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Cash, Food, or Vouchers?

Evidence from a Randomized Experiment in Northern Ecuador

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ABSTRACT

The debate over whether to provide food assistance and the form that this assistance should take has a long history in economics. Despite the ongoing debate, little rigorous evidence exists that compares food assistance in the form of cash versus in-kind. This paper uses a randomized evaluation to assess the impacts and cost-effectiveness of cash, food vouchers, and food transfers. We find that all three modalities significantly improve 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.

Keywords: food assistance, cash and in-kind transfers, food security, Ecuador

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1. INTRODUCTION

Certain design issues are common to all social transfer interventions: who should receive benefits, how much should be given and with what frequency, how long should benefits be provided, what form of assistance should be provided, what conditions should be attached, whether the intervention is incentive compatible with the behaviors or outcomes that are the objectives of the program, and the cost-effectiveness of different design options. Analysis of these issues has a long history within economics. They appear in Senior's (1834) report on the operation of the Poor Laws in nineteenth century England, in the functioning of the Famine Codes in late nineteenth century and early twentieth century India (Drèze 1990), in discussions surrounding welfare reform in the United States in the 1990s (Blank 2002), and in contemporary debates regarding the design and implementation of social protection programs in developing countries (Grosh et al. 2008). The form of assistance—cash, near-cash transfers such as vouchers, or in-kind—has been especially contested.

Assistance in the form of cash is justified primarily on the grounds that it generates the largest welfare gains, because it allows beneficiaries to use these transfers as they see fit. As Glaeser (2012) notes, "I am grateful for the freedom I enjoy when spending my earnings; surely, aid recipients also like autonomy. They can choose the spending that best fits their needs if they are given unrestricted income." It is also argued that less stigma is attached to cash transfers, which, compared with in-kind or near-cash transfers such as vouchers or food stamps, are less visible to non-beneficiaries (Grosh et al. 2008). After the necessary administrative structures are in place, cash transfers are perceived to be less costly to administer. Blackorby and Donaldson (1988) note that under the second theorem of welfare economics, given certain assumptions, lump-sum cash transfers are efficient in that they move the economy from one Pareto optimum to another without introducing welfare-destroying distortions.

Two arguments are made to justify near-cash transfers such as food stamps and in-kind transfers. The first relates to targeting. Where it is not possible or very costly to identify beneficiaries, in-kind transfers are advantageous because only those truly in need will take up these in-kind benefits (Currie and Gahvari 2008; Drèze 1990). Blackorby and Donaldson (1988) note that when the cost of acquiring information on beneficiaries is high, in-kind transfers may be less distortionary than cash transfers. Bruce and Waldman (1991) extend this argument, showing that in the presence of a Samaritan's dilemma, in-kind transfers are more efficient than cash transfers, even under conditions of perfect information. The second argument is essentially paternalistic. Policymakers and program implementers seek to change a particular behavior or the consumption of a particular good (Currie and Gahvari 2008). Underpinning this motive is an assumption that in-kind transfers do not crowd out private spending on the good being provided.

Other arguments in favor of one form of transfer over another are circumstance dependent (Coate 1989). For example, the provision of cash transfers can adversely affect non-beneficiaries living in the same locality when food markets are not integrated because the injection of cash may cause food prices to rise (Basu 1996; Gentilini 2007). In contrast, Senior (1834) criticized the provision of in-kind housing assistance because it increased rents paid by non-beneficiaries. Although cash transfers are preferable when prices are declining, beneficiaries are protected from price increases when they receive in-kind transfers.

In the United States, over the past 40 years, in-kind programs have been growing faster than cash programs (Glaeser 2012). Rather than debating which type of assistance is *most* effective, the debate usually centers on the effectiveness of in-kind programs such as the Supplemental Nutrition Assistance Program (SNAP, formerly known as the Food Stamp Program) and whether funding to these programs should be cut. Only a handful of studies in the United States compare different policy options for food assistance. One such study compares food stamps to equivalent cash transfers and finds that food stamp beneficiaries spend a greater fraction of their transfers on food, a result commonly referred to as the cash-out puzzle (Fraker, Martini, and Ohls 1995). A more recent study compares the less-restricted SNAP

program to the more restricted Women, Infants, and Children (WIC) program and finds that WIC leads to greater nutritional impacts, especially among children (Yen 2010).

In developing-country contexts, the merits of cash transfers rather than near-cash or in-kind transfers, particularly food, have produced a debate that Devereux (2006) describes as polarized and acrimonious. There are concerns regarding the cost-effectiveness of alternative transfer modalities, a belief that in-kind transfers have especially pernicious disincentive effects and the impression that in-kind recipients often sell a portion of their transfers at prices below market value, thereby reducing their value. This debate, however, has been hobbled by the absence of rigorous evidence. Numerous studies exist on the impact of cash transfers (for review, see Fiszbein et al. 2009) and food transfers, but comparisons of impact are confounded by differences in program design, the magnitude of the transfer, and the frequency of the transfer.[1]

This paper contributes to our understanding of the impact of cash, near-cash, and in-kind transfers. It uses a randomized design to compare the impact and cost-effectiveness of cash, food vouchers, and food transfers on the quantity and quality of food consumed. To reduce the probability that impact estimates are confounded by differences in program design, careful attention was paid to ensure that all aspects of the transfer program—transfer levels, transfer frequency, and conditions attached to program participation—were as similar as possible across modalities. Moreover, the program was fielded in several urban and peri-urban localities in Ecuador with well-functioning food markets. Together with the fact that the intervention was small relative to the size of the local economy means that results are not confounded by differences in price trajectories faced by beneficiaries receiving different transfer modalities.

We find that all three treatment arms significantly improve the quantity and quality of food consumed as measured by the value of per capita food consumption, per capita caloric intake, and dietary diversity measures. Moreover, we find no evidence of increases in nonfood expenditures. However, across treatment arms, differences emerge in the types of food consumed, with food transfers leading to a significantly larger increase in calories consumed, and vouchers leading to a significantly larger increase in dietary diversity. Combining impact estimates with costing data, we find that given the significantly higher costs of implementing food transfers, food is always the *least* cost-effective modality of improving any outcome measure, and vouchers are usually the *most* cost-effective.

The rest of this paper is structured as follows: Section 2 introduces the program and study design; Section 3 presents the data and descriptive analysis; Section 4 discusses the empirical methods used to evaluate the different transfer modalities; Section 5 presents the impact results; Section 6 presents the costing and cost-effectiveness analysis; Section 7 discusses beneficiaries preferences and costs; and Section 8 concludes.

[1] Two recent examples illustrate the limitations of the extant literature. Sharma (2006) reports the result of an intervention in Sri Lanka where beneficiaries were randomized into receiving food or cash transfers of equivalent value. However, cash transfers were provided biweekly over a three-month period, whereas food was provided twice; therefore, differences in their impact may reflect differences in the frequency of transfers rather than the form of transfer. Results from a randomized cash and food transfer in southern Mexico (Cunha, De Giorgi, and Jayachandran 2011) suffers from two limitations: the food transfer was worth 33 percent more than the cash transfer, and the food transfer was provided bimonthly, while the cash transfer was given monthly.

