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Evaluating the Impact of Community-Based Interventions on Schooling Outcomes among Orphans And Vulnerable Children in Lusaka, Zambia

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EVALUATING THE IMPACT OF COMMUNITY-BASED INTERVENTIONS ON SCHOOLING OUTCOMES AMONG ORPHANS AND VULNERABLE CHILDREN IN LUSAKA, ZAMBIA

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Abstract

In sub-Saharan Africa, an estimated 12 million children under the age of 18 have lost a parent to AIDS. Despite this situation, the evidence regarding effectiveness of interventions targeting these children remains scant. This paper contributes to the literature by evaluating the impact of a community-based program implemented by a Zambian nongovernmental agency (NGO) on educational outcomes among orphans and vulnerable children (OVC) in Lusaka, Zambia. These outcomes included school enrollment and being at the correct age-for-grade. Our study design included two rounds of post-intervention data collection, in 2003 and 2006. There were 2,302 children, ages 6-19, interviewed in 2003; and 3,105 children or young adults, ages 8-22, interviewed in 2006. We used a sub-sample of 2,922 orphans and vulnerable children, ages 8-19. The effectiveness of Bwafwano Community Home-Based Care Organization, an NGO working in Lusaka, was evaluated, first using the individual cross-sectional samples and then using a differences-in-differences model on the pooled sample. Both cross-sectional analyses found positive and statistically significant effects of the intervention on school enrollment, with marginal effects of 0.104 and 0.168 respectively. The differences-in-differences estimates for school enrollment were positive, but small and not statistically significant. For the estimations of the effects of Bwafwano on the outcome of appropriate age-for-grade, only the difference-in-difference models showed positive program effect, with participation in the program being associated with a 15.7 percentage point increase in appropriate age-for-grade for intervention children, relative to control children. This study suggests that the Bwafwano program is a promising approach to improving educational outcomes among orphans and vulnerable children in urban Zambia.

Introduction

In sub-Saharan Africa, an estimated 12 million children under the age of 18 have lost one or both parents to AIDS (Joint United Nations Programme on HIV/AIDS, United Nations Children's Fund, & U.S. Agency for International Development, 2004). Many more children live with a chronically ill parent. Despite recognition of the magnitude and significant consequences of this problem, and increasing resources devoted to these children, few evidence-based answers are available to such a basic question as "what interventions are most effective in improving the well-being of children?" Because of this lack of evidence, donors, policy-makers, and program managers often have been forced to make decisions regarding the allocation of scarce resources for orphans, children with chronically ill parents, and other children affected by HIV/AIDS, with little proof about what types of interventions are most effective in helping them.

Given the lack of information and the scale of the problem, there is a pressing need to learn more about how to improve the effectiveness of these efforts. This impact evaluation of a community-based program on the educational outcomes of orphans and vulnerable (OVC) children in Zambia will help to provide information to fill some of the gaps in the literature.[1]

To date, there have been only three rigorous impact evaluations of the effectiveness of interventions for OVC. These quasi-experimental studies were conducted in Rwanda, Uganda, and Zimbabwe, and provide evidence that community-based interventions have demonstrated improvements in key outcomes. The pre-post study in Rwanda (Brown, Rice, Boris, Thurman, Snider, Ntaganira, et al., 2007) tracked improvements in key

psychosocial outcomes over time, such as perceived adult support, feelings of marginalization and depression, and found that the intervention was associated with improvements in these outcomes. The pre-post study in Uganda (Horizons, Makerere University, & Plan/Uganda, 2004) found that the intervention was associated with parents appointing successor guardians, will-writing, and parental HIV status disclosure. The retrospective post-intervention study in Zimbabwe (Gilborn, Apicella, Brakarsh, Dube, Jemison, Kluckow, et al., 2006) found positive cross-sectional associations between prior program participation and current self-confidence among males.

With regard to education, several important studies have documented that OVC are disadvantaged when compared to non-OVC for educational outcomes. For instance, orphans have been found to be less likely to be currently attending school than non-orphans (Kamali, Seeley, Nunn, Kengeya-Kayondo, Ruberantwari, & Mulder, 1996; Muller & Abbas, 1990; Nyambedha, Wandibba & Aagaard-Hansen, 2001; Konde-Lule Sewankambo, Wawer, & Sengonzi, 1996; Case, Paxson & Ableidinger, 2003). Nyamukapa and Gregson (2004) found that orphans were less likely to complete primary school than non-orphans, and that maternal orphans were less likely to complete primary school than were paternal or double orphans. While many of these studies are small, Case et al. (2003) used Demographic Health Survey (DHS) data from 10 sub-Saharan African countries and found that orphans are significantly less likely than non-orphans to be enrolled in school. Bicego, Rutstein, and Johnson (2003) found that orphans enrolled in school are less likely to be at a proper educational level than are children with both parents living. The effects are particularly strong for double orphans (i.e., those who have lost both parents). In addition, the authors found that the orphanhood effect is

stronger for children under 10 than for those ages 11 to 14. Finally, they found maternal orphans to be less likely to be at a proper educational level at primary school ages than paternal orphans.

While there has been research comparing educational outcomes between orphans and non-orphans, none of these studies focused on the impact of interventions on educational outcomes among OVC. In an attempt to fill this knowledge gap, we designed an evaluation of an integrated community-based program for orphans and vulnerable children ages 8-19 that was implemented by the Bwafwano Community Home-Based Care Organization (hereafter referred to as Bwafwano), a local Zambian NGO, in peri-urban Lusaka, Zambia.

