WFP/UNICEF/IFPRI

Impact Evaluation of Cash and Food Transfers at Early Childhood Development Centers in Karamoja, Uganda

Final Impact Report

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Acronyms

BIC	Baseline Index Child
CCTs	Conditional Cash Transfers
CSB	Corn Soya Blend
CSCD	Community Support for Capacity Development
DDI	Dietary Diversity Index
DEO	District Education Office (Government of Uganda)
DID	Difference–in-difference
ECD	Early Childhood Development
FCS	Food Consumption Score
HDDS	Household Dietary Diversity Score
IFPRI	International Food Policy Research Institute
LC1	Local Council 1 (smallest administrative unit)
OLS	Ordinary Least Squares
RC1	Reference Child 1
RC2	Reference Child 2
SCF	Save the Children Foundation
SFP	School Feeding Program
SUR	Seemingly Unrelated Regression
UBOS	Uganda Bureau of Statistics
WFP	World Food Programme

Executive Summary

1. This report is a revised draft of the Final Impact Report of an impact evaluation study of the World Food Programme (WFP) project to provide food and cash transfers to households with children participating in Early Childhood Development (ECD) centers in the Karamoja subregion of Uganda. The analysis reported here provides evidence on the relative impact of these food and cash transfers on household food security, frequency of child food consumption, child anthropometry, anemia status, ECD center participation, and child cognitive and noncognitive development. The report also considers the support from this evidence for plausible pathways for impacts on child cognitive and noncognitive development from the effect of WFP transfers on child nutrition and health, as well as a role for stimulation through increased ECD center participation.
2. Chapter 2 describes the WFP project to provide food and cash transfers to households with children participating in ECD centers.
3. Chapter 3 summarizes the design of the impact evaluation. The impact evaluation was designed as a cluster-randomized controlled impact evaluation with 98 villages containing ECD centers randomly assigned in one of three intervention arms: food, cash, or control. Food and cash transfers were provided to households with children enrolled in a ECD center in their village from April 2011 – May 2012.
4. Chapter 4 introduces the survey data used to conduct the impact evaluation and summarizes the components of the data used in the evaluation.
5. Chapter 5 summarizes household's experience with the ECD centers:
    - Food-recipient households, in general, respond very similarly to control households regarding their experience with ECD centers. The exception is on reported quality of the teaching/activities at the ECD center; both food-recipient and cash-recipient report significantly better quality than control households, and the difference in responses between food-recipient and cash-recipient households is insignificant.
    - Cash-recipient households report significantly different experiences with ECD centers than food-recipient or control households in a range of dimensions. Relative to food-recipient or control households, cash-recipient households report a significantly higher value of gifts given to the ECD caregiver as payment for volunteering; a significantly higher proportion of cash-recipient households report attending ECD center meetings; and a significantly higher proportion of cash-recipient households report that their community's ECD center has a shelter, access to a latrine, access to hand-washing facilities, and other materials. Relative to food-recipient or control households, a much higher proportion of cash-recipient households also report providing any gifts they do give the ECD caregiver in the form of cash.
6. Chapter 6 examines the impact of food and cash transfers on three measures of household food security and on the frequency of child food consumption across 11 food groups:

- Impact on household food security measures: We estimated the impact of food and cash transfers and their combined impact on three measures of food security: the Dietary Diversity Index (DDI), the Household Dietary Diversity Score (HDDS), and the Food Consumption Score (FCS). When the two program modalities are pooled, there is no impact of the combined program on any of these measures of food security. Disaggregating impacts by transfer modality, food transfers had no effect on food security measured by the DDI, and the estimated effect was negative. Cash transfers led to a large and significant increase in the DDI of 0.925 points. The impact of cash transfers was significantly larger than that of food transfers, with a difference in impacts on the DDI of 1.13 points. For the HDDS, food transfers had no impact, on average, relative to the control group. Cash transfers improved the HDDS relative to the control group by 0.552 points. The impact of cash transfers on the HDDS was significantly larger than that of food transfers, by 0.698 points. For the FCS, food transfers have a negative impact estimate, but it is not significant. The impact of cash transfers is estimated at 2.99 points in the FCS, and this estimate is significant.
- Impact on frequency of food consumption by children**:** Frequency of food consumption over the past 7 days was assessed for children age 1-7 years across 11 food groups: staples, leafy green vegetables, meat and eggs, dairy, orange fruits and vegetables, other vegetables, other fruit, corn soya blend (CSB), nuts and seeds, snacks, and beer or beer residue. Food transfers had no impact on frequency of consumption for children across any of the food groups, and in any range of child ages. The only exception is that, in a model controlling for district of residence, food transfers increased the frequency of consumption of CSB relative to the control group by 0.198 days in the past 7 days, and this effect was weakly significant. The impact of food transfers on CSB in this model was significantly larger than that of cash transfers. Cash transfers caused significant increases in the frequency of consumption of starches, meat and eggs, and dairy, although impacts were only weakly significant for dairy. The size of these effects was large, representing a 66 percent increase in the frequency of meat and egg consumption and a 100 percent increase in the frequency of dairy consumption. Cash transfers also had significantly larger impacts than food transfers for each of these food groups.
- Impact on household food consumption and total household consumption**:** The surveys measured the impact of food and cash transfers on household daily calorie intake per capita, the value of household food consumption per capita, the value of household nonfood consumption per capita, and the value of total household consumption per capita. Average calorie intake per capita at baseline was 2,066 kcal/day. Results show that having access to either cash or food transfers resulted in a significant 10.2 percentage point increase in daily calorie intake per capita. Disaggregating these impacts, we see that this effect is driven by receipts of cash transfers, which led to a significant increase in daily caloric intake per capita of nearly 20 percent. The estimated impact of food transfers, on the other hand, is small and not significant. This pattern of impacts is similar for the measures of the value of food, nonfood, and total consumption. Cash transfers have a large and significant impact on the value of per capita

consumption in all three categories, approximately by 18.7 percent for food, 31.3 percent for nonfood, and 18.7 percent for total consumption. Food transfers had no significant impact on any of these consumption measures.

- Impact on household food consumption across food groups**:** We estimated impacts of the transfers on the log value of household food consumption per capita of 13 food groups: cereals; roots and tubers; fruit; vegetables; meat and poultry; eggs; fish and seafood; pulses, legumes, and nuts; milk and dairy; fats and oils; sugar and honey; CSB; and other. Cash transfers caused significant increases in the value of per capita consumption of 6 out of the 13 food groups, including cereals, meat and poultry, fish and seafood, milk and dairy, fats and oils, and other. These impacts were also large. The value of consumption per capita more than doubled for consumption of meat and poultry, fish and seafood, milk and dairy, and fats and oils, as a result of the cash transfers. Food transfers had no significant impact on consumption in any of the 13 food groups. The impact of cash transfers was also significantly larger than the impact of food transfers in all six of the food groups mentioned above, as well as pulses, legumes, and nuts.

7. Chapter 7 presents evidence on the impact of the food and cash transfers on child malnutrition using measures of anthropometry:

   - Impact of food and cash transfers on prevalence of malnutrition for children age 61-83 months (BICs): The food and cash transfer programs showed weak impacts on anthropometry of children age 61-83 months (5-6 years) in the Baseline Index Child (BIC) sample. At endline, there are no impacts of food or cash transfers compared to the control group on prevalence of stunting, underweight, or low BMI, or on prevalence of severe levels of these indicators. However, severe underweight prevalence is 3.8 percent lower in the cash group than in the food group and this estimate is weakly significant.
   - Impact of food and cash transfers on prevalence of malnutrition for children age 36-53 months (RC1s): Despite the deteriorating nutrition situation in Karamoja at this time, food and cash transfers did not reduce the prevalence of stunting, underweight, or wasting among children age 36-53 months (3-4.5 years) compared to the control group. However, cash transfers led to a significant 8.0 percentage point reduction in the prevalence of severe wasting compared to the control group. Also, cash transfers led to a significant 5.2 percentage point reduction in the prevalence of severe wasting among RC1s compared to the food group. These are relatively large effects and suggest that cash was playing an important role in protecting the nutritional status of children at the age to receive ECD transfers by endline.
   - Impact of food and cash transfers on prevalence of malnutrition for children age 6-35 months (RC2s): Food and cash transfers did not reduce the prevalence of stunting, underweight, or wasting among children age 6-35 months (0.5-2 years) compared to the control group. For severe underweight prevalence, cash transfers led to a weakly significant *increase* in malnutrition of 5.2 percentage points compared to the control group. However, food transfers had broad impacts on malnutrition compared to the

cash transfers. For all six indicators, the impact of food transfers relative to cash is significant or weakly significant. These impacts include a 9.5 percentage point reduction in prevalence of stunting as a result of spillover effects on children under 3 when the household is receiving food transfers rather than cash. These results suggest that some of the nutrition food rations given to households for their children attending ECD centers also were being provided to younger children in the household.

8. Chapter 8 presents evidence on the impact of the food and cash transfers on the prevalence of anemia:

    - <u>Impact of food transfers on anemia prevalence</u>: Food transfers have mixed impacts on prevalence of anemia among children aged 6-83 months, and impacts are largely insignificant. For BICs aged 54-83 months (4.5-6 years) at endline, we find no significant impact of food transfers on prevalence of any anemia or on prevalence of moderate/severe anemia. We do find food transfers cause a weakly significant *decrease* in prevalence of any anemia among RC1s aged 36-53 months (3-4.5 years) at endline, a reduction of about 9 percentage points. However, we also find food transfers cause a significant "increase" in prevalence of any anemia among RC2s aged 6-35 months (0-2 years) at endline, an increase of about 10 percentage points. We find no impacts of food transfers on prevalence of moderate or severe anemia among RC1s or RC2s. Results suggest that while there may not be direct effects of food transfers on the targeted children, the BICs, there may be mixed spillover effects on younger siblings.
    - <u>Impact of cash transfers on anemia prevalence</u>: Cash transfers cause significant or weakly significant reductions in prevalence of anemia and prevalence of moderate/severe anemia, among BICs aged 54-83 months (4.5-6 years) at endline. Impacts on prevalence of any anemia are similar across younger BICs aged 54-71 months (4.5-5 years) and older BICs aged 72-83 months (6 years) at endline, a reduction of about 10 percentage points. Impacts of cash on prevalence of moderate/severe anemia, however, appear concentrated in younger BICs aged 54-71 months (4.5-5 years) at endline, a reduction of about 10 percentage points; cash has insignificant impacts on prevalence of moderate/severe among older BICs aged 72-83 months at endline. We find no significant impacts of cash on RC1s or RC2s. These results suggest that cash may cause significant reductions in prevalence of any anemia among targeted BICs aged 54-83 months, with significant reductions in moderate/severe anemia focused among the younger BICs, but that there may be no substantial spillover effects to younger siblings not targeted by the intervention.

9. Chapter 9 presents results on the impact of food and cash transfers on parents' reports on whether the ECD center is open and on their child's ECD attendance in the past 7 days and in the past 4 weeks, for children age 3-6:

    - <u>Impact of food transfers on ECD center participation</u>: Food transfers do not have significant impacts on parents' reports of the number of days their ECD centers are open or the number of days their children attend ECD centers over the past 7 days or over the past 4 weeks. While many point estimates are positive, direct effects on BICs in age range (4.5-5 years), direct effects on BICs out of age range (6 years), and spillover effects to RC1s in age range (3-4.5 years) are all insignificant.

- Impact of cash transfers on ECD center participation: Cash transfers cause highly significant increases in parents' reports of the number of days their ECD centers are open and the number of days their children attend ECD centers over the past 7 days and over the past 4 weeks. Direct effects on BICs in age range (4.5-5 years), direct effects on BICs out of age range (6 years), and spillover effects to RC1s in age range (3-4.5 years) all show similar patterns with similar magnitudes. These increases are considerable: ECD centers are reported to be open about 2 days more in the past 7 days and about 4 more days in the past 4 weeks; children are reported to attend about 2 days more (and 7 hours more) in the past 7 days. Results suggest the potential for perverse effects on 6-year-olds targeted by the intervention, if these children delay entry to primary school in order to continue attending ECD. Results also indicate that cash transfers have large positive spillover effects on ECD participation of younger children not targeted by the intervention but in age range for ECD, roughly equivalent to impacts on children directly targeted.

10. Chapter 10 presents impacts of food and cash transfers on children's cognitive and noncognitive development:

- Impact on cognitive and noncognitive development of children aged 72-83 months: For BICs aged 72-83 months (6 years), we find almost no significant impacts of food or cash transfers on our measures of cognitive and noncognitive outcomes including the KABC-II, the sticker test of delayed gratification, and the HTKS test of self-regulation. The sole exception is a finding that food causes a significant *negative* impact on the sticker test of delayed gratification among children aged 72-83 months. We conclude that either the transfers generally have no effects in this age range or that the instruments used for this age range were not sufficiently sensitive to detect changes.
- Impact on cognitive and noncognitive development of children aged 60-71 months: For BICs aged 60-71 months (5 years), we find no significant impacts of food or cash transfers on KABC-II items or the sticker test of delayed gratification. However, in this age range (and expanded to 54-71 months, or 4.5-5 years), we find that cash transfers cause significant increases in scores on the Mullen items related to cognitive development, including in domains of visual reception, receptive language, expressive language, and in the overall Mullen raw score over all domains. We conclude that cash transfers have significant positive impacts on the cognitive development of children in this age range.
- Impact on cognitive and noncognitive development of children aged 36-53 months: For RC1s aged 36-53 months (3-4.5 years), we find no significant impacts of food or cash transfers on Mullen items or the sticker test of delayed gratification. We conclude that food and cash transfers caused no significant spillover effects on cognitive or noncognitive development of younger siblings of the children directly targeted.

11. Chapter 11 presents estimates of the cost of each program modality and relative cost effectiveness.

    - The estimated average cost of providing all seven transfers to a beneficiary is $117.47 for the food modality and $96.74 for the cash modality. This figure includes the cost of operating the food and cash transfer programs, the delivery costs, and the cost of transfer itself (i.e., the cost of the food in the food transfer or the value of the cash). For delivery of seven transfer cycles, the food ration program costs 21.4 percent more than the cash transfer program.

1. Introduction

1.1 Motivation

Social protection programs that provide periodic transfers to households living in poverty, either through a standing safety net program or as part of a temporary program in response to economic shocks, are now common in most parts of the developing world and are considered an important component of effective development policy. However, there are many questions about the optimal design of social protection programs about which there is very little rigorous evidence (Grosh et al. 2008; Adato and Hoddinott 2010). One such question, of great importance, is the relative impact of cash transfers compared to food transfers or other delivery mechanisms, such as food vouchers. Delivery of nutritious, often fortified, food rations to households facing temporary shocks to food availability has traditionally been the primary modality for the World Food Programme (WFP), which responds to the food needs of tens of millions of households in a variety of setting each year. However, cash transfers, and particularly conditional cash transfers (CCTs), have become a popular alternative, particularly for large-scale safety net programs. There is a great deal of evidence on the impact of food assistance (e.g., Barrett and Maxwell 2005) and the impact of CCT programs on a variety of outcomes (Adato and Hoddinott 2010; Fiszbein and Schady et al. 2009). Aware of this evidence, WFP made a deliberate decision to study when food and cash transfers are more effective and for which outcomes. Despite the large literature on the impact of social protection programs, there is almost no evidence from a rigorous evaluation directly comparing the impact and cost-effectiveness of cash transfers and food transfers in the same setting (Ahmed et al. 2009; Gentilini 2007; Webb and Kumar 1995).

As a result, WFP obtained funding from the Spanish government and partnered with the International Food Policy Research Institute (IFPRI) to undertake a multicountry study of the relative impact of food transfers and cash transfers (and in some cases, food vouchers) on food security, nutrition, and other measures of human capital.

In Uganda, this comparison of food and cash transfers is being conducted in the context of supporting an ongoing program in Early Childhood Development (ECD). The United Nations Childrens Fund (UNICEF) has been working in partnership with the Uganda Ministry of Education and Sports to support ECD centers in Karamoja, Uganda, a poor, rugged subregion in Eastern Uganda, near the borders with Kenya and South Sudan. WFP agreed to provide transfers to households with children participating in the ECD centers in three districts in Karamoja in order to study the effect of the transfers on household food security, child participation in the ECD center, and child nutrition and cognitive and noncognitive development. In order to learn about the relative effectiveness of food and cash transfers, the evaluation was designed as an experiment to randomly select the communities in which households would receive transfers in the form of food or cash. Efforts were made to make sure that the value of the transfers was the same across modality.

There is growing evidence that the period of early childhood, when children are age 3-5 years old, is an essential period for investments in human capital. The unique importance of the first 1,000 days of life for nutrition interventions is now well understood. Recently, researchers have discovered that the few years after this period are a critical window when cognitive and noncognitive abilities develop quickly, and these abilities have been shown to predict a surprising number of future outcomes (Cunha and Heckman 2007; Heckman 2006). This new evidence has raised the profile of interventions designed to improve nutrition and learning during this period and to provide stimulation and other interactions to build cognitive and noncognitive skills. Karamoja, Uganda, provides an excellent setting to study the potentially different roles of food and cash transfers provided to households with children participating in ECD centers.

1.2 Background and Study Objectives

The study has two main objectives. First, the evaluation will estimate the relative impact and cost-effectiveness of cash and food transfers on household and child food security. Second, the study will measure the impact of child participation in the ECD centers, separately and joint, with cash or food transfers, on child development and nutrition. This is a final report on the impact evaluation study.

Since 2007, UNICEF has supported an ECD program for preschool aged children in the Karamoja subregion of Uganda, in collaboration with the government's District Education Offices (DEOs).[1] The ECD centers focus on improving school readiness, cognitive development, and provision of a safe environment for children age 3 to 5 years. The ECD centers typically operate as morning gatherings from 8-11 am, five days per week. Each ECD center is staffed by one to three trained community volunteer caregivers, who lead children in learning activities, play, singing, dance, and storytelling.

As part of this evaluation study, WFP has provided an incentive in the form of a take-home food ration or cash transfer to households with children enrolled at UNICEF-sponsored ECD centers in the districts of Kaabong, Kotido, and Napak (formerly part of Moroto district). These transfers were intended to be given monthly to a woman from each household. In the original design, it was intended that transfers would be conditional on preschool children maintaining attendance rates at the ECD center of at least 80 percent. In implementation, due to difficulties monitoring attendance rates, the transfers were made conditional only on children being enrolled in the ECD centers, but unconditional on attendance.

This evaluation study in Uganda is one of four impact evaluations being undertaken in different countries by WFP and IFPRI in which cash, food vouchers, or food assistance will be compared

[1] A limited number of ECD centers are supported by Save the Children Foundation (SCF) in Karamoja, rather than by UNICEF. The SCF-funded ECD centers are not included in this evaluation study, in part to ensure similar levels of support and comparable implementation strategies across centers in the study.

to learn which modalities are most effective in different contexts. This four-country "Cash and Voucher" study is being supported by funding from the Spanish Government and includes evaluations in Ecuador, Niger, Uganda, and Yemen.[2] The motivation and learning objectives for this four-country study are described in detail in the project Inception Report (Ahmed et al. 2010).

The Uganda study will also evaluate the impact of ECD center participation, with or without cash or food transfers, on child development and nutrition. UNICEF is interested in learning about the benefits of early childhood education in development settings and areas recovering from civil conflict or severe food insecurity. Research from the United States has shown large returns to schooling outcomes and future earnings from investments in preschool education that improve cognitive and noncognitive child development (Heckman 2006; Cunha and Heckman 2007).

As in all four "Cash and Voucher" evaluations, the Uganda ECD study was designed as a prospective, randomized impact evaluation. ECD centers selected for the study were randomly assigned into three intervention arms: cash transfers, food transfers, and a control group. Transfers were originally scheduled to be provided to households with children enrolled in ECD centers in the cash and food intervention arms from March-November of the 2011 school year. Due to delays in the start of transfer payments and implementation errors leading to many beneficiaries not receiving payments, the transfer period was revised to April 2011 – July 2012. A baseline survey of households with children in ECD centers in all three intervention arms (or living nearby) was conducted in September-November 2010. An endline survey following up these households was conducted in March-May 2012.

There are many ways that these interventions providing food or cash transfers at ECD centers could improve child human capital outcomes, including the following:

- The transfers could induce higher attendance and/or new enrollments to the ECD centers. Early childhood is gaining increasing attention among both researchers and practitioners as a key period for cognitive and noncognitive development affecting long-term outcomes; to the extent that these ECD centers are able to promote learning in this period, there might be meaningful long-term gains for the children. Moreover, even in the short term, attendance at the ECD centers might lead to higher or more on-time enrollments in primary school, if the ECD centers succeed in improving children's school readiness. Attaching incentives to participation as a draw to the centers might be particularly important in the context of Uganda, since the availability of ECD centers is still quite low.

[2] In addition to the different country contexts, in each country the study will evaluate cash, vouchers or food transfers linked to different social protection interventions relevant to WFP's emergency or recovery food security programming in that country.

- The transfers may have interesting complementarities with ECD attendance in terms of developmental gains, and these may differ by transfer modality. For example, because the food transfer is highly nutritious and CSB, in particular, is fortified with iron, receiving food transfers while attending the ECD center may enhance a child's cognitive gains from participating in the center (for example, by making the child more alert and less physically or mentally fatigued during the period of ECD participation, or less likely to be ill and absent during ECD activities). In the case of the cash transfers, it is likely that not all of the transfer will be used for food. However, parents may use some of the cash to make investments that increase income or to increase expenditures on other inputs to child education and health that are complementary with benefits of ECD, including medicine or sanitation improvements that reduce illness, increase nutrition absorption, and improve ECD attendance.
- Karamoja is very food-insecure and rates of child malnutrition are high. Past evidence suggests that cash and food transfers may have different implications for the intrahousehold allocation of resources that affect childhood malnutrition due to gender-based differences in division of labor and control over resources between adult male and female household members. This study will provide convincing evidence of differences in how cash and food are used within the household and whether there are differences in control over the additional resources that depend on transfer modality.

The purpose of this impact report is to introduce the context for this study, describe the interventions and evaluation design, and report impacts of the food and cash transfers estimated using the baseline and endline surveys. This report is organized as follows. The next section describes the UNICEF-supported ECD programs in Karamoja. Chapter 2 describes WFP's interventions to provide cash and food transfers to households with children participating in ECD centers. Chapter 3 describes the experimental evaluation design for studying the impact of the cash and food transfers and describes methodologies used to measure the impact of the transfers food security and child nutrition and development and of ECD center participation on child development. Chapter 4 describes the sample design and the data for the evaluation surveys. Chapter 5 summarizes data from the endline survey on beneficiary household's experience with the food and cash transfer programs and on respondents' experience with the ECD centers. Chapter 6 presents estimates of the impact of the food and cash transfers on household food security and frequency of child food consumption. Chapter 7 presents evidence on the impact of the food and cash transfer programs on anemia prevalence and Chapter 8 addresses impacts on ECD center participation. Chapter 9 includes results on the impact of the food and cash transfer programs on child cognitive and noncognitive development. Chapter 10 concludes.

1.3 *The UNICEF-Supported ECD Programs in Karamoja*

Since 2007, UNICEF has supported early childhood development (ECD) centers for preschool-age children in the Karamoja region of Northern Uganda. The primary goal of these ECD centers is to improve school readiness among preschool age children, in a context where primary school enrollment is low and often delayed. The ECD centers are informally structured, taking the form of a group of children from the community gathered under the supervision of a caregiver in a typically informal setting, such as under a tree. Officially, only children aged 3-5 are eligible to attend ECD centers. However, many younger children (mostly 2-year-olds) and some older children (mostly 6-year-olds) also attend centers. At the time of the baseline survey, there was no food provided to children at any of the UNICEF-supported ECD centers.

The ECD caregivers are volunteers from the community, trained by the community-based organization Community Support for Capacity Development (CSCD), through funding provided by UNICEF and overseen by the DEOs. By government decree, ECD center caregivers cannot be directly remunerated by the government in any way except through training. Communities are encouraged both to contribute gifts to the caregiver as compensation for the caregiver's services and to provide materials for the ECD center, with the intent that ECD centers become self-sustained through the community rather than relying on government or outside support. In practice, however, community contributions to the caregiver rarely occur, and during our visits, caregivers cited lack of incentives and lack of instructional materials as serious challenges in running the centers. Each center is typically run by two to three different caregivers, who take turns leading instruction on different days of the week, although there is only one caregiver leading the instruction on any given day. Each center has one head caregiver who manages administrative matters. In addition, each ECD center is supported by a local Management Committee that oversees hiring of caregivers and management of the center. Monthly meetings between caregivers and parents are held at each ECD center, but attendance of parents at these meetings is often low. While caregivers typically do not have previous teaching experience and often do not have prior experience working with children, their training is quite comprehensive and covers a range of topics, including but not limited to milestones in child growth and development, activities for children at different development stages, managing learning materials, and child health and safety. Typical activities at the centers include the caregiver leading the children in singing, dancing, learning numbers, learning local customs, and taking short trips to familiarize children with their community. Based on informal conversations, caregivers seem to be well-trained in choosing age-appropriate activities, are well aware of their role in the child’s development, and are committed to their responsibility to instruct the children.

Beyond the presence of caregivers, the centers typically have very little in terms of infrastructure or learning materials. A few centers are housed in a physical structure or have access to some sort of shelter, but the majority of centers has no physical structure and instead meets under a tree. Most centers do not have access to a latrine or access to water, and most caregivers do not have access to instructional materials besides sticks, pebbles, and other natural materials.

Enrollment on the books for the ECD centers is often much higher than actual attendance at the centers. Based on conversations with caregivers, centers at which roughly 150 children were enrolled often had only about 40 children in attendance on a normal day. Caregivers are asked to record children’s daily attendance in attendance registers distributed by CSCD, although some caregivers are illiterate. The quality of attendance records varies. Typically, in areas with ECD centers, there is one ECD center per village or *local council* (LC1), situated at a reasonably central point and within walking distance for most children. Schedules for the centers vary. Most operate five days a week, from Monday to Friday, but some meet for fewer days. Many centers are intermittently closed, often due to caregiver absence. Although the centers have been operating officially since 2007, many have had extended periods of inactivity in the interim. On days that the centers are open, children usually arrive around 8:00 in the morning and return home by noon. According to caregivers, even on days that the centers are open, children sometimes leave early due to heavy rain or because the children become hungry and inattentive.

2. The WFP Food and Cash Transfer Intervention Linked to ECD Center Participation

2.1 Site Selection and Beneficiaries

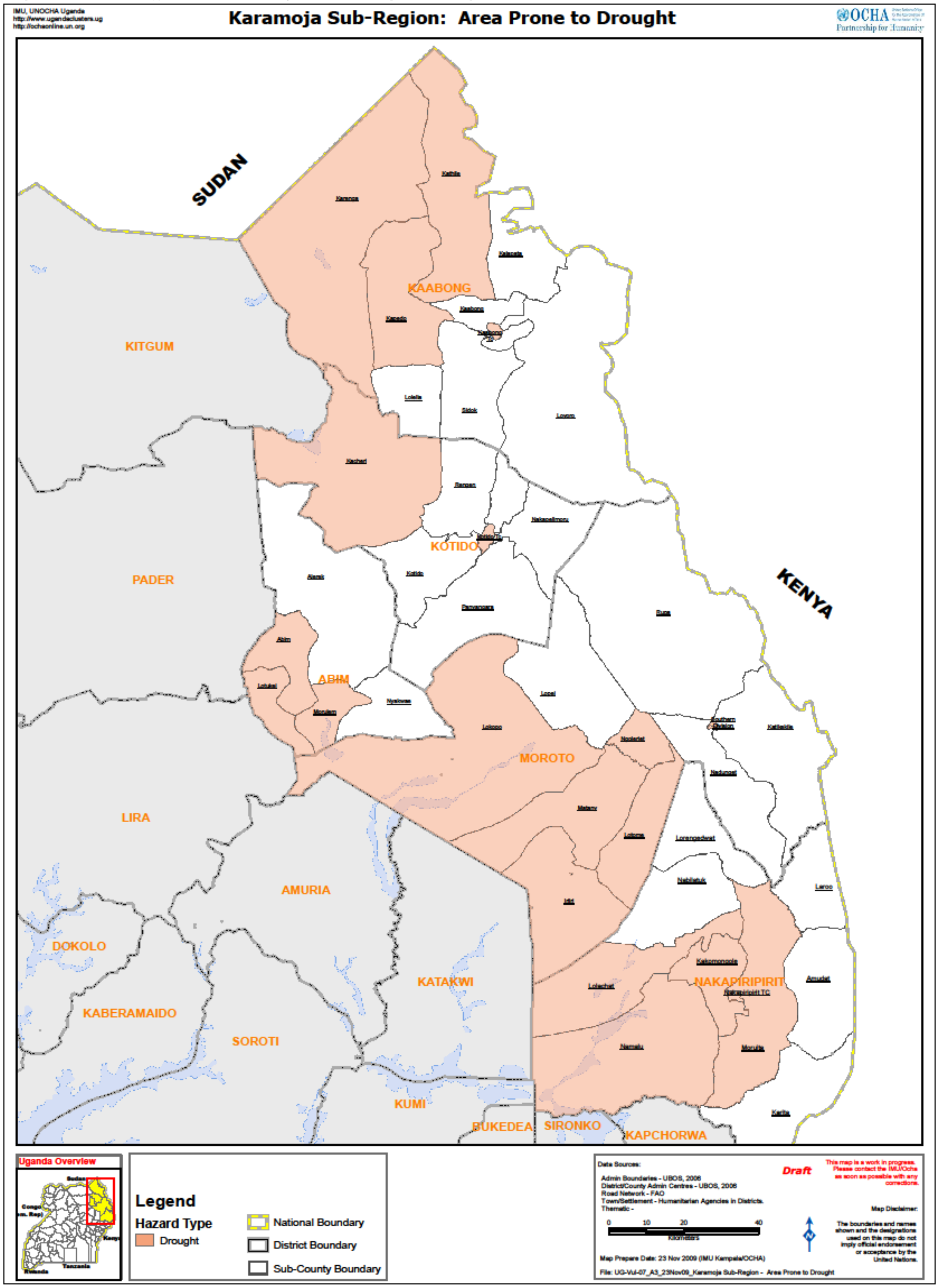
2.1.1 Site selection

The districts of Kaabong, Kotido, and Napak in the Karamoja subregion were selected as the locations where WFP would provide cash and food transfers to randomly-selected UNICEF-supported ECD centers already under operation. (See the map in Figure 2.1, reproduced from UN OCHA.) These districts were considered appropriate because UNICEF had an established presence there and had been supporting ECD centers in the subregion since 2007. In addition, food insecurity is high in the Karamoja subregion. It was thus possible to identify a population of preschool children with potential capacity to respond to food and cash transfers with changes in preschool participation and child development outcomes.

2.1.2 Beneficiaries

The intended beneficiaries of the intervention included all households with a child aged 3-5 years who participated in an ECD center assigned to food or cash transfers, with at least an 80 percent attendance rate. A household would receive one transfer for each child who fulfilled these criteria, such that one household could receive multiple transfers. It was intended that ECD caregivers would record attendance in attendance registers provided by WFP, and at the end of each 6-week cycle, WFP would collect and match these attendance records with its list of potential beneficiaries to determine who would receive a transfer for that cycle. It was also intended that the beneficiary lists would be updated regularly based on caregivers' attendance records: new enrollees over the course of the intervention would be added, and prior enrollees who aged out of eligibility would be dropped. Prior to the start of the intervention, parents in intervention areas were made aware of these conditionalities through sensitization meetings.

