1500 and R2000 in the former bantustan of KaNgwane, between 2000 and 2002. McCord (2004) reports that sale prices for cows varied from R700 to R3000 in Limpopo in mid-2003. Since that time, prices for cattle have increased. The Weekend Argus (2006) reports the market price for a cow in December 2006 as R3000.

### *Burial societies and funeral policies*

One mechanism that has evolved in South Africa to help individuals save for funerals are savings clubs or accounts that pay out only upon death. These include membership in a burial society, or the purchase of a funeral policy with a funeral parlor or an insurance company. Money paid into a funeral policy can only be drawn upon at death. For approximately 20 to 30 Rand per month (more, if one is insuring additional household members), individuals are guaranteed that some expenses incurred for their funerals will be paid for by the insurer.

Information on who participated in these policies, and what the policies paid at the time of the death, is presented in Table 2. Twenty-eight percent of the deceased had a policy of some variety, almost all of which paid something. Participation in burial societies and funeral policies is closely related to individuals' receipt of the South African state old-age pension. A generous pension is provided monthly in cash to women over age 60 and men over age 65. (See Case and Deaton 1998 for details.) Each month, after receiving their pension, pensioners can pay into their burial account at the *pension pay point*. (Funeral parlors and insurance companies are the only private firms allowed to conduct business inside pension pay points, which are generally surrounded by a fence or barrier of some sort.) In the IAD data, 79 percent of pensioners participated in a burial fund, true of only 18 percent of individuals who were not pension-eligible.<sup>4</sup>

Over half of these policies were held with funeral parlors; and 40 percent with other private insurers. Nearly all of the policies (91 percent) paid money to the household at the time

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<sup>4</sup> The probability of participating in a burial fund jumps by 35 percentage points as men and women move from being slightly too young to receive the pension, to being just old enough to be age-eligible for the pension.



of the funeral. The cash payments are large, averaging 4500 Rand. This money need not be spent by the household on the funeral but, as we shall see below, in general it represents only part of funeral spending for individuals who held policies.

Policies were much less likely to provide goods in kind. Only 23 percent of policies provided a coffin; 23 percent provided food; 13 percent, a tent. Even when a policy provides a coffin or food, the deceased's household may incur additional expenses for these items. While it is rare in the IAD data to find that additional money was used to 'upgrade' the coffin provided by the policy, it is not unknown (4 percent of cases). It is quite common for additional money to be spent on meat and groceries, if the provision of food was part of the policy. (92 percent of cases spent additional money on meat; 75 percent spent additional money on groceries.)

### *Funeral costs*

Information on purchases for the funeral is presented in Table 3, where means are presented for all deaths, and separately for those deaths for which the deceased had a funeral policy. With the exception of expenditure on transport, spending on each funeral-related item was significantly higher when the deceased had a funeral policy than it was when the deceased did not. Large expenditures include a coffin, 858 Rand on average; meat, 1382 Rand on average; and groceries, 1084 Rand on average. Other expenditures, for example on burial blankets, are close to universal, but are much less expensive. Overall, spending on funerals averages 4300 Rand per burial. It is significantly higher if the deceased had a funeral policy (5900 Rand), or if we restrict our attention to adult deaths (4700 Rand).

Table 4 presents information on who paid for these funeral-related expenses. (Note that when a funeral policy paid money, and that money was used to purchase funeral-related items, this is included in the household members' contributions toward funeral expenses.) The vast majority of expenses (90 percent) were paid by household members living with the deceased at the time of the death. This is true both for funerals where a funeral policy paid, and for funerals in which one did not. Other family, not in the household, contributed 6 percent of resources put toward the funeral, with community, church, and employers contributing smaller amounts. In the IAD questionnaire, expenses for funeral items were asked separately from reports on who contributed to the funeral, and at what level. The reports nonetheless balance: the primary caregiver on average can recall 4273 Rand worth of funeral expenses, and 4228 Rand of contributions made by family and others.