In this paper, we examine whether the Bwafwano program has improved the ability of OVC to attend school and progress more successfully through the educational system, compared with OVC who have not received the benefits of the intervention package. In the analyses presented here we focus on two educational outcomes: 1) in school status and 2) correct age for grade. The authors hypothesized that the program would result in improvements in the proportion of children in-school in the short run since this outcome is potentially more sensitive to the interventions whereas influencing the proportion of children at the correct age for grade will require more time.

This paper explores two research questions:

1. Does exposure to the interventions over the short-run (1-2 years) result in intervention children being more likely to be in school at the time of the interview than children who are not exposed to the intervention?

2. Does increased exposure to interventions over a longer time period (three or more years) make intervention children more likely to be at or younger than the correct age for grade than children not exposed to the intervention?

Education in Zambia

Primary education in Zambia consists of grades 1-7. The normal age to start school in Zambia is 7 years of age for grade 1, and grade 7 of primary should be completed by age 13 (United Nations Educational, Scientific and Cultural Organization, 2000). Secondary school consists of grades 8-12, and the appropriate age group is considered to be 14-18 years of age. The Zambia DHS Ed Data (ZDES) 2002 (Central Statistical Office [Zambia] & ORC Macro, 2003) measure children's school attendance by using the net attendance ratio (NAR). The NAR indicates participation in schooling among those of official school age. In terms of determining age-for-grade, students are considered to be on time if they are at, or are one year older than, the official age for the grade; over-age if they are two or more years older; and under-age if they are one or more years younger (Central Statistical Office [Zambia] & ORC Macro, 2003).

There are minimal differences between the net attendance ratios between boys and girls in Zambia, and participation rates are generally higher in Lusaka province than the national level. According to the Zambia DHS Ed Data Survey (ZDES) 2002 (Central Statistical Office [Zambia] & ORC Macro, 2003), the primary school NAR in Lusaka province was 74.3 percent and 76.0 percent for boys and girls respectively, whereas at the national level these ratios were 67.2 percent and 66.9 percent. The secondary school attendance ratios for boys and girls in Lusaka province was 28.9 percent and 25.1 percent and were 20.6 percent and 22.5 percent at the national level. Much higher proportions of

boys are over age for grade than girls in Zambia. The ZDES 2002 data show that 51.3 percent of male primary school students and 39.9 percent of female primary school students were over-age for grade at the national level (Central Statistical Office [Zambia] & ORC Macro, 2003).

There are five types of primary schools in Zambia: government, grant-aided, community, private, religious, and private non-religious schools. These five types often are grouped into three categories: (1) government, (2) government-assisted, and (3) private. Government schools are run by the government and receive government funding. Government-assisted schools receive some support from the government, and include grant-aided and community schools. Private schools — religious and non-religious — do not receive government assistance. The government is the main provider of primary schooling in Zambia, with 87 percent of primary school students attending government schools, 7 percent attending private schools, and 6 percent attending government-assisted schools (Central Statistical Office [Zambia] & ORC Macro, 2003).

While only a small proportion of students in Zambia attend community schools, these schools are important in the context of improving educational outcomes of OVC, since community schools have been geared to serve disadvantaged children that cannot attend a government school. Community schools in Zambia are grass-roots organizations that may condense the standard seven-year government primary school curriculum into four years, typically charge lower fees than government schools, and do not require the students to wear uniforms. These schools are typically run by NGOs, churches, or community members. Such schools provide a more flexible approach to education, as timetables, days, and terms of activity can be adjusted to local needs. The teachers at

community schools are volunteers. These schools originally were started to allow children who had missed out on their basic schooling, particularly orphans, to catch up with the government curriculum by the end of grade 7. Therefore, children entering community schools generally have been older than their counterparts at government schools (Landis, 2003). Community schools are becoming popular in other countries affected by AIDS, such as Uganda, Malawi, and Mali (Drake, Maier, Jukes, Patrikios, Bundy, Gardner, et al., 2002).

Description of Bwafwano's Interventions

At the time of the beginning of the program funded by the Community REACH program in 2002, Bwafwano was working in the Chipata catchment area in peri-urban Lusaka. Project Concern International (PCI) Zambia was providing a wide range of technical assistance to Bwafwano. As in many parts of Zambia, HIV prevalence is high, and there are large numbers of orphaned children. Bwafwano serves both adults and children affected by HIV and AIDS. The Bwafwano program is one of the most comprehensive of its kind. The organization provides services to children and adults through two primary mechanisms: (1) home-based caregivers, and (2) the Bwafwano community center. The center includes a community school with a school feeding program, a health clinic offering free services to beneficiaries, and a child psychologist that provides counseling.

Services for chronically ill adults include home-based care and free clinic services. Bwafwano's interventions for children, the focus of this study, include services related to education, health, HIV prevention, psychosocial support, and nutrition. Several of

Bwafwano's child interventions are delivered at the Bwafwano Community Center, such as enrollment in the community school with provision of meals, clinic services, HIV/AIDS prevention education, and psychological counseling. Bwafwano home-based caregivers provide basic material assistance, health education, help with household chores, ongoing psychosocial support, and referrals through regular visits. Other interventions include provision of school supplies, payment of fees to attend government schools, and food rations for some families. Child beneficiaries may receive any combination of these services. In particular, Bwafwano focused on enrolling all intervention children in the Bwafwano community school or provided supplies for children so that they could attend government school, if the children were not already enrolled in school when they became Bwafwano beneficiaries.