Figure 2.1: Map of Karamoja SubRegion, Uganda



Source: This map was created before the district of Napak was created as a distinct district from within the district of Moroto. We acknowledge UNOCHA as the source for this map

Several major challenges faced in implementation led to changes in these beneficiary criteria:

1. *ECD attendance could not be accurately monitored or matched to potential beneficiaries*: It was intended that children could be linked between caregivers' attendance lists and WFP's lists of potential beneficiaries, using a unique identification number for each child (a "Child ID") used on both lists, such that it was straightforward to check whether each child on the beneficiary list had fulfilled the attendance requirement. However, the identification numbers assigned to children were errantly changed in WFP's lists of potential beneficiaries. Attendance records in the caregivers' attendance lists could no longer be matched to potential beneficiaries. Moreover, caregivers' records of child attendance were found to be greatly exaggerated. Nearly all children in the enrollment lists were reported to be attending every day, despite it being well-known that many fewer children attended on any given day than the total number enrolled. Thus, even if caregivers' attendance records could have been linked to WFP's beneficiary lists, the conditionality would not have been effectively enforced. *Therefore, it was determined that transfers would no longer be made conditional on children's ECD attendance rate but would instead be unconditional, requiring only that the child be enrolled in the ECD center and be between ages 3-5 years.* It is not clear to what extent parents were informed that the conditionality had been removed.
2. *WFP's list of potential beneficiaries omitted many eligible households*: WFP constructed its list of potential beneficiaries using as a starting point the enrollment lists collected from ECD caregivers by the IFPRI team in August-September 2010 (described in Section 3.2.1). It was intended that WFP field staff would then conduct a "verification" exercise on the basis of these enrollment lists in March-April 2011: to ensure that the children on the enrollment did, in fact, exist and that their age fell between 3-5 years. The verification process took the form of field staff appearing in each community and asking for the parents of each child on the list to present themselves. It was intended that children on the enrollment list would be omitted from the list of potential beneficiaries "only" if verification revealed that the child did not exist (i.e., the child was a "ghost child"), the child no longer lived in the community, or the child was not aged 3-5 years. If a child was "verified," WFP would add the child to a verified list of potential beneficiaries and give the mother or other caretaker of the child an identification card (a ration card if the household's ECD center was assigned to food, or a photo identification card if the household's ECD center was assigned to cash). However, due to problems in the field, many children were dropped from the list of potential beneficiaries who should not have been. In most cases, it is believed that these children's parents simply were not present at the time that WFP field staff appeared (although the children did exist and were 3-5 years old), and having not found a parent present, WFP staff dropped the children. This situation occurred for large numbers of children, particularly in Kaabong district. *As a result, a large number of children who fulfilled all the criteria to receive transfers did not appear in the "verified" beneficiary list (used for Cycles 1-3), and therefore they did not receive transfers for Cycles 1-3.* It is not clear what field staff told parents of these children during transfer distribution, when parents said their children had fulfilled all

the criteria they had been told about, and yet the child's name was not on the list of potential beneficiaries. *After Cycle 3, it was realized that substantial omission had occurred. A re-verification exercise was conducted by WFP, in an attempt to add back to the list of potential beneficiaries many who had been errantly dropped in the initial verification exercise.* While it was hoped that all children intended to be on the list would be added during the re-verification, children who were in this study's baseline sample but not on WFP's lists were made the first priority for re-verification. This prioritization was primarily due to the fact that, in the course of conducting the baseline survey, the IFPRI team had essentially verified the requisite information already: witnessing that the child existed and collecting detailed information on the child, including age in years. In practical terms, this prioritization also assisted in having these children start to receive transfers as soon as possible, such that their transfer exposure for the study would be maximized despite the initial omission. Nearly all children in this category (i.e., in our baseline survey, not in WFP's verified lists) were added during the re-verification. *Thus, nearly all children *in our sample* who should have received transfers according to the criteria began receiving transfers by, at the latest, Cycle 4 and continued to receive Cycles 5, 6, and 7.*

3. *WFP's lists of potential beneficiaries were not regularly updated to include new enrollees to ECD centers or drop those who had either left the center or aged out of the 3-5 years window*: The enrollment lists collected by the IFPRI team in August-September 2010 had been intended as a starting point for WFP's lists of potential beneficiaries, to be updated using ECD caregivers' attendance registers (including updated enrollment lists) each cycle. However, as described in point 1, scrambled Child IDs made it difficult to match children between attendance lists and beneficiary lists. Thus, it also became difficult to update the beneficiary lists with children who were new additions to the attendance lists (and therefore should be added to the beneficiary lists), with children who were dropped from the attendance lists due to leaving the center (and therefore should be dropped from the beneficiary list), and with children whose age was updated on the attendance lists (and therefore should have eligibility age re-checked on the beneficiary lists). *As a result, the enrollment lists collected in August-September 2010, subject to "verification" and "re-verification" as described in point 2, formed the core of WFP's beneficiary lists for all cycles with minimal updating.*

2.2 Intervention

2.2.1 Cash and food transfers linked to ECD program participation

Starting in April 2011, this project funded by WFP introduced cash and food transfers to the UNICEF-supported ECD centers in order to provide incentives for ECD center attendance and to allow us to evaluate the impacts of the transfer modalities on food security and ECD center participation. As described in Section 3 below, we randomly assigned each center into one of three groups, according to an experimental design: (1) cash, (2) food, or (3) control. While it was originally intended that cash and food transfers would be conditional on a child's attendance at the ECD centers, the conditionality was removed for reasons described in Section 2.1.2.

The food transfers were provided as take-home rations rather than on-site "school meals" at the ECD centers in order to be consistent with the modality of take-home food rations provided in the other WFP "Cash and Voucher" studies. Also, an evaluation of food-for-education programs in primary schools in Northern Uganda from 2005-07 showed comparable impacts of monthly take-home rations to on-site school meals for a large number of education and nutrition outcomes (see Adelman et al. 2009; Alderman, Gilligan, and Lehrer 2012).

The cash and food transfer sizes were substantial, making it plausible that there could be impacts on a range of outcomes related to household food security, child development, and child anthropometry. In the case of the group receiving food transfers, the transfer per child consisted of a highly nutritious food basket of approximately 1,200 calories, including corn soy blend ("CSB" – highly fortified with iron among other nutrients), vitamin-A fortified oil, and sugar. In the case of the group receiving cash transfers, the transfer per child is roughly $12 (USD), equal to the estimated amount of cash required to purchase a basket similar to the food transfer according to a market survey conducted shortly before the intervention started.

Transfers were planned to be distributed in 6-week cycles for both modalities, by truck through the Generalized Food Distribution system in the case of the food transfers and by electronic transfer of funds to cards given to children's parents in the case of the cash transfers. In practice, the frequency of transfers varied considerably over the course of the intervention, and in many cycles, there were significant gaps between the delivery of food transfers and the delivery of cash transfers in the same district. Moreover, the final cycle of transfers occurred after the endline survey. Table 2.1 shows the distribution dates of food and cash transfers, by district.

It had been intended that some form of incentives would be introduced for ECD caregivers, to provide them motivation to continue instruction even in the face of possibly higher work burden, as the number of children attending centers could increase in response to the transfers. It was also perceived that, since the centers were the focal point for providing transfers, it was advisable from the perspective of social dynamics to give caregivers a concrete indication that their role was important. These incentives were to be provided at all of the centers – not only in food and cash groups – in order that any effect of incentive provision on quality of caregiver instruction would occur uniformly across treatment and control groups. In practice, providing incentives to caregiver was complicated by the requirement that caregivers not be directly compensated by external parties, but be supported by the community instead. Only one incentive was provided through the study intervention: a caregiver training was organized to train caregivers on filling out attendance registers (at the time when it was still intended that transfers would be conditional on children's attendance), and caregiver participation in the training was reimbursed with payments that slightly exceeded travel costs and a per-diem.

It had also been intended that there would be nutritional information dissemination to parents, again standardized across all of the ECD centers. Parents of children at all ECD centers would be provided messages regarding the importance of good early childhood nutrition and given recommendations for children's diet based on locally available foods. In practice, due to logistical complications, these sessions never occurred in any of the centers.

We note that there were several other programs operating in Napak, Kotido, and Kaabong districts that provided similar food baskets and/or services to those provided by the ECD intervention, during the course of the study. The ongoing General Food Distribution, targeted to very poor households, included CSB in its food ration. Maternal Child Health and Nutrition programs throughout Karamoja also provided CSB to pregnant and lactating women, as well as to children under 2 years of age. Community-based Supplementary Feeding Programs also operated in all three districts, as part of which malnourished children and adults received a similar food basket to the ECD food basket, as well as receiving nutrition sensitization/training activities. However, because all of these activities were operating in all of our study districts – across the food, cash, and control communities – they do not interfere with the randomized design of the study.

Table 2.1 Dates for distribution of food and cash transfers, 2011-2012

	Kaabong		Kotido		Napak	
	Food	**Cash**	**Food**	**Cash**	**Food**	**Cash**
Cycle 1	3 April - 9 May 2011	13 - 22 Aug 2011	19 - 20 April 2011	7 - 12 June 2011	8 - 15 April 2011	15-23 June2011
Cycle 2	7 June - 14 July 2011	5 - 28 Sept 2011	6 -15 June 2011	23 June - 8 July 2011	11 - 16 June 2011	6 -18 July 2011
Cycle 3	5 Aug - 20 Sept 2011	2 Nov - 22 Dec 2011	9 - 10 Aug 2011	7 - 9 Sept 2011	15 -17 Aug 2011	8 -15 Sep 2011
Cycle 4	28 Nov - 18 Dec 2011	2 Nov - 22 Dec 2011	8 - 10 Nov 2011	22 - 25 Nov 2011	7 - 18 Oct 2011	22 - 30 Nov 2011
Cycle 5	28 Nov - 18 Dec 2011	18 Feb - 8 March 2011	12 - 13 Dec 2011	17 - 30 Jan 2012	13 - 14 Dec 2011	12 -17 April 2012
Cycle 6	31 Jan - 21 Feb 2012	17 - 30 April 2012	29 Feb 2012	11 - 13 April 2012	9 - 14 Feb 2012	12 -17 April 2012
Cycle 7	12 - 29 Aug 2012	26 July - 16 Aug 2012	30 July - 2 Aug 2012	18 - 24 July 2012	6-9 Sept 2012	20 - 27 Aug 2012

3. Evaluation Design

3.1 Study Design

While transfers were provided to households, the unit of randomized intervention assignment for the impact evaluation was the ECD center. All households with children enrolled in a particular ECD center received the same intervention during the study: cash, food, or control.

Our strategy for estimating the impacts of the cash and food transfers is built into the design of the study. We use an experimental design to randomly assign each of the sample ECD centers to one of three "treatment arms": the cash transfer group, the food transfer group, or the control group (which receives no transfers). Because the total number of ECD centers is relatively large, random assignment of ECD centers assures that, on average, households will have similar baseline characteristics across treatment arms. Moreover, with random assignment, the probability that a household receives the transfers (and whether the transfer is cash or food) is independent of these baseline household characteristics. This provides a cleaner basis for comparison than an evaluation that compares beneficiaries to nonbeneficiaries of a program that is targeted on socioeconomic characteristics or geographical location. In a randomized design, systematic differences between beneficiaries and nonbeneficiaries in targeted programs are eliminated, so that there is very little risk of bias in the impact estimates due to "selection effects" based on these differences in household characteristics. As a result, we can interpret average differences in households' outcomes across the groups after the intervention as being truly caused by, rather than simply correlated with, receiving transfers. Therefore, due to the randomization, we expect to be able to cleanly estimate unbiased impacts of cash transfers with ECD attendance and impacts of food transfers with ECD attendance, relative to ECD attendance only.

Taking into consideration the context of Karamoja, we stratify the randomization of ECD centers at the district level for Napak and Kotido and at the subdistrict level for Kaabong. Stratification guarantees that, within each stratum, each of the treatment arms is represented equally. The rationale for doing so is that it prevents the case where, by chance, most centers assigned to a particular treatment are in one area that is very different from another area in which most centers assigned to the other treatment are located (in this case, location-specific characteristics would be correlated and confounded with receipt of treatment). We stratify only to the extent deemed necessary; while areas within the districts of Napak and Kotido could be considered relatively similar to one another, subdistricts within the district of Kaabong are different enough to merit finer stratification.[3]

Before conducting the randomization, we also consulted district representatives to advise us on which ECD centers were so nearby each other that they should be clustered together in

[3] In a few cases, small, neighboring subdistricts in Kaabong that were considered similar were grouped into a single stratum for the randomization.

assigning the treatment. This measure was taken to avoid children migrating from their home center to another center to gain access to one of the treatments. The greatest concern here from the point of view of the study is that children in ECD centers assigned to the control group might walk to a neighboring ECD center assigned to the food or cash group, leading to "contamination" of the control group and weakening the study design. Such migration would also lead to logistical difficulties for the caregivers of the ECD centers. By grouping centers very near each other and treating that grouping as a single cluster for the randomization, we guaranteed that there would be no such incentive for children to migrate. After clustering nearby centers in this way, we were left with 109 clusters (composed out of the 120 ECD centers thought to be run by UNICEF at the time) over which to randomize.

In practice, randomization can be conducted in many ways, including using computer software to draw random numbers that assign each cluster to a type of treatment. For this study, due to the buy-in necessary from the District Education Office in each district, we chose a method that prioritized transparency and ease of understanding: picking colored beads out of a bag in meetings with local officials.[4] In September 2010, we organized meetings for each district in which representatives from the WFP district sub-office, representatives from CSCD, and representatives from the DEO were all present. In this meeting, we first explained the study, then conducted the randomization on the spot for all present to witness. Going down the list of names of each cluster of centers in the district, each person present was asked to take a turn picking a colored bead out of a bag without being able to see inside the bag. Each bead was colored red, yellow, or white, and these were counted out so that there was an equal number of each color. The total number of beads corresponded to the total number of clusters in the stratum (i.e., the district in Napak and Kotido, and each subdistrict in Kaabong). The color picked for each cluster-of-centers name determined its assignment to food (red), cash (yellow), or control (white).

One unexpected complication was that, during the course of fieldwork, it was discovered that some of the centers in Kotido district believed to be run by UNICEF were, in fact, run by Save the Children. These centers had to be removed from the study, and additional UNICEF-supported centers were added to the study. There were not enough ECD centers in Kotido to replace all of those that had been removed from the sample, so additional centers were sampled from Kaabong district as well. As a result, a second randomization was conducted for the newly added centers in Kotido and Kaabong districts, in which treatment assignments were made, by district, in proportion to the original treatment assignments of the ECD centers that had been dropped from the study. After this second randomization and well into the intervention period, it was determined that an additional ECD center in our sample was not run by UNICEF but was rather a private nursery. This ECD center was dropped from the study without replacement.

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[4] Bruhn and McKenzie (2009) review a variety of randomization methods and compare them in simulations. They conclude that in samples larger than 300, the different randomization methods perform similarly. They also indicate that simple, stratified randomization of the type used here performs well.

There are several reasons that we include a control group in this study. From the practical standpoint, given that WFP has funding constraints and could not feasibly give transfers to all potentially vulnerable households in the three districts, it is the most fair to randomly assign which clusters and corresponding households get transfers and which do not. Moreover, if there are sufficient funds to continue and expand the provision of transfers after the endline survey is completed, WFP plans to eventually extend the transfers even to households currently in the control group. From an analytical standpoint, the control group allows us to determine the *absolute* impacts of each of the two treatments, in addition to the *relative* impacts or differences in impacts between the two treatments. For example, if the food and cash groups have identical changes in outcomes over time, without a control group it would not be possible to determine if this indicated that neither treatment had any impact or whether both treatments had substantial impacts of the same size. Of course, these findings have very different implications from a programmatic standpoint. Moreover, the presence of a control group allows us to disentangle impacts of the treatment from other time trends. For example, it is theoretically possible to find that both the cash and food groups look worse off on a range of outcomes at endline than at baseline. If there were no control group, it would be impossible to determine whether receiving transfers somehow caused households to be worse off or whether secular trends over time (e.g., bad weather or poor market conditions) negatively affected all households. The presence of the control group allows us to accurately estimate the impact of the treatments by subtracting the counterfactual outcomes — the average change in outcomes for the control group during the study — from the average change in outcomes for each treatment group. The resulting measure is an estimate of program impact that can be attributed exclusively to the treatments.

3.2 Study Sample

The primary reference group for this study is children age 3-5 years old who live in the service area of a UNICEF-supported ECD center. This is the government-recommended age range for children to participate in ECD centers. In practice, children of other ages, especially younger children, are also enrolled in the centers based on the decision of parents, ECD caregivers, and the local Management Committee of the ECD center. However, only children in this age range at the start of the 2011 school year were originally intended to be eligible for cash or food transfers from WFP as part of this study, and therefore they are the focus of our study's sample design. We describe below how our household-level sample was designed around these children.

Based on sample size calculations, it was determined that a sample of 30 to 40 ECD clusters per treatment arm would be necessary to identify reasonable treatment impacts of the cash or food interventions on key outcomes related to food security, implying the need to include at least 90 to 120 ECD clusters in the study. Within each ECD cluster, at least 20 household observations would be required.

Our original sampling frame at baseline included 128 ECD centers across the three districts: 68 from Kaabong, 35 from Kotido, and 26 from Napak. As described in Section 3.1, before the baseline survey interviews began, the team from IFPRI met with representatives of the DEO, CSCD, WFP, and UNICEF to conduct the randomization of ECD centers into cash, food, and control groups. Prior to the randomization, the staff of CSCD reviewed the 128 ECD centers in the list and suggested centers that were very near each other (1-2 km). These were grouped to create a single sample cluster in order to reduce contamination of the design by children migrating from one ECD center to another to receive transfers. This resulted in 109 ECD center clusters available for sampling.

On the basis of our sample size calculations, in each ECD cluster, we aimed to sample 25 households in which at least one child aged 3-5 years was enrolled in an ECD center at baseline, as the sample over which we would estimate treatment impacts. Furthermore, it was decided that, in each ECD cluster, we would also include a small sample of 5 households with at least one child aged 3-5 years but with no children enrolled in the ECD center at baseline, as a basis to estimate spillover effects or "enrollment draw" effects of the transfers.

To obtain the sample of 25 ECD-participant households per ECD cluster, an ECD census was conducted in each of these ECD centers in August-September 2010 to obtain the names of all children enrolled in the ECD center. From these census lists, only children age 3-5 years old were included in the sample draws. The sample was designed as a household sample, in which households were identified by sampling children from the ECD center census lists. Children were randomly sampled from the census to create a sample list of 40-80 children per ECD center cluster, to allow for alternates. Since siblings were not identified as such in most ECD center census lists, in the event that two children from the same household were sampled, the household would be interviewed only once, and an additional household would be selected for an interview from the list of alternates. In the course of the baseline survey, enumerators were instructed to verify from household responses that each of the 25 households sampled per ECD cluster as an ECD-participant indeed had at least one child aged 3-5 years currently enrolled in or attending the ECD center. If a household sampled as ECD-participant was found not to have any child aged 3-5 years currently enrolled in or attending the ECD center, the household was dropped from the sample, and another from the list of alternates was interviewed.

To obtain the sample of 5 ECD-nonparticipant households per ECD cluster, households were drawn from alternative sample lists obtained from the LC1 chairperson of households with children age 3-5 years not currently enrolled in the center. Again, in the course of the baseline survey, enumerators were instructed to verify from household responses that each of the 5 households sampled per ECD cluster as an ECD-participant indeed had at least one child aged 3-5 years but had no children currently enrolled in or attending the ECD center. If a household sampled as ECD-participant was found to not have a child aged 3-5 years or to have a child currently enrolled in or attending the ECD center, the household was dropped from the sample, and another from the list was interviewed.

In each sample household, one child aged 3-5 years at baseline was designated as the "Baseline Index Child" (BIC). The BIC was intended to serve in our sample as the representative for the children targeted directly by the intervention. Therefore, the subsample of BICs would be our focus in estimating direct child-level treatment impacts. The BIC was selected in the course of the baseline survey. In ECD-participant households, this child was selected randomly among all children aged 3-5 years in the household who were enrolled in or attending an ECD center. In the case that there was only one such child, that child was designated the BIC. In ECD nonparticipant households, this child was selected randomly among all children aged 3-5 years in the household who were "not" enrolled in or attending an ECD center. Again, in the case that there was only one such child, that child was designated the BIC.

At endline, we also designated, at most, two additional children in each sampled household, "Reference Child 1" (RC1) and "Reference Child 2" (RC2). RC1 and RC2 were intended to serve in our sample as the representatives of children not originally targeted by the intervention themselves, but younger siblings of children who were targeted. Therefore, the sample of RC1s and RC2s would be our focus in estimating indirect child-level spillover effects of the treatments within the household. RC1s were representative of younger siblings in the age range of 36-53 months (3-4.5 years) at endline, therefore in the age range for ECD participation themselves. Although these children sampled as RC1 were too young to enroll in an ECD center at baseline, some of them may have enrolled in the ECD center by the time of the endline survey. If so, the child could have earned access to a separate food ration or cash transfer because of their enrollment in the ECD center if they lived in the catchment area of an ECD center assigned to the food or cash intervention groups. Impacts of the food or cash transfers on the RC1s may represent a combination of spillover effects and direct benefits of obtaining access to the transfers during the period of study. RC2 were representative of younger siblings in the age range of 6-35 months (0.5-2 years) at endline, therefore not yet in the age range for ECD participation. Both could experience potentially meaningful spillover effects – for example, if receipt of transfers changed the household's food consumption for all members, or changed parents' decision to send children to ECD, or changed the quality of the ECD center, etc. In all households, RC1 was selected randomly among all children aged 36-54 months at endline. In the case there was no such child, there was no RC1 designated in the household. In all households, RC2 was selected randomly among all children aged 6-35 months at endline. Again, in the case there was no such child, there was no RC2 designated in the household.

While the baseline survey was conducted over all 108 ECD clusters in the sampling flame, after the baseline survey was well under way, IFPRI was informed that 16 of the ECD centers on the sample list were actually supported by SCF and not by UNICEF. This meant that these centers were not eligible to be included in the study. As a result, these 16 ECD centers were dropped from the study. It was possible to identify another 6 ECD centers from other lists provided by UNICEF as partial replacement, resulting in a sample of 99 ECD centers in the study. After the baseline survey was concluded, it was determined that one additional ECD center in our sample was not run by UNICEF but was, in fact, a private nursery. Dropping this center, our final sample for the study that can be used for impact estimation includes 98 ECD clusters. While this sample is smaller than intended, our aforementioned sample size calculations suggest that it may be sufficient to detect modest impacts in food security and other outcomes.

3.3 *Estimation Strategy*

Randomized, prospective evaluation studies like this one have the attraction of being able to identify causal impacts of interventions using very simple comparisons of mean outcomes between randomly assigned intervention arms over time. A popular form of measuring the impact of interventions in this type of study is the difference-in-difference (DID) method, which involves estimating the impact of an intervention relative to the control group as the difference in the change in an outcome between the treatment and control group over time. This simple difference in change in means is easily calculated and a test of whether this DID estimate is significantly different from zero is a test of whether the program had any impact.

Recently, economists have recognized that in some cases, the DID model is not the preferred model for estimating the impact of a program over time in a randomized study. McKenzie (2010) noted that results in other disciplines have shown that the ANCOVA model provides a more efficient estimate of the impact of a program when the autocorrelation of outcomes (the correlation of the outcome over time, such as between baseline and endline surveys) is low.

Let Y_{i0} be the outcome variable at baseline and Y_{i1} be the outcome at endline, and let T_i represent an indicator for the treatment. The ANCOVA model takes the form,

$$Y_{i1} = \beta_0 + \beta_1 T_i + \beta_2 Y_{i0} + \varepsilon_i. \quad (1)$$

The DID model is equivalent to assuming that the autocorrelation in the outcome, β_2, is equal to one. When this is not the case, it is more efficient to allow the model to estimate the correlation in the outcome over time by placing the baseline outcome on the right-hand-side of the model and estimating impacts on the endline outcome. The ANCOVA model provides just such an estimation strategy. McKenzie shows that when the autocorrelation is low, there is a substantial gain in statistical power from estimating and ANCOVA model rather than a DID model. This leads to more efficient estimation and more true findings of significant differences in impact.

In the impact estimates presented in this report, we test the autocorrelation in outcomes and find that they are generally quite low. For example, the autocorrelation in the food security measures is always below 0.2. As a result, we estimate only ANCOVA models in this report.

4. Data

4.1 Survey Instruments and Topics

The survey instruments designed for the baseline and endline consist of several components:

1. *Household questionnaire*: completed for each household in the sample
2. *Child assessment (including direct measurement of cognitive and noncognitive development, anthropometry, and anemia)*: completed for one child aged 3-5 years (BIC) in each designated household at baseline, and for three children (BIC, RC1, RC2) in each designated household at endline
3. *ECD caregiver questionnaire*: completed for each sampled ECD center
4. *Community questionnaire*: completed for each LC1 in which there is a sampled ECD center

A key objective of the study is to understand how households use food or cash transfers, whether these uses differ by transfer modality, what factors determine these uses, and how these uses contribute to food security. Thus, many survey modules in the household questionnaire focus on socioeconomic characteristics of the household and uses of resources, while the community questionnaire focuses on capturing households' environment. A second objective of the study is to understand how receiving food or cash transfers linked to ECD affects children's ECD center participation, as well as their cognitive and noncognitive development and nutritional outcomes. Therefore, the child assessment is focused on capturing children's cognitive and noncognitive development as well as nutritional outcomes, the caregiver questionnaire captures characteristics of children's ECD center, and the household questionnaire includes several modules devoted to food consumption and ECD participation of young children (Table 4.1).

The *household questionnaire* contained household-level information as well as detailed information on individual household members. Baseline and endline household questionnaires were nearly identical. The key differences were that, in endline, one module on budgeting behavior was not repeated because we were primarily interested in baseline characteristics, and modules were added on experience with the transfers and experience with the ECD centers during the course of the intervention. Household-level information included household composition and demographics, dwelling characteristics, consumption habits, food and nonfood consumption and expenditures, assets, transfers into and out of the household, history of shocks, and budgeting behavior. Among the individual-level information, several sections focused specifically on areas of interest for studying ECD: ECD participation of young children, activities including chores and domestic work of young children, child health and development of young children, health knowledge of the mother or primary caregiver, and food consumption of young children. Other individual-level information included schooling of household members, activities and labor force participation of household members, health information on any household members suffering from recent illness, and information on women's status and decisionmaking in the household as reported by the female head of household or female spouse. Most sections in the household questionnaire were answered by the member of the household reported to be most knowledgeable on the topic.

Table 4.1 IFPRI ECD Center study: Baseline and endline survey contents

	Baseline	Endline
HOUSEHOLD SURVEY TOPICS		
Household identification, location, interview details	X	X
Consent	X	X
Household roster and demographics	X	X
ECD center participation of children ages 3 to 6	X	X
Experience with ECD during the study period		X
Experience with transfers		X
Schooling of children ages 6 to 17	X	X
Activities and labor force participation	X	X
Dwelling characteristics	X	X
Health	X	X
Child health and development of children ages 3 to 6	X	X
Health knowledge	X	X
Consumption habits	X	X
Food consumption and expenditures	X	X
Food consumption of young children ages 1 to 6	X	X
Markets and purchasing behavior	X	X
Non-food consumption and expenditures	X	X
Assets: Land, livestock, durables, savings and credit	X	X
Other transfers	X	X
Shocks	X	X
Budgeting behavior	X	
Women's status / decision-making	X	X
CHILD ASSESSMENT TOPICS		
Background information for BIC	X	X
Cognitive and noncognitive tests for BIC	X	X
Anthropometry for BIC	X	X
Hemoglobin measurement for BIC		X
Background information for RC1		X
Cognitive and noncognitive tests for RC1		X
Anthropometry for RC1		X
Hemoglobin measurement for RC1		X
Background information for RC2		X
Anthropometry for RC2		X
Hemoglobin measurement for RC2		X
Anthropometry for BICs mother		X
CAREGIVER QUESTIONNAIRE	X	X
COMMUNITY QUESTIONNAIRE	X	X

Due to time and cost constraints, we randomly selected a subset of 24 out of the 30 households sampled in each cluster in which to administer a child assessment. At baseline, the child assessment was administered only to the BIC in these 24 households per cluster. At endline, the child assessment was administered to the BIC, the RC1, and the RC2 (where available) in these same households. At baseline, the primary components of the *child assessment* were cognitive and noncognitive tests and anthropometry (height and weight). At endline, we also measured hemoglobin levels to test for anemia, in addition to administering cognitive and noncognitive tests and collecting anthropometry.

The cognitive and noncognitive tests in both baseline and endline surveys were developed with the guidance of Dr. Paul Bangirana, a psychologist at Makerere University. For cognitive tests, items were primarily drawn and adapted from two widely-used tests of children's cognitive ability: the Mullen test (appropriate for children ages 3-5 years) and the KABC-II test (appropriate for children ages 5 years and older). Both tests had previously been used extensively by Dr. Bangirana and co-authors to study cognitive ability in Ugandan children. Test items in both the Mullen and KABC-II take the form of simple games enumerators play with children – for example, asking the child to sort items of different shapes and colors; asking the child to match pictures; asking the child to answer simple questions; asking the child to recall and repeat numbers and words spoken to them; asking the child to detect patterns in pictures; etc. Adaptations were made to the items to suit the local context – for example, replacing test materials with similar locally-familiar items so as not to be distracting. Items were drawn from the tests based on several considerations:

- captured a domain of child development likely to be affected by attendance at the ECD centers, receipt of food transfers, and/or receipt of cash transfers
- age-appropriate and culturally-appropriate
- relatively quick to administer
- could be adapted to use locally-available materials and could be translated to the local language while retaining assessment of the same underlying skill
- relatively easy to administer for enumerators after an intensive but short training

We furthermore validated individual cognitive items in the Mullen test before including them in the endline survey. For each Mullen item, we analyzed baseline scores and chose to re-administer only items that met the following criteria:

> (1) Appeared to be sensitive to small differences in children's underlying ability, as gauged by properties of scores: (a) variation in scores, rather than discrete degenerate distributions with nearly all children failing or nearly all children succeeding,
> (b) increasing probability of successful completion of the item by a child's age in months per logistical regression, (c) lower probability of successful completion of the item among malnourished children. These factors suggested that the item may be sensitive enough to allow detection of small program impacts.
>
> (2) Appeared to capture information distinct from other items already included (e.g., not highly correlated with other included items).

We additionally included two measures of noncognitive ability. The first was a "Sticker Test" of patience, or ability to delay gratification. For this Sticker Test, we gave children one sticker before collecting anthropometry, then asked children if they would like to receive one more sticker immediately or alternatively to receive two more stickers after we finished measuring them. The second was the "Head-Toes-Knees-Shoulders" test of self-regulation (Cameron Ponitz et al. 2008). The "Head-Toes-Knees-Shoulders" (HTKS) test entails first instructing children that they should follow instructions given to them exactly (e.g., "Touch your head," "Touch your toes," "Touch your knees," "Touch your shoulders"), then instructs children that they should do the opposite of the instruction given to them (e.g., touch their toes if instructed "Touch your head," touch their shoulders if instructed "Touch your knees," and so on).

Because the age range of children who we tested differed across baseline and endline rounds, the items we included in our cognitive and noncognitive tests also differed across rounds. The Mullen test items and Sticker test were included in both rounds. The majority of the KABC-II items and the HTKS test of self-regulation were included only at endline (and therefore were not possible for us to validate before the endline survey).

Anthropometry collection included measurements of children's height and weight. At endline, the BICs mother's height and weight were also collected, in order to provide information on any heritable components of the BICs anthropometry. If any children's weight-for-height measurements indicated that they were severely wasted, the children were referred to a clinic immediately by the enumerator.

Hemoglobin measurement was done using Hemocue analyzers. Hemoglobin reading using Hemocue involves the enumerator cleaning the child's finger, then making a quick prick (typically described as feeling like a small pinch) to draw the blood sample. In our data collection, the hemoglobin level from the blood sample was read and recorded immediately off the Hemocue analyzer, and the blood sample was discarded. If any children's hemoglobin reading indicated that they were severely anemic, the children were referred to a clinic immediately by the enumerator.

