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# EXPLORING THE IMPACT OF THE COMMUNITY-BASED CARE FOR ORPHANS AND VULNERABLE CHILDREN (CBCO) PROGRAM

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## **Exploring the Impact of the Community-Based Care for Orphans and Vulnerable Children (CBCO) Program**

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The views and opinions expressed in this report are the authors'.

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## **Executive Summary**

### **Introduction and Overview**

The Community Based Care for Orphans and Vulnerable Children (CBCO) program operated during 2006-2011 in Nyanza Province and portions of Eastern Province. Christian Aid partnered with two NGOs, the Benevolent Institute for Development Initiatives (BIDII) in Eastern Province and Anglican Development Services (ADS, formerly known as Inter Diocesan Christian Community Services) in Nyanza Province, to implement the program. The central component of the CBCO program was to support household economic strengthening through the development of village “saving and loan associations” (SLAs), which for the CBCO program consisted of a group of approximately 30 OVC caregivers. The SLA was an institution through which members could mobilize local resources to improve access to credit, to support group-based income generating activities, and to provide a conduit through which other CBCO program services could be provided to OVC. Section II provides more detailed background on the CBCO program.

As part of the OVC-CARE Project, Boston University in collaboration with Christian Aid, BIDII, and ADS, completed a two-year program of research evaluating the costs and impacts of the CBCO program. Year One focused on evaluating the costs of the CBCO program from the level of the local NGOs implementing the program and developing a research protocol for collecting household- and child-level data for investigating impacts of the program. Year Two focused on evaluating program impacts consistent with the 2011 USAID Evaluation Policy guidance [1].

In Year One, the costing analysis showed that the direct annual financial cost of implementing this program was \$21 per OVC per year (\$49 per household) for BIDII in Eastern Province and \$25 per OVC (\$57 per SLA member) for ADS in Nyanza Province (evaluated using 2009 program data).[2] These financial costs did not account for the fundamental role of volunteers, who were responsible for implementing key components of the program. We estimated that each NGO was able to mobilize 14,000-15,000 days of volunteer or semi-volunteer time for program implementation. The imputed opportunity cost of this time was \$47/household for BIDII and \$35/household for ADS, so that the estimated total cost of the program was \$101/household for BIDII and \$98/household for ADS. A practical methodology for evaluating OVC program costs was also developed as part of this activity that is available for other OVC programs to use.[3]

In Year Two, the protocol was finalized in collaboration with Christian Aid, BIDII, ADS, and the Kenya Medical Research Institute (KEMRI) with additional input from USAID and the President’s Emergency Plan for AIDS Relief (PEPFAR) interagency OVC Technical Working Group. The remainder of the year involved obtaining ethical research approvals from BU and KEMRI, mobilizing and training the overall research team (enumerators, data entry clerks), communicating with local communities and authorities to gain local support for the survey activity, implementing the survey, data entry and cleaning, data analysis, and dissemination of findings. The research protocol, including consent forms and survey instruments, are available from the OVC-CARE Project.

### **Primary Objective and Study Limitations**

The overall objective of this report was to investigate the impacts of the CBCO program on various development outcomes associated with household economic strength and child-welfare. USAID’s Evaluation Policy document provides a clear explanation of key features of impact evaluations:

“Impact evaluations measure the change in a development outcome that is attributable to a defined intervention; impact evaluations are based on models of cause and effect and require a credible and rigorously defined counterfactual to control for factors other than the intervention that might account for the observed change. Impact evaluations in which comparisons are made between beneficiaries that are randomly assigned to either a “treatment” or a “control” group provide the strongest evidence of a relationship between the intervention under study and the outcome measured” (underlines added, [1]).

A **first limitation** of this study is that a control group based on random assignment to the CBCO program among eligible households (eligible at the beginning of the program) does not exist for defining a counterfactual. Given the urgency to provide and scale-up services to OVC in 2006, it is not surprising that the CBCO program did not assign households with OVC randomly into a treatment group (those in the CBCO program) and a control group (those eligible for the program but not provided program services).

With or without randomization to the treatment and control group, at least two rounds of data for at least two groups are very useful for identifying program impacts:

- a first round of representative data (sometimes called a baseline) are needed for households in the treatment group (e.g. in the CBCO program) and for households not in the treatment group (typically called a comparison group); and
- a second round of representative data (sometimes called endline or follow up) are needed for both groups at some later date (e.g. end of the program).

With two or more rounds of data on two or more groups, credible and straightforward analytical methods exist to define rigorously a credible counterfactual. At least two rounds of data for the same households (panel/longitudinal data) are best.

A **second limitation** of this study is that relevant data collected before the CBCO program began (or at least early in the program) do not exist. To be useful, data would need to be collected for a representative sample of households participating in the CBCO program and for those not in the program. The CBCO program did collect information for a baseline needs assessment (information collected during June and July 2005). Such baseline information often collected by programs are not very useful for impact evaluation activities unless the baseline procedures (sampling strategy, data collected, etc.) are developed in conjunction with a future data collection plan so that study groups can be identified, sample sizes are adequate, consistent information is collected, and so on.

Recognizing both of these limitations, this study completed a survey of households participating in the CBCO program and other households not participating in the program in 2011. The discussion below on **Survey Procedures and Study Groups** and **Impact Evaluation** explain how these data are used to develop counterfactuals for this study. Additional limitations of the study are identified and discussed in the following sections as well.

### **Survey Procedures and Study Groups**

Data for this analysis were developed through a cross-sectional survey of households completed during May-June 2011. The target sample size was 1500 households in each province (3000 total households). In an attempt to develop appropriate comparison groups for this evaluation activity (i.e. for developing counterfactuals for the analysis), the survey instrument for the study was administered to random samples of three sub-populations:

- CBCO program participants (n = 500);
- other households living in the same sub-locations where the program was implemented (n = 300, called the Local Community Group); and
- households living in adjacent sub-locations where the program did not operate (n = 700, called the Adjacent Community Group).

The non-CBCO households were then further stratified into those households who would have been defined as “vulnerable” based on the CBCO program criteria and, therefore, eligible for the program (e.g. include at least one child who is an orphan, no working-age adults, an adult that is chronically ill). Section III describes in detail the study design and questionnaire.

A **third limitation** of this study potentially is that only households participating in the CBCO program at the end of the program were included in the CBCO sample. Attrition from the program could imply that the households participating in 2011 are a biased sample of all households participating in the program. For example, if only households benefiting the most from the program remained in the program (a survivor bias), impacts observed would be a biased estimate (too large) of average program impacts. An opposite possibility, albeit less likely, is that some portion of households benefiting from the program become so well off that they no longer participate in the program, so that impacts observed among the remaining participants would be a biased estimate (too small) of impacts. Because programs already have a strong incentive to identify such successes, estimates that are biased towards being too large (or too favorable) are likely to be most relevant here.

Section IV provides basic summary information on the results of the survey. We included in the analysis all households interviewed who reported that at least one child less than 23 years of age at the time of the survey (a 22 year old at the time of the survey would have been 17 in 2006 when the program began). A significant share (40-60%) of the non-CBCO households included in the survey met the CBCO program eligibility criteria at the time of the survey (see Table 3), and a significant share of the non-CBCO households surveyed in the local and adjacent communities included at least one orphan (30-50%).

Given that a large share of the non-CBCO households met the eligibility criteria for the program but were not in the program, we stratified the non-CBCO groups into those eligible and not eligible for the CBCO program at the time of the survey. In sum, we have five study groups in each province (Section IV, Figure 2 summarizes the study groups and Table 4 provides sample sizes for each):

1. the CBCO group (CBCO);
2. the local community group not meeting program eligibility requirements (LCG-N);
3. the local community group meeting program eligibility requirements (LCG-E);
4. the adjacent community group meeting program eligibility requirements (ACG-E); and
5. the adjacent community group not meeting eligibility requirements (ACG-N).

Table 5 in Section IV provides some basic information on these households. Typical household size is 5-6 people. A large proportion of all households are female headed, from over 80% for the CBCO group to 38-74% for the other groups. Households in the local and adjacent community groups not eligible for the CBCO program were the least likely to have female household heads. For the majority of all households, the highest level of education of any adult was completion of primary school or less.

The survey data (see Section IV, Table 6) show that:

- The CBCO households did participate in group savings activities at significantly higher rates than other households (roughly 90% for the CBCO group in each province compared to 10-25% for the other groups).
- CBCO households were also significantly more likely to have taken a loan in the six months leading up to the survey (60-70% for the CBCO group in each province compared to 21% or less for the other groups).
- Participation in group income-generating activities was similar across all study groups in Eastern Province (about 20% of households). A typical loan across all groups was around KES 1,000 (\$12) to be paid back with interest within 6 months.
- In Nyanza Province, participation in group income-generating activities was somewhat more common for the CBCO group (31%) as compared to the other study groups (7-20%).

Participation in an SLA, or accessing credit, and participating in group-income generating activities are useful indicators of program performance. As discussed in Section V, however, the focus of this study was to attempt to assess impacts of the program on development outcomes associated with household and child welfare.

### **Development Outcomes**

As explained in Section V.A (also refer to Tables 7 and 8), the following household-level and child-level development outcomes were evaluated in this analysis:

- household wealth based on agricultural assets (the mean, median, and proportion in lowest wealth quintile were evaluated);
- household wealth based on housing assets (the mean, median, and proportion in lowest wealth quintile were evaluated);
- household food security (the mean, median, and the proportion classified as severely food insecure);
- the proportion of children completing the most recent school term (7-13 year olds and 14-17 years olds analyzed separately);
- the proportion of children progressing in school on schedule (7-13 year olds and 14-17 year olds analyzed separately);
- the proportion of young adults (18-22 years of age) who completed secondary school;
- the total score and the proportion of children classified as “abnormal” on the Strengths and Difficulties Questionnaire (4-10 year olds and 11-17 year olds analyzed separately).

Section V.A provides detailed explanations of the outcomes and the procedures used to create them.

A **fourth limitation** of this study is that the above list of development outcomes is potentially not complete. For example, the core goal of the CBCO program was to improve household economic strength, yet the concept is not directly measurable. Economic strength should be correlated with asset-based wealth measures and household food security. The study did not have the resources (financial or time) to complete a solid household expenditure survey to measure directly household poverty based on national or international poverty standards.

## Impact Evaluation Strategy

As reviewed in Section V of the report and discussed above, evaluating impacts of interventions involves a search for a counterfactual. The survey data obtained in May-June 2011 provide information on what existed at the time of the survey among program participants. For example, 60% of households in the CBCO group were defined as severely food insecure. The counterfactual in this case would be the percent of households who would have been severely food insecure if they had not participated in the program. Impact is then the difference between the observed outcome and the counterfactual.

Given the limitations of this study due to the lack of randomization and lack of baseline data, Section V.C. explains the approach followed in this report for identifying a counterfactual. For each outcome evaluated, two counterfactuals were developed.

The first counterfactual is:

- the outcome for the adjacent community group of households who would have been eligible for the program (the ACG-E group).

Impact in this case is then just the simple difference in outcomes between the CBCO group and the adjacent community group of eligible households (the ACG-E group). This single-difference approach is potentially plausible because the CBCO program did not operate in the adjacent sub-locations (so self-selection could not be an issue) but the sub-locations are adjacent with similar ecosystems and cultures.

The second counterfactual is:

- the first counterfactual minus the difference in outcomes between the local and adjacent community groups not eligible for the CBCO program.

The second counterfactual is based on the assumption that the difference observed between the not-eligible groups would also be the difference observed between the CBCO and the ACG-E groups in the absence of the program (see Section V.C. for additional details). This is essentially an adaptation of a 'difference-in-difference' analysis typically applied to two groups over two time periods [4].

In addition to considering impacts, the study also includes a basic analysis of on-going disparities at the local level. Comparing outcomes between these two groups identifies the existence and depth of continuing disparities between CBCO households and other households in the local community who would not be considered vulnerable.

## Results

The results for the 18 outcomes analyzed in this report are presented and discussed in Section VI (and in Tables 9.A. – 21). Because of the distinct differences in ecosystem, cultures, and NGOs providing services in each Province, results are reported by Province (Eastern Province is the BIDII sample, Nyanza Province is the ADS sample).

### ***Household Wealth***

Regarding disparities, a general positive result in Table 13 is that households in the CBCO program, and the children living in these households, are estimated to have similar development outcomes in terms of agricultural and housing wealth as compared to the local community group not eligible for the program (i.e. “non-vulnerable” households). The lack of disparities does not necessarily imply the lack of deprivation. Poverty is widespread in rural Kenya and it is likely that a significant share of households living in the CBCO program area are poor but not eligible for the CBCO program.

Regarding impacts, the data are less clear. The CBCO households in both provinces are estimated to have somewhat higher agricultural wealth measures (mean, median, and proportion in the poorest 20% of households) than the adjacent community group of eligible households (see Table 13 and 14). The CBCO households in Nyanza Province also are estimated to have somewhat higher housing wealth. If the ACG-E group outcomes could be reasonably used as the counterfactual for impact evaluation, these single difference results would suggest positive impacts of the CBCO program on household agricultural wealth for both provinces and housing wealth for the ADS sample in Nyanza Province. However, because the LCG-N group is estimated to have higher wealth measures than the ACG-N group, the results of the double-difference analysis would be interpreted as no impact.

In sum, few disparities exist between CBCO households and other households living in the same communities (the LCG-N group) in terms of agricultural and housing wealth. The single and double-difference approaches used here do not clearly suggest strong impacts of the program.

### ***Household Food Security***

A significant share of all households in all study groups were classified as ‘severely food insecure’ based on the Household Food Insecurity Access instrument (45-60% of all households in the BIDII sample and 68-85% in the ADS sample). In terms of disparities, a larger percentage of CBCO households were classified as severely food insecure (14% more for the BIDII group and 8% more for the ADS group) as compared to the LCG-N group. The single and double-difference approaches used here do not clearly suggest strong impacts of the program (see Table 17).

### ***Education***

Across all children 7-17 in the surveyed households, 90% or more of each study group completed the last school term as of the interview date, which would have been the first term. A very large percentage, 80-90%, of primary school aged children (7-13 years) are on track in school (age-for-grade congruent within one year), but a smaller percent of secondary school children are on track (65-75%). However, only 20-30% of 18-22 year olds completed secondary school across all households sampled in Eastern Province and only 11-20% of all households sampled in Nyanza Province.

The results in Table 19 indicate some continuing disparities in educational outcomes between the CBCO and the LCG-N group in each province. Children 14-17 years old were somewhat less likely to have completed the last school term as compared to their local peers in the LCG-N group (9% less for the BIDII group and 5% less for the ADS group) and more likely to be 2 or more years behind appropriate grade for age (6% for the BIDII sample and 20% for the ADS sample).

The single-difference estimates of impacts reported in Table 19 show no difference in the proportion of children completing the last school term (these proportions are high for all groups). As compared to the ACG-E, the CBCO children were somewhat less likely to be 2 or more years behind appropriate

age for grade (3% less for the 7-13 year olds and 6-7% less for the 14-17 year olds). The CBCO young adults were also more likely to have completed secondary school (6%). Given that the proportion of young adults completing secondary school was relatively small in all groups, a 6% improvement is relatively large in magnitude. As consistent with the analyses for the wealth and food security, the potentially positive impacts observed based on a single-difference analysis are muted or eliminated in the double-difference analysis.

### ***Strengths and Difficulties***

No disparities were estimated in the percentage of children ranked as “abnormal” between the CBCO and LCG-N groups except for the younger children (4-10 year olds) in the ADS sample. For this group, 21% of children in the CBCO group scored in this category, which was 14% more than in the 7% reported for the LCG-N group. The small but potentially positive impacts observed based on a single-difference analysis are muted or eliminated in the double-difference analysis here as well.

### **Final Remarks**

Throughout the analysis of all outcomes, a simple comparison of the CBCO group and the group of households in adjacent communities meeting eligibility requirements (ACG-E) showed varying levels of differences (sometimes CBCO somewhat better, sometimes not, sometimes statistically significant at the 5% level, and sometimes not). The double-difference approach consistently indicated no measured impacts of the program. Thus, using the standard definition of ‘impact’ as understood in the evaluation of health and development interventions (e.g., [4]) and USAID’s Evaluation Policy [1], the analysis presented in this report does not highlight clear and substantial impacts of the CBCO program on the empirical development outcomes.

This conclusion does not, however, imply that the program did not provide useful benefits to the households or the OVC living in the households. The data show that households participating in the CBCO program were significantly more likely to participate regularly in savings groups and borrow money than households in the other study groups. Since participation in an SLA is voluntary, it is difficult to conclude that these SLA members (OVC caregivers) would continue to allocate their time and energy to a group activity that was not useful for their needs. While not an “OVC outcome”, SLAs as an institution are likely to provide useful non-financial social support to their members. It is entirely possible that such benefits are real, but do not have additional measurable impacts on the development outcomes included in this analysis. For example, an SLA member who is severely food insecure may find significant emotional support from other SLA members, even if such support has no impact on food security.