Bwafwano's target population for the child-based interventions includes orphans, children with chronically ill parents or guardians, and children who may be needy for other reasons. Bwafwano selects child beneficiaries for its program through four referral sources: (1) home-based caregivers (HBC) who encounter children during home visits to chronically ill adults, (2) community OVC committees, (3) Bwafwano clinic visits by children and/or adults, and (4) self-referrals. The clinic visits were the most commonly used referral mechanism.

Non-Bwafwano beneficiaries may obtain services from the Bwafwano clinic, but are required to pay a fee. Non-beneficiaries do not, however, have access to any other Bwafwano services.

Data and Methods

The purpose of this study is to evaluate the effectiveness of Bwafwano's interventions in improving educational outcomes. The study design involved measurement of school outcomes for intervention households relative to a set of comparison households across time. Intervention households were selected from Bwafwano's registry, while comparison households were identified through the "nearest neighbor" approach. This approach entails obtaining comparison households by selecting the nearest household with children 6-19 to each intervention household. From an evaluation perspective, random assignment of a subset of OVC to receive interventions would have been the ideal study design, as it reduces the potential confounding effects of observable and unobservable differences between intervention and control groups (Moffitt, 1991; Heckman, 1991). However, such a design was not practical in this case. Even so, the quasi-experimental nearest-neighbor approach used here has the advantage that the comparison group is likely to include children with socio-demographic characteristics similar to those in the intervention group.[2]

There was no screen used with the nearest neighbor approach to specifically identify OVC in these households. For this reason, many children in the comparison households were not appropriate controls for the intervention children. Thus, for the analyses presented here we have included only orphans and children with chronically ill parents or guardians in both groups.

Our study design included two rounds of post-intervention data collection. Due to delays in funding for the phase 1 data collection and existing program support, the program intervention for an array of services had been underway for 12 months at the

time of the first data collection. Some services, such as home-based care, were nascent, whereas other interventions, such as the community school, appeared to be well underway. For example, the analysis of intervention exposure data from the first round of data collection indicated that only 15.1 percent (62) of the 396 primary parent/guardians in the intervention group interviewed reported having had a Bwafwano home-based caregiver and only 41.9 percent (26) of these primary parent/guardians reported seeing their Bwafwano HBC at least once a month. Thus, it appears that exposure to the home-based care interventions was minimal prior to phase 1 data collection. However, a large proportion of intervention group children ages 6-19 reported that they were in school at the time of the phase 1 survey. The phase 1 survey instrument did not contain questions regarding the type of school attended; however, it is likely that a majority of the intervention children were enrolled in the Bwafwano community school. Thus, their exposure to educational interventions prior to the phase 1 survey likely was substantial.

Due to the exposure to interventions prior to the first round of data collection, we examined differences between groups in point estimates of educational outcomes at the first round of data collection to assess the impact of the intervention over the short-run. We assessed differences between groups at the second round of data collection to determine longer term impact of the intervention. Using the pooled data (both rounds of data collection), we examined changes in outcomes across time (from 2003 to 2006) for the intervention versus comparison group to see if increased exposure to the interventions led to improvements in our educational outcomes over the long run.

PCI Zambia trained interviewers specifically for this study. These interviewers administered face-to-face surveys at the household level for two rounds of data collection. Phase 1 data collection took place in July-August 2003, and phase 2 data collection was conducted in March-May 2006. The research protocols and phase 1 survey instruments were approved by a local institutional review board (IRB) in Zambia. Immediately prior to the phase 2 survey, the research protocol and the phase 2 survey instruments were approved again by an IRB in the U.S. and Zambia. The instruments were translated into Bemba and Nyanja in Zambia.

Interviewers were asked to read an informed consent form to the respondent and obtain consent prior to administering the questionnaires. In the event that the interview was upsetting to the child, the interviewer was asked to suspend the interview and make a referral.

The phase 1 sample included 907 primary parents/guardians and 2,302 children ages 6-19 from 754 households. During the phase 2 data collection, efforts were made to re-interview the same children, and the team was successful in re-interviewing 65 percent of the phase 1 child respondents.[3] New intervention and comparison children were also interviewed. There were 1,193 primary parent/guardians and 3,105 children and young people ages 8-22 interviewed from 1,185 households. Households had multiple children and, in a few cases, multiple primary parent/guardians. Each household surveyed had at least one child between the ages of 6 to 22 (data not shown).

The household characteristics and socio-demographic profile modules were modeled after the Zambia DHS so that the study sample could be compared to a nationally representative sample of the Zambian population. The education module of the survey

instruments was modeled after the Zambia DHS education module. This section of the questionnaire included questions such as whether the child had ever attended school, why the child dropped out of school, at what age had the child started school, whether the child was currently in school, at what age the child stopped attending school, why the child dropped out of school, and the highest grade attended. At phase 2, questions related to type of school attended (government, Bwafwano community school, or other), school attendance, and class rank were included. These questions were asked of the primary parents/guardians of children under 13 years of age and directly to adolescents ages 13 and over.

An OVC sub-sample was created for the analyses, so that children with similar levels of vulnerability could be compared with one another and could be analyzed to answer our research questions. The criterion used to select children for the OVC sub-sample were: (1) mother or father dead, (2) mother or father chronically ill, or (3) primary parent/guardian or partner of primary parent/guardian chronically ill. We restricted the age range of the OVC sub-sample to 8- to 19-year-olds, so that the age ranges for the phase 1 and phase 2 samples were the same.