2. PROGRAM DESIGN

Intervention

Responding to a request from the government of Ecuador in April 2011, the World Food Programme (WFP) expanded its assistance to address the food security and nutrition needs of Colombian refugees and to support their integration into Ecuadorian communities. The new program was designed as a prospective randomized control trial and consisted of six monthly transfers of cash, food vouchers, or food transfers to Colombian refugees and poor Ecuadorian households. The objectives of the program were threefold: (1) to improve food consumption by facilitating access to more nutritious foods, (2) to increase the role of women in household decisionmaking related to food consumption, and (3) to reduce tensions between Colombian refugees and host Ecuadorian populations.

The program was implemented in seven urban centers in the provinces of Carchi and Sucumbíos. Both Carchi and Sucumbíos are northern border provinces that receive high influxes of Colombian refugees and cross-border traffic. However, Carchi is located in the northern highlands and Sucumbíos is located in the Amazonian lowlands, and therefore each has distinct cultural, socioeconomic, and geographic features. Barrios (or neighborhoods)[2] within these urban centers were chosen for the intervention by WFP in consultation with the United Nations High Commissioner for Refugees (UNHCR) as areas that had large numbers of Colombian refugees and relatively high levels of poverty. Each household in the selected barrios was visited, mapped, and administered a one-page questionnaire that consisted of basic demographic and socioeconomic questions. These questions were used to develop a proxy means test to define program eligibility. However, based on point scores by nationality, the decision was made to automatically enroll all Colombian and mixed-nationality households. In addition, all households who reported receiving the government's social safety-net transfer program, the *Bono de Desarrollo Humano* (BDH), were automatically excluded from eligibility. Households residing in the selected barrios with low socioeconomic status as measured by the proxy means test that met the criteria described above were eligible to participate in the program.

During enrollment and sensitization, the program was described as a poverty and food security transfer targeted toward women, and therefore, the majority of the entitlement cardholders[3] were expected to be women. However, based on household demographics (for example, if there was no adult woman available), men could also be entitlement holders and participate in all program activities. Overall, approximately 79 percent of cardholders in Carchi and 73 percent of cardholders in Sucumbíos were women (WFP-Ecuador 2011).

Participating households received benefits from April 2011 to September 2011. The value of the monthly transfer was standardized across all treatment arms at US$40 per month[4] per household. The transfer size for all modalities was set to be roughly comparable to the national cash transfer scheme, the BDH, which at the time of program design was $35 per month per household. For the cash treatment arm, the $40 was transferred monthly onto preprogrammed automated teller machine (ATM) cards. Cash transfer households were able to retrieve the cash at any time after it had been transferred onto the card; however, it had to be taken out in bundles of $10. The food vouchers were also valued at $40 and given in denominations of $20, redeemable for a list of nutritionally approved foods at central supermarkets in each urban center. The list of approved foods is included in Appendix Figure A.1 (along with the recommended amount of food items to buy) and consists of cereals, tubers, fruits, vegetables, legumes, meats, fish, milk products, and eggs. The food vouchers could be used over a series of two visits per month and had to be redeemed within 30 days of initial receipt of the voucher. The vouchers were serialized and printed centrally, and were nontransferable. The food basket was valued according to regional market prices at $40 and included rice (24 kilograms), vegetable oil (4 liters), lentils (8

[2] Barrios are existing administrative units within the urban centers with oversight over social services and other administrative functions.

[3] Participants of WFP's cash, food, and voucher program were issued photo identification (ID) cards with their name, participant ID number, and transfer modality.

[4] Ecuador uses US dollars as its currency. All dollar amounts in this paper are in US dollars.

kilograms), and canned sardines (8 cans of 0.425 kilograms). The quantity of food received is higher than what the median household in our sample consumes at baseline, which suggests that for many households the items from the food transfer will be extra-marginal.[5]

Nutrition sensitization was a key component of the program, aimed at influencing behavior change and increasing knowledge of recipient households, especially in regard to dietary diversity. To ensure a consistent approach to knowledge transfer, a curriculum was developed by WFP to be covered at each monthly training. Topics included (1) program sensitization and information, (2) family nutrition, (3) food and nutrition for pregnant and lactating women, (4) nutrition for children ages 0–12 months, and (5) nutrition for children ages 12–24 months. All participants regardless of transfer modality participated in this training, and transfers were conditional on attendance. In addition to monthly meetings, posters and flyers on nutrition were developed and posted at distribution sites, including supermarkets, banks, and community centers, to further expose participants to knowledge messaging.

Particular attention was given to ensure beneficiaries' experiences with the program would be similar across modalities, and descriptive results indicate this goal was achieved. In particular, across all modalities, beneficiaries reported extremely high rates of satisfaction with both the program and program transparency, believed that the program was fair, and reported that program employees treated them with respect. On average, 99 percent of beneficiaries reported receiving their transfers in totality, and 97 percent reported that they received all information needed to understand how the program worked. Across the three modalities, a minimum of 88 percent of beneficiaries stated that they received their scheduled payments on time and that they knew how many transfers they would receive. Knowledge gained from the nutrition sensitization sessions, as measured by a set of questions at baseline and follow-up, was also similar across modalities.[6]

Beneficiaries were also asked about how they used their most recent transfer. Voucher households reported using 98.8 percent on food consumption, compared to 83 percent for cash households and 63.2 percent for food households. Cash households reported that the remainder was spent on nonfood expenditures (6.3 percent), shared with others outside the household (2.4 percent), and saved for later use (8.3 percent). Food households reported that the remainder was saved for later use (29.4 percent) and shared with others outside the household (6.8 percent). Less than 1 percent of voucher and food beneficiaries reported selling their food or voucher.

Study Design

The program evaluation was based on random assignment. Randomization was conducted in two stages: first, barrios were randomized to either the treatment group or the control group; second, all treatment clusters (geographical units within barrios) were randomized to cash, food voucher, or food transfer. Because the geographic area in each urban center was relatively small, this measure was taken to avoid having a cluster assigned to the control group within the same barrio as a cluster assigned to the treatment group and consequently causing discontent among potential beneficiaries. Due to the distinct socioeconomic and geographic characteristics of Sucumbíos and Carchi, the randomization of cluster centers was stratified at the province level. The number of clusters per barrio varied from one to six, with an average of approximately two per barrio. The barrios and clusters were randomized into the four treatment arms using percentages of 20/20 for the control and food arms, and 30/30 for the cash and food voucher arms.[7] In total, 80 barrios and 145 clusters were randomized into the four intervention arms—control, cash, food vouchers, and food.

[5] At baseline, households consume 20 kg of cereals, 0.35 kg of fish and seafood, and 2 kg of pulses and legumes.

[6] Out of eight items intended to measure nutrition knowledge (for example, food sources of vitamin A or iron), only one showed significantly different impacts across modalities.

[7] One unexpected complication in the study design was the change in beneficiary criteria implemented during the baseline survey data collection. In the process of surveying households, it was concluded that the targeting for the transfers was too broad, resulting in the inclusion of households who were relatively well off. This led to a retargeting process, where households who were relatively well off were dropped from the program. Since there were not enough households in existing barrios to replace those that had been excluded and still reach program enrollment targets; coverage was expanded to additional barrios on the outer circle of urban areas. These areas were subsequently randomized into treatment arms according to the approximate percentage lost.

3. DATA

The baseline survey was conducted in March–April 2011 before the first transfers were distributed. The follow-up survey was conducted approximately seven months later (October–November 2011), after the last of the six transfer distributions. In total, the baseline sample for the evaluation consists of 2,357 households, of whom 2,122 were resurveyed at follow-up.