Caregiver questionnaires were administered to the caregiver present at each of our sampled centers at the time that the field team visited at both baseline and endline. These questionnaires included basic information on characteristics of the caregivers at the center, characteristics of the facility, details on the curriculum at the center, typical children's enrollment and attendance patterns, and information on the caregiver's own prior experience. At endline, these questionnaires also included questions on the caregivers' experience with the program.

Community questionnaires were completed for each LC1 in which there was a sampled ECD center, in both baseline and endline. This information was asked of local leaders or other "key informants" in the community. The questionnaires included information on community characteristics, educational and health facilities in the community, access to services in the community, infrastructure in the form of access to water, electricity, and access to roads, market conditions, livelihoods and shocks in the community, social assistance available in the community, and women's status. The final component of the community questionnaire was a price survey, with a list of the main food items in our food consumption module, for each of which the enumerator was asked to look in local markets and assess the food's availability and price.

All questionnaires were printed in English. Enumerators were trained to administer the interviews in Na'Karimojong and worked together during the training to standardize the translation.

4.2 Balance of Baseline Characteristics

In this section, we present descriptive statistics for a small selection of baseline characteristics of households, by treatment arm. We focus on variables that are not our key outcomes for impact estimation, but are other relevant characteristics of households that may affect key outcomes. The statistics we show demonstrate that the randomization successfully balanced these pre-program characteristics across treatment arms, ensuring minimal bias in the impact estimates we present in Sections 6-9.

4.2.1 Household demographics

To compare household demographics across treatment groups, we first look at differences in household size and age distribution. Table 4.2 shows that means are very similar in magnitude by treatment group, and there are no significant differences.

Table 4.2 Differences in household size and age distribution, by treatment group, 2010

	Means, 2010			Difference in means		
	Food	**Cash**	**Control**	**Food - control**	**Cash - control**	**Food - cash**
Total number of household members	6.324	6.190	6.311	0.014	-0.121	0.135
	(0.084)	(0.100)	(0.112)	(0.142)	(0.156)	(0.129)
Number of members aged 0-2	0.796	0.797	0.785	0.012	0.013	-0.001
	(0.024)	(0.032)	(0.027)	(0.036)	(0.042)	(0.041)
Number of members aged 3-5	1.360	1.398	1.380	-0.020	0.019	-0.038
	(0.020)	(0.022)	(0.018)	(0.028)	(0.029)	(0.030)
Number of members aged 6-14	1.791	1.705	1.764	0.028	-0.058	0.086
	(0.049)	(0.061)	(0.074)	(0.088)	(0.098)	(0.077)
Number of members aged 15 and up	2.377	2.289	2.383	-0.006	-0.094	0.088
	(0.045)	(0.037)	(0.046)	(0.066)	(0.060)	(0.057)

Notes: Estimates in columns (1)-(3) are baseline means with standard deviations in parentheses. Standard deviations are not reported for the prevalence of low FCS. Columns (4)-(6) report estimates of differences in baseline means with robust standard errors in parentheses. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

We then compare ownership of assets and durables by treatment group. Table 4.3 shows that proportions of households owning each category of assets or durables is in most cases very similar in magnitude by treatment group, particularly for livestock. There are, however, significant differences in the ownership of large pots and pans (about 7 percent more households in each of the cash and food groups owns large pots and pans than in the control group), as well as in ownership of mosquito nets (about 8 percent more households in each of the cash and food groups owns mosquito nets than in the control group). There is also very-small-in-magnitude but borderline-significant difference in the proportions of households owning farm implements between the food and control groups.

Table 4.3 Differences in ownership of assets and durables, by treatment group, 2010

	Proportions, 2010			Difference in Proportions		
Proportion of households with…	**Food**	**Cash**	**Control**	**Food - Control**	**Cash - Control**	**Food - Cash**
Any cattle	0.125	0.105	0.122	0.002	-0.018	0.020
	(0.021)	(0.025)	(0.025)	(0.033)	(0.035)	(0.032)
Any sheep	0.132	0.107	0.115	0.016	-0.008	0.025
	(0.019)	(0.018)	(0.015)	(0.025)	(0.025)	(0.026)
Any goats	0.192	0.190	0.176	0.016	0.014	0.002
	(0.019)	(0.028)	(0.024)	(0.031)	(0.038)	(0.035)
Any chickens	0.373	0.365	0.394	-0.021	-0.029	0.008
	(0.025)	(0.031)	(0.026)	(0.037)	(0.042)	(0.041)
Any farm implements	0.952	0.944	0.912	0.039*	0.032	0.007
	(0.008)	(0.017)	(0.018)	(0.020)	(0.025)	(0.019)
Any ploughs	0.259	0.232	0.228	0.031	0.004	0.027
	(0.030)	(0.034)	(0.027)	(0.041)	(0.045)	(0.047)
Any seed stores	0.100	0.073	0.082	0.018	-0.008	0.027
	(0.018)	(0.017)	(0.020)	(0.027)	(0.026)	(0.025)
Any chairs	0.423	0.452	0.416	0.007	0.036	-0.029
	(0.035)	(0.041)	(0.045)	(0.057)	(0.062)	(0.054)
A coal or wood stove	0.171	0.201	0.165	0.006	0.035	-0.029
	(0.028)	(0.033)	(0.030)	(0.041)	(0.044)	(0.043)
Any granaries	0.468	0.414	0.367	0.101	0.047	0.054
	(0.048)	(0.051)	(0.046)	(0.066)	(0.069)	(0.070)
Any jewelry	0.831	0.819	0.847	-0.016	-0.028	0.012
	(0.028)	(0.030)	(0.029)	(0.041)	(0.043)	(0.042)
Any large pots/pans	0.410	0.416	0.340	0.071*	0.076*	-0.005
	(0.029)	(0.024)	(0.028)	(0.041)	(0.038)	(0.038)
Any mosquito nets	0.849	0.841	0.759	0.089**	0.081**	0.008
	(0.022)	(0.023)	(0.033)	(0.040)	(0.040)	(0.032)
Any skins/animal hide	0.681	0.665	0.694	-0.013	-0.028	0.015
	(0.032)	(0.039)	(0.031)	(0.045)	(0.050)	(0.052)
Any weapons	0.204	0.171	0.171	0.033	0.001	0.033
	(0.024)	(0.030)	(0.025)	(0.036)	(0.040)	(0.040)

Notes: Estimates in columns (1)-(3) are baseline means with standard deviations in parentheses. Standard deviations are not reported for the prevalence of low FCS. Columns (4)-(6) report estimates of differences in baseline means with robust standard errors in parentheses. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

4.2.2 Food consumption patterns

In Table 4.4, we test whether there are differences at baseline between treatment groups on several measures of food consumption patterns. For the food gap and meal frequency during the worst month of food insecurity over the last 12 months, there is no significant difference in these indicators by treatment group status. For meal frequency during a good month, there is a small, weakly significant difference between meal frequencies, with households in the cash group reporting slightly higher meal frequency than those in the control group.

Table 4.4 Differences in measures of food consumption patterns, by treatment group, 2010

		Mean, 2010			Difference in Means		
	N	Food	Cash	Control	Food - Control	Cash - Control	Food - Cash
Number of months of 'food gap' in last 12 months	2,977	6.155 (0.313)	5.926 (0.298)	5.571 (0.312)	0.584 (0.442)	0.355 (0.449)	0.229 (0.431)
Meals per day for adults during worst month in last 12 months	2,930	1.208 (0.031)	1.268 (0.039)	1.221 (0.029)	-0.014 (0.046)	0.046 (0.051)	-0.060 (0.052)
Meals per day for children during worst month in last 12 months	2,929	1.636 (0.040)	1.656 (0.047)	1.622 (0.037)	0.013 (0.057)	0.034 (0.063)	-0.020 (0.063)
Meals per day for adults during a good month in last 12 months	2,929	2.318 (0.049)	2.335 (0.051)	2.206 (0.052)	0.112 (0.073)	0.129* (0.073)	-0.017 (0.072)
Meals per day for children during a good month in last 12 months	2,911	2.645 (0.047)	2.706 (0.050)	2.591 (0.044)	0.054 (0.066)	0.114* (0.067)	-0.061 (0.069)

Notes: The "food gap" refers to a month in which the household was unable to meet its food needs. Difference reports difference in mean between ECD nonparticipants and participants. Absolute value of standard errors (in parentheses) are clustered at the ECD center level and stratified at the district level. Test statistics are t statistics.
* Significant at the 10 percent level, ** significant at the 5 percent level, *** significant at the 1 percent level.

4.2.3 Child health

We first consider differences in child illness. Table 4.5 shows differences in illness in the past 4 weeks, by treatment group. We see, at the levels of both the household and children age 3-5, that proportions are very similar for all categories across treatment groups, and there are no statistically significant differences.

Table 4.5 Differences in illness in the past 4 weeks, by treatment group, 2010

	Proportions, 2010			Difference in proportions		
Proportion of…	Food	Cash	Control	Food - control	Cash - control	Food - cash
Households with any illness in the last 4 weeks	0.734 (0.022)	0.713 (0.020)	0.733 (0.024)	0.001 (0.033)	-0.020 (0.032)	0.021 (0.030)
Children age 3-5 with any illness in the last 4 weeks	0.380 (0.031)	0.358 (0.025)	0.391 (0.031)	-0.011 (0.044)	-0.033 (0.040)	0.023 (0.040)
Children age 3-5 with cold/cough/flu/fever in the last 4 weeks	0.284 (0.026)	0.260 (0.020)	0.286 (0.028)	-0.002 (0.039)	-0.026 (0.035)	0.024 (0.033)
Children age 3-5 with diarrhea in the last 4 weeks	0.152 (0.019)	0.135 (0.014)	0.138 (0.020)	0.014 (0.029)	-0.003 (0.025)	0.017 (0.024)
Children age 3-5 with malaria in the last 4 weeks	0.234 (0.028)	0.221 (0.022)	0.253 (0.030)	-0.019 (0.043)	-0.032 (0.038)	0.013 (0.036)

Notes: Estimates in columns (1)-(3) are baseline means with standard deviations in parentheses. Standard deviations are not reported for the prevalence of low FCS. Columns (4)-(6) report estimates of differences in baseline means with robust standard errors in parentheses. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 4.6 shows differences in child deworming in the past 6 months, by treatment group. We see that proportions of children age 3-5 receiving deworming are very similar across treatment groups for all categories, and there are no statistically significant differences.

Table 4.6 Differences in child deworming in the past 6 months, by treatment group, 2010

	Proportions, 2010			Difference in proportions		
Proportion of…	**Food**	**Cash**	**Control**	**Food - control**	**Cash - control**	**Food - cash**
Children age 3-5 who received de-worming medicine in the last 6 months	0.904 (0.020)	0.907 (0.017)	0.906 (0.019)	-0.002 (0.028)	0.001 (0.026)	-0.003 (0.026)

Notes: Estimates in columns (1)-(3) are baseline means with standard deviations in parentheses. Standard deviations are not reported for the prevalence of low FCS. Columns (4)-(6) report estimates of differences in baseline means with robust standard errors in parentheses. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

4.3 Attrition

The baseline household survey included 2,959 households in 98 ECD center clusters across the three districts of Kotido, Kaabong, and Napak. In the baseline sample, 391 households (13.2 percent) were households with at least one child age 3-5 years, but that did not have any children enrolled in the ECD center. This is the sample to be used to measure any potential enrollment effect of the food and cash transfers. The remaining sample of 2,568 households is the sample of households with a child age 3-5 enrolled in an ECD center. This the main sample for the analysis contained in this report.

In the endline survey, the survey team was able to find and interview 2,838 of the baseline sample households, leading to an attrition rate of 4.1 percent over roughly 18 months. This is equivalent to an annual attrition rate of 2.7 percent. This low rate of attrition is encouraging, particularly for the remote and rugged districts of Karamoja. This also indicates that, although some households in this region live a semi-pastoralist lifestyle – moving with their cattle in search of grazing grounds – the households in our sample are settled. Indeed, most of the households lived in gated manyatas (groupings of households surrounded by a sturdy fence made of briars), and have invested in building their compounds. The attrition rate in the sample of households with a child age 3-5 enrolled in an ECD center at baseline was only slightly higher, at 4.18 percent. This left 2,461 beneficiary households with endline outcome variables for inclusion in the analysis.

Although this attrition rate is low, it is necessary to examine whether the attrition was balanced with respect to key characteristics of the sample. First, we estimated a simple model to test whether the attrition rate was the same for households with children enrolled in an ECD center at baseline and households with no children in an ECD center. We found that the attrition rate is not significantly different across these two samples. Second, we tested whether the probability of attrition was correlated with the treatment assignment. It may be that households receiving food or cash transfers are more likely to remain in their community than the control group households, in order to maintain their access to the transfers. If so, this would bias estimated impacts of the transfers on outcomes between treated and control communities. Table 4.7 presents the results of the models to test for whether attrition was associated with the assignment to the treatment arms. Column 1 shows the results of a linear probability model

(OLS) and column 2 presents a probit model. In both models, there is no relationship between assignment to the food, cash, or control group and the probability of attrition.

Table 4.7 Association of attrition with assignment to treatment

Dep. Var.: 1 if household attrited from the sample, 0 otherwise	Linear prob. model	Probit
Food	0.003	0.037
	(0.018)	(0.198)
Cash	-0.004	-0.047
	(0.018)	(0.211)
Constant	0.042***	-1.730***
	(0.013)	(0.143)
Observations	2,561	2,561

Notes: *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

We also examined whether the distribution of key outcome variables or child age differed at baseline in the sample of households that later attrited from the sample of households that remained in the study. Table 4.8 presents means of several outcome variables and child age across the attrited and non-attrited baseline sample, as well as a test for differences in means across these samples.

Across five outcomes from the tests of child cognitive development, there is no significant difference across samples for four of these outcomes. For the expressive language score, there is a small difference in scores between attrited and remaining households, but the difference is only weakly significant. For the anthropometry outcomes, there is a statistically significant difference in the prevalence of stunting, wasting and underweight for the BICs age 36-60 months. However, the difference in mean stunting prevalence is extremely small. For wasting and underweight, there is a much lower prevalence of wasting and underweight in the attrited sample. However, the attrited sample is so small that this is unlikely to have an effect of estimates of the impact of the programs on attrition. The prevalence of malnutrition in the sample of households that remained in the study is very similar to the overall baseline prevalence. Finally, there are no differences in food security measures or in child age for the BIC across the attrited sample and the sample that remained in the study.

Table 4.8 Differences in baseline outcome indicators, by attrition group

		Full sample	Remain	Attrited	Difference
Cognitive Development	Mullen	30.154	30.125	30.792	0.667
	[1,735 obs.]	(7.958)	(0.367)	(1.005)	(1.014)
	Visual reception	9.336	9.312	9.894	0.582
	[2,024 obs.]	(3.562)	(0.143)	(0.363)	(0.374)
	Fine motor	5.038	5.044	4.911	-0.133
	[1,845 obs.]	(2.255)	(0.093)	(0.280)	(0.281)
	Receptive language	10.934	10.913	11.417	0.504
	[2,018 obs.]	(3.143)	(0.137)	(0.362)	(0.362)
	Expressive language	4.442	4.431	4.694	0.263*
	[2,072 obs.]	(1.295)	(0.046)	(0.085)	(0.096)
Anthropometric	HAZ	-0.222	-0.221	-0.246	-0.025
	[1,658 obs.]	(2.253)	(0.077)	(0.277)	(0.288)
	WAZ	-0.606	-0.605	-0.611	-0.005
	[1,631 obs.]	(1.214)	(0.045)	(0.178)	(0.176)
	WHZ	-0.808	-0.808	-0.808	0.000
	[1,560 obs.]	(1.306)	(0.041)	(0.147)	(0.149)
	Stunted	0.165	0.165	0.164	0.000**
	[1,658 obs.]	(0.371)	(0.011)	(0.049)	(0.048)
	Wasted	0.114	0.117	0.049	-0.068**
	[1,560 obs.]	(0.318)	(0.010)	(0.026)	(0.029)
	Underweight	0.120	0.121	0.091	-0.030**
	[1,631 obs.]	(0.325)	(0.011)	(0.045)	(0.044)
Food Security	DD I	8.239	8.245	8.112	-0.132
	[2,560 obs.]	(3.331)	(0.160)	(0.330)	(0.340)
	HDDS 13	5.307	5.315	5.121	-0.193
	[2,560 obs.]	(1.738)	(0.076)	(0.154)	(0.162)
	HDDS	5.092	5.098	4.953	-0.145
	[2,560 obs.]	(1.608)	(0.074)	(0.152)	(0.158)
	FCS 9	34.168	34.193	33.589	-0.604
	[2,560 obs.]	(15.179)	(0.633)	(1.955)	(1.871)
	FCS	32.863	32.867	32.766	-0.101
	[2,560 obs.]	(14.638)	(0.649)	(2.003)	(1.918)
Demographic	Child age (months)	53.003	52.847	56.579	3.733
	[2,561 obs.]	(17.719)	(0.416)	(1.451)	(1.458)

Notes: *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

5. Experience with the Program

5.1 Experience with ECD Centers

Our data collection includes a range of questions on households' experience with the ECD centers themselves. Because ECD centers operate in control communities as well as in treatment communities, these questions were asked of households in all three treatment arms. We document households' self-reported experiences with the ECD centers, in order to provide context and suggest potential pathways for the impact estimates we report in later sections.

Table 5.1 shows the mean responses to questions on experiences with ECD centers, as well as the differences in mean responses by treatment arm. Responses of food-recipient households in general look very similar to responses of control households. The exception is on reported quality of the teaching/activities at the ECD center; both food-recipient and cash-recipient report significantly better quality than control households, and the difference in responses between food-recipient and cash-recipient households is insignificant. However, we find that cash-recipient households report significantly different experiences than food-recipient or control households in a range of dimensions. Relative to food-recipient or control households, cash-recipient households report a significantly higher value of gifts given to the ECD caregiver as payment for volunteering; a significantly higher proportion of cash-recipient households report attending ECD center meetings; and a significantly higher proportion of cash-recipient households report that their community's ECD center has a shelter, access to a latrine, access to hand-washing facilities, and other materials.

Table 5.2 shows the breakdown of the type of gift that the household reports giving to the ECD caregiver, if any, by treatment group. We see that, relative to food-recipient and control households, cash-recipient households are much less likely to report giving no gift to the ECD caregiver and much more likely to report giving a cash gift.

Table 5.1 Differences in experience with ECD centers, by treatment group

	Mean responses, 2012			Differences in mean responses		
	Food	Cash	Control	Food - Control	Cash - Control	Food - Cash
Minutes to the ECD center by normal means	21.765	19.620	24.687	-2.922	-5.067	2.146
	(22.039)	(20.805)	(28.905)	(3.419)	(3.394)	(2.452)
Total value of gifts to the ECD caregiver	383.329	980.403	318.243	65.085	662.159***	-597.074***
	(1,882.430)	(1,663.323)	(1,176.669)	(95.370)	(163.790)	(168.248)
Anyone in HH helps operate/manage the ECD center	0.238	0.254	0.221	0.017	0.033	-0.016
	(0.426)	(0.435)	(0.415)	(0.033)	(0.033)	(0.036)
Anyone in HH has gone to ECD center meeting in 2012	0.643	0.717	0.563	0.080*	0.154***	-0.074**
	(0.479)	(0.451)	(0.496)	(0.042)	(0.039)	(0.035)
Quality of teaching/activities at ECD center (1=Excellent, 4=Poor)	1.969	1.952	2.208	-0.238***	-0.256***	0.017
	(0.537)	(0.540)	(0.672)	(0.064)	(0.071)	(0.044)
ECD center has a shelter	0.707	0.861	0.655	0.051	0.206***	-0.155**
	(0.456)	(0.346)	(0.476)	(0.075)	(0.064)	(0.067)
ECD center has access to a latrine	0.665	0.887	0.605	0.060	0.282***	-0.221***
	(0.472)	(0.317)	(0.489)	(0.082)	(0.063)	(0.071)
ECD center has hand-washing facilities	0.240	0.382	0.220	0.020	0.162**	-0.142**
	(0.428)	(0.486)	(0.415)	(0.066)	(0.074)	(0.066)
ECD center has chalk boards for children	0.327	0.350	0.303	0.023	0.046	-0.023
	(0.469)	(0.477)	(0.460)	(0.054)	(0.057)	(0.053)
ECD center has books	0.172	0.242	0.215	-0.043	0.027	-0.070*
	(0.378)	(0.429)	(0.411)	(0.047)	(0.049)	(0.037)
ECD center has toys	0.167	0.248	0.250	-0.082	-0.001	-0.081
	(0.374)	(0.432)	(0.433)	(0.055)	(0.060)	(0.052)
ECD center has musical instruments	0.074	0.079	0.050	0.024	0.029	-0.005
	(0.262)	(0.270)	(0.217)	(0.022)	(0.022)	(0.027)
ECD center has paper and pencils	0.142	0.194	0.200	-0.058	-0.006	-0.053
	(0.349)	(0.396)	(0.400)	(0.044)	(0.050)	(0.038)
ECD center has pictures	0.340	0.343	0.354	-0.014	-0.012	-0.002
	(0.474)	(0.475)	(0.479)	(0.055)	(0.063)	(0.055)
ECD center has beads	0.074	0.066	0.092	-0.019	-0.027	0.008
	(0.261)	(0.248)	(0.290)	(0.027)	(0.027)	(0.022)
ECD center has other materials	0.063	0.130	0.039	0.024	0.091**	-0.067*
	(0.243)	(0.336)	(0.193)	(0.024)	(0.037)	(0.038)

Notes: Estimates in columns (1)-(3) are baseline means with standard deviations in parentheses. Standard deviations are not reported for the prevalence of low FCS. Columns (4)-(6) report estimates of differences in baseline means with robust standard errors in parentheses. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 5.2 Type of gift given to the ECD caregiver, by treatment group

	Treatment		
Type of gift given to ECD caregiver (%)	**Food**	**Cash**	**Control**
Cash gift given	14.80	31.09	13..47
Food gift given	3.73	6.59	2.99
No gift given	79.84	57.84	80.41
Other gift given	1.63	4.48	3.13
Observations	858	759	735

Note: Figures are proportions of type of gift given within each treatment arm.

5.2 Experience with Food and Cash Transfers

The endline survey data include information on the experience of beneficiary households with receiving food and cash transfers. Since these questions pertain only to households that received transfers, they were not asked of the control group.

We first explore the costs incurred by beneficiaries to receive transfers, both in terms of time and out-of-pocket expenses. Table 5.3 compares the time taken to travel to the transfer collection point (i.e., the distribution point for food and the bank agent's station for cash), the time spent waiting to receive the transfer at the collection point, and the total cost incurred in reaching the collection point. We see that mean differences by transfer modality are not statistically significant. For both food and cash beneficiaries, average travel time to the collection point is slightly more than 30 minutes, average waiting time once at the collection point is slightly more than 80 minutes, and average total out-of-pocket cost incurred in reaching the collection point is very small (with 14.09 to 89.13 UGX converting to roughly 0.01 to 0.04 USD). In fact, nearly all beneficiaries receiving either modality (98 percent of food beneficiaries and 99 percent of cash beneficiaries) report zero total costs in traveling to the collection point. Thus, even the statistically insignificant mean difference in total travel costs between food and cash beneficiaries is driven by a small number of outliers. Taken together, these findings suggest that the main cost incurred by beneficiaries in order to receive transfers is the time taken to reach the collection point and wait at the collection point, but that this time cost does not differ significantly between food and cash modalities.

Next, we study how beneficiaries report using the last transfer they received. For food beneficiaries, we have information on how much CSB, oil, and sugar the household reports receiving, and how much of each was used for specific purposes (i.e., consumed, sold in order to buy non-staple foods, sold in order to buy nonfood goods, voluntarily shared or given to family or friends outside the household, sold in order to repay debts, saved to use beyond the next two weeks, stolen from the household, or given to relatives or neighbors out of obligation such as threat or social pressure). Table 5.4 shows the average proportion of each component of the food transfer reported to be used for each purpose. We see that the average food beneficiary household reports consuming nearly all of the food transfer, more than 90 percent of each food type. Negligible amounts of all other uses are reported, other than a very small average proportion of the food types reported to be saved (5 percent or less).

Table 5.3 Time and cost to receive the transfer, as reported by food and cash beneficiaries

The last time you received a food/cash transfer:	Food	Cash	Difference
How much time did it take you to travel to the transfer collection point from your home? (minutes)	35.13	38.38	-3.23
	(1.67)	(1.55)	(2.27)
How long did you wait to receive your transfer, from the moment you arrived at the collection point? (minutes)	86.18	80.11	6.08
	(3.08)	(4.00)	(4.98)
How much did it cost you in total to reach the transfer collection point (bus fare, etc.)? (UGX)	14.09	89.13	-75.04
	(5.99)	(62.97)	(59.11)
Proportion of beneficiaries reporting zero total cost to reach the transfer collection point	0.98	0.99	-0.01
	(0.00)	(0.00)	(0.01)
Number of observations	**660**	**577**	

Notes: Mean values reported with standard errors in parentheses. All differences are statistically insignificant at the 10 percent level.

Table 5.4 Proportion of food transfer used for various purposes, as reported by food beneficiaries

Average proportion of the [FOOD] in the last food transfer that was…	CSB	Oil	Sugar
Consumed	0.94	0.96	0.97
Sold in order to buy non-staple foods	0.00	0.00	0.00
Sold in order to buy nonfood goods	0.00	0.00	0.00
Voluntarily shared or given to family or friends outside the household	0.01	0.00	0.00
Sold in order to repay debts	0.00	0.00	0.00
Saved to use beyond the next two weeks	0.05	0.03	0.03
Stolen from the household	0.00	0.00	0.00
Given to relatives or neighbors out of obligation	0.00	0.00	0.00
Number of observations	***652***	***652***	***652***

Notes: Mean proportions reported.

For cash beneficiaries, we have analogous information on how much cash the household reports receiving, and how much of each was used for specific purposes (i.e., spent on staple foods, spent on non-staple foods, spent on nonfood goods, voluntarily shared or given to family or friends outside the household, spent in order to repay debts, saved to use beyond the next two weeks, stolen from the household, or given to relatives or neighbors out of obligation such as threat or social pressure). Table 5.5 shows the average proportion of the cash transfer reported as used for each purpose. We see that the average cash beneficiary household reports spending a substantial proportion of the cash transfer on staple foods (roughly 41 percent of the transfer value) and also a fairly large proportion on non-staple foods (roughly 12 percent of the transfer value). However, the average cash beneficiary also reports spending sizeable proportions of the cash transfer on nonfood goods (roughly 23 percent of the transfer value) and on saving to use beyond the next two weeks (roughly 16 percent of the transfer value). In other words, while the average food beneficiary appears to simply consume much of the food given (rather than, for example, selling it in order to purchase different food), cash beneficiaries have more diverse uses. Cash beneficiaries do spend a sizeable proportion of the transfer on purchasing food, but these food purchases include both staples and non-staples, and they also spend considerable proportions of the cash transfer on nonfood goods and saving. We note that this finding is broadly consistent with the results shown in Section 5.1, which suggested that cash beneficiaries used some of the transfer to support the ECD center with materials and facilities.

Table 5.5 Proportion of cash transfer used for various purposes, as reported by cash beneficiaries

Average proportion of the cash in the last cash transfer that was…	
Spent on staple foods	0.41
Spent on non-staple foods	0.12
Spent on nonfood goods	0.23
Voluntarily shared or given to family or friends outside the household	0.02
Spent in order to repay debts	0.02
Saved to use beyond the next two weeks	0.16
Stolen from the household	0.00
Given to relatives or neighbors out of obligation	0.02
Number of observations	***568***

Notes: Mean proportions reported.

We note that, although food beneficiaries report consuming nearly all of the food rations received, it is possible that receipt of the rations nonetheless freed resources in the household that would have otherwise been spent on food to be used for other purposes. In other words, even if the food transfer itself was consumed, its receipt could indirectly allow food beneficiaries to increase their spending on nonfood goods, or to increase their savings, using other sources of income. This type of substitution behavior is generally expected from in-kind transfer programs. We examine the relative impact of the food and cash transfers on the overall pattern of households' consumption behavior across food and nonfood items as well as across food groups in Chapter 6 below. However, the virtual absence we see here of food rations sold in order to increase expenditures in other domains provides suggestive evidence that there were transaction costs associated with selling the food rations to obtain cash.

We then look at beneficiaries' stated preferences regarding transfer modality. The endline questionnaire asks both food and cash beneficiaries to report, if they could receive a transfer worth 25,000 UGX split between food and cash, what amount of the transfer they would choose to receive in cash. Figure 5.1 shows the distribution of the reported amounts of preferred cash, by food and cash beneficiaries. We see few clear differences between the food and cash beneficiaries, and most beneficiaries report an intermediate amount between 0 and 25,000 UGX, suggesting a preference for a mix of food and cash.

Figure 5.1 Preferred amount of 25,000 UGX transfer to be delivered in cash, across food and cash beneficiaries

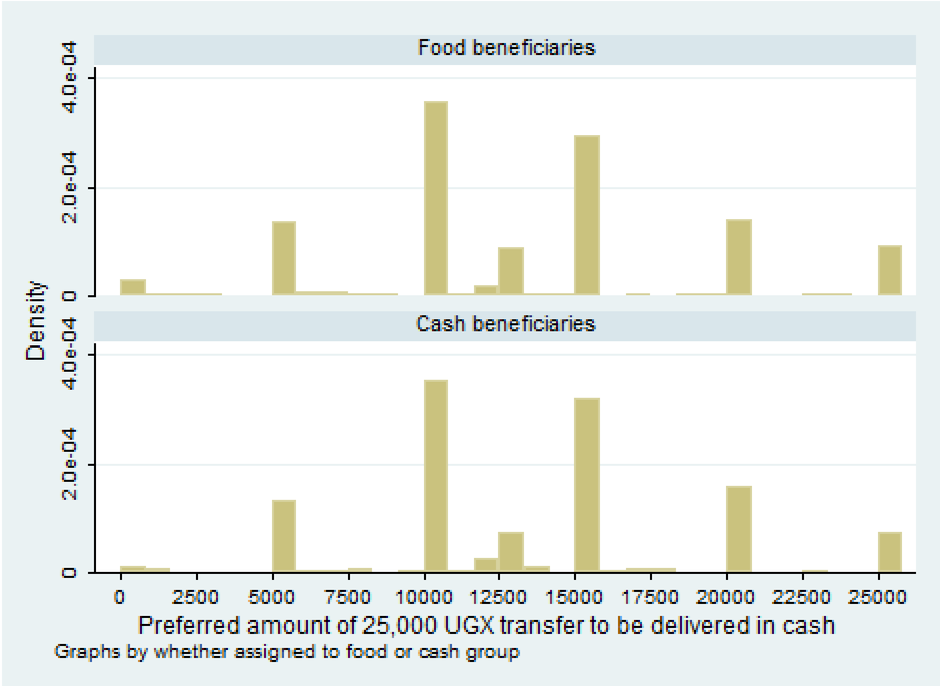


Table 5.6 shows, by group, the mean preferred amounts of cash, as well as the proportions of beneficiaries that report preferring all of the transfer in cash, none of the transfer in cash, and some of the transfer in cash. We see further evidence that the average preferred amount of cash is not significantly different between food and cash beneficiaries. Across both groups, the mean preferred amount of cash is slightly more than 13,000 UGX out of a 25,000 UGX transfer, indicating a preference for only slightly more than 50 percent of the transfer value in the form of cash. We also see differences that are statistically significant but very small in magnitude between food and cash beneficiaries in proportions of beneficiaries that prefer all, none, or some of the transfer in cash. About 1 percent more food beneficiaries report preferring to receive none of the transfer in cash, and about 3 percent fewer food beneficiaries report preferring to receive at least some (but not all) of the transfer in cash. However, the overall share of beneficiaries reporting a preference to receive all or none of the transfer in cash is less than 10 percent across both groups. More than 90 percent of beneficiaries report preferring to receive some (but not all) of the transfer in cash, again indicating a preference to receive a mix of food and cash.

