The impact of cash and food transfers: Evidence from a randomized intervention in Niger

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June 2012
March 2013
This version December 2013

Acknowledgements:
We are grateful to Kountche Boubacar Idrissa for supervising the survey team, to Lynn Brown, Gianluca Ferrera, Giorgi Dolidze, Marco Sanguineti and other staff at the World Food Programme for valuable support and conversations. We thank also Jenny Aker, Jennifer Alix-Garcia, Andrew Dillon, seminar participants at Cornell University, and conferences audiences at CSAE, PAC-Dev, MWIEDC, and AAEA for comments on earlier drafts. We gratefully acknowledge funding from the Government of Spain received through the World Food Programme. Errors are ours.

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Key words: cash and food transfers; food security; Niger; randomized intervention

Abstract

We assess the relative impacts of receiving cash versus food transfers using a randomized design. Drawing on data collected in eastern Niger, we find that households randomized to receive a food basket experienced larger, positive impact on measures of food consumption and diet quality than those receiving the cash transfer. Other outcomes showed greater variation by season. Receiving food reduced the use of a number of coping strategies but this effect was more pronounced during the height of the lean season. Households receiving cash spent more money on agricultural inputs during the growing season. Less than five percent of food was sold or exchanged for other goods. Food and cash were delivered with the same degree of frequency and timeliness but the food transfers cost 15 percent more to implement.

JEL classification: D04, I38, O12

1. Introduction

Interest in providing cash transfers for food assistance has been increasing in recent years. Cash transfers have known advantages relative to food transfers with respect to timeliness of delivery (Gentilini 2007; Lentz *et al* 2013).The other potential benefits and drawbacks of each form of transfer, across a range of criteria, depend on the context and objectives of the program (Upton and Lentz 2011). It is widely supposed that--as predicted by economic theory--recipients would prefer to receive cash; provided that cash transfers integrate the transaction costs involved in obtaining a comparable food transfer, recipients can better meet their diverse needs with a cash transfer. However, there is little *rigorous* evidence on the comparative impacts of cash and food transfers on food security and food related outcomes. There have been numerous studies on the impact of cash transfers (see summaries in Fiszbein *et al* 2009 and DfID 2011) and numerous studies on the impact of food transfers (see Margolies and Hoddinott 2012). However, as Hidrobo *et al* (forthcoming) note comparisons of these impacts is confounded by differences in program design, the magnitude of the transfer, and the frequency of the transfer.[1]

More recently, a handful of studies have begun to make progress on this issue using carefully designed randomized control trials. In randomized studies of programs in Sri Lanka and Mexico impacts of cash and food transfers are compared and although food is inframarginal in both programs, in Sri Lanka food leads to smaller impacts on total food expenditures, while in Mexico food and cash lead to similar impacts (Cunha, 2012; Sharma, 2006; Skoufias, Unar, and González-Cossío, 2008). In urban Ecuadorian localities, Hidrobo *et al* (forthcoming) find that find that randomly assigned cash, food and voucher transfers all lead to improvements the quantity and quality of food consumed. However, differences emerge in the types of food consumed with food transfers leading to significantly larger increases in calories consumed and vouchers leading to significantly larger increases in dietary-diversity. In a randomized study in the Democratic Republic of Congo, cash and coupons are compared and found to have similar impact on total food expenditures (Aker, 2013). However, similar to the studies in Mexico and Sri Lanka, differences across cash and coupons (or food in the case of Mexico and Sri Lanka) emerge with respect to consumption

[1] See Hidrobo *et al* (2012) for a review of recent studies including work by Sharma (2006) and Cunha, De Giorgi, & Jayachandran (2011).

of certain food items. Finally, Aker et al (2012) examine how the form of cash transfers – delivered manually or via mobile phone. They find that beneficiaries receiving transfers via mobile phone purchased a more diverse set of goods, had higher diet diversity, and suffered less asset depletion.

This paper contributes to our understanding of the impact of cash and food transfers on household food security. It uses a randomized design implemented by the World Food Programme (WFP) in the Zinder region of Niger. Niger is an appropriate venue for such a study. Following a famine in 2005, it has become a significant recipient of food assistance (WFP 2012). There are sharp seasonal dimensions to food insecurity in Niger and our evaluation design allows us to assess whether the impact of food and cash transfers varies by season. Additionally, most studies using a randomized design to compare the impacts of cash and food transfers on food security outcomes have been fielded in localities which, by developing country standards, are relatively well off. These, for example the Ecuador and Sri Lanka studies, show that cash transfers lead to greater dietary diversity. However, work that examines the relationship between income and caloric acquisition find that both across and within countries, poorer households have higher income-calorie elasticities than better off households.[2] This suggests that the differential impacts of cash and food transfers on the quantity and variety of food acquisition found in lower-middle and middle income countries may not be replicated in localities where income levels are much lower.

Consistent with this hypothesis we find that food and cash have different impacts on measures of food security. Households in villages randomized to receive the food basket experienced larger, positive impact on measures of food consumption and diet quality than those receiving the cash transfer. The likelihood of attaining an acceptable food consumption score was 11.8 percentage points higher for food households in July and 9.4 in percentage points higher in October. By contrast, households randomized to receive cash were more likely to make bulk purchases of grains. Other outcomes, however, showed greater variation by season. Receiving food reduced the use of a number of coping strategies but this effect was more pronounced during the lean season. Households receiving cash spent more money on agricultural inputs during the growing season. Less

[2] Examples of this are found in Gibson and Rozelle (2002), Hoddinott and Wiesmann (2010), Skoufias et al (2011) and Subramainan and Deaton (1996).

than five percent of food was sold or exchanged for other goods. Both food and cash were delivered with the same degree of frequency and timeliness but the food transfers cost 15 percent more to implement.

2. Contexts

Zinder region, Niger

Niger is one of the poorest countries in the world. It is the fifth poorest when ranked by gross national income per capita (PPP dollars), 172 of 187 when ranked on life expectancy and 186 of 187 on the Human Development Index (UNDP 2012). Poverty in Niger is endemic; 65 percent of the population falls under the national poverty line of $1.65 PPP per day, and the Human Development Report headcount index ranks nearly 93 percent of the population as suffering from deprivation (UNDP 2012). Only about 11 percent of Niger's land is considered arable, and crops suffer from volatility in rainfall and frequent drought. Even when food is available, there are systemic and periodic problems with access and use. Severe food crises affected parts of Niger in 2005-2006, 2010, and again in 2012.

The Zinder region is by Nigerian standards relatively well off.[3] It is in the southern part of the country that receives more rain than the arid north. Approximately 40 percent of Niger's millet production comes from Zinder and the nearby region of Maradi, and Zinder is a surplus production zone for millet and cowpeas, two key staples (FEWS 2010). Livelihoods are a mix of sedentarism and agro-pastoralism. It is also a key commercial hub, in part due to its close proximity and close cultural ties to Nigeria (Eilerts 2006). Yet the region has frequently been among the hardest hit by food crises, and chronically suffers some of the highest rates of malnutrition (Grobler-Tanner 2006). During the 2005 famine, daily mortality rates were higher in Zinder than in any other region, and an estimated 65% of the population had to resort to 'irreversible' coping strategies such as selling large livestock or production tools (Reza *et al* 2008). These challenging conditions are embedded in a complex cultural landscape. Zinder is culturally dominated by the Hausa people, a traditionally agricultural people who speak the Hausa language. They share Zinder with

[3] Outside of the capital, Niamey, Niger is divided into seven regions which in turn are divided into 36 *departements* which are further divided into *communes*.

several smaller ethnic groups including the agro-pastoral Kanuri and the pastoral Peulh, Touareg, and Toubou.