The second panel of Table 4 reports on borrowing that the households undertook to finance funerals. Nearly a quarter of all deaths resulted in money being borrowed to pay for the funeral. Conditional on borrowing, households took loans from money lenders over 50 percent of the time; neighbors, 25 percent; and other family, 14 percent of the time. The statistics on money lenders are troubling: in South Africa, money lenders charge exorbitant interest rates, 30 percent per month or more (Siyongwana 2004). Poor households who borrow 1300 Rand from a money lender for a funeral may find themselves paying back many multiples of that over several years.<sup>5</sup>

In summary, funerals are expensive, and often leave households economically vulnerable. In the next section, we examine the determinants of funeral spending and borrowing. We develop a model of household decision-making on funeral spending, which provides tests for our data.

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<sup>5</sup> Consistent with findings of Roth (1999), we rarely observe households selling assets to pay funeral expenses. Roth argues that this is largely because the time between the sale of the asset and the receipt of cash is too long for households who need immediate cash to pay for funeral-related items.

#### 4. Household decision-making on funeral spending and borrowing

The ethnographic literature and our own experience in training field workers to administer questionnaires on illness and death modules suggest that social norms are held strongly and play an important role in setting funeral spending.<sup>6</sup> Denoting characteristics that mark an individual's status (sex and relationship to the head of household, for example) as  $X_1$  and community and extended family perception of household income at the time of the death as  $\hat{Y}$ , we hypothesize that the community and extended family form an opinion about the appropriate size of the funeral  $F^*$  according to the deceased's status and that of his household at the time of the death:

$$F^* = \beta_1 X_1 + \gamma \hat{Y} .$$

Here  $\gamma$  is the fraction of current household income that is thought to be appropriate to use for the burial ( $0 < \gamma < 1$ ), net of the spending determined by the deceased's characteristics.<sup>7</sup> The funeral expenses we observe in our data are the desired spending plus an idiosyncratic error:

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<sup>6</sup> In training teams to capture information on funeral spending, we would play the role of the deceased's primary caregiver, and would be interviewed by field workers as a group, so that we could make sure they understood the concepts, and filled in forms correctly. If we gave an answer on spending for particular items that did not match the field team's opinion on an appropriate amount to spend, given the scenario laid out about the deceased's status and that of his family, the field team would insist on explaining to us why our response was inappropriate.

<sup>7</sup> We have no evidence that pressure about the size of funeral comes from the community or extended family, rather than from within the household itself. However, ethnographic work suggests that the community plays an important role in setting the size of the funeral.

$$(1) \quad F = F^* + u_1 = \beta_1 X_1 + \gamma \hat{Y} + u_1.$$

Community and extended family do not observe household income. Instead, they observe a vector of household and individual characteristics that are correlated with income, which they use to form an expectation of household income. Denoting these observable characteristics as

$X_2$ , we can express perceived household income  $\hat{Y}$  and true household income  $Y$  as:

$$(2) \quad Y = \hat{Y} + u_2 = \beta_2 X_2 + u_2,$$

so that true household income differs from perceived household income by an unobservable idiosyncratic shock,  $u_2$ .

Households that experience an unobserved income shortfall will be less able to meet social expectations with respect to the size of the funeral, without borrowing money.

Specifically, the household will have inadequate resources to meet  $F^*$  if

$$(3) \quad Y < F^* = \beta_1 X_1 + \gamma(\beta_2 X_2).$$

The probability that the household will need to borrow ( $B = 1$ ) to finance a funeral of size  $F^*$  can be written, substituting (2) into (3):

$$(4) \quad \Pr[B = 1] = \Pr[u_2 < \beta_1 X_1 + (\gamma - 1)\beta_2 X_2].$$

This provides us with several checks, and a formal test, of our model. First, characteristics associated with lower individual status will have different predictions for spending and borrowing than do characteristics associated with lower household income. Characteristics of the deceased associated with lower individual status (that is, with lower values of  $\beta_1 X_1$ ) should reduce both the size of the funeral, as in (1), and the probability of borrowing, as in (4). In contrast, any information available to the community that causes them to revise downward their estimate of household income,  $\hat{Y}$ , should reduce the size of the funeral, as in (1), but *increase* the probability of borrowing for the funeral. We examine these in turn.