Table 5.6 Amount of cash preferred in a transfer worth 25,000 UGX split between food and cash, as reported by food and cash beneficiaries

Out of a 25,000 UGX transfer split between food and cash…	Food	Cash	Difference
Amount that beneficiaries report preferring to receive in cash (UGX)	13,050.32 (225.20)	13,219.13 (222.34)	-168.81 (318.14)
Proportion of beneficiaries that report preferring to receive ***all*** of the transfer in cash	0.08 (0.01)	0.06 (0.01)	0.01 (0.01)
Proportion of beneficiaries that report preferring to receive ***none*** of the transfer in cash	0.01 (0.00)	0.00 (0.00)	0.01** (0.006)
Proportion of beneficiaries that report preferring to receive ***some*** (but not all) of the transfer in cash	0.91 (0.01)	0.94 (0.01)	-0.03* (0.015)
Number of observations	***666***	***583***	

Notes: Mean values reported with standard errors in parentheses. * indicates significance at the 10 percent level, ** significance at the 5 percent level, and *** significance at the 1 percent level.

We note that in the above question, there is no explicit description of what type of "food" would be delivered in the hypothetical transfer. As context for household preferences on food types – and specifically on preferences regarding CSB – we look at responses to a question asking households whether they would prefer to buy 1 kg of CSB for 1,000 shillings or 1 kg of maize flour ("posho," a staple in Karamoja, somewhat similar to CSB but without any micronutrient fortification) for 1,000 UGX. We see that there is no significant difference in the proportion of beneficiaries that prefer maize flour to CSB across the food and cash groups, and moreover, that most beneficiaries prefer maize (Table 5.7). More than 60 percent of both food and cash beneficiaries report that they would prefer to buy maize flour over CSB, if both were offered at the same price. This observation suggests that preferences for receiving "food" in a transfer may depend somewhat on what type of food is transferred.

Table 5.7 Preference for CSB vs. maize flour, as reported by food and cash beneficiaries

If either 1 kg of CSB or maize flour could be purchased for 1,000 UGX…	Food	Cash	Difference
Proportion of beneficiaries that report preferring to purchase 1 kg of maize flour rather than 1 kg of CSB	0.64 (0.02)	0.65 (0.02)	-0.01 (0.03)
Number of observations	***812***	***624***	

Notes: Mean value reported with standard error in parentheses. Difference is statistically insignificant at the 10 percent level.

For additional context on how CSB is used in households, we look at responses to a question on who in the household typically consumes CSB when it is available. Possible response options include children under age 5, school-age children, adult women, adult men, all household members, or no one, with multiple responses permitted. Table 5.8 shows the proportion of households who report each of these categories, across food and cash beneficiaries. We see that food beneficiaries are slightly but significantly more likely than cash beneficiaries to target CSB consumption to children, and slightly but significantly less likely to share CSB across all household members. A likely reason for this pattern is that households receiving a food transfer “intended for” particular children – as in this program linking the transfers to specific children’s ECD center enrollment – attempted to allocate the transferred food to those children. CSB received by cash beneficiary households from other programs (such as the general food distribution or public works programs) or purchased may have been perceived as less targeted to children. However, we note that, even among food beneficiaries, a very large proportion (about 60 percent) report that all household members consume CSB when it is available. This finding suggests that a large portion of the food transfers from this program may be shared across many household members, not just given to the target child. While we do not have comparable information on how uses of cash are allocated across household members, these findings provide suggestive evidence that among food beneficiary households, the target children may receive only a fraction of the transferred food.

Table 5.8 Who in the household typically consumes CSB when available, as reported by food and cash beneficiaries

When CSB is available…	Food	Cash	Difference
Proportion of beneficiaries that report consumption by children under age 5	0.48	0.34	0.14***
	(0.02)	(0.02)	(0.03)
Proportion of beneficiaries that report consumption by school-age children	0.42	0.30	0.12***
	(0.02)	(0.02)	(0.03)
Proportion of beneficiaries that report consumption by adult women	0.10	0.11	-0.01
	(0.01)	(0.01)	(0.02)
Proportion of beneficiaries that report consumption by adult men	0.01	0.00	0.01
	(0.00)	(0.00)	(0.01)
Proportion of beneficiaries that report consumption by all household members	0.60	0.68	-0.07***
	(0.02)	(0.02)	(0.03)
Proportion of beneficiaries that report consumption by no one in the household	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Number of observations	**812**	**624**	

Notes: Mean values reported with standard errors in parentheses. * indicates significance at the 10 percent level, ** significance at the 5 percent level, and *** significance at the 1 percent level.

Finally, we assess whether, at the time of the endline survey, receipt of transfers differed on average between food and cash beneficiaries. We compare how many total transfers beneficiaries report having received in the last 16 months, as well as how recently they report having last received a transfer. The latter measure is estimated based on beneficiaries’ self-report of the month and year in which they last received a transfer, from which we estimate days elapsed as of the endline survey, trimming the estimates at 150 days. Table 5.6 shows that food beneficiaries received a slightly higher number of transfers, on average, than cash beneficiaries by the time of the endline survey (3.22 vs. 2.97) and this difference is significant.

However, the average number of days since the last transfer was significantly higher for food beneficiaries than cash beneficiaries (about 57 days ago, vs. about 40 days ago).

Table 5.9 also shows that the average number of transfers that both food and cash beneficiaries report receiving is much lower than the six transfers conducted by WFP at the time of the endline survey. One potential reason for this low estimate of the number of transfers received is that survey respondents may not accurately recall each transfer received over the 12-month period of the project. However, these figures also suggest that many beneficiaries did not receive all of the transfers. This observation is consistent with what we know about errors in the early beneficiary lists, as described in Chapter 2.1.2. As noted in 2.1.2, a large number of children who fulfilled the criteria to receive transfers did not appear in the "verified" beneficiary list used for Cycles 1-3. After Cycle 3, once it was realized that substantial omission had occurred, a re-verification exercise was conducted by WFP, after which nearly all children inadvertently omitted from the Cycles 1-3 beneficiary lists were added. We would expect transfers to the households of these newly-added children to have first occurred in Cycle 4 and continued in Cycles 5 and 6 (as well as in Cycle 7 after the endline), such that these households would have received three transfers by the endline survey. This calculation is roughly consistent with the averages reported. Table 5.6 shows that the average difference in number of transfers received between the Food and Cash groups is small, suggesting that the initial omissions and reverification played out similarly across the two modalities.

Table 5.9 Number of transfers received and days since last transfer, as reported by food and cash beneficiaries

At the time of the endline survey…	Food	Cash	Difference
Number of transfers that beneficiaries report receiving in the last 16 months	3.22	2.97	0.25***
	(0.05)	(0.06)	(0.08)
Estimated days since beneficiaries report last receiving a transfer	56.59	40.33	16.26***
	(1.08)	(1.66)	(1.93)
Number of observations	**665**	**575**	

Notes: Mean values reported with standard errors in parentheses below means. * indicates significance at the 10 percent level, ** significance at the 5 percent level, and *** significance at the 1 percent level.

Figures 5.2 and 5.3 show graphically the distributions at endline of total number of transfers received and the days since the last transfer was received, based on beneficiary reports. We see direct evidence here that many households report receiving three transfers by endline, consistent with our expectation that many beneficiaries were added after Cycle 3. These distributions also further support that while food beneficiaries tend to have received similar or very slightly more transfers than cash beneficiaries, the last transfer received was longer ago. These reports are consistent with the fact that, while the sixth food cycle went out per the planned schedule, there was considerable delay in WFP's distribution of the sixth cash cycle. We take from these findings that food and cash beneficiaries were exposed to roughly the same number of transfers, on average (less than the intended six transfers on average), but that the food beneficiaries may have been more likely than the cash beneficiaries to experience fade-out in effects by the time of the endline survey. In other words, it is possible that the average food beneficiary was more likely than the average cash beneficiary to have "run out" of the transfer by the time of the endline, suggesting that impacts of transfers may have dampened more for food beneficiaries by endline.

Figure 5.2 Number of transfers reported, across food and cash beneficiaries

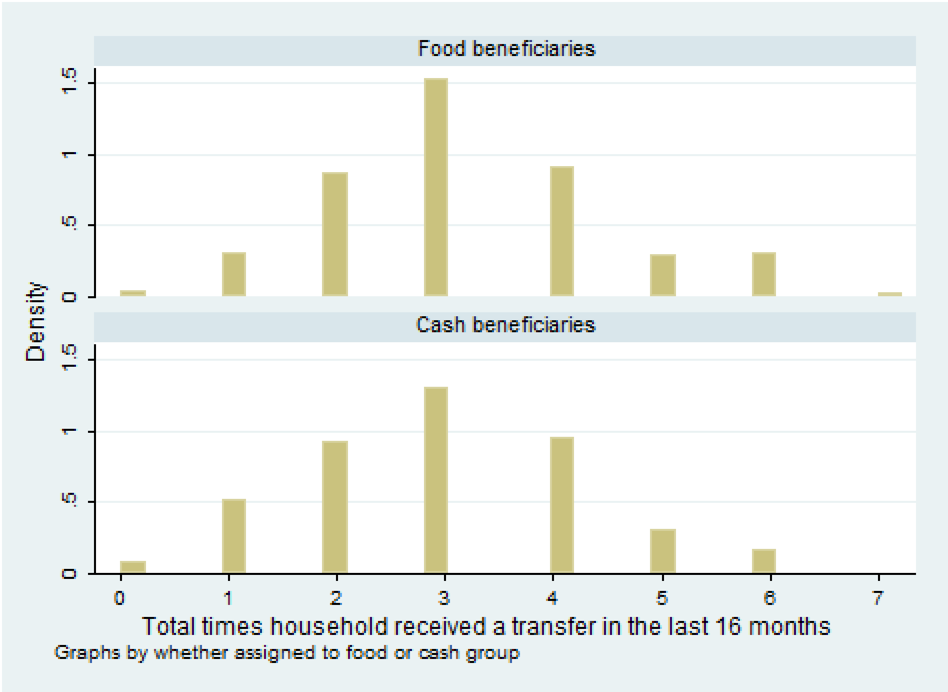
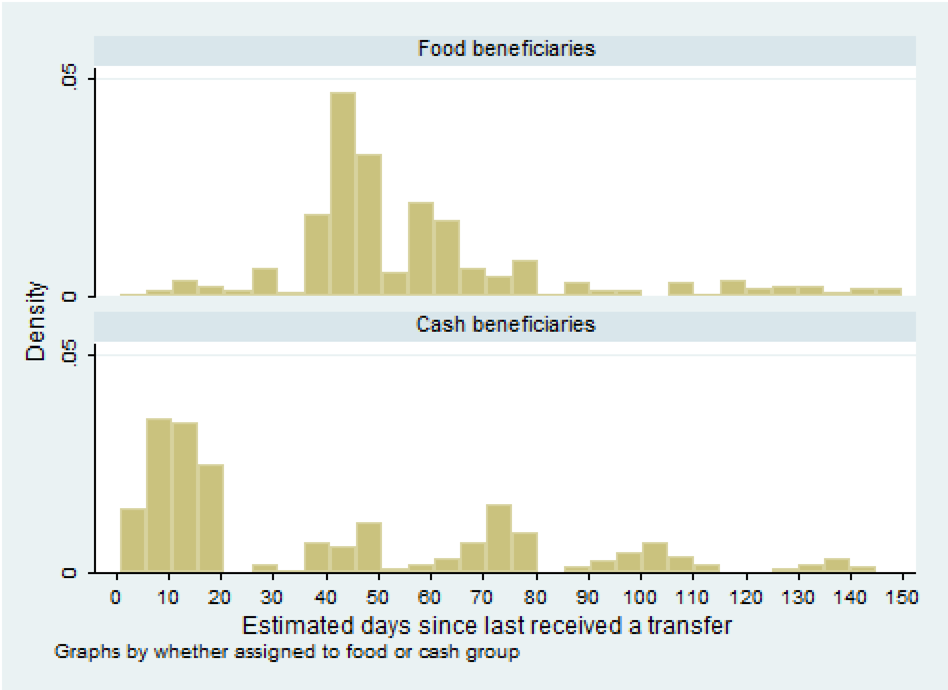


Figure 5. 3 Estimated days reported since last transfer, across food and cash beneficiaries



5.3 Summary

In summary, comparing households' self-reports on experiences with ECD centers across treatment arms, we find the following patterns:

- Food-recipient households, in general, respond very similarly to control households regarding their experience with ECD centers. The exception is on reported quality of the teaching/activities at the ECD center; both food-recipient and cash-recipient report significantly better quality than control households, and the difference in responses between food-recipient and cash-recipient households is insignificant.
- Cash-recipient households report significantly different experiences with ECD centers than food-recipient or control households in a range of dimensions. Relative to food-recipient or control households, cash-recipient households report a significantly higher value of gifts given to the ECD caregiver as payment for volunteering; a significantly higher proportion of cash-recipient households report attending ECD center meetings; and a significantly higher proportion of cash-recipient households report that their community's ECD center has a shelter, access to a latrine, access to hand-washing facilities, and other materials. Relative to food-recipient or control households, a much higher proportion of cash-recipient households also report providing any gifts they do give the ECD caregiver in the form of cash.
- We note that these responses form a coherent story for the differing experiences with ECD centers of cash-recipient households, relative to food-recipient or control households. If cash-recipient households are more likely to contribute a portion of their cash transfers to the ECD caregiver, in the form of a cash gift, that contribution may lead to the caregiver improving ECD center's facilities, including providing access to a shelter, latrine, hand-washing facilities, and other materials. Cash-recipient households' contribution could also lead to the household becoming more involved with the ECD center in other ways, including attending ECD center meetings.

Comparing households' self-reports on experiences with transfers across food beneficiaries and cash beneficiaries, we find the following patterns:

- There are few differences in implicit costs of receiving transfers by transfer modality. Both the average food beneficiary and the average cash beneficiary report slightly more than 30 minutes travel time to the relevant transfer collection point and slightly more than 80 minutes waiting time at the collection point, with no statistically significant differences. There are also no statistically significant differences in reported out-of-pocket costs to travel to the relevant collection point. In fact, nearly all food and cash beneficiaries (98 percent and 99 percent, respectively) report zero out-of-pocket costs, indicating that time is the main cost to beneficiaries, and this component is similar across transfer modalities.
- The average food beneficiary consumes nearly all of the transferred food (more than 90 percent of each food type transferred), with a very small proportion saved and

negligible proportions sold, given away, or used for other purposes. The average cash beneficiary spends a large proportion of the transfer on purchasing food (roughly 41 percent of the transfer value on staple foods, about 12 percent of the transfer value on non-staple foods), but also reports spending sizeable proportions on nonfood goods (roughly 23 percent of the transfer value) and on saving (roughly 16 percent of the transfer value). In other words, the average food beneficiary appears to consume much of the food given. Cash beneficiaries report more diverse uses, including a sizeable proportion spent on food but also sizeable proportions used for other purposes such as nonfood goods and saving. We note that this result is broadly consistent with the previous finding that cash beneficiary households appeared to use a portion of their transfers to support the ECD center (potentially through purchases of materials, etc.), while there is limited evidence of support from food beneficiary households.

- Reported preferences regarding a hypothetical transfer worth 25,000 UGX to be split over food and cash are very similar across food and cash beneficiaries. Most beneficiaries (more than 90 percent of both food and cash groups) report preferring to receive some but not all of the transfer in the form of cash, suggesting a preference for a mix of food and cash. The mean amount of preferred cash is just over 13,000 UGX among both groups, about half of the transfer value. There are few significant differences in these responses between food and cash beneficiaries, with only a negligibly higher proportion of food beneficiaries (1 percent more) preferring to receive the transfer in the form of no cash.
- Preferences for CSB (the main component of the food transfer) relative to maize meal ("posho," an un-fortified staple in the Karamojong diet) are very similar across food and cash beneficiaries. Most beneficiaries (more than 60 percent of both food and cash groups) report preferring to buy maize meal rather than CSB, if both are available in the same quantity at the same price. This observation suggests that the type of food transferred may affect households' preference for a food transfer.
- Most food beneficiaries and cash beneficiaries (about 60 percent of both groups) report that, when CSB is available, it is consumed by all household members. A slightly higher proportion of food beneficiaries report that CSB is consumed by children, and a slightly lower proportion of food beneficiaries report that CSB is consumed by all household members, indicating that this program's targeting may make food beneficiaries more likely to allocate the transferred food to the target child. However, the large proportion of households that share CSB even in food households suggests that many target children in food beneficiary households likely consume only a fraction of the transferred food.
- At the time of the endline, food beneficiaries and cash beneficiaries had received similar numbers of transfers, although food beneficiaries had, on average, received slightly but significantly more. However, based on beneficiary reports regarding when a transfer was last received, food beneficiaries received their last transfer, on average, significantly longer ago than cash beneficiaries (about 57 days before the endline interview for the average food beneficiary vs. about 40 days before the endline interview for the average

cash beneficiary). These reports are consistent with our knowledge of WFP's transfer schedule, which was roughly on time for the sixth distribution cycle of food but considerably delayed for the sixth distribution cycle of cash. We take from these findings that, while food and cash beneficiary households were likely to have been exposed to roughly the same number of transfers on average at endline, the effects of the food transfers may have been more likely to fade out by endline than the effects of the cash transfers.

6. Impact on Food Security, Frequency of Child Food Consumption, and Household Consumption

6.1 Indicators and Descriptive Statistics

The WFP ECD transfer scheme was designed to improve food security among households with children participating in ECD centers. An important dimension of household food security is the quality of food consumed in terms of protein and the micronutrient content of the diet (vitamins and minerals). In order to obtain a variety of these nutrients through food, it is generally recognized that a diverse diet is needed. As a result, measures of dietary diversity are often used as measures of dietary quality. In addition, increased dietary diversity is associated with a number of positive health outcomes, including increased birth weight, child anthropometric status, hemoglobin concentration, hypertension, cardiovascular disease and cancer (Hoddinott and Yohannes 2002). We use three measures of dietary diversity to identify the impact of the WFP transfers on the quality of household diets: the Dietary Diversity Index (DDI), the Household Dietary Diversity Score (HDDS), and the Food Consumption Score (FCS).

Each of these measures is constructed from data in the household food consumption and expenditure module in each round of the household survey. This module asks respondents to report the quantity and value of all food purchased or consumed by household members in the last 7 days, across 47 distinct food groups. These questions were asked in the same way in the baseline and endline surveys; measures of food security constructed from these data should be consistent over time.

The Dietary Diversity Index (DDI) measures the number of food groups from which food was consumed by any household member over the last 7 days. The maximum possible score for the DDI is 46; the group for "tobacco and related products" (commonly included in food consumption and expenditure modules) was excluded from all measures of dietary diversity. Hoddinott and Yohannes (2002) show that the DDI is correlated with dietary quality and quantity and so is a useful, simple summary measure of household food security. The Household Dietary Diversity Score (HDDS) gathers foods by type into 13 groups and sums the number of distinct food groups from which food were consumed by household members over the last 7 days. The food groups included in the HDDS are (Kennedy, Ballard, and Dop 2011): cereals, roots/tubers, corn soya blend (CSB), vegetables, fruits, meat/poultry/offal, eggs, fish/seafood, pulses/legumes/nuts, milk/dairy, oils/fats, sugar/honey, and miscellaneous. As noted previously, the CSB provided through transfers to households in the Food beneficiary group is fortified with protein and at least 15 vitamins and minerals. In constructing the HDDS, we use the 12 food grouping suggested by Kennedy, Ballard, and Dop (2011), but we add CSB as a distinct food group because it is so uniquely nutritious. In addition, we constructed the Food Consumption Score (FCS), which is a measure of food insecurity often used by WFP. The FCS goes beyond measuring dietary diversity and incorporates aspects of frequency of food consumption and dietary quality. The FCS is a weighted sum of the number of days in the last 7 days that food was consumed by the household across 9 distinct food categories: staples, pulses, vegetables, fruit, meat/fish, milk/dairies, sugar/honey, oils/fats, and CSB. As with the HDDS, we treat CSB as a unique food group in the construction of the FCS. According to WFP (2008), the weights assigned to the food groups in the FCS were designed to reflect the nutrient density of the foods in that group in terms of energy, protein and micronutrients (Table 6.1). We assigned a weight of 4 to the CSB group, putting it on par with meat, fish and dairy products because of its very high nutrient density.[5] As a measure of food security, the FCS is correlated with household caloric availability and reflects both the quantity, frequency and quality of food consumed.

Table 6.1 Food groups and weights in the Food Consumption Score

Group	Food items	Food group	Weight
1	Maize, maize porridge, rice, sorghum, millet past, bread and other cereals	Staples	2
	Cassava, potatoes and sweet potatoes, other tubers, plantains		
2	Beans, peas, groundnuts and cashew nuts	Pulses	3
3	Vegetables, leaves	Vegetables	1
4	Fruits	Fruit	1
5	Beef, goat, poultry, pork, eggs, and fish	Meat and fish	4
6	Milk, yogurt, and other dairies	Milk	4
7	Sugar, sugar products, and honey	Sugar	0.5
8	Oils, fats, and butter	Oil	0.5
9	Corn soya blend	CSB	4

Source: Based on WFP (2008) and modified to account for CSB.

In the Uganda data, the DDI and HDDS are fairly highly correlated, with a correlation coefficient of 0.838 among households in the baseline survey. The correlation between the DDI and the FCS is 0.564 and that between the HDDS and the FCS is 0.648 in the baseline survey. This reflects the differences between the FCS and the other measures of dietary diversity.

The average value of the DDI, HDDS, and FCS in the 2010 baseline survey are reported in Table 6.2, for the entire sample of households with children participating in ECD centers and by district. The average DDI at baseline was 8.24. This measure of dietary diversity was lowest in Kotido district and highest in Kaabong. The average HDDS was 5.31 (out of 13 food groups). Mean HDDS was lowest in Kotido district, but was higher in Napak than in Kaabong district. At baseline, the FCS ranged from 0 to 120.5 and the mean FCS was 35.60. As with the other measures, the mean score was lowest in Kotido, suggesting somewhat lower food security in Kotido district than elsewhere in the sample at baseline.

We also investigate the proportion of households with low FCS. According to WFP guidelines, households with an FCS at or below 35 have poor to borderline food consumption and

[5] We also developed measures of the FCS in which CSB was assigned a weight of 3 (like pulses) or 2 (like cereals). Estimates of the impact of the cash and food transfer programs on the FCS do not differ substantially across these alternative definitions of the FCS.

associated health (Kennedy, Ballard, and Dop 2011). As shown in Table 6.2, over half of all households in the sample (53.2 percent) have FCS below 35. Kotido district appears to have the worst food security by this measure as well, with 63.5 percent of households having low FCS.

Table 6.2 Baseline average food security measures, by district

	Overall (1)	Kotido (2)	Kaabong (3)	Napak (4)
Dietary Diversity Index (DDI)	8.24	6.53	8.58	7.70
	(3.33)	(2.95)	(3.24)	(3.53)
Household Dietary Diversity Score (HDDS)	5.31	4.85	5.29	5.60
	(1.74)	(1.84)	(1.66)	(1.94)
Food Consumption Score (FCS)	35.60	32.49	36.29	34.36
	(16.37)	(17.65)	(16.49)	(14.94)
Prevalence of low Food Consumption Score (FCS<35)	0.532	0.635	0.507	0.581

Notes: Estimates for DDI, HDDS, and FCS are baseline means with standard deviations in parentheses. Estimates for prevalence of low FCS are mean prevalence.

We also compared the value of the food security measures by treatment group at baseline and conducted tests of whether the distribution of these measures was balanced across treatment groups before the transfers started (Table 6.3). The tests show that the DDI, HDDS, and FCS were well balanced at baseline. Means for all three measures were slightly lower in the control group, but the tests show that differences in means between each pair of intervention arms were not statistically significantly different from zero. For the prevalence of low FCS (FCS<35), this prevalence is nearly 8 percentage points higher in the Control group than in the Food or Cash group, and the difference in means between the Control group and either treatment group is weakly significant. We will attempt to control for this difference in means when measuring the impact of the programs on the prevalence of low FCS.

We provide a comparison of the empirical distributions of the food security measures at baseline and endline across the three intervention arms in Figures 6.1-6.3. The graph of the DDI in the group of communities receiving Food transfers under the WFP program shows a distinct shift to the left in the distribution of dietary diversity, representing a worsening over time in this measure of food security (Figure 6.1). For the cash group, the distribution of the DDI is fairly stable, showing a modest shift to the right between the baseline and endline surveys. In the control group, the DDI also shifts to the left, particularly in the middle of the distribution. The distribution of the HDDS in the food group also shows a considerable worsening of this measure of dietary diversity between survey rounds (Figure 6.2). In the cash group, there is a broad improvement in the HDDS, with a shift to the right in across most of the distribution. Changes in the HDDS in the control group are mixed, with an improvement in the score in the middle of the distribution and a reduction in the HDDS in the upper tail. Changes in the FCS show a similar pattern (Figure 6.3). The distribution of the FCS shifts back in the food group, with a worsening in this measure of food security over time for much of the distribution. In the cash group, the FCS shows some improvement in food security, particularly in the lower tail of the distribution. Changes in the FCS distribution are mixed in the control group, showing modest improvements in the lower portion of the distribution, but a shift to the left for much of the upper tail.

Table 6.3 Baseline average food security measures, by treatment status

	Baseline means			Difference in baseline means		
	Food	Cash	Control	Food - control	Cash - control	Food - cash
	(1)	(2)	(3)	(4)	(5)	(6)
Dietary Diversity Index (DDI)	8.52	8.21	7.95	0.567	0.255	0.312
	(3.30)	(3.46)	(3.21)	(0.345)	(0.430)	(0.398)
Household Dietary Diversity Score (HDDS)	5.43	5.27	5.21	0.216	0.060	0.156
	(1.71)	(1.76)	(1.74)	(0.165)	(0.216)	(0.181)
Food Consumption Score (FCS)	36.74	35.42	34.49	2.256	0.931	1.326
	(0.91)	(1.06)	(1.20)	(1.580)	(1.721)	(1.431)
Prevalence of low Food Consumption Score (FCS<35)	0.508	0.506	0.585	-0.078*	-0.079*	0.001
				(0.040)	(0.043)	(0.039)

Notes: Estimates in columns (1)-(3) are baseline means with standard deviations in parentheses. Standard deviations are not reported for the prevalence of low FCS. Columns (4)-(6) report estimates of differences in baseline means with robust standard errors in parentheses. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

These results provide a glimpse of the impact of the Food and Cash transfer program on these measures of food security. Surprisingly, food security appears to have declined in much of the food group. However, food security improved for households receiving cash transfers. In the control group, there is a modest worsening of food security. In the next section, we conduct tests of the impact of the food and cash transfers relative to the control group and to each other.

Figure 6.1 Density graphs of the Dietary Diversity Index, by treatment group at baseline and endline

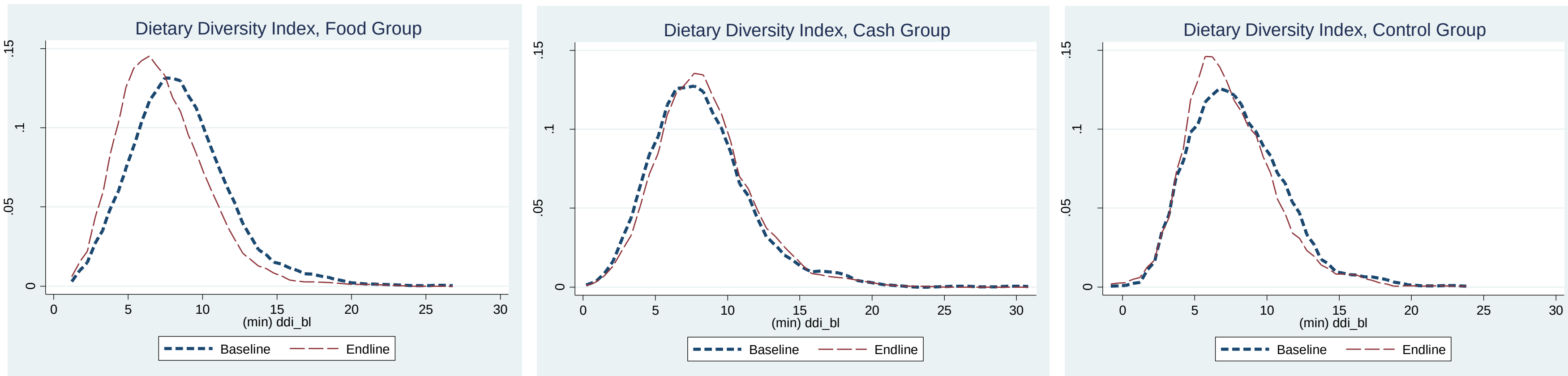


Figure 6.2 Density graphs of the Household Dietary Diversity Score, by treatment group at baseline and endline

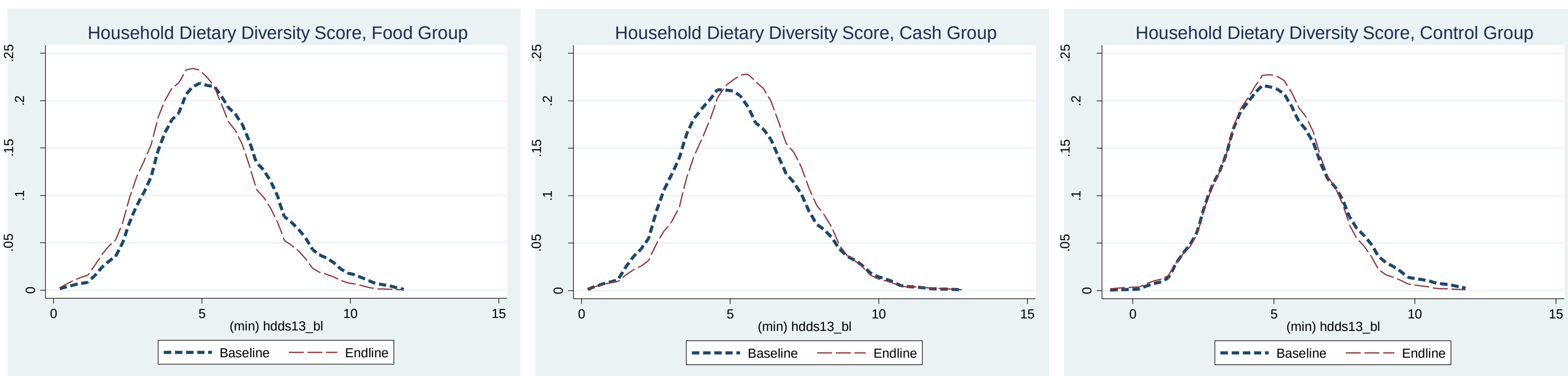
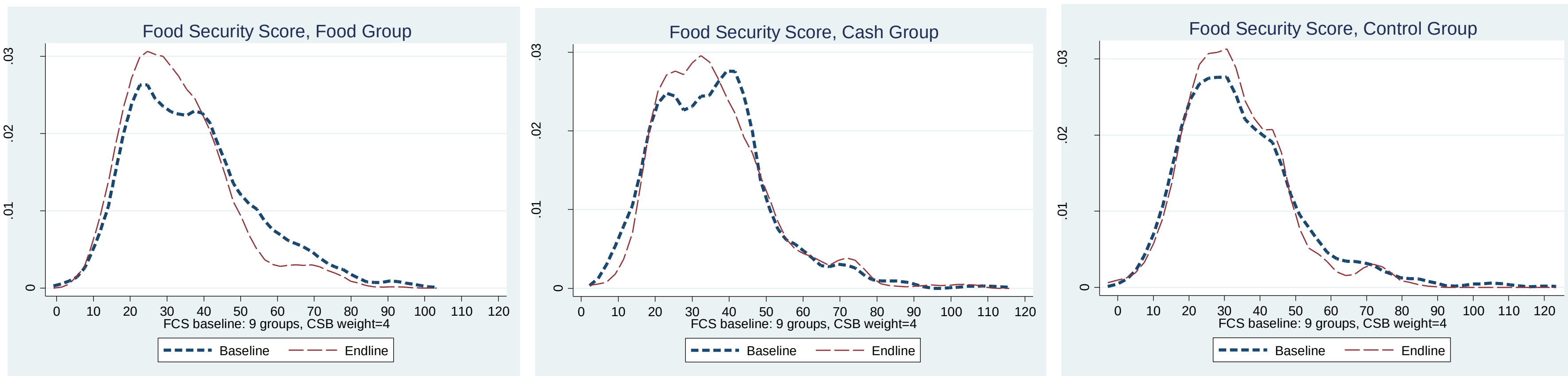


Figure 6.3 Density graphs of the Food Consumption Score, by treatment group at baseline and endline



6.2 Impacts on Food Security Measures (DDI, HDDS, and FCS)

The food and cash transfers both provided additional resources to beneficiary households with children enrolled in ECD centers. Before examining the relative differences in impacts of these two transfer modalities, we estimate the average impact on households of receiving either form of transfers, relative to the control group. Table 6.4 shows that, for the DDI, the average impact of the two programs was positive, at 0.326, but was not statistically significant. When impacts are disaggregated by transfer modality, food transfers had no effect on food security measured by the DDI, with the estimated effect being negative but not significantly different from zero. Cash transfers, on the other hand, led to a large and significant increase in the DDI of 0.925 points. A test for the difference in impacts between food and cash transfers shows that the impact of cash transfers was significantly larger than that of food transfers, with a difference in impacts on the DDI of 1.13 points. Similarly for the HDDS, the impact of the pooled programs is not significant. Households in the food group had a lower score on the HDDS than the control group, but the difference is not significant. However, cash transfers improved this measure of food security relative to the control group by 0.552 points. Also, the impact of cash transfers on the HDDS was significantly larger than that of food transfers, by 0.698 points. For the FCS, there is no impact of the pooled transfers relative to the control group. Food transfers have a negative impact estimate, but it is not significant. The impact of cash transfers is estimated at 2.99 points in the FCS, and this estimate is significant. Also, the estimated impact of cash is 3.28 points larger than that of food, and this difference is significant.