The magnitude of the intervention may also be an issue. As noted above, the cost of implementing the CBCO program at the level of implementers in each province was \$49-\$57 per household per year (\$21-\$25 per child) as of 2009. The program relied on large quantities of volunteer labor, which if valued at reasonable local wages, might increase these costs by 100% (e.g. \$50 or less per child per year). While some variation occurred across the program years (2006 into mid 2011), these are very modest levels of program services. For perspective, a scaled up “Cash Transfer Programme for Orphans and Vulnerable Children” in Kenya is reported to cost about \$320 per household per year, which is 500% more per household than the CBCO program (see <http://go.worldbank.org/2IL8VR9LX0>). As another example, it cost \$84 to identify one new HIV infection in a home-based HIV testing program implemented in Kenya [5].

The results of this study suggest that a low-cost and low-input SLA model is not adequate to generate significant additional impacts on household welfare. If all the households in the SLA are

essentially caught in a poverty-trap, pooling resources within such households is unlikely to push them out of poverty. An SLA model within an OVC support program may make sense as a foundation for a program, but additional poverty alleviation activities (e.g. direct cash transfers, direct transfers of agricultural inputs, new jobs, etc.) are still needed.

It should be noted that the SLA model has been widely implemented across many countries in Africa, with millions of individuals participating in SLAs (e.g., [www.vsla.net](http://www.vsla.net)). Although no peer-reviewed studies have been published documenting the impacts of SLA programs on development outcomes based on empirical measures of household welfare, several studies are in progress that will provide additional information on SLA impacts for different types of groups in different settings. While reports of returns on savings exist outside peer-reviewed publications, even a substantial return on a small amount of savings could be very useful to a household but not be large enough to have greater impacts on household welfare.

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## I. Introduction

Because of the HIV/AIDS epidemic in sub-Saharan Africa, millions of children have been orphaned because one or both parents died from AIDS. Millions of other children have become vulnerable to lower levels of welfare because of parental HIV infection. In response to the needs of orphans and vulnerable children (OVC), the U.S. PEPFAR program spent over \$1.5 billion dollars on OVC support programs during 2005-2010 and an even larger amount will be spent on OVC support in the coming years [6].

In sub-Saharan Africa, the vast majority of OVC live in a household – with a surviving parent, within households of their extended family, or in households of non-relatives. A large number of these households are poor. Because they are poor, they are less able to meet the material and emotional needs of their children. These households were poor before assuming responsibility for additional children, and they perhaps became even poorer with additional children in their household.

If the economic situation of these households was adequate (sometimes referred to as socio-economic status in the health literature), the basic material needs of OVC—food, shelter, clothing, education, health care, protection—would be provided directly by these households. OVC programs could then focus on emotional/psychological needs of OVC due to the loss of their parent(s) and new living environment.

Recognizing the extant poverty of households caring for OVC, OVC programs attempt to improve the economic situation of households (increase cash and non-cash income, improve access to credit, increase savings, etc.) so that they can provide for a larger share of overall needs for their families. This area of OVC program support has become known as household economic strengthening (HES). In short, HES activities are designed to reduce household poverty and improve household economic status so that households themselves can provide for their children.

The existing literature generally shows that improved household economic strength is positively correlated with improved measures of child well-being [7-9]. For example, a recent analysis using Demographic and Health Survey (DHS) data from 36 countries concludes that “household wealth is a strong predictor of child outcomes” [7], where the specific child outcomes analyzed were wasting (ages 0-4 years), school attendance (ages 10-14 years), and early sexual debut (ages 15-17 years). In contrast, “orphanhood or co-residence with chronically ill or HIV-positive adults are not universally robust measures of child vulnerability” [7].

While improving household economic strength is likely to lead to improvements in child welfare (OVC and non-OVC), the impacts of HES programs funded by PEPFAR and others on households (e.g. household wealth) remains poorly documented. In a recent review focused on the cost-effectiveness of OVC programs, we concluded that the “impacts on child wellbeing of OVC programs, both immediate and sustained impacts over time, remain poorly understood” [6]. Another review of OVC programs concluded that “considering the widespread experience in implementing OVC programs represented by spending to date, the evidence base guiding resource allocation is disappointingly limited” [10].

HES activities were a central component of an OVC program implemented in Kenya between 2005-2011. This program was called the Community-Based Care for Orphans and Vulnerable Children (CBCO) program. The CBCO program was implemented by Christian Aid in collaboration with two

partner organizations in Eastern and Nyanza Provinces.<sup>1</sup> The Benevolent Institute of Development Initiatives (BIDI) based in Machakos led activities in Eastern Province (Machakos and Makueni Districts), while the Anglican Development Services (ADS) based in Kisumu led activities in Nyanza Province (Siaya, Rachuonyo, Kisumu, Migori, Bondo, and Nyando Districts). Both PEPFAR and Christian Aid provided funds for implementing the CBCO program.

A basic focus of the CBCO program was to improve the economic strength of poor rural households caring for OVC. To accomplish this goal, the central component of the CBCO program was to support the development and operation of village “saving and loan associations” (SLAs). An SLA involves representatives from households who form a group through which they save small amounts of money regularly [11, 12]. From the capital created by their savings, members can take small loans for basic needs (medicines, school supplies) or for individual income generating activities (purchasing and then reselling small amounts of food stuffs or other items). SLA members also can engage in additional self-help initiatives such as group income-generating activities (IGAs) as well as other types of support to members (e.g. one-time small donation by each member to assist a family with unexpectedly large medical expenses).

Unlike micro-credit programs, this SLA model does not rely on external sources of capital for loans. Also unlike micro-credit programs, individual SLA members need not be entrepreneurs or have entrepreneurial instincts for useful participation in SLAs. This feature of SLAs is crucial for elderly OVC caregivers (e.g. grandparents) who very likely would not participate in micro-credit programs.

To contribute to the evidence base on the impacts of OVC programs, the Study Team developed a retrospective cohort study to investigate the quantitative impacts of the CBCO program on multiple indicators of household and child-level welfare. A cross-sectional survey was completed in May and June 2011 based on a random sample of three study groups: (1) CBCO program participants; (2) other households living in the same sub-locations as the CBCO program participants; and (3) other households living in adjacent sub-locations (where the program did not operate) in late May through early June 2011.<sup>2</sup>

This report is organized as follows. Section II provides an overview of the CBCO program. The CBCO program was an excellent choice for an evaluation study because the program can be packaged as an “intervention model” that could be replicated elsewhere. Without a clear intervention model, information on costs and outcomes from one study are less useful for informing other programs in the future. Section III describes the study locations, study design, sampling strategies, and survey implementation. Section IV summarizes results of the survey and general descriptive information on the surveyed households stratified by study group.

Through the survey, data were developed to document key domains of household economic strength, including household wealth based on housing assets and agricultural assets, household food security, participation in social groups (SLAs and others), and use of credit. In addition to such household level information, information on child welfare was also developed based on educational progress and emotional/behavioral information using a standardized child psychological assessment tool. Using these outcomes associated with household economic strength and child welfare, Section V explains the approaches used to consider impacts of the CBCO program on these outcomes. Limitations of the study for identifying program impacts, and how the methods used attempt to minimize these limitations, are also discussed in Section V. Section VI concludes.

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<sup>1</sup> Christian Aid is a U.K. faith-based non-governmental organization. The organizations website is at: <http://www.christianaid.org.uk/>. CA’s Kenya office is located in Nairobi. Basic information on the program can be found on the USAID Kenya website: <http://kenya.usaid.gov/programs/health/102>.

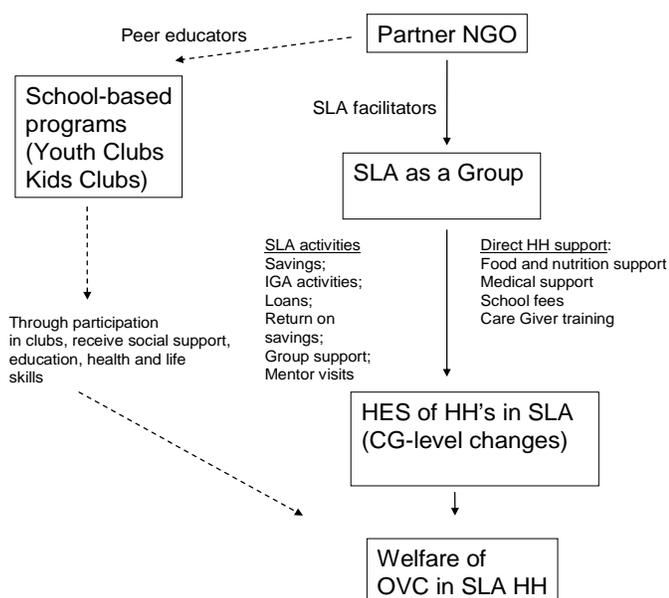
<sup>2</sup> At the time of the survey, sub-locations were the smallest administrative unit of the national government.

## II. An Overview of the Community-Based Care for OVC Program in Kenya

### A. Introduction

The CBCO program used a general OVC definition consistent with criteria outlined in the Kenya Aids Indicator Survey [13], the Kenyan OVC action plan [14], and UNICEF [15]. For the CBCO program, a child under the age of 18 was considered an OVC if he or she had lost one or both parents, lived in a household where there had been an adult death in the last 12 months, lived in a household with a chronically ill adult (an adult that had been bedridden or hospitalized for at least three months out of the last 12 months), or lived in a household where there were no adults under 60 years of age. While more detail on households is provided in Section III, we note here that the vast majority of OVC caregivers in the CBCO program were women who were also heads of their households. Many were also elderly. This family structure is consistent with patterns of OVC care in other countries in sub-Saharan Africa [16].

Figure 1. An Overview of the CBCO Program (the intervention package)



\* SLA = savings and loan association; CG = caregiver; IGA = income generating activities.

Figure 1 summarizes the activities included in the overall CBCO program. The central component of the CBCO program was to support the development and operation of village “saving and loan associations” (SLAs). Self-help groups that include rotating or accumulating savings and credit associations (ROSCAs and ASCAs) have been common throughout the world and have been well analyzed [17-19]. These types of organizations existed long before the world of formal microfinance institutions (MFIs), and include individuals and communities who are too poor, not entrepreneurial enough, and/or too risk averse to access credit through MFIs. The SLA model implemented in the CBCO program evolved from CARE International’s experience with SLAs beginning in Niger in the early 1990s [11, 12]. In effect, the SLA model is an accumulating savings and credit association where numbers in the group are limited, which is generally not the case with ASCAs. The CBCO program adopted and adapted the SLA model as a core component of its OVC program. Additional details of SLAs and the CBCO program are provided below.

### ***B. Savings and Loan Associations***

For the CBCO program, an SLA was formed with a group of OVC caregivers (roughly 30), which is one key innovation of the CBCO program. Through this group, the program could also provide other services to these households and their children.

An SLA provides an institution through which members come together for regular meetings (typically weekly or every other week). For management purposes, each SLA votes on its management officers (typically a director, secretary, and treasurer). They are volunteer positions. At these meetings, members of the group save small amounts of money regularly. As part of the formation process, the group decides on a fixed amount of savings that each member contributes at each meeting. KES 25 (roughly US\$0.33) is a typical amount. Conceptually, each of these regular contributions is a share in the fund, so that a person could save KES 50 at one meeting and own two shares. For perspective, saving \$0.33 per week for 52 weeks a year among 30 members would generate annual savings per SLA of about \$515. The support and positive incentives for saving, even among very poor households, is a key feature of SLAs and ASCAs in general [17]. From the capital created by their savings, individual members can take small loans for basic needs (e.g. perhaps to purchase medicine) or individual income generating activities (e.g. trading small amounts of food stuffs). The loans are for a relatively short period of time (e.g., 3 months) and paid back with a fixed percentage of the principal. For example, 10% of the principal is common (e.g. 40% or more implied annual interest rate). The cash is stored in a small metal box, which is managed by one SLA member. The box is locked with three padlocks, and three different SLA members are “key holders”. All four people must be in the same location (at the regular meeting) to open the box.

While SLAs as institutions can operate continually over time, an SLA liquidates the fund periodically (e.g. after one year or 18 months). All outstanding loans are repaid by the end of each cycle, and then each SLA member receives a portion of the total fund based on their ownership (number of shares as a portion of total shares). By liquidating the fund, SLA members benefit directly from interest earnings and group income earning activities. Non-liquid assets, such as on-going agricultural activities, remain as SLA assets and income earned from these assets is returned to the fund in a future cycle.

Millions of individuals are reported to be participating in village savings and loan associations (see, e.g., <http://vsla.net>). If so many individuals participate in such associations, they are presumably contributing something useful to the participants (otherwise they would not participate). Given the many years of experience with supporting such associations, it is surprising however that essentially no peer-reviewed research has been published documenting household level welfare impacts of participation in such programs. The only article found in a review of literature was an evaluation of SLA experience from Zanzibar (published in 2007 using data from 2001-2002), where the solid returns on savings was attributed in large part to the group members being well-off and well educated [12], which is not the case for CBCO program participants.

### ***C. Group-Income Generating Activities (IGAs)***

In addition to loans to individuals in the SLA, SLAs typically engage in group income generating activities (IGAs). For example, one member may have access to a piece of land that could be used for maize production, but she does not have enough labor in her household to work the land (or management skills, or seeds, etc.). With this land, the SLA as a group could purchase maize seed (perhaps hybrid maize with significantly higher yields than local varieties) and as a group allocate time to this activity. Net income from the activity (e.g., sales minus seed costs and any other cash

costs for inputs) is then returned to the fund. Group IGAs are a fundamental component of the CBCO SLA model. Each individual in the group does not need to be an entrepreneur and face individual financial risks, as is essentially the case with more formal micro-finance institutions. Individuals in the group are also not jointly liable for repayment of loans, which is also the case with micro-credit programs requiring group responsibility for individual loan repayment.

#### ***D. Social Support and Risk Pooling***

In addition to savings, loan, and group IGA activities, the SLA as an institution provides a mechanism for social support and risk pooling. If one SLA member or someone in their household becomes sick, the SLA may organize an additional voluntary contribution from SLA members to provide the member with inputs to meet their unexpected needs (e.g. cash for medicine for a sick child, some small amount of maize). These one-time activities are separate and do not show up in the SLA's accounts.

#### ***E. OVC Support***

Beyond supporting the development and operation of SLAs, the CBCO program was designed to provide additional support to OVC caregivers and their children. Rather than traveling to 30 individual households who might be caring for 40-60 OVC, the CBCO program worked through the SLA's regular meeting structure to meet with the 30 caregivers. Two members of each SLA group also volunteered in a social worker capacity to visit caregivers and their children at their homes (at least once per month). These volunteers were called "mentors" by the program, whose role was simply to talk to caregivers and their children (separately from caregivers for older children), listen to their concerns, and informally monitor OVC welfare. Mentors would report to the facilitators about OVC with specific needs or concerns of neglect or abuse, which were then reported to appropriate local authorities for follow-up.

#### ***F. Facilitators Supporting SLAs***

The CBCO program included individuals trained on developing and managing SLAs, called a facilitator. The facilitator played various roles in the program. He/she supported the creation of the SLA and provided training and management support for financial matters (accounting, loan disbursement, and repayments, etc.). The facilitator was also the person the CBCO program used to distribute any materials or services to OVC caregivers and their children, usually at an SLA meeting, such as seeds for home gardens or support with school materials. And third, the facilitator acted like a rural extension agent, who assisted the SLA with learning about and identifying income generating project ideas. For example, a facilitator arranged for a local Ministry of Forests and Wildlife (MFW) to come to an SLA group meeting and discuss the possibility of the SLA developing a small tree nursery (with seeds from the local MFW office). The SLA eventually did develop the nursery as an income generating activity, and sold the seedlings (fruit trees and fast growing trees for materials and soil protection) to local households. Through the SLA structure, the CBCO program with the assistance of the facilitator also provided programs on special needs of OVC and child care practices targeted to SLA members (e.g., elderly women).

#### ***G. Program Participants***

As of 2010, 108 SLA groups (52 with BIDII and 56 with ADS), were part of the CBCO program with participation from over 3000 household representatives. These households included over 7000 children in 2010. As with other OVC support programs, households participating in the program and their children received different levels of "support" during the program period based on numerous

factors. Detailed information, similar for example to a patient medical file that documents details of patient care over time, does not readily exist in OVC programs. Thus, while all households and their children were exposed to the intervention, the magnitude of the exposure (length of time participating in an SLA, intensity of participation in an SLA) differed for individual households.