Experimental design

In late 2010, the Government of Niger (GoN) identified the Mirriah *departement* in Zinder as a place where food assistance would be required during the six month period before the September 2011 harvest. Given the availability of grains in local markets, WFP determined that it would be feasible to provide both food and cash to recipients in this area.[4]

Within Mirrah, WFP in cooperation with the GoN identified 126 villages both in need of assistance and suitable for the public works envisaged as part of this intervention. Some villages were subsequently dropped because another organization was planning to provide food assistance to them or because the villages themselves declined to participate. Further investigation indicated that 13 villages had such poor market access that it was inappropriate to provide them with cash primarily due to the possible difficulty and cost entailed for cash recipients to access sufficient food. These villages received transfers but were not included in the surveys leaving 79 villages that were both suitable for the project and that could receive either food or cash transfers. Implementing parties deemed that it would be too complicated and/or lead to tension if proximate villages—especially that shared a worksite during the public works phase—received different forms of transfer. Hence randomization was done at the worksite level. This led to 52 village or village cluster randomization units. Prior to randomizing, we had information on whether these worksites were located in a sedentary agriculture or agro-pastoralist livelihood zone and the number of inhabitants in each worksite. We stratified by livelihood zone (and agro-pastoralist), then ranked worksites from smallest to largest in terms of population. We then randomized through a procedure that assured an approximately equal distribution of villages/worksites by zone and size receiving each transfer (Figure 1)

The project was implemented in two phases over a six month period, from April through September 2011. Phase 1 involved public works activities that took place from April to June. Every household in participating villages was guaranteed 75 day's work on these

[4] A market assessment in May 2011 confirmed that most traders in Zinder were still purchasing grain from local sources. Unlike the northern and western parts of Niger, Zinder is relatively secure which meant that heavily armed escorts would not be needed for cash disbursements.

projects.[5] Most worksites were located near the targeted villages. While participation in public works was voluntary, almost all households in these villages, including both male and female-headed households, took part in work activities (98 percent in the food transfer zone and 95 percent in the cash transfer zone). Households worked the same number of days in both food and cash villages. There was no meaningful difference in women's participation in villages receiving cash relative to villages receiving food. The registered beneficiary, who was usually the household head, was paid twice-monthly. In cash villages, they received 1000 FCFA (roughly 2 USD) per day worked to a maximum of 25000 FCFA per month. This transfer is relatively large, equivalent to approximately 65 percent of annual GDP per capita (Aker et al, 2011). Food payments were provided in the form of a food basket of commodities similar to those typically eaten in the region. A day payment provided a full ration of food for the average household size of seven people, including 3.5 kg of grain (primarily maize in the first transfer period and sorghum in the second), 0.72 kg of pulses (cowpeas, red beans, or lentils), 0.14 kg of vegetable oil, and 0.035 kg of salt. Based on the average monthly prices of these commodities between April and September 2010, the average monthly cost of this food basket to recipients was 24000 FCFA. During the design phase, respondents told project staff that it would cost approximately 800 FCFA to make four trips per month to markets to buy food. Subtracting these transport costs made the value of the food basket and the cash transfer equivalent.[6]

The transport, storage and distribution of food and cash payments were contracted out to several Nigerian non-governmental organizations. For the cash transfers, they charged WFP a fixed percentage of the total amount of cash distributed. For food transfers, they charged a monetary fee based on the quantity of food delivered. These transport, storage and distribution costs were 15.4 per cent higher for food relative to the cash payments.[7] A series of steps were undertaken to ensure that delivery of food and cash was

[5] A small number of households such as those with a young mother and young children were exempted from the work requirement and given an unconditional payment.

[6] Respondents at the community level indicated that on average it cost 480 FCFA (roughly 1 USD) to transport 100kg of cereals from the market to home, or otherwise 1920 FCFA for the transfer period (four trips). This figure, however, does not take into account households pooling transport costs, which could significantly reduce the per-household cost. The average cost for obtaining the food transfers by beneficiaries, as reported in household surveys, was only 60 CFA per trip.

[7] These calculations abstract from a number of fixed costs associated with setting up these payments. For example each smart card used for the cash payments cost $6.00 and there were additional costs associated with writing the computer programs needed to dispense payments through the mobile ATMs. Costs such as

similar. On payment days in villages receiving cash payments, all beneficiaries would assemble at a central point where a mobile ATM would be situated. In most cases, this was the village where public works participants resided but there were six villages where it was necessary to travel to a nearby village. At the beginning of the project food was delivered to each village and stored in a centrally located secure building that was constructed to ensure that the food would not deteriorate. On payment days, households queued near the granary to receive their payments. The average total time spent obtaining transfers, walking to the payment site and waiting in line, were the same for food and cash households (one hour). Actual transport costs were much lower than anticipated as beneficiaries pooled transport costs; recipients reported that the average cost of obtaining the food transfers was, in fact, only 60 CFA per trip or 0.8 percent of the monthly transfer. We also note that nearly all payments were made within each recipient village. Access to markets was relatively similar for cash versus food recipient villages (see Table 1). All were roughly equally likely to have a market within the village. For those without a market within the village, which was the majority of all households, food recipients were slightly further (65 versus 57 minutes' walk away), and somewhat less likely to have a cereal bank or government point of purchase in or near the village (60% versus 78% of villages).

During the second phase, from July through September, 50 percent of households in each village were selected to continue to receive the same transfer without having to fulfill a work requirement; this was dropped out of concern that public works activities would interfere with the planting and weeding of crops during the agricultural season. Targeting of unconditional transfer recipients was left in part to the implementing partners, with guidance from the WFP on key vulnerability criteria. Implementing partners applied the key criteria using a participatory approach in each community.[8] A locality selected to receive cash(food) used cash(food) for both public works and unconditional transfer payments.

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these are not included in the calculations reported here. We exclude costs that were common to both the food and cash payments such as costs associated with implementing the public works, identifying the beneficiaries, program sensitization, identification of implementing partners and contract negotiations with MFIs selected to implement this intervention.

[8] The implementing agencies made the selection in partnership with village leadership committees, with reference to a set of categorical indicators such as households with children under the age of 24 months, single parent household, etc. We later collected information at the community level on the vulnerability criteria used in each case to assess any systematic differences in the targeting procedure by transfer modality, and found none.

3. Data

Randomization and balance

Impact evaluations usually have baseline surveys prior to the start of the intervention, though as McKenzie (2012) notes, this is not always necessary. We had planned a baseline survey but security considerations in the intervention region at the start of 2011 prevented us from accessing the intervention sites.[9] The first survey was implemented in July, at the conclusion of the public works intervention but before the roll-out of the unconditional transfer. All households in all villages were administered a basic questionnaire. A randomly selected sample of 2268 households who had been targeted for the unconditional transfers was interviewed in greater depth. A follow up survey was then administered to the sampled households at the conclusion of the unconditional transfers, with 2209 being successfully traced and interviewed.