#### *Individual status, funeral spending and borrowing*

We provide estimates of the association between individual status, funeral spending and funeral borrowing in Table 5. The first set of columns presents results of OLS regressions for funeral spending, with and without controls for household characteristics, and the second set provides OLS results, using the same specifications, for borrowing money for the funeral.<sup>8</sup>

Characteristics that enter individual status ( $X_1$ ) include sex and relationship to the household head, and here we examine whether these characteristics move funeral spending and borrowing in the same direction, as predicted by the model. Women have lower status in the DSA than do men, so we would expect both that less would be spent on women's funerals, and

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<sup>8</sup> In our regression analyses, we control for age using indicators for 10-year age categories. Results are not changed if, instead, we include age at death and that age squared in our regressions. In addition, regressions include indicators for the year of death and an indicator that age at death is missing (true for 5 cases). All regressions allow for robust standard errors, allowing for correlation between unobservables for observations from the same homestead.

that the probability of borrowing for a woman's funeral would be lower. We find that this is the case: with or without controls for household demographics and SES, approximately 600 Rand less is spent on a woman's funeral, and borrowing for a woman's funeral is 3 to 4 percentage points less likely on average.<sup>9</sup>

We also examine whether household members with a more distant relationship to the head are treated differently from other members. Relative to a parent, spouse or child of the head, we find all other relationships to be associated with lower funeral spending, and a lower probability of borrowing for the funeral.<sup>10</sup> Specifically, the funerals of 'other' relatives or non-relatives of the head are approximately 800 to 1000 Rand less expensive, and the probability of borrowing for their funerals is 4 percentage points lower.

#### *Observable household characteristics, funeral spending and borrowing*

We can also examine whether observable characteristics that are associated with household income have different effects on spending and borrowing, as is predicted by our model. Table 6 presents OLS regression results for funeral spending (columns 1 to 6) and borrowing for funerals (columns 7 to 12). We find that household assets are associated with significantly higher spending on funerals, with an increase in spending of 316 Rand for each asset, and with a significantly lower probability of borrowing, with each asset associated with a 1 percentage point drop in the probability of borrowing, on average.

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<sup>9</sup> This largely reflects the difference in cost between slaughtering cows and goats. With the exception of burial clothing, for which a small (34 Rand) but statistically significant amount more was spent on men, meat was the only funeral-related expense for which we find a significant difference in spending between the sexes.

<sup>10</sup> "Other" relationships are siblings, grandparents, grandchildren, sons- or daughters-in-law, other family and individuals not related to the current head of household.

The maximum education of any household member is associated with significantly higher household income in the DSA. Row 2 of Table 6 finds that maximum education in the household at HSE1 is positively related to funeral spending, with each year associated with additional funeral expenses of 325 Rand. As was true of household assets, education is negatively associated with the probability of borrowing for the funeral, with each year of schooling associated with a 0.5 percentage point decline in the probability of borrowing.

Payments of medical expenses for the deceased prior to death also reduce household resources. The next set of regressions in Table 6 examine the association between such expenses and funeral outcomes, and finds treatments are associated with significantly lower funeral expenditures (475 Rand on average), and a significantly higher probability of borrowing for the funeral (3 percentage points). Half of all individuals who died in the DSA between 2003 and 2005 died of AIDS, which is associated with significantly higher medical expenditures prior to death in our IAD sample.<sup>11</sup> When an individual dies of AIDS, almost 1000 fewer Rand are spent on the funeral, on average, while the probability of borrowing to pay for the funeral is 7 percentage points higher.

The deceased's own education appears to enter as a marker of household SES, rather than of the individual's own status. The coefficients on own education are much like those we observed for maximum education in the household.

Ninety percent of cases in which the deceased held a funeral policy, that policy paid money to the household at the time of the death. Consistent with our model, it is the cash

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<sup>11</sup> Controlling for age at death, we find total treatments for individuals who died of AIDS to be 315 Rand more expensive during this period than treatments for people who died of other causes. (See Naidu and Harris 2005 for a review of the literature on the impact of AIDS on household economic status.)

transfer, and not the ownership of a policy, that is associated with significantly higher spending on the funeral, and a significantly lower probability of borrowing to fund the funeral.