Table 6.4 Impacts of food and cash transfers on food security measures, 2012

	Dietary Diversity Index		**Household Dietary Diversity Score**		**Food Consumption Score**	
	Pooled	**Food or Cash**	**Pooled**	**Food or Cash**	**Pooled**	**Food or Cash**
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Treated	0.326		0.182		1.256	
	(0.270)		(0.162)		(1.194)	
Food		-0.207		-0.146		-0.285
		(0.257)		(0.163)		(1.361)
Cash		0.925**		0.552***		2.993**
		(0.367)		(0.200)		(1.412)
Baseline outcome	0.116***	0.122***	0.182***	0.187***	0.119***	0.121***
(DDI, HDDS or FCS)	(0.030)	(0.028)	(0.030)	(0.028)	(0.023)	(0.022)
Observations	2,357	2,357	2,357	2,357	2,357	2,357
R-squared	0.019	0.042	0.042	0.073	0.020	0.029
Test H_0: Food-Cash=0:		-1.13***		-0.698***		-3.28**
F test		(0.343)		(0.182)		(1.44)

Notes: Parameter estimates for Treated, Food, and Cash are average intent-to-treat effects on households with children enrolled in an ECD center at baseline in an ANCOVA model controlling for the level of the baseline outcome. The coefficient on the baseline outcome represents the change in the endline outcome for a one unit change in the baseline outcome. Standard errors are stratified by district or subcounty and clustered at the village level (in parentheses). *** Significant at the 1percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

An interesting result from the ANCOVA models presented in Table 6.4 is that the correlation of the baseline food security measures with the endline measures is not higher than 0.2 for any of these models. In all cases, the autocorrelation of the food security measure over time is significantly less than one. This confirms that the ANCOVA model is the appropriate specification and that a difference-in-differences (DID) model would be overly restrictive; the DID model effectively imposes that the autocorrelation in the outcome is equal to one.

The absence of any impact of the food transfers on these measures of household food security is surprising. WFP might have expected that providing food rations to households would have had a larger impact on food security than cash transfers, which would be apportioned according to the household's marginal propensity to consume food and other goods out of additional income. Food transfers, on the other hand, may be costly to monetize or convert to other resources. In addition, food markets in the Karamoja subregion of Uganda are not well developed, which would increase the transaction costs of purchasing additional food through markets and could have made cash transfers less effective at improving food security.

One possible explanation for this pattern of impacts is that the food transfers were inframarginal with respect to their food groups (e.g., cereals or staples, oil, sugar). If so, the food rations provided by WFP may not have increased the probability that a household consumes more food in that food group or consumes it more frequently. The additional resource provided by the food ration should have relaxed constraints on consumption of other food groups, but the size of this effect may have been too small to have much effect on the food security measures. In the following section, we explore other possible explanations for the pattern of effects.

Improving the average FCS represents a meaningful improvement in food security in this very food insecure population. However, we also wish to examine whether the transfers had an impact on the most food insecure households, those with low FCS (FCS < 35). Table 6.5 presents estimates of the impact of the pooled transfers and the food or cash transfers on the prevalence of low FCS, using an ANCOVA model (columns 1 and 2) or a difference-in-differences (DID) model (columns 3 and 4). The ANCOVA model allows for a more flexibility in controlling for baseline prevalence of low FCS than the DID model, which estimates the change in prevalence of low FCS between the baseline and endline surveys. Using the pooled treatment (Food and Cash groups combined), there is no impact on the prevalence of low FCS. When the treatments are considered separately, the ANCOVA model shows a significant impact of cash transfers in reducing the prevalence of low FCS and no impact of food transfers. The DID model provides different results, showing that the food transfers *increased* the prevalence of low FCS, while the cash transfers had no impact. The different results from these models arise because the prevalence of low FCS was much higher in the Control group at baseline than in the Food or Cash groups, and the two models control for this effect in different ways. In the ANCOVA model, this difference in baseline prevalence has very little effect on the impact estimates; the estimated correlation of baseline and endline prevalence of low FCS is low (0.05, not shown in Table 6.5). In the DID model, regression to the mean led to a significant reduction in the prevalence of low FCS in the control group between baseline and endline, essentially correcting the difference that existed at baseline. This left little room for impact from the Food or Cash interventions. A conservative interpretation of these results suggests that we cannot conclude that either program had an impact on the prevalence of low FCS.

Table 6.5 Impacts of food and cash transfers on the prevalence of low FCS, 2012

	Prevalence of low FCS (FCS<35) ANCOVA Model		Prevalence of low FCS (FCS<35) DID Model	
	Pooled	Food or Cash	Pooled	Food or Cash
Variables	**(1)**	**(2)**	**(3)**	**(4)**
Treated	-0.033		0.059	
	(0.028)		(0.044)	
Food		0.008		0.099**
		(0.033)		(0.049)
Cash		-0.079**		0.014
		(0.032)		(0.049)
Observations	2,561	2,561	2,561	2,561
R-squared	0.043	0.048	0.003	0.005
Test H_0: Food-Cash=0:		0.086**		0.085*
F test		(0.036)		(0.045)

Notes: Parameter estimates for Treated, Food, and Cash are average intent-to-treat effects on households with children enrolled in an ECD center at baseline in an ANCOVA model controlling for the level of the baseline outcome (columns 1 and 2) or in a difference-in-differences model (columns 3 and 4). Standard errors are stratified by district or subcounty and clustered at the village level (in parentheses). *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

6.3 Impacts on Frequency of Child Food Consumption

Although the WFP program was designed as a social protection program to improve the welfare and food security of the entire household, a main objective of the program was to improve the food security and nutrition of young children in the household, particularly those of age to attend the local ECD center. Here we present evidence on the impact of the food and cash transfers on the frequency of child food consumption. In a later section, we explore impacts of the transfers on child anthropometry and anemia status.

In the endline survey, the mother or primary caregiver of each child age 1-7 years in the sample was asked to report the number of days in the past 7 days that the child consumed food from 11 food groups: staples, leafy green vegetables, meat and eggs, dairy, orange fruits and vegetables (as sources of vitamin A), other vegetables, other fruit, corn soya blend (CSB), nuts and seeds, snacks, and beer or beer residue. Examples from each food group were read to the mother during the interview. Snacks included foods like soda, chips and biscuits (cookies). A category for beer and beer residue was included because it is common practice in Karamoja to brew beer, usually from sorghum, and to feed the residue from the brewing process to children. It is also not uncommon for children to sometimes drink beer. Although the beer residue is fairly nutritious, it retains some of the alcohol from the brewing process and so is not healthy for young children to consume.

In order to explore the pattern of the frequency of child food consumption, we summarize the average number of days that children in the control group consumed food from each food group in 2012, for the sample of children overall, by age group and by district (Table 6.6).[6] Households report that children consume starches nearly every day and that children consume leafy green vegetables nearly 4 days per week. Most households in Karamoja keep livestock, but the frequency of consumption of meat and eggs by children is relatively low, at somewhat less than once per week (0.62 days/week). Vegetables (other than orange ones) are consumed one day per week on average by children, and nuts and seeds are consumed 2.5 days per week. Frequency of consumption of other nutritious foods is relatively uncommon, including dairy (0.21 days/week), orange fruit and vegetables (0.13 days/week), and other fruit (0.35 days/week). Households in the control group reported relatively infrequent consumption of CSB, a main component of the food rations, at 0.31 days per week on average. Some households may obtain CSB through other targeted programs that operated in Karamoja at the same time including through targeted rations to vulnerable households and through food-for-work schemes. Consumption of snacks by children is very infrequent, but beer or beer residue is the fourth most commonly consumed food group for children out of the 11 food groups in this list. This appears to be a cause for concern.

Columns (2)-(4) of Table 6.6 present average frequency of consumption of these food groups by children in the control group disaggregating children into three age groups: 1-2 years, 3-5 years, and 6-7 years. Age 3-5 years is the target age for ECD participation, but younger children are the highest priority group for nutrition interventions. Children age 6-7 should be in their first years of primary school according to Ugandan education policy, although in practice many children do not start primary school until late in this age interval or after. The pattern of food frequency is remarkably stable across these three age groupings. Consumption of meat and eggs is modestly less common among 1-2 year olds. These youngest children also consume CSB, which is normally prepared as a porridge, somewhat more frequently than children age 3-7. This consistency in responses on food frequency by age may reflect some bias in responses to the survey because these questions were asked in succession for each child age 1-7 in the household, in order not to lengthen the interview by returning to these questions for each child over time. This approach can sometimes lead to a grouping of responses for all children in the household.

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[6] We report control group mean frequency of child food consumption at endline in Table 6.5 rather than the sample mean at baseline to control for seasonality, because the baseline data were collected in a different season.

Table 6.6 Food frequency of consumption for children age 1-7 years by age group and district, Control group, 2012

Number of days child consumed [FOOD] in the past 7 days	Overall, Age 1-7 (1)	By Age Group (years) Age 1-2 (2)	Age 3-5 (3)	Age 6-7 (4)	By District Kotido (5)	Kaabong (6)	Napak (7)
Starches	5.78	5.93	5.69	5.84	5.53	5.86	5.58
	(1.93)	(1.84)	(2.00)	(1.88)	(2.33)	(1.86)	(2.02)
Leafy green vegetables	3.91	4.02	3.90	3.86	4.03	3.91	3.91
	(2.51)	(2.44)	(2.53)	(2.52)	(1.92)	(2.63)	(2.21)
Meat and eggs	0.62	0.56	0.66	0.60	0.43	0.72	0.29
	(1.12)	(1.09)	(1.18)	(1.04)	(0.78)	(1.23)	(0.58)
Dairy	0.21	0.23	0.20	0.21	0.86	0.17	0.03
	(1.01)	(1.09)	(0.98)	(1.00)	(2.18)	(0.85)	(0.27)
Orange fruit and vegetables	0.13	0.10	0.13	0.14	0.10	0.08	0.35
	(0.56)	(0.51)	(0.56)	(0.59)	(0.44)	(0.40)	(0.97)
Other vegetables	0.98	0.88	1.02	0.98	1.54	0.77	1.58
	(1.74)	(1.56)	(1.82)	(1.72)	(1.77)	(1.70)	(1.65)
Other fruit	0.35	0.37	0.34	0.33	0.10	0.40	0.23
	(1.27)	(1.33)	(1.29)	(1.18)	(0.39)	(1.44)	(0.56)
Corn soya blend (CSB)	0.31	0.38	0.29	0.28	0.71	0.12	0.88
	(1.13)	(1.34)	(1.08)	(1.07)	(1.35)	(0.71)	(1.92)
Nuts and seeds	2.52	2.50	2.58	2.44	1.72	2.88	1.42
	(2.63)	(2.56)	(2.67)	(2.62)	(2.25)	(2.74)	(1.86)
Snacks	0.05	0.07	0.06	0.04	0.07	0.06	0.04
	(0.39)	(0.45)	(0.39)	(0.34)	(0.45)	(0.40)	(0.28)
Beer and beer residue	1.53	1.37	1.52	1.65	0.96	1.60	1.50
	(2.14)	(2.05)	(2.18)	(2.13)	(1.39)	(2.21)	(2.13)

Notes: Estimates are baseline means with standard deviations in parentheses.

Columns (2)-(4) of Table 6.6 present average frequency of consumption of these food groups by district. Here, there is greater variation. Kaabong district has a somewhat different pattern of frequency of child food consumption than Kotido and Nepak. For example, consumption of meat or eggs is somewhat more frequent in Kaabong (0.72 days/week) than in Kotido (0.43 days/week) or Nepak (0.29 days/week). Child consumption of vegetables (other than orange vegetables) is less frequent in Kaabong and consumption of nuts and seeds is more frequent than in the other two districts. Child consumption of CSB is much less frequent in control group households in Kaabong (0.12 days/week) than in the other two districts (0.71-0.88 days/week) suggesting less access there to this nutritious food source through other programs. This also suggests possible lower contamination of the evaluation design from access to CSB from other programs in Kaabong, the district with the largest share of the study sample. There are other unique patterns by district. For example, dairy is more frequently consumed by children in Kotido district than in Kaabong and Nepak, and consumption of orange fruits and vegetables is higher in Nepak. Consumption of beer residue by children is also somewhat less common in Kotido than in the other districts.

Before presenting the impact estimates, we discuss the empirical model used. We estimate the impact of the food and cash transfers on frequency of consumption of these foods using ordinary least squares (OLS) models with controls for clustering and stratification in the sample design. As a robustness check, we also estimated the models accounting for the fact that these food consumption decisions are interrelated. Some foods are complements in consumption and others are substitutes, so that decisions about what to eat are made jointly. To address this issue, we estimated a system of simulateneous equations using Zellner's Seemingly Unrelated Regressions (SUR) model, which allows for correlation in the error term across equations. However, in the SUR model, we were unable to control for sample design in terms of clustering and stratification of the sample. Without controlling for sample design, the SUR model provided unrealistically optimistic (low) estimates of standard errors. Estimated impacts were similar between the two models. Therefore, we present the more conservative results from the least squares models.

We also acknowledge that estimating this system of food frequency measures using OLS provides reduced form impact estimates. If these food frequency variables were continuous measures of the value of consumption rather than count data limited between 0 and 7, it would be appropriate to estimate a structural model of consumer demand equations as a function of prices of the foods in each group and household income. This would require imposing restrictions, known as the 'integrability conditions,' on the system of equations to make sure that the estimates satisfy the principles of consumer theory concerning budget constraints and the relationship between substitutes and complements in consumption. However, to our knowledge, no equivalent empirical model has been developed for count data. Also, the impact estimates from our SUR model may still be unbiased because the treatment effects operate as intercept shifts in the level of the outcome and so may not be affected by restrictions placed on parameters measuring the effect of prices and income in a structural model.

Table 6.7 presents the impact of the food transfers and the cash transfers on frequency of food consumption for children. Food transfers were estimated to increase the number of days in which children age 1-7 years consumed starches in the past 7 days by 0.163 days, but this effect was not statistically significant. Cash transfers significantly increased the number of days that children age 1-7 consumed starches, by 0.448 days in the past 7 days, compared to the control group. A test of the equality of these impacts on frequency of consumption of staples by children age 1-7 years shows that cash transfers had a significantly larger effect than food transfers. Disaggregating impacts by age groups, neither food nor cash had an impact on frequency of consumption of starches in the past 7 days on children age 1-2 years. However, the positive impact of cash transfers on frequency of consumption of starches is concentrated among children age 3-5 years (0.549 days/week) and those 6-7 years (0.438 days/week). The impact of cash transfers was significantly larger than the impact of food transfers among children in this age group. This shows that the cash transfers provided to households were being used to increase the frequency of consumption of starches for the targeted children, those who were at the recommended age to attend the ECD center (3-5 years). The impacts on children age 6-7 years may derive in part from children who were enrolled in the ECD center at baseline and were targeted by their households for increased food consumption, and then aged into this older category during the study.

The results also show that cash transfers were used to substantially increase the frequency of consumption of meat and eggs for children in all age groups relative to the control group. The impacts for all age groups are equivalent to half of one day increase in frequency of meat and egg consumption in the past 7 days. This is a large effect. Average frequency of meat and egg consumption at baseline was only 0.79 days in the past 7 days, so this represents a 66 percent increase in the frequency of meat and egg consumption among children. Food transfers had no significant impact on frequency of consumption of meat and eggs for children at any age. The impact of cash transfers in this food category was larger than the impact of food transfers across all age categories.

Cash transfers also caused an increase in the frequency of consumption of dairy by children age 1-7 years, by 0.275 days in the past 7 days relative to the control group. This effect was only weakly significantly, but it is substantial, representing a 100 percent increase in the frequency of dairy consumption since the baseline. The effect of cash transfers on frequency of dairy consumption was also weakly significant for children age 3-5 and for children age 6-7, but not for children age 1-2. When compared to the food group, the impact of cash transfers on frequency of dairy consumption was significantly larger for children in all age groupings.

Table 6.7 also shows a weakly significant effect of cash transfers on frequency of consumption of vegetables (other vegetables), by 0.399 days relative to the control group, for children age 1-2 years. The larger impact of cash relative to food transfers on frequency of consumption of vegetables is also weakly significant among children age 3-5.

For most other food groups, including leafy green vegetables, orange fruits and vegetables, other fruit, nuts and seeds, snacks, and beer and beer residues, there is no significant impact of food or cash transfers on the frequency of food consumption among children. It is worth noting that the estimated impact of cash transfers on frequency of consumption of snacks and beer residue is a relatively large reduction in consumption of these food items, although the estimated impacts are not significant. If there is any effect of cash transfers on frequency of consumption of these food items, it is to reduce their consumption.

Table 6.7 Impacts of food and cash transfers on child food frequency, 2012

	Overall,	By Age Group (years)				Overall,	By Age Group (years)		
	Age 1-7	Age 1-2	Age 3-5	Age 6-7		Age 1-7	Age 1-2	Age 3-5	Age 6-7
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
Starches					**Other fruit**				
Food	0.163	-0.021	0.223	0.192		-0.088	-0.124	-0.081	-0.074
	(0.137)	(0.164)	(0.154)	(0.142)		(0.087)	(0.119)	(0.098)	(0.083)
Cash	0.448***	0.203	0.549***	0.438***		0.096	0.095	0.096	0.098
	(0.125)	(0.171)	(0.133)	(0.132)		(0.175)	(0.233)	(0.188)	(0.146)
H_0: Food=Cash	0.010***	0.174	0.006***	0.028**		0.259	0.316	0.289	0.222
N	5420	1027	2704	1685		5414	1025	2702	1683
Leafy green vegetables					**CSB**				
Food	-0.126	-0.174	-0.174	-0.015		0.182	0.111	0.209	0.191
	(0.259)	(0.298)	(0.267)	(0.274)		(0.161)	(0.215)	(0.157)	(0.157)
Cash	0.042	-0.117	0.166	-0.069		-0.000	0.024	-0.016	0.014
	(0.290)	(0.319)	(0.308)	(0.287)		(0.126)	(0.194)	(0.116)	(0.120)
H_0: Food=Cash	0.524	0.843	0.246	0.835		0.228	0.667	0.117	0.258
N	5427	1028	2708	1687		5408	1023	2699	1682
Meat and eggs					**Nuts and seeds**				
Food	0.022	0.032	0.021	0.013		-0.001	-0.023	0.008	-0.004
	(0.099)	(0.110)	(0.113)	(0.095)		(0.021)	(0.032)	(0.026)	(0.023)
Cash	0.522***	0.514***	0.511***	0.545***		0.088	0.105	0.100	0.059
	(0.109)	(0.125)	(0.122)	(0.106)		(0.088)	(0.121)	(0.097)	(0.057)
H_0: Food=Cash	0.000***	0.000***	0.000***	0.000***		0.440	0.445	0.386	0.626
N	5412	1024	2702	1682		5388	1019	2690	1675
Dairy					**Snacks**				
Food	-0.076	-0.113	-0.071	-0.060		0.002	-0.151	-0.003	0.097
	(0.077)	(0.105)	(0.077)	(0.085)		(0.291)	(0.310)	(0.314)	(0.281)
Cash	0.275*	0.252	0.329*	0.204*		-0.212	-0.373	-0.255	-0.043
	(0.147)	(0.163)	(0.173)	(0.122)		(0.285)	(0.288)	(0.307)	(0.303)
H_0: Food=Cash	0.009***	0.007***	0.014**	0.027**		0.310	0.293	0.348	0.270
N	5411	1024	2702	1681		5416	1026	2702	1684
Orange fruit and vegetables					**Beer and beer residue**				
Food	0.034	0.045	0.047	0.004		-0.002	0.111	0.015	-0.119
	(0.065)	(0.058)	(0.071)	(0.071)		(0.176)	(0.227)	(0.184)	(0.182)
Cash	0.021	0.028	0.034	-0.002		-0.234	-0.197	-0.198	-0.309
	(0.050)	(0.045)	(0.055)	(0.062)		(0.183)	(0.211)	(0.198)	(0.189)
H_0: Food=Cash	0.834	0.779	0.842	0.923		0.196	0.161	0.229	0.342
N	5414	1024	2702	1684		5419	1027	2703	1685
Other vegetables									
Food	-0.028	0.246	-0.127	-0.032					
	(0.158)	(0.200)	(0.149)	(0.189)					
Cash	0.286	0.399*	0.212	0.342					
	(0.190)	(0.217)	(0.180)	(0.225)					
H_0: Food=Cash	0.104	0.526	0.052*	0.102					
N	5411	1024	2701	1682					

Notes: Estimated impacts of food and cash are average intent-to-treat effects on the number of days the child consumed that food in the past 7 days, using the sample of children in households participating in an ECD center at baseline. All models control for child age in months (not shown). Standard errors in parentheses. H_0: Food=Cash is an F-test that the impact of food and cash are equal (p-values reported). *** Significant at the 1 percent level, ** significant at the 5percent level, * significant at the 10 percent level.

Lastly, the results show no impact of food or cash transfers on the frequency of consumption of CSB by children in the past 7 days. This is somewhat surprising given that the CSB is the largest component of the food rations. However, the estimated size of the effect of the food transfers is relatively large, at 0.182 days in the past 7 days for children age 1-7 years. This represents a 48 percent increase in frequency of consumption of CSB by children in the food group. In order to test the robustness of these estimates, we also estimated the model including dummy variables for district of residence. This should improve the precision of the estimates. In that model, the impact of food transfers on frequency of consumption of CSB was an increase of 0.198 days in the past 7 days for children age 1-7 years and this effect was weakly significant (p-value 0.076). There was no effect of cash transfers in this model. In addition, the difference in impact of food transfers relative to cash transfers (an increase of 0.216 days per week) on frequency of CSB consumption was statistically significant. This lends support to the conclusion that food transfers increased child consumption of CSB.

These results provide useful information about differences in how cash and food transfers are utilized by the household to improve child food security. The food rations provided included CSB, vegetable oil and sugar in most cases. These rations directly increased the supply of food to the household in only one of the food groups, CSB. The food transfers could have increased consumption of food in other food groups by reducing household expenditure on CSB or close substitutes for CSB (such as starches), so that the savings could be used to purchase other foods. Our results show that this substitution effect of the food transfers was not happening to a measurable extent for any other food category. We have only weak evidence that the food rations increased the frequency of consumption of CSB alone. Cash transfers, on the other hand, were easily used to increase the frequency of consumption of a variety of foods for children, including starches, meat and eggs, and dairy. An important issue that we address later in this report is which effect is better for child food security and nutrition, the increased consumption of CSB from the food transfers or the increased frequency and diversity of the diet from the cash transfers.

6.4 Impacts on Household Food Consumption and Total Household Consumption

It is also possible to learn about the impact of the cash and food transfers on household food availability, household food security and household welfare using aggregate measures of household food consumption and total consumption provided in the food and nonfood consumption and expenditure modules of the evaluation surveys. Cash transfers or food rations may have increased household food consumption on average within the sample, or, in particular, among those households with low food consumption at baseline. The transfers may also have increased household expenditures in other areas, particularly those related to improving the development and health of children in the ECD program. Cash and food transfer modalities may have different effects on aggregate household expenditure or on the composition of expenditure, for several reasons. For example, because the quantity of CSB in the food rations was not *inframarginal* – more was provided than a household would typically consume – the rations are likely to change the composition of household consumption relative to the cash group, particularly because households receiving cash could not readily buy CSB on the market. In addition, if cash is scarce, households receiving cash would have faced lower transaction costs in purchasing goods they sought than food beneficiary households, who would have had to obtain goods in part through barter. In general, anything that contributed to transaction costs – making it difficult or expensive to exchange transfers from one modality to the other – would contribute to modality-specific differences in the impact of the transfers on consumption and expenditure patterns. Here, we present evidence on the impact of the cash and food transfer programs on aggregate measures of household food and nonfood consumption as well as on the composition of household consumption.

Using data from the food and nonfood consumption and expenditure modules, we constructed several measures of consumption. In the food consumption module, respondents were asked to indicate all foods that the household purchased or consumed from its own stocks or other sources (such as gifts) over the last 7 days. From purchases, the quantity consumed over this period was requested. Food consumed by household members from any source were converted into values and aggregated into a measure of the value of food consumption, which was then converted into a monthly equivalent from the 7 day recall. In addition, the quantity consumed in each food group was converted into calories (kcals) and aggregated into a measure of household daily calorie consumption per capita. Similarly, the module on nonfood consumption and expenditure over the last 30 days covered 15 items in broad categories such as housing, fuel, clothing for women and clothing for children (including examples). A measure of the value of monthly nonfood expenditure was created from these data. Finally, the variables on the value of food and nonfood consumption were added to create a single measure of the value of household consumption. This is a measure of household welfare commonly used in poverty analysis.

At baseline, average calorie consumption per capita was 2,066 kcals/day, as shown in Table 6.8. This estimate of average consumption, which is roughly at the recommended level of calorie intake for an adult, masks considerable variability in the consumption recall data. Median calorie consumption per capita at baseline was only 1,510 kcals/day, indicating that a large share of the sample had average calorie consumption at baseline that was well below requirements. Also, calorie intakes varied by district in the sample, with the average being much higher in Kaabong district at baseline than in Kotido or Napak. These figures may be low, in part, because households in the sample have many children (average household size at baseline is 6.3 members), whose caloric needs are lower than adults. Average calorie intake per adult equivalent at baseline is 2,978 kcals/day and median intakes is 2,179 kcals/day, when children age 14 and under are weighted as half of an adult's intakes.

The average monthly value of food consumption per capita at baseline was 28,200 Ugandan shillings (UGX), or USD 12.79, as shown in Table 6.8.[7] The value of food consumption was lowest in Napak district (UGX 15,300/month) and much higher in Kotido district (UGX 60,900/month). The average monthly value of nonfood consumption reported in the baseline

[7] We use an exchange rate in October 2010 of 2,204 UGX/USD.

survey was very low, at only UGX 3,100 per capita (USD 1.41/month). Although expenditure of nonfood items may indeed be very low in this setting, this may be an underestimate because the questionnaire focused on consumption and expenditure in 15 relatively aggregated categories of nonfood items. The value of monthly total household expenditure per capita was UGX 31,400, or USD 14.23. This is equivalent to a value of consumption of 47 US cents per capita per day. The Karamoja region is indeed a very poor.[8] This implies that each transfer of UGX 25,000 received from the cash or (equivalent) food program was equal to approximately 80 percent of per capita monthly household expenditure, or 13 percent of total monthly household expenditure. These transfers represent substantial resources to the households.

Table 6.8 Baseline average household consumption, by district

	Overall (1)	**Kotido (2)**	**Kaabong (3)**	**Napak (4)**
Calorie intake per capita (daily)	2,066	1,511	2,243	1,629
	(2,498)	(1,487)	(2,585)	(2,452)
Value of food consumption per capita	28.2	60.9	27.4	15.3
('000 UGX/month)	(120.2)	(387.7)	(29.8)	(35.6)
Value of nonfood consumption per capita	3.1	2.0	3.5	2.3
('000 UGX/month)	(6.9)	(2.5)	(7.9)	(2.9)
Value of total household consumption	31.4	62.9	30.9	17.6
('000 UGX/month)	(120.7)	(387.9)	(31.8)	(36.3)

Notes: Estimates are baseline means with standard deviations in parentheses. UGX = Ugandan shillings.

We also compared average calorie intake and the value of household consumption across treatment groups in the data and tested for differences in baseline means, as shown in Table 6.9. These consumption measures were well balanced across treatment arms in the baseline survey. There are no significant differences in mean values of any of these measures across treatment groups at baseline.

For the analysis of the impact of the cash and food transfers, we use the natural logarithm (hereafter, the "log" or "ln") of these consumption measures. This has the advantage of reducing the influence of very large values, which are outliers that can distort the comparison of means. We also tested for differences in mean of the log consumption measures across treatment arms at baseline and did not find any significant differences in these measures.

[8] The average value of household consumption per adult equivalent at baseline is equal to US 67 cents per day.

Table 6.9 Baseline average household consumption, by treatment status

	Baseline Means			Difference in Baseline Means		
	Food	Cash	Control	Food - Control	Cash - Control	Food - Cash
	(1)	(2)	(3)	(4)	(5)	(6)
Calorie intake per capita (daily)	1,953	2,061	2,201	-248	-140	-108
	(1,999)	(2,561)	(2,910)	(0,160)	(0,210)	(0,168)
Value of food consumption per capita	33.4	24.0	26.7	6.7	-2.7	9.4
('000 UGX/month)	(195.0)	(27.3)	(37.4)	(10.5)	(2.7)	(10.5)
Value of nonfood consumption per capita	3.2	3.0	3.2	0.0	-0.2	0.2
('000 UGX/month)	(9.0)	(5.8)	(5.0)	(0.6)	(0.6)	(0.7)
Value of total household consumption	36.5	27.0	29.9	6.7	-2.9	9.5
('000 UGX/month)	(195.3)	(29.1)	(38.7)	(10.6)	(3.0)	(10.6)

Notes: Estimates in columns (1)-(3) are baseline means with standard deviations in parentheses. Columns (4)-(6) report estimates of differences in baseline means with robust standard errors in parentheses. T-tests of differences in baseline means by treatment status were not significant, as reported here for differences in levels. Tests conducted on differences in means of the natural logarithm of these outcomes were also not significant. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Before turning to the impact estimates, we examine changes in the distribution of the consumption measures over time, by treatment status. Figure 6.4 shows the distribution of log daily calorie consumption per capita by survey round for each treatment group. The figure for the control group (the right-hand-side panel of Figure 6.4) shows that calorie consumption fell between baseline and endline across the entire distribution. This shift in the distribution to the left reflects seasonality in the data: the baseline survey was collected during a harvest period, but the endline survey was collected during the lean season. This seasonal trend captured in the control group data is important to keep in mind as we interpret the impacts of the cash and food transfers. Because the randomized allocation of treatment arms was stratified by location (district or subcounty) the distribution of these seasonal effects should be comparable across treatment arms. In communities receiving food transfers (the left-hand-side panel of Figure 6.4) the distribution of the daily calorie intake also shifts to the left, though this change is somewhat less pronounced than in the Control group. In the Cash group, the distribution of calorie intakes becomes more condensed between the baseline and endline. The upper tail of the distribution shifts to the left, but the lower tail of the distribution, where households have the lowest calorie intakes, shows small gains in calorie intakes. These patterns foreshadow the effects presented in the impact estimates below.

