The impact of the Kenya CT-OVC programme on productive activities and labour allocation

Solomon Asfaw[1], Benjamin Davis, Josh Dewbre, Giovanni Federighi, Sudhanshu Handa and Paul Winters

Food and Agriculture Organization, University of North Carolina at Chapel Hill and American University

Version: November 1, 2012

Abstract

This paper used data from a four-year randomized experimental design impact evaluation to analyze the impact of the Kenya Cash Transfer Programme for Orphans and Vulnerable Children (CT-OVC) on individual and household decision making including labour supply, accumulation of productive assets and productive activities. The general framework for empirical analysis is based on a comparison of program beneficiaries with a group of controls, interviewed before the program began and again four years later using difference in difference estimators and propensity score methods. The results show that the program has a positive and significant impact on the accumulation of productive assets, especially on the ownership of small livestock such as sheep and goats. While we receive mixed signals of a direct impact on productive activities, we find robust indirect evidence, including a positive impact on the share of food consumption coming from home production. The programme has a variety of generally positive impacts on adult labour supply, varying by gender and by type of wage and own farm labour, and leads to large reduction in child labour on family farms.

Key words: cash transfers, impact evaluation, productive impact, difference in difference, propensity score, Kenya

JEL Classification: I38, Q01, Q18

[1] Corresponding author (solomon.asfaw@fao.org). We would like to thank participants at two workshops at the Department of Child Services in Nairobi and the Transfer Project workshop in Aberdares for comments and suggestions. Errors are the responsibility only of the authors, and this paper reflects the opinions of the authors, and not the institutions which they represent or with which they are affiliated. This research forms part of the From Protection to Production Project (http://www.fao.org/economic/ptop/en/), supported financially by DFID. The 2011 survey round was funded through grant number 1R01MH093241-01 from the National Institute of Mental Health to the University of North Carolina at Chapel Hill.

1. Introduction

Over the past 15 years, a growing number of African governments have launched safety net programmes to provide assistance to the elderly and children, as well as households that are ultra-poor, labour-constrained, and/or caring for orphan and vulnerable children. Cash transfer programmes in African countries have tended to be unconditional (where regular and predictable transfers of money are given directly to beneficiary households without conditions or labour requirements) rather than conditional (more common in Latin America), which require recipients to meet certain conditions such as using basic health services or sending their children to school. Most of these programmes seek to reduce poverty and vulnerability by improving food consumption, nutritional and health status and school attendance.

The Kenya Cash Transfer Programme for Orphans and Vulnerable Children (CT-OVC) is the government's flagship social protection programme, reaching over 130,000 households and 250,000 OVC across the country as of end-2011, with the ultimate goal of providing coverage to 300,000 households or 900,000 OVC. A flat monthly transfer of Ksh 1500 (approximately US$21; this was increased in the 2011/12 budget from Ksh 1500 to Ksh 2000) is given to those households who are ultra-poor and contain OVC (Kenya CT-OVC Evaluation Team, 2012). OVC are defined as household residents between zero and 17 years old with at least one deceased parent, or a parent who is chronically ill, or whose main caregiver is chronically ill. The Government of Kenya began implementing the CT-OVC as a pilot in 2004. After a three-year demonstration period, the programme was formally approved by Cabinet, integrated into the national budget and began expanding rapidly in 2007. Further details on the programme and the targeting procedure can be found in Annex I.

Although the primary goal of the programme is to build human capital and to improve the care of OVC, there are good reasons to believe that cash transfer programmes, and the CT-OVC programme in particular, can have impacts on the economic livelihoods of beneficiaries as well. Most beneficiaries of cash transfer programmes in Sub Saharan Africa live in rural areas, depend on subsistence agriculture and live in places where markets for financial services (such as credit and insurance), labour, goods and inputs are lacking or do not function well. Cash transfers often represent a significant share of household income, and when provided in a regular and predicable fashion, may help households in overcoming the obstacles that block their access to credit or cash. This appears to be the case for the families in the CT-OVC programme. Over 80 percent of beneficiary households grow crops, and over half of all adults work on farm—yet very few had access to credit.

Our hypothesis is that the liquidity and security of regular and predictable cash transfers can increase productive and other income-generating investments, influence beneficiaries' role in social networks, increase access to markets and inject resources into local economies. These impacts come through changes in individual and household behaviour (labour supply, investments, and risk management) and through impacts on the local economy of the communities (social networks, labour and good markets, multiplier effects) where the transfers operate.

There is robust evidence from numerous countries (especially Latin America and increasingly Sub Saharan Africa) that cash transfers have leveraged sizeable gains in access to health and education services, as measured by increases in school enrolment (particularly for girls) and use of health services (particularly preventative health, and health monitoring for children and pregnant women) (e.g., Fiszbein and Schady, 2009; Barrientos and DeJong, 2004; Davis et al., 2012). However, there is limited empirical evidence on the productive impact of cash transfer programmes in either the

Latin American or African context. In terms of production, despite the lack of available information, most of those studies that do exist point to potential productive impacts of cash transfer programmes. Todd, Winters and Hertz (2010) and Gertler, Martinez and Rubio-Codina (2012), for example, find that the Mexican PROGRESA program led to increased land use, livestock ownership, crop production and agricultural expenditures and a greater likelihood of operating a microenterprise. Soares, Ribas and Hirata (2010) show that in Paraguay, conditional cash transfers (CCT) beneficiary households invested between 45–50 percent more in agricultural production and that the programme also increased the probability that households would acquire livestock by six percent. Martinez (2004) found that the BONOSOL pension program in Bolivia had a positive impact on animal ownership, expenditures on farm inputs, and crop output, although the specific choice of investment differs according to the gender of the beneficiary.

From Sub Saharan Africa, Covarrubias, Davis and Winters (2012) and Boone et al. (2012) found that the Malawi SCT programme led to increased investment in agricultural assets, including crop implements and livestock and increased satisfaction of household consumption by own production. For Ethiopia, Gilligan, Hoddinott and Taffesse (2009) find that households with access to both the Productive Safety Net Programme (PSNP) as well as complementary packages of agricultural support were more likely to be food secure, to borrow for productive purposes, use improved agricultural technologies, and operate their own nonfarm business activities. In a later study, Berhane et al. (2011) found that the PSNP has led to a significant improvement in food security status for those that had participated in the programme for 5 years versus those who only received one year of benefits. Moreover, those households that participated in PNSP as well as the complementary programmes had significantly higher grain production and fertilizer use.

On the other hand, CCTs in Latin America have been shown to have little impact on work incentives and adult labour supply. Studies of Bolsa Familia in Brazil (Ribas and Soares, 2111; Foguel and Paes de Barrios, 2010; Teixeira, 2010), PROGRESA in Mexico (Parker and Skoufias, 2000; Skoufias and di Maro, 2008; Alzua et al, 2010), the Red de Proteccion Social in Nicaragua (Maluccio and Flores, 2005; Maluccio, 2010; Alzua, et al, 2010), the BDH programme in Ecuador (Edmonds and Schady, 2008) and PRAF in Honduras (Alzua et al., 2010; Galiani and McEwan, 2012), using a variety of approaches, have not found significant impact on participation in wage employment by adults, female or male, nor reallocation between agricultural and non agricultural sectors.[2] There is some evidence, however, that CCTs have modestly reduced time spent working, for males in Nicaragua (Maluccio and Flores, 2005) and females in Brazil (Teixeira, 2010), and substitution between wage and domestic home work in Brazil (Ribas and Soares, 2011). And Handa et al. (2010) find that agricultural households benefiting from PROGRESA were less likely to comply with conditionality due to time conflicts with agricultural work on their own farms. Finally, a number of programmes have been found to lead to reduced child labour (see the review in Fiszbein and Shady, 2009).

However, early evidence from unconditional cash transfers in Sub Saharan Africa shows a mixed picture. Gilligan, Hoddinott and Taffesse (2009) in Ethiopia found that households with access to both the Productive Safety Net Programme (PSNP) and a complementary package of agricultural support showed no indication of disincentive effects on labour supply, while Ardington, Case, and Hosegood (2008) find that the South African Old Age Pension had a positive effect on adult labour supply arguing that the OAP relieved financial and child care constraints. On the other hand, Covarrubias, Davis and Winters (2012) found that the Malawi cash transfer programme led to

[2] See also the review of evidence by Fiszbein and Shady (2009).

decreased agricultural wage labour and child work off farm, and increased labour allocation to on farm activities by both adults and children.

Building on the existing literature, the objective of this paper is therefore to analyze the impact of the CT-OVC programme on individual and household decision making regarding productive activities, including changes in the labour supply of household members, the accumulation of productive assets and the extent and content of productive activities. The paper uses both direct and indirect measures of these outcomes; an indirect measure, for example, is the share of household consumption produced on farm. The impact evaluation strategy was based on a randomized cluster longitudinal design. The general framework for empirical analysis is based on a comparison of programme beneficiary with a group of controls, interviewed before the programme began and again four years later by employing difference in difference (DD) estimators in a multivariate framework, complemented with propensity score methods when necessary.

The rest of the paper is organized as follows. Section 2 provides a conceptual framework on the link between cash transfers, productivity activities and labour supply. Survey design and data collection methods are discussed in Section 3. The fourth section presents the analytical methods, with emphasis on empirical models and hypothesized relationships. The main analytical results are presented and discussed in Section 5, followed by the conclusions in Section 6.

2. Cash transfer, productive activities and labour supply

The concept of cash transfer programs leading to economic and productive impacts is built around the hypothesis that the provision of regular and predictable cash transfers to very poor households in the context of missing or malfunctioning markets has the potential to generate economic and productive impacts at the household level and to stimulate the local economy through the networks that link individuals, households, businesses and institutions.

To understand the influence of transfers on agricultural production, we start by considering how agricultural households make decisions. A common approach toward investigating household decision-making in these contexts is to employ an agricultural household model where households are both utility-maximizing consumers of agricultural goods and profit-maximizing producers of those goods, and potentially face market constraints (Singh et al., 1986). In this model, when markets function perfectly, production and consumption decisions can be viewed as "separable"—profit maximization and utility maximization are solved recursively. First, the agricultural household maximizes profit from agricultural production based on standard economic theory. Second, given that profit, they seek to maximize utility. All prices are determined exogenously through market mechanisms and households are price takers. If markets are perfect, spending and investment in agriculture are optimal and the effect of the transfer should only be on consumption.

In contrast to the assumptions underlying this model, agricultural households in developing countries often face significant barriers in multiple markets. For example, high transaction costs in staple markets can often make self-sufficiency the optimal choice (Key et al., 2000). Labour transaction costs, such as monitoring worker effort, can prevent households from hiring labour and to prefer the use of family labour, making family and hired labour imperfect substitutes. Poor households often face difficulties in accessing credit due to lack of assets to use as collateral or credit rationing that might occur due to factors such as adverse selection, asymmetric information, or government policies (Feder et al., 1990). Liquidity and credit constraints are two of the main factors limiting poor agricultural households from investing optimally (Rosenzweig and Wolpin, 1993, Fenwick and Lyne, 1999, Lopez and Romano, 2000, Barrett et al., 2001, Winter-Nelson and

Temu, 2005). Without access to adequate credit markets or insurance, agricultural households may adopt low-risk, low-return strategies, either in production or the diversification of income sources. Agricultural households will often sell more than the optimal amount of labour off farm in order to provide a variety of sources of income.

When faced with multiple market failures agricultural households may then make decisions to ensure that they have enough food to eat, but not necessarily what would be the most profitable. For example, to minimize the risk of high prices for staple foods they may produce more of these foods to ensure food security even if they could make more money from a cash crop. In the face of such constraints, the production and consumption decisions of agricultural households can be viewed as "non-separable", in the sense they are jointly determined (Singh et al., 1986).

If household production and consumption decisions are non-separable, cash transfers may be able to help overcome several of these constraints. First, transfers provide a guaranteed steady source of income at regular (e.g. monthly or bimonthly) intervals. This assurance, especially for agricultural households which are less likely to have regular sources of income, might allow households to adopt riskier strategies with a higher rate of return because they have a definite source of basic income. This guaranteed flow of income can help make up for failures in the insurance market. Secondly, the additional cash can be used for productive investment by providing liquidity. This liquidity can help farmers move closer to the optimal level of inputs when credit markets have failed. Such investments can be complemented by household labour and lead to increased agricultural production by the household.

Alternative theoretical models can also help understand the potential impact of a cash transfer programme on labour supply decisions. Becker's Time and Household Production theory (1965) suggests that time allocation decisions involve a trade-off between time devoted to domestic activities such as domestic production or leisure, which generate utility, and time devoted to paid labour, which yields income. An increase in household income unrelated to work enhances the value of time dedicated to housework activities, relative to the time dedicated to paid work. Cash transfer programmes can potentially create negative incentives for time allocated to paid work—i.e., the income effect discussed by Parker and Skoufias (2000)—while at the same time providing incentives for housework activities which promote well-being. This impact may vary by gender: given cultural norms and the constraints of caring for children, income effects may lead women to withdraw from the labour market while men increase their leisure. On the other hand, a substitution effect might also occur when there is an increase in adult labour supply in order to compensate for a reduction in child labour in response to a conditionality related to school attendance which is the case for most CCTs. Further, meeting conditions, such as taking heath clinic requirements, may conflict with time spent working—and this may well vary by gender (Kabeer, 2009). While the Kenya CT-OVC is unconditional, the program does involve social messaging.

Following from this discussion, the hypotheses we wish to test in this paper are the following: does the Kenya CT-OVC (i) lead to an increase in investment in agricultural and non agricultural productive assets and activities, (ii) increase food consumption obtained from own production, and (iii) result in a shift in adult labour towards own agricultural and non agricultural activities and/or domestic home work and away from casual labour. We also look at the impact on child labour.