Household-level baseline and follow-up questionnaires include detailed information on household food and nonfood expenditures, in addition to information on education, labor, health, discrimination, and decisionmaking. The follow-up questionnaire also includes a section on a household's experience with the transfers. Using information from the food and nonfood expenditure module, we create measures of household food consumption, nonfood expenditures, dietary diversity, and caloric intake.

Outcome Indicators

Household food consumption aggregates are constructed from data on the total value of 41 different food items consumed in the seven days prior to the survey. Aggregates are constructed using not only food purchased in the marketplace but also food produced at home, food received as gifts or remittances from other households or institutions, and food received as payments for in-kind services. Median prices from food purchased are used to calculate the total value of food consumed from home production or received as gifts or in-kind payments. Weekly household values of food consumed are converted to monthly values, which are then converted to household per capita values by dividing by the number of household members. Given that the distribution of per capita food consumption is skewed to the right, we convert all values to their logarithms for the analysis, and we trim the top and bottom 0.5 percent of outliers (further details are available in Appendix B).

Caloric intake is constructed from the amount of food consumed by households (from purchases, own stock, or in-kind payments). In particular, the amount of food consumed for each item is multiplied by the energy value for that item to obtain the kilocalories consumed. Energy values are taken from the Nutrition Database for Standard Reference (USDA 2010) and from the *Tabla de Composicion de Alimentos de Centroamerica* (Manchu and Mendez 2007). Total monthly household caloric values are then converted to daily amounts and divided by household size to obtain caloric availability per person per day. Although we use per capita values, our results are robust to using adult equivalent values.[8] Similar to consumption aggregates, all values are converted to their logarithms, and the top and bottom 0.5 percent of outliers are trimmed. In addition to calculating the total kilocalories consumed, we calculate the kilocalories consumed per dollar in order to see if households are changing their food consumption behavior toward cheaper foods that are higher in calories. An indicator for kilocalories consumed per dollar is constructed by dividing total daily per capita caloric intake by the value of total daily per capita consumption.

Food consumption and caloric intake play important roles in meeting food security needs. However, households do not solely value quantity—a more varied diet is also important. Increased dietary diversity is associated with a number of improved outcomes in areas such as birth weight, child anthropometrics, hemoglobin concentrations, hypertension, cardiovascular disease, and cancer (Hoddinott and Yohannes 2002). We construct three separate measures for dietary quality: the dietary diversity index (DDI), household dietary diversity score (HDDS), and the food consumption score (FCS). The most straightforward of these measures, the dietary diversity index, sums the number of distinct food items consumed by the household in the previous seven days. The household questionnaire covers 41 such food items, and thus the DDI in this survey can feasibly range from 0 (no consumption at all) to 41. Hoddinott and Yohannes (2002) show that the DDI correlates well with household dietary quantity and quality; thus it provides a useful summary point of comparison within the measured sample. The HDDS captures a

[8] Adult equivalent values are calculated using the following formula: $AE = (A + \propto K)^{\theta}$, where $\propto = .5$ and $\theta = .9$ (Deaton and Zaidi 2002).

similar element of food access, although it differs from the DDI in that frequency is measured across standardized food groups instead of individual food items. The score is calculated by summing the number of food groups consumed in the previous seven days from the following 12 groups (Kennedy, Ballard, and Dop 2011): cereals, roots and tubers, vegetables, fruits, meat and poultry, eggs, fish and seafood, pulses/legumes/nuts, milk and milk products, oils and fats, sugar and honey, and miscellaneous. Lastly, WFP measures food insecurity using a proxy indicator called the food consumption score (FCS). The FCS is calculated by summing the number of days that the household consumed the corresponding food group (staples, pulses, vegetables, fruit, meat and fish, milk and dairy, sugar and honey, oils and fats), multiplying the number of days by the food group's weighted frequencies, and summing across categories to obtain a single proxy indicator. Households are then categorized as having poor to borderline consumption if their FCS score is 35 or less (WFP 2008). The FCS has been found to correlate well with caloric availability at the household level (Wiesmann et al. 2009) and thus reflects the quality of the diet in terms of energy and diversity.

Nonfood expenditures are calculated from expenditures on the following items: entertainment, personal hygiene, clothing, shoes, transportation, beauty services, communication (telephone and Internet), durable goods, jewelry, housing (rent and repairs), water, and electricity. In addition, expenditures on health and education are calculated separately from the education and health modules. All expenditures are converted to monthly values, and similar to the food consumption aggregates, the top 0.5 percent of outliers is trimmed.[9]

Attrition

The attrition rate in this sample is 10 percent. If attrition is correlated with treatment assignment, this could potentially bias our impact estimates. Table 3.1 shows no significant difference in attrition rates between the control arm and the pooled treatment arm. However, when we compare attrition across each individual treatment arm, we do find a significant difference in rates for the food transfer arm when compared to the control arm (Table 3.2).

Table 3.1—Attrition rates, by treatment and control groups

	Control	Treatment	Difference
Attrition rates	0.11 (0.01)	0.09 (0.01)	0.02 (0.01)
Observations	652	1,705	

Source: Authors' calculations from baseline and follow-up surveys.
Notes: *Treatment* refers to all treatment arms (food, cash, and voucher) combined. Standard errors are reported in parentheses. Difference in means conducted using t-tests.

Table 3.2—Difference in attrition rates, by treatment arms

	Means				Difference in means		
	Control	Food	Cash	Voucher	Control—food	Control—cash	Control—voucher
Attrition rates	0.11 (0.01)	0.08 (0.01)	0.09 (0.01)	0.11 (0.01)	0.04** (0.02)	0.02 (0.02)	0.01 (0.02)
Observations	652	453	601	651			

Source: Authors' calculations from baseline and follow-up surveys.
Notes: Standard errors are reported in parentheses. Difference in means conducted using t-tests. In the last three columns, stars indicate the following significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[9] We do not trim the bottom 0.5 percent because a significant portion of households report 0 expenditures on education and health.

Attrition could bias the study results in a number of unanticipated ways. If poorer households are more likely to leave the study, and significantly more households in the control arm left the study than in the food treatment arm, then our estimates will be underestimates of the impact of food transfers. Even across arms with similar attrition rates, differential attrition would threaten the internal validity of the study. In particular, if households that leave the treatment arms are poorer than households that leave the control arm, then our treatment estimates will be biased because any change in outcomes will be due to both treatment *and* differential attrition. In order to examine if differential attrition threatens the internal validity of the study, we compare baseline characteristics of households that leave the study across treatment and control arms. Table 3.3 reveals significant differences in both the treatment and control arms between those that left the study and those that stayed. For example, in both the treatment and control arms, Colombians were significantly more likely to leave the study. However, internal validity is threatened only if those who left the study in the control arm are significantly different from those who left in the treatment arm. Consequently, we focus on columns 7 and 8, which compare the "attrited" groups across the two arms, and we find significant differences at the 5 percent level only for household head's age and ownership of agricultural plots. In particular, those who left the treatment arm are significantly younger and less likely to own agricultural land than those who left the control arm. However, baseline analysis across treatment and control arms for households that remained in the study (Table 3.4) reveals that differences in age and owning agricultural land are not significant; therefore, we conclude that the bias due to the differential attrition of these variables is likely to be very small.

Balance of Baseline Characteristics

To ensure that randomization was successful, we compare baseline characteristics across treatment and control households. We conduct the analysis on the 2,122 households that are in the baseline and follow-up surveys. We first combine all three treatment arms (cash, voucher, and food transfer) and compare pooled treatment households to control households (Table 3.4), and then we compare each treatment arm separately to the control arm (Table 3.5).