#### **H. Program Implementation Costs**

We completed previously a detailed costing analysis of the CBCO program from the perspective of each NGO (BIDII and ADS) [2, 20]. The direct financial cost in 2009 of implementing this program for BIDII/ADS was \$49/57 per SLA member and \$21/25 per OVC per year. Most of these costs can be grouped into three key components: NGO financial expenses associated with program implementation (staff and local travel); small payments to a number of individuals supporting the program (assistance to SLA, social worker activities for OVC); and payments associated with OVC educational expenses (school fees and supplies). The CBCO financial costs did not account for the fundamental role of volunteers, who were responsible for implementing key components of the program. The two key categories of volunteers were 'facilitators' who supported SLAs or school-based programs and 'mentors' who served essentially as social workers for OVC and their guardians. While facilitators were both men and women, almost all mentors were women. We estimated that each NGO was able to mobilize 14,000-15,000 days of volunteer or semi-volunteer time for program implementation. The imputed opportunity cost of this time was \$47/household for BIDII and \$35/household for ADS, so that the estimated total cost of the program was \$101/household for BIDII and \$98/household for ADS.

For perspective, Kenya's "Cash Transfer Programme for Orphans and Vulnerable Children" (see <http://www.gender.go.ke/index.php/Divisions/cash-transfer-programme-for-orphans-and-vulnerable-children.html>) provided about \$21 per month per household with OVC in the program. With \$243 per household of payments annually, and some additional amount for program development, identification of households, and implementation, this OVC cash transfer program probably cost at least \$300 per year per household, which is 500% more per household than the CBCO program. One can only speculate on the benefits to poor households caring for OVC from jointly participating in an SLA while receiving regular payments through a cash transfer program.

### III. Study Design and Questionnaire

The study was a retrospective cohort study of CBCO program participants (the intervention group) and other households living in sub-locations where the program was implemented and in nearby communities (adjacent sub-locations) where the CBCO program did not operate. As discussed in detail in Section V, the study groups not participating in the CBCO program are used for the analysis of program impacts.

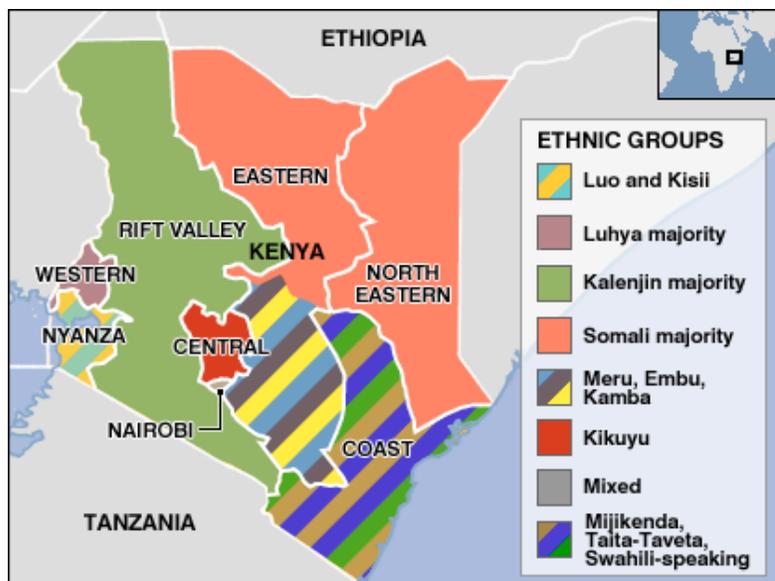
#### A. Study Sites

The survey was implemented in Eastern and Nyanza Provinces in the same districts included in the CBCO program. A basic map of Kenya is provided below. Kisumu located on the shores of Lake Victoria is the main city in Nyanza Province (ADS headquartered) and Machakos to the south and east of Nairobi is the main city in the southern part of Eastern Province (BIDII headquartered).



\* Map from <http://www.kenya-advisor.com/kenya-map.html>

The map below provides an overview of Kenyan Provinces, which shows the relatively small size of Nyanza Province and the large size of Eastern Province. In Eastern Province, the program operated in the southern portion of the province (where Kamba is the main ethnic group). In Nyanza, the program operated throughout the province.



\* Map from

[http://newsimg.bbc.co.uk/media/images/44331000/gif/\\_44331251\\_kenya\\_ethnic416x313.gif](http://newsimg.bbc.co.uk/media/images/44331000/gif/_44331251_kenya_ethnic416x313.gif)

Nyanza Province has a population of 5.05 million and the districts in Eastern Province where the program operated (Machakos and Makueni) have a population of 2.2 million [21]. HIV prevalence was reported at 7.1% in 2007, with Nyanza province having the highest HIV prevalence (14.9%) and Eastern province below the national average at 4.0% [13].

Almost 30% of all children in Nyanza met the criteria of orphan or vulnerable child in the 2007 Kenya Aids Indicator survey, while 15% of children in Eastern Province met the criteria, which is close to the national average [13]. On average in Kenya, 38.5% of rural households have female heads, and average household size in rural areas is 4.4 [13].

Tables 1 and 2 list the sub-locations where the CBCO program operated in Eastern and Nyanza Provinces (Machakos and Makueni Districts in Eastern Province are in the southern portion of the province). As explained later in the study design, households were also sampled in sub-locations that were adjacent to each program sub-location, and Tables 1 and 2 also provide the list of adjacent sub-locations included in the study.

*Table 1. Study Locations in Eastern Province*

District	CBCO Sub-locations	Adjacent Sub-locations
Machakos	Kathiani	Kauti
	Mbee	Ngoleni
	Lita	Thinu
Makueni	Mavivye	Maiani
	Kilome	Kavuko
	KiimaKiu	Malili

Table 2. Study Locations in Nyanza Province

District	CBCO Sub-locations	Adjacent Sub-locations
Migori	Bande	Nyandago
Homabay	Kadik	Kobiero North
	Kamwania	Kobiero South
	Kochola	Kanyumbre
	Kokidi	Kakoko
Kisii	Upper Kodhoch	Lower Kodhoch
Ahero	Katolo	Achego
	Ayweyo	Magina
Kisumu	Kolunjer West	Kolunjer East
Yala	Kanayadet Lower	Kanaydet Upper
	East Kaudha	West Kaudha
Siaya	Nyajuok	MurMalang'a
Bondo	Bar Chando	Abom

### B. Study Groups

We explain each group below. In each province, we had a total target sample size of 1500 households (3000 total). In the discussion below, the sample sizes for each study group are for each province (Nyanza = ADS program implementation; Eastern = BIDII program implementation).

**The CBCO Group.** We randomly sampled 500 SLA members in each province, with proportionate sampling by SLA. For the CBCO group, we randomly selected 50 SLAs to be included in the study. For each SLA, we completed interviews with the SLA members in conjunction with a regularly scheduled SLA meeting. We randomly sampled 33% of SLA members from the SLA roster. We used  $n^{\text{th}}$  name sampling with a random starting number between 1 and 6 (based on roll of a die).

**The Local Community Group (LCG).** The local community group provides a reference point from the local community on typical outcomes/risks faced by children who were in households that did not participate in the CBCO program. We randomly sampled 300 households living in the CBCO sub-locations whose household included at least one child < 18 years of age at the time of the survey. For the local community group, we followed a similar sampling strategy as above for the CBCO group except that household rosters were obtained from the local chiefs in each sub-location.

**The Adjacent Community Group (ACG).** We sampled 700 households living in sub-locations adjacent to the CBCO program whose household includes at least one child < 18 years of age. For the adjacent community group, for each sub-location included in the CBCO program, we choose one adjacent sub-location for inclusion in the study (6 for Eastern and 9 for Nyanza). For each of these sub-locations, we randomly sampled 10 households (meeting the inclusion criteria) from several villages within the sub-location (8 villages in each adjacent sub-location for Nyanza and 12 villages in each sub-location in Eastern). For each village, we sampled from household rosters obtained from local chiefs.

### ***C. Survey Procedures and the Questionnaire***

We obtained ethics approval from the Human Ethics Research Committee of the Kenya Medical Research Institute and the IRB of the Boston University Medical Center prior to implementing the survey. ADS and BIDII managed implementation of the survey in their respective provinces using enumerators hired for the study (20 in each location). Both ADS and BIDII conducted survey activities as part of their programs, and enumerators used previously were engaged again for this survey. Christian Aid, BIDII, ADS, and BU provided a 2-day training workshop for the enumerators to review research ethics, the purpose of the study, detailed review of the questionnaire, and piloting of the instrument with CBCO program volunteers.

A CSPro database was developed by the study team for data entry, with training provided to the ADS and BIDII teams by CA and BU. ADS and BIDII teams (5 data entry staff) entered data daily as the surveys were completed after review by the study coordinator in each province. Data were reviewed regularly by BU (Larson and Rohr).

Written informed consent was obtained from all study participants in appropriate local languages (English and Kiswahili are national languages; Luo is a main location language in Nyanza, and Kikamba is a main local language in the program location in the southern part of Eastern Province). When a subject consented to be part of the study (CBCO program participant for CBCO group and adult with primary child care responsibilities for the other study groups), the study questionnaire was administered verbally by a trained study enumerator. The questionnaire included sections on household demographics including education attainment, housing characteristics, asset ownership (consumer durables, land, animals), participation in groups, recent loan history, the Strengths and Difficulties instrument (SDQ) for one child 4-10 years of age, the SDQ for one child 11-17 years of age, household food security (the Household Food Insecurity Access Scale). Additional details on the basic survey results are provided below.

## IV. Survey Results

### A. Surveys Completed

We completed 1500 surveys in each Eastern Province and 1487 in Nyanza Province. Very few households declined to participate in the survey, which is consistent with the general experience in developing countries as long as the community is informed of the activity and the households are interviewed when time is available.

The survey was implemented in the end of May and early June of 2011 after the main planting season (associated with the long-rain season typically during March – May). Of note is that the short rains in 2010 (October-November) failed in the study locations in Nyanza Province, and the long-rains in both Nyanza and Eastern in 2011 were poor. While the study locations were not hit as hard as the major drought areas in the Horn of Africa (see [http://www.fews.net/docs/Publications/Horn\\_of\\_Africa\\_Crisis\\_2011\\_07.pdf](http://www.fews.net/docs/Publications/Horn_of_Africa_Crisis_2011_07.pdf)), the poor rains had a negative impact on agricultural production in Kenya and food prices increased (see, e.g. the Ministry of Agriculture’s Food Situation report for March at: [http://www.kilimo.go.ke/kilimo\\_docs/pdf/FOOD\\_SECURITY\\_MARCH\\_2011.pdf](http://www.kilimo.go.ke/kilimo_docs/pdf/FOOD_SECURITY_MARCH_2011.pdf)).

The CBCO program operated between 2006 and 2011, in which case a child who was less than 18 years of age during the program might be 18 or older at the time of the survey. Thus, we include in the analysis in this report all households interviewed who reported at least one child less than 23 years of age at the time of the survey (a 22 year old at the time of the survey would have been 17 in the 2006 when the program began). For Eastern Province, the final sample size used in this analysis is 1429 (CBCO n = 486; ACG n = 659; and LCG n = 284). For Nyanza Province, the final sample size used is 1361 (CBCO n = 464; ACG n = 632; LCG n = 265).

### B. The Five Study Groups for Each Province

The LCG and ACG study groups were further stratified into two groups:

- “eligible” households: those households meeting the eligibility requirements for the CBCO program at the time of the survey; and
- “not eligible” households: those households not meeting the eligibility requirements for the CBCO program at the time of the study.

For each province, the five study groups are summarized in Figure 2.

Figure 2. Summary of Study Groups

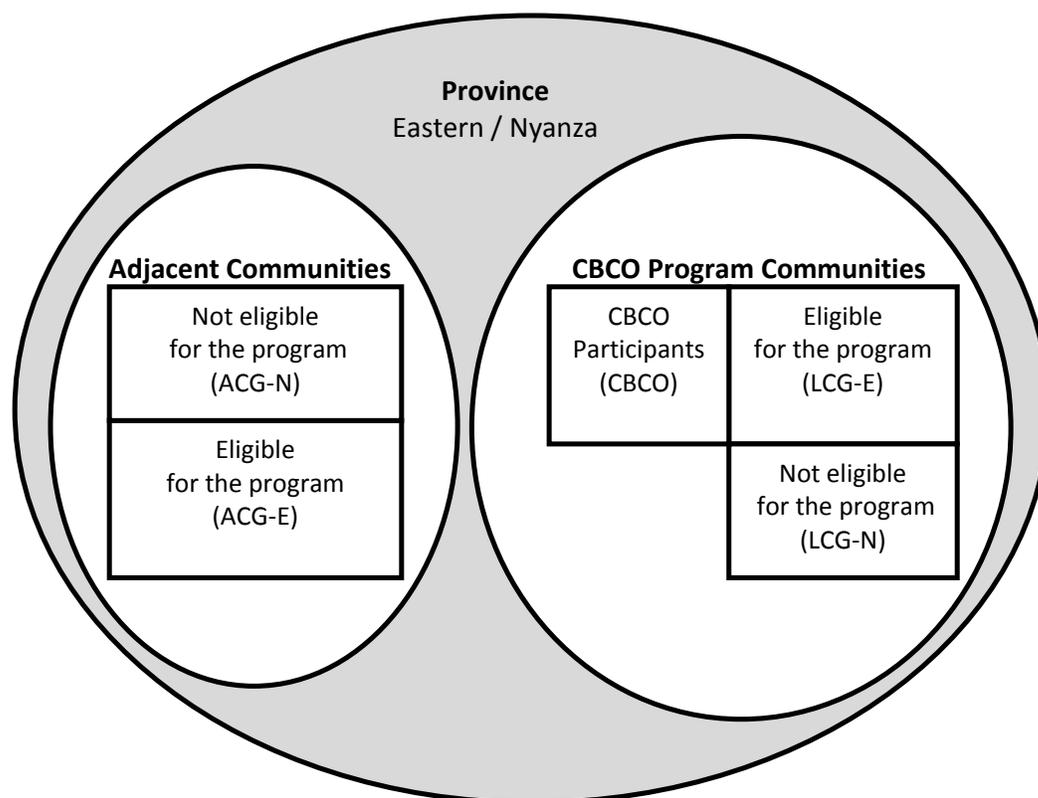


Table 3 shows that a significant share of the non-CBCO households included in the survey met the CBCO program eligibility criteria at the time of the survey. Among the eligible households in the non-CBCO groups, over 70% included at least one orphan child under the age of 18 at the time of the survey.

Table 3. Proportion of Eligible Households Identified in the Sample

	ADS - Nyanza		BIDII - Eastern	
	ACG	LCG	ACG	LCG
Total sample	632	265	659	284
Meet CBCO program eligibility requirements at the time of the survey	424	163	365	123
(% of total)	67	62	55	43
	ADS - Nyanza		BIDII - Eastern	
Which eligibility requirements met? (% of sample)	ACG	LCG	ACG	LCG
Disabled adult	39.39	46.01	23.29	35.77
No working age adults	9.43	15.95	10.41	5.69
Orphan child	75.94	71.78	83.29	73.98
Meets 2 of the above definitions	24.76	33.74	16.99	15.45

With the stratification by program eligibility, we have five study groups in each province (Table 4 provides sample sizes for each):

1. the CBCO group (CBCO);
2. the local community group not meeting program eligibility requirements (LCG-N);
3. the local community group meeting program eligibility requirements (LCG-E);
4. the adjacent community group meeting program eligibility requirements (ACG-E); and
5. the adjacent community group not meeting eligibility requirements (ACG-N).

*Table 4. Study Groups and Sample Sizes*

Site	CBCO	ACG-E	LCG-N	ACG-N	LCG-E	Total
ADS - Nyanza	464	424	102	208	163	1361
BIDII - Eastern	486	365	161	294	123	1429

The CBCO group is the ‘intervention’ group for this evaluation activity. The second study group includes households living in the same locations as the CBCO program participants who would not be eligible for the CBCO program (the LCG-N group). This LCG-N group provides one reference point for this study (one comparison group). Negative and significant differences in key outcome measures between the LCG-N and CBCO groups would indicate that disparities continue to exist between children living in CBCO households and their non-OVC peers in the local community (the LCG-N households). On the other hand, the lack of difference in outcomes would suggest the lack of disparities.

The third study group includes the households in the local community who met the eligibility criteria for the CBCO program at the time of the survey (LCG-E). This group is perhaps the most complicated to include in the evaluation exercise due to typical confounding issues related to non-random assignment to the intervention group (especially participant self-selection). While eligibility is evaluated as of 2011, it is likely that a significant portion of these households would have been eligible to be in the program during 2006-2011, but did not participate in the program. It is possible that this group of households was relatively better off than CBCO households, which is why they did not participate. It is also possible that this group was worse off than CBCO households and either decided not to participate (e.g. so poor that unable to save anything on a regular basis) or were excluded by the program (e.g., because they were not willing to join an SLA and mobilize regular savings).

The fourth study group includes all households in the adjacent sub-locations that met the eligibility criteria for the CBCO program at the time of the survey (ACG-E). If the adjacent sub-locations are similar to the CBCO program sub-locations, then households who would meet the eligibility criteria for the program (the ACG-E group) but who could not participate in the program (the program did not operate in their sub-locations) provides a possible comparison group for evaluating program impacts. The sub-locations are geographically next to each other and their inhabitants are from the same ethnic groups.