Next, we examine changes in the distribution of the value of monthly food consumption per capita, in Figure 6.5. The Control group shows only modest changes in the distribution of food consumption, with a somewhat higher frequency of households in the middle of the distribution. In the Food group, the left tail of the distribution shifts to the right, reflecting some gains in the value of food consumption among those with lowest consumption at baseline. In the Cash group, there is a pronounced shift of the distribution of consumption to the right, with most of the gains occurring in the lower tail and middle of the distribution. This indicates that there were large gains in the value of food consumed by households in the Cash group, and confirms that they were using the cash transfers to increase food consumption.

The value of total monthly household consumption per capita (food and nonfood) is an informative summary measure of the wellbeing of households in the sample. Figure 6.6 shows the change in the distribution of household consumption per capita across the three treatment arms. The value of consumption shifts to the right for all three groups: Food, Cash, and Control. However, the shift in the distribution is more pronounced in the Cash group than in the other two.

Figure 6.4 Density graphs of log daily calorie intake per capita, by treatment group at baseline and endline

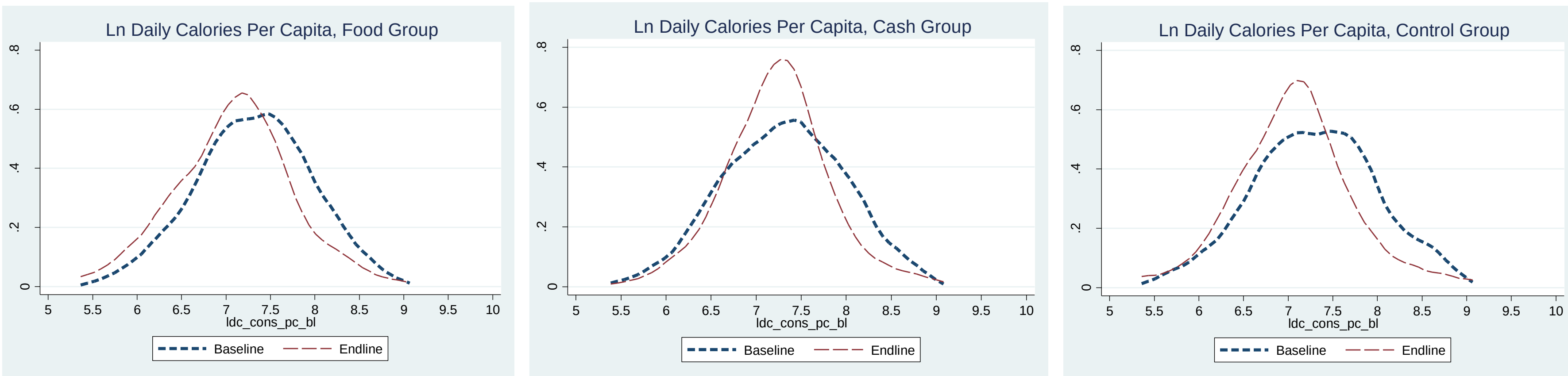


Figure 6.5 Density graphs of log value of monthly food consumption per capita, by treatment group at baseline and endline

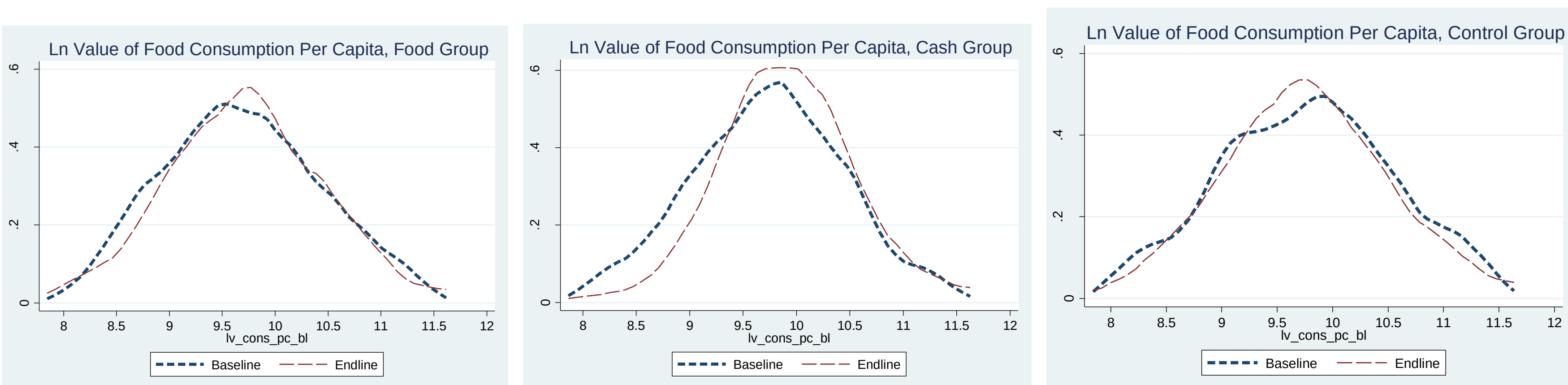
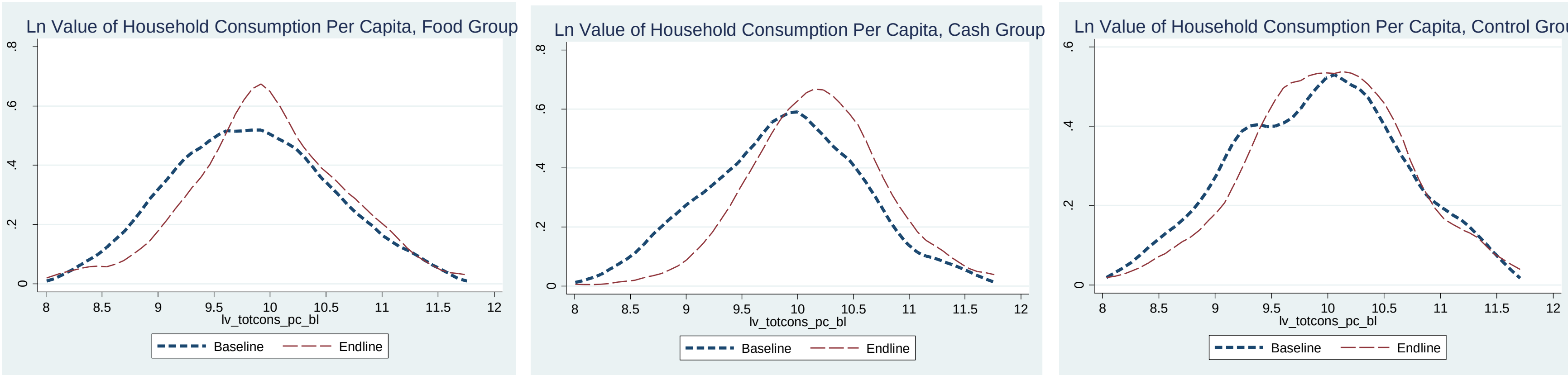


Figure 6.6 Density graphs of log value of monthly total household consumption per capita, by treatment group at baseline and endline



The impact estimates of the cash and food transfers on these measures of household consumption are presented in Table 6.10. For each outcome, the first column shows the estimated impact of the pooled treatment (the impact of receiving either cash or food transfers) on consumption relative to the control group.[9] For calorie intake per capita, having access to either cash or food transfers resulted in roughly a 10.2 percentage point increase in the daily calorie intake per capita (column 1) and this effect is statistically significant. Disaggregated these impacts, we see that this effect is being driven by receipts of cash transfers, which led to a significant increase in daily caloric intake per capita of nearly 20 percent. The estimated impact of food transfers, on the other hand, is small, at only 1.7 percent and this impact is not significant. This pattern of impacts is similar for the measures of the value of food, nonfood and total consumption. The pooled treatment does not have a significant impact on food consumption or total consumption, but has a weakly significant impact on nonfood consumption of 16 percent. When disaggregated, cash transfers have a large and significant impact on the value of consumption in all three categories, approximately by 18.7 percent for food, 31.3 percent for nonfood and 18.7 percent for total consumption. These results show that, although households used cash transfers to increase consumption of nonfood items, the bulk of the transfers was used to increase household food consumption, which represented roughly 90 percent of household consumption at baseline. The cash transfers clearly made a meaningful contribution to household food security and household welfare, while the impacts of food transfers were disappointing.

We are also interested to examine how the food and cash transfers affected household food consumption of major food groups. Table 6.11 presents the estimated impacts of the transfers on the log value of household food consumption per capita of 13 food groups: cereals; roots and tubers; fruit; vegetables; meat and poultry; eggs; fish and seafood; pulses, legumes and nuts; milk and dairy; fats and oils; sugar and honey; CSB; and other. The first row shows the impact of the pooled treatment, receiving either food or cash. Access to either transfer caused a significant increase in the value of per capita cereals consumption by roughly 17 percent. Receiving either transfer also caused the value of meat and poultry consumed to more than double, and this effect is significant.

[9] Because the outcomes are presented in logs, the interpretation of the coefficient for the indicator variables for treated, food or cash is approximately the percentage change in the log outcome as a result of receiving that treatment.

Table 6.10 Impacts of food and cash transfers on household consumption, 2012

	Ln daily calorie intake per capita		Ln value of monthly food consumption per capita		Ln value of monthly nonfood consumption per capita		Ln value of monthly total consumption per capita	
	Pooled	**Food or cash**	**Pooled**	**Food or cash**	**Pooled**	**Food or cash**	**Pooled**	**Food or cash**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Treated	0.102**		0.078		0.160*		0.081	
	(0.041)		(0.058)		(0.088)		(0.050)	
Food		0.017		-0.021		0.021		-0.013
		(0.049)		(0.067)		(0.095)		(0.057)
Cash		0.196***		0.187***		0.313***		0.187***
		(0.043)		(0.062)		(0.098)		(0.053)
Baseline outcome	0.079***	0.077***	0.125***	0.122***	0.076***	0.080***	0.135***	0.133***
	(0.019)	(0.020)	(0.024)	(0.023)	(0.017)	(0.017)	(0.021)	(0.021)
Observations	2,356	2,356	2,357	2,357	2,238	2,238	2,363	2,363
R-squared	0.020	0.029	0.052	0.062	0.084	0.099	0.060	0.072
Test H_0: Food-Cash=0:		-0.180***		-0.208***		-0.292***		-0.171***
F test		(0.046)		(0.064)		(0.089)		(0.078)

Notes: Parameter estimates for Treated, Food, and Cash are average intent-to-treat effects on households with children enrolled in an ECD center at baseline in an ANCOVA model controlling for the level of the baseline outcome and indicator variables for the district or subcounty stratum. The coefficient on the baseline outcome represents the change in the endline outcome for a one unit change in the baseline outcome. Standard errors are stratified by district or subcounty and clustered at the village level (in parentheses). *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

When we compare estimates of the impact of food and cash transfers, it is clear that the significant impacts of the pooled transfers are driven by the impact of the Cash program. Indeed, cash transfers had broad positive effects on household food consumption, increasing both the quantity and diversity of food consumed. Cash transfers caused a significant increase in per capita consumption of six out of the 13 food groups, including cereals, meat and poultry, fish and seafood, milk and dairy, fats and oils, and other. The impact on meat and poultry is particularly large. For logged outcomes, parameters this large (2.77) no longer approximate the percentage change, and the parameter must be transformed to obtain the true estimate.[10] In this case, the cash transfers caused the value of meat and poultry consumption per capita to increase 15 times (1,500 percent). The size of this effect is due, in part, to the very low levels of meat and poultry consumption at baseline. However, this represents a massive improvement in access to nutritious animal source foods in the diet. Cash transfers also caused consumption of fish and seafood, milk and dairy, and fats and oils to more than double. Food transfers, on the other hand, caused no improvement in the value of per capita food consumption in any of these food groups. The estimated size of the impact of food transfers on consumption of CSB is fairly large (roughly 26.8 percent), but this effect is not statistically significant. Also, the relative impact of cash transfers to food transfers is significantly larger for cash than food for seven out of the 13 food groups. Although the impact of cash relative to the control group on consumption of pulses, legumes and nuts is not significant, cash transfers led to significantly higher consumption of these foods than the food transfers did.

6.5 Explaining the Impacts of Food and Cash Transfers on Food Security and Food Consumption

Another possible explanation for the negative impacts of food transfers relative to cash transfers on food security indicators and the lack of impact of food transfers on food consumption may be differences in implementation between the two program modalities, in particular, concerning the size and timing of transfers. Although the food and cash transfers were intended to be the same in number, should have had comparable value and should have occurred at around the same time, in practice there were problems in implementation related to identifying children eligible for food transfers. At the beginning of 2011, after the baseline survey, WFP and its implementing partners conducted a verification of children on the beneficiary list for the food transfers and failed to find a large number of children who had previously been identified as participating in the ECD center. These problems in targeting meant that more than half of children enrolled in ECD centers in the food group in the sample did not receive the first three transfers and only began receiving transfers in September 2011, eight months after the program started. Results presented in Chapter 5, show that there is no significant difference in the average number of transfers that households in the Food and Cash groups reported receiving, but the average number of days since the last transfer is significantly higher for Food beneficiaries (57 days) than Cash beneficiaries (40 days). This long lag (almost 2 months) since the last food transfer could help explain why the food transfers have no impact on food security and food consumption in the last 7 days. However, this cannot explain the entire difference in

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[10] For outcomes expressed in natural logarithms, a parameter β represents a percentage change of e^{β}-1.

the pattern of results because cash transfers had also not been received for more than one month, on average, but the cash transfers had much larger effects on food consumption and food security. It appears that households receiving cash transfers were more easily able to access a diverse diet and may have saved some of the transfers to improve food security and consumption in months after the transfers were received.

Table 6.11 Impacts of food and cash transfers on log value of household food consumption, by food group, 2012

	Outcome variable: Log value of monthly household food consumption of [Food Group]…												
Food group	**Cereals**	**Roots & Tubers**	**Vegetables**	**Fruits**	**Meat & poultry**	**Eggs**	**Fish & seafood**	**Pulses legumes & nuts**	**Milk & dairy**	**Fats & oils**	**Sugar & honey**	**CSB**	**Other**
Treated	0.170**	-0.393	0.166	-0.159	1.227**	0.187	0.372	-0.173	0.465*	0.358	0.287	0.134	0.313
(pooled)	(0.084)	(0.297)	(0.238)	(0.197)	(0.474)	(0.120)	(0.258)	(0.313)	(0.245)	(0.353)	(0.198)	(0.222)	(0.304)
R-squared	0.012	0.132	0.021	0.009	0.044	0.020	0.139	0.013	0.089	0.087	0.071	0.119	0.026
Food	0.122	-0.656*	-0.134	-0.321	-0.159	0.120	-0.033	-0.567	0.057	-0.037	0.268	0.268	-0.077
	(0.098)	(0.357)	(0.253)	(0.214)	(0.525)	(0.123)	(0.269)	(0.365)	(0.228)	(0.392)	(0.220)	(0.259)	(0.361)
Cash	0.225**	-0.099	0.504*	0.022	2.770***	0.262	0.823***	0.265	0.919***	0.797**	0.307	-0.016	0.743**
	(0.089)	(0.298)	(0.297)	(0.223)	(0.430)	(0.160)	(0.297)	(0.345)	(0.306)	(0.400)	(0.229)	(0.246)	(0.334)
R-squared	0.013	0.136	0.026	0.011	0.079	0.020	0.146	0.018	0.101	0.091	0.071	0.120	0.032
Test H_0: Food-Cash=0:													
F test (p-value)	0.209	0.062*	0.029**	0.083*	0.000***	0.354	0.001***	0.019**	0.002***	0.031**	0.857	0.249	0.022**
Observations	2,364	2,364	2,364	2,364	2,364	2,364	2,364	2,364	2,364	2,364	2,364	2,364	2,364

Notes: Parameter estimates for Treated, Food and Cash are average intent-to-treat effects on households with children enrolled in an ECD center at baseline in an ANCOVA model controlling for the level of the baseline outcome and indicator variables for the district or subcounty stratum. Standard errors are stratified by district or subcounty and clustered at the village level (in parentheses). *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

6.6 Summary

- Impact on household food security measures: We estimated the impact of food and cash transfers and their combined impact on three measures of food security: the Dietary Diversity Index (DDI), the Household Dietary Diversity Score (HDDS), and the Food Consumption Score (FCS). When the two program modalities are pooled, there is no impact of the combined program on any of these measures of food security. Disaggregating impacts by transfer modality, food transfers had no effect on food security measured by the DDI, and the estimated effect was negative. Cash transfers led to a large and significant increase in the DDI of 0.925 points. The impact of cash transfers was significantly larger than that of food transfers, with a difference in impacts on the DDI of 1.13 points. For the HDDS, food transfers had no impact on average relative to the control group. Cash transfers improved the HDDS relative to the control group by 0.552 points. The impact of cash transfers on the HDDS was significantly larger than that of food transfers, by 0.698 points. For the FCS, food transfers have a negative impact estimate, but it is not significant. The impact of cash transfers is estimated at 2.99 points in the FCS, and this estimate is significant.

- Impact on frequency of food consumption by children**:** Frequency of food consumption over the past 7 days was assessed for children age 1-7 years across 11 food groups: staples, leafy green vegetables, meat and eggs, dairy, orange fruits and vegetables, other vegetables, other fruit, corn soya blend (CSB), nuts and seeds, snacks, and beer or beer residue. Food transfers had no impact on frequency of consumption for children across any of the food groups, and in any range of child ages. The only exception is that, in a model controlling for district of residence, food transfers increased the frequency of consumption of CSB relative to the control group by 0.198 days in the past 7 days, and this effect was weakly significant. The impact of food transfers on CSB in this model was significantly larger than that of cash transfers. Cash transfers caused significant increases in the frequency of consumption of starches, meat and eggs and dairy, though impacts were only weakly significant for dairy. The size of these effects was large, representing a 66 percent increase in the frequency of meat and egg consumption and a 100 percent increase in the frequency of dairy consumption. Cash transfers also had significantly larger impacts than food transfers for each of these food groups.

- Impact on household food consumption and total household consumption**:** The surveys measured the impact of food and cash transfers on household daily calorie intake per capita, the value of household food consumption per capita, the value of household nonfood consumption per capita, and the value of total household consumption per capita. Average calorie intake per capita at baseline was 2,066 kcal/day. Results show that having access to either cash or food transfers resulted in a significant 10.2 percentage point increase in daily calorie intake per capita. Disaggregated these impacts, we see that this effect is driven by receipts of cash transfers, which led to a significant increase in daily caloric intake per capita of nearly 20 percent. The estimated impact of food transfers, on the other hand, is small and not significant. This pattern of impacts is similar for the measures of the value of food, nonfood and total consumption. Cash transfers have a large and significant impact on the value of per capita consumption in all three categories, approximately by 18.7 percent for food, 31.3 percent for nonfood and 18.7 percent for total consumption. Food transfers had no significant impact on any of these consumption measures.

- Impact on household food consumption across food groups**:** We estimated impacts of the transfers on the log value of household food consumption per capita of 13 food groups: cereals; roots and tubers; fruit; vegetables; meat and poultry; eggs; fish and seafood; pulses, legumes and nuts; milk and dairy; fats and oils; sugar and honey; CSB; and other. Cash transfers caused significant increases in the value of per capita consumption of six out of the 13 food groups, including cereals, meat and poultry, fish and seafood, milk and dairy, fats and oils, and other. These impacts were also large. The value of consumption per capita more than doubled for consumption of meat and poultry, fish and seafood, milk and dairy, and fats and oils, as a result of the cash transfers. Food transfers had no significant impact on consumption in any of the 13 food groups. The impact of cash transfers was also significantly larger than the impact of food transfers in all six of the food groups mentioned above, as well as pulses, legumes and nuts.

7. Impact on Child Anthropometry

7.1 Indicators and Descriptive Statistics

Using data collected in the baseline survey on the height and weight of the Baseline Index Child (BIC) in each sample household, we constructed anthropometry indicators for height-for-age Z-scores (HAZ), weight-for-age Z-scores (WAZ), and weight-for-height Z-scores (WHZ) using the 2006 growth reference standards from the WHO.[11] These variables were used to construct individual indicators for stunting (HAZ<-2), underweight (WAZ<-2), and wasting (WHZ<-2), as well as severe stunting (HAZ<-3), severe underweight (WAZ<-3), and severe wasting (WHZ<-3). Although the BICs range in age from 36-71 months, the 2006 reference population from WHO only includes children from age 6-60 months. For children older than 5 years, WHO developed an alternative database in 2007 to construct anthropometry measures using the older growth reference standards from the National Center for Health Statistics (NCHS). However, given the differences in the two reference populations, it is not appropriate to conduct analysis on samples with children less-than-or-equal-to 60 months of age and children older than 60 months. Therefore, in summarizing the baseline anthropometry of the BICs, we focus on children age 36-60 months of age. Table 7.1 presents summary statistics of average prevalence of malnutrition for BICs for these indicators overall and by district.

Table 7.1 Baseline prevalence of malnutrition for children age 36-60 months (BIC), by district

	Overall (1)	Kotido (2)	Kaabong (3)	Napak (4)
Malnutrition				
Stunted	0.165	0.148	0.165	0.173
	(0.371)	(0.356)	(0.371)	(0.379)
Underweight	0.120	0.066	0.137	0.077
	(0.325)	(0.249)	(0.344)	(0.268)
Wasted	0.114	0.061	0.130	0.080
	(0.318)	(0.241)	(0.337)	(0.272)
Severe malnutrition				
Severely stunted	0.061	0.041	0.066	0.049
	(0.239)	(0.200)	(0.249)	(0.217)
Severely underweight	0.024	0.006	0.029	0.014
	(0.153)	(0.077)	(0.167)	(0.118)
Severely wasted	0.019	0.018	0.021	0.007
	(0.135)	(0.135)	(0.145)	(0.085)

Notes: Estimates are baseline means with standard deviations in parentheses.

Prevalence of stunting at baseline was 16.5 percent among children age 36-60 months. Stunting was slightly higher in Kaabong and Napak districts than in Kotido. Underweight prevalence

[11] WHO updated the growth reference standards in 2006 to use a new sample of breastfed reference children from many countries, as described in the WHO Multicentre Growth Reference Study (http://www.who.int/childgrowth/en/).

was 12 percent overall, but was much higher in Kaabong (13.7 percent) than in Kotido and Napak (6.6 percent and 7.7 percent, respectively). This pattern in underweight prevalence is consistent with the pattern of wasting. Prevalence of wasting was 11.4 percent overall at baseline, but was 13.0 percent in Kaabong, while only 6.1 percent and 8.0 percent in Kotido and Napak, respectively. The prevalence of severe malnutrition in children age 36-60 months at baseline was relatively low. Overall, prevalence of severe stunting was 6.1 percent, prevalence of severe underweight was 2.4 percent and prevalence of severe wasting was 1.9 percent. Severe malnutrition was somewhat worse for all three of these measures in Kaabong district than in Kotido or Napak.

Differences in mean prevalence of malnutrition at baseline between intervention arms were estimated in order to test the balancing properties of the sample with regard to these outcomes, as shown in Table 7.2. These estimates show that the random assignment of communities with ECD centers into the three intervention arms lead to relatively balanced samples with very low sampling bias. There were no significant differences across treatment arms in any of these measures of nutritional status in the baseline sample.

Table 7.2 Baseline prevalence of malnutrition for children age 36-60 months (BIC), by treatment status

	Baseline means			Difference in baseline means		
	Food	Cash	Control	Food - control	Cash - control	Food - cash
	(1)	(2)	(3)	(4)	(5)	(6)
Malnutrition						
Stunted	0.158	0.150	0.187	-0.029	-0.037	0.008
	(0.365)	(0.358)	(0.390)	(0.029)	(0.028)	(0.025)
Underweight	0.121	0.099	0.139	-0.018	-0.040	0.023
	(0.327)	(0.298)	(0.346)	(0.027)	(0.027)	(0.027)
Wasted	0.127	0.106	0.106	0.021	0.000	0.021
	(0.334)	(0.308)	(0.308)	(0.023)	(0.020)	(0.024)
Severe malnutrition						
Severely stunted	0.053	0.061	0.070	-0.017	-0.009	-0.008
	(0.225)	(0.239)	(0.256)	(0.018)	(0.018)	(0.015)
Severely underweight	0.020	0.021	0.032	-0.012	-0.010	-0.002
	(0.139)	(0.144)	(0.175)	(0.009)	(0.010)	(0.010)
Severely wasted	0.024	0.016	0.015	0.009	0.001	0.008
	(0.152)	(0.126)	(0.121)	(0.009)	(0.007)	(0.010)

Notes: Estimates in columns (1)-(3) are baseline means with standard deviations in parentheses. Columns (4)-(6) report estimates of differences in baseline means with robust standard errors in parentheses. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Anthropometry data were collected at endline in 2012 for children in all three age cohorts: BICs (age 54-83 months), RC1s (age 36-53 months), and RC2s (age 6-35 months). Anthropometry measures constructed include prevalence of stunting, underweight and wasting. For BICs in the endline, prevalence of low BMI based on BMI-for-age Z-scores is reported rather than prevalence of wasting. Also, because of the change in growth reference group at age 60 months, estimates of anthropometry at endline are reported for children age 61-83 months; children age 54-60 months are excluded from the endline analysis.

Table 7.3 presents endline mean prevalence of malnutrition in the control group for these three age cohorts in order to show the trend in malnutrition in the area between the baseline survey in September-November 2010 and the endline survey in March-May 2012. Stunting prevalence among BICs is similar at endline (15.1 percent) to the baseline (18.7 percent in the control group). This is as expected because the effects of malnutrition on linear growth are concentrated in the first three years of life. However, the BICs experience a sharp increase in prevalence of underweight and wasting over this period. Prevalence of underweight among the BICs jumped from 13.9 percent at baseline to 26.2 percent at endline. Prevalence of wasting increased from 10.6 percent to 22.8 percent over this period. Prevalence of severe underweight also increased, from 3.2 to 9.4 percent. Although the measures changed, prevalence acute malnutrition jumped from 1.5 percent prevalence of wasting for the BICs to 11.2 percent with severely low BMI by endline.

Table 7.3 Endline prevalence of malnutrition in the control group, BICs, RC1s, and RC2s

	Stunted	Under-weight	Low BMI or wasted	Severely stunted	Severely underweight	Severely low BMI or wasted
	(1)	(2)	(3)	(4)	(5)	(6)
BICs, 61-83 months	0.151	0.262	0.228	0.052	0.094	0.112
	(0.359)	(0.441)	(0.421)	(0.222)	(0.293)	(0.316)
RC1s, 36-53 months	0.300	0.333	0.243	0.153	0.101	0.119
	(0.459)	(0.473)	(0.430)	(0.361)	(0.302)	(0.325)
RC2s, 6-35 months	0.426	0.350	0.219	0.215	0.124	0.083
	(0.495)	(0.478)	(0.415)	(0.411)	(0.330)	(0.276)

Notes: Estimates are baseline means with standard deviations in parentheses. For BICs, estimates are prevalence of low BMI (column 3) and prevalence of severely low BMI (column 6). For RC1s and RC2s, estimates are prevalence of wasting (column 3) and prevalence of severe wasting (column 6).

This worsening of malnutrition is also reflected in the average malnutrition among RC1s at endline. Comparisons of baseline BICs to endline RC1s constitute a repeated cross section on the same approximate age group, from 36-60 months at baseline and 36-53 months at endline. Table 7.3 shows that all measures of malnutrition are much worse at endline than they had been at baseline for children in this age range. Stunting affected 30 percent of the RC1s at endline. Prevalence of underweight is 33.3 percent and prevalence of wasting reached 24.3 percent for RC1s at endline. The situation is somewhat worse for the youngest children in the endline sample, the RC2s, age 6-35 months. For RC2s, stunting prevalence at endline is 42.6 percent, underweight prevalence is 35.0 percent and wasting prevalence is 21.9 percent.

7.2 *Impact on Child Anthropometry*

The food and cash transfer programs showed relatively weak impacts on anthropometry of BICs. In Table 7.4, single difference estimates for BICs age 61-83 months (5-6 years) at endline (differences in endline means between intervention arms) show no impacts of food or cash transfers compared to the control group on prevalence of stunting, underweight, or low BMI, or on prevalence of severe levels of these indicators. However, severe underweight prevalence is 3.8 percent lower in the cash group than in the food group and this estimate is weakly significant.

Table 7.4 Impacts of food or cash transfers on anthropometry, single-difference, BICs, age 61-83 months

	Stunted	Underweight	Low BMI	Severely stunted	Severely underweight	Severely low BMI
Food	-0.016	-0.018	0.005	0.002	-0.001	-0.002
	(0.032)	(0.049)	(0.044)	(0.018)	(0.033)	(0.033)
Cash	0.013	-0.034	-0.006	-0.014	-0.039	-0.021
	(0.034)	(0.048)	(0.043)	(0.018)	(0.032)	(0.033)
Age (mos)	0.002	0.005*	0.000	0.002	0.001	-0.001
	(0.002)	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)
Female	-0.011	-0.025	-0.015	0.017	0.016	-0.015
	(0.022)	(0.027)	(0.027)	(0.016)	(0.017)	(0.020)
Observations	839	841	837	839	841	837
T-test of H_0: Food=Cash (p-value)						
	0.264	0.680	0.734	0.262	0.093*	0.411

Notes: All models include stratum dummy variables. Standard errors, in parentheses, are stratified at the district or subcounty level and clustered at the ECD center level. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 7.5 presents similar estimates of the impact of the programs on anthropometry of BICs age 61-83 months, using an ANCOVA model. The ANCOVA model controls for baseline prevalence of the same indicator of malnutrition for each child. Impacts on low BMI are not reported in this table because acute malnutrition at baseline (when these children were under age 5 years) was measured using wasting rather than low BMI. Results show similar effects, with no impact of the food or cash transfer programs relative to the control group for prevalence of stunting, underweight, severe stunting, or severe underweight. As in the single difference model, in the ANCOVA model there is a weakly significant difference in impact of cash transfers compared to food transfers, with prevalence of severe underweight 3.0 percentage points lower in the cash group than the food group. These weak effects may be due, in part, to the fact that the older children in this age range, who were 6 years old, are likely no longer be enrolled in the ECD center and so may not be receiving food or cash transfers.

Table 7.5 Impacts of food or cash transfers on anthropometry, ANCOVA model, BICs, age 61-83 months

	Stunted	Underweight	Severely stunted	Severely underweight
Food	-0.017	0.001	-0.007	-0.019
	(0.033)	(0.050)	(0.021)	(0.037)
Cash	-0.018	-0.033	-0.007	-0.049
	(0.038)	(0.050)	(0.022)	(0.035)
Stunted at baseline	0.317***			
	(0.062)			
Underweight at baseline		0.345***		
		(0.066)		
Severely stunted at baseline			0.245***	
			(0.089)	
Severely underweight at baseline				0.172
				(0.121)
Age (months)	0.005**	0.009***	0.002	0.001
	(0.003)	(0.003)	(0.001)	(0.002)
Female	0.014	-0.009	0.030*	0.033*
	(0.026)	(0.033)	(0.017)	(0.018)
Observations	649	643	649	643
T-test of H_0: Food=Cash (p-value)	0.264	0.680	0.262	0.093*

Notes: All models include stratum dummy variables. Standard errors, in parentheses, are stratified at the district or subcounty level and clustered at the ECD center level. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 7.6 presents the impacts of the food and cash transfer programs on anthropometry for RC1s, who were age 36-53 months (3-4.5 years) at endline. Despite the deteriorating nutrition situation in Karamoja at this time, food and cash transfers did not reduce the prevalence of stunting, underweight or wasting in this age group compared to the control group. However, cash transfers led to a significant 8.0 percentage point reduction in the prevalence of severe wasting compared to the control group. Also, cash transfers led to a significant 5.2 percentage point reduction in the prevalence of severe wasting among RC1s compared to the food group. These are relatively large effects and suggest that cash was playing an important role in protecting the nutritional status of children at the age to receive ECD transfers by endline.