Column 6 also suggests that borrowing money for the funeral is not a significant predictor of funeral spending. This result is robust to specification,<sup>12</sup> and we turn next to examine why this might be the case.

### *Comparing the spending of borrowers and non-borrowers*

Results presented in Table 4 showed that, conditional on borrowing money, 1400 Rand were borrowed on average. However, we find no trace of borrowing on funeral spending. If households are attempting to maintain a standard that is consistent with what is expected of them, then money borrowed would be used to bring funeral spending in line with social norms.

If family or community expectations are driving the decision to borrow, the coefficients on individual and household characteristics in regressions of funeral spending should be the same for those who borrowed and those who did not. We examine this in Table 7, where we focus on two markers of individual status – sex, and relationship to the household head – and three markers of household SES – asset holdings, maximum education of a household member, and an indicator that the deceased died of AIDS. We present OLS regression results for total funeral spending for non-borrowers (marked as column 1) and borrowers (column 2), and compare these with results for total funeral spending *net of what was borrowed* among those who borrowed (column 3). Bootstrapped standard errors are presented in parentheses for all results in Table 7.

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<sup>12</sup> An indicator that money was borrowed for the funeral is not significant in a regression of funeral expenses in which the only other controls are indicators for age at death and for year of death, or in regressions that also include other markers for household socioeconomic status. Results are available from the authors.



We find that the association between individual and household status variables and funeral spending are not significantly different when we compare regression coefficients between non-borrowers and borrowers from columns (1) and (2). Differences in the regression coefficients are jointly and individually equal to zero. In contrast, examining funeral spending net of what was borrowed, we find significant differences in the responses to household SES variables, when comparing regression results for borrowers and non-borrowers. In particular, the coefficients on assets held and on the maximum education of a household member are significantly lower in our regression of spending net of borrowing. Taken together, household and individual coefficients from this regression are jointly significantly different from those presented in column 1 for non-borrowers. This is consistent with households using funds borrowed to keep funeral spending in line with expectations.

*Formal tests of household decision-making*

Our model also yields formal tests of the association between funeral expenditures and borrowing decisions, which we analyze here. Rewriting the equation for funeral spending as

$$(1') \quad F = \beta_1 X_1 + \gamma(\beta_2 X_2) + u_1$$

and the equation for the probability of borrowing for the funeral as

$$(4') \quad \Pr[B = 1] = \Pr\left[\frac{u_2}{\sigma_2} < \frac{\beta_1}{\sigma_2} X_1 + (\gamma - 1)\frac{\beta_2}{\sigma_2} X_2\right]$$

we can test several elements in our model.

First, the ratio of each regression coefficient  $\beta_1$ , from vector  $X_1$  in (1'), relative to the corresponding regression coefficient  $\frac{\beta_1}{\sigma_2}$  from (4'), should be equal for each element of  $X_1$ .

That is, for each variable  $X_{1i}$ , for  $i \in (1, k)$ ,

$$(5) \quad \frac{\beta_{1i}}{\beta_{1i} / \sigma_2} \dots = \frac{\beta_{1k}}{\beta_{1k} / \sigma_2} = \sigma_2 \quad .$$

Such a test is of interest in its own right, in gauging whether the model fits the data. The ratio of the coefficients on  $X_1$  from (1') and (4') also yield an estimate of the scaling parameter  $\sigma_2$  from (4'). This is useful in what follows.

In addition, the ratio of each regression coefficient  $\gamma\beta_2$ , from vector  $X_2$  in (1'), relative to the corresponding regression coefficient  $\frac{(\gamma-1)\beta_2}{\sigma_2}$  from (4'), should be equal for each element of  $X_2$ . That is, for each variable  $X_{2i}$ , for  $i \in (1, j)$ ,

$$(6) \quad \frac{\gamma\beta_{2i}}{(\gamma-1)\beta_{2i} / \sigma_2} \dots = \frac{\gamma\beta_{2j}}{(\gamma-1)\beta_{2j} / \sigma_2} = \frac{\gamma\sigma_2}{(\gamma-1)} \quad .$$

The equality of these ratios provides a second test of our model. We can also use them, together with our estimate of  $\sigma_2$  from equation (5), to estimate the fraction of household income,  $\gamma$ , that is expected will be spent on the funeral.