In both rounds household and community surveys were administered. The household survey instruments included questions on demographic characteristics, livelihoods, assets, livestock, agricultural production, and public works participation. Pre-intervention characteristics (ie as of April 2011) including household composition, asset ownership and indebtedness were retrospectively assessed as part of July survey. Food security impacts and intra-household sharing were captured in modules on food consumption, coping strategies and children's food consumption. The survey instrument also included questions on non-food expenditures, debt, inter-household transfers, migration, and labor force participation. The community survey instrument collected information on access to services, proximity and distance of markets, prices on key staples and livestock, and criteria for selection of beneficiaries for the unconditional transfers.

Table 1 provides selected pre-intervention descriptive statistics. Following Bruhn and McKenzie (2009, p.28), we focus on those characteristics that we believe *a priori* are correlated with the food security outcomes that we will consider. Results presented in the first two rows are derived from data collected by WFP in late 2010; the remainder are

[9] These security issues – a dramatically heightened risk of kidnapping of foreign nationals – prevented us from even pilot testing of the survey instruments before June 2011. However, as these were directed at foreigners, not nationals, it was possible for the intervention to start in April 2011.

drawn from the retrospective components of the community and household survey instruments.[10]

We begin with worksite means, disaggregated by whether the locality was randomized to receive food or cash. They are equally divided across sedentary and agro-pastoralist zones. Households are relatively large in both food and cash villages, 7.2 and 7.4 members respectively. We consider measures of access to food in terms of local production and access to markets. Land allocations are similar in cash and food villages with most land allocated to coarse grains, sorghum or millet, and smaller fractions allocated to cowpeas and groundnuts. About two-thirds of villages are accessible by road. It typically takes just under one hour to reach a road and about the same time to access a market. There are relatively few food markets in these villages. Nearly all have cell phone coverage.

Next, we consider household characteristics which affect food security: demographic, wealth and food production. About third are either polygamous or female headed. They are poor. Fewer than 10 percent of heads have any formal schooling.[11] While nearly all households own or rent farmland, and average operating sizes look large, this is not highly productive. Housing quality is poor and the vast majority of households own little in the way of productive assets or consumer durables. We summarize these in the form of an asset index. Around 30 per cent of households report that they own no livestock and another 12 percent own only chickens or one ruminant. We convert data on livestock holdings to Tropical Livestock Units (TLU), a measure that weights different animals (in this case between 0.02 and 1) based on their bodyweight. Households own, on average, one TLU.

We now consider whether the sample is balanced across worksites and across households in those worksites. Before doing so, we note that given *k* number of covariates over which we assess balancing, the chance of at least one covariate showing a "significant difference" between our two treatment groups at significance level α is $1 - (1 - \alpha)^k$. As Morgan and Rubin (2012) point out, with a modest number of covariates, say 10, and α set equal to 0.05, there is a 40 percent chance of at least one covariate not balancing. Given

[10] We provide unweighted statistics. Using sampling weights that reflect the inclusion probability of the households in the sample have a minor impact on the results.

[11] Formal education refers to the completion of at least one year of primary schooling. We exclude attendance at Koranic schools because individuals attending these do not necessarily learn to read and write.

this, as Bruhn and McKenzie (2009) note, it would be odd if we did not encounter at least one variable where we will reject the null of no difference between the groups over which we randomize.

At the worksite level, there is no statistically significant difference in household size or residence by agro-ecological zone, the two characteristics we could observe before randomizing. When we look at a wide range of household demographic, asset, or livelihood characteristics, there is are no statistically significant differences between food and cash localities across most variables that we consider; further, the magnitudes of the differences are small. The one exception is the presence of a cereal bank in the village which is higher in cash villages than in food villages.

At the household level, we are working with very large sample sizes, 2256 observations in the July survey round. At such large sample sizes, as Behrman and Todd (1999) note in their assessment of the randomization in the evaluation of Mexico's *Progresa* conditional cash transfer progamme, even small deviations from the null are likely to be rejected. Despite this, Table 1 shows that there are a few household characteristics where we reject the null of equality between households residing in localities randomized to receive food and those randomized to receive cash and the magnitudes of these differences are small. Households in localities randomized to receive food have similar demographic and land use characteristics as those randomized to receive food. On some measures of wealth such as livestock they are comparable but on others, such as the asset index, households in food localities are wealthier. Also, households receiving food transfers were more likely to be from the largest ethnic group, the Hausa.

Outcomes

The survey module on household food security identified which foods were consumed and the frequency of their consumption over the previous seven days. The specific items selected were based on previous survey work in this area as well as discussions with key informants. While the survey instrument did not collect information on quantities consumed, it distinguished between foods that are served as a separate item and foods that are used only as a sauce or condiment. We use these data to construct two measures of household food security: the Dietary Diversity Index (DDI) and the Food Consumption Score (FCS). DDI is calculated by simply summing the number of distinct food categories consumed

by the household in the previous seven days. The household questionnaire covers 25 such food categories, and thus the DDI in this survey ranges from 1 to 25. Hoddinott and Yohannes (2002) show that the DDI correlates well with both household dietary quantity and quality. Next, we aggregate these 25 food categories into eight groups: staples, pulses, vegetables, fruit, meat/fish, milk/dairies, sugar/honey, oils/fats. The FCS is calculated by summing the number of days each food group was consumed then multiplying those frequencies by a predetermined set of weights designed to reflect the heterogeneous dietary quality of each food group (Weismann *et al* 2009).[12]

Three considerations motivate our use of these outcome variables. First, the FCS is considered a "core" indicator by WFP (WFP 2008) and the success of interventions such as the one evaluated here is measured by improvements in this outcome. Second, validation studies show that the FCS is highly correlated with measures of food security that draw on more detailed food consumption data such as per capita caloric availability derived from seven day recall of food quantities consumed (Wiesmann *et al* 2009). Third, logistical constraints meant that we needed to keep the survey instrument as simple as possible. It was simply impractical to include a more detailed consumption module.

Table 2 describes these outcome variables by both round and modality. The DDI shows us that in July 2011 households consumed on average 8.2 foods out of the list of 25 items, and in October (following the 2011 harvest) on average 9.2. When we compare individual food groups over time, we see increases of five to 15 percentage points in the proportion of households consuming vegetables, oils, pulses, dairy, sugars, tubers and meats. There is no meaningful change in the proportion of households consuming fruit, fish or eggs.

WFP classifies households as having poor food security when the FCS falls below 21, borderline when it lies between 21 and 35, and acceptable if over 35. Loosely, a cut-off of 35 corresponds to daily per capita caloric availability of around 1950 kcal. Food insecurity is widespread in this sample in July 2011; while the full sample average is 40.8, 33 percent of households have borderline food insecurity and 24.7 percent have poor food insecurity. Due for the most part to the onset of the harvest and a seasonal increase in food availability and

[12] Weights are: staples, 2; pulses, 3; vegetables, 1; fruit, 1; meat, poultry, fish and eggs, 4; dairy 4; sugars, 0.5; oils and fats, 0.5

access, these figures improve significantly in October, with the full sample average FCS up to 47.3, those with borderline down four percentage points to 29 per cent and those with poor down to only 9 per cent. Figure 2 shows the density of FCS by transfer modality in July and October, with the rightward shifts in October indicating improvement for both cash and food households. Table 2 shows that households in localities that were randomized to receive food have higher mean levels of DDI and FCS.