Next, we investigate the potential for spillover effects of the food and cash transfer on younger siblings of children enrolled in the ECD centers. Table 7.7 presents the impacts of the food and cash transfer programs on anthropometry for RC2s, who were age 6-35 months (0.5-2 years) at endline. Food and cash transfers did not reduce the prevalence of stunting, underweight or wasting in this age group compared to the control group. In fact, the estimated impacts of cash transfers compared to the control group are positive. For severe underweight prevalence, cash transfers led to a weakly significant *increase* in malnutrition of 5.2 percentage points compared to the control group. However, Table 7.7 also shows that food transfers had broad impacts on malnutrition compared to the cash transfers. For all six indicators, the impact of food transfers relative to cash is significant or weakly significant. These impacts include a 9.5 percentage point reduction in prevalence of stunting as a result of spillover effects on children under three when the household is receiving food transfers rather than cash. There is also a weakly significant 6.4 percentage point reduction in prevalence of wasting as a result of receiving food transfers rather than cash. These results suggest that some of the nutrition food rations given to households for their children attending ECD centers were also being provided to younger children in the household.

Table 7.6 Impacts of food or cash transfers on anthropometry, single-difference, RC1s, age 36-53 months

	Stunted	Underweight	Wasted	Severely stunted	Severely underweight	Severely wasted
Food	0.011	-0.027	-0.043	-0.019	-0.001	-0.028
	(0.048)	(0.046)	(0.040)	(0.035)	(0.030)	(0.030)
Cash	0.054	-0.017	-0.058	0.014	0.005	-0.080**
	(0.051)	(0.046)	(0.036)	(0.036)	(0.030)	(0.033)
Age (mos)	-0.001	0.002	-0.002	0.001	0.002	-0.003*
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)
Female	-0.036	-0.059	-0.039	-0.011	-0.024	-0.027
	(0.041)	(0.040)	(0.036)	(0.031)	(0.030)	(0.023)
Observations	620	611	598	620	611	598
T-test of H_0: Food=Cash (p-value)						
	0.359	0.823	0.690	0.344	0.834	0.034**

Notes: All models include stratum dummy variables. Standard errors, in parentheses, are stratified at the district or subcounty level and clustered at the ECD center level. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 7.7 Impacts of food or cash transfers on anthropometry, single-difference, RC2s, age 6-35 months

	Stunted	Underweight	Wasted	Severely stunted	Severely underweight	Severely wasted
Food	-0.056	-0.056	-0.037	-0.023	0.004	-0.004
	(0.035)	(0.038)	(0.036)	(0.027)	(0.030)	(0.023)
Cash	0.039	0.042	0.027	0.042	0.052*	0.038
	(0.037)	(0.040)	(0.037)	(0.033)	(0.031)	(0.023)
Age (mos)	0.011***	0.006***	-0.003*	0.007***	0.004**	-0.001
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
Female	-0.097***	-0.056*	-0.034	-0.058**	-0.011	-0.033*
	(0.027)	(0.031)	(0.026)	(0.028)	(0.023)	(0.018)
Observations	910	894	880	910	894	880
T-test of H_0: Food=Cash (p-value)						
	0.015**	0.012**	0.060*	0.050**	0.097*	0.096*

Notes: All models include stratum dummy variables. Standard errors, in parentheses, are stratified at the district or subcounty level and clustered at the ECD center level. *** Significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

7.3 Summary

In summary, we find the following impacts of food and cash transfers on prevalence of malnutrition among children in the sample:

- Impact of food and cash transfers on prevalence of malnutrition for children age 61-83 months (BICs): The food and cash transfer programs showed weak impacts on anthropometry of children age 61-83 months (5-6 years) in the Baseline Index Child (BIC) sample. At endline, there are no impacts of food or cash transfers compared to the control group on prevalence of stunting, underweight, or low BMI, or on prevalence of severe levels of these indicators. However, severe underweight prevalence is 3.8 percent lower in the cash group than in the food group and this estimate is weakly significant.
- Impact of food and cash transfers on prevalence of malnutrition for children age 36-53 months (RC1s): Despite the deteriorating nutrition situation in Karamoja at this time, food and cash transfers did not reduce the prevalence of stunting, underweight or wasting among children age 36-53 months (3-4.5 years) compared to the control group. However, cash transfers led to a significant 8.0 percentage point reduction in the prevalence of severe wasting compared to the control group. Also, cash transfers led to a significant 5.2 percentage point reduction in the prevalence of severe wasting among RC1s compared to the food group. These are relatively large effects and suggest that cash was playing an important role in protecting the nutritional status of children at the age to receive ECD transfers by endline.
- Impact of food and cash transfers on prevalence of malnutrition for children age 6-35 months (RC2s): Food and cash transfers did not reduce the prevalence of stunting, underweight or wasting among children age 6-35 months (0.5-2 years) compared to the control group. For severe underweight prevalence, cash transfers led to a weakly significant *increase* in malnutrition of 5.2 percentage points compared to the control group. However, food transfers had broad impacts on malnutrition compared to the cash transfers. For all six indicators, the impact of food transfers relative to cash is significant or weakly significant. These impacts include a 9.5 percentage point reduction in prevalence of stunting as a result of spillover effects on children under three when the household is receiving food transfers rather than cash. These results suggest that some of the nutrition food rations given to households for their children attending ECD centers also were being provided to younger children in the household.

8. Impact on Anemia Prevalence

8.1 Impact on Anemia Prevalence

We use measurements of hemoglobin levels for BICs (54-83 months), RC1s (36-53 months), and RC2s (6-35 months) at endline, to construct indicators for prevalence of anemia. We use cut-offs following WHO standards to define no anemia, mild anemia, moderate anemia, or severe anemia. Since we do not have baseline hemoglobin measurements on these children, we estimate single-difference impacts, taking advantage of the randomized design that assures baseline comparability. For each estimated specification, we also run a Wald F-test to determine whether the estimated impacts of food and cash are statistically different from each other.

There are several reasons to expect that food or cash transfers could affect anemia prevalence. The food transfers in this study are highly iron-fortified, and thus consuming the food transfers could reduce iron-deficiency anemia. Cash transfers could also be used to purchase iron-rich foods for consumption or for purchase of other health-related goods that would reduce anemia (e.g., iron supplements, mosquito nets to prevent malaria, which increases anemia, etc.).

We first study impacts on BICs, RC1s, and RC2s separately. Table 8.1 shows impacts on prevalence of any anemia. We find that, among BICs aged 54-83 months, there is no significant impact of food transfers on anemia. However, cash transfers significantly reduce prevalence of any anemia, by about 10 percentage points. We see that the impacts of cash are very similar across younger BICs aged 54-71 months (4.5-5 years) and older BICs aged 72-83 months (6 years). Among RC1s aged 36-53 months (3-4.5 years), we find that food transfers cause a weakly significant reduction of prevalence of any anemia, by about 9 percentage points. While the point estimate for cash transfers is not significant, the magnitude is similar, and the F-test suggests that the impacts of food and cash are not significantly different. Moreover, pooling the food transfer and cash transfer groups into an "any transfer" group, we find that, children in the RC1 cohort experience a similar weakly significant reduction in prevalence of any anemia, by about 9 percentage points relative to the control group.

Among RC2s aged 6-35 months (0.5-2 years), we find that food transfers cause a significant *increase* in prevalence of any anemia, by about 10 percentage points. This result is robust to a number of alternative specifications for how children's age enters the model.[12] Cash transfers have no significant impact on anemia in this age range, and the point estimate for food and cash are significantly different.

[12] In addition to the model reported in Table 8.1, column 5, with dummy variables for age in months, we also tried entering dummies for 6-month windows of age in months (non-parametrically), age-in-months entered linearly, and age-in-months omitted. Estimates in these models for the impact of food transfers on anemia prevalence ranged from 9.1 to 9.7; all were significant at the 1 percent level.

The finding that food transfers significantly increases anemia prevalence among RC2s is surprising, particularly given that we show in Section 7 that food transfers appear to reduce malnutrition among RC2s. One potential explanation relates to differences in hygiene of ECD centers across treatment groups. Our findings in Section 5 indicate that households receiving cash transfers were more likely to contribute to ECD centers, and the cash ECD centers were more likely at endline to have shelters, latrines, and hand-washing facilities. All of these features can be seen as improvements in the ECD centers' hygiene and sanitation. Similar improvements in hygiene and sanitation were not found in the food centers, however. We note that, per anecdotal accounts, introducing transfers to ECD centers considerably increased enrollments and number of children regularly attending in both food and cash centers. There is thus some possibility that, in the food centers, the combination of more children attending and no meaningful improvements in hygiene and sanitation led to increased infection among children attending the ECD centers. Infection may have, in turn, been transmitted to younger siblings with lower immunity and more susceptibility to illness, reflected in increased anemia among the RC2s despite reduced malnutrition. In cash centers, meanwhile, the improvements in hygiene and sanitation coincident with increased child attendance may have minimized this effect. While it would be very useful to further investigate this mechanism, our data do not contain sufficiently reliable measures of infection and illness to verify its plausibility.

Table 8.1 Impacts of food or cash transfers on prevalence of any anemia, single-difference – BICs, RC1s, and RC2s

	BIC, 54-83m	BIC, 54-71m	BIC, 72-83m	RC1, 36-53m	RC2, 06-35m
Food	0.002	0.017	-0.027	-0.089*	0.099***
	(0.045)	(0.053)	(0.069)	(0.052)	(0.036)
Cash	-0.101**	-0.100*	-0.106*	-0.084	0.001
	(0.042)	(0.054)	(0.064)	(0.051)	(0.041)
Observations	1,112	702	410	612	898
F-Test: Food=Cash	5.24 **	4.17 **	1.80	0.01	6.58 **
p-value	0.0245	0.0443	0.1829	0.9204	0.0121

Notes: Standard errors in parentheses, corrected for stratified design. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. All estimations include children's age-in-months dummies as covariates.

Table 8.2 shows prevalence of moderate or severe anemia, as opposed to no anemia or mild anemia, among BICs, RC1s, and RC2s. We find no significant impacts of food transfers on prevalence of moderate or severe anemia across BICs, RC1s, or RC2s. However, coinciding with the above results on any anemia, we find that cash causes a weakly significant reduction in moderate or severe anemia among all BICs aged 54-83 months (4.5-6 years). This reduction is driven by younger BICs aged 54-71 months (4.5-5 years), among whom cash transfers cause a significant reduction in moderate or severe anemia, by about 10 percentage points. We see no significant impact of cash transfers on prevalence of moderate or severe anemia among older BICs aged 72-83 months, on RC1s, or on RC2s.

Table 8.2 Impacts of food or cash transfers on prevalence of moderate or severe anemia, single-difference – BICs, RC1s, and RC2s

	BIC, 54-83m	BIC, 54-71m	BIC, 72-83m	RC1, 36-53m	RC2, 6-35m
Food	0.015	0.012	0.019	-0.013	0.061
	(0.036)	(0.039)	(0.063)	(0.037)	(0.038)
Cash	-0.065*	-0.096**	-0.018	-0.050	-0.021
	(0.035)	(0.040)	(0.059)	(0.034)	(0.038)
Observations	1,112	702	410	612	898
F-Test: Food=Cash	5.80**	7.76***	0.47	1.31	4.38**
p-value	0.0182	0.0066	0.4969	0.2559	0.0394

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

Tables 8.3-8.4 show impacts over several age ranges. The tables show that, over the age ranges of 6-83 months, 6-71 months, or 36-71 months, food transfers have no significant impact on prevalence of any anemia or on prevalence of moderate/severe anemia. Cash transfers cause weakly significant or significant impacts on all of these age ranges.

Table 8.3 Impacts of food or cash transfers on prevalence of any anemia, single-difference – BICs, RC1s, and RC2s, by age range

	All, 6-83m	All, 6-71m	All, 36-71m
Food	0.015	0.021	-0.026
	(0.030)	(0.031)	(0.039)
Cash	-0.058*	-0.051	-0.085**
	(0.032)	(0.033)	(0.037)
Observations	2,995	2,584	1,647
F-Test: Food=Cash	5.45**	4.93**	2.39
p-value	0.0219	0.0290	0.1260

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

Table 8.4 Impacts of food or cash transfers on prevalence of moderate or severe anemia, single-difference – BICs, RC1s, and RC2s, by age range

	All, 6-83m	All, 6-71m	All, 36-71m
Food	0.023	0.024	0.001
	(0.026)	(0.026)	(0.031)
Cash	-0.043*	-0.049*	-0.068**
	(0.025)	(0.025)	(0.026)
Observations	2,995	2,584	1,647
F-Test: Food=Cash	7.89 ***	9.07 ***	6.63 **
p-value	0.0062	0.0034	0.0118

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

8.2 Summary

In summary, for children aged 6-83 months (0-6 years) we find the following impacts of food and cash transfers on prevalence of anemia:

- Impact of food transfers on anemia prevalence: Food transfers have mixed impacts on prevalence of anemia among children aged 6-83 months, and impacts are largely insignificant. For BICs aged 54-83 months (4.5-6 years) at endline, we find no significant impact of food transfers on prevalence of any anemia or on prevalence of moderate/severe anemia. We do find food transfers cause a weakly significant *decrease* in prevalence of any anemia among RC1s aged 36-53 months (3-4.5 years) at endline, a reduction of about 9 percentage points. However, we also find food transfers cause a significant *increase* in prevalence of any anemia among RC2s aged 6-35 months (0-2 years) at endline, an increase of about 10 percentage points. We find no impacts of food transfers on prevalence of moderate or severe anemia among RC1s or RC2s. Results suggest that while there may not be direct effects of food transfers on the targeted children, the BICs, there may be mixed spillover effects on younger siblings.

- Impact of cash transfers on anemia prevalence: Cash transfers cause significant or weakly significant reductions in prevalence of anemia and prevalence of moderate/severe anemia, among BICs aged 54-83 months (4.5-6 years) at endline. Impacts on prevalence of any anemia are similar across younger BICs aged 54-71 months (4.5-5 years) and older BICs aged 72-83 months (6 years) at endline, a reduction of about 10 percentage points. Impacts of cash on prevalence of moderate/severe anemia, however, appear concentrated in younger BICs aged 54-71 months (4.5-5 years) at endline, a reduction of about 10 percentage points; cash has insignificant impacts on prevalence of moderate/severe among older BICs aged 72-83 months at endline. We find no significant impacts of cash on RC1s or RC2s. These results suggest that cash may cause significant reductions in prevalence of any anemia among targeted BICs aged 54-83 months, with significant reductions in moderate/severe anemia focused among the younger BICs, but that there may be no substantial spillover effects to younger siblings not targeted by the intervention.

9. Impact on ECD Participation

9.1 Indicators and Descriptive Statistics

The WFP ECD transfer scheme was linked to ECD center participation with the intent of encouraging children's attendance at ECD centers. Research shows that stimulation in early childhood is crucial for cognitive development and school readiness, and preschools may play a key role in providing stimulation during this age.

We construct several measures of children's ECD participation to assess impacts. We use parents' self-reports on children's participation, including questions that ask, for each child, how many days the ECD center the child usually attends was open in the past 7 days and in the past 4 weeks (where "open" means that the caregiver was present), how many days the child attended in the past 7 days, how many hours the child attended in the past 7 days, and how many days the child attended in the past 4 weeks. These outcomes we construct are unconditional. That is, if an ECD center was closed throughout the past 4 week, it is included in the estimates as being open for 0 days; if a child has never attended an ECD center during the school year, the child is included in the estimates as having attended 0 days. These questions were asked in the same way in the baseline and endline surveys; measures of ECD participation constructed from these data should be consistent over time.

We compare the average values of ECD participation measures by treatment group at baseline and conduct tests of whether the distribution of these measures was balanced across treatment groups before the transfers started (Table 9.1). The tests show that these measures were well balanced at baseline. Differences in means between each pair of intervention arms were not statistically significantly different from zero.

Table 9.1 Baseline average ECD participation measures, by treatment status

	Mean values, 2010			Difference in mean values		
	Food	**Cash**	**Control**	**Food - control**	**Cash - control**	**Food - cash**
Days ECD center was open in the past 7 days	4.446 (0.174)	3.931 (0.343)	4.056 (0.296)	0.390 (0.370)	-0.124 (0.466)	0.514 (0.396)
Days ECD center was open in the past 4 weeks	16.009 (0.628)	13.992 (1.268)	14.181 (0.936)	1.828 (1.169)	-0.189 (1.602)	2.017 (1.429)
Days child attended ECD center in the past 7 days	3.124 (0.182)	2.728 (0.262)	2.583 (0.254)	0.541 (0.330)	0.145 (0.371)	0.396 (0.324)
Days child attended ECD center in the past 4 weeks	11.730 (0.579)	10.634 (1.022)	10.103 (0.887)	1.627 (1.080)	0.532 (1.360)	1.096 (1.178)

Notes: Standard errors in parentheses, corrected for stratified design. All differences in means are statistically insignificant. Sample includes all baseline index children age 36-71 months for whom we have non-missing ECD participation information at endline as well, i.e., the non-attrited sample in terms of ECD participation measures.

9.2 *Impact on ECD Participation*

There are several reasons to expect that food or cash transfers could affect ECD participation. In the original plan for the intervention, both food and cash transfers were intended to be conditional on children's regular attendance at the ECD center. Parents in treatment communities were sensitized on this conditionality. The conditionality was later dropped due to problems monitoring attendance; however, it is not clear whether parents were made aware that transfers were no longer conditional on ECD center attendance. Moreover, it was intended that new enrollees to the ECD centers would be included on WFP's beneficiary lists. While it is not clear that this addition of new enrollees occurred regularly in practice, the possibilty may have induced some parents to start sending children who had not attended before. It is also possible that, due to receiving food or cash transfers, a child feels less hungry or more prepared in some other way to attend the ECD center, improving attendance. Additionally, if some component of the transfers are given to ECD caregivers or contributed toward improving the center, the resulting improvements in caregiver motivation and access to facilities in the ECD center may induce parents to send their children to the ECD centers more frequently.

In estimating impacts on each outcome, we allow for age in months to enter non-parametrically as a covariate. This non-parametric inclusion of age captures any age-specific patterns in outcomes (for example, parents may choose to send a younger child to an ECD center that is open fewer days a week, and younger children may in general attend ECD centers fewer days a week), including any discontinuities at particular ages, allowing for greater precision in impact estimates. We again use single-difference estimates, taking advantage of the randomized design which assures baseline comparability. For each estimated specification, we also run a Wald F-test to determine whether the estimated impacts of food and cash are statistically different from each other.

We begin by looking at children in the target age range for ECD centers, 3-5 years. Table 9.2 shows impacts on BICs and RC1s in this age range (36-71 months). Among BICs and RC1s aged 36-71 months, we find that receipt of food transfers has no significant effects on parents' reports of the number of days their child's ECD center was open in the past 7 days or past 4 weeks, the number of days the child attended the ECD center in the past 7 days, the number of hours the child attended the ECD center in past 7 days, or the number of days the child attended the ECD center in the past 4 weeks. While point estimates are positive for several of the estimated impacts, none are statistically significant. However, we find that cash transfers cause highly significant increases in parents' report of the number of days their child's ECD center was open, by about 2.5 days in the past 7 days and by about 3.9 days in the past 4 weeks. Cash transfers also cause highly significant increases in parents' reports of the child's attendance in the past 7 days, an increase of about 2 days, coinciding with an increase of about 7 hours. For each of these outcomes, we find highly significant differences between the impacts of food and cash. We find no significant impact of cash transfers on children's reported attendance over the past 4 weeks.

Table 9.2 Impacts of food or cash transfers on child participation in ECD centers, single-difference – BICs and RC1s, 36-71 months (3-5 years)

	# days ECD center open in past 7 days	# days ECD center open in past 4 weeks	# days child attended ECD in past 7 days	# hours child attended ECD in past 7 days	# days child attended ECD in past 4 weeks
Food	-0.098	0.483	0.303	0.921	1.479
	(0.161)	(0.388)	(0.257)	(1.055)	(0.921)
Cash	2.458***	3.900***	1.931***	7.184***	1.433
	(0.348)	(0.607)	(0.374)	(1.513)	(0.977)
Observations	1,750	1,728	1,907	1,907	1,889
F-Test: Food=Cash	41.15 ***	17.44 ***	9.01 ***	8.35 ***	0.00
p-value	0.0000	0.0001	0.0035	0.0049	0.9794

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

We then focus on BICs, who were the targeted children for the intervention. We first look at all BICs aged 4.5-6 years (54-83 months), since while the official age range for ECD is 3-5 years, it is not uncommon in Karamoja for 6-year-olds to also attend. Table 9.3 shows impacts on these children. We find that patterns are similar to the results on BICs and RC1s aged 3-5 years. Among BICs aged 54-83 months, we again find no significant impacts of food, but we do find highly significant positive impacts of cash on parents' reports of the child's ECD center being open and of the child's attendance.

Table 9.3 Impacts of food or cash transfers on child participation in ECD centers, single-difference – BICs, 54-83 months (4.5-6 years)

	# days ECD center open in past 7 days	# days ECD center open in past 4 weeks	# days child attended ECD in past 7 days	# hours child attended ECD in past 7 days	# days child attended ECD in past 4 weeks
Food	-0.049	0.486	0.228	0.847	1.127
	(0.187)	(0.457)	(0.286)	(1.184)	(1.037)
Cash	2.348***	3.831***	1.874***	7.134***	1.422
	(0.374)	(0.671)	(0.404)	(1.570)	(1.126)
Observations	1,163	1,156	1,281	1,281	1,274
F-Test: Food=Cash	28.83 ***	12.16 ***	7.35 ***	6.89 **	0.02
p-value	0.0000	0.0008	0.0081	0.0102	0.8862

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

We next look separately at only BICs aged 6, who as noted above are technically above the official age range for ECD centers, then at only the younger BICs aged 4.5-5 who are in the official age range. Tables 9.4–9.5 show the impacts on these children. We again find similar patterns and similar magnitudes to the above results. The only difference is that the estimated impact of cash on the report of children's attendance over the past 4 weeks is weakly significant, rather than insignificant, although the point estimate is similar to above. In general, the patterns suggest that food and cash transfers have similar effects on children who are out of the official age range as on children in the official age range. We note that these results may reflect a perverse effect of the transfers, if 6-year-olds' attending ECD centers coincides with the children delaying entry to primary school.

Table 9.4 Impacts of food or cash transfers on child participation in ECD centers, single-difference – BICs, 72-83 months (6 years)

	# days ECD center open in past 7 days	# days ECD center open in past 4 weeks	# days child attended ECD in past 7 days	# hours child attended ECD in past 7 days	# days child attended ECD in past 4 weeks
Food	-0.135	0.087	-0.095	-0.014	0.014
	(0.289)	(0.644)	(0.318)	(1.346)	(1.038)
Cash	2.222***	3.591***	1.844***	7.135***	2.343*
	(0.441)	(0.862)	(0.431)	(1.585)	(1.214)
Observations	410	412	467	467	466
F-Test: Food=Cash	16.50	7.42	9.32	8.06	1.30
p-value	0.0001 ***	0.0078 ***	0.0030 ***	0.0056 ***	0.2577

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

Table 9.5 Impacts of food or cash transfers on child participation in ECD centers, single-difference – BICs, 54-71 months (4.5-5 years)

	# days ECD center open in past 7 days	# days ECD center open in past 4 weeks	# days child attended ECD in past 7 days	# hours child attended ECD in past 7 days	# days child attended ECD in past 4 weeks
Food	-0.009	0.680	0.393	1.287	1.707
	(0.156)	(0.433)	(0.301)	(1.275)	(1.156)
Cash	2.431***	4.009***	1.919***	7.200***	0.894
	(0.374)	(0.667)	(0.427)	(1.713)	(1.218)
Observations	753	744	814	814	808
F-Test: Food=Cash	32.75 ***	12.40 ***	5.60 **	5.19 **	0.13
p-value	0.0000	0.0007	0.0202	0.0251	0.7207

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

We finally look only at RC1s aged 3-4.5, who were not directly targeted by the intervention but were within the official age range for ECD and may have experienced spillover effects. Table 9.6 shows the impacts on these children. We again find similar patterns and similar magnitudes to the above results. These patterns suggest that food and cash transfers have spillover effects on younger children not directly targeted that are very similar to the impacts on older children directly targeted.

Table 9.6 Impacts of food or cash transfers on child participation in ECD centers, single-difference – RC1s, 36-53 months (3-4.5 years)

	# days ECD center open in past 7 days	# days ECD center open in past 4 weeks	# days child attended ECD in past 7 days	# hours child attended ECD in past 7 days	# days child attended ECD in past 4 weeks
Food	-0.121	0.621	0.329	0.759	1.488
	(0.229)	(0.530)	(0.305)	(1.268)	(1.046)
Cash	2.397***	3.742***	1.783***	6.810***	1.771
	(0.366)	(0.701)	(0.389)	(1.580)	(1.082)
Observations	643	633	716	716	709
F-Test: Food=Cash	28.32 ***	8.87 ***	5.97 **	6.16 **	0.02
p-value	0.0000	0.0037	0.0166	0.0150	0.8870

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

9.3 Summary

In summary, for children aged 3-6 years we find the following impacts of food and cash transfers on parents' reports of their child's ECD centers being open and their child's ECD attendance in the past 7 days and in the past 4 weeks:

- Impact of food transfers on ECD center participation: Food transfers do not have significant impacts on parents' reports of the number of days their ECD centers are open or the number of days their children attend ECD centers over the past 7 days or over the past 4 weeks. While many point estimates are positive, direct effects on BICs in age range (4.5-5 years), direct effects on BICs out of age range (6 years), and spillover effects to RC1s in age range (3-4.5 years) are all insignificant.

- Impact of cash transfers on ECD center participation: Cash transfers cause highly significant increases in parents' reports of the number of days their ECD centers are open and the number of days their children attend ECD centers over the past 7 days and over the past 4 weeks. Direct effects on BICs in age range (4.5-5 years), direct effects on BICs out of age range (6 years), and spillover effects to RC1s in age range (3-4.5 years) all show similar patterns with similar magnitudes. These increases are considerable: ECD centers are reported to be open about 2 days more in the past 7 days and about 4 more days in the past 4 weeks; children are reported to attend about 2 days more (and 7 hours more) in the past 7 days. Results suggest the potential for perverse effects on 6-year-olds targeted by the intervention, if these children delay entry to primary school in order to continue attending ECD. Results also indicate that cash transfers have large positive spillover effects on ECD participation of younger children not targeted by the intervention but in age range for ECD, roughly equivalent to impacts on children directly targeted.

We note that these results are consistent with benefiaries' reported experience with ECD. We recall our findings that, relative to food-recipient households, cash-recipient households were much more likely to report that they gave gifts to the ECD caregiver, that these gifts were in the form of cash and of substantial value, that their children's ECD centers had shelters, latrines, and/or hand-washing facilities, and that they attended ECD meetings. If cash-recipient households are more likely to contribute a portion of their transfers to the ECD than food-recipient households, and if these contributions serve to improve caregivers' motivation, the environment of the ECD center, and parents' involvement with the ECD center, these factors may in turn affect how often the ECD center operates and how often children attend. For example, if caregivers are more motivated, they may be more likely to operate the center more regularly; if the ECD center has better facilities (e.g., a shelter in case of rain), children may be more likely to attend given that the center is open; if parents are more involved with the ECD center, they may be more likely to motivate both the caregiver and their children.

10. Impact on Child Cognitive and Noncognitive Development

10.1 Indicators and Descriptive Statistics

We construct indicators of children's cognitive and noncognitive development for impact estimation, guided by the following considerations. We choose outcome measures that are

(1) In a domain shown from previous research to be a strong determinant of future outcomes in educational attainment and the labor market,

(2) In a domain with a clear counterpart to skills related to school-readiness,

(3) In a domain that has been shown from previous research to (or that may reasonably be expected to) be responsive to cash transfers, iron-fortified food transfers, or ECD participation.

The final selection of items we include in outcome measures for cognitive and noncognitive development fall into the following domains:

(1) *Visual reception*: ability to receive information through visual stimulus
- Matching pictures (Mullen)
- Sorting items by color and shape (Mullen)

(2) *Receptive language*: ability to receive information through language and respond accordingly
- Following simple spoken instructions (Mullen)
- Answering simple spoken "general knowledge" questions (Mullen)

(3) *Expressive language*: ability to express information through language
- Answering simple spoken "open-ended" questions (Mullen)
- Vocabulary (KABC-II)

(4) *Fine motor*: ability to coordinate small-muscle movements (for example, gripping and manipulating a pencil with fingers)
- Drawing simple shapes using a pencil (Mullen)
- Stringing beads (Mullen)

(5) *Reasoning*: ability to process information and recognize patterns
- Pattern reasoning (KABC-II)

(6) *Memory*: ability to retain information and retrieve it at a later time
- Number recall (KABC-II)
- Delayed word recall (KABC-II)

- Imitation of hand movements (KABC-II)

(7) *Executive function*: ability to react to novel situations, which includes ability to delay gratification, self-regulation, sustained attention, and persistence

- Ability to delay gratification (Sticker test)
- Self-regulation (Head-Toes-Knees-Shoulders test)

The relevant outcome measures for children differ by their age, since the individual items administered in these categories differ by children's ages. Mullen items are considered appropriate for children roughly aged 3-5 years, while KABC-II items are considered appropriate for children 5 years and older. The Sticker Test was not perceived to be age-specific, while the Head-Toes-Knees-Shoulders test is generally intended for children aged 6 years or older. Thus, children aged 3-4 years (36-59 months) take only the Mullen items and the Sticker Test. Children aged 5 years (60-71 months) take the Mullen items, the KABC-II items, and the Sticker Test. Children aged 6 years (72-83 months) take the KABC-II items, the Sticker Test, and the Head-Toes-Knees-Shoulders Test.

For the Mullen items, we construct as outcomes the raw scores over all items in each domain, as well as a raw score over all domains. For the KABC-II items, due to the distinction of types of skills within each domain (e.g., recall of numbers vs. recall of words vs. recall of observed movements), we construct raw scores over each type of skill, as well as a raw score over all domains. For the items related to executive function, again due to the distinction of types of skills within the domain (e.g., ability to delay gratification vs. self-regulation), we construct raw scores over each type of skill.

Thus, the final list of outcomes is as follows:

- Visual reception raw score - Mullen (VR-M): ages 3-5 years (36-71 months)
- Receptive language raw score - Mullen (RL-M): ages 3-5 years (36-71 months)
- Expressive language raw score - Mullen (EL-M): ages 3-5 years (36-71 months)
- Fine motor raw score - Mullen (FM-M): ages 3-5 years (36-71 months)
- Mullen total raw score: ages 3-5 years (36-71 months)
- Number recall raw score - KABC-II: ages 5-6 years (60-83 months)
- Delayed word recall raw score - KABC-II: ages 5-6 years (60-83 months)
- Imitation of hand movements raw score - KABC-II: ages 5-6 years (60-83 months)
- Pattern reasoning raw score - KABC-II: ages 5-6 years (60-83 months)
- Vocabulary raw score - KABC-II: ages 5-6 years (60-83 months)
- KABC-II total raw score: ages 5-6 years (60-83 months)
- Self-regulation raw score: age 6 years (72-83 months)

- Sticker test raw score: ages 3-6 years (36-83 months)

We compare the average values of cognitive measures relevant to children aged 36-71 months by treatment group at baseline and conduct tests of whether the distribution of these measures was balanced across treatment groups before the transfers started (Table 10.1). The tests show that these measures were well balanced at baseline. Differences in means between each pair of intervention arms were not statistically significantly different from zero.