3. Data and descriptive statistics

The expansion of the CT-OVC programme in 2007 was accompanied by a rigorous impact evaluation with random assignment of communities to treatment and control groups and pre-treatment and post-treatments rounds of data collection. The evaluation was contracted to a private consulting firm, Oxford Policy Management, with the baseline quantitative survey implemented between April and July, 2007. The underlying justification for the design was that the programme could not spread out to all eligible locations at the same time, and as a result sites whose entry is expected to happen later were considered as controls.

Within each of seven districts across the country (Nairobi, Kwale, Garissa, Homa Baye, Migori, Kisumu and Suba), four locations were identified as eligible, and two were randomized out of the initial expansion phase and served as control locations (Figure 1). The evaluation sample was drawn from the programme eligibility lists compiled by the community and ranked by the Ministry of Gender, Children and Social Development in the seven selected districts. Households in both the treatment and control arms were surveyed prior to their knowledge that they were selected into the programme. A total of 1542 and 755 households were interviewed in intervention and control locations respectively at baseline. A first follow up survey was carried out in 2009, while a second follow up study (this time under the leadership of the University of North Carolina) was conducted four years later between May and July, 2011 with a more detailed economic activity module to capture potential investment and productive activity benefits of the programme on families. Both the baseline and first follow up surveys collected only limited data on production activities and labour allocation. For more details on the sample and a discussion of attrition, please see Annex I.

In order to measure the economic impacts of CT interventions at the individual and household level, additional data were collected in the second round follow up in 2011. First, to measure the investment impacts of the programme, data were collected on livestock, agricultural asset, and non-agricultural asset and durable goods ownership, in terms of whether any items are owned and, if so, how many are owned; information on land ownership and acquisition was also captured. Crop level information on harvest, sales, own consumption and in kind gifts, as well as by-products obtained, sold and consumed from agricultural production are also collected. A livestock production module captured animal stocks, revenues from sales of live and slaughtered animals, as well as of animal by-products. In order to adequately build a picture of the farm household in terms of both net income and agricultural practices, data on input use and expenditures were also collected. Additional detailed information on changes in the labour allocation of household members in off-farm and on-farm activities was also collected.

For this paper, we rely on data collected at baseline (2007) and the second round follow up in 2011. However, the major limitation of our data set is that for many of the outcome variables of interest, such as agricultural production and labour allocation of individual household members, we have only one data point in 2011 (no baseline). This limits our ability to control for time-invariant unobservables in the impact estimation for some of the outcome variables with no baseline information.

Table 1 (household) and Table 2 (individual) present baseline summary statistics by treatment status. As is discussed in the explanation of the sample in Annex I, significant differences in baseline characteristics across the treatment and control groups can be found for a number of variables related to household demographic structure and individual characteristics, but poverty-related characteristics are balanced across the two study arms. At the time of the 2011 survey (before the increase mentioned above), the share of the CT-OVC transfer in total consumption

expenditure was 14 percent in 2011, which represents a reduction from 25 percent of consumption in 2007 when the program began.

A large majority of beneficiaries in the evaluation sample are agricultural producers; over 80 percent of beneficiaries grow crops, and three quarters have livestock. However, of those involved in agriculture, most grow local maize and beans, using traditional technology and low levels of modern inputs. Agriculture households in the sample, as would be expected, have modest levels of assets—around 2.6 acres of agricultural land (Table 3), an assortment of animals and low levels of education.

As can be seen in Table 3, the most important crops are local maize (grown by approximately 90 percent of all producers), beans (42 percent), millet (29 percent) and cassava and groundnuts (15 and 16 percent, respectively). Only 12 percent of all producers grow an improved maize variety. Of those households with livestock (Table 4), 81 percent have poultry, 57 percent cattle, 46 percent goats and 14 percent sheep. For those that have animals, average herd size range from 2 cattle, to approximately 3 small animals and 5 poultry. Only 16 percent of households used credit in 2011, and of these, less than half used credit for investment in productive activities (Table 5). Of those who did not use credit, the vast majority felt they had no means to repay loans.

The importance of agriculture is also seen in the allocation of household labour supply (Table 6). Over half of all adults work on their own farm, with a somewhat higher percent of women (59 versus 52 percent). A quarter of all adults work for wages (31 percent men and 23 percent women); almost all of this work is casual and approximately 2/3 is non agricultural. Agricultural producers also own a variety of tools and implements (Table7). Almost all crop producers have a hoe, and almost 90 percent have a machete, so we would expect little impact of the programme on the acquisition of these tools. Less than half (46 percent) of crop producers own an axe, while 21 percent own a plough, 10 percent a wheelbarrow, with smaller numbers of other tools and implements.

While a majority of households are agricultural producers, the use of modern technology and inputs is quite limited (Table 8). Few households use pesticides (10 percent), even fewer irrigation (4 percent), and less than a third use organic or inorganic fertilizer. Less than half of livestock producers use any kind of purchased input, and most rely on own production of fodder (though information was not collected on the amount of own produced inputs in livestock production).

The 2011 survey included a small module on non agricultural business operated by the household, and approximately one/third of households had some small business activity in 2011. Both male and female-headed households reported that own savings were the principal first source of capital for their nonfarm enterprise (Table 9), followed by gifts, loans and sales of assets. Nevertheless, the CT-OVC transfer was reported as the most important second source of capital for female-headed households (over 30 percent) and second most important for male-headed households (just under 20 percent). For beneficiary households, the percentage rises to almost 50 percent, indicating that the transfer is perceived as a factor in investment in nonfarm enterprises.

4. Estimation strategies

In this paper we seek to answer the question: “How would cash transfer beneficiaries have fared in absence of the programme?” As it is impossible to observe a household both participating in the programme and not participating, the goal is to compare participants with non-participants who are as similar as possible except for the fact that they are not beneficiaries. Creating a valid

counterfactual is crucial to producing reliable estimates of programme effects. By comparing outcomes between these two groups the average impacts of the cash transfer programme can be estimated.

Let D_i denote a dummy variable equal to one if a household receives a cash transfer and equal to zero if a household does not receive a cash transfer. Similarly, let Y_i denote an outcome of interest such that potential outcomes are defined as $Y_i(D_i)$ for every household. The treatment effect of the programme for household i, τ_i, is then the change in the outcome measure caused by the transfer:

$$\tau_i = Y_i(1) - Y_i(0) \tag{1}$$

Nevertheless the main problem of causal inference in this case stems from the fact that the unobserved counterfactuals cannot be estimated. One common concern in this regard is that control households may have different characteristics--both observable (e.g., location, wealth, demography) and unobservable (ability, willingness to work, skills) - which can introduce selection bias into impact estimates. Furthermore the existence of unobservables correlated with both the outcome of interest and the programme intervention can result in additional bias (omitted variable bias). The most direct way of ensuring a comparable control group is via an experimental design (randomized control trial), in which eligible households are randomly allocated between control and treatment groups. This guarantees that the treatment status is uncorrelated with other (observable and unobservable) variables, and as a result the potential outcomes will be statistically independent of treatment status. On average the groups will be identical, except for the fact that one of them received the treatment. Under these conditions, the average treatment effect (ATE) of the cash transfer can be identified simply as the mean difference in outcomes between the two groups:

$$E(\tau) = ATE = E[Y(1)] - E[(Y(0)] \tag{2}$$

In addition to the ATE, the parameter of interest in our case is the average treatment effect on the treated (ATT), which measures the average impact of the cash transfer programme on those that received treatment. This is defined as:

$$ATT = E[\tau \mid D = 1] = E[(Y(1) \mid D = 1) - E[Y(0) \mid D = 1] \tag{3}$$

Again, the counterfactual mean for those being treated is not observed. In an experimental setting where the randomization works fine, the ATE equals the ATT. However, in a non-experimental setting or at times when the experimental design does not work as anticipated (i.e., randomization produces baseline differences between the treated and control groups), the ATE and the ATT usually differ and in addition, using the mean outcome of untreated individuals, $E[Y(0) \mid D = 0]$ runs the risk of comparing apples and oranges if factors that determine the decision to participate in the programme also influence the outcome variable of interest.

4.1. Propensity Score Methods: propensity score matching (PSM) and inverse probability weighting (IPW)

When panel data are not available, as is the case for some of our outcome variables (i.e. those that are observed only after the programme), propensity score matching and propensity score weighting

can be applied. Propensity score methods attempt to simulate the conditions of an experiment in which recipients and non-recipients are randomly assigned, allowing for the identification of a causal link between treatment and outcome variables. Let $\hat{P}(Z) = \Pr(D = 1 \mid Z)$ be the probability of participating in the cash transfer programme where Z is a vector of control variables. Propensity score matching (PSM) constructs a statistical comparison group by matching every individual observation of recipient of cash transfer programme with an observation with similar characteristics from the group of non-recipient with similar value of $\hat{P}(Z)$. A closely related alternative involves weighting control households using this score, such that the mean of each Z variable is approximately equal across participants and non participants (Khandker, Koolwal and Samad, 2010).

The validity of PSM approach rests in part on two basic assumptions: conditional independence or unconfoundness assumption (CIA) and common support. CIA implies the existence of a given set of observable covariates Z which are not affected by treatment such that the potential outcome is independent of the treatment assignment.

$$E[(Y(1)_{t=0} \mid Z, D = 1)] = E[(Y(0)_{t=0} \mid Z, D = 0)] \tag{4}$$

This entails that conditional on control observable variables Z, non-participants of a cash transfer programme have the same mean outcomes as participants, had they not received treatment. In other words, selection is solely based on observable characteristics and all variables that influence participation in a cash transfer programme and potential outcomes simultaneously are observed. This is clearly a strong assumption, requiring justification on a case by case basis (Caliendo and Kopeinig, 2008).

The second main assumption of propensity models is the common support condition, which requires that the propensity score lie strictly between zero and one,

$$0 < \hat{P}(Z) < 1 \tag{5}$$

Equation 5 requires that the proportion of treated and untreated households must be greater than zero for every possible value of Z. The overlap condition ensures that treatment observations have comparison observations 'nearby' in the propensity score distribution (Heckman et al., 1998; Rosenbaum and Rubin, 1983). This implies that the effectiveness of propensity methods also depends on having a large number of non participants so that a substantial region of common support can be found.

In addition to these two basic assumptions, analysis by Heckman et al. (1998) suggests that it is equally important that (i) the same data source is used for participants and non-participants and, (ii) participants and non-participants have access to the same markets. The seminal explanation of the PSM method is provided by Rosenbaum and Rubin (1983), and its strengths and weaknesses are elaborated, for example, by Dehejia and Wahba (2002), Heckman et al. (1998), Caliendo and Kopeinig (2008), and Smith and Todd (2005).

In the case of Inverse Probability Weighting (IPW), control observations are assigned weights equal to the inverse of their propensity score; i.e., $w = \dfrac{\hat{P}(Z)}{(1 - \hat{P}(Z))}$, and treatment observations receive a

weight equal to one. Applying these weights[3] to control households effectively reweights the distribution of observable characteristics included in $\hat{P}(Z)$ to be like that of the treatment group. Said differently, control observations that are dissimilar to the treatment group will have a $\hat{P}(Z)$ near zero and a weight near zero; conversely, control observations who are similar to the treatment group will receive a higher weight.

A regression of an outcome on treatment and Z variables thus amounts to a comparison of means and produces an estimate of the ATT[4]. One advantage of the weighting approach is that it is considered to be "doubly robust": if either the propensity model or the outcome equation is correctly specified the estimator will be consistent. As with matching, ensuring that a region of common support exists is necessary to avoid observations with extremely large weights, which can yield estimates with high variance and undue influence on results (Imbens and Wooldridge, 2009).

Following Rubin (1977) as suggested by Hirano and Imbens (2001), we combine the IPW estimator with the regression adjustment in the analysis of individual and household level outcomes. Equation 6 presents the regression equivalent of single difference (SD) with covariates;

$$Y_i = \beta_0 + \beta_1 D + \sum \varphi_i Z_i + \gamma_i (D * Z_i) + \mu_i \tag{6}$$

4.2. Difference in Difference estimator (DD)

When panel data are available with pre and post intervention information, which is the case with some of our outcome variables, then the estimator in equation (3) can be improved by subtracting off the difference in pre-programme outcomes between participants in cash transfer programme and non-participants. This can be seen in equation 7:

$$\begin{aligned} ATT = E[(\tau_t - \tau_{t-1}) \mid D=1] &= E[(Y(1)_t - Y(0)_t) - (Y(1)_{t-1} - Y(0)_{t-1}) \mid D=1], \\ &= E(Y(1)_t - Y(1)_{t-1}) \mid D=1) - E(Y(0)_t - Y(0)_{t-1} \mid D=1) \end{aligned} \tag{7}$$

where $t-1$ and t represent time periods before and after the introduction of the cash transfer programme and the binary indicator D refers to programme assignment at the baseline. The panel nature of the data provides the option of using a before-after comparison of control and treatment because it compares the difference between control and treatment as well as before and after.

By taking the difference in outcomes for the treatment group before and after receiving the cash transfer, and subtracting the difference in outcomes for the control group before and after the cash transfer was disbursed, DD is able to control for pre-treatment differences between the two groups, and in particular the time invariant unobservable factors that cannot be accounted for otherwise (Woodridge, 2002). The key assumption is that differences between treated and control households remain constant throughout the duration of the project. If prior outcomes incorporate transitory shocks that differ for treatment and comparison households, DD estimation interprets such shocks as representing a stable difference, and estimates will contain a transitory component that does not represent the true programme effect.

[3] Note that propensity weights are also multiplied by survey sampling weights.