We also consider a second measure of food security, household coping strategies. These actions taken by individuals or households who, under stress, restrict expenditures or generate additional resources so as to acquire basic consumption goods (food, shelter) while protecting existing asset holdings. As Devereux and others have noted (e.g. Devereux, 1993), these exist along a continuum from those that involve relatively modest shifts in consumption patterns to more extreme behaviors such as going without food for a full day. The household survey instrument contained a set of questions on household coping strategies. We look in turn at a range of food-related coping strategies, such as not having to borrow or beg for the means to purchase food, consuming undesirable foods, or reducing portion sizes or the number of meals. We then construct a Coping Strategies Index (CSI) following Maxwell and Caldwell (2008), as an aggregate measure of food security. Each strategy is given a frequency score depending on the number of times it was used and a weight reflecting its severity. There is significant improvement in the coping strategies index over the course of the second round of intervention between July and October, from an average of 5.4 to an average of only 0.8. There are significant differences in both periods between cash and food households, but this gap closes between July and October.

We hypothesized that beneficiaries might use their transfers to buy food in bulk. Since the notion of a "bulk" purchase is somewhat subjective, in both survey rounds we asked this in an open ended fashion. For example, in the July survey this was phrased as "*Depuis avril 2011, avez-vous acheté des graines en plus grande quantité que vos achats de grains habituels*? ("Since April 2011, have you purchased grains in larger quantities than you usually purchase?") In July, 504 out of 2,263 households (22.2 percent) indicated that they had made such a purchase, 85 percent of whom were households in villages randomly assigned to receive cash. We then asked the cash value of such purchases. We also examined non-food expenditures across a range of categories. There are some differences between cash and food households, as well as between periods, but most are small in

magnitude (Table 3). Cash households spend more for example on wages, veterinary products, and seeds, in both July and October, while food households spend somewhat more on a few other items. Cash households do however spend significantly more on average on bulk grains; they are nearly 30 percentage points more likely to invest in 'larger quantities of grain than usual,' and spend larger sums, in both periods.

4. Methods

Ideally, we would estimate either a double-difference model or a single difference model with controls for the stratification variable and baseline outcomes. However, because we do not have a baseline survey, this is not possible. Instead, following Bruhn and McKenzie (2009), we estimate a single difference model that contains the treatment variable, the stratification variables and the pre-intervention characteristics that are correlated with the outcomes we consider and over which we tested the balancing properties of our sample.

$$y_{iw} = \alpha + \beta\, stratum_{iw} + \delta food\ village_{iw} + \boldsymbol{\theta X_{iw}} + \varepsilon_{iw} \qquad (1)$$

where y_{iw} is the outcome of interest for household i at worksite w, stratum is the variable (agro-ecological zone) over which the randomization was stratified, $food\ village_i$ is a dummy variable equal to one if a household lives in a village receiving food (and 0 otherwise) and $\boldsymbol{X_{iw}}$ is a vector of household baseline covariates and village characteristics correlated with the outcomes being considered and over which in Table 1 we assessed the balancing properties of our data. The parameter δ is the parameter of primary interest. It tells us the impact on outcomes of being randomized into a village receiving food relative to being randomized into a village receiving cash. We allow for the error terms to be correlated by clustering at the worksite (randomization) level. The randomization of the modality ensures that E(*food village*$_i$ ε_{iw}) equals 0 and thus that δ is an unbiased estimate of impact. We estimate (1) separately for outcomes measured in July and in October. We use OLS for outcomes that are continuous, probits where they are dichotomous, Poisson regressions where we have count data and tobits where the outcome is continuous but also censored at zero. Estimates of δ are transformed into marginal effects where the estimator is non-linear. Standard errors are calculated accounting for clustering at the unit of randomization.

5. Results

a. Food security

Table 4 shows the impact of residing in a village whose worksite was randomized to receive food transfers on the DDI, FCS and whether the FCS was above the WFP cut-off for a minimally acceptable diet.

We begin with the DDI. There is a small, positive impact of being in a village receiving food on the DDI, an additional 0.56 food items in July and 0.38 items in October. But these magnitudes are relatively small, corresponding to increases of 7.2 and 4.4 percent respectively. By contrast, there are large, positive and statistically significant impacts of the receipt of food on the FCS. After controlling for household and village characteristics, households in localities receiving food have an FCS on average 3.9 points higher than cash households in July and 3.5 points higher in October, relative to a mean FCS in July for cash households of 37.6. The likelihood of having an acceptable food consumption score is 11.8 percentage points higher for food households in July and 9.4 percentage points higher in October.

Table 5 reports the impact of access to food transfers on the likelihood and frequency of consumption of selected food groups in the seven days prior to the survey. We find that relative to households receiving cash, households in villages randomly assigned to receive food consumed more of the items given to them in the food basket: cereals, pulses and oil. They also increased the frequency of their consumption of these items: increasing their consumption of oils by one day and pulses by 0.6-0.7 days. By contrast, their consumption of cheap, starchy calories from tubers declines. There is no differential effect on the frequency of consumption of meat, dairy, fruit or vegetables. This is consistent with information food recipients provided to us. Only 5 percent of food recipients reported that they sold some of the food, and 13 percent that they exchanged some of the payment for other food or non-food items. Just 1.2 percent of all food received was sold and only 3.7 percent exchanged.

Table 6 shows the results of estimating our single difference equations for the July and October survey rounds where the dependent variables are the likelihood of making a large grain purchase and the value of this purchase. While the type of grain purchased was not specified, it was most likely to be one of the core local staples, either millet or sorghum. Households who received cash ate few other grains, as reported toward the end of the

transfer period; 96%(100%) ate millet, 60%(36%) and ate sorghum, whereas 17.5%(6%) ate maize and 4%(50%) ate rice in the July(October) round. In the three months prior to the July(October) survey, households in food localities were 27(37) percentage points less likely to make these purchases relative to households in cash localities. The marginal impact was a reduction in the value of such purchases of 15,377 FCFA in July and 23,756 FCFA in October. In other words, it appears that relative to households in food localities, households receiving cash used a significant proportion of their transfers to purchase the cheapest form of calories available.

One reason lies in the sharply seasonal nature of grain prices in this region. Agriculture production is characterized by volatile conditions and one fairly short growing season. The climate is hot and dry year round, but hottest in May, right before the brief but at times intense rainy season of June to August. Field preparation may start as early as April but peaks between July and September, the pre-harvest period known as the *soudure* or hungry season. Millet, the dominant food produced and consumed throughout Niger, is surplus in production throughout much of the southern part of the country, especially Zinder, where millet is sourced for much of the country. Niger often produces a deficit, however, and imports millet from Nigeria, Benin, and Burkina Faso during the hungry season. The seasonality of production patterns and trade flows leads to inter-seasonal fluctuations in the prices of key staple commodities in Zinder.