Table 3.4 reveals that household heads in our sample have a mean age of approximately 42 years, 35 percent have secondary schooling or higher, 28 percent are married, 29 percent are Colombian, and slightly more than one-quarter are females. The average household size is 3.8, and the average monthly household expenditure is approximately $243. Thus, the transfer of $40 is approximately 16 percent of a household's pre-transfer expenditures. Although these households are poor, the daily caloric intake per adult equivalent is high, at 2,532 kilocalories (kcals). Across 21 difference-in-means tests between the treatment and control groups, only 5 are statistically different, which reveals that randomization was, for the most part, effective at balancing baseline characteristics. In particular, control households are significantly more likely to be Colombian, have more children ages 6–15 years, have larger households, and have lower per capita food consumption and caloric intake.

Table 3.3—Differential attrition analysis (baseline characteristics)

	Control Arm			Treatment Arm			Difference	
	(1) Attrited	(2) In study	(3) P-value	(4) Attrited	(5) In study	(6) P-value	(7) Col(1)–Col(4)	(8) P-value
Characteristics of the household head								
Female	0.31	0.26	0.36	0.34	0.27	0.10	–0.02	0.71
Colombian	0.57	0.37	0.00	0.55	0.26	0.00	0.01	0.83
Married	0.23	0.28	0.41	0.22	0.28	0.10	0.01	0.83
Age (years)	42.08	41.87	0.90	36.67	41.63	0.00	5.41	0.01
Has secondary education or higher	0.41	0.32	0.14	0.47	0.36	0.01	–0.06	0.39
Household characteristics								
Number of children 0–5 years	0.57	0.58	0.92	0.59	0.62	0.65	–0.02	0.83
Number of children 6–15 years	0.80	1.01	0.15	0.72	0.86	0.11	0.08	0.58
Household size	3.66	4.01	0.17	3.34	3.75	0.01	0.33	0.19
Floor type: dirt	0.08	0.06	0.37	0.03	0.04	0.65	0.05	0.09
Owns television	0.69	0.80	0.03	0.64	0.81	0.00	0.05	0.46
Owns computer	0.31	0.27	0.44	0.31	0.30	0.73	0.00	1.00
Owns mobile phone	0.82	0.84	0.69	0.81	0.82	0.81	0.01	0.85
Owns car/truck/motorcycle	0.20	0.24	0.51	0.17	0.23	0.08	0.03	0.60
Owns land	0.12	0.13	0.91	0.05	0.13	0.00	0.07	0.05
Total household expenditure (monthly)	253.63	245.85	0.74	241.63	242.38	0.96	11.99	0.62
Outcome variables								
Per capita food consumption (monthly)	37.93	36.94	0.76	39.84	40.27	0.86	–1.91	0.64
Caloric intake per capita (daily)	1,867.96	1,793.68	0.58	1,851.90	1,913.78	0.54	16.06	0.93
Caloric intake per adult equivalent (daily)	2,557.10	2,475.08	0.64	2,382.88	2,554.88	0.14	174.23	0.37
Dietary diversity index	16.52	16.99	0.52	16.00	17.39	0.00	0.52	0.55
Household dietary diversity score	8.77	9.08	0.14	8.87	9.19	0.02	–0.11	0.71
Food consumption score	57.49	59.29	0.48	56.95	60.49	0.04	0.54	0.86

Source: Authors calculations from baseline and follow-up surveys.

Notes: In columns 3 and 6, p-values are reported from t-tests on the equality of means for each variable between the In Study and Attrited groups. Column 7 reports the difference in means between the Attrited group in the control arm and the Attrited group in the treatment arm. Column 8 reports the p-values for the difference in means between the two Attrited groups. The In Study sample consists of households that were in the baseline and follow-up.

Table 3.4—Baseline characteristics, by treatment and control group

	Obs.	All	Control	Treatment	P-value of difference
Characteristics of the head					
Female	2,122	0.27	0.26	0.27	0.54
Colombian	2,122	0.29	0.37	0.26	0.00
Married	2,122	0.28	0.28	0.28	0.88
Age (years)	2,122	41.69	41.87	41.63	0.75
Has secondary education or higher	2,122	0.35	0.32	0.36	0.09
Household characteristics					
Number of children 0–5 years	2,122	0.61	0.58	0.62	0.28
Number of children 6–15 years	2,122	0.90	1.01	0.86	0.01
Household size	2,122	3.82	4.01	3.75	0.00
Floor type: dirt	2,122	0.04	0.06	0.04	0.08
Owns television	2,122	0.80	0.80	0.81	0.84
Owns computer	2,122	0.29	0.27	0.30	0.19
Owns mobile phone	2,122	0.83	0.84	0.82	0.25
Owns car/truck/motorcycle	2,122	0.23	0.24	0.23	0.88
Owns land	2,122	0.13	0.13	0.13	0.97
Total household expenditures (monthly)	2,077	243.32	245.85	242.38	0.69
Outcome variables					
Per capita food consumption (monthly)	2,010	39.35	36.94	40.27	0.02
Caloric intake per capita (daily)	2,034	1,880.83	1,793.68	1,913.78	0.04
Caloric intake per adult equivalent (daily)	2,035	2,532.88	2,475.08	2,554.88	0.24
Dietary diversity index	2,096	17.28	16.99	17.39	0.15
Household dietary diversity score	2,096	9.16	9.08	9.19	0.19
Food consumption score	2,096	60.17	59.29	60.49	0.22

Source: Authors' calculations from baseline survey.
Note: P-values are reported from t-tests on the equality of means for each variable between the control arm and treatment arm.
Obs. = observations.

Table 3.5 conducts difference-in-means tests for each treatment arm compared to the control arm. Results show a similar pattern where, across the 63 (21 × 3) tests, 12 have means that are significantly different at the 5 percent level. Overall, these confirm previous tests by pooled treatments that indicate that the baseline randomization was generally successful with respect to household observable characteristics. However, the few significant differences reaffirm our decision to add baseline covariates as controls in our empirical analysis.