[4] An estimate of the ATE can be achieved by replacing the weight of one for treatment observations with $w = \frac{1}{\hat{P}(Z)}$

When differences between treatment and control groups at the baseline exist, the DD estimator with conditioning variables has the advantage of minimizing the standard errors as long as the effects are unrelated to the treatment and are constant over time (Wooldridge, 2002). Control variables are most easily introduced by turning to a regression framework which is convenient for the DD or by combining DD with propensity score matching or DD with inverse probability weighting. Equation 8 presents the regression equivalent of DD with covariates;

$$Y_{it} = \beta_0 + \beta_1 D_{it} + \beta_2 R_t + \beta_3 (R_t * D_{it}) + \sum \beta_i X_i + \mu_{it} \quad (8)$$

where Y_{it} is the outcome indicator of interest; D_{it} is a dummy equal to 1 if household i received the treatment; R_t is a time dummy equal to 0 for the baseline and to 1 for the follow up round; $R_t * D_{it}$ is the interaction between the intervention and time dummies and, μ_{it} is an error term. To control for household and community characteristics that may influence the outcome of interest beyond the treatment effect alone, we add in X_i, a vector of household and community characteristics to control for observable differences across households at the baseline which could have an effect on Y_{it}. These factors are not only those for which some differences may be observed across treatment and control at the baseline, but also ones which could have some explanatory role in the estimation of Y_{it}. As for coefficients, β_0 is a constant term; β_1 controls for the time invariant differences between the treatment and control; β_2 represents the effect of going from the baseline to the follow-up period, and β_3 is the double difference estimator, which captures the treatment effect.

For both the DD and SD, we calculate clustered standard errors at the community level for household level outcomes, and we cluster the standard errors at the household level for individual outcomes.

4.3. Estimation of propensity scores

We estimate three sets of propensity scores—for household level outcomes we match at the household level, while for individual level outcomes we match at the individual level, overall and by gender. Alternatively we could have estimated household level weights and then disaggregated the analysis at the individual level. However, given the importance of individual level variables in the labour allocation decision, and the existence of at least some limited information at baseline on individual labour market participation, we decided to use propensity scores generated by individual level matching.

The baseline data provide a rich set of variables to help identify programme participation. In the baseline survey implemented in 2007, the criteria used to target programme beneficiaries are documented. This enables us to identify the targeting component of the participation decision by including the specific eligibility criteria as control variables in the participation regression which is estimated using a logit model (Table 10 and 11). At the household level the set of observable variables includes household characteristics such as age, gender, education of the household head, household size, dependency ratio, sex ratio, number of OVC in the household; poverty indicators such as income sources, access to drinking water; household assets such as ownership of bicycles, blankets, mosquito nets, land and livestock holding, consumption expenditure; community level indicators such as access to roads, distance to daily market, access to telephone and finally district fixed effects. Individuals' characteristics at baseline were used in addition to the above variables

when estimating the participation equation for individuals. Specifically these included participation and type of labour activity, age, education, marital status, and health.

Evidence on the result of re-weighting can be seen in Figure 2, which shows the distribution of the estimated propensity scores. As shown in Figure 2 on the left side, the unweighted distribution of the propensity score for the control groups is more negatively skewed to the right. However on the right side, with weighting the distribution of the propensity score of the control groups is similar to the distribution of the treatment group. A similar picture is seen in Figure 3 for the individual level matching.

Given that the analysis does not condition on all covariates, but on the propensity score, there is a need to check if the weighting procedure is able to balance the distribution of the variables used in the construction of the propensity score. After some experimentation we have settled on a preferred specification of the participation model for which we cannot reject the null of mean equality of baseline characteristics between (reweighted) treatment and control households. Judging the re-weighted sample to offer a satisfactory counterfactual, results presented in this paper for both SD and DD rely solely on the weighted regressions. Following Imbens and Wooldridge (2009), we use IPW by combining the propensity score with regression analysis rather than PSM. Just over 4 percent of observations are outside of common support in the household level IPW, while the original and (post IPW) final number of observations for the individual level analysis (including by gender) can be found in Table 12a.

4.4. Heterogeneity of programme impacts

The average treatment effect of participation in the CT-OVC may mask differential impacts of the programme on subgroups of households, for example, among female and male headed households. We use two approaches to determine the existence of these differential effects. For all household level equations, we divide the sample of households into female and male headed households and by household size. Since the transfer is a fixed amount per household regardless of household size, we would expect the impact of the programme to be different for households with a smaller number of members compared to a household with a larger number of members. For the labour allocation equations at the individual level, we divide the sample into males and females and perform separate analysis on each group. For these individual level equations we interact treatment (in separate equations) with individual age and chronic illness status, as well as with household distance to market, adult household members and regional dummies.

5. Results and discussion

In this section we discuss the average treatment effects of the Kenya CT-OVC programme over four broad groups of outcome variables—productive assets, agricultural production, non agricultural business activities and labour supply. When the baseline information is available for a given outcome variables, we employ a DD estimator in a multivariate framework. However, when baseline information is missing, we use the IPW described above.

5.1. Investment in productive assets

We look at investment in two types of productive assets: livestock ownership and agricultural implements. Table 13 presents the impact of the CT-OVC on ownership of livestock assets

estimated using the DD estimator with IPW.[5] We used two indicators to measure the impact on livestock assets – the proportion of households owning each type of livestock and the total quantity owned of each type, as well as overall (aggregated using tropical livestock units, or TLU). The results show a positive and significant impact only on the ownership of small livestock such as sheep and goats, for both smaller and female-household households. For smaller households, the estimated average treatment effect of 0.154 is equivalent to a 15.4 percentage point increase in ownership of small livestock compared to control households, while female-household households receiving the transfer experienced a 6 percentage point increase in ownership. Overall no impact is found on the number of livestock owned by households; however for smaller households, the total number of livestock (aggregated in Tropical Livestock Units) increased by 0.7 compared to control households. Given the relatively small amount of the transfer the lack of impact on cattle is not surprising; however, we would have expected some kind of positive impact on poultry ownership.[6]

In terms of programme impact on farm tools and implements, the results of the DD estimator with IPW[7] are reported in Table 14. Very little impact of the programme is found on agricultural tools and implements; the only exception is the ownership of troughs for livestock production (consistent with the aforementioned increase in ownership of small animals which get fed from troughs). While the magnitude of this result appears small, on the order of one or two percentage points, given the starting point (2 percent), it is relatively large.

5.2. Impact on agricultural production

Direct impact

We look at various dimensions of the productive process to ascertain whether households have increased spending in agricultural activities. These include crop production, crop and livestock input use and credit use. All of these outcome variables are analyzed using IPW in a multivariate framework.[8]

Overall, as can be seen in Table 15, we find very little impact of the programme on crop production. This includes no impact over the share of households growing crops (and specifically improved maize), nor the share of crop producing households using different inputs (seeds, pesticides and organic and inorganic fertilizer). In fact, we find some small, but significant, negative impacts on the use of pesticides by large households and by female headed households. Similarly, we find no impact on input expenditures, with the exception of a negative impact on seed expenditure.

The results are similar in terms of livestock production, as can be seen in Table 16. No impact is found on expenditure on inputs for livestock production, including insurance, veterinary services, medicine and manufactured feeds/salt. A negative impact is found on fodder expenditure, overall and for large and female-headed households. As data were not collected on the use of own maize

[5] Two kinds of data were available. In 2007, the survey asked about ownership of large and small livestock, and poultry, while in 2011 the survey asked about current and past (4 years ago) livestock holdings, both disaggregated and animal type. In this case the DD estimator is based on the 2007 data.

[6] We also looked at the purchase of different kinds of animals using IPW with controls; no significant impacts were found, with the exception of a positive impact (but tiny magnitude) on sheep purchases for male-headed households. Results are available upon request.

[7] In this case, the DD estimator is based on recall data; that is, in the 2011 household survey, households were asked about agricultural implements ownership in 2007.

[8] For each outcome variable we estimated an unweighted comparison, IPW without controls and IPW with controls, reporting only the latter in the included tables. The results are broadly consistent across all three estimates. Full results are available upon request.

production for fodder, we do not know about the total use of fodder, or whether home produced fodder is substituting for purchased fodder. In terms of hired labour for both crop and livestock production (Table 17), we find small, yet significant, negative impacts on livestock herding (small households) and positive impacts on crop weeding (male-headed households).

Finally, in terms of credit use, male-headed households reported a higher tendency to use credit for agricultural and non agricultural business activities, and female-headed households for consumption and emergency expenditures (Table 5). However, we do not find a significant impact of the programme either in solicitation or receipt of credit (Table 18).

Indirect impact

One of the most consistent findings regarding the impact of cash transfer programmes is their contribution to reducing hunger and food insecurity. Often the most immediate impact of cash transfer programmes for the very poor relates to basic consumption needs, particularly nutrition and food security through a direct increase in purchasing power (Devereux and Coll-Black, 2007). Table 19 presents the average difference between the control and treated groups in components of food consumption expenditure. Results from the DD estimator with IPW show a positive and significant impact on consumption of animal products such as dairy and eggs, meat and fish and in consumption of fruits. The results show no significant impact on consumption expenditure of cereals and legumes. The average treatment effect for food spending on dairy and eggs is 0.123, which is equivalent to a 12.3 percentage point increase as a result of the programme.

As expected, the results of the disaggregated analysis show considerable variation in the impact of the programme across gender and household size. The programme has no effect on spending on most of the food consumption categories for households with larger number of members but it has large, positive, and significant effects on three of the outcomes (dairy and eggs, meat and fish and fruit) for households with smaller number of members. The programme tends to have larger and positive impact on female-headed compared to male-headed households. For instance the programme has also large, positive and significant effects on consumption of animal products for female headed households. The only one exception where the impact is positive and significant for male-headed households is in the consumption of cooking oil.

Information was collected on the primary source of specific types of food consumption, with own production, purchases and gifts as the possible sources. An increasing share of own production in total consumption is an indirect indicator of increased investment in own agricultural activities (see Todd, Winters and Hertz, 2010). Table 20 shows the DD with IPW results of the programme impact on the proportion of food consumption that comes from own production. The treated households appear to consume more animal products, as well as other foods, from their own production compared to control households. The estimated treatment effect for change in dairy and eggs consumption from own production is about 13 percentage points, and the impact on other types of foods is about 4 percentage points. For most of the outcomes, the differential impact also appears to be bigger for households with smaller size and for female-headed households. The average treatment effect for the share of consumption from home produced dairy and eggs is 20 percentage points for smaller households and 15 percentage points for female headed households.

5.3. Non agricultural production

As reported in table 9 approximately one/third of households had some small business activity in 2011. Households reported that own savings were the principal first source of capital for their

nonfarm enterprise while the CT-OVC transfer was reported as the most important second source of capital for female-headed households. This perception is confirmed in the econometric analysis, at least for women (Table 21); we find that the CT-OVC transfer is associated with a 7 percentage point increase in household participation in a nonfarm enterprise, for female headed households, and an 11 percentage point decrease for male headed households. It should however need to be noted that the negative impact of the CT on participation in a nonfarm enterprise for males is only significant at 10 percent.

5.4. Impact on labour supply

In this section we focus on the impact of the CT-OVC programme on labour supply. As is common with the labour literature, we model labour supply as an individual decision, though we include a series of household and context variables as this decision takes place within the decision making process of the household and within a given economic context. We look at the two main types of labour supply: wage labour, and labour on own farm. First, we focus on three types of wage labour supply—all wage labour and then separately agricultural wage labour and non agricultural wage labour. We look at both the decision to participate in wage labour, and then, conditional on participation, the intensity of participation in each of these three types of wage labour. Note that since almost the entire wage employment in this sample is casual, whether agricultural or non agricultural, we make no distinction between casual and permanent labour. Second, we look at labour used on own farm. For both wage and own farm labour, we look at all individuals as well as by gender, and we make a distinction between adults (older than 18 years in 2011) and children (between 10 and 15 years of age, inclusive). We further look at heterogeneity of impact by interacting programme participation with the family's distance to market for both adults and children and individual age and physical health (chronic illness) for adults as well as with adult household members and regional dummies.

An important element missing from the analysis is the impact related to time devoted to housework activities, as receipt of the programme may permit substitution between casual wage activities and pressing housework, including care of children (one of the objectives of the programme). Unfortunately data were not collected on adult time use, and thus we leave this question for future research.

Impact on adult labour supply

Overall, in the equations for all types of wage labour and for all adults (Table 22), we find no significant impact of the CT-OVC programme. For all individuals, but for women in particular, however, we find a positive and large impact (13 percentage points) of the programme for those who live farther from markets (more isolated). The programme thus appears to facilitate labour market participation for those who face higher transaction costs, in terms of distance.

From the separate male equation, for all types of wage labour, we do find a negative and significant impact on participation. However, this negative impact decreases with increasing age, eventually becoming positive (Figure 4); indeed, for most relevant ages the impact on male participation on non agricultural wage labour is positive. Thus from this same figure, the positive impact of the programme on males is much stronger for non agricultural wage labour, while the negative impact is more relevant for agricultural wage labour, though even here the impact of the programme becomes less negative and eventually positive with increasing age. A similar story (initially negative, increasingly positive with age) is found for men in terms of their participation in own farm labour (Table 24).

In terms of the participation of females in non agricultural wage labour, the trend is similar, though more muted. In terms of agricultural wage labour, however, the pattern is reversed; the programme has a positive impact on younger women, and this decreases with age, eventually becoming negative. Again, a similar trend is found for female participation in own farm labour. In both cases, with older women, the programme impact eventually becomes positive[9].

Some of the positive impact on the supply of own farm labour seen with increasing age may be related to chronic illness, as those who are older are more likely to be chronically ill. For both men and women reporting chronic illness, but particularly with men, the programme has a positive and significant impact on participating in own farm labour.