As shown in Table 1, the OVC sub-sample included 2,922 children ages 8-19.[4] Nearly 70 percent of the phase 1 sample of 1,242 OVC represented children who were exposed to the intervention at the first (phase 1) round of data collection, with some 30 percent of that number serving as the comparison group.[5] For the phase 2 data collection, the proportions of OVC in the intervention versus the comparison group remained essentially the same, although more OVC were interviewed in each of these two groups

in phase 2. Thus, of the overall sample of 2,922, phase 2 represented nearly 60 percent of the total (57.5%), while phase 1 data represented 42.5%.[6]

Table 2 shows the distribution of key socio-demographic characteristics for both the intervention and comparison groups by phase of data collection.[7] For both phases of data collection, the children from intervention households had a significantly different distribution across the wealth index when compared to children from comparison households, with the former clustering more in the bottom two quintiles (42.9% versus 37.3 % at phase 2).[8] [9]

The intervention primary parents/guardians were significantly more likely to be older than those in the comparison group at both phases of data collection, with more than a quarter of parents and guardians reporting to be 50 years of age or older in the intervention group in phase 1, compared to just 17.6 percent of the comparison group.

Parents/guardians were quite different across groups in terms of their union status. Less than one-third of the intervention group parents/guardians reported being in union, as opposed to nearly two-thirds of those in the comparison group in phase 1. Nearly 58 percent of the intervention parents/guardians reported to be widowed, as compared to just 27 percent of the comparison group in phase 1. These differences in union status persisted in phase 2 of the data collection. There were no significant differences in the level of education for the primary parent/guardian in the intervention groups when compared to the comparison group for either phase.

To get an idea of how the primary parent/guardian respondents in our sample (who were 97% female) compare to a nationally representative sample, we can compare the characteristics of the primary parent/guardians in our sample with the Zambia DHS

(2001-2002) female survey respondents (data not shown). In terms of age, in the DHS female sample, 45.4 percent of the sample consists of 15-24 year olds, whereas 54.7 percent are aged 25-49. Our sample consists of approximately 6 percent 15-24 year olds, 68 percent 25-29 year olds, and approximately one quarter of the sample is aged 50 and older. Almost one quarter of the DHS female respondents reported never being married compared with under 5 percent of our sample. The DHS female sample respondents are also more likely to be married (61.3 percent) in contrast to under 40 percent of primary parent/guardians in our sample. While only about 5 percent of the national sample is widowed, approximately half of our sample is widowed. This is to be expected given that our sample includes beneficiaries of a program for people living with HIV/AIDS (PLWHA) and orphans. In terms of education, our sample is almost identical to that of the DHS in the proportion who have attained only a primary education (58 percent). However, approximately one quarter of the respondents in our sample have had no formal education compared with 12.1 percent of the national sample. (Central Statistical Office [Zambia], Central Board of Health, Lusaka, Zambia, & ORC Macro, 2003).

Child characteristics analyzed for differences between the intervention and comparison samples included the sex and age of the respondent, as well as the category or type of orphan or vulnerable child into which the respondent could be classified. In phase 1, there were no significant differences in the sex of the respondents, although the intervention group of children was split a bit more evenly between genders than the comparison group (with boys representing slightly less than half of all respondents — 45 percent — and girls slightly more, at 54.9 percent). However, at the phase 2 data collection, there was a more significant difference in the division of the sexes across

intervention and comparison groups (at the $p<.05$ level). In phase 2, more than half (51.5 percent) of respondents in the intervention group were boys, compared to only 45.3 percent of the comparison group, while 48.5 percent of the intervention group were girls, compared to nearly 55 percent of the comparison group. Nevertheless, child characteristics such as age and sex would not have been influenced by the intervention.

The intervention group was much younger than the comparison group at the initial phase 1 measurement. At phase 1, 57 percent of the intervention group was in the 8-12 years of age category, as opposed to just 35.2 percent of the comparison group. At phase 2, both the intervention and comparison groups were nearly evenly divided across the two age groups.

In terms of orphan status, the comparison group was much more likely than the intervention group to contain "vulnerable children" (non-orphans with a chronically ill parent) than the intervention group. While the intervention and comparison groups were similar in both phases in terms of the proportions of double orphans (approximately one-quarter of all respondents were double orphans across groups and phases of data collection), the proportions of paternal and maternal orphans and non-orphans varied significantly across intervention and comparison groups in both phases.[10]

Bivariate Analyses

Bivariate analyses were then conducted for educational outcomes by sex, phase, and group to assess whether there were significant differences within the intervention and comparison groups between phase 1 and phase 2. The educational outcomes examined included: (1) whether the child was currently in school, (2) primary school net attendance ratio for children ages 8-13, (3) secondary school net attendance ratio for adolescents

ages 14-19, (4) whether the child was currently under-age, on time, or over-age for grade among those children who currently were in primary school, and (5) whether the child was currently under-age, on time, or over-age for grade among those children who currently were in secondary school .[11]

Multivariate Analyses

The effectiveness of Bwafwano was examined in relation to two binary educational outcomes for children — being enrolled in school and being the appropriate age-for-grade, both modeled as probits. To address issues of non-random selection of Bwafwano participants, we included a set of socio-demographic control variables to control for observed differences between participants and non-participants. We also controlled and tested for the importance of common unobservable factors affecting participation in Bwafwano and schooling outcomes using bivariate probit models that treated Bwafwano as a potentially endogenous explanatory variable in the school outcome equations.