Table 3.5—Baseline characteristics, by treatment arms

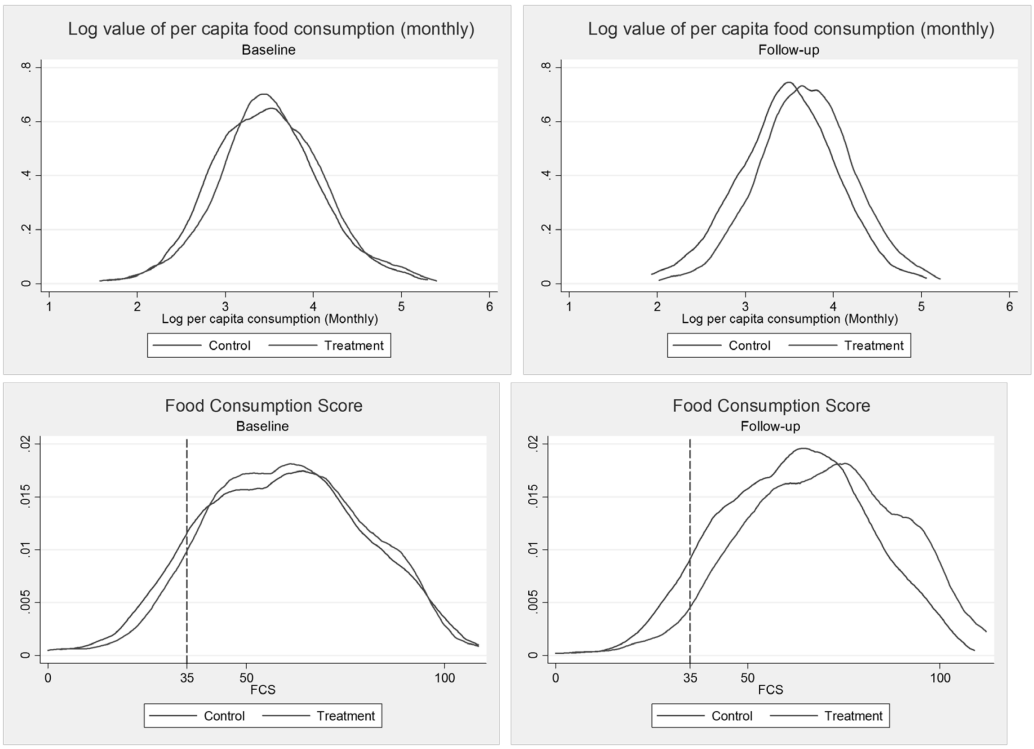
	Means				P-value of difference		
	Control	Food	Cash	Voucher	Food—control	Cash—Control	Voucher—control
Characteristics of the head							
Female	0.26	0.25	0.28	0.29	0.72	0.46	0.35
Colombian	0.37	0.28	0.24	0.26	0.00	0.00	0.00
Married	0.28	0.30	0.28	0.26	0.36	0.94	0.65
Age (years)	41.87	41.26	41.47	42.04	0.53	0.66	0.85
Has secondary education or higher	0.32	0.35	0.35	0.38	0.30	0.34	0.04
Household characteristics							
Number of children 0–5 years	0.58	0.66	0.59	0.62	0.12	0.84	0.34
Number of children 6–15 years	1.01	0.89	0.88	0.82	0.13	0.07	0.01
Household size	4.01	3.82	3.75	3.69	0.15	0.03	0.00
Floor type: dirt	0.06	0.04	0.03	0.04	0.29	0.05	0.33
Owns television	0.80	0.81	0.78	0.82	0.70	0.42	0.35
Owns computer	0.27	0.32	0.29	0.29	0.10	0.42	0.39
Owns mobile phone	0.84	0.81	0.82	0.83	0.13	0.28	0.72
Owns car/truck/motorcycle	0.24	0.22	0.23	0.25	0.42	0.93	0.72
Owns land	0.13	0.12	0.12	0.13	0.75	0.79	0.69
Total household expenditures (monthly)	245.85	255.18	239.55	235.87	0.45	0.57	0.32
Outcome variables							
Per capita food consumption (monthly)	36.94	40.56	40.79	39.60	0.04	0.03	0.10
Caloric intake per capita (daily)	1,793.68	1,830.11	2,024.55	1,871.01	0.59	0.00	0.24
Caloric intake per adult equivalent (daily)	2,475.08	2,480.01	2,658.49	2,512.79	0.95	0.04	0.64
Dietary diversity index	16.99	17.48	17.43	17.30	0.19	0.20	0.36
Household dietary diversity score	9.08	9.23	9.21	9.15	0.19	0.21	0.52
Food consumption score	59.29	61.42	60.39	59.91	0.10	0.36	0.61

Source: Authors' calculations from baseline survey.
Note: P-values from difference in means t-tests reported in the last three columns.

Graphical Analysis

Figure 3.1 shows the densities at baseline and follow-up of two main outcome indicators: (1) log of the value of per capita food consumption, and (2) the FCS. At baseline there are no large differences between treatment and control arms for either indicator. However, at follow-up the density for the treatment group has shifted more to the right, causing a larger difference between the treatment and control groups. Our estimation strategy, explained in more detail below, captures these differences of the treatment group compared to the control group.

Figure 3.1—Density by treatment and control group at baseline and follow-up



Source: Authors' calculations from baseline and follow-up surveys.

4. METHODS

Our estimation strategy relies on the randomized design of the transfer program. Random assignment of clusters assures that, on average, households will have similar baseline characteristics across treatment and control arms, as demonstrated in the previous section. Such a design eliminates systematic differences between beneficiaries and non-beneficiaries and minimizes the risk of bias in the impact estimates due to selection effects. Moreover, we take advantage of the baseline survey and estimate the treatment effect using analysis of covariance (ANCOVA), which controls for the lagged outcome variable. Given the high variability and low autocorrelation of our food expenditure data, ANCOVA estimates are preferred over difference-in-difference estimates (McKenzie 2012). The ANCOVA model that we estimate is the following:

$$Y_{h1} = \propto + \beta_f food_h + \beta_c cash_h + \beta_v voucher_h + \gamma Y_{h0} + \delta X_{h0} + \varepsilon_h,$$

where Y_{h1} is the outcome of interest for household h at follow-up and Y_{h0} is the outcome of interest at baseline. $food_h$, $cash_h$, and $voucher_h$ are indicators that equal 1 if household h is in the corresponding treatment arm. The β represents the intent-to-treat estimator, or the effect of being assigned to the specific treatment arm. To test whether the estimator is statistically different by treatment arm, we conduct Wald tests of equality and report the p-values.

X_{h0} is a vector of control variables for household h at baseline. Given the relative success of the random assignment, the inclusion of baseline controls is not necessary to obtain unbiased estimates of β. In all estimates, however, we account for baseline socioeconomic characteristics in order to increase the precision of the estimates and control for any minor differences between treatment and control arms at baseline. The core group of baseline control variables that we use are indicators for urban centers, an indicator for whether household head is female, an indicator for whether household head is Colombian, an indicator for whether household head has at least some secondary education, household head's age, household size, number of children 0–5 years old, number of children 6–15 years old, and household wealth quintiles (five indicators for each quintile). The household wealth quintiles are constructed from a wealth index that is created using the first principal from a principal components analysis (PCA). Variables used to construct the index are housing infrastructure indicators (for example, type of floor, roof, toilet, light, fuel, water source) and 11 asset indicators (for example, refrigerator, mobile phone, TV, car, computer). In all regressions we cluster the standard errors at the level of randomization that is the cluster.

5. RESULTS

Food versus Nonfood Consumption

We begin our analysis by comparing the impact of treatment on food versus nonfood consumption. The outcomes of interest are the value of food consumption, health and education expenditures, and nonfood expenditures. Table 5.1 reveals that across all treatment arms, the transfer is being used on food rather than nonfood items. In particular, being in the program significantly increases the value of a household's food consumption by \$14.00–\$18.60, depending on the treatment arm.[10] The size of the impact is not significantly different across arms, which implies that the amount of the transfer being used on food consumption is the same across transfer modalities. While the results are large and significant, the magnitude is slightly lower than what we would expect to see if households used the whole transfer on food. One possible explanation for this discrepancy is that households report saving a significant amount of their transfer. Another possible explanation is that for many households, the follow-up survey was conducted more than two weeks after the last transfer was received. Given that the survey asks about consumption of only the last week, it may not be capturing lumpy consumption occurring immediately after receiving the transfer.