Results of these tests are provided in Table 8. In *chi*-square tests presented in the last column of the table, we fail to reject the equality of ratios for  $X_1$  variables (equation 5), or for  $X_2$  variables (equation 6). Moreover, these equations yield an estimate of  $\gamma$ , the fraction of household income expected to be spent on funerals, equal to 0.56. In the next section, we compare this estimate of  $\gamma$ , provided by reduced form estimation of (1') and (4'), with that yielded by the maximum likelihood estimation.

### *Maximum likelihood estimates*

To gain more precision in our estimates, we turn to maximum likelihood estimation. We denote the latent variable driving the borrowing decision as  $B^* = F - \beta_2 X_2 - u_2$ , where

$B = 1$  if  $B^* > 0$ , and 0 otherwise. We assume that funeral expenses and the latent need to borrow are jointly normally distributed. The relevant joint density when borrowing occurs will be

$$(7) \quad g(F, B = 1) = \int_{-\infty}^{F - \beta_2 X_2} f(F - \beta_1 X_1 - \gamma \beta_2 X_2, u_2) du_2,$$

and for cases where no borrowing occurs is

$$g(F, B = 0) = \int_{F - \beta_2 X_2}^{\infty} f(F - \beta_1 X_1 - \gamma \beta_2 X_2, u_2) du_2.$$

We can express the likelihood function to be maximized as

$$(8) \quad L(\beta_1, \beta_2, \gamma) = \Pi [g(F, B = 1)]^B [g(F, B = 0)]^{(1-B)}.$$

To estimate (8), we re-write (7) as

$$g(F, B = 1) = \int_{-\infty}^{F - \beta_2 X_2} f(u_1, u_2) du_2.$$

Standardizing  $u_2$ , and defining  $z = \frac{u_2}{\sigma_2}$ , yields

$$(9) \quad g(F, B = 1) = \int_{-\infty}^{(F - \beta_2 X_2)/\sigma_2} f(u_1, z) dz = \int_{-\infty}^{(F - \beta_2 X_2)/\sigma_2} f(z | u_1) f(u_1) dz = f(u_1) \int_{-\infty}^{(F - \beta_2 X_2)/\sigma_2} f(z | u_1) dz$$

where the marginal density of  $u_1$  can be written  $f(u_1) = \phi\left(\frac{u_1}{\sigma_1}\right) \frac{1}{\sigma_1}$ .

Under the assumption that  $u_1$  and  $z$  are mean zero, the distribution of  $z$  conditional on  $u_1$  is normally distributed

$$z | u_1 \sim N\left(\frac{\sigma_{12}}{\sigma_1^2} u_1, 1 - \frac{\sigma_{12}^2}{\sigma_1^2}\right).$$

Making a simple change of variables, equation (9) becomes

$$(10) \quad g(F, B = 1) = f(u_1) \Phi \left( \frac{\left( \frac{F - \beta_2 X_2}{\sigma_2} \right) - \frac{\sigma_{12}}{\sigma_1^2} u_1}{\sqrt{1 - \frac{\sigma_{12}^2}{\sigma_1^2}}} \right)$$

and

$$(11) \quad g(F, B = 0) = f(u_1) \left[ 1 - \Phi \left( \frac{\left( \frac{F - \beta_2 X_2}{\sigma_2} \right) - \frac{\sigma_{12}}{\sigma_1^2} u_1}{\sqrt{1 - \frac{\sigma_{12}^2}{\sigma_1^2}}} \right) \right].$$

Substitution of (10) and (11) into (8) provides the expression we use for our likelihood.

We present maximum likelihood (ML) estimates for the structural parameters from (1') and (4') in Table 9. We again use sex and relationship to the household head as our markers for the status of the deceased, and household assets, an indicator that the death was from AIDS, and an indicator that a funeral policy paid money at the time of the death as our markers for household resources available for the funeral. Our ML estimation suggests households are expected to spend a third of household income on a funeral ( $\gamma = 0.34$ ), net of the spending

expected based on the deceased's status.<sup>13</sup> Estimates for the impact of household socioeconomic status variables are very similar to those presented in Table 8, once we multiply our  $\beta_2$  maximum likelihood coefficients by our estimate of  $\gamma$ .