We focused first on the individual cross-sectional samples (2003 and 2006) and then, using a difference-in-differences model, on the pooled 2003-2006 sample.[12] The objective of the estimation with the 2003 cross-sectional sample was to measure the short-term effects of Bwafwano after the program had been running for approximately 12 months. The 2006 cross-sectional estimations, in contrast, allowed us to measure the longer run effects after approximately four years of exposure to Bwafwano. However, we were concerned that, in the absence of a "true" pre-intervention baseline measurement, these cross-sectional measures of program effect might reflect pre-existing differences in outcomes and characteristics of intervention and control children, rather than the effects

of the program per se. As an alternative measure of program effect, the difference-in-differences estimator with the pooled 2003 and 2006 samples calculated the change in average outcomes over this period for intervention children relative to control children. Depending upon when the bulk of the program effect, if any, occurred — either prior to measurement in 2003 or during the interval between 2003 and 2006 — the cross-sectional estimations and the difference-in-differences estimations may provide very different assessments of program effectiveness. Absent a true baseline, however, there is no way of knowing for sure which measure is the more accurate. Therefore, both sets of results are presented here.

Both current school enrollment and appropriate age-for-grade were hypothesized to be influenced by a set of theoretically important control variables, including the program participation variable. These control variables included wealth status of and language used in the household; education level and age of primary parent/guardian; and child's age, sex, and orphanhood status. As a test of this assumption, we estimated bivariate probit models that included participation in Bwafwano as an endogenous variable in the equations for current school enrollment and for appropriate age-for-grade. In all cases, we failed to reject the null hypothesis that ρ (the covariance between the error terms in the Bwafwano equation and the school outcome equation) was equal to zero. We therefore concluded that Bwafwano was exogenous and estimated single-equation probit models for the school outcomes.

The difference-in-differences estimations contained all of the same control variables as the cross-sectional estimations, but also included a dummy variable for phase (year 2006 = 1; 0 otherwise) and the phase dummy variable interacted with the Bwafwano

program participation variable. As noted above, this model estimates the change from phase 1 to phase 2 in the likelihood of the outcome (e.g., current school enrollment or appropriate age-for-grade) for the intervention group relative to the comparison group, again controlling for the observed characteristics of both groups (Cameron & Trivedi, 2005). In this model, the marginal effect is calculated from the coefficient on the interaction term for the program participation and phase variables.

As the coefficients from the probit model have no direct interpretation, marginal effects were calculated using the *mfx* command in Stata 10.0. Further, because the selection process involved interviewing multiple children within selected households, we controlled for household-level clustering using the linearized variance estimators with the Stata 10.0 *svy* commands.

For the purpose of the multivariate analyses, being at appropriate age-for-grade was defined as being "under-age" or "on time" per the definitions used for the bivariate analyses and in the Zambia Ed Data Report (Central Statistical Office [Zambia] & ORC Macro, 2003).

Results

Bivariate Results

Table 3 presents the results from the bivariate analyses of whether children are currently in school, the primary and secondary net attendance ratios, and whether children are at the correct age for grade in primary and secondary school disaggregated by sex. Overall, higher proportions of intervention children ages 8-13 and 14-19 are in-school at both phase 1 and phase 2, and these results are statistically significant for 8-13 boys and girls for both phases and for girls ages 14-19 for phase 2. We find that a much

lower proportion of intervention phase 1 females and all phase 2 females ages 14-19 are in school compared with boys.

In examining the primary school net attendance ratio, we find significant differences between the groups for both sexes during both phases, with higher proportions of intervention children in school. We find that, in general, higher proportions of boys and girls ages 8-13 are enrolled in primary school (82.1 percent and 81.8 percent, respectively — not shown) compared with the Lusaka province sample from the EdData report (74.3 percent and 76.0 percent) (Central Statistical Office [Zambia] & ORC Macro, 2003). For the secondary school net attendance ratio for 14-19 year olds, lower proportions of intervention adolescents are in secondary school during phase 1, but these differences are not statistically significant. The overall total proportion of boys and girls ages 14-19 in secondary school (24.5 percent and 23.2 percent respectively — not shown) in our sample is comparable to the Lusaka province sample (28.9 percent and 25.1 percent) (Central Statistical Office [Zambia] & ORC Macro, 2003).

While larger proportions of intervention children are in school, lower proportions of intervention children who are in primary school are at the correct age for grade or better than comparison children in primary school. However, these differences are not statistically significant. Our sample is quite comparable to the national sample in this regard as 51.1 percent and 43.3 percent (not shown) of boys and girls, respectively, are over age for grade in primary school in our sample compared with 51.3 percent and 39.9 percent of the children in national Zambia EdData sample (Central Statistical Office [Zambia] & ORC Macro, 2003). Similar to the national sample, we find that much larger proportions of boys are over age for grade than girls in primary school. There are almost

no differences between the intervention and comparison in the proportion of secondary school students ages 14-19 at the correct age for grade or better. However, in phase 2 we find that a much larger proportion of boys are over age for grade than girls.

Multivariate Results

Table 4 presents the program effects for Bwafwano on the outcomes of current school enrollment and appropriate age-for-grade using: (1) the 2003 cross-sectional sample, (2) the 2006 cross-sectional sample, and (3) the pooled sample with the difference-in-differences estimator. We present only the simple probit models here. While we did test for endogeneity of program participation (sgroup) using bivariate probit, in none of these cases, was rho statistically different from 0.