We also looked at the intensity of wage labour (days per year) and own farm labour (days per month). Overall, the programme appears to have a negative impact on labour intensity (Table 23); participation in the CT-OVC programme is associated with a reduction in 20 days per year of all types of wage labour (no significant impact is found for the separate male and female estimations). However, this negative impact is mostly concentrated among the chronically ill—for all types of wage labour and for agricultural wage labour (both in the all individuals equation and in the separate male and female equations), participation in the programme allows the chronically ill to reduce intensity of wage labour participation (reaching for example 68 days in the all adults estimation). Similarly, for all wage labour and non agricultural wage labour (the only two equations for which the groups of age interactions were significant), the negative impact of the programme increases with age (Figure 5)[10].

In terms of own farm labour, once again the results are different (Table 24). For both males and females, participation in the programme leads to increasing intensity of own farm labour with age (Figure 5). This suggests that the programme may facilitate substitution between casual agricultural wage labour and own farm labour. This is a pattern observed in other cash transfer programmes in Sub Saharan Africa (Covarrubias, Davis and Winters, 2012)[11].

Impact on child labour supply

We find no impact of the CT-OVC programme on wage labour participation by children (Table 25), which is not surprising since less than 2 percent of children aged 10-15 work in wage labour.

On the other hand, a significant percentage of children work on the family farm (42 percent), particularly boys (45 percent). We find that the programme has a positive and significant impact on reducing child labour on farm—a 12 percentage point reduction (Table 26). This impact appears to

[9] We have also looked at the distributional impact of the program by interacting the programme participation with adult household size and also with regional dummies. The results seems to suggest a differentiated impact across region – treated individuals in the central province participate more in wage labor compared to individuals in the coast and the same appears to be true for intensity of participation. We have also looked the impact by interacting the treatment with the number of adult household members and there is no differentiated impact in terms of the participation decision, though individuals in treated households with more adult household members tend to participate less intensively. Results of these interactions are not discussed in this paper; however the full results can be available from the authors upon request.

[10] In terms of intensity of participation, the program appears to have a positive impact on individuals in the central and western province compared to individuals on the coast.

[11] We have also looked at the heterogeneous impact on own farm labor across different regions and the results show the same pattern like wage labor. Treated Individuals in the central and western province tend to participate more in own farm labor vis-à-vis treated individuals in the coastal province. However there seem to be no differentiated impact by adult household members in terms of participation in own farm labor. Again full results can be available upon request.

be concentrated among boys, as no significant impact is found on the model for girls. When the interaction term with distance to markets is added, the results vary by gender. While we find that in the equation for all children the child labour reducing impact of the programme increases with increased isolation, with similar results for girls (though not statistically significant), for boys the impact of the programme is muted (by approximately 5 percentage points) by increased geographic isolation.

6. Conclusions

Kenya's CT-OVC is a national child-protection programme that provides a flat monthly transfer of Ksh 1500 to ultra-poor families with orphans and vulnerable children aged 17 years and younger. Although the programme is designed to encourage care of OVC and human capital development, we find that this programme also has an impact on the economic livelihoods of beneficiaries, who are primarily agricultural producers, growing local maize and beans using traditional technologies, but also diversified into casual wage labour and nonfarm enterprises.

Four main conclusions can be drawn from the results of this study on the effect of the CT-OVC cash transfer program on household economic activities. First, the programme has a significant impact on the accumulation of productive assets, particularly on certain subgroups within the evaluation sample. Large and significant effects on the share of households owning small animals are found for smaller households and female headed households. Second, we find some mixed messages regarding the direct impact of the programme on agricultural and non agricultural productive activities. Participation in the programme is associated with a small but negative impact on the use of pesticides and seed expenditures, as well as the hiring of labour for livestock herding. We also find a negative impact on fodder expenditures; but as no data were collected on the use of own maize production for fodder, this finding is difficult to interpret. On the other hand, we find a positive effect on hired labour for crop weeding, and the programme is associated with a 7 percentage point increase in female headed household participation in nonfarm enterprises—and an 11 percentage point decrease for male headed households.

Third, however, we do find robust evidence of an indirect impact of the programme on agricultural production. Taking advantage of comparable baseline information, we find that treated households consumed significantly more cereals, animal products (meat and dairy) and other foods out of own production, as compared to control households. This is particularly true for both smaller, and female headed, households. This indirect evidence is worth highlighting because underreporting of consumption is much less likely than underreporting or measurement error in income generating activities such as agricultural and non agricultural businesses.

Finally, the programme has a variety of impacts on labour supply, varying by gender and by type of labour. Overall, when grouping all types of labour and for all adults, we find no significant impact of the programme on participation in wage or own farm labour. For all individuals, however, and particularly for women, the programme facilitates labour force participation for those living farther from markets. In addition, the programme is associated with a generally positive impact on participation in non agricultural wage labour (particularly for males), compared to generally negative impact on participation in agricultural wage and own farm labour. In both cases, however, the probability of participation increases with the age of programme beneficiaries.

On the other hand, the programme appears to have a negative impact on wage labour intensity, which increase with age – although this effect appears to be concentrated among the chronically ill. Indeed, the intensity of own farm labour increases with programme participation, suggesting

substitution between agricultural wage labour and own farm labour, a phenomenon reported elsewhere in sub-Saharan Africa (Covarrubias, Davis and Winters, 2012). At the same time, the program leads to a significant reduction in child labour on farm, particularly for boys.

Overall, the study has provided evidence, direct and indirect, that the CT-OVC programme influences the livelihood strategies of the poor. While we are somewhat constrained by incomplete data at base line, forcing us to rely on non-experimental measures for some indicators, together they point to the importance of considering impacts on household economic decision making in the design and implementation of the program. While we wait for the qualitative field work to provide some context and explanations to these results, it seems clear that the programme has helped families increase food self sufficiency, as well as provide more flexibility to families in terms of labour allocation, particularly for those individuals who are chronically ill, and children, an important objective of the programme.

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Annex I

Kenya Cash Transfer for Orphans and Vulnerable Children Evaluation: Sample Design and Description[12]

The Programme

The Kenya CT-OVC is the government's flagship social protection programme, reaching over 130,000 households and 250,000 OVC across the country as of the end of 2011. In response to a concern for the welfare of OVC, particularly AIDS orphans, the Government of Kenya, with technical and financial assistance from the United Nations Children's Emergency Fund (UNICEF), designed and began implementing a pilot cash-transfer program in 2004. After a successful demonstration period, the CT-OVC was formally approved by Cabinet, was integrated into the national budget, and began expanding rapidly in mid 2007 across Kenya. The objective of the program is to provide regular cash transfers to families living with OVC to encourage fostering and retention of children and to promote their human capital development. Eligible households, those who are ultra-poor and contain an OVC, received a flat monthly transfer of $21 (U.S.) (Ksh 1500). The transfer level was increased to Ksh 2000 per household in the 2011-12 Government of Kenya budget. An OVC is defined as a household resident between 0 to17 years old with at least one deceased parent, or who is chronically ill, or whose main caregiver is chronically ill. Beneficiary households are informed that the care and protection of the resident OVC is their responsibility for receiving the cash payment. Currently there are no punitive sanctions for noncompliance with this responsibility, although the next expansion phase of the program, scheduled for late 2012 and 2013, is expected to test conditionality.

The Impact Evaluation

Prior to program expansion of the CT-OVC in 2007, UNICEF designed a social experiment to track the impact of the program on a range of household welfare indicators including child health and schooling and economic productivity. The evaluation was contracted to a private consulting firm, Oxford Policy Management (OPM), and entailed a cluster randomized longitudinal design, with a baseline household survey (and related community survey) conducted in mid 2007 and a 24 month follow-up in 2009. The ethical rationale for the design was that the program could not expand to all eligible locations at the same time, so locations whose entry would occur later in the expansion cycle could be used as control sites to measure impact. Thus within each of 7 districts that were scheduled to be included in this expansion phase four locations were identified as eligible, and 2 were randomized out of the initial expansion phase and served as control locations. Targeting of households was carried out in the intervention locations according to standard program operation guidelines. Each location forms a committee of citizens that is charged with identifying potentially eligible households based on criteria of ultra-poverty and containing at least one OVC as defined above. The list of eligible households is sent to the program's central office (located within the Ministry of Gender, Children and Social Development, the Ministry responsible for the program), which then administers a detailed socioeconomic questionnaire to confirm eligibility, and to assess poverty in order to rank households. The final number of households that enter the program in each district depends on funding to that district but approximately 20 percent of the poorest households in each location are enrolled in the program. Since the program was not scheduled to be implemented during this phase in the control locations, program targeting was 'simulated' in order

[12] This note was prepared by Sudhanshu Handa of the Department of Public Policy and Carolina Population Center, University of North Carolina at Chapel Hill.

to identify a sample of households that were comparable to those in identified as eligible in treatment locations. Households in either arm (Intervention, Control) were surveyed prior to their knowledge that they were selected into the program.

The Carolina Population Center obtained funding from the NIMH (1R01MH093241-01) to conduct a second follow-up survey of the evaluation sample in 2011, with a special focus on understanding the impact of the program on the successful transition of OVC into young adulthood. The 2011 survey focused on the eligible sample only, and included a special module for young people 15-25 on sexual activity, mental health and peers, administered face-to-face. The main household survey was also expanded to include more detailed information on economic activity, fertility, and time preference.

Characteristics of Evaluation Sample, Attrition and Balance

The OPM evaluation sample includes four groups of households: treatment and control households, and non-eligible OVC households in intervention and control localities. The latter two groups were included in the initial study in order to assess the targeting effectiveness of the program but these were not surveyed in the 2011 round.

Table A1 reports the sample sizes for each survey round for eligible intervention and control households only. Approximately one-third of the sample is control households and the sample size at the 2007 baseline is 2294. Attrition was fairly substantial between 2007 and 2009 at 18 percent, but was reduced considerably to only 5 percent in the 2011 round. All three rounds of field work were conducted by Research Solutions Africa, a private research firm based in Nairobi; the field work report for the 2011 survey is provided by Otienoh (2011).

Table A1: Sample Sizes by Wave (Eligible Households only)

Treatment	Control	Total
	Round 1 2007	
1542	755	2294
	Round 2 2009	
1311 + 15 (new)	571 + 13 (new)	1910
	Round 3 2011	
1280	531	1811

Table A2 shows selected characteristics at baseline for households from each of the three survey rounds for treatment and control households. This table helps us understand the degree of non-random attrition as well as the comparability of households in the two arms.

As mentioned earlier, targeting in control areas was ‘simulated’. Targeting in the program was conducted in two stages. First, location OVC committees identified potential program beneficiaries, who were subsequently enumerated by Ministry designates. Second, because the potential list of eligible households exceeded program budget households were prioritized according to age of the household head, with child-headed households (of which there were very few) receiving the highest priority and then oldest household heads receiving priority. The first stage of targeting was replicated in control locations but not the second stage, since a final eligibility list was not actually required in control locations.

Table A2 indicates that the first stage targeting (based on OVC and poverty) was accurate in control households. Both treatment and control households are comparable across poverty indicators. However there are small differences in demographic composition between the two groups in 2007; treatment households have heads who are about five years older than control households (due the priority ranking of the program), and who are more likely to be male and have less education. Control households also have more prime-age adults (age 18-64) in the household relative to treatment households.

Note that these differences are essentially the same across households in each of the three waves of the study. In other words, there is no significant change in the composition of households across the two arms over time, which supports the idea that attrition is random and not systematic across the survey rounds.

Table A2: Household characteristics by wave and intervention status

Sample:	2007		2009		2011	
	T	C	T	C	T	C
Demographics						
Household size	5.48	5.79	5.54	5.81	5.53	5.82
Residents 0-5 years	0.66	**0.86**	0.68	0.85	0.67	**0.86**
Residents 6-11 years	1.21	**1.33**	1.23	1.32	1.23	1.31
Residents 12-17 years	1.40	1.38	1.40	1.39	1.40	1.40
Residents 18-45 years	1.12	**1.45**	1.13	**1.46**	1.13	**1.46**
Residents 46-64 years	0.59	**0.36**	0.60	**0.37**	0.60	**0.38**
Residents 65+ years	0.51	0.42	0.50	0.41	0.51	0.41
Female head	0.65	**0.57**	0.65	**0.59**	0.65	**0.59**
Age of head in years	62.34	**56.06**	62.21	**56.20**	62.55	**56.55**
Head not completed primary	0.53	**0.38**	0.53	**0.38**	0.53	**0.38**
Poverty						
Per adult equiv. monthly exp. (Ks)	1533.30	1501.25	1541.77	1459.94	1550.14	1441.99
Walls of mud/dung/grass/sticks	0.75	0.84	0.75	0.86	0.74	0.87
Roof of mud/dung/grass/sticks	0.23	0.22	0.23	0.23	0.22	0.22
Floor of mud/dung	0.66	0.74	0.65	0.77	0.66	0.79
No toilet	0.55	0.56	0.55	0.56	0.54	0.56
Unprotected water source	0.62	0.68	0.61	0.70	0.61	0.70
Region						
Garissa	0.10	0.06	0.11	0.06	0.09	0.05
Homa Bay	0.12	0.13	0.12	0.13	0.12	0.14
Kisumu	0.18	0.23	0.18	0.22	0.18	0.22
Kwale	0.08	0.09	0.08	0.10	0.08	0.11
Migori	0.23	0.23	0.22	0.25	0.22	0.26
Nairobi	0.13	0.10	0.13	0.07	0.13	0.06
Suba	0.15	0.16	0.16	0.16	0.17	0.17
N	1540	754	1325	583	1266	545

Statistically significant (at 10%) differences of t-test between Treatment (T) and Control (C) within each wave shown in bold. Standard error of t-statistic clustered on location. Sample sizes do not exactly match those in Table A1 because of missing values and because new households not included.

Annex References and Bibliography

Handa, S., et al., "Targeting Performance in Three African Cash Transfer Programs," Journal of Development Effectiveness, Vol.4(1):78-108, 2012.