This seasonality, as is shown in Figures 3a and 3b, provides clues as to why we may be observing these bulk purchases of grains by households in cash villages. Figure 3a shows that historically grain prices in the survey area, both millet and maize, rise between January and August. They fall sharply during the harvest period before starting to rise again in November. Figure 3a also shows that this pattern was somewhat different in the year prior to the intervention. Not only were grain prices significantly above historical averages, millet prices rose faster than the historical average. Figure 3b shows that in the four months prior to the start of the intervention, both millet and maize prices were again rising, with April 2011 prices already equal to or higher than the highest price typically observed during the peak of the hungry season. Given this historical experience, it is understandable that may

cash households may have felt compelled to buy large grain quantities rather than risk exposure to uncertain food price changes.[13]

b. Coping strategies and non-food expenditures

Table 7 examines the coping strategy index (CSI) and individual coping strategies used by households to acquire food. Recall that the higher the CSI, the more severe the coping strategies used. Households in food localities have a lower CSI than cash households in July and October. The July results are driven by changes in credit behavior by households receiving food payments: these households were less likely to borrow from relatives, friends or neighbors, to purchase food on credit or to cancel a debt repayment. Food households were less likely to report that they reduced portion sizes served to children or that household members went to be hungry. While the marginal effects look small, they are relatively large compared to the mean values reported in Table 3. However, these effects on more severe coping strategies are less marked in October as the harvest period begins.

We considered whether households in food and cash villages had different patterns of expenditures on non-food items (Table 8). Across all items, the marginal impact of being in a food village is to raise monthly expenditures on all non-food items by 2542 FCFA in July. This is equivalent to about ten percent of the value of the monthly transfer. There is no statistically significant impact on all non-food items in October. Across the individual items, it is difficult to discern consistent patterns. Only seven of the 18 coefficients are statistically significant at the 10 percent level or higher and the magnitude of two of these (firewood and other fuels; soap, perfumes and hair products) is small, less than 500 FCFA. The most noteworthy finding is that households in cash villages spent more on agricultural inputs in both the lead up and during the main cropping season and the magnitude of this effect especially in October (6188 FCFA or just over 24 percent of the monthly transfer) was large.

c. Additional results

[13] As a robustness check, we re-estimated the results found in Tables 4, 5 and 6 with food (millet, maize) prices included as additional controls. Doing so did not affect our results.

We considered whether there were larger changes over time in households residing in localities assigned to receive food. To do so, we also estimated models of the following form:

$$y_{iwOctober} - y_{iwJuly} = \alpha + \beta\, stratum_{iw} + \delta food\ village_{iw} + \boldsymbol{\theta X_{iw}} + \varepsilon_{iw} \quad (2)$$

Generally, across the outcomes we consider, δ is not statistically significant when we estimate (2), that is, we do not reject the null hypothesis that changes in outcomes over time are different in food and cash villages. The exception to this are the results for specific coping strategies where δ is negative and significant for a number of the more severe coping strategies such as reducing children's portion sizes and going a whole day without eating.

We looked for evidence of heterogeneous impacts along two dimensions, household wealth and the gender of the household head. Across all outcomes we consider and across both survey rounds, we do not find any evidence that the interaction terms between gender of head and residing in a village receiving food are statistically significant. Across all outcomes measured in the July round, the interaction terms between wealth (measured in tertiles, quartiles or quintiles) and residing in a village receiving food are not statistically significant. In the October round, households in the lowest quartile and in food villages obtained greater improvements in the FCS measure and were less likely to have poor food security status. Overall, however, we found little evidence of heterogeneous impacts across wealth categories and gender of head.

6. Conclusions

In this paper, we have used a randomized design to inform debates regarding the use of cash and in-kind transfers as a means of improving household food security. With respect to the short term food security objectives of the donor – WFP - this intervention, the food basket had clear advantages. Households in localities randomized to receive the food basket experienced larger, positive impacts on measures of food security and dietary diversity than those receiving the cash transfer. One reason that the cash recipients had less diverse diets lies in their choice of purchasing grains in bulk, a reflection we perceive of both the extreme poverty found in this area and uncertainty regarding future food prices. While these

differences held in both periods, other outcomes showed greater variation by season. Households receiving food resorted to fewer coping strategies, and this effect was more pronounced during the height of the lean season than during the growing season. Food recipients did not trade their transfers to any large extent; less than five percent of food was sold or exchanged for other goods. Households receiving cash spent more money on agricultural inputs during the growing season. Both food and cash were delivered with the same degree of frequency and timeliness, but the food transfers cost 15 percent more to implement.

While food recipients experienced greater food security benefits in the short term, we cannot assess the relative benefits in the long term; the fact that beneficiaries receiving cash spent more on agricultural inputs may mean that these households have higher incomes in the future. Finally, the specific context of this study is important. Our results are informative about the relative impacts of food and cash transfers in an extremely poor, rural setting, but caution should be exercised in extrapolating them to settings much different than those found in rural Niger.

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Table 1: Pre-intervention characteristics by transfer modality

	Cash	Food	Difference (Cash-Food)	Cash	Food	Difference (Cash-Food)
Characteristics known before randomization						
Agro-pastoral zone (stratum variable)	44.4	44.0	0.4			
Household size (average)	7.4	7.2	0.2			
Pre-intervention village-level characteristics						
Land allocation to millet (%, average)	64.2	62.2	2.0			
Land allocation to sorghum (%, average)	17.6	16.8	0.8			
Land allocation to cowpeas (%, average)	11.9	14.0	-2.1			
Land allocation to groundnuts (%, average)	4.6	4.8	-0.2			
Time to reach main road (min)	57.6	52.9	4.7			
Market in village	11.1	8.7	2.4			
Time to reach market, if not in village (min)	56.2	68.8	-12.6			
Cereal bank in or near village	79.3	52.2	27.1**			
Cellular phone service in village	86.9	96.0	-9.1			
Pre-intervention household-level characteristics						
Polygamous household (percentage)	14.6	17.4	-2.81	14.7	17.1	-2.4
Female household heads (percentage)	23.1	20.9	2.21	21.8	24.5	-2.7
Age of head (average)	47.6	47.9	-0.26	48.4	48.5	-0.1
Heads with formal education (percentage)	6.0	5.6	0.4	7.0	7.5	-0.5
Households belonging to ethnic majority (percentage)	90.7	86.9	3.8	91.0	88.6	2.4
Hausa	54.2	64.7	-10.5	57.4	66.2	-8.7***
Tropical Livestock Units	1.1	1.8	-0.1	0.8	1.0	-0.2
Asset Score (PCA)	-0.15	0.22	-0.37	-0.19	0.24	-0.43***
Cultivates land (%)	96.0	95.7	0.3	96.1	95.4	0.7
Land area cultivated (ha)	1.7	1.7	0.0	1.7	1.8	-0.1
Sample sizes	27	25		1198	1070	

Notes: P values are from t tests where the null hypothesis is that the work site means are equal.