Looking first at the results for current school enrollment, the cross-sectional analyses all found positive and statistically significant effects of Bwafwano participation on current school enrollment. For example, the predicted probability of being enrolled in school was 0.764 for a Bwafwano child, relative to 0.660 for a non-Bwafwano child (marginal effect = .104, Z=2.93). In 2006, the effect was slightly larger; the predicted probability of enrollment was 0.819 for a Bwafwano child, relative to 0.651 for a non-Bwafwano child (marginal effect =.168, Z=5.21).

The difference-in-differences estimates also found positive effects of the Bwafwano program, but the estimates were substantially smaller and of a lower level of statistical significance. In this case, the measure of program effect was 0.059 (or 5.9 percentage points) (Z=1.66). The absence of statistical significance is perhaps unsurprising, given the small magnitude of change in the unadjusted probabilities of being in school for the treatment versus the comparison group (absent any controls). For example, from 2003 to

2006, school enrollment for children in the treatment group increased from 75.5 percent to 79.4 percent. For the comparison group, school enrollment increased by just slightly less — from 60.3 percent in phase 1 to 62.9 percent in phase 2.

For the estimations of the effects of Bwafwano on the outcome of appropriate age-for-grade, only the difference-in-differences models showed positive program effects. In this case, participation in Bwafwano was associated with a 15.8 percentage point increase (Z=2.90) in appropriate age-for-grade for intervention children, relative to control children. The cross-sectional estimations found that the Bwafwano program was negatively associated with appropriate age-for-grade, though this association was statistically significant only in 2003. This is clearly not a valid causal conclusion, and reflects the fact that program children were less likely to be at appropriate age-for-grade in both 2003 and 2006, even though they made larger gains during the period between the two surveys.

Discussion

Because of the absence of a true baseline measurement, the choice of which estimates of the program effects are most accurate for the in-school analyses is made somewhat difficult. The cross-sectional estimates for 2003 may *overstate* program effects if the true differences in enrollment are due to pre-existing differences between intervention and control children, i.e. intervention children were already more likely to be in school than comparison children even prior to the intervention. In contrast, the difference-in-differences estimates may *understate* program effects if most of the program's impact was experienced prior to 2003, rather than in the period 2003 to 2006.

In any case, the differences-in-differences analyses strongly suggest that increased exposure to the Bwafwano program was successful in increasing the proportion of intervention children that were either under-age or on time in terms of age-for-grade between 2003 and 2006 although again, the effect may be understated.

Limitations

While there is much to learn from this study, there are some important limitations. The most obvious one is the lack of a pre-intervention baseline measurement. The comparison group for the OVC sub-sample was relatively small, particularly in relation to the intervention group in the OVC sub-sample thus limiting the power and reducing the minimum detectable difference.

The children in the intervention group were not randomly assigned to the intervention. Thus, we do not know if there are unobserved differences between the intervention and comparison group. However, since there are observed differences between the two groups, it is likely that there are also unobserved differences. The bivariate probit estimations (not presented) would seem to indicate that the influence of non-random selection into Bwafwano was not an important issue, once we controlled for some of these socio-demographic differences.

Program and Policy Implications

This study contributes to the scant literature on OVC program effectiveness. Our findings suggest that Bwafwano's approach may increase the proportion of orphans and vulnerable children in school and increase the proportion that are at the current age for grade. Since Bwafwano's approach appears promising, it would be ideal if the program

were expanded to a new area, and this new program could be evaluated with a more rigorous study design.

While this study seems to indicate that Bwafwano is effective in improving schooling outcomes, it says nothing about whether the program is a good value; that is, whether it provides the best "bang for the buck" relative to the alternatives. The addition of cost data collection alongside this analysis would help to address the issue of whether Bwafwano is an appropriate use of scarce programmatic resources by allowing for the calculation of the cost-effectiveness of the program. If similar studies of the cost-effectiveness of alternative OVC support programs could also be conducted, policy-makers and planners could develop a repertoire of cost-effective programs and best practices, thereby helping to ensure that funding of OVC programs produces the largest possible impact.

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TABLE 1

NUMBER AND PERCENT OF ORPHANS AND VULNERABLE CHILDREN[a] AGES 8-19 INTERVIEWED, BY EXPOSURE TO INTERVENTION AND BY PHASE OF DATA COLLECTION[b]

	Intervention Group		Comparison Group		Total	
Data Collection Phase	**n**	**%**	**n**	**%**	**n**	**%**
Phase 1 (2003)	867	69.8	375	30.2	1242	42.5
Phase 2 (2006)	1163	69.2	517	30.8	1680	57.5
Total	**2030**	**69.5**	**892**	**30.5**	**2922**	**100**

[a] Orphans are children who have lost at least one parent. Vulnerable children are non-orphans with a chronically ill parent or primary guardian.

[b] In some cases, more than one child was interviewed in the same household and/or had the same primary parent/guardian. Some children were interviewed during phase 1 and again during phase 2.