The fifth study group includes all households in the adjacent sub-locations that did not meet the eligibility criteria for the program (the ACG-N group). One possible way to check if the adjacent sub-locations are ‘similar’ to the CBCO program sub-locations is to compare the ‘not eligible’ groups.

### ***C. Basic Household Characteristics***

Table 5 summarizes basic household demographic characteristics for the five study groups. A significant percentage of all households across both provinces and all study groups are female headed. The CBCO groups have the highest percentage of female heads (about 86% for BIDII and 80% for ADS), while the not-eligible groups (LCG-N and ACG-N) have the lowest percentage of female heads (LCG-N at 38% is similar to the national average).

Across all study groups, mean household size is about 6 with between 2-3 working-age adults (18-59 years old). In the CBCO groups, 2 out of 10 households in the BIDII sample and 5 out of 10 households in the ADS sample include at least one chronically ill adult (18-59), both of which are slightly lower than for other eligible households (the LCG-E and ACG-E groups).

Table 5 also includes basic information on the highest level of education attainment for any adult 23 years of age and older. Just the adults in the households 23 years of age and older are included in Table 5 because these individuals would not have been a 'child' during the CBCO program years. All adults in the household had no schooling in 8-10% of CBCO and ACG-E households compared to 3-5% for the LCG-N and ACG-N households. For the CBCO groups, no adults had completed primary school in 36% of the households in Eastern Province and 42% in Nyanza Province. Similar percentages are reported for the ACG-E groups in both provinces (38% and 49%), while the LCG-N groups reported substantially lower percentages (25% in Eastern and 22% in Nyanza).

Table 5. Household Demographics

	BIDII					ADS				
	CBCO	ACG-E	LCG-N	ACG-N	LCG-E	CBCO	ACG-E	LCG-N	ACG-N	LCG-E
Total	486	365	161	294	123	464	424	102	208	163
% Female headed household	<b>85.8</b>	66.4	38.5	43.9	55.8	<b>79.7</b>	66.8	49.5	49.0	77.8
Total household size (mean)	6.1	5.8	6.1	5.7	6.3	6.0	5.8	5.4	5.9	5.7
HH size std dev	2.4	2.1	1.9	2.0	2.6	2.3	2.3	2.1	2.3	2.4
Household size by age group (mean)										
0-4	0.5	0.6	0.6	0.6	0.5	0.7	0.8	0.9	0.8	0.7
5-13	1.6	1.6	1.6	1.6	1.8	1.9	1.8	1.6	1.7	2.0
14-17	0.9	0.8	0.7	0.6	0.7	0.8	0.8	0.5	0.6	0.8
18-22	0.8	0.6	0.7	0.6	0.7	0.6	0.6	0.5	0.6	0.5
18-59	2.5	2.2	2.9	2.6	2.7	2.1	2.1	2.3	2.4	1.9
60+	0.6	0.6	0.3	0.3	0.5	0.4	0.3	0.1	0.3	0.4
Mean number of chronically ill or disabled adults 18-59	0.2	0.3	0.0	0.0	0.4	0.5	0.6	0.0	0.0	0.7
Maximum education level of household members over 22 (%)										
None	10.5	8.8	3.1	3.1	4.9	8.4	9.8	0.0	4.4	11.7
Some primary	25.5	29.1	22.4	19.1	22.0	34.2	39.4	22.0	35.0	34.6
Completed primary	26.1	25.8	28.0	36.7	28.5	24.7	23.9	32.0	24.8	29.0
Some secondary	8.9	10.7	11.2	11.2	8.1	13.4	12.7	14.0	12.6	12.4
Completed secondary	23.7	21.4	30.4	24.5	30.9	16.7	11.2	23.0	17.0	10.5
Higher	5.4	4.1	5.0	5.4	5.7	2.6	3.1	9.0	6.3	1.9

#### D. Participation in Groups and Access to Credit

The CBCO program was specifically designed to support participation in savings groups, and Table 6 confirms that the CBCO program did increase participation in group savings associations. While by definition the CBCO participants were part of an SLA, 87% of CBCO households with ADS in Nyanza Province and 97% of households with BIDII in Eastern Province **participated regularly** (defined as at least once per month) in saving group activities. Participation in savings groups was substantially less common for the other study groups (about 20% in Eastern and 10-18% in Nyanza).

Table 6 also shows that 48%/66% of the CBCO group in Eastern/Nyanza Province had taken a loan from their SLA over the six months before the survey (and 56%/72% loan from any source). In contrast, between 13% and 20% of the other study groups had taken a loan from any source during the same period. While not reported in Table 6, a typical loan across all groups was around KES 1,000 (\$12) to be paid back with interest within 6 months.

In addition to savings and credit activities, SLAs developed group income generating projects. Individual members could 'participate' actively in the group by contributing labor and perhaps land for agricultural projects. In Eastern Province, 17-21% of each study group participated regularly (at

least once a month) in group income-generating activities, with 20% of the CBCO group. In Nyanza, 31% of the CBCO group while 5-19% of the other study groups participated in such activities.

Table 6. Participation in Groups and Borrowing

Variable (% of total)	BIDII				
	CBCO	ACG-E	LCG-N	ACG-N	LCG-E
Participate regularly in:					
Church / religious group	20.2	15.6	21.7	14.0	14.6
Savings group	97.3	20.8	23.0	19.4	19.5
Political or advocacy group	0.8	0.8	1.2	0.3	0.8
Community service group	13.8	18.9	25.5	18.0	20.3
Income generating group	20.8	19.5	21.1	17.4	17.1
Taken loans in the past 6 months	58.9	16.2	20.5	14.0	20.3
Took loans from:*					
Family member	3.1	0.3	0.6	1.0	0.0
Friend	6.8	6.3	5.0	5.1	6.5
Money lender	1.7	1.4	1.9	1.0	0.8
SLA	48.4	0.0	0.0	0.0	0.8
Cooperative / SACCO	1.4	1.6	1.9	0.3	2.4
Merry-go-round	7.2	4.1	9.9	3.7	5.7
Other type of savings group	5.4	2.2	3.1	4.1	4.1
Other	0.2	1.4	0.0	0.0	0.8
Variable (% of total)	ADS				
	CBCO	ACG-E	LCG-N	ACG-N	LCG-E
Participate in:					
Church / religious group	27.6	6.6	11.8	11.1	8.6
Savings group	86.6	10.4	12.8	13.0	18.4
Political or advocacy group	2.4	0.5	2.0	1.4	0.0
Community service group	10.8	5.7	11.8	7.7	7.4
Income generating group	31.7	7.6	9.8	5.8	19.0
Taken loans in the past 6 months	72.2	14.4	17.7	13.0	21.5
Took loans from:*					
Family member	0.9	0.0	1.0	0.5	1.2
Friend	5.6	1.9	2.0	1.4	2.5
Money lender	0.7	0.0	0.0	0.0	0.0
SLA	66.0	0.7	1.0	0.0	3.1
Cooperative / SACCO	1.3	0.2	1.0	0.5	0.6
Merry-go-round	5.6	3.1	2.0	4.8	2.5
Other type of savings group	6.3	5.4	7.8	3.4	9.8
Other	3.7	2.8	2.9	1.9	1.2

\* Note: Percentages are from the total in the group, with some households taking loans from multiple sources.

## V. Evaluating Program Impacts on Development Outcomes

### A. Development Outcomes

As outlined in the USAID Evaluation Policy paper, “impact evaluations measure the change in a development outcome that is attributable to a defined intervention” [22]. The objective of Section V is to consider the impacts of the CBCO program on a set of development outcomes relevant to the CBCO program. Tables 7 and 8 provide a summary of the conceptual development outcomes and empirical variables used for considering program impacts.

To begin, Table 6 shows that CBCO program participants did participate regularly in SLA activities (defined as at least once per month). The CBCO group also reported substantially higher use of credit (as measured by the proportion of group taking a loan within the past 6 months), with SLAs being the primary source for such credit. Within a “performance evaluation” framework as outlined in the USAID Evaluation Policy document [22], the CBCO program achieved core objectives to mobilize OVC caregivers into SLAs and improved access to and use of credit among the participants.

Performance measures are not development outcomes. For example, borrowing rates and loan repayment rates in micro-credit programs could be considered performance measures. However, repayment rates do not indicate if the loan actually created positive and substantial improvements in more basic development outcomes such as household food security, asset accumulation, education, and so on.

The primary development outcomes included in this analysis are outlined in Tables 7 and 8. The outcomes in Table 7 are measures of household economic strength while the outcomes in Table 8 are additional child-level outcomes.

#### Household-level Development Outcomes

As outlined in Table 7, three empirical measures of household economic status at the end of the project (May/June 2011) are evaluated:

- household wealth based on agricultural assets;
- household wealth based on housing assets; and
- household food security.

The concept of household economic strength is related to poverty, household wealth, and socioeconomic status (SES). Although consumption-based measures of household poverty have become the norm for international poverty comparisons and in the Millennium Development Goals [23], asset-based measures of household wealth have been regularly used to measure wealth and poverty [9, 24, 25]. Principal components analysis is used to aggregate information on multiple assets into an aggregate wealth measure [24-26].

The “wealth index” is often included in analyses using demographic and health surveys is an asset-based index as well [26]. For example, the wealth index discussed in the Kenya DHS 2008-2009 report (see p. 25 of the report) is based on ownership of consumer goods, dwelling characteristics, type of drinking water source, toilet facilities, and “other characteristics that relate to a household’s socioeconomic status” [27]. The Kenyan DHS 2008-2009 report uses the wealth index as a “proxy for the long-term standard of living of the household” ([27], p. 25).

Rather than one generic ‘wealth’ index, wealth based on agricultural and housing-related assets are

analyzed separately. Agricultural assets provided useful information on productive capital for income generation. Housing assets provide better detail on shelter quality and potentially the use of accumulated income invested in housing.

*Table 7. Overview of conceptual outcomes and empirical variables for household economic strength*

Conceptual development outcome at the household level	How were empirical outcome variables created?
Asset-based measures of household wealth  Housing Assets Agricultural Assets	<ul style="list-style-type: none"> <li>• Method: Polychoric principal components analysis [24, 25].</li> <li>• Variable: The estimated wealth index, which is a continuous variable.</li> <li>• Outcomes: mean, median, proportion in lowest wealth quintile.</li> </ul>
Household food security	<ul style="list-style-type: none"> <li>• Method: The HFIAS instrument was included in the survey instrument and the instrument guide provides the coding logic [28].</li> <li>• Variables: The numeric HFIA scores (integer 0-27, 0 is best, 27 is worst).</li> <li>• Outcomes: mean, median, proportion classified as “severely food insecure” based on HFIA scoring criteria.</li> </ul>

In addition to wealth, household food security is another outcome variable included in this analysis. USAID defined “food security” in 1992 as follows: “all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life.” [29]

Over several years, USAID’s Food and Nutrition Technical Assistance (FANTA) project supported research initiatives to develop, adapt, and evaluate different instruments for measuring household food insecurity. Based on this work, the “Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access”, based on 18 questions with a 4-week recall period, has been used in several countries for measuring food security and assigning households along a continuum from food secure to severely food insecure [28]. The HFIAS instrument (18 questions) were included in the survey instrument used for this study.

The HFIAS Indicator Guide provides further details on the instrument’s history, use, questions, and scoring [28]. In short, the FANTA project identified a set of 18 questions that have been used in several countries to distinguish food secure from food insecure households. The FANTA project concluded that:

“These questions represent apparently universal domains of the household food insecurity (access) experience and can be used to assign households and populations along a continuum of severity, from food secure to severely food insecure. The information generated by the HFIAS can be used to assess the prevalence of household food insecurity (access) (e.g., for geographic targeting) and to detect changes in the household food insecurity (access) situation of a population over time (e.g., for monitoring and evaluation). The questions can be added to a standard baseline and final evaluation survey” ([28], p.2).

The 18 HFIAS questions are provided below.

NO.	QUESTION	RESPONSE OPTIONS
Q1	In the past four weeks, did you worry that your household would not have enough food?	___ 0 = No (skip to Q2) ___ 1 = Yes
Q1a	How often did this happen?	___ 1 = Rarely (once or twice in the past four weeks) ___ 2 = Sometimes (three to ten times in the past four weeks) ___ 3 = Often (more than ten times in the past four weeks)
Q2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	___ 0 = No (skip to Q3) ___ 1 = Yes
Q2a	How often did this happen?	___ 1 = Rarely (once or twice in the past four weeks) ___ 2 = Sometimes (three to ten times in the past four weeks) ___ 3 = Often (more than ten times in the past four weeks)
Q3	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	___ 0 = No (skip to Q4) ___ 1 = Yes
Q3a	How often did this happen?	___ 1 = Rarely (once or twice in the past four weeks) ___ 2 = Sometimes (three to ten times in the past four weeks) ___ 3 = Often (more than ten times in the past four weeks)
Q4	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	___ 0 = No (skip to Q5) ___ 1 = Yes
Q4a	How often did this happen?	___ 1 = Rarely (once or twice in the past four weeks) ___ 2 = Sometimes (three to ten times in the past four weeks) ___ 3 = Often (more than ten times in the past four weeks)
Q5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	___ 0 = No (skip to Q6) ___ 1 = Yes
Q5a	How often did this happen?	___ 1 = Rarely (once or twice in the past four weeks) ___ 2 = Sometimes (three to ten times in the past four weeks) ___ 3 = Often (more than ten times in the past four weeks)
Q6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	___ 0 = No (skip to Q7) ___ 1 = Yes
Q6a	How often did this happen?	___ 1 = Rarely (once or twice in the past four weeks) ___ 2 = Sometimes (three to ten times in the past four weeks) ___ 3 = Often (more than ten times in the past four weeks)

Q7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	___ 0 = No (skip to Q8) ___ 1 = Yes
Q7a	How often did this happen?	___ 1 = Rarely (once or twice in the past four weeks) ___ 2 = Sometimes (three to ten times in the past four weeks) ___ 3 = Often (more than ten times in the past four weeks)
Q8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	___ 0 = No (skip to Q9) ___ 1 = Yes
Q8a	How often did this happen?	___ 1 = Rarely (once or twice in the past four weeks) ___ 2 = Sometimes (three to ten times in the past four weeks) ___ 3 = Often (more than ten times in the past four weeks)
Q9	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	___ 0 = No (skip to closing of interview) ___ 1 = Yes
Q9a	How often did this happen?	___ 1 = Rarely (once or twice in the past four weeks) ___ 2 = Sometimes (three to ten times in the past four weeks) ___ 3 = Often (more than ten times in the past four weeks)

The total HFIAS score is calculated as the sum of the frequency-of-occurrence questions (HFIAS total score = Q1a + Q2a + Q3a + Q4a + Q5a + Q6a + Q7a + Q8a + Q9a). In addition to the total HFIAS score, households are also grouped into four categories of food security based on responses to these questions (Food Secure, Mildly Food Insecure Access, Moderately Food Insecure Access, and Severely Food Insecure Access). For example, households are defined as Severely Food Insecure if their response to Q5a=3 or Q6a=3 or Q7a=1 or Q7a=2 or Q7a=3 or Q8a=1 or Q8a=2 or Q8a=3 or Q9a=1 or Q9a=2 or Q9a=3. In short, households who ate smaller or fewer meals often in the past four weeks (Q5a=3 or Q6a=3) or had no food in the house, went to bed hungry, or went a day without food, are classified as severely food insecure. For the analysis in this paper, these two primary outcomes (HFIAS score and household classified as severely food insecure) are the primary food security outcomes evaluated.

### Child-level Development Outcomes

In addition to household-level development outcomes, child-level development outcomes related to education attainment and psychological/emotional well being are included in this analysis. Educational attainment information was obtained for all children in each household interviewed. As a short-term outcome, we assessed the proportion of children completing the most recent school term stratified by two age-groups: 7-13 year olds which is the standard age for primary school; and 14-17 years olds which is the standard age for secondary school. As a second educational outcome, we assessed the proportion of children progressing in school on schedule, defined as age-for-grade

congruent (within 1 year plus or minus) also stratified by primary and secondary school age groups (7-13 year olds; 14-17 year olds). And as a third educational outcome, we assessed the proportion of young adults (18-22 years of age) who completed secondary school. These young adults would have been considered ‘children’ at some point during the CBCO program period.