Kenya CT-OVC Evaluation Team, "The Impact of the Kenya CT-OVC Program on Human Capital," Journal of Development Effectiveness, Vol.4(1): 38-49, 2012.

Kenya CT-OVC Evaluation Team, "Impact of the Kenya CT-OVC on Household Spending," Journal of Development Effectiveness, Vol.4(1):9-37, 2012.

Otienoh, Peter, 2011, "Fieldwork Report for Health, Economic, Demographic and Social Survey of Families with OVC 2011," Research Solutions Africa, Nairobi, Kenya.

Table 1. Differences in characteristics of participants and non-participants, 2007 (sample mean, household level)

	Total (N=1783)	Treatment (N=1265)	Control (N=518)	Difference
Household characteristics				
Age of the head (years)	55.97	58.53	49.73	8.81***
Female headed household (1=yes)	0.64	0.65	0.60	0.06**
Household size	5.62	5.55	5.79	0.23*
Total non-active labour force in hh	3.19	3.17	3.24	0.06
Elderly headed household (1=yes)	0.42	0.48	0.27	0.20***
Education of household head (years)	3.37	2.99	4.30	1.30***
Education of the spouse (years)	1.25	1.10	1.63	0.53***
Dependency ratio	1.49	1.49	1.50	0.01
Sex ratio	1.24	1.25	1.22	0.03
Number of household members				
Under 11 years	2.04	1.97	2.20	0.23***
12-17 years	1.31	1.31	1.32	0.1
18-34 years	1.02	0.97	1.15	0.18***
35-49 years	0.37	0.33	0.48	0.16***
50-64 years	0.50	0.57	0.35	0.21***
Over 65 years	0.36	0.39	0.25	0.14***
Head was sick (1=yes)	0.02	0.01	0.04	0.03***
Number of OVC in the household	2.47	2.50	2.38	0.13
Poverty Indicators				
Number of adult hh member with over 8 years of educ.	0.63	0.62	0.66	0.04
Drinking water from unprotected sources (1=yes)	0.63	0.61	0.70	0.09***
Agriculture is the main source of income (1=yes)	0.43	0.44	0.39	0.05*
Main source of income is salaried employment (1=yes)	0.04	0.03	0.06	0.03***
Main source of income is casual labour (1=yes)	0.57	0.56	0.58	0.02
Main source of income is self-employment (1=yes)	0.32	0.32	0.30	0.02
Main source of income is transfers (1=yes)	0.07	0.07	0.05	0.02
Household asset				
Own bicycle (1=yes)	0.17	0.15	0.21	0.05***
Proportion of hh who owns blankets	0.86	0.86	0.86	0.00
Proportion of hh who owns mosquito net	0.62	0.59	0.69	0.11***
Total cultivable land owned by hh (acres)	1.95	1.70	2.56	0.85***
Proportion of livestock owner	0.76	0.75	0.79	
Monthly consumption per capita (Ksh)	1285.98	1298.09	1256.40	41.69
Community level indicators				
Access to road to the village (1=yes)	0.76	0.77	0.72	0.05**
Distance from daily market (1=far)	0.23	0.21	0.27	0.07***
Proportion of hh who can make telephone calls (1=high)	0.12	0.11	0.15	0.04**
Dummy if district is Homabay (1=yes)	0.12	0.12	0.14	0.02
Dummy if district is Migori (1=yes)	0.23	0.22	0.27	0.04**
Dummy if district is Kisumu (1=yes)	0.19	0.18	0.22	0.03
Dummy if district is Suba (1=yes)	0.17	0.17	0.16	0.14
Dummy if district is Kwale (1=yes)	0.09	0.08	0.11	0.02
Dummy if district is Garissa (1=yes)	0.08	0.09	0.05	0.04***
Dummy if district is Nairobi (1=yes)	0.11	0.13	0.06	0.06***

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels.

Table 2. Differences in characteristics of participants and non-participants, 2007 (sample mean, individual level)

	Total (N=7191)	Treatment (N=5114)	Control (N=2077)	Difference
Individual Characteristics				
Age	27.23	27.91	25.56	2.35***
Female	0.52	0.52	0.52	0.00
Married	0.2	0.19	0.23	0.04***
Single	0.62	0.62	0.61	0.01
Education	2.52	2.42	2.75	0.33**
Disabled	0.04	0.05	0.03	0.02***
Unemployed	0.63	0.64	0.62	0.02**
in Wage labor	0.01	0.01	0.01	0.00
in Non wage work	0.23	0.22	0.26	0.04**
in Causal work	0.09	0.09	0.07	0.02**
in Off farm work	0.03	0.03	0.04	0.01

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels.

Table 3. Land use and crop production, 2011

	All	HH size<5	HH size>4	Female head	Male head
Share of households that operate land	0.80	0.83	0.79	0.79	0.82
For those that operate, size in acres	2.67	2.20	2.96	2.52	2.90
Share of households that own land	0.76	0.82	0.72	0.75	0.76
For those that own, size in acres)	2.58	2.15	2.86	2.45	2.79
HH has crop production	**0.81**	**0.84**	**0.79**	**0.81**	**0.81**
Among those households with crop production:					
Local Maize	0.89	0.90	0.88	0.89	0.88
Improved maize	0.12	0.11	0.12	0.11	0.13
Millet	0.29	0.33	0.27	0.29	0.29
Beans	0.42	0.43	0.41	0.42	0.42
Cow peas	0.07	0.04	0.10	0.08	0.07
Sorghum	0.05	0.04	0.05	0.04	0.06
Yams	0.00	0.00	0.01	0.00	0.01
Arrowroots	0.01	0.00	0.01	0.00	0.01
Cassava	0.15	0.12	0.17	0.14	0.18
Sweet potato	0.08	0.09	0.08	0.07	0.10
Potato	0.01	0.02	0.01	0.01	0.02
Grams	0.01	0.01	0.02	0.02	0.01
Yellow grams	0.00	0.01	0.00	0.01	0.00
Groundnuts	0.16	0.19	0.14	0.16	0.14
Sugarcane	0.10	0.10	0.11	0.10	0.12
Vegetables	0.06	0.07	0.05	0.06	0.06
Fruits	0.03	0.04	0.03	0.03	0.03
N	1783	698	1085	1137	646

Table 4. Livestock production, 2011

Share	All	HH size<5	HH size>4	Female head	Male head
HH has livestock	**0.75**	**0.75**	**0.76**	**0.73**	**0.78**
Among those households with livestock production, share of with :					
Cattle-local	0.57	0.56	0.58	0.53	0.64
Cattle-hybrid	0.01	0.00	0.02	0.00	0.02
Donkeys	0.05	0.04	0.06	0.04	0.07
Camels	0.01	0.00	0.02	0.01	0.01
Goats	0.46	0.37	0.51	0.44	0.48
Sheep	0.14	0.10	0.17	0.12	0.18
Pigs	0.02	0.03	0.01	0.02	0.02
Poultry	0.81	0.82	0.81	0.82	0.80
Other	0.00	0.00	0.00	0.00	0.00
Among those households with livestock production, number of :					
Cattle-local	1.95	1.78	2.05	1.63	2.45
Cattle-hybrid	0.02	0.00	0.02	0.00	0.03
Donkeys	0.08	0.07	0.09	0.06	0.11
Camels	0.08	0.01	0.12	0.08	0.08
Goats	2.74	1.62	3.38	2.49	3.13
Sheep	0.67	0.28	0.89	0.47	0.98
Pigs	0.05	0.07	0.04	0.05	0.05
Poultry	5.65	5.04	6.00	5.13	6.45
Other	0.01	0.01	0.01	0.01	0.00
N	1783	698	1085	1137	646

Table 5. Household access to credit, 2011 (access and reasons for use)

	All	HH size<5	HH size>4	Female head	Male head
HH accessed credit	**0.16**	**0.20**	**0.14**	**0.16**	**0.17**
Among those households who used credit, the use:					
Invest in agricultural activities or business	0.21	0.17	0.24	0.21	0.21
Invest in non-agricultural activities or business	0.19	0.17	0.20	0.14	0.27
Pay for expenses related to emergency, illness	0.17	0.21	0.14	0.19	0.14
Pay off other loans	0.02	0.02	0.01	0.03	0.01
Make dwelling improvements	0.06	0.04	0.07	0.03	0.09
For consumption	0.26	0.31	0.21	0.29	0.21
Other	0.10	0.06	0.13	0.12	0.07
HH did not access credit	**0.84**	**0.80**	**0.86**	**0.84**	**0.83**
Among those households who did not use credit, reason why:					
Prefer to work with own resources	0.08	0.06	0.09	0.05	0.11
Did not need credit	0.07	0.06	0.07	0.07	0.07
Have other loans to pay off	0.01	0.02	0.01	0.01	0.02
No means to repay	0.78	0.80	0.77	0.83	0.71
Other	0.06	0.06	0.06	0.04	0.09
N	1783	698	1085	1137	646

Table 6. Labor participation and intensity (2011)

	All (18+)	Female (18+)	Male (18+)	Children (10-15)	Female (10-15)	Male (10-15)
Labor participation						
Works in casual wage labor	0.26	0.23	0.31	0.01	0.01	0.02
…in agriculture	0.09	0.09	0.08	0.01	0.01	0.01
…in non-agriculture	0.18	0.14	0.23	0.00	0.00	0.01
Works in own agriculture	0.56	0.59	0.52	0.42	0.39	0.45
Labor intensity						
…days per year in main occupation	38.21	29.60	50.07	0.76	0.25	1.21
…days per year in agriculture	10.28	9.79	10.97	0.65	0.19	1.04
…days per year in non-agriculture	27.93	19.81	39.10	0.12	0.06	0.17
…days per month in own agriculture	6.78	7.29	6.07	1.61	1.26	1.91
Observations	3965	2297	1668	2133	995	1138

Table 7. Ownership of agricultural assets, 2011.

	All	HH size<5	HH size>4	Female head	Male head
Share of households that have crop or livestock production	**0.87**	**0.88**	**0.86**	**0.86**	**0.89**
…and that own agricultural assets	**0.97**	**0.97**	**0.97**	**0.97**	**0.97**
Plough	0.20	0.18	0.21	0.14	0.30
Wheelbarrow (An. cart)	0.10	0.07	0.11	0.05	0.17
Planter	0.00	0.00	0.00	0.00	0.00
Sprayer	0.04	0.03	0.04	0.03	0.06
Thresher	0.00	0.00	0.01	0.01	0.00
Grinder	0.04	0.05	0.03	0.03	0.06
Watering can	0.02	0.02	0.03	0.02	0.03
Hoe (Jembe)	0.95	0.98	0.94	0.96	0.93
Machete (Panga)	0.87	0.86	0.88	0.86	0.89
Axe	0.46	0.43	0.49	0.40	0.57
Sickle	0.08	0.09	0.07	0.05	0.11
Pen	0.05	0.06	0.04	0.04	0.06
Trough	0.02	0.03	0.01	0.02	0.02
Other	0.01	0.02	0.01	0.02	0.01
N	1783	698	1085	1137	646

Table 8. Crop and livestock input use, 2011

Share	All	HH size<5	HH size>4	Female head	Male head
HH has crop production and uses inputs	**0.92**	**0.92**	**0.92**	**0.92**	**0.91**
Among those households using inputs:					
Seeds/seedlings	0.96	0.97	0.96	0.96	0.96
Pesticides	0.10	0.06	0.13	0.10	0.10
Organic fertilizer	0.31	0.31	0.31	0.29	0.33
Inorganic fertilizer	0.27	0.30	0.25	0.26	0.28
Water	0.04	0.04	0.04	0.04	0.04
HH has livestock production and uses inputs	**0.57**	**0.54**	**0.58**	**0.52**	**0.64**
Among those households using inputs:					
Water (purchased)	0.05	0.05	0.04	0.06	0.03
Fodder	0.09	0.07	0.10	0.11	0.07
Vet services; vaccines	0.92	0.89	0.93	0.91	0.92
Insurance	0.00	0.00	0.00	0.00	0.01
Manufactured feed	0.31	0.34	0.29	0.27	0.36
N	1783	698	1085	1137	646

Table 9. Sources of capital for nonfarm enterprises, 2011.