TABLE 2

DISTRIBUTION (PERCENT) OF SOCIO-DEMOGRAPHIC CHARACTERISTICS OF HOUSEHOLDS, PRIMARY PARENTS/GUARDIANS, AND ORPHANS AND VULNERABLE CHILDREN AGES 8-19, BY EXPOSURE TO INTERVENTION AND BY PHASE OF DATA COLLECTION[a]

	Phase 1 (2003)		Phase 2 (2006)	
Household Level	Intervention	Comparison	Intervention	Comparison
Wealth Index *** both phases				
Poorest quintile	21.9	16.3	21.7	18.0
2nd poorest quintile	24.3	13.9	21.2	19.3
Middle quintile	18.3	19.2	18.9	17.8
2nd wealthiest quintile	17.1	28.0	19.4	20.3
Wealthiest quintile	18.3	22.7	18.8	24.6
Total N	867	375	1163	517
Missing	0	0	0	0
Primary Parent/Guardian Level				
Age of Primary Parent/Guardian ** Phase 1 *** Phase 2				
15 to 24	6.0	8.8	4.0	10.8
25 to 49	68.0	73.6	66.9	67.5
50 and over	26.0	17.6	29.1	21.7
Total N	863	375	1163	517
Missing	4	0	0	0
Marital Status of Primary Parent/Guardian *** Phase 1 and Phase 2				
Never married	1.4	0.0	5.1	5.2
Married/living with partner	29.3	63.5	30.8	50.9
Widowed	57.6	27.5	58.0	39.3
Divorced/separated	11.8	9.1	6.2	4.6
Total N	867	375	1159	515
Missing	0	0	4	2
Highest Level of Education of Primary Parent/Guardian				
None	25.3	21.7	25.9	24.8
Primary	57.5	55.5	58.1	60.7
Secondary or higher	17.3	22.8	16.0	14.5
Total N	863	373	1163	517
Missing	4	2	0	0
Child Level				
Sex * Phase 2				
Male	49.6	45.1	51.5	45.3
Female	50.4	54.9	48.5	54.7
Total	867	375	1163	517
Missing	0	0	0	0
Age *** Phase 1				
8 to 12	57.4	35.2	49.5	51.1
13 to 19	42.6	64.8	50.5	48.9
Total	867	375	1163	517
Missing	0	0	0	0

TABLE 2 (*continued*)

[b]Orphan Status *** Phase 1 and Phase 2				
Maternal orphan	8.5	14.9	8.0	8.1
Paternal orphan	59.3	33.6	61.0	46.6
Double orphan	25.8	23.5	26.3	27.5
Non-orphan (has chronically ill parent or guardian)	6.3	28.0	4.7	17.8
Total N	867	375	1163	517
Missing	0	0	0	0

Notes:

[a] Statistical significance is shown for differences between the intervention and comparison groups, but not for differences within the intervention and comparison groups between phases 1 and 2. Analyses run on child-based file.

[b] Missing values and "don't know" responses for "mother alive" and "father alive" were treated as if the mother was alive and father was alive, respectively. Maternal orphan is defined as child with a dead mother and live father, whereas paternal orphans have a live mother and dead father. Double orphans have lost both parents. Non-orphans in the OVC sub-sample had a chronically ill (sick last three out twelve months or longer) parent or guardian.

* $p \leq .05$

** $p \leq .01$

*** $p \leq .001$

TABLE 3

EDUCATIONAL OUTCOME MEASURES AMONG ORPHANS AND VULNERABLE CHILDREN AGES 8-19 ACROSS GROUP AND PHASE OF DATA COLLECTION

	Phase 1 (2003)		Phase 2 (2006)	
	Intervention	Comparison	Intervention	Comparison
CURRENTLY IN SCHOOL				
8- to 13-year-olds				
Male	83.0*	70.0	91.2***	75.6
Female	86.3***	66.7	90.8***	73.5
14- to 19-year-olds	**		*	**
Male	64.6	53.9	67.3	56.6
Female	48.2	51.0	56.8**	38.5
N	867	375	1163	517
Missing	0	0	0	0
PRIMARY SCHOOL NET ATTENDANCE RATIO				
8- to 13-year-olds				
Male	81.2**	62.3	90.3***	74.8
Female	85.1***	64.4	89.1***	71.7
Total N	536	181	688	301
Missing	47	7	0	0
SECONDARY SCHOOL NET ATTENDANCE RATIO				
14 to 19 year olds				
Male	17.6	25.8	26.8	27.3
Female	19.3	27.8	24.3	22.2
Total N	277	186	475	216
Missing	7	1	0	0
PRIMARY SCHOOL AGE FOR GRADE (8-19 YEAR OLDS)				
Under-age				
Male	1.1	8.2	7.1	7.7
Female	2.2	7.9	11.4	11.6
On time				
Male	38.2	42.5	45.2	49.2
Female	46.9	50.6	47.9	52.2
Over-age				
Male	60.7	49.3	47.7	43.1
Female	50.9	41.6	40.7	36.2
Total n	549	162	793	268
Missing[a]	-	-	-	-
SECONDARY SCHOOL AGE FOR GRADE (8-19 YEAR OLDS)				
Under-age				
Male	4.0	25.0	9.3	10.7
Female	7.4	10.7	19.6	20.7

TABLE 3 (*continued*)

On time				
Male	60.0	39.3	46.7	42.9
Female	55.6	50.0	48.2	55.2
Over-age				
Male	36.0	35.7	44.0	46.4
Female	37.0	39.3	32.1	24.1
Total N	52	56	131	57
Missing[a]	-	-	-	-

Notes:

[a] 62 children who reported being in school are missing information about grade-level. Since we do not know if these children are in primary or secondary school, these missing values cannot be included in the table.