Table 10.1 Baseline average ECD cognitive development measures, by treatment status

	Mean values 2010			Difference in means		
	Food	Cash	Control	Food - control	Cash - control	Food – cash
Visual reception score	8.708	9.092	8.827	-0.119	0.265	-0.384
	(0.310)	(0.347)	(0.371)	(0.510)	(0.530)	(0.479)
Fine motor score	4.549	4.641	4.591	-0.041	0.051	-0.092
	(0.183)	(0.234)	(0.269)	(0.334)	(0.362)	(0.301)
Receptive language score	10.334	10.719	10.910	-0.575	-0.191	-0.385
	(0.263)	(0.311)	(0.325)	(0.424)	(0.457)	(0.411)
Expressive language score	4.328	4.356	4.330	-0.003	0.025	-0.028
	(0.104)	(0.117)	(0.109)	(0.149)	(0.159)	(0.158)
Mullen total raw score	28.257	29.162	29.524	-1.267	-0.361	-0.905
	(0.784)	(0.902)	(0.894)	(1.235)	(1.311)	(1.234)

Notes: Standard errors in parentheses, corrected for stratified design. All differences in means are statistically insignificant. Sample includes all baseline index children age 36-71 months for whom we have non-missing cognitive scores at endline as well, i.e., the non-attrited sample in terms of cognitive measures.

10.2 Impact on Cognitive and Noncognitive Development

There are several reasons to expect that food or cash transfers could affect children's cognitive and/or noncognitive development. As discussed above, the transfers could potentially induce changes in children's anemia levels through changes in diet or other health-related purchases, leading to changes in mental alertness and fatigue, and therefore also possibly affecting cognitive and noncognitive development. The transfers could also affect children's ECD participation, as well as potentially the quality of the ECD centers if households use any of the transfers to improve the centers, both ofwhich could improve the quality of stimulation to a child and therefore the child's development.

For each cognitive and noncognitive outcome, we estimate impacts of receiving food transfers or receiving cash transfers, relative to receiving no transfers in the control group. We estimate impacts on Baseline Index Children (BICs) aged 54-83 months to determine direct effects, as well as on Reference Children 1 (RC1s) aged 36-53 months to investigate potential spillover effects within the household. In all our estimates, we include age-in-months dummies non-parametrically. These dummies capture variation due to the effects of age on cognitive and noncognitive development, improving precision of estimates. The non-parametric specification is flexible enough to take into account relationships between development and age that are not linear and include discontinuities at particular ages. For each estimated specification, we also run a Wald F-test to determine whether the estimated impacts of food and cash are statistically different from each other.

In most cases, we estimate single-difference estimates using endline data only. This specification is valid given that treatment arms were randomized, and scores were balanced at baseline. Where possible, we estimate an ANCOVA specification for comparison, including the baseline score for the same outcome as a covariate in estimation. Because the majority of KABC-II items were not administered at baseline, and only BICs were tested at baseline, we only have relevant baseline scores for BICs who took the Mullen at both baseline and endline, meaning BICs who were ages 54-71 months at endline. We show using these results that, as expected given balancing of baseline scores across treatments, the ANCOVA results using both baseline and endline scores are quite similar to single-difference results using only the endline scores.

We first present results on Baseline Index Children aged 60-83 months at endline (5-6 years), who took KABC-II items. Tables 10.2–10.4 shows impacts on the KABC-II items, as well as the HTKS test where relevant and the Sticker Test. We find that among BICs aged 60-83 months, there are very few significant impacts of food or cash transfers on KABC-II items. These patterns seem to apply to both the older children in this age range (72-83 months) and to the younger children in this age range (60-71 months). The only significant impact we find is a significant *decrease* in the Sticker Test score from BICs aged 72-83 months receiving food transfers, with about 20 percentage point fewer children choosing to “delay gratification” and receive two stickers.

Table 10.2 Impacts of food or cash transfers on cognitive and noncognitive development of BICs age 60-83 months, single-difference

	Number recall	Delayed word recall	Hand movements	Pattern reasoning	Vocabulary	All KABC-II items	Sticker test
Food	0.065	-0.234	0.096	-0.067	-0.181	-0.320	-0.117
	(0.219)	(0.226)	(0.219)	(0.137)	(0.232)	(0.788)	(0.083)
Cash	0.181	0.126	0.223	0.192	0.052	0.774	0.097
	(0.203)	(0.230)	(0.222)	(0.167)	(0.246)	(0.882)	(0.083)
Observations	949	949	949	949	949	949	859
F-Test: Food=Cash	0.11	0.78	0.12	1.01	0.30	0.59	2.15
p-value	0.7440	0.3801	0.7326	0.3168	0.5833	0.4463	0.1461

Notes: Standard errors in parentheses, corrected for stratified design. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. All estimations include children’s age-in-months dummies as covariates.

Table 10.3 Impacts of food or cash transfers on cognitive and noncognitive development of BICs age 72-83 months, single-difference

	Number recall	Delayed word recall	Hand movements	Pattern reasoning	Vocabulary	All KABC-II items	Self-regulation	Sticker test
Food	-0.289	-0.201	0.196	-0.016	-0.190	-0.500	0.283	-0.211**
	(0.349)	(0.270)	(0.345)	(0.230)	(0.330)	(1.261)	(0.553)	(0.095)
Cash	0.225	0.054	0.032	0.170	0.055	0.537	0.098	0.134
	(0.322)	(0.289)	(0.320)	(0.229)	(0.298)	(1.201)	(0.556)	(0.093)
Observations	423	423	423	423	423	423	423	380
F-Test: Food=Cash	0.84	0.28	0.09	0.22	0.19	0.24	0.04	4.16 **
p-value	0.3627	0.6000	0.7662	0.6441	0.6647	0.6229	0.8493	0.0446

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

Table 10.4 Impacts of food or cash transfers on cognitive and noncognitive development of BICs age 60-71 months, single-difference

	Number recall	Delayed word recall	Hand movements	Pattern reasoning	Vocabulary	All KABC-II items	Sticker test
Food	0.331	-0.260	0.016	-0.106	-0.173	-0.192	-0.047
	(0.223)	(0.235)	(0.222)	(0.152)	(0.244)	(0.775)	(0.090)
Cash	0.160	0.187	0.388	0.209	0.049	0.993	0.070
	(0.244)	(0.242)	(0.247)	(0.185)	(0.303)	(1.013)	(0.090)
Observations	526	526	526	526	526	526	479
F-Test: Food=Cash	0.18	1.10	0.90	1.28	0.22	0.60	0.59
p-value	0.6712	0.2981	0.3451	0.2604	0.6402	0.4391	0.4450

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

We then focus on estimates on BICs aged 4.5-5 years (54-71 months), who took the Mullen items. Since these children took the same items at baseline, we are able to run ANCOVA estimates using baseline scores as covariates, in addition to single-difference estimates using endline data only. Tables 10.5–10.6 show impacts on the Mullen items, as well as on the Sticker Test.

We find that results for BICs aged 54-71 months are both qualitatively and quantitatively similar between the ANCOVA specification and the single-difference specification, as would be expected with balanced scores at baseline. The ANCOVA specification simply has slightly fewer observations due to some missing observations at baseline.

We find very few significant impacts of food transfers on the Mullen items or the sticker test among BICs aged 54-71 months, other than a weakly significant or significant *reduction* in the visual reception and expressive language domains. However, we find that cash transfers cause significant increases in Mullen scores: in visual reception, in receptive language, in expressive language, and in the total Mullen raw score.

Table 10.5 Impacts of food or cash transfers on cognitive and noncognitive development of BICs age 54-71 months, ANCOVA

	Visual reception	Fine motor	Receptive language	Expressive language	All Mullen items	Sticker test
Food	-0.735	-0.250	-0.397	-0.258*	-1.366	-0.044
	(0.455)	(0.398)	(0.459)	(0.142)	(1.349)	(0.083)
Cash	1.207**	0.557	1.152**	0.532***	3.208*	0.076
	(0.538)	(0.516)	(0.516)	(0.176)	(1.856)	(0.086)
Observations	644	556	640	659	519	612
F-Test: Food=Cash	5.18 **	1.09	3.47 *	8.95 ***	2.92 *	0.69
p-value	0.0254	0.2997	0.0661	0.0036	0.0912	0.4086

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

Table 10.6 Impacts of food or cash transfers on cognitive and noncognitive development of BICs age 54-71 months, single-difference

	Visual reception	Fine motor	Receptive language	Expressive language	All Mullen items	Sticker test
Food	-0.792*	-0.170	-0.531	-0.278**	-1.561	-0.047
	(0.469)	(0.343)	(0.428)	(0.140)	(1.170)	(0.084)
Cash	1.196**	0.424	1.282**	0.530***	3.232**	0.090
	(0.556)	(0.450)	(0.523)	(0.173)	(1.604)	(0.084)
Observations	681	658	680	680	656	668
F-Test: Food=Cash	5.13 **	0.76	5.20 **	9.75 ***	4.18 **	0.91
p-value	0.0260	0.3867	0.0251	0.0025	0.0439	0.3427

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

We then look at RC1s aged 3-4.5 years (36-53 months), who were tested only at endline and who took the Mullen items. Table 10.7 shows impacts on these children. We find no significant impacts of food or cash transfers on the Mullen items among RC1s aged 36-53 months. Neither Mullen items nor the sticker test score is affected by receipt of transfers. We interpret these results as suggesting that there were few or no spillover effects in these domains to younger siblings.

Table 10.7 Impacts of food or cash transfers on cognitive and noncognitive development of RC1s age 36-53 months, single-difference

	Visual reception	Fine motor	Receptive language	Expressive language	All Mullen items	Sticker test
Food	-0.697	0.041	1.120	0.006	0.608	0.089
	(0.628)	(0.533)	(1.480)	(0.263)	(2.445)	(0.117)
Cash	0.677	0.691	0.579	0.290	2.548	0.076
	(0.661)	(0.616)	(0.736)	(0.316)	(2.025)	(0.116)
Observations	252	243	251	253	241	228
F-Test: Food=Cash	1.53	0.40	0.10	0.34	0.28	0.00
p-value	0.2192	0.5291	0.7486	0.5603	0.6004	0.9513

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

Finally, we look across all children (BICs and RC1s) aged 3-5 years (36-71 months), who took Mullen items at endline. Table 10.8 shows impacts across this range. We find that these results for children aged 36-71 months appear to be driven by the results on BICs aged 54-71 months. Consistent with those results, we find that food transfers cause only negative impacts on visual reception and expressive language domains. Cash transfers, meanwhile, cause significant increases in visual reception, receptive language, expressive language, and overall Mullen raw scores.

Table 10.8 Impacts of food or cash transfers on cognitive and noncognitive development of BICs and RC1s age 36-71 months, single-difference

	Visual reception	Fine motor	Receptive language	Expressive language	All Mullen items	Sticker test
Food	-0.903**	-0.367	-0.202	-0.231*	-1.697	-0.005
	(0.446)	(0.328)	(0.537)	(0.136)	(1.215)	(0.081)
Cash	0.948*	0.501	0.979**	0.448**	2.823**	0.065
	(0.496)	(0.395)	(0.447)	(0.174)	(1.371)	(0.073)
Observations	832	805	830	832	801	793
F-Test: Food=Cash	4.98	1.89	2.28	6.89	4.18	0.29
p-value	0.0283	0.1731	0.1346	0.0103	0.0439	0.5903

Notes: Standard errors in parentheses, corrected for stratified design. * p < 0.1; ** p < 0.05; *** p < 0.01. All estimations include children's age-in-months dummies as covariates.

10.3 Summary

In summary, for children aged 36-83 months (3-6 years), we find the following impacts of food and cash transfers on children's cognitive and noncognitive development:

- Impact on cognitive and noncognitive development of children aged 72-83 months: For BICs aged 72-83 months (6 years), we find almost no significant impacts of food or cash transfers on our measures of cognitive and noncognitive outcomes including the KABC-II, the sticker test of delayed gratification, and the HTKS test of self-regulation. The sole exception is a finding that food causes a significant *negative* impact on the sticker test of delayed gratification among children aged 72-83 months. We conclude that, either the transfers generally have no effects in this age range, or that the instruments used for this age range were not sufficiently sensitive to detect changes.
- Impact on cognitive and noncognitive development of children aged 60-71 months: For BICs aged 60-71 months (5 years), we find no significant impacts of food or cash transfers on KABC-II items or the sticker test of delayed gratification. However, in this age range (and expanded to 54-71 months, or 4.5-5 years), we find that cash transfers cause significant increases in scores on the Mullen items related to cognitive development, including in domains of visual reception, receptive language, expressive language, and in the overall Mullen raw score over all domains. We conclude that cash transfers have significant positive impacts on the cognitive development of children in this age range.
- Impact on cognitive and noncognitive development of children aged 36-53 months: For RC1s aged 36-53 months (3-4.5 years), we find no significant impacts of food or cash transfers on Mullen items or the sticker test of delayed gratification. We conclude that food and cash transfers caused no significant spillover effects on cognitive or noncognitive development of younger siblings of the children directly targeted.

We note that these results are broadly consistent with our findings related to impacts on children's food consumption, prevalence of anemia, and ECD participation, as well as on households' experience with ECD. In all cases, we see significant positive impacts of cash transfers, while we see insignificant or even slightly negative impacts of food transfers. Taken together, these results suggest that cash transfers may significantly increase children's cognitive development due to improved dietary intake, reduced anemia, and/or increased participation in ECD. Given that we find the improvements in cognitive development due to cash transfers concentrated in the age range of BICs 54-71 months at endline (4.5-5 years at endline, which is 36-53 months or 3-4.5 years at baseline), while we find no significant improvements in older BICs, it is possible that the improvements in diet, anemia status, or stimulation from ECD centers may have larger impacts on younger targeted children. Moreover, given that we do not see impacts on RC1s aged 36-53 months at endline (3-4.5 years at endline, which is 18-35 months or 1.5-2 years at baseline), spillover effects to cognitive development of children not directly targeted appear not to be substantial.

11. The Cost of Program Modalities and Estimates of Cost-Effectiveness

11.1 Methods

An important factor in comparing the effectiveness of different food assistance modalities is the relative cost of implementing each modality. An assessment of cost-effectiveness by modality allows an examination of which mechanism (cash or food) provides the greater benefit in terms of key outcomes for the amount of funds invested. The particular goals of this costing analysis are to answer the following two research questions: (1) *What is the relative cost of each modality (cash and food)?* (2) *Which modality is the most cost-effective in improving a range of key outcomes?*

While WFP tracks program costs via conventional accounting for its own records and for external accountability purposes, such methods do not allow for a comprehensive breakdown by modality. Conventional accounting costs often underestimate the overall cost of program operations due to, for example, excluding the cost of staff time.

In this analysis, costs are calculated using the Activity-based Costing – Ingredients (ABC-I) approach. The ABC-I method is a combination of activity-based accounting methods (which delineate all activities necessary for program implementation) with the "ingredients" method (which calculates program costs from inputs, input quantities, and input unit costs; see Fiedler, Villalobos, and de Mattos 2008, and Tan-Torres Edejer et al. 2003). Pairing the ingredients method with the ABC approach allows first detailing all activities required for each program modality, then mapping these activities to their corresponding inputs and cost centers. As a result, implementation costs can be comprehensively compared across modalities. The use of the ABC-I method has several advantages. It allows for opportunity costs, quantified as economic costs, to be included in the total program costs. It also allows for the incorporation of "off-budget" expenditures, for example, donated goods or services that otherwise would not be included as program operating costs (e.g., 'piggy-backing' delivery using transportation from another project).

The costing analysis for this study utilizes data from the WFP-CO accounting ledger, information gathered from staff by the country office, internal procurement and operations documents, as well as interviews with local partners. An advantage of the detailed information on costs from the WFP accounting ledgers is that it permits the separation of costs that are common across program modalities from those that are modality specific. Distinct cost calculations by modality are necessary to allow for differing operational field costs, as well as to avoid double-counting. A second strength of the cost data is that it allows calculation of the staff costs associated with the intervention.

There are several assumptions underlying this analysis which must be noted:

(1) This analysis focuses specifically on the cost to WFP and not to external institutions or to program beneficiaries. Differing costs to beneficiaries entailed in collecting different transfer modalities, for example, are not taken into account in this calculation.[13]

(2) In this costing analysis, the cost to WFP of the food in each food ration is assumed to be equal to the value of each cash transfer. Since the value of the cash transfer was set to the amount required to purchase the food ration in the market, this assumption implicitly translates to assuming that the full cost to WFP for the food in each food ration is the market value of the food. An alternate estimate of WFP's costs for the food would calculate its actual procurement costs for the food, including the total shipping and handling costs from source to in-country. Given the substantial challenges involved to estimate the full cost of procurement, particularly total transport cost, we employ the method which assumes that the cost of the food to the program is its market value.[14] These results can then be interpreted as providing the cost of replicating this program using locally sourced food for the food rations.[15]

(3) Related to the previous point, variation in the market cost of food across districts or over time (e.g., due to inflation) is not taken into account. This is because the value of the cash transfer was set to the average market price of the food at the start of the program and was kept fixed across districts and throughout the study period.

(4) Cost measures are calculated as estimates of average cost per beneficiary for all transfers received. In the case of food, since WFP's food distribution system has much larger scope than only the food rations distributed through this ECD study, the cost of food rations is taken as the proportion of WFP's total costs of its food assistance operations that can be attributed to this program's food rations (rather than as the marginal cost of each food ration for this program abstracting from fixed costs). Since cash transfers were introduced only for this study, calculation of average costs per beneficiary for cash entails a more straightforward measure of total costs divided by the number of beneficiaries reached. However, there are two caveats to this point. First, it is very likely some setup costs of the food distribution system are not captured in the measures of total costs for food (since these setup costs were incurred many years ago), while setup costs of the cash distribution are captured in the measures of total costs for cash (since these setup costs were incurred during the study). In particular, because the cash modality was a new endeavor in the region, start-up activities for cash (such as re-verification, security, and other measures)

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[13] The cost to beneficiaries of travelling to receive transfers as well as the time taken to do so are reported, by modality, in Chapter 5.

[14] Prior to the start of the project, WFP commissioned a market analysis in the project districts that included developing estimates of the cost of the components of the food rations, including corn-soya blend (CSB).

[15] We believe that this 'market value' approach produces lower costs of the food ration than an approach that accurately measured the total cost of food procurement, including transportation overseas. Lentz, Passarelli and Barrett (2013) document that these procurement costs of food aid are substantial.

required costly labor and human resources, while analogous activities for the food modality had been incurred long before the study period and did not appear in project financial records. Second, in principle, average costs are likely to differ by scale of the distribution. Moreover, the way in which average cost would change by scale may differ by modality since the implied activities differ. For example, increasing the number of food beneficiaries would require increasing Landside, Transport, Storage and Handling (LTSH) costs, while increasing the number of cash beneficiaries would mainly require increasing transaction costs (which may be fairly low). While these issues would be relevant in comparing the costs of scale-up by modality, the available data do not include sufficient information to estimate how average costs by modality would change if the project were scaled up. Therefore, for the purposes of this initial analysis, average costs are assumed to be constant.

11.2 Program Details

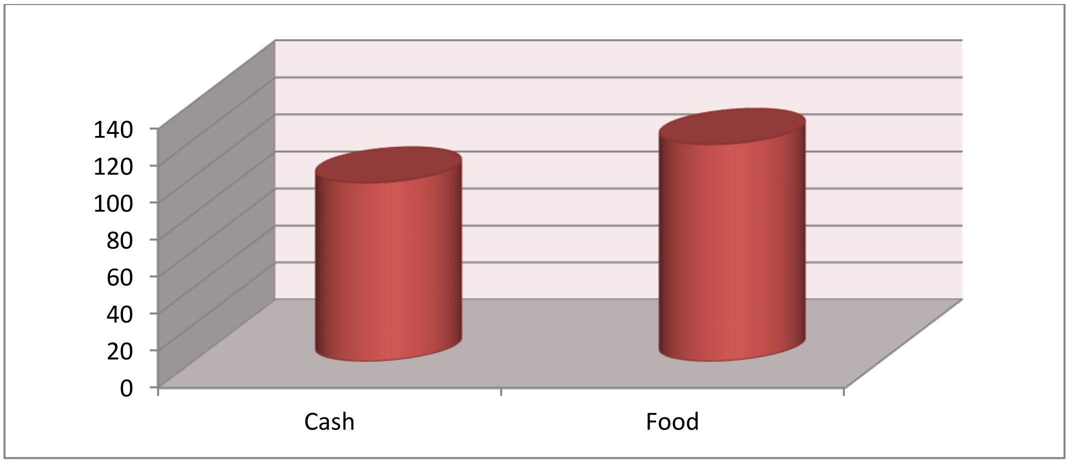
The duration of the food and cash transfer program was 12 months, spanning 7 cycles of transfers in the districts of Kotido, Kaabong and Napak.[16] The average exchange rate between Ugandan shillings (UGX) and the U.S. dollar during the program intervention period was UGX 2,488.40 to $1.00 USD, a figure used throughout the costing exercise to determine program costs in dollars. Also, as variation occurred in the number of beneficiaries between cycles, an average was calculated per region (Napak, Kaabong, Kotido) for program recipients. The average numbers of child beneficiaries calculated were 2,972 for the cash modality and 4,530 for the food modality.

11.3 Results

The estimated average cost of providing all seven transfers to a beneficiary is $117.47 for the food modality and $96.74 for the cash modality. This figure includes the cost of operating the food and cash transfer programs, the delivery costs, and the cost of transfer itself (i.e., the cost of the food in the food transfer or the value of the cash). For delivery of seven transfer cycles, the food ration program costs 21.4 percent more than the cash transfer program. Figure 1 shows these costs, highlighting the difference between the two transfer modalities.

[16] The last transfer cycle was completed after the impact evaluation endline survey.

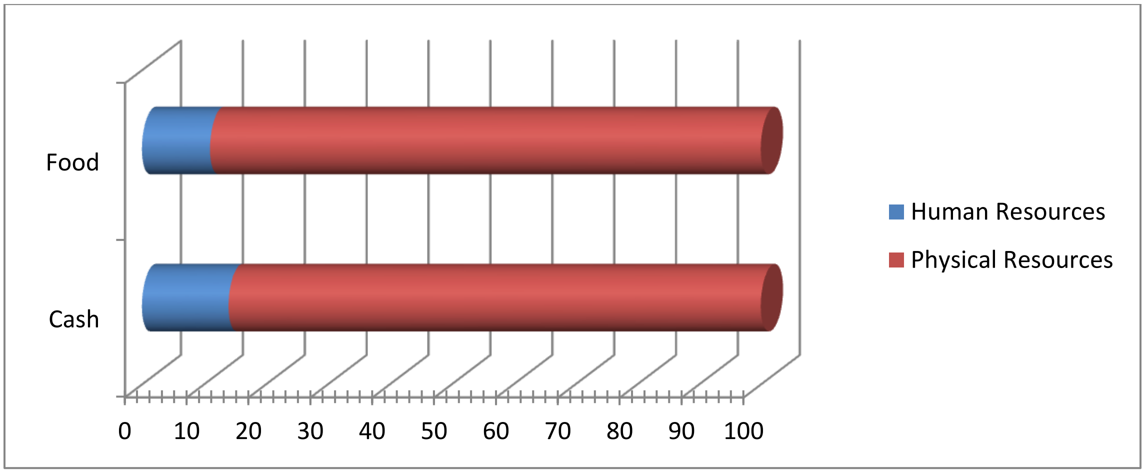
Figure 1: Total cost per beneficiary by modality (USD)



These figures for total costs by modality imply that the delivery cost for each 25,500 UGX transfer (approximately $10.25 USD), excluding the cost of the ration itself, is $6.53 (=$117.47/7-$10.25) for food and $3.57 ($96.74/7-$10.25) for cash. In other words, over the duration of the intervention period, delivery costs are approximately $45.71 in total per beneficiary for food (~$6.53*7) and $24.99 in total per beneficiary for cash (~$3.57*7).

Certain categories of cost differ considerably between the modalities. For food, the principal modality-specific costs included food storage and transport. The primary modality-specific difference in cost for cash in contrast to food was transaction withdrawal fees. Figure 2 disaggregates the costs for each modality between human and physical resources, showing that the breakdown is similar across modalities. In this case, human resources are categorized as staff time allocated to activities, whether by WFP-CO or by implementing partners, and physical resources include facilities, transport, equipment and materials. Food requires a slightly higher percentage of cost devoted to physical resources (89%) than cash (86%). The greater percentage of human resources for cash (14%) versus food (11%) is likely in part due to the staff time required for start-up of the cash modality.

Figure 2: Cost type by modality (%)



11.4 Cost Effectiveness

Consistent with the methodology used to calculate cost-effectiveness in the other WFP studies, this analysis examines the cost required to achieve a 15% increase in key outcomes of interest (relative to either the baseline outcome or the endline control group's outcome, depending on available information), based on the cost per beneficiary of providing seven transfers of the modality, including the cost of the ration. The key difference for the Uganda analysis is that cost effectiveness is calculated only for the cash transfer modality. The reason is that the impact evaluation for the Uganda case study revealed no statistically significant impacts of the food modality on several key outcomes related to food security or target children's health and development. Since statistically insignificant impacts cannot be distinguished from zero impacts, there is no well-defined way to construct the cost of achieving a given magnitude of positive impact. In other words, if the food transfer modality caused no impacts on key outcomes, it is not possible to determine a level of cost incurred through a food modality that would result in a specified level of improvement. Therefore, calculations of cost effectiveness are conducted for the cash transfer modality, but not for the food transfer modality.

Table 11.1: Cost required to increase food security outcomes by 15%

	Children's frequency of consumption of food groups (3-5 years)			Household Food Security Indices		
	Starches	Meat/Eggs	Dairy	HDDS	DDI	FCS
Cash	$145.11	$18.74	$8.79	$145.11	$129.27	$181.39
Food	--	--	--	--	--	--

Table 11.1 shows cost-effectiveness of each modality in improving key outcomes related to food security: children's frequency of consumption of various food groups and household food security indices. As noted above, since food did not have significant impacts on any of these outcomes, its cost-effectiveness is not well-defined, and cash is trivially more cost effective for improving all of the outcomes.

However, Table 11.1 also shows that, for the cash modality, cost-effectiveness differs across outcomes. For instance, it is significantly cheaper to increase by 15% the frequency of meat/eggs or dairy consumption than to increase the frequency of starch consumption by the same percent. The Karamojong diet is heavy in starches, with a baseline frequency of consumption at 5.69 days, which could affect the cost of further increasing the frequency of consumption. Conversely, meat/eggs, and dairy are consumed infrequently at baseline, at 0.66 and 0.20 days respectively, such that it may be less costly to increase consumption by 15%. Based on these figures, increasing dairy and meat/egg consumption through the use of a cash transfer appears quite cost-effective.

Similar differences in cost-effectiveness can be noted in terms of improving dietary diversity measures. A cost of $129.27 would result in a 15% increase in the Dietary Diversity Index, while a 15% increase in Household Dietary Diversity Score would cost $145.11, and a 15% increase in the Food Consumption Score would cost $181.39.

Table 11.2: Cost required to improve child health and development outcomes by 15%

	Anemia prevalence		Days attended ECD center, past 7 days	Cognitive development measures (children age 54-71 months at endline)				
	Any anemia	Moderate / severe anemia		Visual reception	Fine motor	Receptive language	Expressive language	Cognitive total score
Cash	$63.09	$60.46	$21.99	$103.65	$157.39	$120.23	$118.75	$129.56
Food	--	--	--	--	--	--	--	--

In Table 11.2, cost effectiveness calculations are shown for reducing anemia prevalence, increasing ECD attendance, and increasing cognitive development measures. Again, since food did not have significant impacts on any of these outcomes, its cost-effectiveness is not well-defined, and cash is trivially more cost effective. The cost-effectiveness calculations for cash indicate that a cost of $63.09 through the cash modality would decrease the prevalence of any anemia by 15%, and a slightly lower cost ($60.46) would decrease moderate-to-severe anemia by 15%. Furthermore, using the cash modality, a 15% increase in ECD center attendance could be achieved at quite low cost ($21.99). In terms of cognitive development measures, the costs required for 15% increases in measures of visual reception ($103.65), receptive language ($120.23) and expressive language skills ($118.75) are slightly lower than the costs of improving fine motor skills ($157.39). For an aggregate measure over all of these cognitive domains ("Cognitive total score"), a 15% improvement would cost $129.56 per beneficiary.

Overall, the cost effectiveness analysis indicates that, trivially, the cash modality is more cost-effective than the food modality in terms of improving key outcomes, since food is found to have no significant impacts on these outcomes. These calculations indicate that cash transfers can achieve improvements of 15% across a range of outcomes related to food security and child health/development at reasonable cost (less than $200 per beneficiary over all seven transfers). Improvements in consumption of meat/eggs and dairy consumption, reduction in anemia prevalence, and increases in ECD center attendance are found to be particularly cost-effective through the cash modality – with 15% increases resulting from less than $70 cost incurred per beneficiary over all seven transfers.

11.5 Interpretation of results

In interpreting these results, it is useful to recall a data constraint in this analysis and consider how results would change if cost information were adjusted accordingly. As noted, because the cash modality was a new endeavor in the region and incurred initial start-up costs, whereas the food modality had long been used by WFP in the region, this initial analysis of relative costs includes a component for cash that it does not include for food. An adjustment to remove the start-up costs from the cash modality, putting it on equal footing with the food modality, would therefore reduce the estimated cost of cash relative to the estimated cost of food. Since the current analysis already shows that cash is more cost-effective than food for the key outcomes presented here, adjustment to the numbers to account for start-up costs would only strengthen the results in favor of the relative cost-effectiveness of the cash modality.

12. Conclusion

This report examines the relative impact of food and cash transfers provided to households with children participating in ECD centers through a randomized evaluation study. The overwhelming conclusion from the evidence presented here is that food transfers affected very few outcome measures while cash transfers had broad impacts across a range of outcomes. On topics including household food security, frequency of child food consumption, anemia prevalence, ECD participation and child cognitive and noncognitive development, cash transfers consistently caused positive impacts for key outcomes, while food transfers had surprisingly few positive impacts (e.g., on frequency of child consumption of CSB), and appears to have caused a worsening anemia status in some children.

These weak effects of food transfers on food security and frequency of child consumption are due in part to the composition of the food rations, which were limited to three goods, and to nature of the food security and food frequency indicators, which measure the degree of variety in the diet. Food beneficiary households did not use the additional resources provided by the food ration to augment their consumption of other foods. This may be due in part to CSB, a unique fortified form of food aid, being a poor substitute for other foods in the diet, despite being very nutritious.

The poor performance of the food transfers may also be due to problems in targeting the food transfers that led roughly half of all food beneficiaries in the evaluation sample to fail to receive their food rations for the first three cycles of food transfers. Although there was no significant difference in the average number of transfers that households in the Food and Cash groups reported receiving, the average number of days since the last transfer was significantly higher for Food beneficiaries (57 days) than Cash beneficiaries (40 days). This long lag (almost 2 months) since the last food transfer could help explain why the food transfers have no impact on food security and food consumption in the last 7 days. However, this cannot explain the entire difference in the pattern of results because cash transfers had also not been received for more than one month, on average, but the cash transfers had much larger effects on food consumption and food security. It appears that households receiving cash transfers were more easily able to access a diverse diet and may have saved some of the transfers to improve food security and consumption in months after the transfers were received.

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