	Treatment	Control	All	HH size<5	HH size>4	Female head	Male head
HH owns non-farm enterprise	**0.36**	**0.39**	**0.35**	**0.31**	**0.37**	**0.34**	**0.37**
First source of capital							
Loan from family friend	0.10	0.09	0.09	0.13	0.08	0.10	0.08
Loan from saccos	0.02	0.05	0.04	0.06	0.03	0.06	0.02
Nonagricultural credit, bank, other institution	0.01	0.01	0.01	0.00	0.01	0.00	0.02
Loan-money lender	0.02	0.01	0.01	0.01	0.02	0.01	0.03
Gift from friend/family	0.15	0.19	0.17	0.13	0.19	0.18	0.17
Own savings	0.36	0.37	0.37	0.33	0.38	0.33	0.42
Sale of assets owned	0.05	0.07	0.07	0.05	0.07	0.07	0.07
Proceeds from other business	0.04	0.08	0.06	0.07	0.06	0.05	0.08
Inherited	0.01	0.01	0.01	0.02	0.01	0.00	0.02
OVC-Transfer	0.10	0.00	0.04	0.04	0.04	0.05	0.02
Other	0.02	0.02	0.02	0.02	0.02	0.03	0.02
None	0.11	0.10	0.10	0.13	0.09	0.12	0.07
Second source of capital							
Loan from family friend	0.03	0.09	0.05	0.18	0.02	0.03	0.07
Loan from saccos	0.03	0.00	0.02	0.00	0.02	0.00	0.03
Nonagricultural credit, bank, other institution	0.02	0.00	0.01	0.06	0.00	0.03	0.00
Gift from friend/family	0.05	0.18	0.11	0.15	0.10	0.12	0.09
Own savings	0.22	0.48	0.34	0.09	0.41	0.18	0.48
Sale of assets owned	0.09	0.13	0.11	0.34	0.04	0.24	0.00
Proceeds from other business	0.02	0.08	0.05	0.05	0.04	0.03	0.06
Inherited	0.07	0.00	0.04	0.00	0.05	0.04	0.03
OVC-Transfer	0.46	0.00	0.26	0.14	0.29	0.34	0.19
Other	0.00	0.05	0.02	0.00	0.03	0.00	0.04
N	1265	518	1783	698	1085	1137	646

Table 10. Estimation of the propensity score at household level – logit model

	Coef.	Robust Std. Err.	P-value
Female headed household (1=yes)	0.149	0.155	0.334
Age of the household head (years)	0.172	0.038	0.000
Age square (years)	-0.001	0.000	0.000
Elderly headed household (1=yes)	0.134	0.231	0.562
Child headed household (1=yes)	2.706	0.783	0.001
Number of OVC in the household	0.164	0.064	0.010
Education of household head (years)	-0.014	0.019	0.448
Education of the spouse (years)	0.000	0.025	0.988
Number of adult hh member with over 8 years of educ.	0.119	0.100	0.230
Dependency ratio	-0.023	0.080	0.773
Sex ratio	0.064	0.063	0.304
Total non-active labour force in hh	0.129	0.103	0.209
Under 11 years	-0.191	0.102	0.061
12-17 years	-0.171	0.091	0.059
18-34 years	-0.087	0.082	0.289
35-49 years	-0.195	0.211	0.354
50-64 years	0.330	0.184	0.073
Over 65 years	-0.187	0.189	0.323
Head was sick (1=yes)	-1.003	0.384	0.009
Total cultivable land owned by hh (acre)	-0.043	0.037	0.250
Monthly consumption per capita (Ksh)	0.000	0.000	0.559
Agriculture is the main source of income (1=yes)	0.436	0.148	0.003
Main source of income is salaried employment (1=yes)	-13.639	1.044	0.000
Main source of income is self-employment (1=yes)	-13.096	0.928	0.000
Main source of income is casual labour (1=yes)	-13.027	0.910	0.000
Main source of income is transfers (1=yes)	-13.101	1.016	0.000
Proportion of hh who owns bicycle (1=yes)	0.017	0.175	0.922
Proportion of hh who owns Blankets (1=Yes)	0.336	0.245	0.171
Proportion of hh who owns Mosquito Net (1=Yes)	-0.300	0.159	0.059
Drinking water from unprotected sources (1=yes)	-0.475	0.302	0.116
Access to road to the village (1=yes)	-0.010	0.615	0.988
Distance from daily market (1=> 5 km)	-0.613	0.612	0.317
Proportion of hh who can make nearby telephone calls (1=High)	-0.237	0.248	0.339
Dummy if district is Homabay (1=Yes)	-1.208	1.209	0.318
Dummy if district is Migori (1=Yes)	-1.386	1.085	0.202
Dummy if district is Kisumu (1=Yes)	-1.693	1.259	0.179
Dummy if district is Suba (1=Yes)	-0.735	1.078	0.496
Dummy if district is Kwale (1=Yes)	-0.551	0.971	0.571
Dummy if district is Garissa (1=Yes)	0.912	1.338	0.495
Constant	9.201	1.241	0.000

Table 11. Estimation of the propensity score at individual level – logit model

	Coef.	Robust Std. Err.	P-value
Female headed household (1=yes)	0.278	0.211	0.187
Age of the household head (years)	0.183	0.033	0
Age square (years)	-0.001	0.000	0
Elderly headed household (1=yes)	0.036	0.265	0.891
Child headed household (1=yes)	3.239	1.003	0.001
Number of OVC in the household	0.166	0.057	0.003
Education of household head (years)	0.008	0.023	0.727
Education of the spouse (years)	0.020	0.029	0.494
Number of adult hh member with over 8 years of educ.	0.034	0.098	0.728
Dependency ratio	0.015	0.079	0.851
Sex ratio	0.078	0.066	0.234
Total non-active labour force in hh	0.077	0.134	0.565
Under 11 years	-0.149	0.135	0.273
12-17 years	-0.062	0.105	0.553
18-34 years	-0.018	0.088	0.838
35-49 years	-0.130	0.173	0.453
50-64 years	0.442	0.205	0.031
Over 65 years	0.116	0.280	0.678
Head was sick (1=yes)	-1.024	0.509	0.044
Total cultivable land owned by hh (acre)	-0.053	0.033	0.108
Monthly consumption per capita (Ksh)	0.000	0.000	0.924
Agriculture is the main source of income (1=yes)	0.480	0.158	0.002
Main source of income is salaried employment (1=yes)	-15.942	1.202	0
Main source of income is self-employment (1=yes)	-15.405	1.272	0
Main source of income is casual labour (1=yes)	-15.360	1.436	0
Main source of income is transfers (1=yes)	-15.532	1.187	0
Proportion of hh who owns bicycle (1=yes)	0.001	0.184	0.994
Proportion of hh who owns blankets (1=yes)	0.434	0.288	0.132
Proportion of hh who owns mosquito net (1=yes)	-0.261	0.145	0.073
Drinking water from unprotected sources (1=yes)	-0.633	0.165	0
Access to road to the village (1=yes)	0.728	0.158	0
Distance from daily market (1=> 5 km)	-0.943	0.203	0
Proportion of hh who can make nearby telephone calls (1=high)	-0.423	0.219	0.053
Dummy if district is Homabay (1=yes)	-0.746	0.383	0.051
Dummy if district is Migori (1=yes)	-1.126	0.333	0.001
Dummy if district is Kisumu (1=yes)	-1.275	0.347	0
Dummy if district is Suba (1=yes)	-0.338	0.369	0.359
Dummy if district is Kwale (1=yes)	-0.189	0.400	0.638
Dummy if district is Garissa (1=yes)	0.921	0.455	0.043
Age of individual (years)	-0.012	0.015	0.45
Years of individuals' education	-0.002	0.008	0.801
Dummy if unemployed (1=yes)	0.711	0.544	0.191
Dummy if in wage labor (1=yes)	0.872	0.604	0.149

Dummy if in non wage labor (1=yes)	0.615	0.543	0.257
Dummy if in casual labor (1=yes)	0.894	0.551	0.105
Dummy if in self enterprise (1=yes)	0.561	0.568	0.323
Dummy if married (1=yes)	-0.193	0.099	0.051
Dummy if single (1=yes)	-0.283	0.146	0.053
Dummy if disabled (1=yes)	0.287	0.183	0.117
Dummy for ages 15-20 (1=yes)	-0.106	0.124	0.394
Dummy for ages 20-25 (1=yes)	-0.001	0.210	0.997
Dummy for ages 25-30 (1=yes)	0.104	0.299	0.727
Dummy for ages 30-35 (1=yes)	-0.251	0.363	0.489
Dummy for ages 35-40 (1=yes)	-0.087	0.434	0.84
Dummy for ages 40-45 (1=yes)	-0.457	0.522	0.381
Dummy for ages 45-50 (1=yes)	0.596	0.581	0.305
Dummy for ages 50-55 (1=yes)	0.036	0.632	0.955
Dummy for ages 55-60 (1=yes)	0.463	0.714	0.517
Dummy for ages 60-65 (1=yes)	0.415	0.793	0.601
Dummy for ages 65-70 (1=yes)	0.542	0.879	0.537
Dummy for ages 70-75 (1=yes)	0.745	0.950	0.433
Dummy for ages 75-80 (1=yes)	0.411	1.022	0.688
Dummy for ages 80-85 (1=yes)	1.025	1.129	0.364
Dummy for ages 85-90 (1=yes)	1.100	1.362	0.419
Dummy for ages >90 (1=yes)	0.672	1.570	0.669
Constant	9.201	1.241	0

Table 12a. Original and post IPW number of observations

	Total Sample	ages>18	ages10-15
Overall			
Households	1,783		
Male individuals	3,151	1,548	1,005
Female individuals	3,429	2,126	904
Total	**6,580**	**3,674**	**1,909**
On common support (ALL)			
Households	1,706		
Male individuals	3,139	1,537	1,005
Female individuals	3,408	2,106	904
Total	**6,547**	**3,643**	**1,909**
On common support (Male)			
Male individuals	**2,867**	**1,276**	**998**
On common support (Female)			
Female individuals	**3,042**	**1,743**	**901**

Table 13. Impact on livestock ownership, 2007-2011. DD estimator with IPW

	All	HH size <5	HH size 5 & above	Female head	Male head
Proportion of household owning					
Large livestock (cattle, donkey etc)	0.038 (0.91)	0.033 (0.58)	0.041 (0.88)	0.051 (1.06)	0.01 (0.21)
Small livestock (sheep, goat etc)	0.054 (1.65)	0.154 (2.85)***	-0.022 (0.48)	0.06 (1.74)*	0.043 (0.74)
Poultry	-0.001 (0.02)	0.053 (0.84)	-0.038 (0.58)	0.005 (0.12)	-0.013 (0.13)
Total quantity owned					
Large livestock	0.129 (0.57)	0.20 (1.03)	0.07 (0.25)	0.16 (0.59)	0.06 (0.16)
Small livestock	-0.457 (0.81)	-0.605 (0.39)	-0.368 (0.70)	-0.784 (1.10)	0.172 (0.39)
Poultry	0.857 (1.19)	0.569 (0.66)	1.04 (1.09)	0.268 (0.44)	2.01 (1.51)
Total (measured in TLU)	0.593 (0.62)	0.671 (1.72)*	0.50 (0.34)	0.57 (1.16)	0.66 (0.31)
N	1706	680	1026	1087	619

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. T-statistics in parentheses.

Table 14. Impact on ownership of agricultural assets, 2007-2011. DD estimator with IPW

	All	HH size <5	HH size 5 & above	Female head	Male head
Plough	-0.006 (0.86)	-0.011 (0.87)	-0.004 (0.48)	-0.014 (1.23)	0.007 (0.70)
Wheelbarrow	0.004 (0.40)	0.000 (0.01)	0.007 (0.47)	0.002 (0.16)	0.009 (0.51)
Sprayer	-0.006 (0.64)	-0.025 (1.34)	0.006 (0.57)	0.007 (1.25)	-0.03 (1.43)
Thresher	0.002 (1.71)	0.000 (0.00)	0.004 (1.70)	0.002 (1.37)	0.002 (1.02)
Grinder	-0.000 (0.08)	0.002 (1.02)	-0.002 (0.22)	0.006 (0.54)	0.010 (1.59)
Watering can	-0.007 (0.83)	-0.019 (0.90)	0.000 (0.00)	-0.004 (0.50)	-0.013 (1.07)
Hoe	0.010 (0.42)	0.008 (0.26)	0.011 (0.47)	0.032 (1.39)	-0.026 (0.55)
Machete	0.029 (1.43)	0.042 (1.07)	0.020 (0.79)	0.010 (0.44)	0.064 ()2.44)*
Axe	-0.007 (0.58)	-0.055 (2.47)*	0.023 (1.60)	-0.015 (0.91)	0.010 (0.43)
Sickle	0.005 (0.79)	-0.004 (0.30)	0.011 (1.47)	0.007 (1.11)	0.003 (0.19)
Pen	0.005 (0.90)	0.002 (0.28)	0.007 (1.34)	-0.002 (0.28)	0.019 (2.67)*
Trough	0.011 (4.35)***	0.006 (1.71)	0.015 (3.46)**	0.009 (2.98)**	0.017 (3.05)**
N	1706	629	1077	1103	603

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. T-statistics in parentheses.

Table 15. Impact on crop production, 2011. IPW, with controls.

	All	HH size <5	HH size 5 & above	Female head	Male head
Proportion of households:					
growing crops	-0.024	-0. 036	-0.008	-0.016	-0.054
	(-0.44)	(-1.16)	(-0.13)	-(0.31)	(-0.96)
Improved maize	-0.009	0.018	-0.013	0.003	-0.028
	(-0.45)	(0.83)	(-0.43)	(0.10)	(-0.99)
Using seed	-0.015	-0.005	-0.011	0.001	-0.067
	(-0.25)	(-0.09)	(-0.17)	(0.04)	(-1.07)
Using pesticide	-0.031	-0.021	-0.035*	-0.053*	0.008
	(-1.65)	(-0.80)	(-1.74)	(-1.95)	(0.35)
Using organic fertilizer	-0.005	0.038	-0.036	0.015	-0.039
	(-0.11)	(0.67)	(-0.71)	(0.31)	(-0.63)
Using inorganic fertilizer	-0.028	0.014	-0.048	-0.007	-0.079
	(-0.45)	(0.20)	(-0.81)	(-0.12)	(-1.05)
Expenditure per acre on:					
Seeds	-104.8**	-76.59	-110.4**	-95.94	-157.1**
	(-2.19)	(-1.28)	(-2.25)	(-1.58)	(-2.35)
Pesticide	7.428	-9.393	16.37	-5.635	27.51
	(1.03)	(-1.20)	(1.61)	(-0.78)	(1.28)
Organic fertilizer	10.69	21.13	15.17	3.357	29.07
	(0.61)	(0.88)	(0.66)	(.015)	(1.02)
Inorganic fertilizer	-72.45	-14.10	-107.1	-81.15	-68.99
	(-1.16)	(-0.22)	(-1.38)	(-1.32)	(-0.86)
N	1706	680	1026	1087	619

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. T-statistics in parentheses.

Table 16. Impact on livestock production, 2011. IPW, with controls.