*Table 8. Conceptual outcomes and empirical variables for child-level outcomes*

Conceptual development outcomes for individual children	How were empirical outcome variables created?
Educational attainment	<p>Method: Questions included directly in survey instrument.</p> <p>Variables and outcomes for each child in household 7-13 years old and 14-17 years old:</p> <ul style="list-style-type: none"> <li>• proportion of children who completed most recent school term (Jan-March 2011).</li> <li>• proportion of children progressing in school on schedule (no more than 1 year behind standard age for grade)</li> </ul> <p>Variable and outcome for each young adult in household 18-22 years of age:</p> <ul style="list-style-type: none"> <li>• proportion of young adults completed secondary school.</li> </ul>
Child Emotional and Mental Health Status	<p>Method: The Strengths and Difficulties Questionnaire is a behavioral screening instrument (see <a href="http://www.sdqinfo.org">www.sdqinfo.org</a>). The SDQ total difficulties score is based on response to 20 questions across 4 areas:</p> <ul style="list-style-type: none"> <li>• emotional symptoms (5 items)</li> <li>• conduct problems (5 items)</li> <li>• hyperactivity/inattention (5 items)</li> <li>• peer relationship problems (5 items)</li> </ul> <p>Variable and outcomes for up to one child in household 4-10 and one child 11-16 in household:</p> <ul style="list-style-type: none"> <li>• total difficulties score based on above 20 items (integer from 0 – 40, lower is ‘better’)</li> <li>• indicator variable (0,1) if the child falls in the typical SDQ “abnormal” range (17-40)</li> </ul> <p>Note: The SDQ also has a 5<sup>th</sup> area call pro-social behavior (also 5 items) that is not included in the total difficulties score.</p>

The Strengths and Difficulties Questionnaire (SDQ), which is a 25-question behavioral screening instrument that has been translated into over 60 languages, was included in the overall survey instrument for this study [30-33]. General background information on the SDQ is available at <http://www.sdqinfo.org/a0.html>, and a list of peer-reviewed publications using or evaluating the SDQ is available at <http://www.sdqinfo.org/py/doc/f0.py>.

For this study, the versions for 4-10 years olds and 11-17 year olds designed to be administered to teachers or parents were used. For perspective, the U.S. English version of the SDQ instrument for 11-17 year olds is provided below.

## Strengths and Difficulties Questionnaire

**P or T**<sup>11-17</sup>

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain. Please give your answers on the basis of this young person's behavior over the last six months or this school year.

Young person's name .....

Male/Female

Date of birth.....

	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Restless, overactive, cannot stay still for long	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often complains of headaches, stomach-aches or sickness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shares readily with other youth, for example books, games, food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often loses temper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Would rather be alone than with other youth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generally well behaved, usually does what adults request	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Many worries or often seems worried	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helpful if someone is hurt, upset or feeling ill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Constantly fidgeting or squirming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has at least one good friend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often fights with other youth or bullies them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often unhappy, depressed or tearful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generally liked by other youth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easily distracted, concentration wanders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nervous in new situations, easily loses confidence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kind to younger children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often lies or cheats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Picked on or bullied by other youth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Often offers to help others (parents, teachers, children)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thinks things out before acting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steals from home, school or elsewhere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gets along better with adults than with other youth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Many fears, easily scared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good attention span, sees work through to the end	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Signature .....

Date .....

Parent / Teacher / Other (Please specify):

**Thank you very much for your help**

The 25 questions are grouped into 5 sub-topics (5 questions each): (1) emotional symptoms; (2) conduct problems; (3) hyperactivity/inattention; (4) peer relationships; and (5) pro-social behavior. The scoring for each question is 0, 1, or 2 (0 best, 2 worst), so that a score of 0 is the best and 10 the worst for each sub-topic. Sub-topics (1)-(4) are added together to generate a total difficulties score (0 best, 40 worst). The SDQ score is then grouped into three general categories: 0-13 is normal; 14-16 is borderline; and 17-40 is abnormal. To achieve a score of 17 or higher, numerous answers to the first twenty questions would need to be “somewhat true” or “certainly true”.

For each household, the SDQ was completed for up to one child aged 4-10 and one child 11-17. For households with more than one child in an age category, an algorithm was included to select randomly one child.

In sum, 9 empirical development outcome variables were created for each household, and where relevant, for children in each household:

- housing-based wealth (a continuous variable);
- agricultural-based wealth (a continuous variable);
- household food security based on the numeric HFIA score (an integer 0-27, with 0 the best and 27 the worst);
- child completed the most recent school term (0 = no, 1 = yes; stratified by 7-13 year olds and 14-17 years olds);
- child on track age-for-grade (0=no, 1 = yes; stratified by 7-13 year olds and 14-17 years olds); and
- child SDQ score (an integer 0-40, with 0 the best and 40 the worst; stratified by 4-10 year olds and 10-16 year olds).

The survey completed in June 2011 collected data to measure these outcomes, but outcome measures themselves do not provide information on the impacts of the program.

### ***B. Identifying Program Impacts on Development Outcomes***

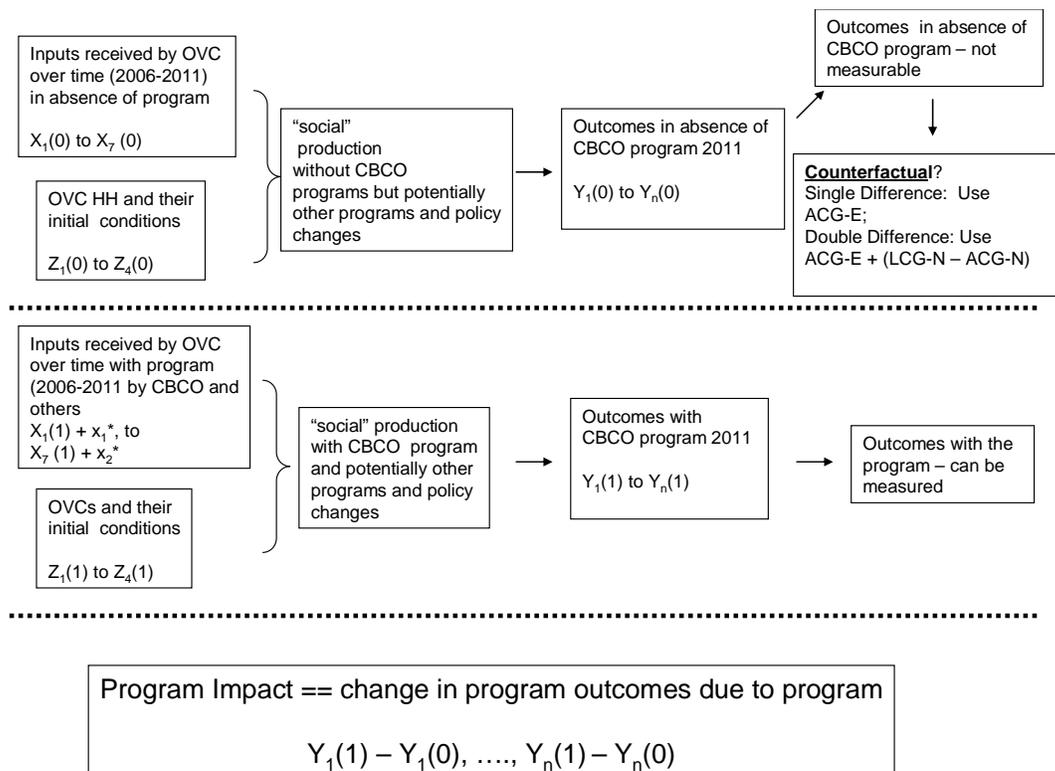
To begin to consider program impacts, Figure 3 summarizes a conceptual **production-function** framework for evaluating impacts of the CBCO program. In Figure 3, the variables Z denote the initial conditions for OVC and their households at the beginning of the program, X represent additional **inputs** that they received during program implementation (e.g. between 2006 and March 2011), and Y represent outcomes at the end of the project (e.g., the 15 outcomes identified in Tables 7 and 8). The top panel summarizes inputs and outcomes that **would have been** achieved in the absence of the program (the counterfactual), and the middle panel shows **what was achieved** with the CBCO program. The bottom panel provides a standard definition of program **impact** (the difference between outcomes observed and the counterfactual), which is also the definition of impact included in the USAID Evaluation Policy document [22].

Figure 3 also highlights why calls for ‘cost-effectiveness’ analysis of OVC programs are not well conceived. OVC programs involve multiple inputs that jointly produce multiple outcomes. No logical aggregate indicator of OVC welfare exists. As a result, ‘effectiveness’ in OVC program remains multidimensional, which precludes cost-effectiveness analysis.

The basic issue for all impact evaluation studies is to define an appropriate **counterfactual**. Returning to Figure 3, consider the case where the top panel represents some comparison group while the middle panel represents information for the treatment group (CBCO program participants). As is well known, if an intervention is allocated randomly to two study groups from

the same population (e.g. both eligible for the program) and if the sample size is adequate, the observed outcome for the comparison group provides a good counterfactual for the group that received the intervention. In this situation, a simple comparison of outcomes between the two study groups (e.g. difference in means or medians if continuous variables, difference in proportions if dichotomous) provides a reasonable measure of impact.

Figure 3. Overview of impact evaluation logic



Note: In this figure, the multiple potential outcomes from an OVC program are denoted  $Y_1$  to  $Y_n$ . The notation 0 means without the program (the counterfactual), and 1 means with the program. Z represents "initial conditions" of OVC and their households, while X represents inputs received by OVC and their households over time during program implementation.

A **first limitation** of this study is that a control group based on random assignment to the CBCO program among eligible households (eligible at the beginning of the program) does not exist for defining a counterfactual for this study. Given the urgency to provide and scale-up services to OVC in 2006, it is not surprising that the CBCO program did not assign households with OVC randomly into a treatment group (those in the CBCO program) and a control group (those eligible for the program but not provided program services).

With or without randomization to the treatment and control group, at least two rounds of data are very useful for identifying program impacts: a first round is needed at or before the program begins for both groups; and a second round is also needed for both groups (sometimes called end line or follow up). With two or more rounds of data for two or more groups, credible and straightforward analytical methods exist to define rigorously a credible counterfactual. Without random assignment

to the treatment group, however, even these methods (e.g. difference-in-difference estimates) rely on additional assumptions that cannot be tested [4]. In addition, at least two rounds of data for the same households in each group (panel/longitudinal data) are best.

A **second limitation** of this study is that data collected before the CBCO program began (or at least early in the program) do not exist. For baseline data to be useful for later impact evaluation analysis, data need to be collected for a representative sample of households participating in the CBCO program and for those not in the program. The CBCO program did collect information for a baseline needs assessment (information collected during June and July 2005). Such baseline information often collected by programs is not very useful for impact evaluation activities unless the baseline procedures (sampling strategy, data collected, etc.) are developed in conjunction with a planned future data collection so that study groups can be identified, sample sizes are adequate, consistent information is collected, and so on.

In the absence of explicit randomization and two or more rounds of data on households in the CBCO program and other households not in the program, quasi-experimental methods have been developed to attempt to identify program impacts when only one round of end-line data exist. Instrumental variable (IV), propensity-score matching (PSM), and nearest-neighbor matching (NNM) methods rely on various assumptions and statistical methods to adjust for the lack of randomization to the treatment group data [4, 34, 35]. IV methods are difficult to use appropriately because of the assumption that at least one ‘instrumental’ variable exists that is good at explaining why a household participated in the CBCO program but is not correlated with any of the outcomes being analyzed. NNM assumes essentially that it is possible to create a randomized comparison group by matching households participating in the program with those not in the program on a limited number of variables [34, 36]. PSM assumes it is possible to develop good estimates of the probability of participating in the program based on observable variables (e.g. demographic variables such as age, education, household size, OVC in the households, and so on). Once this probability model is estimated, PSM then requires that households in the CBCO program can be matched to households not in the program based on the propensity score (probability of being in the program) along with additional details (common support, etc.).

### ***C. Counterfactuals and Estimation Strategy for this Analysis***

For the analyses presented below, we adopt two strategies for developing a counterfactual. Rather than relying on fairly complicated statistical approaches (IV, PSM, NNM), the study was designed to collect information on multiple study groups to develop comparison groups and counterfactuals.

First, we use the outcome for the adjacent community group meeting program eligibility criteria at the time of the survey (the ACG-E group) as the counterfactual (see counterfactual box in top panel of Figure 3). By definition, the adjacent sub-locations are geographically next to each other, with similar weather patterns and agricultural cycles, and their inhabitants are from the same ethnic groups. The CBCO program could not operate in all locations due to financial constraints, so a limited number of sub-locations were included in the program.

In this case, impact is estimated as the single difference between the two study groups:

$$(1) \quad \text{Impact (single difference)} = Y(\text{CBCO}) - Y(\text{ACG-E}).$$

where  $Y(\text{CBCO})$  and  $Y(\text{ACG-E})$  denotes one of the empirical outcomes outlined in Tables 7 and 8 (e.g. mean score on the food security instrument for the CBCO group compared to the mean score for the ACG-E group).

This single-difference approach is potentially plausible because the CBCO program did not operate in the adjacent sub-locations (so self-selection could not be an issue) but the sub-locations are adjacent with similar ecosystems and cultures. To assess this assumption, we use information for the local and adjacent community groups of household not meeting eligibility criteria (LCG-N and ACG-N) to assess if households across these locations in general have similar situations (and outcomes).

If the outcomes between the two non-eligible groups are similar,  $Y(\text{LCG-N}) - Y(\text{ACG-N}) = 0$ , then some empirical evidence would exist to confirm that the CBCO and adjacent community sub-locations are similar (giving more credibility to the single difference estimates). If  $Y(\text{LCG-N}) - Y(\text{ACG-N})$  is not equal to 0, however, then the single difference approach to estimating impact discussed above may not be adequate.

One caveat, or **third limitation** of this study, is that only households participating in the CBCO program at the end of the program were included in the CBCO sample. Attrition from the program could imply that the households participating in 2011 are a biased sample of all households participating in the program. For example, if only households benefiting the most from the program remained in the program (a survivor bias), impacts based on the above single-difference estimated would be a biased estimate (too large) of average program impacts. An opposite possibility, albeit less likely, is that some portion of households benefiting from the program become so well off that they no longer participate in the program, so that impacts observed among the remaining participants would be a biased estimate (too small) of impacts. Because programs already have a strong incentive to identify such successes, estimates that are biased towards being too large (or too favorable) are likely to be most relevant here. This issue will be discussed further when reviewing results in Section VI.

As a second approach to estimating a counterfactual, we employ a ‘difference-in-difference’ approach, where we subtract from the first counterfactual any difference observed between outcomes for the local and adjacent community groups who did not meet eligibility requirements,  $Y(\text{LCG-N}) - Y(\text{ACG-N})$ . In this case, we use  $Y(\text{ACG-E}) + [Y(\text{LCG-N}) - Y(\text{ACG-N})]$  as the counterfactual. Subtracting this counterfactual from the outcome for the CBCO group and rearranging yields an estimate of impact based on a double-difference between study groups as:

$$(2) \quad \text{Impact (double difference)} = [Y(\text{CBCO}) - Y(\text{ACG-E})] - [Y(\text{LCG-N}) - Y(\text{ACG-N})].$$

A double-difference approach, also called a difference-in-differences approach, is often used in prospective studies with baseline data and end-line data for program participants and non-participants [4, 37]. The assumption is that changes observed over time among the non-participants would also have occurred for the participants (a ‘parallel trend’ assumption). As a result, the change observed over the two time periods among the non-participants is subtracted from the change observed for the participants to measure impact.

The parallel trend assumption common in double-difference estimates of program impact is adapted in equation (2) to be an “equal-difference” assumption. The assumption is that the difference observed between the not eligible groups would also be the difference between the CBCO and the ACG-E groups in the absence of the program.

The equal-difference assumption is probably somewhat extreme. Households not eligible for the program could generally have better outcomes (e.g., wealthier) than households eligible for the program in the same sub-locations. In the absence of the program, it is entirely possible that the households eligible for the program (the CBCO and ACG-E groups) would have similar outcomes

even if households not eligible for the program were different. If this was the case, the double-difference estimate in equation (2) would underestimate program impacts.

Based on these two complementary approaches to estimating impacts, evidence of positive program impact would exist if (in order of credibility):

- both the single- and double-difference estimates of impact were positive (and statistically different from 0);
- the single-difference estimate was positive (and statistically different from 0) but the double difference was substantially smaller and not statistically different from 0.

If both the single and double difference estimates are essentially 0, little evidence of program impact exists.

In addition to 'impact', an addition issue is 'disparity'. A simple comparison of the outcome for the CBCO group and the local-community group not eligible for the program provides useful information on the existence and depth of disparities between CBCO households and other households in the local community who would not be considered vulnerable:

$$(3) \quad \text{Disparities (single difference)} = Y(\text{CBCO}) - Y(\text{LCG-N})$$

To estimate the impact and disparity measures outlined in equations (1)-(3), we estimate a linear regression model:

$$(4) \quad Y = a + b_1 * \text{ACG-E} + b_2 * \text{LCG-N} + b_3 * \text{ACG-N} + b_4 * \text{LCG-E} + e,$$

where Y is an outcome variable of interest (from Table 7 and 8), ACG-E, LCG-N, ACG-N, and LCG-E are 0,1 dummy variables equal to 1 if the household falls into that group (CBCO is the excluded group), e is an error, and the parameters to be estimated are a,  $b_1 - b_4$ . Ordinary least squares (OLS) regression is used for the analysis of outcomes (using reg command in STATA 11 with robust standard errors) except for the analysis of median outcomes, in which case non-parametric quantile regression is used (qreg command in STATA 11).

