**Title of paper:**
Examining the impact of orphanhood on school leaving among children aged 6-19 in Rwanda and Zambia

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**Introduction:** Family dynamics and family structure theory suggest that familial upheaval and disruption increase the probability that youth will engage in various risky behaviors. Change in family structure and time spent in non-intact families has been associated in the United States and some developing country settings with such negative behavioral outcomes as alcohol use, drug use, sexual intercourse, premarital pregnancy, and school dropout (Wu and Martinson, 1993; Wojtkiewicz, 1993; Florenzano, 1997; Roizblatt et al, 1997; Murray, 2001). Despite these results, research on the impact of orphanhood on educational outcomes among children conducted thus far have been contradictory. Some studies suggest that orphanhood status put children at higher risk of dropping out of school, whereas other studies point to poverty or overall low national school enrollment as the primary determinant of adverse educational outcomes among children, rather than the death of a parent.

This study investigates whether changes in family structure, specifically the transition into single or double orphanhood put children and adolescents aged 6-19 at a higher risk of dropping out of school in Rwanda and Zambia.

**Literature review: School enrollment and orphanhood**

Several small studies (Kamali et al. 1996; Muller and Abbas 1990; , Nyambedha Wandibba and Aagaard-Hansen 2001; Konde-Lule et al. 1996) have found that orphans, relative to non-orphans are less likely to be currently attending school.

Case and colleagues (Case, Paxson and Ableidinger, 2003) used DHS data from 10 countries in Sub-Saharan Africa to examine the impact of orphanhood on school enrollment and found that orphans are significantly less likely than non-orphans to be enrolled in school. Non-enrollment of orphans is not explained by poverty but by relationship (i.e. closeness) of the orphan to the head of household. The authors conclude that the study results are consistent with Hamilton's rule which posits that altruistic behavior between any two individuals depends upon the degree of genetic relatedness between them. Investments in children thus would decrease as the relationship between the child and the guardian adult becomes more distant.

Bicego and his colleagues (Bicego, Rutstein and Johnson, 2003) found that an orphan is less likely to be at his/her proper educational level than a child who has both parents living. The effect is stronger at younger ages (ages 6-10) than older ages (11-14). Furthermore, double orphans are less likely to be at their proper level than single orphans. For single orphans, a mother's death causes more deterioration in education at the primary school ages, as compared to a father's death. The authors indicate that more data and research would be required to understand the issues regarding decisions to educate or not educate an orphan child.

Despite these results indicating substantial educational disadvantage accruing to children who have at least one deceased parent, two larger studies (Ainsworth and Filmer, 2002; Deininger, Garcia and Subbarao, 2001) found that poverty, rather than orphan status, was the primary determinant of school attendance. In the Ainsworth and Filmer study, which is based on data from 28 countries, the relationship between orphanhood and school attendance was inconsistent, and dependent on the overall enrollment rate in the country. Only countries with low or moderate rates of enrollment found underenrollment of orphans relative to non-orphans. Deininger and his colleagues also suggest that national educational policies can impact on school attendance rates for OVC. Their study examined education and health outcomes among orphans in Uganda and found that OVC were not discriminated against in terms of school enrollments in settings where sectoral policies were adequate but faced discrimination where policies were inadequate.

The aforementioned studies conducted thus far have been based on analysis of cross-sectional data which is usually unable to ensure that orphanhood has preceded the outcome event of interest. Our data which include detailed information on which parent(s) are deceased, and the age of the child at the loss of his or her parent, as well as detailed information on when the child began and ended their schooling allow us to model the effects of orphanhood on school-leaving.

**Hypothesis:**

Based on the literature on family structure and on some of the literature on educational outcomes and orphans, our primary hypothesis is that orphanhood increases the probability that the child will drop out of school in the year of the occurrence, or in years following the death of a parent, when compared to non-orphans of the same age.

**Data:**

The USAID-funded Community REACH project, in collaboration with Project Concern International Zambia (PCIZ) and CARE Rwanda, collected data on exposure to interventions targeting orphans, and on a variety of health, psychosocial, economic, and educational outcomes among children and adolescents aged 6-19. Data was collected in peri-urban Lusaka, Zambia and in rural Gitarama province, Rwanda. Baseline data was collected in June-September 2003.

Information related to education that was included in the questionnaire include: a) Ever attended school, b) Current school attendance, c) Age of child when attending grade/level, d) Highest grade or level attended, e) Age at which child stopped attending school, and f) Primary reason for school discontinuation. The data also include information regarding the survival status of both parents and the year of death for those parents who have died

In Zambia, 2,470 children and adolescents aged 6-19 were interviewed. In Rwanda, 2,797 children and adolescents aged 6-19 were interviewed.