	All	HH size <5	HH size 5 & above	Female head	Male head
Proportion of households using:					
Insurance	-0.004	0.001	-0.008	0	-0.012
	(-0.82)	(1.20))	(-1.02)	(.)	(-0.86)
Vet services, medicines	-0.028	0.0420	-0.0607	-0.0152	-0.068
	(-0.59)	(0.68)	(-1.22)	(-0.32)	(-1.11)
Manufactured feed, salts	0.0319	0.067	0.0225	0.069**	-0.057
	(1.05	(1.58)	(0.73)	(2.27)	(-1.06)
Fodder	-0.0269	0.0124	-0.0418*	-0.042	0.004
	(-1.23)	(0.46)	(-1.78)	(-1.45)	(0.19)
Expenditure on:					
Insurance	4.789	11.51	-7.046	0	17.43
	(0.58)	(1.20)	(-1.02)	(.)	(0.56)
Vet services, medicines	-46.60	75.91	-116.0	2.981	-154.2
	(-0.68)	(0.88)	(-1.37)	(0.04)	(-1.19)
Water	-2.059	-12.65	2.781	18.56	-42.29
	(-0.05)	(0.13)	(0.13)	(0.44)	(-0.81)
Manufactured feed, salts	-2.568	11.46	-18.15	19.83	-110.3
	(-0.07)	(0.26)	(-0.33)	(0.57)	(-1.35)
Fodder	-240.3**	-84.92	-329.3	-315.9	-69.78
	(-2.36)	(-0.73)	(-2.51)	(-2.75)	(-0.46)
N	1706	680	1026	1087	619

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. T-statistics in parentheses.

Table 17. Impact on hiring in of labour, 2011. IPW, with controls.

Total days	All	HH size <5	HH size 5 & above	Female head	Male head
Total, livestock and crop	-4.019	0.368	-7.215	-5.605	0.965
	(-1.22)	(0.18)	(-1.45)	(-1.34)	(0.66)
Total livestock	-4.069	-1.308*	-5.871	-5.139	-0.151
	(-1.43)	(-1.91)	(-1.30)	(-1.47)	(-.022)
Livestock fodder	0.022	0	0.046	0	0.100
	(0.96)	(.)	(0.97)	(.)	(0.98)
Livestock herding	-4.09	-1.308*	-5.917	-5.139	-0.251
	(-1.44)	(-1.91)	(-1.31)	(-1.47)	(-0.39)
Total crop	0.049	1.675	-1.344	-0.466	1.117
	(0.06)	(1.02)	(-1.03)	(-0.37)	(1.02)
Crop harvest	-0.0381	0.0283	-0.084	-0.215	0.273
	(-0.19)	(0.07)	(-0.39)	(-0.73)	(0.84)
Crop weeding	0.376	0.820	-0.126	-0.114	1.316*
	(0.69)	(0.85)	(-0.18)	(-0.17)	(1.90)
Crop land preparation	-0.288	0.827	-1.134	-0.137	-0.472
	(-0.60)	(1.41)	(-1.37)	(-0.20)	(-0.82)
N	1706	680	1026	1087	619

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. T-statistics in parentheses.

Table 18. Impact on use of credit, 2011. IPW, with controls.

	All	HH size <5	HH size 5 & above	Female head	Male head
Received loan	0.007	-0.006	0.015	0.031	-0.044
	(0.31)	(-0.18)	(0.57)	(1.31)	(-1.13)
Sought credit	0.010	0.007	0.010	0.036	-0.046
	(0.44)	(.20)	(0.39)	(1.18)	(-1.10)
N	1706	680	1026	1087	619

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. T-statistics in parentheses.

Table 19. Impact on consumption of food groups, 2007-2011. DD estimator, with IPW.

	All	HH size <5	HH size 5 & above	Female head	Male head
Cereals	-0.004	-0.010	0.001	-0.005	-0.000
	(0.54)	(0.63)	(0.63)	(0.52)	(0.20)
Legumes	0.004	0.109	-0.069	0.067	-0.117
	(0.04)	(1.48)	(0.64)	(0.65)	(1.25)
Dairy and eggs	0.123	0.297	-0.001	0.163	0.045
	(2.52)**	(5.03)***	(0.02)	(3.08)***	(0.63)
Meat and fish	0.053	0.135	-0.007	0.072	0.015
	(1.22)	(2.96)***	(0.12)	(1.83)*	(0.22)
Vegetables	-0.022	-0.043	-0.007	-0.033	-0.003
	(0.69)	(0.73)	(0.17)	(0.79)	(0.06)
Fruit	0.043	0.104	-0.000	0.047	0.036
	(1.08)	(1.80)*	(0.02)	(0.98)	(0.93)
Cooking oil	0.021	0.023	0.019	-0.004	0.069
	(0.77)	(0.50)	(0.53)	(0.11)	(4.80)***
Other food	-0.009	-0.009	-0.009	-0.007	-0.012
	(0.66)	(0.46)	(0.50)	(0.41)	(1.04)
N	1783	698	1085	1137	646

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. T-statistics in parentheses.

Table 20. Impact on proportion of food consumption from own production, 2007-2011. DD estimator, with IPW.

	All	HH size <5	HH size 5 & above	Female head	Male head
Cereals	0.06	0.13	0.01	0.05	0.08
	(1.10)	(1.72)*	(0.18)	(0.73)	(0.93)
Legumes	-0.001	0.02	-0.02	0.04	-0.08
	(0.02)	(0.32)	(0.44)	(0.72)	(1.66)
Dairy and eggs	0.13	0.20	0.09	0.15	0.11
	(3.09)***	(3.40)***	(1.66)	(3.03)***	(1.32
Meat and fish	0.04	0.11	-0.003	0.03	0.07
	(0.89)	(3.64)***	(0.05)	(1.01)	(0.62)
Vegetables	0.004	-0.006	0.02	-0.05	0.10
	(0.06)	(0.09)	(0.25)	(0.72)	(1.12)
Fruit	0.04	0.09	0.01	0.06	0.003
	(1.02)	(1.93)*	(0.12)	(1.31)	(0.07)
Cooking oil	0.003	0.01	-0.003	0.003	0.002
	(0.46)	(0.97)	(1.02)	(0.42)	(0.39)
Other foods	0.04	0.04	0.04	0.04	0.05
	(4.20)***	(2.92)***	(3.38)***	(3.60)***	(2.52)**
N	1706	680	1026	1087	619

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. T-statistics in parentheses.

Table 21. Impact on household participation in nonfarm enterprises, 2011. IPW, with controls.

	All	HH size <5	HH size 5 & above	Female head	Male head
Household participation in nonfarm enterprise	0.016	0.019	0.001	0.072**	-0.112*
	(0.47)	(0.53)	(0.04)	(2.09)	(-1.94)
N	1706	680	1026	1087	619

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. T-statistics in parentheses

Table 22. Impact on wage labour participation by adults, 2011 (age >18 in 2011). IPW with controls

	All wage labour				Agricultural wage labour				Non-agricultural wage labour			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
All adults												
Treatment	-0.026	-0.053*	-0.138	-0.025	-0.018	-0.037*	-0.010	-0.009	-0.008	-0.016	-0.128	-0.016
Treatment * distance to market		0.129**				0.090**				0.039		
Treatment * age			0.005				-0.002				0.007	
Treatment * age squared			-0.000				0.000				-0.000	
Treatment * chronic illness				-0.004				-0.042				0.037
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	3,643	3, 643	3, 643	3, 643	3, 643	3, 643	3, 643	3, 643	3, 643	3, 643	3, 643	3, 643
Adjusted R2	0.098	0.101	0. 098	0. 098	0.051	0.054	0.052	0.051	0.110	0.110	0.111	0.110
F-test of joint significance		2.17*	16.20***	0.60		3.12**	8.02***	0.62		0.96	12.79***	1.21
Female												
Treatment	0.017	-0.009	-0.007	0.022*	-0.006	-0.019	0.119	-0.001	0.022	0.010	-0.126	0.023
Treatment * distance to market		0.132*				0.071				0.061		
Treatment * age			0.002				-0.005				0.007	
Treatment * age squared			-0.000				0.000				-0.000	
Treatment * chronic illness				-0.026				-0.021				-0.005
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	1,743	1,743	1,743	1,743	1,743	1,743	1,743	1,743	1,743	1,743	1,743	1,743
Adjusted R2	0.117	0.119	0.116	0.117	0.091	0.092	0.091	0.090	0.115	0.115	0.115	0.114
F-test of joint significance		2.51*	7.83***	0.26		1.69	3.78***	0.09		1.05	5.71***	0.62
Male												
Treatment	-0.091*	-0.108*	-0.527**	-0.091*	-0.071	-0.103*	-0.148	-0.063	-0.020	-0.005	-0.379**	-0.028
Treatment * distance to market		0.072				0.139				-0.067		
Treatment * age			0.021*				0.002				0.019**	
Treatment * age squared			-0.000				0.000				-0.000*	
Treatment * chronic illness				-0.000				-0.065				0.065
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276
Adjusted R2	0.120	0.120	0.126	0.119	0.086	0.093	0.091	0.087	0.139	0.139	0.141	0.139
F-test of joint significance		1.77	12.13***	1.18		1.42	2.81**	1.32		2.95*	9.24***	0.40

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. The sample excludes Garissa district. Control variables used in the regression include individual level indicators (gender, age, education, health), household level proxies (gender, age, education, household size, dependency ratio, education), community level indictors (distance to market, access to road) and district level fixed effect. The full set of regression results is available from authors upon request.

Table 23. Impact on days worked per year in wage labour by adults, 2011 (age >18 in 2011). IPW with controls.

	All wage labour				Agricultural wage labour				Non-agricultural wage labour			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
All adults												
Treatment	-20.409**	-22.162*	39.603	-12.310	-13.741	-16.752	-34.294	2.789	-20.066	-24.012	14.867	-15.953
Treatment * distance to market		26.047				15.582				22.206		
Treatment * age			-2.539				1.347				-1.367	
Treatment * age squared			0.024				-0.017				0.010	
Treatment * chronic illness				-29.299				-68.202**				-29.781
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	1,028	1,028	1,028	1,028	342	342	342	342	684	684	684	684
Adjusted R2	0.059	0.079	0.078	0.079	0.157	0.155	0.152	0.170	0.056	0.055	0.054	0.056
F-test		1.70	3.31***	2.72**		0.27	0.55	3.22**		1.28	2.04*	1.23
Female												
Treatment	-13.912	-17.357	58.556	-7.234	-12.486	-12.754	202.286	7.907	-25.439	-27.181	72.479	-20.927
Treatment * distance to market		19.903				1.389				10.197		
Treatment * age			-3.377				-6.679				-4.676	
Treatment * age squared			0.035				0.048				0.049	
Treatment * chronic illness				-33.715				-77.856**				-31.790
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	457	457	457	457	175	175	175	175	282	282	282	282
Adjusted R2	0.064	0.063	0.061	0.065	0.128	0.122	0.128	0.147	0.008	0.004	0.002	0.006
F-test		0.60	0.52	2.73**		0.65	1.02	6.47***		0.55	0.60	0.90
Male												
Treatment	-18.582	-27.710	46.016	-6.740	-46.018*	-64.512*	-74.157	-22.012	-14.999	-18.809	10.333	-9.224
Treatment * distance to market		46.944				69.596				18.780		
Treatment * age			-3.017				-0.438				0.058	
Treatment * age squared			0.024				0.013				-0.026	
Treatment * chronic illness				-100.56***				-145.256*				-54.975
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	420	420	420	420	107	107	107	107	313	313	313	313
Adjusted R2	0.090	0.092	0.088	0.102	0.295	0.295	0.281	0.316	0.131	0.129	0.133	0.132
F-test		1.46	1.55	3.12**		1.44	1.27	1.96		0.29	1.17	1.23

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. The sample excludes Garissa district. Control variables used in the regression include individual level indicators (gender, age, education, health), household level proxies (gender, age, education, household size, dependency ratio, education), community level indictors (distance to market, access to road) and district level fixed effect. The full set of regression results is available from authors upon request.

Table 24: Impact on participation in own farm labour by adults, 2011 (age >18 in 2011). IPW with controls.

	Participation in own farm labour				Days worked per month in own farm labour			
	model1	model2	model3	model4	model1	model2	model3	model4
All Adults								
Treatment	-0.047	-0.063*	-0.107	-0.055**	-0.042	0.058	-6.521	-0.090
Treatment * distance to market		0.077				-0.491		
Treatment * age			0.001				0.330	
Treatment * age squared			-0.000				-0.003	
Treatment * chronic illness				0.038				0.291
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	3,643	3,643	3,643	3,643	2,184	2,184	2,184	2,184
Adjusted R2	0.243	0.243	0.243	0.352	0.133	0.133	0.136	0.133
F-test		1.55	4.58***	10.29***		0.42**	5.75***	0.36
Male								
Treatment	-0.055	-0.043	-0.115	-0.088**	-0.622	-1.012	-0.233	-0.642
Treatment * distance to market		-0.052				1.886		
Treatment * age			-0.002				-0.081	
Treatment * age squared			-0.000				0.002	
Treatment * chronic illness				0.278***				0.214
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	1,276	1,276	1,276	1,276	671	671	671	671
Adjusted R2	0.222	0.222	0.230	0.228	0.223	0.223	0.224	0.222
F-test		0.70	2.31**	5.01***		0.18	5.00***	0.39
Female								
Treatment	0.007	-0.021	0.356*	-0.017	0.406	0.671	-12.198***	0.433
Treatment * distance to market		0.143*				-1.481		
Treatment * age			-0.019**				0.503**	
Treatment * age squared			0.000**				-0.004*	
Treatment * chronic illness				0.113				-0.149
District fixed effect	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	1,743	1,743	1,743	1,743	1,084	1,084	1,084	1,084
Adjusted R2	0.340	0.342	0.342	0.341	0.235	0.235	0.247	0.234
F-test		2.01	9.23***	3.25**		1.86	7.25***	1.53

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. The sample excludes Garissa district. Control variables used in the regression include individual level indicators (gender, age, education, health), household level proxies (gender, age, education, household size, dependency ratio, education), community level indictors (distance to market, access to road) and district level fixed effect. The full set of regression results is available from authors upon request.