## 5. Conclusions

This paper provides quantitative evidence from KwaZulu-Natal on the extent to which funerals place households at risk, taking potentially productive resources and turning them into consumption (coffins, meat, groceries). In addition, in a quarter of all funerals for individuals who died between 2003 and 2005 in the DSA, households borrowed money for the funeral, which can be anticipated to drain household resources well into the future. Our point estimates suggest that households are expected to spend a third of household income on funerals, in addition to the spending expected given the status of the deceased.

These results do not lead us to optimism on the impact of the AIDS crisis on the future economic wellbeing of South Africans. Recent evidence from Demographic and Health Surveys suggests that fertility rates may not have fallen in response to the AIDS crisis in the manner suggested by Young (2005). (See Fortson 2008, and Juhn, Kalemli-Ozcan and Turan 2008.) To this, we add evidence that households are taking what, in other circumstances, could be productive capital and using it on coffins, meat and groceries to bury their dead.

Such elaborate funerals are unlikely to be sustainable, if the AIDS pandemic continues to take lives at such a rapid rate. New norms may develop. According to the BBC, the king of neighboring Swaziland put a ban on lavish funerals

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<sup>13</sup> This estimate is smaller than that yielded by reduced form (0.56), however the latter is imprecisely estimated, and we cannot reject that the estimates are the same.

<http://news.bbc.co.uk/1/hi/world/africa/2082281.stm>). In South Africa, there is qualitative evidence that some communities have tried to set new norms, but these norms are often not acceptable to extended family who come in from far away to attend the funeral. The South African Council of Churches has called repeatedly for “appropriate and affordable” funerals. (See, for example, <http://www.sacc.org.za/docs/AnRept05.pdf> .) However, movement in this direction has been quite slow. Indeed, our findings suggest that households forced to borrow money to pay for funerals do not shade their funeral spending significantly: an indicator that money was borrowed for the funeral is not a significant predictor of funeral spending. Understanding coordination failures between communities, or among members of extended households, will be important if there is to be an effective response working toward smaller, less expensive funerals.

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**Table 1. Africa Centre Demographic Surveillance Data**

All individuals in DSA 2001	Illness and Death (IAD) Sample 2003-2005	
<i>Household characteristics</i>		
Household size (HSE1)	10.35	10.08
Number of resident members (HSE1)	7.36	7.16
Number of employed members ages 18+ (HSE1)	1.96	1.96
Number of children 0-17 (HSE1)	5.00	4.58
Number of pension-aged household members (HSE1)	0.51	0.63
Household assets (HSE1)	6.20	5.83
<i>Individual characteristics</i>		
Female	0.526	0.515
Age at HSE1	23.4	Age at death 38.4
	--	Cause of death was AIDS 0.478
Resident in DSA, Employed at HSE1 (ages 18+)	0.337	Deceased employed when healthy (ages 18+) 0.324
Not resident in DSA, Employed at HSE1 (ages 18+)	0.575	
Education at HSE1(ages 6+)	6.20	5.69
Number of observations (individuals)	81177	3751

Note: When the IAD sample is restricted to those who were 18 and older (employment variables), the sample size is 2840. Information on education comes from the first socio-economic survey (HSE1). IAD sample is restricted to deaths that occurred between January 2003 and December 2005.

**Table 2. Burial Societies and Funeral Policies**

BURIAL SOCIETY AND FUNERAL POLICIES		
Fraction with a policy	0.284	
Fraction pension-eligible with a policy	0.785	
Fraction non-pension eligible with a policy	0.182	
Number of observations	3668	
TYPE OF POLICY	Conditional on reporting a policy, fraction with:	Money paid for funeral by type of policy:
Traditional burial society	0.016	3520
Funeral policy with:		
Funeral parlor	0.542	3628
Insurer	0.408	5091
Bank/Retailer/Other	0.023	8373
FUNERAL POLICY PAID	fraction	Mean amount
Money for the funeral	0.907	4515
Coffin	0.230	
Food	0.232	
Transport	0.087	
Tent	0.134	
Number of observations	1007	

Notes: Type of policy and fraction of policies that paid for expenses are conditional on the deceased having been covered by a funeral policy or burial society that paid at the time of the funeral.