**Research methods:**

We will examine our data using a discrete time hazard model, which can address the fact that our data are censored (not all children and adolescents have yet dropped out of or completed school) and dichotomous (in-school) for each year of the respondents' lives. In addition, because the hazard for our outcome variable of interest varies with time (over the life of the child or adolescent) and a pooled hazard model makes no assumption about the shape of the underlying hazard, this model is the most flexible. The multivariate model constructed for this research also includes time-varying covariates related to the family structure of the child or adolescent (parents living or dead as well as years since death of parent), and in the pooled logistic regression approach, the construction of time varying covariates is straight-forward and the computation of the model quite efficient. Finally, many of the independent variables have hazard rates which are not proportional over time, which precludes the use of the Cox Proportional Hazards Model (Collett, 1994).

Time is defined in one year intervals due to the nature of the data: The model is:

$$\text{Log } (P(t)/(1-P(t))=a(t) + b_1x_1 +b2(t)x_2(t)$$

Where P (t) is the probability that an individual experiences the behavior (school leaving) at time t, given that he or she is at risk at time t-1; a(t) represents the effect of exposure to risk (time); $x_1$ is a vector of time invariant predictors and $x_2(t)$ is a vector of time-varying covariates (Allison, 1984).

**Results:**

As seen in Table 1, socio-economic status, relationship to caregiver, and orphan status are significant predictors of school leaving. Odds ratios for the socioeconomic status variables are in the expected direction with Zambian girls in households with lower socioeconomic status are approximately 65% more likely to drop out of school than Zambian girls from middle income households. Similarly, Rwandan girls and Zambian boys in higher income households are 40% and 60% less likely to leave school compared to children in middle income households. In Rwanda, relationship to caregiver is an important predictor, as girls heading households are 135% more likely to leave school than girls living with a parent. Orphan status is an important predictor in both countries.

Rwandan girls and boys who are single orphans are 50% and 125% more likely respectively to leave school than children with both parents alive. The odds of leaving school for Rwandan girls, Rwandan boys, and Zambian boys who are double orphans are 66%, 210%, and 180% higher respectively than children with both parents alive.

**Key Findings:**

- Boys who have experienced the death of one, but especially those who have lost both parents, are at significant risk of school leaving, in both countries
- Girls who are orphans seem to be at some risk in Rwanda of school-leaving, but not in Zambia
- Girls who are themselves caretakers of other children are at greater risk of school-leaving in Rwanda
- Higher levels of household income does seem to result in lower odds of boys leaving school, even when controlling for orphanhood status, especially in Zambia. Similarly, low levels of household income put girls and boys at risk for school-leaving, even controlling for orphanhood status.

**Table 1. Final Pooled Logistic Regression Model: School Leaving Odds Ratios for Children Aged 6-19 in Rwanda and Zambia**

| | Rwanda | | Zambia | |
|---|---|---|---|---|
| | Girls | Boys | Girls | Boys |
| **Age**++ | | | | |
| <12 years | .07*** | .09*** | .05*** | .12* |
| 13-14 years *(Ref.)* | 1.00 | 1.00 | 1.00 | 1.00 |
| 15-19 years | 1.15 | .91 | 1.40 | 1.68 |
| **Socio-economic Status** | | | | |
| Poorest two quintiles | 1.19 | .86 | 1.65* | 1.17 |
| Middle two quintiles *(Ref.)* | 1.00 | 1.00 | 1.00 | 1.00 |
| Richest quintile | .62+ | .73 | .80 | .38* |
| **Relationship to Caregiver** | | | | |
| Self | 2.35** | 1.20 | NA | NA |
| Son/daughter *(Ref.)* | 1.00 | 1.00 | 1.00 | 1.00 |
| Grandchild | NA | NA | .67 | .89 |
| Other relative/not related | .74 | .59+ | 1.42 | .87 |
| **Orphan Status**++ | | | | |
| Single orphan | 1.53+ | 2.26*** | 1.19 | 1.52 |
| Both parents alive *(Ref.)* | 1.00 | 1.00 | 1.00 | 1.00 |
| Double orphan | 1.66+ | 3.11*** | .86 | 2.84** |
| **Household Size** | | | | |
| 1-3 people | 1.23 | 1.36 | .96 | 1.27 |
| 4-5 people *(Ref.)* | 1.00 | 1.00 | 1.00 | 1.00 |
| 6 or more people | .95 | .93 | .88 | .68 |

+ $p \leq .10$ * $p \leq .05$ ** $p \leq .01$ *** $p \leq .001$; ++ timevarying covariate