Table 5.1—Impact of treatment arms on food and nonfood consumption

	Value of food consumption	Health and education expenditures	Nonfood expenditures
Food treatment	18.59 (6.58)***	8.10 (12.76)	7.60 (4.92)
Cash treatment	14.10 (6.20)**	2.98 (12.63)	–0.35 (4.54)
Voucher treatment	18.29 (5.91)***	8.29 (12.12)	2.73 (4.52)
R^2	0.27	0.23	0.21
Observations	1,985	2,044	2,044
Baseline mean	131.79	46.91	91.16
P-value: Food=Voucher	0.96	0.99	0.32
P-value: Cash=Voucher	0.45	0.60	0.49
P-value: Food=Cash	0.46	0.62	0.09

Source: Authors' calculations from baseline and follow-up surveys.
Notes: Standard errors in parentheses are clustered at the cluster level. * p < 0.1, ** p < 0.05, *** p < 0.01. All estimations control for the following baseline variables: household head's gender, age, ethnicity, and education; household size; number of children; wealth quintiles; baseline outcome variable and contain urban center fixed effects.

Value of Food versus Caloric Intake

Although the amount of money spent on food is similar across treatment arms, the types of food being bought may differ, and, in particular, the amount of calories being consumed as a result of the transfer. The first column in Table 5.2 reinforces the results from Table 5.1 in that all treatment arms lead to significant increases in the value of per capita food consumption. Significant improvements are also seen in per capita caloric intake across all three treatment arms, ranging from 6 to 16 percent. In contrast to the results on the value of food consumption, the size of the impact is significantly different across arms, with the food arm leading to significantly larger increases compared to the cash arm. The findings that all

[10] We also find increases in food shares that are slightly lower than what Schady and Rosero (2008) find under the *Bono de Desarrollo Humano* (BDH) in Ecuador; however, there are no differences across treatment arms.

transfers lead to large increases in the value of food consumed, but the food transfer leads to significantly larger increases in calories implies that cash and voucher households are buying more expensive goods that are lower in calories. Evidence of this is found in the last column of Table 5.2, which shows that the number of calories per dollar significantly decreases for the cash and voucher arms but not for the food arm.

Table 5.2—Impact of treatment arms on the value of food consumption and caloric intake

	Log value of per capita food consumption	Log per capita caloric intake	Log calories per dollar
Food treatment	0.16 (0.04)***	0.16 (0.04)***	–0.01 (0.02)
Cash treatment	0.12 (0.04)***	0.06 (0.03)*	–0.05 (0.02)**
Voucher treatment	0.13 (0.04)***	0.11 (0.03)***	–0.03 (0.02)*
R^2	0.35	0.32	0.13
Observations	1,985	2,006	1,947
Baseline mean	3.51	7.38	7.32
P-value: Food = Voucher	0.38	0.10	0.26
P-value: Cash = Voucher	0.69	0.18	0.41
P-value: Food = Cash	0.22	0.01	0.08

Source: Authors' calculations from baseline and follow-up surveys.
Notes: Standard errors in parentheses are clustered at the cluster level. * p < 0.1, ** p < 0.05, *** p < 0.01. All estimations control for the following baseline variables: household head's gender, age, ethnicity, and education; household size; number of children; wealth quintiles; baseline outcome variable and contain urban center fixed effects.

To better understand the difference in caloric intake across treatment arms, we disaggregate daily caloric intake by the 12 food groups that make up the HDDS (Table 5.3). As shown from the baseline means in the bottom panel of the table, 41 percent (or 766 kcals) of a household's calories come from cereals. Thus an 18 percent increase in calories from cereals by the food arm is equivalent to an increase of 138 kcals. On the other hand, cash leads to only an 8 percent increase in cereals, which is significantly different from the increase by the food transfer. Food also leads to significantly larger increases in calories from fish and seafood and from pulses, legumes, and nuts, than cash or vouchers. These significantly larger increases in items that make up the food basket—cereals, fish and seafood, pulses, and legumes—suggests that these items were extra-marginal.

Dietary Diversity

Although caloric intake plays an important role in meeting food security needs, a more varied diet is important for improving health outcomes. Table 5.4 reveals that all three treatment arms significantly increase the measures of dietary quality—the HDDS, DDI, and FCS—however, the size of the impact differs by treatment arms. In particular, vouchers lead to significantly larger increases than food transfers for the DDI and significantly larger increases than both food and cash transfers for the FCS. Even though all three modalities significantly increase the FCS, only the vouchers and food significantly decrease the percentage of households with poor to borderline food consumption scores, and the size of the decrease is significantly larger for the food arm when compared with the cash arm.

Table 5.3—Impact of treatment arms on caloric intake, by food groups

	Outcome variable: Log per capita caloric intake (daily)											
	Cereals	**Roots & tubers**	**Vegetables**	**Fruits**	**Meat & poultry**	**Eggs**	**Fish & seafood**	**Pulses, legumes, & nuts**	**Milk & dairy**	**Sugar & honey**	**Other**	**Oils & fats**
Food treatment	0.18 (0.05)***	0.29 (0.12)**	0.12 (0.06)*	0.14 (0.08)	0.26 (0.12)**	0.04 (0.10)	1.08 (0.18)***	0.89 (0.15)***	0.31 (0.17)*	–0.01 (0.11)	0.19 (0.12)*	0.05 (0.10)
Cash treatment	0.08 (0.05)	0.22 (0.12)*	0.12 (0.06)**	0.09 (0.08)	0.35 (0.11)***	–0.00 (0.09)	0.30 (0.13)**	0.38 (0.13)***	0.50 (0.14)***	0.04 (0.09)	0.06 (0.11)	–0.12 (0.08)
Voucher treatment	0.11 (0.05)**	0.22 (0.11)*	0.13 (0.05)**	0.16 (0.08)**	0.31 (0.11)***	0.11 (0.09)	0.43 (0.13)***	0.59 (0.13)***	0.70 (0.14)***	0.06 (0.09)	–0.05 (0.11)	–0.07 (0.06)
Observations	2,006	2,006	2,006	2,006	2,006	2,006	2,006	2,006	2,006	2,006	2,006	2,006
Baseline mean	765.60	147.51	30.65	232.56	144.05	38.17	22.62	51.26	102.99	295.25	50.17	–
P-value: Food = Voucher	0.13	0.54	0.95	0.69	0.69	0.42	0.00	0.02	0.01	0.45	0.03	0.22
P-value: Cash = Voucher	0.55	1.00	0.99	0.24	0.67	0.20	0.17	0.07	0.09	0.81	0.28	0.56
P-value: Food = Cash	0.04	0.52	0.97	0.52	0.42	0.72	0.00	0.00	0.20	0.57	0.22	0.12

Source: Authors' calculations from baseline and follow-up surveys.

Notes: Standard errors in parentheses are clustered at the cluster level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All estimations control for the following baseline variables: household head's gender, age, ethnicity, and education; household size; number of children; wealth quintiles; and baseline outcome variable and contain urban center fixed effects. Oils and fats was not included in the baseline survey, and thus we do not have a baseline mean; it was not controlled for in the estimation.

Table 5.4—Impact of treatment arms on dietary diversity outcomes

	Household dietary diversity score	Dietary diversity index	Food consumption score	Poor food consumption
Food treatment	0.51 (0.12)***	1.98 (0.50)***	6.10 (1.46)***	–0.06 (0.02)***
Cash treatment	0.40 (0.11)***	2.39 (0.44)***	6.48 (1.34)***	–0.03 (0.02)
Voucher treatment	0.51 (0.11)***	2.89 (0.46)***	9.41 (1.36)***	–0.04 (0.02)**
R^2	0.19	0.29	0.19	0.08
Observations	2,087	2,087	2,087	2,087
Baseline mean	9.16	17.28	60.17	0.11
P-value: Food = Voucher	0.99	0.04	0.03	0.19
P-value: Cash = Voucher	0.18	0.18	0.03	0.22
P-value: Food = Cash	0.23	0.31	0.78	0.02

Source: Authors' calculations from baseline and follow-up surveys.
Notes: Standard errors in parentheses are clustered at the cluster level. * p < 0.1, ** p < 0.05, *** p < 0.01. All estimations control for the following baseline variables: household head's gender, age, ethnicity, and education; household size; number of children; wealth quintiles; baseline outcome variable and contain urban center fixed effects.