* p≤ .05

** p≤ .01

*** p≤ .001

TABLE 4

PREDICTED PROBABILITY OF OUTCOME,
2003 AND 2006 CROSS-SECTIONS AND
POOLED DIFFERENCE-IN-DIFFERENCES MODEL

	(1) 2003 Cross-Section			(2) 2006 Cross-Section			(3) Pooled 2003 & 2006
	Intervention	Control	Difference	Intervention	Control	Difference	Difference-in-Differences
Outcome	Pr_{Interv}	$Pr_{Control}$	$Pr_{Interv}-Pr_{Control}$	Pr_{Interv}	$Pr_{Control}$	$Pr_{Interv}-Pr_{Control}$	$(Pr_{Interv}-Pr_{Control})_{2006}$ $-(Pr_{Interv}-Pr_{Control})_{2003}$
1 Currently enrolled in school							
Pr (In school=1)	0.764	0.660	0.104	0.819	0.651	0.168	0.059
Z			2.93			5.21	1.66
P>|z|			0.004			0.000	0.097
N			1242			1680	2922
2 Appropriate age-for-grade							
Pr(age-for-grade=1)	0.428	0.645	-0.217	0.576	0.618	-0.042	0.158
Z			-4.64			-1.07	2.90
P>|z|			0.000			0.285	0.004
N			819			1249	2068

Endnotes

[1] For the purpose of this study, orphans are children who have lost at least one parent, and vulnerable children are defined as a non-orphan having a chronically ill parent or primary guardian. Chronically ill is defined as seriously ill for at least three of the last 12 months.

[2] Households with Bwafwano beneficiaries are referred to as "intervention households" in this study. All children ages 8-19 living in these intervention households are considered to have been exposed to the intervention for the purpose of this evaluation, even if all of these "intervention" children may not have received services directly. The terms "comparison" households, primary parent/guardians, and children are used in a similar manner.

[3] Approximately 26 children were in the comparison group at phase 1, but were in the intervention group at phase 2 since they were selected into the Bwafwano program.

[4] The OVC sub-sample is approximately 54 percent of the full sample.

[5] In the full sample, the intervention and comparison groups were approximately equivalent in size. However, since the OVC sub-sample included only OVC, the comparison group became much smaller than the intervention group after the sub-sample was created.

[6] Similar to the full sample, the data from the OVC sub-sample were nested. In many cases, there was more than one child per household, and in a few cases, there was more than one primary parent/guardian per household in the OVC sub-sample. In this sub-sample, there were 593 primary parent/guardians and 1,242 children interviewed from 580 households in phase 1, whereas in phase 2, there were 781 primary parent/guardians and 1,676 children interviewed from 773 households. In addition, there were 876 children in the OVC sub-sample who were interviewed at *both* phases.

[7] Bivariate analyses were conducted on the OVC subsample for key household, primary parent/guardian, and child-level characteristics by group and phase.

[8] The wealth status index was calculated by using principal components analysis. Selected items related to household assets were analyzed to calculate wealth status by quintiles at the household level.

[9] The director of the Bwafwano program reported that the OVC in comparison group were often not enrolled in the program because they had relatives who provided them with some essential needs and supported them in school.

[10] For the purpose of this paper, a double orphan is defined as a child with both parents dead, while a paternal orphan has a live mother and dead father, and a maternal orphan has a dead mother and live father.

[11] Based on the literature, entering primary school "on time" is defined as being ages 7 to 8 when entering grade 1. Those entering school at age 6 or under were defined as "under-age," and those children entering school at age 9 or older were defined as "over-age." The age-for-

grade measure was constructed based on the same logic, with those attending 2nd grade at age 7 and under being classified as "under-age," 8- to 9-year-olds in 2nd grade classified as "on time," and children ages 10 and over in 2nd grade categorized as "over-age."

[12] As can be seen in Table 2, there were few missing values for the explanatory (control) variables. Cases with missing values were assigned the mode value for the purpose of the multivariate analyses. The only exception to this rule was for orphan status where missing values or "don't know" responses for mother alive and father alive were treated as the "mother was living" and "father was living," respectively. Cases with missing values for the educational outcomes, in-school status or age-for-grade, were excluded from these respective analyses.

Appendix 1: Data Collection and Data Entry Team

Phase 1 Data Collection and Entry Team

Field Supervisors:
1. Ellinah Chongo
2. Francis Chilinga

Interviewers:
1 Elina Bwalya
2 Agness Chileshe
3 Dumase Ngoma
4 Racheal Siachobe
5 Elizabeth Banda
6 Charity Nondo
7 Idah Kapambwe
8 Grace Kapasa
9 Nedah Musopelo
10 Monica Phiri
11 Shila Makunku
12 Mercy Nachande
13 Eunice Mutempa
14 Phani Hamangaba

Data Entry Staff Members:
1. Charles Nyendwa
2. David Kabaso
3. Chunga Sitali
4. Robson Nyanga
5. Makandwe Nyirenda
6. Paul Mwale
7. Rhoda Kapansa
8. Martin Chanda
9. Felix Bwalanda
10. Yotam Banda

Phase 2 Data Collection and Entry Team

Coordinator:
Ellinah Chongo

Field Supervisors:
Shila Makunku
Elina Bwalya

Interviewers:
1 Agness Chileshe
2 Dumase Ngoma
3 Racheal Siachobe
4 Elizabeth Banda
5 Charity nondo
6 Glenda Chileshe
7 Grace Kapasa
8 Nedah Musopelo
9 Matildah Musopelo
10 Mercy Nachande
11 Eunice Mutempa
12 Phani Hamangaba
13 Namukolo Mwangala
14 Rachel Siachobe

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2 Paul Mwale
3 Victor Sinyangwe
4 Charles Nyendwa