**Table 3. Costs of Funerals**

Funeral purchases	Fraction making purchase	Mean All deaths (Rand)	Mean, Funeral policy holders (Rand)
Coffin	.710	858	1250
Meat	.946	1382	2061
Groceries	.974	1084	1414
Tent	.575	317	414
Clothing	.726	82	95
Blankets	.983	266	300
Transport	.692	318	334
Other	.113	64	97
Total Rands		4273	5909
Number of observations	3698	3682	1007

Notes: Cost of the funeral are those not covered by a burial society or funeral policy. These include funeral purchases made with money received from a burial society or funeral policy at the time of the death. The number of observations in each mean varies because respondents sometimes did not know whether items were purchased. (For example, 3682 respondents knew whether meat was purchased; 3666 knew whether a tent was rented.)

**Table 4. Accounting for Funeral Costs**

CONTRIBUTIONS TO FUNERAL COSTS ( RAND)		
	Fraction Contributing	Mean amount
Household members	0.949	3789
Other family	0.250	260
Community	0.146	54
Church	0.084	37
Employer	0.037	80
Other	0.011	14
Total		4228
Number of observations	3747	
MONEY BORROWED		
	Fraction borrowing	Mean conditional on borrowing
	.238	1387
Number of observations	3615	
Conditional on borrowing, fraction borrowing from:		
Bank	.016	3815
Money lender	.524	1326
Employer of deceased	.007	2133
Employer of another person	.038	2284
Family outside the household	.138	1414
Neighbor	.248	1150
Other	.021	1482
Number of observations	862	
ASSETS SOLD		
	Fraction selling assets	Mean conditional on selling
	.039	2650
Number of observations	3635	

Notes: Cost of the funeral are those not paid for by a burial society or funeral policy. These include funeral purchases made with money received from a burial society or funeral policy at the time of the death. Sixteen observations were not used in calculating mean sum borrowed, conditional on borrowing, because either two borrowing sources were mentioned (5 cases), or none of our categories was mentioned (11 cases).

**Table 5. Individual Status, Funeral Spending and Borrowing**

	Dependent variable:							
	Funeral spending (Rand)				=1 if borrowed money for funeral			
Female	-577.46 (107.06)	-635.12 (107.70)	--	--	-0.026 (0.014)	-0.039 (0.015)	--	--
Relation of deceased to current head is 'other'	--	--	-1026.21 (110.78)	-784.76 (113.22)	--	--	-0.037 (0.016)	-0.038 (0.016)
Household characteristics?	No	Yes	No	Yes	No	Yes	No	Yes
Number of observations	3751	3334	3751	3334	3615	3219	3615	3219

Notes: OLS regressions with robust standard errors in parentheses. Unobservables are clustered at the homestead level. All regressions include year of death indicators, a complete set of age indicators by 10-year age categories and an indicator that age at death was missing (5 cases). Omitted category for relationship of the deceased to current head of household includes parents, spouse and children. 'Other' relationships are: siblings, grandparents, grandchildren, sons- or daughters-in-law, other family and individuals not related to the current head of household. Household characteristics in columns 2, 4, 6 and 8 are household size, household asset holdings and the maximum number of years of education in the household (all measured in 2001).

**Table 6. Household Income, Funeral Spending and Borrowing**

	Dependent variable:											
	Funeral spending (Rand)						=1 if borrowed money for funeral					
Household asset holdings	316.40 (23.64)	--	--	--	--	--	--0.009 (0.002)	--	--	--	--	--
Maximum education of any household member HSE1	--	325.04 (24.27)	--	--	--	--	--	--0.005 (0.003)	--	--	--	--
Indicator: payments made for medical treatment before death	--	--	-474.73 (131.89)	--	--	--	--	--	0.026 (0.016)	--	--	--
Indicator: cause of death was AIDS	--	--	--	-927.58 (119.52)	--	--	--	--	--	0.067 (0.017)	--	--
Education of the deceased	--	--	--	--	268.90 (23.08)	--	--	--	--	--	-0.008 (0.002)	--
Deceased had a funeral policy	--	--	--	--	--	-179.51 (315.30)	--	--	--	--	--	-0.044 (0.043)
Funeral policy paid money	--	--	--	--	--	1745.97 (342.03)	--	--	--	--	--	-0.074 (0.043)
Money was borrowed for the funeral	--	--	--	--	--	-41.78 (109.87)	--	--	--	--	--	--
Number of observations	3653	3310	3751	3629	3485	3581	3524	3195	3615	3499	3374	3581