Table 2: Food security measures and coping strategies by survey round and transfer modality

	July			October		
	Cash villages	**Food villages**	**P-value of t-test**	**Cash villages**	**Food villages**	**P-value of t-test**
HDDI	7.8	8.7	0.00	8.9	9.6	0.00
FCS (average)	37.6	44.4	0.00	44.4	50.6	0.00
FCS categories (percentage of households)						
Poor	31.4	17.1	0.00	11.4	6.6	0.00
Borderline	34.9	31.6	0.09	34.7	23.4	0.00
Acceptable	33.6	51.3	0.00	53.9	70	0.00
Food Groups Consumed (percentage of HHs)						
Cereals	100.0	100.0	.	100.0	100.0	.
Tubers	30.7	20.9	0.00	32.7	28.3	0.03
Vegetables	94.2	94.3	0.95	99.8	100	0.19
Fruit	8.6	14.2	0.00	5.9	11.0	0.00
Meat	22.7	30.4	0.00	28.8	34.5	0.00
Eggs	2.5	2.3	0.79	1.3	1.2	0.82
Fish	2.8	4.9	0.01	3.9	5.2	0.13
Pulses	76.5	85.3	0.00	96.0	99.1	0.00
Dairy	55.8	61.1	0.01	73.8	68.9	0.01
Oils	80.3	94.5	0.00	87.3	96.6	0.00
Sugars	48.0	54.5	0.00	60.2	60.2	0.99
Coping strategy index (Average)	7.3	3.1	0.00	1.0	0.6	0.02
Individual Coping Strategies (percentage of HHs)						
Relied on less preferred foods (w=1)*	28.8	18.6	0.00	6.7	6.0	0.51
Borrowed food from relatives, neighbors or friends (w=2)	18.9	8.5	0.00	6.3	5.4	0.40
Purchased food on credit (w=2)	17.4	8.5	0.00	5.1	3.2	0.03
Consumed more than usual of shortage food (w=4)	9.8	3.2	0.00	0.4	0.0	0.04
Consumed seed stock (w=3)	11.0	7.1	0.00	1.5	0.5	0.02
Had to beg (w=4)	1.8	0.7	0.03	0.1	0.3	0.25
Reduced portion sizes for adults (w=2)	16.7	6.6	0.00	2.5	0.6	0.00
Reduced portion sizes for children (w=1)	10.5	3.9	0.00	1.4	1.1	0.54
Had to reduce number of meals per day (w=2)	14.3	5.9	0.00	2.2	0.6	0.00
Had entire days without eating (w=4))	6.2	1.7	0.00	0.4	0.3	0.60
Had to cancel debt repayments to buy food	13.4	6.4	0.00	1.9	1.3	0.25

*w refers to severity weight used for calculating the CSI.

Table 3: Household expenditures by survey round and transfer modality

	July			October		
	Cash villages	**Food villages**	**P-value of t-test**	**Cash villages**	**Food villages**	**P-value of t-test**
Bulk Grain Purchases						
Household has purchased larger quantities of grain than usual, prior 3 mos. (percentage)	36.0	7	0	32	2	0
Average monthly purchase of lumpy grain, Apr-Jun / Jul-Sep (FCFA)	3419	644	0	3434	219	0
Non-Food Purchases (FCFA)						
Total spending, past 3 months (all households)	27349	30742	0.07	25981	27372	0.39
Firewood, charcoal/ Oil, gas, batteries/ Fuel, lubricants	518	707	0.00	746	948	0.24
Bodycare (soap, perfumes, braids)	1807	1926	0.13	1818	1899	0.30
Communication/transports	2525	3294	0.27	2576	3153	0.24
Wages, veterinary products and seeds	4413	3534	0.01	3635	2553	0.02
Health	5272	5185	0.89	5242	5595	0.51
Education	1329	975	0.05	333	234	0.20
Clothing, footwear	5346	6762	0.00	7757	8466	0.06
Ceremonials, funerals, festivities	6591	9454	0.00	5819	7007	0.07
Construction, repair, housing	2289	2000	0.39	1013	860	0.45
Number of households	*1198*	*1070*		*1179*	*1030*	

Table 4: Impact of food transfers, relative to cash, on food security outcomes by survey round

	Dietary Diversity Index		Food Consumption Score		Household has low FCS	
	July	October	July	October	July	October
Household residing in village receiving food transfers	0.563***	0.379*	3.905***	3.532***	0.118***	0.094**
	(-0.186)	(-0.203)	(-1.153)	(-1.292)	(-0.04)	(-0.043)
Household resides in agro-pastoral zone	0.402	1.305***	2.846	8.797***	0.141**	0.320***
	(-0.342)	(-0.302)	(-1.925)	(-2.02)	(-0.063)	(-0.076)
Age of household head	0.000	-0.002	0.081***	0.03	0.002***	0.001**
	(-0.004)	(-0.004)	(-0.024)	(-0.022)	(-0.001)	(-0.001)
Household head is female	-0.261	-0.224*	0.918	-0.149	0.024	-0.016
	(-0.163)	(-0.119)	(-0.561)	(-0.606)	(-0.019)	(-0.021)
Household head has formal schooling	-0.161	0.154	-1.087	-0.718	-0.029	-0.060**
	(-0.211)	(-0.198)	(-1.273)	(-1.006)	(-0.034)	(-0.028)
Household Size	-0.079***	-0.055***	-0.514***	-0.292*	-0.010***	-0.007
	(-0.023)	(-0.017)	(-0.148)	(-0.151)	(-0.004)	(-0.005)
Polygamous household	-0.355**	-0.224	-0.186	1.14	-0.055**	-0.012
	(-0.163)	(-0.161)	(-0.973)	(-1.146)	(-0.026)	(-0.035)
Household belongs to ethnic majority in village	-0.12	-0.317	-0.601	-2.293*	0.001	-0.065
	(-0.255)	(-0.204)	(-1.114)	(-1.208)	(-0.037)	(-0.04)
Household belongs to Hausa ethnic group	0.019	0.133	-1.341	-1.567	-0.091***	-0.086**
	(-0.19)	(-0.169)	(-1.042)	(-1.036)	(-0.035)	(-0.034)
Asset ownership index	0.410***	0.220***	1.913***	0.924***	0.046***	0.025***
	(-0.053)	(-0.034)	(-0.272)	(-0.174)	(-0.007)	(-0.005)
Total Livestock Units owned	0.009	-0.038**	0.292	0.114	0.008	0.001
	(-0.035)	(-0.016)	(-0.217)	(-0.198)	(-0.006)	(-0.004)
Food market is present in village	0.431**	0.486*	0.001	-0.214	-0.025	0.014
	(-0.186)	(-0.258)	(-1.252)	(-1.76)	(-0.05)	(-0.059)
Time to reach food market if not in village	0.001	0.002	0.013	0.003	0.000	0.000
	(-0.002)	(-0.003)	(-0.012)	(-0.014)	(0.000)	(0.000)
Cereal bank in or near village	0.279	-0.118	-3.001**	-4.271***	-0.058	-0.125**