For any outcome variable, four comparisons are made based on the estimated model:

1.  $\text{CBCO} - \text{ACG-E} = -b_1$ , which is the single difference estimate of impact in equation (1);
2.  $[\text{CBCO} - \text{ACG-E}] - [\text{LCG-N} - \text{ACG-N}] = -b_1 - (b_2 - b_3)$ , which is the double difference estimate in equation (2); and
3.  $\text{CBCO} - \text{LCG-N} = -b_2$ , which is the disparities estimate in equation (3).

As part of the double difference estimate, we also estimate  $\text{LCG-N} - \text{ACG-N} = b_2 - b_3$ , which considers if non-eligible households in the adjacent community look similar to the non-eligible households living in the CBCO sub-location. If  $b_2 - b_3$  is close to 0, better evidence exists to support using the single-difference estimate of impact.

Standard regression output directly provides standard errors, p-values, and confidence intervals for the individual parameters (e.g. for  $-b_1$  and  $-b_2$ ), while hypothesis tests for linear combinations of

estimated parameters (for comparison 3 and 4 above) were completed using the “test” post-estimation routine in STATA 11 (F-tests).

## VI. Impact and Disparities: Estimation Results

### A. Introduction

Section VI presents results for each development outcome identified in Table 7 and 8. Because of the distinct geographic locations and cultures in the two study provinces, all separate analyses are presented for each outcome for each province. Section VI.B presents results for agricultural and household wealth, VI.C provides results for household food security, VI.D provides results for educational outcomes, and VI.E provides results for the SDQ total difficulties scores. Due to the number of tables included for each outcome, and the size of some of the tables, all tables for each outcome are provided after the summary of the results.

### B. Agricultural and Housing Wealth

Tables 9A, 9B, and 10 summarize basic information on the ownership of agricultural assets and housing characteristics for the study groups. Rather than considering one generic wealth index for households, the analysis here develops two wealth measures: wealth based on housing characteristics; and wealth based on agricultural assets. Housing characteristics are associated with day-to-day quality of life issues (dry sleeping area, mosquito nets, type of fuel used for cooking), while agricultural assets are associated with current and future food and income generating activities.

The housing data show clear structural differences across provinces. For example, brick walls are common in Eastern Province for all study groups, while brick is rather uncommon in Nyanza. Ownership of mosquito nets and sleeping areas becoming wet during rains is more common in Nyanza Provinces, where the climate is wetter and more humid and malaria risk are higher. The majority of all households rely on surface water as their main drinking water source, which is generally 30-40 minutes walking time away from the dwelling.

Table 11 for the BIDII sample and Table 12 for the ADS sample provide details on the creation of the agricultural wealth and housing wealth index. In each table, the first column indicates the asset included in the creation of the agricultural wealth index and the coding for each asset (owns cart = 1, acres of agricultural land owned, number of cows owned, and so on). When asset ownership can be ranked from lower to higher as an integer, the variable is coded as an integer. When the variable is continuous, such as acres of agricultural land, the specific number is used (e.g. 2.2 acres of land). When asset numbers increase beyond 10, such assets are evaluated as continuous variables (goats, ewes, and chickens).

The second column in Table 11 reports the “coefficient” or wealth index weight based on a principal components analysis (using the *pcapolychoric* routine in STATA 11 based on the methods used in [24, 25]). For any household, the coefficients for the categorical variables (coded as integers where 0 is lowest) are added up based on their level of asset ownership. For example, a household owning a cart has 0.745164 added to their wealth score, a household owning 7 cows has 1.294064 added to their wealth score (note that the coefficients are not multiplied by the number of assets owned for the categorical variables). For the continuous variables, the coefficient is multiplied by the “standardized” variable for that household (for example, the data for acres of agricultural land is standardized to have a mean of zero and standard deviation of one). Similar information is provided in Table 11 for creation of the housing wealth index and the associated coefficients (only categorical variables used in the housing wealth index).

The set of variables included in the creation of the wealth indices were based on review of the literature (e.g., [26]), discussions with the CBCO program staff who live in the study locations, and a review of the information in Table 9a, 9b, and 10.

The wealth index itself is also a standardized variable with a mean equal to zero. The estimated coefficients rise with increasing numbers of assets owned, and a larger number (either positive or negative) indicates that the asset provides more “information” on wealth index (for the categorical variables). For example, consider the coefficients for owning a cart for hauling agricultural products in Table 11. Not owning a cart has a small negative coefficient of -0.042096, while owning a cart has a coefficient of 0.745164, which is almost one-standard deviation above the mean. The interpretation is that owning a cart is a strong indicator of high wealth status (based on agricultural assets) but not a strong indicator of lower wealth status.

Using the estimated wealth indices for each household as the empirical development outcome variables, Table 13 and 14 provide the results of the impact and disparities estimates for Eastern Province (BIDII sample) and Nyanza Province (ADS sample) for the comparisons explained in Section V.C.

In each table, we present results for three analyses. First, using the estimated wealth index as the dependent variable (the “Y” in equations (1) – (3) for example), we estimate equation (4) using OLS regression to estimate differences in mean outcomes. Second, also using the wealth index as the dependent variable, we estimated equation (4) using quantile regression to estimate median differences in outcomes. And third, we create a dichotomous variable equal to 1 if the household’s estimated wealth index is in the lowest 20% of all households (and 0 otherwise). Using this dichotomous variable as the dependent variable, we estimate a simple OLS regression model to differences in the proportion of the households in the lowest 20% based on the wealth measure.

From Table 13 for the BIDII sample, the mean agricultural wealth score for the CBCO group is 0.0125 and -0.0387 for housing wealth. Because the estimated wealth indices are normalized variables with a mean of 0, the means for the BIDII CBCO group are very close to the mean for the overall sample of households. Table 14 has similar information for the ADS sample (mean agricultural wealth of 0.15578 for agricultural wealth and 0.17690 for housing wealth).

### **Disparities**

A general positive result in Table 13 is that the CBCO households in Eastern Province rank generally close to the local community group of households not eligible for the program (the LCG-N group) in terms of agricultural and housing wealth. In Table 13, the mean and median differences in agricultural wealth are small (-0.0545 and -0.0561 respectively) and the proportion of households in the lowest agricultural wealth quintile are similar (0.1419 for the CBCO group and only 0.0381 lower for the LCG-N group). Although the mean difference between the CBCO group and the LCG-N group in housing wealth is negative and statistically significant (-0.2745), the absolute magnitude of the difference is small (about 1/3 of one standard deviation). There is no significant difference between these two groups (in magnitude or statistical significance) in either the median or proportion in the lowest 20%.

Similar information is provided in Table 14 for the ADS sample. For agricultural wealth, the CBCO group is estimated to have somewhat higher mean (0.13041) and median (0.09949) wealth levels than the LCG-N group, although p-values for the estimated differences are large. In terms of housing wealth, the CBCO group is also estimated to have somewhat higher mean and median values than the LCG-N group (difference of 0.17583 and 0.23789 respectively), indicating that the CBCO

households have similar or somewhat higher levels of housing wealth as compared to the LCG-N group.

Thus, the households in the CBCO program, and the children living in these households, are estimated to have similar development outcomes in terms of agricultural and housing wealth as compared to the local community group not eligible for the program (i.e. “non-vulnerable” households). The lack of disparities does not necessarily imply the lack of deprivation. Poverty is widespread in rural Kenya, and it is likely that a significant share of households living in the CBCO program area but not eligible for the CBCO program are also poor.

#### **Impacts based on single-difference estimates**

The CBCO households in the BIDII sample (Table 13) have higher agricultural wealth than the ACG-E group based on a single difference analysis of means (0.1330 is the first difference estimate), median difference (0.2365), and the proportion of households in the lowest wealth quintile is lower (-0.1375). There was no estimated difference in these measures for housing wealth for the Eastern Province sample (BIDII). Table 14 provides similar results, with somewhat larger estimated differences for the ADS sample for mean and median agricultural and household wealth.

If the ACG-E group outcomes could be reasonably used as the counterfactual for impact evaluation, the single difference results presented in Table 13 and 14 suggest positive impacts of the CBCO program on household agricultural wealth for both provinces and housing wealth for the ADS sample in Nyanza Province. In all cases, the CBCO households are not estimated to be worse off than ‘similar’ households (meaning meeting the CBCO program eligibility criteria) living nearby but outside the program implementation locations.

#### **Impacts based on double-difference estimates**

In Table 13 and Table 14, the LCG-N group is generally estimated to have higher agricultural and housing wealth than the ACG-N group. Although the mean difference is only 0.0245 for agricultural wealth, the median difference is 0.2800, and 9% fewer households in the LCG-N groups fall into the lowest 20% as compared to the ACG-N group. Housing wealth for the LCG-N group is also estimated to be significantly larger than for the ACG-N group (and the CBCO group). These results suggest that the adjacent communities included in the study are somewhat poorer in terms of agricultural wealth and significantly poorer in terms of housing wealth than the sub-locations where the CBCO program operated.

As a result, the simple single difference estimate of impact reported in Tables 13 and 14 may not adequately control for differences that exist across locations. It is also possible that the differences observed between the LCG-N and ACG-N groups, which in general were likely to be better off households, would not extend to differences between the CBCO and ACG-E groups in the absence of the CBCO program. Because the LCG-N group is estimated to have higher wealth measures (based on agricultural and housing wealth), the double difference analyses are substantially lower than the single difference estimates.

Table 9A. Ownership of agricultural assets (BIDI sample)

	ACG-E	ACG-NE	CBCO	LCG-E	LCG-NE
BIDI – Eastern					
Total land owned by household (mean, sd)	2.19 (2.67)	2.35 (3.09)	2.62 (3.18)	2.62 (3.85)	2.34 (3.27)
Total land for agriculture owned (mean, sd)	1.11 (1.23)	1.05 (1.22)	1.30 (1.71)	1.20 (1.46)	1.11 (1.28)
% Households owning cart of carrying products	3.84	5.44	4.94	8.94	6.83
% Own any livestock	80	81.63	93	84.55	89.44
(% who own this type of livestock, Mean number if owned (sd))					
<b>Local cattle (cows)</b>	32.33	30.61	34.77	34.96	42.86
	1.37 (0.84)	1.6 (1.12)	1.26 (0.58)	1.70 (0.96)	1.43 (0.88)
Local cattle (bulls)	10.41	15.99	11.11	12.2	8.7
	1.82 (0.87)	2.14 (1.10)	1.63 (0.83)	2 (0.76)	1.93 (0.92)
Local cattle (heifer, calves)	10.96	10.2	11.11	10.57	8.07
	1.3 (0.61)	1.23 (0.50)	1.37 (0.70)	1.38 (0.65)	1.31 (0.48)
Grade milk cows	4.66	3.06	6.79	6.5	8.07
	1.59 (0.80)	1.67 (0.87)	1.24 (0.50)	1.38 (0.52)	1.54 (0.88)
Grade bulls	0.82	0.68	0.62	0	0.62
	1.67 (0.58)	1 (0)	1 (0)	-	2 (.)
Other grade (heifer, calves)	1.1	2.38	4.32	1.63	0.62
	2.5 (1.29)	1 (0)	1.23 (0.44)	1 (0)	4 (.)
Horses, donkeys, mules	4.38	1.7	1.44	0.81	1.86
	1.25 (0.58)	1.6 (0.55)	1.29 (0.76)	20 (.)	1.67 (0.58)
<b>Local goats</b>	47.4	49.66	53.7	53.66	49.69
	3.62 (3.54)	5.23 (8.75)	3.48 (3.36)	3.73 (3.40)	4.48 (6.27)
She goats (dairy)	4.66	6.8	6.38	0.81	3.73
	3.47 (3.14)	3.8 (2.46)	2.58 (2.49)	1 (.)	1.83 (1.60)
He goats (grade)	3.29	4.08	3.5	0.81	2.48
	1.92 (1.24)	1.58 (1.08)	1.53 (0.80)	16 (.)	1.24 (0.5)
<b>Sheep (ewes)</b>	11.78	15.31	17.9	14.63	18.63
	2.51 (1.64)	3.02 (3.56)	2.18 (1.67)	2.06 (1.06)	2.7 (2.12)
<b>Sheep (rams)</b>	7.4	9.18	9.47	7.32	9.32
	1.81 (1.04)	3.11 (4.78)	1.98 (1.26)	3.11 (4.28)	2.6 (1.64)
<b>Chickens</b>	64.93	68.71	72.02	66.67	75.16
	5.89 (6.07)	6.22 (8.27)	6.07 (8.29)	8.92 (12.89)	5.86 (4.91)
Rabbits	2.47	2.38	5.56	1.63	6.21
	3.56 (2.13)	4.14 (3.18)	2.89 (2.41)	12 (4.24)	4.2 (5.47)
Guinea pigs	0	0	0	0	0.62
	-	-	-	-	3 (.)
Other	0	0	0.62	0	0
	-	-	4.67 (4.62)	-	-

Table 9B. Ownership of Agricultural Assets (ADS sample)

	ACG-E	ACG-NE	CBCO	LCG-E	LCG-NE
ADS – Nyanza					
Total land owned by household (mean, sd)	2.26 (1.98)	2.60 (4.11)	2.39 (2.49)	2.45 (3.08)	2.30 (2.13)
Total land for agriculture owned (mean, sd)	1.33 (1.20)	1.38 (1.44)	1.39 (1.56)	1.22 (1.15)	1.31 (1.10)
% Households owning cart of carrying products	1.89	2.88	4.31	3.07	1.96
% Own any livestock	81.84	86.06	92.24	79.75	90.2
(% who own this type of livestock, Mean number if owned (sd))					
<b>Local cattle (cows)</b>	44.81	48.08	52.37	41.1	51.96
	5.11 (36.20)	2.24 (1.26)	2.11 (1.48)	2.60 (2.07)	2.36 (1.53)
Local cattle (bulls)	16.04	19.23	23.28	22.7	22.55
	2.06 (1.53)	2.30 (1.45)	2.08 (1.28)	2.81(1.90)	2.52 (2.13)
<b>Local cattle (heifer, calves)</b>	13.21	17.31	20.04	22.09	10.78
	2.23 (1.64)	1.94 (1.85)	2.15 (2.87)	2.06 (1.98)	1.45 (0.93)
Grade milk cows	0.24	0	1.29	3.07	0
	6 (.)	-	2 (0.89)	4.2 (4.38)	-
Grade bulls	0.24	0	0.43	1.23	0
	1 (.)	-	2.5 (2.12)	9 (0)	-
Other grade (heifer, calves)	0.94	0	0.43	1.23	0
	2 (0.82)	-	1 (0)	9 (0)	-
Horses, donkeys, mules	3.07	1.44	4.31	4.91	0.98
	2.46 (1.33)	1.33 (0.58)	3.4 (2.41)	4.5 (3.34)	5 (.)
<b>Local goats</b>	33.73	29.81	46.55	38.65	36.27
	2.71 (1.56)	2.66 (1.47)	3.00 (2.00)	3.25 (1.89)	2.24 (1.23)
She goats (dairy)	2.36	4.81	5.82	2.45	2.94
	2 (1.33)	2.2 (0.79)	2.41 (1.31)	7 (2.31)	4 (2)
He goats (grade)	1.65	3.37	3.23	1.84	0.98
	1.71 (0.49)	2.29 (1.11)	2.33 (1.29)	7 (3.46)	4 (.)
<b>Sheep (ewes)</b>	11.79	11.54	21.55	19.02	22.55
	2.56 (1.68)	2.46 (1.64)	2.63 (3.58)	2.63 (3.58)	2.52 (1.88)
<b>Sheep (rams)</b>	5.19	8.17	11.21	9.82	8.82
	2.41 (2.44)	2.41 (1.62)	4.94 (12.64)	2.69 (2.06)	2.89 (3.48)
<b>Chickens</b>	69.58	70.67	75.86	67.48	81.37
	5.25 (4.35)	5.77 (5.55)	8.15 (7.32)	7.11 (6.63)	12.64 (54.68)
Rabbits	0.24	1.92	1.29	3.07	1.96
	5 (.)	3.25 (3.30)	12.17 (10.19)	6 (4.30)	4.5 (0.71)
Guinea pigs	0.47	1.44	0.43	1.23	0
	1.5 (0.71)	1.67 (0.58)	2.5 (2.12)	9 (0)	-
Other	0	0	0.86	1.84	0
	-	-	1.5 (0.58)	7.33 (2.89)	-