In order to see what items are being consumed more frequently by the voucher group compared to the other two groups, we disaggregate the frequency of consumption by the same 12 food groups (Table 5.5). Consistent with the composition of the food transfer, large and significant increases are seen in the number of days the food group ate cereals, fish and seafood, and pulses and legumes. Significant increases are also found in the number of days the food group ate roots and tubers, and meat and poultry, which implies that these items are not substitutes for those in the food basket. On the other hand, cash leads to significant increases in the number of days that households consume foods in the following 7 groups: roots and tubers, vegetables, meat and poultry, eggs, fish and seafood, pulses and legumes, and milk and dairy. The vouchers lead to the largest number of significant increases in 9 out of the 12 food groups. When compared to the food transfers, the vouchers lead to significantly larger increases in the frequency of consumption of vegetables, eggs, and milk and dairy. When compared to the cash arm, the vouchers lead to significantly larger increases in the frequency of consumption of fish and seafood, and pulses and legumes.

Table 5.5—Impact of treatment arms on food frequency, by food groups

	Outcome variable: Number of days in the last week the household consumed											
	Cereals	Roots & tubers	Vegetables	Fruits	Meat & poultry	Eggs	Fish & seafood	Pulses, legumes, & nuts	Milk & dairy	Sugar & honey	Other	Oils & fats
Food treatment	0.43 (0.10)***	0.42 (0.19)**	0.13 (0.12)	0.26 (0.17)	0.19 (0.09)**	0.06 (0.16)	0.61 (0.12)***	1.20 (0.15)***	0.19 (0.20)	0.05 (0.10)	0.12 (0.18)	0.00 (0.11)
Cash treatment	0.15 (0.10)	0.45 (0.17)***	0.30 (0.11)***	0.15 (0.15)	0.34 (0.11)***	0.26 (0.16)*	0.15 (0.08)*	0.59 (0.12)***	0.66 (0.17)***	–0.05 (0.11)	0.24 (0.17)	–0.10 (0.08)
Voucher treatment	0.30 (0.10)***	0.56 (0.17)***	0.39 (0.10)***	0.29 (0.14)**	0.28 (0.10)***	0.46 (0.15)***	0.40 (0.09)***	0.83 (0.11)***	0.90 (0.18)***	0.01 (0.10)	0.16 (0.19)	–0.13 (0.08)
Observations	2,087	2,087	2,087	2,087	2,087	2,087	2,087	2,087	2,087	2,087	2,087	2,087
Baseline mean	6.17	5.15	6.06	4.75	1.90	3.64	0.85	1.53	3.01	6.38	4.60	–
P-value: Food = Voucher	0.11	0.46	0.02	0.87	0.36	0.03	0.07	0.01	0.00	0.59	0.81	0.21
P-value: Cash = Voucher	0.11	0.52	0.38	0.33	0.64	0.23	0.00	0.06	0.15	0.56	0.59	0.74
P-value: Food = Cash	0.00	0.87	0.12	0.49	0.17	0.25	0.00	0.00	0.01	0.26	0.38	0.34

Source: Authors' calculations from baseline and follow-up surveys.

Notes: Standard errors in parentheses are clustered at the cluster level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All estimations control for the following baseline variables: household head's gender, age, ethnicity, and education; household size; number of children; wealth quintiles; baseline outcome variable and contain urban center fixed effects. Oils and fats was not included in the baseline survey, and thus we do not have a baseline mean; it was not controlled for in the estimation.

Heterogeneity

Tables 5.2–5.5 reveal the average impact of the transfers on food consumption outcomes, but they do not provide any information on how the different treatment arms have an impact on those at the lower end of the wealth distribution. In particular, we are interested in how the impacts compare for the poorest households, who are the most food insecure. We conduct this comparison by creating interaction terms of each treatment arm with an indicator that equals 1 if households are in the top two wealth tertiles. Thus the coefficients on the treatment arm represent the impact for those in the poorest wealth tertile, and the interaction term represents the differential effect with respect to being in the top two tertiles. Table 5.6 reveals that all three treatment modalities significantly increase the value of food consumption for those in the poorest tertiles; however, only food leads to significant increases in the caloric intake for those in the poorest tertile. Even more revealing is that for those in the bottom tertile, the impact of food transfers is significantly larger than the impact of vouchers for both the value of food consumption and caloric intake. Although the differential effect with respect to wealth tertile is not significant, it is always negative for food and positive for vouchers. This implies that food has a larger impact on the poorest tertiles, while vouchers have a larger impact on the top two tertiles. Cash and vouchers also lead to significant decreases in the calories per dollar indicator for those in the bottom wealth tertile, and this impact is significantly different from the impact for those in the top two wealth tertiles. In other words, for those at the bottom end of the wealth distribution, cash and vouchers are leading households to buy fewer calories per dollar, but this does not hold for those at the top end of the distribution.

Table 5.6—Impact of treatment arms on food consumption outcomes, by wealth tertiles

	Log value of per capita food consumption	Log per capita caloric intake	Log calories per dollar
Food treatment	0.23 (0.06)***	0.19 (0.06)***	–0.06 (0.04)
Cash treatment	0.18 (0.06)***	0.08 (0.06)	–0.11 (0.03)***
Voucher treatment	0.12 (0.06)*	0.05 (0.05)	–0.10 (0.04)***
Food X Top 2 tertiles	–0.09 (0.06)	–0.04 (0.06)	0.06 (0.05)
Cash X Top 2 tertiles	–0.10 (0.07)	–0.03 (0.06)	0.08 (0.04)**
Voucher X Top 2 tertiles	0.02 (0.07)	0.09 (0.06)	0.09 (0.04)**
= 1 if in top 2 tertiles	0.01 (0.06)	–0.07 (0.05)	–0.10 (0.04)**
Constant	2.73 (0.10)***	5.78 (0.18)***	6.14 (0.20)***
Observations	1,985	2,006	1,947
P-value: Food = Voucher	0.05	0.02	0.23
P-value: Cash = Voucher	0.27	0.52	0.76
P-value: Food = Cash	0.44	0.10	0.12

Source: Authors' calculations from baseline and follow-up surveys.

Notes: Standard errors in parentheses are clustered at the cluster level. * $p < 0.1$ ** $p < 0.05$; *** $p < 0.01$. All estimations control for the following baseline variables: household head's gender, age, ethnicity, and education; household size; number of children; wealth quintiles; baseline outcome variable and contain urban center fixed effects.

Table 5.7 reveals similar results. In particular, all three treatment arms lead to significant improvements in dietary diversity for those in the bottom wealth tertile. Moreover, for these poor households, there are no differences across treatment arms in the size of the impact for the DDI and the FCS, although the food arm leads to significantly larger impacts than the cash arm for the HDDS. The differential impact with respect to wealth tertiles again reveals that food has a larger impact for those at the bottom of the distribution. In particular, the impact on the HDDS and FCS for the food arm is significantly larger for those in the bottom wealth tertile than those in the top two wealth tertiles. On the other hand, for the cash or voucher arm, the differential effect with respect to wealth on the three dietary diversity measures is not significant. As would be expected, the last column in Table 5.7 reveals that the decrease in poor food consumption is concentrated on households at the bottom end of the wealth distribution.