	(-0.227)	(-0.212)	(-1.327)	(-1.573)	(-0.04)	(-0.057)
Village has mobile	-0.113	0.158	-1.133	0.03	0.015	-0.073
	(-0.322)	(-0.317)	(-1.938)	(-1.764)	(-0.064)	(-0.065)
Time to reach main road	-0.015***	-0.012***	-0.063***	-0.036	-0.002**	-0.002**
	(-0.004)	(-0.004)	(-0.022)	(-0.025)	(-0.001)	(-0.001)
% of village land allocated to millet	0.012	-0.024	0.421***	0.106	0.010**	0.005
	(-0.023)	(-0.024)	(-0.125)	(-0.135)	(-0.004)	(-0.004)
% of village land allocated to sorghum	-0.007	-0.023	0.353***	0.119	0.008*	0.003
	(-0.024)	(-0.026)	(-0.122)	(-0.136)	(-0.004)	(-0.004)
% of village land allocated to cowpeas	0.012	0.007	0.399***	0.222)	0.008*	0.007*
	(-0.025)	(-0.022)	(-0.122)	(-0.139	(-0.004)	(-0.004)
% of village land allocated to peanuts	-0.054	-0.036	0.404*	0.078	0.01	0.004
	(-0.038)	(-0.049)	(-0.209)	(-0.219)	(-0.006)	(-0.007)
R squared	0.328	0.324	0.309	0.221		
Number of observations	2267	2208	2263	2208	2263	2208

Notes: Commune fixed effects are included but not reported. Standard errors, shown in parentheses, are calculated accounting for clustering at the worksite level. *, significant at the 10% level; **, significant at the 5% level; ***, significant at the 1% level. Marginal effects are reported where the outcome is dichotomous.

Table 5: Marginal effects of food transfers, relative to cash, on consumption of selected food groups by survey round

	In the last seven days:			
Food group	Were items in this food group consumed?		Number of days items in this food group were consumed	
	July	October	July	October
Cereals	-	-	0.104*	0.093***
			(-0.053)	(-0.036)
Pulses	0.093***	0.018	0.656**	0.739***
	(-0.031)	(-0.015)	(-0.27)	(-0.147)
Oils	0.121***	0.059***	0.983***	0.994***
	(-0.034)	(-0.02)	-0.274	(-0.194)
Tubers	-0.055	0.036	(-0.22)	-0.072
	(-0.032)	(-0.032)	-0.084	(-0.074)
Meat	0.031	0.039	0.069	-0.12
	(-0.032)	(-0.026)	(-0.091)	(-0.078)
Dairy	-0.008	0.024**	-0.118	-0.134
	(-0.008)	(-0.01)	(-0.23)	(-0.215)
Vegetables	-	-	0.037	0.081*
			(-0.151)	(-0.042)
Sugar, sweets	0.053**	0.020	0.05	0.218
	(-0.024)	(-0.023)	(-0.146)	(-0.142)

Notes: Each cell represents the impact of being randomized to receive food transfers on the likelihood or frequency of consumption of a particular food group. Consumption of items estimated using a probit. Number of days consumed estimated using a Poission model. Results are reported as marginal effects. See Table 4 and its notes for controls included but not reported here, sample sizes and construction of standard errors.

Table 6: Marginal effects of food transfers, relative to cash, on purchase of large quantities of grain

	Did household make purchase		Expenditure on this item	
	July	October	July	Oct
Purchase of grains in bulk	-0.265***	-0.368***	-15377.3***	-23756.9***
	(0.021)	(0.036)	(1595)	(478.0)

Notes: Purchase of items estimated using a probit. Expenditures estimated using a tobit. Results are reported as marginal effects. Also see Table 4 notes.

Table 7: Impact of food transfers, relative to cash, on coping strategies by survey round

Coping Strategies Index	-4.235**	-4.310***
	(-1.91)	(-0.37)
Selected coping strategies		
Relied on less preferred foods	-0.04	-0.002
	(-0.03)	(-0.023)
Borrowed food from relatives, neighbors or friends	-0.092***	-0.028
	(-0.025)	(-0.02)
Purchased food on credit	-0.052**	-0.025
	(-0.02)	(-0.015)
Had to rely on aid from outside the household	0.004	-0.006
	(-0.017)	(-0.021)
Had to cancel debt repayments	-0.050**	0.021
	(-0.019)	(-0.015)
Had to ask other households for food to feed children	-0.023	0.003
	(-0.017)	(-0.012)
Reduced portion sizes for adults	-0.038	-0.070***
	(-0.023)	(-0.013)
Reduced portion sizes for children	-0.055**	-0.039**
	(-0.022)	(-0.018)
Reduced number of meals per day	-0.031	-0.037***
	(-0.023)	(-0.014)
Went to bed hungry	-0.031**	-0.002
	(-0.013)	(-0.017)

Notes: Each cell represents the marginal effect of being randomized to receive food transfers on the likelihood of using a particular coping strategy or on the level of coping strategies used. Also see Table 4 for additional notes

Table 8: Marginal effects of food transfers, relative to cash, on non-food expenditures

	Did household make purchase		Expenditure on this item	
	July	October	July	October
Total non-food expenditures	-	-	2542.1***	-225.5
			(694.7)	(927.9)
Firewood, fuels, batteries	0.088***	-0.078***	352.2***	-160.3
	(0.030)	(0.021)	(111.1)	(231.8)
Personal care (soap, perfumes, braids)	-0.005	-0.002	414.3***	126.3
	(0.009)	(0.009)	(115.7)	(135.9)
Communication and transport	-0.069***	-0.036	-2050.5	-928.4
	(0.023)	(0.030)	(1908.5)	(1321.1)
Wages, veterinary products, seeds	-0.095***	-0.093***	-1577.7**	-6188.2***
	(0.034)	(0.032)	(796.9)	(2135.9)
Health	-0.030	-0.024	1869.1	-286.4
	(0.028)	(0.029)	(1187.9)	(896.5)
Education	0.098***	-0.012	3696.3***	-1393.6
	(0.023)	(0.017)	(218.7)	(2300.8)
Clothing and footwear	0.001	-0.013	1727.1***	248.6
	(0.022)	(0.014)	(660.3)	(580.4)
Ceremonies, funerals, feasts	0.033	0.043*	3301.5*	393.0
	(0.025)	(0.026)	(1809.5)	(1351.0)
Construction, repair, housing	-0.020	0.015	-1501.6	2434.3***
	(0.022)	(0.012)	(1730.1)	(305.4)

Notes: Purchase of items estimated using a probit. Expenditures estimated using a tobit. Results are reported as marginal effects. Each cell represents the marginal effect of being randomized to receive food transfers on the likelihood or level of non-food expenditures. Also see Table 4 notes.