Table 10. Housing characteristics

Variable (% of total group)	BIDII					ADS				
	CBCO	ACG-E	LCG-N	ACG-N	LCG-E	CBCO	ACG-E	LCG-N	ACG-N	LCG-E
Live in single family house with metal roof (otherwise thatching)	88.9	93.2	90.7	91.2	88.6	76.7	71.0	63.7	61.5	66.3
Walls made from:										
Mud	8.2	15.3	8.1	20.1	8.9	89.0	95.5	95.1	94.7	91.4
Iron sheets	0.6	0.6	0.6	1.0	0.0	1.5	0.9	0.0	0.0	0.6
Wood / timber	1.2	1.4	1.9	1.0	0.0	0.0	0.5	0.0	0.5	0.0
Brick	84.8	76.4	84.5	71.1	84.6	7.8	2.4	2.0	4.3	4.9
Stone	5.1	6.3	5.0	6.8	6.5	1.5	0.5	2.9	0.0	1.8
Own home	92.6	92.1	96.3	92.5	91.1	97.4	98.1	96.1	97.6	95.1
Own land where home sits	88.5	89.6	95.0	88.4	88.6	93.3	95.3	90.2	94.7	92.0
Sleeping area stays dry when it rains										
No	21.6	19.2	13.0	14.6	18.7	39.9	45.3	26.5	44.2	41.7
Yes, because we move where we sleep	16.7	18.9	11.8	13.6	12.2	12.7	14.2	5.9	11.1	12.9
Yes, it stays dry	61.7	61.9	75.2	71.8	69.1	47.4	40.3	66.7	44.7	45.4
Main source of water is from a dug well, surface water, or natural spring (otherwise borehole or community tap)	79.2	66.3	82.6	58.2	73.2	83.6	67.5	82.4	69.2	82.8
Have mosquito nets	49.4	52.1	57.8	57.1	54.5	84.5	77.4	81.4	85.1	71.2
Wood is main cooking fuel	96.9	98.9	96.9	98.0	94.3	96.8	98.4	97.1	97.6	98.2
Time (minutes) one way to water source in minutes (mean)	34.4	37.6	31.4	38.3	30.2	36.8	34.6	39.4	30.9	32.8
(standard deviation)	25.8	44.1	19.6	46.1	21.2	42.5	45.1	41.8	37.4	36.3

Table 11. Polychoric PCA coefficients for agricultural and housing wealth indices (BIDI Sample)

BIDI Wealth Index		BIDI Housing Wealth Index	
Asset	Coefficient	Variable	Coefficient
Owns cart for hauling agricultural products			
0	-0.042096	Own house	
1	0.745164	No 0	-0.870034
Acres of land used primarily for agriculture	0.288725	Yes 1	0.067875
Cows (local)			
0	-0.218732	Own land under house	
1	0.31463	No 0	-0.840966
2	0.618782	Yes 1	0.098203
3	0.806583		
4	0.918957	House has metal roof (else thatching)	
5	1.033435	No 0	-0.733575
6	1.126206	Yes 1	0.073674
7	1.294064		
Bulls (local)		House walls made of	
0	-0.09743	mud 0	-0.563864
1	0.568307	brick 1	0.048456
2	0.758985	stone 2	0.711067
3	1.012738		
4	1.107075	Source of lighting	
5	1.209823	none 0	-0.902716
6	1.382566	tin and kerosene 1	-0.258544
Heifers/calves (local)		hurricane lamp and kerosene 2	0.159514
0	-0.04566	solar panel 3	0.492906
1	0.343767	electricity/generator 4	0.693731
2	0.484922		
3	0.601982	Sleeping areas dry	
4	0.712604	no 0	-0.492605
Local goats	0.355421	yes because move 1	-0.21962
Local sheep (ewes)	0.290767	yes 2	0.188639
Local sheep (rams)			
0	-0.063984	cooking_outside	
1	0.560424	No 0	0.018467
2	0.677807	Yes 1	-0.515655
3	0.764986		
4	0.83586		
5	0.924022		
6	1.009311		
10	1.138024		
Chickens	0.203646		

Table 12. Polychoric PCA coefficients for agricultural and housing wealth indices (ADS Sample)

ADS agricultural wealth index		ADS housing wealth index	
Variable	Coefficient	Variable	Coefficient
		Own land under house	
Owns cart for hauling agricultural products		No 0	-0.12305
0	-0.0249	Yes 1	0.00814
1	0.7926	Metal roof (else thatching)	
Acres of land used primarily for agriculture	0.1904	No 0	-0.48477
Cows (local)		Yes 1	0.20068
0	-0.3004	Walls not mud	
1	0.1096	No 0	-0.09090
2	0.3057	Yes 1	1.20572
3	0.4893	Main source of lighting	
4	0.6197	None 0	-1.63895
5	0.7284	Tin 1	-0.26900
6	0.8172	Hurricane lamp 2	0.50596
7	0.9934	Solar 3	0.99256
Bulls (local)		Electricity or generator 4	1.26476
0	-0.1591	Sleeping area stays dry	
1	0.4443	No 0	-0.24826
2	0.5993	Yes because move 1	-0.01587
3	0.7444	Yes 2	0.22685
4	0.8822	Cooking outside	
5	1.0254	No 0	0.09223
6	1.1338	Yes 1	-0.44552
7	1.3198		
Heifers/calves (local)			
0	-0.1033		
1	0.3895		
2	0.5361		
3	0.6490		
4	0.7290		
5	0.7968		
6	0.8185		
7	0.9364		
Local goats			
0	-0.1481		
1	0.0984		
2	0.1705		
3	0.2534		
4	0.3291		
5	0.4113		
6	0.4906		

	7	0.6108	
Local sheep (ewes)			
	0	-0.1206	
	1	0.4337	
	2	0.5484	
	3	0.6759	
	4	0.7839	
	5	0.8653	
	6	0.9278	
	7	1.0850	
Local sheep (rams)			
	0	-0.0668	
	1	0.5782	
	2	0.6826	
	3	0.7892	
	4	0.8410	
	5	0.8562	
	6	0.8772	
	7	1.0218	
Chickens		0.0135	

Table 13. Analysis of program impacts on agricultural and household wealth (BIDII)

BIDII sample	Outcome Variable	Agricultural wealth based on polychoric PCA analysis			Housing wealth based on polychoric PCA analysis		
MODEL							
OLS Regression with robust standard errors	Comparisons	Estimate	p-value difference test		Differences	Estimate	p-value difference test
single difference	CBCO - ACG_E	0.1330	0.111		CBCO - ACG_E	0.0036	0.954
disparity	CBCO - LCG_N	-0.0545	0.658		CBCO - LCG_N	-0.2745	0.000
	LCG_N - ACG_N	0.0245	0.863		LCG_N - ACG_N	0.2847	0.001
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	0.1084	0.658		(CBCO-ACG_E) - (LCG_N - ACG_N)	-0.2811	0.006
	Mean CBCO	0.0125			Mean CBCO	-0.0387	
Quantile Regression (median)							
single difference	CBCO - ACG_E	0.2365	0.004		ND		
disparity	CBCO - LCG_N	-0.0561	0.607		ND		
	LCG_N - ACG_N	0.2800	0.017		ND		
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	-0.0435	0.607		ND		
	Median CBCO	-0.3420028			Median CBCO	0.2368	
Proportion in SES1 (lowest 20%)							
single difference	CBCO - ACG_E	-0.1375	0.000		CBCO - ACG_E	0.0149	0.000
disparity	CBCO - LCG_N	-0.0381	0.265		CBCO - LCG_N	-0.0183	0.203
	LCG_N - ACG_N	-0.0920	0.022		LCG_N - ACG_N	-0.1735	0.026
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	-0.0455	0.265		(CBCO-ACG_E) - (LCG_N - ACG_N)	0.1884	0.247
	Proportion CBCO in lowest quintile	0.1419			Proportion CBCO in lowest quintile	0.2201	

Table 14. Analysis of program impacts on agricultural and household wealth (ADS)

	Outcome Variable	Agricultural wealth based on polychoric PCA analysis			Housing wealth based on polychoric PCA analysis		
MODEL							
<b>OLS Regression with robust standard errors</b>	Comparisons	Estimate	p-value difference test		Differences	Estimate	p-value difference test
single difference	CBCO - ACG_E	0.32386	0.00000		CBCO - ACG_E	0.28423	0.00000
disparity	CBCO - LCG_N	0.13041	0.28700		CBCO - LCG_N	0.17583	0.03500
	LCG_N - ACG_N	0.10174	0.44340		LCG_N - ACG_N	0.14802	0.10110
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	0.22213	0.28680		(CBCO-ACG_E) - (LCG_N - ACG_N)	0.13621	0.03490
	Mean CBCO	0.15578			Mean CBCO	0.17690	
<b>Quantile Regression (median)</b>							
single difference	CBCO - ACG_E	0.31619	0.00000		CBCO - ACG_E	0.47510	0.00000
disparity	CBCO - LCG_N	0.09949	0.45400		CBCO - LCG_N	0.23789	0.00000
	LCG_N - ACG_N	0.26112	0.07580		LCG_N - ACG_N	0.23721	0.00000
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	0.05508	0.45440		(CBCO-ACG_E) - (LCG_N - ACG_N)	0.23789	0.00000
	Median CBCO	-0.06743			Mean CBCO	0.16799	
<b>Proportion in SES1 (lowest 20%)</b>							
single difference	CBCO - ACG_E	-0.11422	0.00000		CBCO - ACG_E	-0.06897	0.01300
disparity	CBCO - LCG_N	-0.04069	0.32200		CBCO - LCG_N	-0.07387	0.11500
	LCG_N - ACG_N	-0.04949	0.29950		LCG_N - ACG_N	-0.07683	0.15660
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	-0.06473	0.32150		(CBCO-ACG_E) - (LCG_N - ACG_N)	0.00786	0.11470
	Proportion CBCO in lowest quintile	0.13578			Proportion CBCO in lowest quintile	0.18104	

### **C. Household Food Insecurity**

Table 15 (BIDII) and Table 16 (ADS) summarize the results of the food security portion of the questionnaire. Overall, the HFIA scores show poor food security for all groups in both regions. The majority of households in Eastern Province were classified as severely food insecure, with the exception of the LCG-N group (46% severely food insecure). The households in Nyanza Province had worse food security scores, with the proportion of severely food insecure households ranging from 69% to 86%.

Using the HFIA score for each household as the empirical development outcome variable, Table 17 provides the results of the impact and disparities estimates for Eastern Province (BIDII sample) and Nyanza Province (ADS sample) for the comparisons explained in Section V.C.

In each table, we present results for three analyses. First, using the HFIA score as the dependent variable (the “Y” in equations (1) – (3) for example), we estimate equation (4) using OLS regression to estimate differences in mean outcomes. Second, also using the HFIA score as the dependent variable, we estimated equation (4) using quantile regression to estimate median differences in outcomes. And third, we create a dichotomous variable equal to 1 if the household is defined as ‘severely food insecure’ based on the HFIA scoring criteria. Using this dichotomous variable as the dependent variable, we estimate a simple OLS regression model to measure differences in the proportion of the households defined as severely food insecure.

#### **Disparities**

In terms of mean and median HFIA scores, the scores for the CBCO group are somewhat higher than for the LCG-N group (e.g. 1 or 2 point higher), but the differences are not substantial in magnitude or statistically significant at a 5% significance level. In terms of severe food insecurity, however, 14% more households in the BIDII sample and 8% more households in the ADS sample were rated as severely food insecure as compared to the LCG-N group.

#### **Impacts based on single- and double-difference estimates**

The CBCO households in the BIDII and ADS sample (Table 17) have somewhat lower mean and median HFIA scores than their respective ACG-E group. For the ADS study location, the proportion of households rated as severely food insecure is 8% lower for the CBCO group as compared to the ACG-E group.

The LCG-N group has consistently lower HFIA scores at the mean and median as compared to the ACG-N group, although the differences are not consistently statistically significant. As a result, any “positive” differences observed in the single-difference estimates (i.e. lower HFIA scores for the CBCO group) are eliminated in the double-difference analysis.

Table 15. Food security based on HFIA instrument (BIDII)

	CBCO	ACG-E	LCG-N	ACG-N	LCG-E
HFIA mean	10.82	11.47	8.70	10.57	10.30
HFIA median	11.00	12.00	9.00	11.00	10.00
Variable (% of total)					
HFIA category					
Food secure	8.02	11.54	16.77	11.90	11.38
Mildly food insecure	5.76	4.12	7.45	7.48	8.94
Moderately food insecure	25.51	23.35	29.81	26.19	23.58
Severely food insecure	60.70	60.99	45.96	54.42	56.10
HFIA Q7: No food of any kind to eat in the household in the last 4 weeks					
No	48.45	45.60	62.11	51.54	51.22
Rarely	21.24	23.90	18.01	21.50	22.76
Sometimes	22.89	17.58	16.15	15.36	19.51
Often	7.42	12.91	3.73	11.60	6.50
HFIA Q8: You or household member went to bed hungry in the last 4 weeks					
No	61.52	60.55	75.78	67.01	69.92
Rarely	19.34	22.47	14.29	18.37	13.82
Sometimes	13.79	9.86	8.70	10.88	11.38
Often	5.35	7.12	1.24	3.74	4.88
HFIA Q9: You or household member went a whole day without eating					
No	79.42	81.37	87.58	82.31	84.55
Rarely	9.88	7.40	7.45	8.50	5.69
Sometimes	6.79	7.95	3.73	5.78	6.50
Often	3.91	3.29	1.24	3.40	3.25

Table 16. Food security based on HFIA instrument (ADS)

	CBCO	ACG - E	LCG - N	ACG - N	LCG - E
HFIA mean	13.28	15.54	13.14	14.39	13.96
HFIA median	13.00	16.00	13.50	14.00	14.00
Variable (% of total)					
HFIA category					
Food secure	4.75	2.36	1.96	1.46	2.45
Mildly food insecure	3.24	1.42	3.92	0	3.07
Moderately food insecure	14.9	10.38	25.49	25.24	12.88
Severely food insecure	77.11	85.85	68.63	73.3	81.6
HFIA Q7: No food of any kind to eat in the household in the last 4 weeks					
No	35.79	27.01	49.02	41.26	28.83
Rarely	26.03	23.7	23.53	25.73	24.54
Sometimes	26.46	31.99	20.59	19.9	34.97
Often	11.71	17.3	6.86	13.11	11.66
HFIA Q8: You or household member went to bed hungry in the last 4 weeks					
No	39.83	31.99	40.2	38.54	33.33
Rarely	24.89	24.88	22.55	26.83	22.84
Sometimes	24.24	30.57	32.35	24.88	33.95
Often	11.04	12.56	4.9	9.76	9.88
HFIA Q9: You or household member went a whole day without eating					
No	53.26	42.79	63.73	57.97	41.98
Rarely	19.13	22.46	16.67	20.29	27.78
Sometimes	17.17	20.57	15.69	11.59	22.22
Often	10.43	14.18	3.92	10.14	8.02

Table 17. Analysis of program impacts on household food security

MODEL		BIDII		ADS	
OLS Regression with robust standard errors	Comparisons	Estimate	p-value difference test	Estimate	p-value difference test
single difference	CBCO - ACG_E	-0.646	0.184	-2.258	0.0000
disparity	CBCO - LCG_N	2.123	0.000	0.145	0.8265
	LCG_N - ACG_N	-1.868	0.004	-1.250	0.0871
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	1.222	0.129	-1.008	0.2425
	Mean CBCO	10.825		13.283	
Quantile Regression (median)					
single difference	CBCO - ACG_E	-1.000	0.462	-3.0	0.021
disparity	CBCO - LCG_N	2.000	0.267	0.0	1.000
	LCG_N - ACG_N	-2.000	0.304	-1.0	0.661
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	1.000	0.674	-2.0	0.412
	Median CBCO	11.000		13.000	
Probability of severe food insecurity (OLS regression)					
single difference	CBCO - ACG_E	-0.001	0.971	-0.087	0.0009
disparity	CBCO - LCG_N	0.147	0.001	0.085	0.0923
	LCG_N - ACG_N	-0.085	0.083	-0.047	0.3983
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	0.083	0.159	-0.041	0.5051
	Proportion CBCO severe food insecurity	0.607		0.771	

#### **D. Education**

Responses to education attainment of young adults and school attendance of children are shown in tables 18A (BIDII) and 18B (ADS). A clear pattern emerges when reviewing the information in Tables 18A and 18B. Across all study groups:

- over 90% of 7-13 year olds (primary school age) completed the last school term and a large proportion (80-90%) were reported to be age-for-grade congruent (on track) or better;
- over 90% of 14-17 year olds (secondary school age) also complete the last school term, although a smaller proportion (65-75%) were reported to be age-for-grade congruent or better; and
- only 20-30% of 18-22 year olds completed secondary school for BIDII sample and only 11-20% of 18-22 year olds completed secondary school for the ADS sample.

Table 19 presents the results of disparities, single-difference, and double-difference analysis for the following outcomes: proportion of 7-13 year olds (primary school age) completing the last school term; proportion of 14-17 year olds (secondary school age) completing the last school term; the proportion of 7-13 year olds who are 2+ years behind grade for age; the proportion of 14-17 year olds who are 2+ years behind grade for age; and the proportion of 18-22 year old who completed secondary school.