Table 25. Impact on participation in wage labour by children, 2011 (10-15 years in 2011). IPW with controls.

	All wage labour		Agriculture wage labour		Non agriculture wage labour	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
All adults						
Treatment	-0.006	-0.006	-0.002	-0.004	-0.003	-0.002
Treatment * distance to market		0.003		0.011		-0.008
District fixed effect	YES	YES	YES	YES	YES	YES
Number of observations	1,909	1,909	1,909	1,909	1,909	1,909
Adjusted R2	0.013	0.012	0.008	0.008	0.003	0.003
F-test of joint significance		0.85		0.61		0.29
Female						
Treatment	-0.002	-0.004	-0.004	-0.007	0.002	0.003
Treatment * distance to market		0.014		0.019		-0.006
District fixed effect	YES	YES	YES	YES	YES	YES
Number of observations	901	901	901	901	901	901
Adjusted R2	0.039	0.038	0.057	0.057	-0.015	-0.015
F-test of joint significance		0.30		0.78		0.32
Male						
Treatment	-0.003	-0.006	0.001	-0.002	-0.004	-0.004
Treatment * distance to market		0.012		0.014		-0.002
District fixed effect	YES	YES	YES	YES	YES	YES
Number of observations	998	998	998	998	998	998
Adjusted R2	0.011	0.011	0.005	0.004	-0.002	-0.003
F-test of joint significance		0.32		0.17		0.44

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. The sample excludes Garissa district. Control variables used in the regression include individual level indicators (gender, age, education, health), household level proxies (gender, age, education, household size, dependency ratio, education), community level indictors (distance to market, access to road) and district level fixed effect. The full set of regression results is available from authors upon request.

Table 26. Impact on participation in own farm labour by children, 2011 (10-15 years in 2011). IPW with controls.

	Participation in own farm labour		Days worked per month in own farm labour	
	Model 1	Model 2	Model 1	Model 2
All children				
Treatment	-0.124***	-0.120***	0.072	0.462
Treatment * distance to market		-0.119		-1.764
District fixed effect	YES	YES	YES	YES
Number of observations	1,909	1,909	887	887
Adjusted R2	0.139	0.138	0.007	0.010
F-test of joint significance		4.28***		0.56
Boys				
Treatment	-0.120**	-0.131**	-0.266	0.433
Treatment * distance to market		0.048		-3.207
District fixed effect	YES	YES	YES	YES
Number of observations	998	998	504	504
Adjusted R2	0.142	0.141	0.032	0.046
F-test		3.13**		0.85
Girls				
Treatment	-0.072	-0.056	0.488	0.684
Treatment * distance to market		-0.085		-0.957
District fixed effect	YES	YES	YES	YES
Number of observations	901	901	380	380
Adjusted R2	0.109	0.109	0.015	0.013
F-test		1.14		0.29

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels. The sample excludes Garissa district. Control variables used in the regression include individual level indicators (gender, age, education, health), household level proxies (gender, age, education, household size, dependency ratio, education), community level indictors (distance to market, access to road) and district level fixed effect. The full set of regression results is available from authors upon request.

Figure 1. Map of the evaluation sites

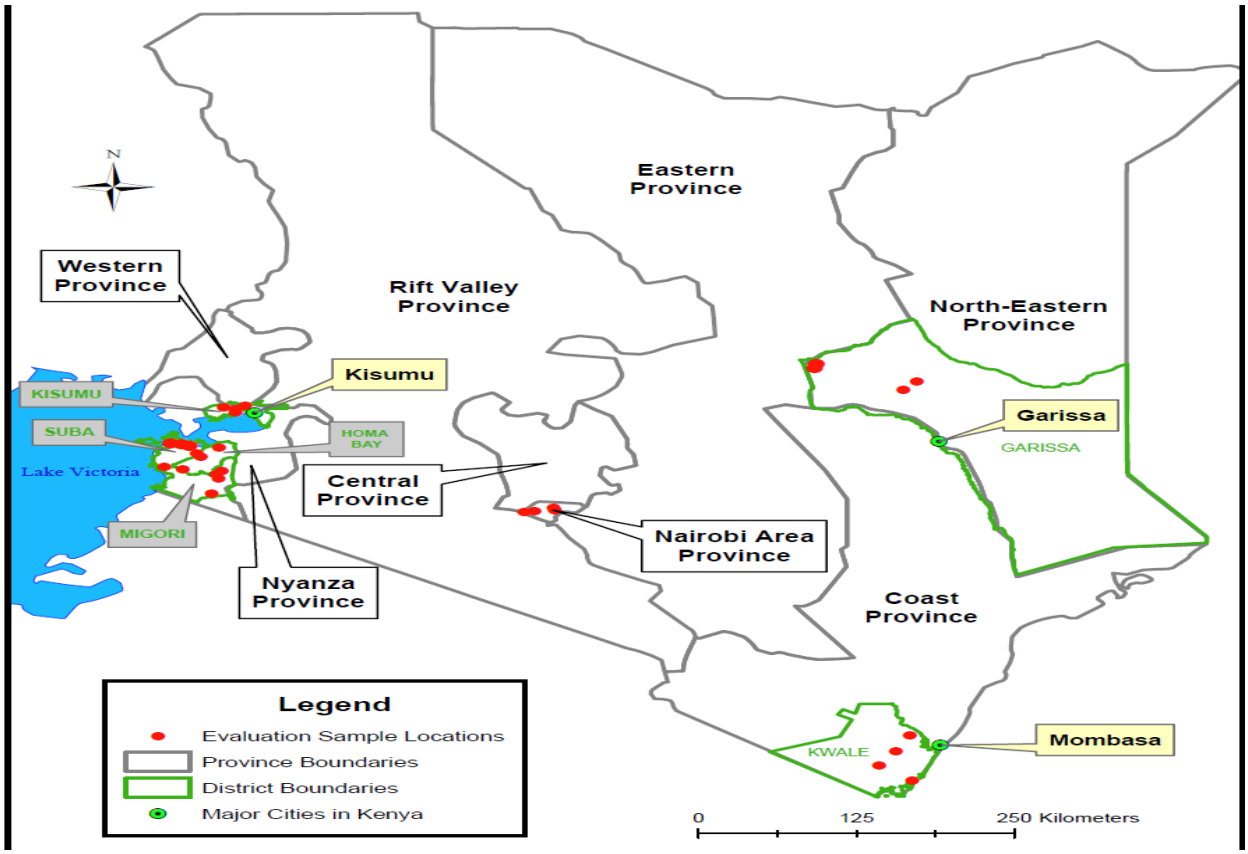

Figure 2. Kernel density of the propensity score for the treated and control groups, household level weighting

(i) Not weighted (ii) weighted

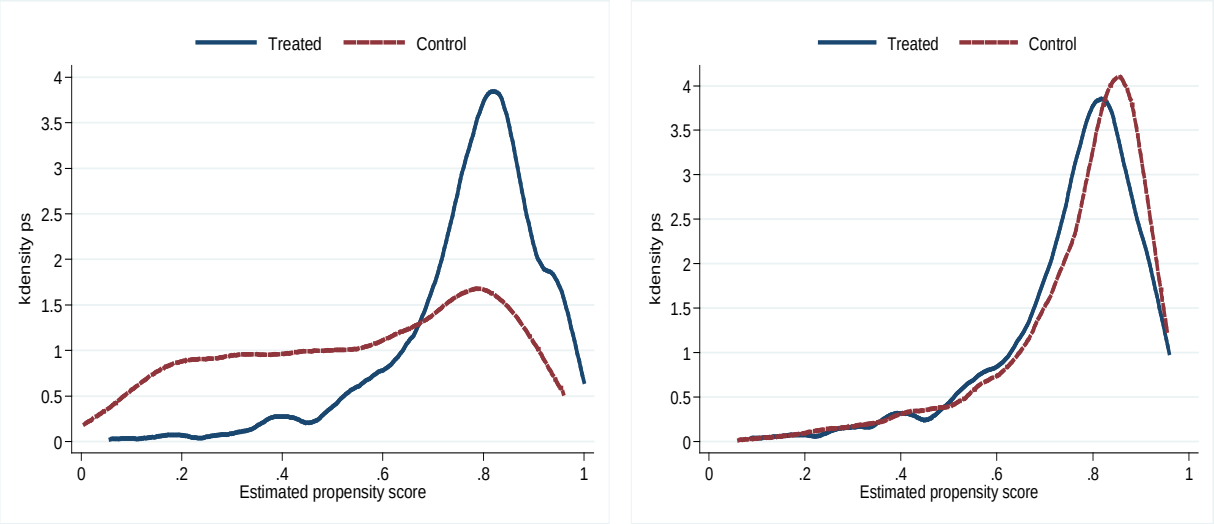

Figure 3. Kernel density of the propensity score for the treated and control groups, individual level weighting

(i) Not weighted (ii) weighted

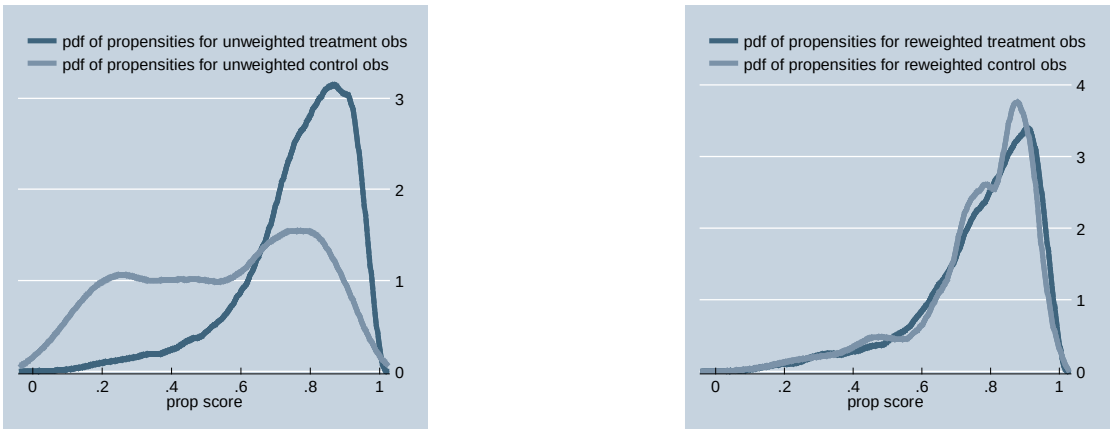

Figure 4. Impact of the program on labour supply (participation) by age and sex of adult individuals, 2011.

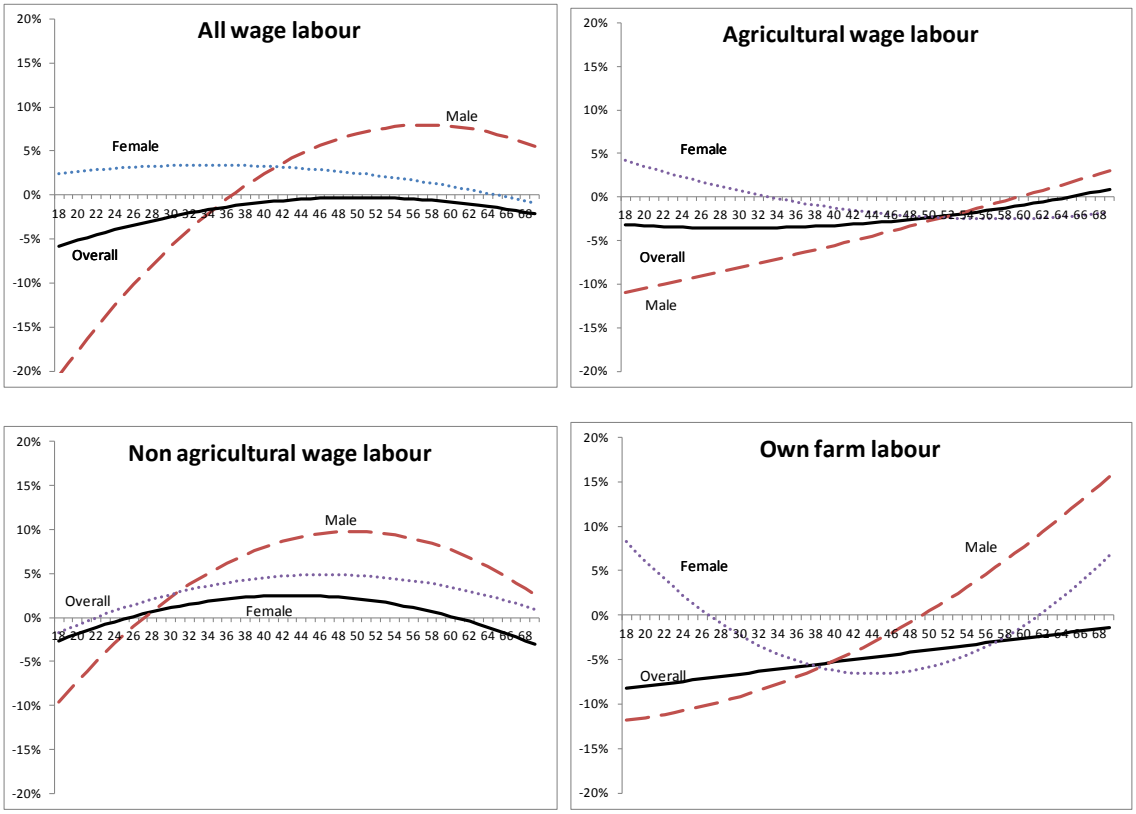

Figure 5. Impact of the program on labour supply (intensity) by age and sex of adult individuals, 2011.