Notes: OLS regressions with robust standard errors in parentheses, allowing for correlation in the unobservables for observations from the same homestead. All regressions include year of death indicators, a complete set of age indicators by 10-year age categories and an indicator that age at death was missing (5 cases).

**Table 7. Differences in Responses by Borrowing Status**

	Dependent Variable:				
	total funeral expenses			total funeral expenses net of funds borrowed	
	Non-borrowers	Borrowers Only	Difference: non-borrowers and borrowers	Borrowers only	Difference: non-borrowers and borrowers
	(1)	(2)	(1) – (2)	(3)	(1) – (3)
Indicator: female	-547.50 (138.56)	-614.64 (178.500)	67.14 (222.72)	-471.66 (217.32)	75.85 (248.96)
Indicator: relationship to head of household is 'other'	-681.00 (140.57)	-614.16 (194.26)	-66.84 (236.40)	-1012.17 (303.44)	331.17 (333.60)
Household assets	246.71 (27.10)	206.37 (37.65)	40.34 (45.65)	79.62 (42.30)	167.09 (49.80)
Maximum education of household members HSE1	210.89 (25.16)	145.20 (38.99)	65.69 (46.22)	89.46 (39.58)	121.43 (46.88)
AIDS death	-725.40 (138.28)	-1057.81 (211.44)	332.42 (252.42)	-906.21 (212.620)	180.81 (252.18)
<i>Chi-square test: difference in coefficients is jointly significant (p-value)</i>			6.48 (.2619)		22.50 (.0004)

Notes: OLS regressions with bootstrapped standard errors in parentheses. Unobservables are clustered at the homestead level. All regressions include age at death and age at death squared. For ease of computation, 5 observations were omitted because at age death was unknown.

**Table 8. Testing Predictions of the Model**

	Dependent Variable:		Ratio:
	Total spending on funeral (1')	Indicator: =1 if borrowed money for the funeral (4')	coefficient from (1')/(4')
Indicator: female	-551.55 (102.831)	-0.034 (0.015)	16019.66
Indicator: relationship to head of household is 'other'	-809.79 (104.868)	-0.039 (0.016)	20509.65
<i>Chi-square test:</i> X <sub>1</sub> coefficients ( <i>p</i> -value)			0.00 (0.994)
Household assets	289.72 (22.002)	-0.006 (0.002)	-44688.79
Indicator: funeral policy paid money	1351.81 (113.933)	-0.106 (0.018)	-12750.61
AIDS death	-747.45 (207.215)	0.066 (0.017)	-11410.32
<i>Chi-square test:</i> X <sub>2</sub> coefficients ( <i>p</i> -value)			0.07 (0.966)
Estimate of Gamma			0.557
Number of observations	3461	3381	

Notes: OLS regressions with bootstrapped standard errors in parentheses. Unobservables are clustered at the homestead level. All regressions include age at death and age at death squared. For ease of computation, 5 observations were omitted because at age death was unknown.



**Table 9. Maximum Likelihood Estimates**

	coefficient (standard error)	z-score
$\beta_1$ : Individual characteristics		
Female	-618.35 (104.59)	5.91
Indicator: relation to head is 'other'	-1340.15 (112.11)	11.95
$\beta_2$ : Predictors of household income		
Household assets	802.90 (204.29)	3.98
AIDS death	-2121.55 (605.58)	3.54
Indicator: funeral policy paid money	5579.84 (1412.85)	4.00
$\gamma$ : Fraction of household income to be used for the funeral	0.342 (0.086)	4.04
Number of observations	3381	

Notes: Unobservables are clustered at the homestead level.