Figure 1: Sample sizes, by agroecological zone, transfer modality and survey round

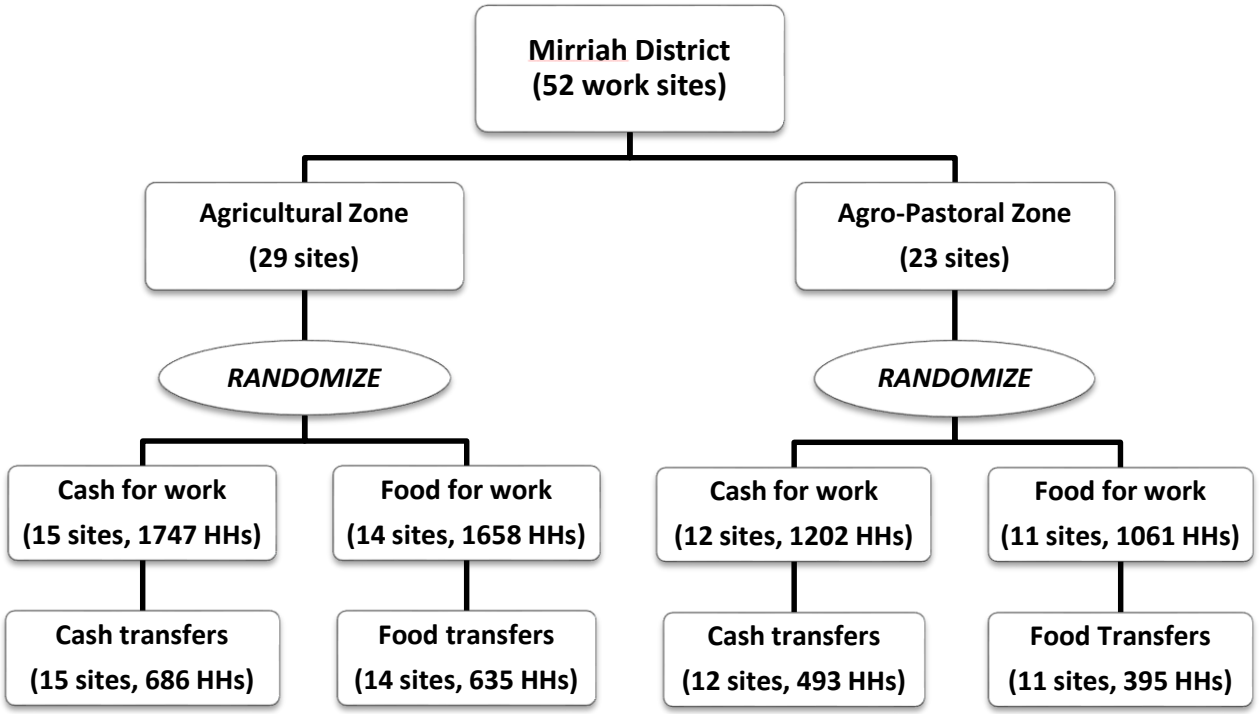

Figure 2: Density function of FCS by transfer modality

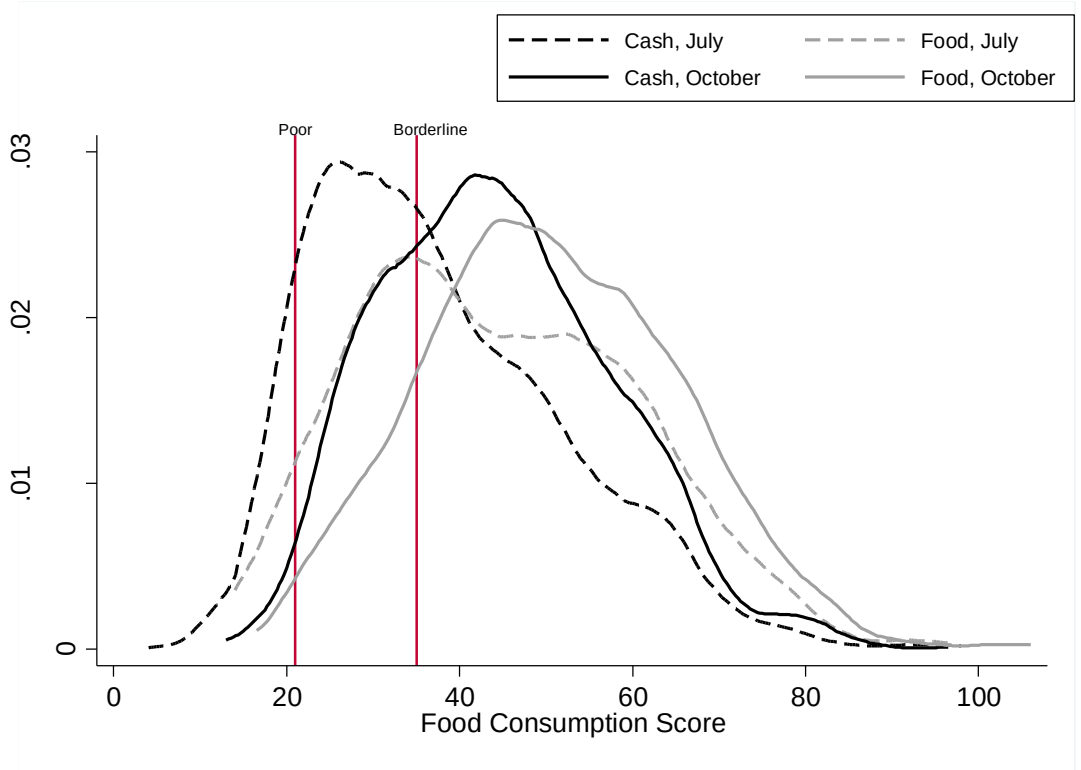

Figure 3a: Historical grain price patterns

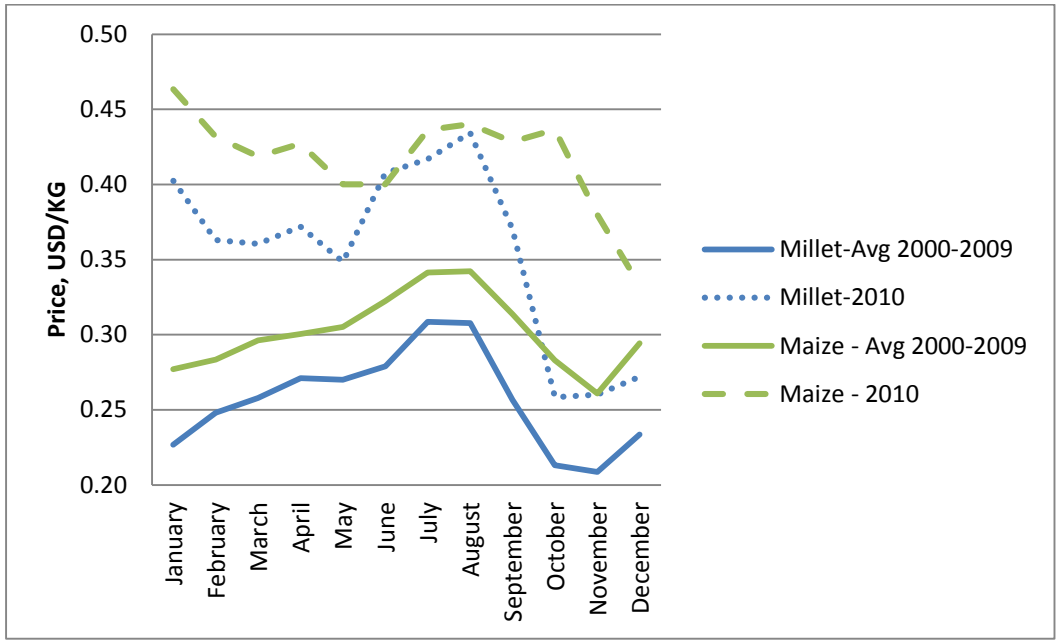

Figure 3b: Grain prices in 2010 and 2011