#### **Disparities**

The results in Table 19 indicate some continuing disparities in educational outcomes between the CBCO and the LCG-N group in each province. Essentially no or small differences (< 5%) are observed in the proportion of children 7-13 years olds who completed the last school term or are 2 or more years behind appropriate age-for-grade and the proportion of young adults 18-22 who completed secondary school. Children 14-17 years old were somewhat less likely to have completed the last school term as compared to their local peers in the LCG-N group (9% less for the BIDII group and 5% less for the ADS group) and more likely to be 2 or more years behind appropriate grade for age (6% for the BIDII sample and 20% for the ADS sample).

#### **Impacts based on single- and double-difference estimates**

The single-difference estimates of impacts reported in Table 19 show no difference in the proportion of children completing the last school term (these proportions are high for all groups). As compared to the ACG-E, the CBCO children were somewhat less likely to be 2 or more years behind appropriate age for grade (3% less for the 7-13 year olds and 6-7% less for the 14-17 year olds). The CBCO young adults were also more likely to have completed secondary school (6%). Given that the proportion of young adults completing secondary school was relatively small in all groups, a 6% improvement is relatively large in magnitude.

In both provinces, the LCG-N group had similar or somewhat better educational outcomes than the ACG-N group. As a result, and as consistent with the analyses for the wealth and food security, the potentially positive impacts observed based on a single-difference analysis are muted or eliminated in the double-difference analysis.

Table 18A. Educational Outcomes (BIDII)

	CBCO	ACG -E	LCG - N	ACG - N	LCG - E
Total children 7-13 years old	669	507	209	373	192
Percent of children 7-13 who completed last school term	97.31	98.03	97.61	96.51	96.35
Grade track for 7-13 year olds (%)					
Over 4 years behind	0	0.4	0.48	0.27	0
2-4 years behind	4.2	5.32	7.65	6.43	10.94
On track (+/- 1 year)	72.52	72.97	78.95	72.65	77.6
2+ years ahead	23.27	21.31	12.92	20.64	11.46
Total children 14-17 years old					
Percent of children 14-17 who completed last school term	90.38	91.64	100	96.05	93.02
Grade track for 14-17 year olds (%)					
Over 4 years behind	2.46	2.45	1.79	0	1.16
2-4 years behind	23.04	30.06	30.36	33.89	25.57
On track (+/- 1 year)	61.3	60.49	62.5	59.32	62.79
2+ years ahead	13.2	6.99	5.36	6.77	10.47
Total number of 18-22 year olds	387	237	113	180	89
Education among 18 to 22 year olds					
None	0.78	0.84	0	1.11	1.12
Some primary	17.31	19.41	17.7	21.67	19.1
Completed primary	26.1	28.27	24.78	28.33	24.72
Some secondary	28.68	31.22	27.43	27.22	25.84
Completed secondary	25.06	14.77	25.66	17.78	22.47
Higher	2.07	5.49	4.42	3.89	6.74

Table 18B. Educational Outcomes (ADS)

	CBCO	ACG – E	LCG - N	ACG -N	LCG -E
Total children 7-13 years old	705	601	115	263	261
Percent of children 7-13 who completed last school term	94.47	93.34	99.13	96.2	98.08
Grade track for 7-13 year olds (%)					
Over 4 years behind	1.42	1.36	3.48	1.14	0
2-4 years behind	9.68	13.88	11.31	9.92	10.35
On track (+/- 1 year)	64.87	67.18	66.95	73.28	68.2
2+ years ahead	24.03	17.6	18.26	15.65	21.46
Total children 14-17 years old	375	325	49	128	127
Percent of children 14-17 who completed last school term	90.4	92.31	95.92	90.63	88.98
Grade track for 14-17 year olds (%)					
Over 4 years behind	3.19	6.49	4.08	7.13	6.3
2-4 years behind	26.93	30.55	46.93	35.72	26.78
On track (+/- 1 year)	54.93	51.55	46.94	43.65	59.05
2+ years ahead	14.93	11.42	2.04	13.49	7.88
Total number of 18-22 year olds	293	273	53	132	74
Education among 18 to 22 year olds					
None	2.05	3.3	1.89	3.03	5.41
Some primary	26.96	34.07	35.85	32.58	31.08
Completed primary	11.6	18.68	9.43	21.97	20.27
Some secondary	39.25	29.67	37.74	30.3	27.03
Completed secondary	14.68	11.36	13.21	9.85	10.81
Higher	5.46	2.93	1.89	2.27	5.41

Table 19. Analysis of program impacts on educational outcomes

		BIDII		ADS	
		Estimate	p-value	Estimate	p-value
Proportion Completed Last School Term (7 -13 years)					
single difference	CBCO - ACG_E	-0.0071	0.4196	0.0112	0.4025
disparities	CBCO - LCG_N	-0.0029	0.8119	-0.0466	0.0002
	LCG_N - ACG_N	0.0110	0.4384	0.0293	0.0450
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	-0.0182	0.2773	-0.0181	0.3606
	Proportion CBCO	0.9731		0.9447	
Proportion Completed Last School Term (14-17 years)					
single difference	CBCO - ACG_E	-0.0126	0.5612	-0.0191	0.3720
disparities	CBCO - LCG_N	-0.0962	0.0000	-0.0552	0.0884
	LCG_N - ACG_N	0.0396	0.0069	0.0529	0.1663
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	-0.0521	0.0450	-0.0720	0.0996
	Proportion CBCO	0.9038		0.9040	
Proportion 2+ years behind grade for age (14-17 year olds)					
single difference	CBCO - ACG_E	-0.0701	0.0442	-0.0690	0.0560
disparities	CBCO - LCG_N	-0.0664	0.1764	-0.2089	0.0061
	LCG_N - ACG_N	-0.0176	0.7568	0.0816	0.3307
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	-0.0526	0.4282	-0.1507	0.0987
	Proportion CBCO	0.2550		0.3013	
Proportion 2+ years behind grade for age (7 -13 year olds)					
single difference	CBCO - ACG_E	-0.0152	0.2421	-0.0413	0.0307
disparities	CBCO - LCG_N	-0.0394	0.0564	-0.0369	0.2979
	LCG_N - ACG_N	0.0141	0.5377	0.0371	0.3329
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	-0.0294	0.2647	-0.0785	0.0666
	Proportion CBCO	0.0420		0.1110	
Proportion of 18-22 year olds completed secondary school					
single difference	CBCO - ACG_E	0.0688	0.0485	0.0585	0.0664
disparities	CBCO - LCG_N	-0.0296	0.5467	0.0504	0.3582
	LCG_N - ACG_N	0.0842	0.1118	0.0297	0.6006
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	-0.0154	0.8072	0.0288	0.6579
	Proportion CBCO	0.2713		0.2014	

### ***E. Strengths and Difficulties***

The SDQ instrument was completed for up to one child 4-10 years old and 11-16 years old in each household. The instrument administered to caregivers and teachers was used. If a household had more than one child, the SDQ was administered to the child closest to 7 years for the 7-10 year old group and 14 years for the 11-17 year old group. The total difficulties score, based on 20 questions, ranges from 0 (the best) to 40 (the worst). In general, scores 13 or less are considered 'normal', 14-16 'borderline', and 17+ as 'abnormal'. An 'abnormal' score general suggests additional screening for mental health problems. As one example, a small study of OVC and non-OVC in South Africa reported a mean total difficulties score of 13 for non-OVC and 14 for OVC [32]. For the children in this study, the mean total difficulties scores across all groups in both locations were roughly 8-9.

Table 20.A (BIDII) and 20.B (ADS) show the range of results for strengths and difficulties questionnaire (SDQ) separately for 4 to 10 year olds and 11 to 17 years olds in both provinces. The total scores are grouped into normal ( $\leq 13$ ), borderline (14-16), and abnormal (17-40) ranges. The SDQ scoring guidance suggests that roughly 10% of children would be ranked as abnormal and another 10% as borderline in general population surveys, which is roughly consistent with the data for the BIDII sample in Eastern Province.

### **Disparities and Impacts**

Table 21 shows essentially no disparities in the percentage of children ranked as "abnormal" between the CBCO and LCG-N groups except for the younger children (4-10 year olds) in the ADS sample. For this group, 21% of children in the CBCO group scored in this category, which was 14% more than in the LCG-N group.

Single-difference estimates for the BIDII sample are 0% for 4-10 year olds and -4% for the 11-17 year olds ( $p$ -value = 0.05). The same estimates for the ADS sample are 9% ( $p$ -value < 0.05) for 4-10 year olds and 2% for 11-17 year olds. As with the other outcomes, the LCG-N group generally had 'better' outcomes (smaller percentage scored as abnormal) than the ACG-N group (except no difference for the ADS sample for the 11-17 year olds). Thus, the somewhat positive single-difference estimates for the BIDII sample for the 4-10 year olds are muted by the double difference estimates.

Table 20.A SDQ Results (BIDII)

	CBCO	ACG -E	LCG - N	ACG - N	LCG - E
SDQ scores: 4 to 10 year olds					
% of households with at least one child in this age group	0.60	0.62	0.71	0.65	0.66
Total difficulties					
Normal	77.93	77.53	84.35	77.6	73.75
Borderline	10.34	10.13	6.96	7.29	11.25
Abnormal	11.72	12.33	8.7	15.1	15
SDQ scores: 11 to 17 year olds					
SDQ completed (% of interviews)	0.80	0.75	0.66	0.57	0.74
Total difficulties					
Normal	84.24	79.56	85.85	80.36	82.42
Borderline	8.27	8.39	7.55	8.33	8.79
Abnormal	7.49	12.04	6.6	11.31	8.79

Table 20.B SDQ Results (ADS)

	CBCO	ACG -E	LCG - N	ACG - N	LCG - E
SDQ scores: 4 to 10 year olds					
% of households with at least one child in this age group	0.69	0.68	0.70	0.62	0.72
Total difficulties					
Normal	60.87	77.43	85.92	86.05	70.94
Borderline	17.39	10.76	7.04	6.2	11.11
Abnormal	21.74	11.81	7.04	7.75	17.95
SDQ scores: 11 to 17 year olds					
SDQ completed (% of interviews)	0.75	0.73	0.45	0.56	0.74
Total difficulties					
Normal	71.26	78.57	91.3	82.05	77.5
Borderline	14.08	9.09	6.52	7.69	7.5
Abnormal	14.66	12.34	2.17	10.26	15

Table 21. Analysis of program impacts on SDQ outcomes

		BIDII		ADS	
	Comparisons	Estimate	p-value	Estimate	p-value
Proportion SDQ Total Difficulties "Abnormal" 4-10 years					
single difference	CBCO - ACG_E	-0.0061	0.8330	0.099	0.001
disparities	CBCO - LCG_N	0.0303	0.3510	0.147	0.000
	LCG_N - ACG_N	-0.0641	-0.0833	-0.007	0.854
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	0.0580	0.2100	0.106	0.029
	Proportion CBCO Abnormal	0.1172		0.217	
Proportion SDQ Total Difficulties "Abnormal" 11-17 years					
single difference	CBCO - ACG_E	-0.0455	0.0570	0.023	0.388
disparities	CBCO - LCG_N	0.0089	0.7480	0.125	0.000
	LCG_N - ACG_N	-0.0471	0.1720	-0.081	0.022
double difference	(CBCO-ACG_E) - (LCG_N - ACG_N)	0.0016	0.9700	0.104	0.019
	Proportion CBCO Abnormal	0.0749		0.147	

## VII. Conclusion

The overall objective of this report was to investigate the impacts of the CBCO program on various development outcomes associated with household economic strength and child-welfare. Data for this analysis were developed through a cross-sectional survey of households completed during May-June 2011. The target sample size was 1500 households in each province (3000 total households). In an attempt to develop appropriate comparison groups for this evaluation activity, the survey instrument for the study was administered to random samples of three sub-populations: CBCO program participants (n = 500); other households living in the same sub-locations where the program was implemented (n = 300, called the Local Community Group); and households living in adjacent sub-locations where the program did not operate (n = 700, called the Adjacent Community Group). The non-CBCO households were then further stratified into those households who would have been defined as “vulnerable” based on the CBCO program criteria (e.g. include at least one child who is an orphan, no working-age adults, an adult is chronically ill). Section III describes in detail the study design and questionnaire.

Section IV provides basic summary information on the results of the survey. We include in the analysis in this report all households interviewed who reported that at least one child less than 23 years of age at the time of the survey (a 22 year old at the time of the survey would have been 17 in the 2006 when the program began). A significant share (40-60%) of the non-CBCO households included in the survey met the CBCO program eligibility criteria at the time of the survey (see Table 3), and a significant share of the non-CBCO households surveyed in the local and adjacent communities included at least one orphan (30-50%).

The survey data (see Section IV, Table 6) show that the CBCO households did participate in group savings activities at significantly higher rates than other households (roughly 90% for the CBCO group in each province compared to 10-25% for the other groups). CBCO households were also significantly more likely to have taken a loan in the six months leading up to the survey (60-70% for the CBCO group in each province compared to 21% or less for the other groups). Participation in group income-generating activities was similar across all study groups in Eastern Province (about 20% of households). A typical loan across all groups was around KES 1,000 (\$12) to be paid back with interest within 6 months. In Nyanza Province, participation in group income-generating activities was somewhat more common for the CBCO group (31%) as compared to the other study groups (7-20%).

Participation in an SLA, accessing credit, and participating in group-income generating activities are useful indicators of program performance. As discussed in Section V, however, the focus of this study was to attempt to assess impacts of the program on development outcomes associated with household and child welfare.

It should be noted that the SLA model has been widely implemented across many countries in Africa, with millions of individuals participating in SLAs (e.g., [www.vsla.net](http://www.vsla.net)). It should also be noted, however, that no peer-reviewed studies have been published documenting the impacts of SLA programs on development outcomes based on empirical measures of household welfare. While reports of returns on savings exist outside peer-reviewed publications, even a substantial return on a small amount of savings could be very useful to a household but not be large enough to have larger impacts on household welfare.

Throughout the analysis of all outcomes, a simple comparison of the CBCO group and the group of households in adjacent communities meeting eligibility requirements (ACG-E) showed varying levels

of differences (sometimes CBCO somewhat better, sometimes not, sometimes statistically significant at the 5% level, and sometimes not). The double-difference approach consistently indicated no measured impacts of the program. Thus, using the standard definition of ‘impact’ as understood in the evaluation of health and development interventions (e.g., [4]) and USAID’s Evaluation Policy [1], the analysis presented in this report does not highlight clear and substantial impacts of the CBCO program on the empirical development outcomes.

This conclusion does not, however, imply that the program did not provide useful benefits to the households or the OVC living in the households. The data show that households participating in the CBCO program were significantly more likely to participate regularly in savings groups and borrow money than households in the other study groups. Since participation in an SLA is voluntary, it is difficult to conclude that these SLA members (OVC caregivers) would continue to allocate their time and energies to a group activity that was not useful for their needs. While not an “OVC outcome”, SLAs as an institution are likely to provide useful non-financial social support to their members. It is entirely possible that such benefits are real, but do not then have additional measurable impacts on the development outcomes included in this analysis. For example, an SLA member who is severely food insecure may find significant emotional support from other SLA members, even if such support has no impact on food security.

Four important limitations of the study were identified at the beginning of this study, and the survey was designed in part in response to these limitations. A **first limitation** is that a control group based on random assignment to the CBCO program among eligible households (eligible at the beginning of the program) does not exist for defining a counterfactual. A **second limitation** is that data collected before the CBCO program began (or at least early in the program) do not exist. A **third limitation** of this study potentially is that only households participating in the CBCO program at the end of the program were included in the CBCO sample. Attrition from the program could imply that the households participating in 2011 are a biased sample of all households participating in the program. A **fourth limitation** is that the development outcomes included in the study are potentially not complete.

The magnitude of the intervention is also probably an issue. As noted above, the cost of implementing the CBCO program at the level of implementers in each province was \$49-\$57 per household per year (\$21-\$25 per child) as of 2009. The program relied on large quantities of volunteer labor, which if valued at reasonable local wages, might increase these costs by 100% (e.g. \$50 or less or child per year). While some variation occurred across the program years (2006 into mid 2011), these are very modest levels of program services. For perspective, a scaled up “Cash Transfer Programme for Orphans and Vulnerable Children” in Kenya is reported to cost about \$320 per year, which is 500% more per household than the CBCO program (see <http://go.worldbank.org/2IL8VR9LX0>). As another example, it cost \$84 to identify one new HIV infection in a home-based HIV testing program implemented in Kenya [5].

The results of this study clearly suggest that a low-cost and low-input SLA model is not adequate to generate significant additional impacts on household welfare. If all the households in the SLA are essentially caught in a poverty-trap, pooling resources within such households is unlikely to push them out of poverty. An SLA model within an OVC support program may make sense as a foundation for a program, but additional poverty alleviation activities (e.g. direct cash transfers, direct transfers of agricultural inputs, new jobs, etc.) is still needed.

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