Table 5.7—Impact of treatment arms on dietary diversity outcomes, by wealth tertiles

	Household dietary diversity score	Dietary diversity index	Food consumption score	Poor food consumption
Food treatment	0.90 (0.22)***	2.75 (0.81)***	9.53 (2.54)***	–0.14 (0.04)***
Cash treatment	0.56 (0.20)***	2.67 (0.70)***	7.52 (2.27)***	–0.07 (0.04)*
Voucher treatment	0.66 (0.23)***	2.87 (0.76)***	11.50 (2.88)***	–0.10 (0.04)***
Food X Top 2 tertiles	–0.56 (0.23)**	–1.15 (0.84)	–4.94 (2.72)*	0.12 (0.04)***
Cash X Top 2 tertiles	–0.21 (0.21)	–0.37 (0.71)	–1.26 (2.51)	0.06 (0.04)
Voucher X Top 2 tertiles	–0.19 (0.23)	0.06 (0.73)	–2.85 (3.08)	0.08 (0.04)**
= 1 if in top 2 tertiles	0.27 (0.19)	0.40 (0.64)	3.54 (2.30)	–0.08 (0.03)**
Constant	7.57 (0.32)***	11.31 (0.80)***	39.12 (2.95)***	0.16 (0.04)***
Observations	2,087	2,087	2,087	2,087
P-value: Food = Voucher	0.19	0.87	0.49	0.15
P-value: Cash = Voucher	0.58	0.74	0.14	0.26
P-value: Food = Cash	0.03	0.89	0.38	0.01

Source: Authors' calculations from baseline and follow-up surveys.

Notes: Standard errors in parentheses are clustered at the cluster level. * p < 0.1 ** p < 0.05; *** p < 0.01. All estimations control for the following baseline variables: household head's gender, age, ethnicity, and education; household size; number of children; wealth quintiles; baseline outcome variable and contain urban center fixed effects.

One concern for policymakers is that transfers, and especially the food modality, are increasing caloric intake of a population that is already meeting the recommended daily requirements for calories. To see if larger improvements occur for those not meeting the daily requirements, we create interaction terms similar to the ones for wealth tertiles. Specifically, we interact each treatment arm with an indicator that equals 1 if a household consumes more than 2,100 adult-equivalent kcals a day.[11] Given that we are using an adult equivalent cut-off, we estimate the impact on adult equivalent outcomes instead of per capita outcomes. The first column in Table 5.8 reveals the average impact of the treatment arms on adult-

[11] The recommended kilocalories per day is 2,100 is for women ages 18–30 years with moderate activity, and 2,150 for women 30–60 years with moderate activity (Smith and Subandoro 2007). Our results are robust to either cutoff.

equivalent caloric intake, and the second column reveals the heterogeneous impacts with respect to being above the cut-off. Similar to the per capita outcomes in Table 5.2, the average treatment effects across all arms are large and significant. The treatment effects of food are significantly larger for households not consuming more than 2,100 adult-equivalent kcals a day than for households consuming more than 2,100 adult-equivalent kcals a day. Although the differential effect is significant for the food arm, the impact on caloric intake for households receiving more than 2,100 kcals a day is still large (11 percent increase) and significant. In contrast to the food arm, the differential effect is not significant for the cash or voucher arm.

Table 5.8—Heterogeneous impact on adult-equivalent caloric intake

	Log adult-equivalent caloric intake uninteracted	Log adult-equivalent caloric intake interacted
Food treatment	0.16 (0.04)***	0.22 (0.05)***
Cash treatment	0.07 (0.03)*	0.08 (0.04)*
Voucher treatment	0.12 (0.03)***	0.13 (0.04)***
Food X High caloric intake (kcals > 2,100)		–0.11 (0.06)**
Cash X High caloric intake (kcals > 2,100)		–0.03 (0.06)
Voucher X High caloric intake (kcals > 2,100)		–0.02 (0.05)
High caloric intake (kcals > 2,100)		0.06 (0.05)
Constant	6.03 (0.18)***	6.17 (0.25)***
Observations	2,007	2,007
P-value: Food = Voucher	0.20	0.03
P-value: Cash = Voucher	0.09	0.33
P-value: Food = Cash	0.01	0.00

Source: Authors' calculations from baseline and follow-up surveys.

Notes: Standard errors in parentheses are clustered at the cluster level. * $p < 0.1$ ** $p < 0.05$; *** $p < 0.01$. All estimations control for the following baseline variables: household head's gender, age, ethnicity, and education; household size; number of children; wealth quintiles; baseline outcome variable and contain urban center fixed effects.

6. COSTING

As part of this study, we collected detailed information on the costs of implementing the three modalities using an ABC-I (activity-based costing—ingredients) method. The ABC-I method combines activity-based accounting methods with the *ingredients* method, whereby program costs are obtained from inputs, input quantities, and input unit costs (Edejer et al. 2003; Fiedler, Villalobos, and De Mattos 2008). An advantage of the detailed information on costs that we obtained from WFP's accounting ledgers and from interviews is that we can separate costs that are common across all modalities from those that are modality specific. For example, the cost of obtaining the data needed to implement the proxy means test is a common cost—it is independent of the type of transfer a household received. In contrast, the cost of manufacturing the debit cards used by cash beneficiaries is specific to the cash transfer. A second strength of these cost data is that we can calculate the staff costs associated with this intervention. Again, some of these costs, such as those associated with the project launch, are common across all modalities, while others, such as time spent identifying which supermarkets would be able to accept food vouchers, are modality specific.

We are interested in the marginal cost of implementing these modalities. That is to say, after all common costs of program implementation (planning costs, targeting, sensitization, nutrition training, and others) are accounted for, what additional costs are incurred to deliver these transfers in the form of food, cash, and vouchers. Expressing these in per-transfer terms, the cost to provide a food transfer is $11.50; a cash transfer, $3.03; and a voucher, $3.30 (details on costing can be found in Appendix Table C.1). The cost of physical materials associated with vouchers, such as printing, is trivial. However, significant staff costs are associated with supermarket selection, the negotiation of contracts with individual supermarkets, and voucher reconciliation and payment. These staff costs account for nearly 90 percent of the cost of implementing the voucher component of the intervention. The cost of generating the debit cards is the main cost item in the cash transfer. The food transfer is significantly more expensive because of the cost of transporting the food to the distribution sites and rental of storage facilities. Taking bulk items and repackaging them for distribution is also very costly, accounting for approximately 30 percent of the cost of distributing the food ration.

In order to compare the cost-effectiveness across modalities, we do a simulation whereby beneficiaries' outcomes increase by 15 percent. Specifically, we calculate the cost to achieve this goal using food, cash, and vouchers, conditional on the transfer size and abstracting from costs common to all modalities. Given the different metrics by which our outcomes are measured, we conduct the simulations for each outcome. For example, Table 5.4 tells us that cash transfers increase the food consumption score (FCS) by 6.48 points, which is an 11 percent increase. Therefore, the modality-specific cost of increasing FCS by 15 percent using cash transfers is (15 percent / 11 percent) × $3.03 = $4.13. Table 6.1 shows the results of these calculations for each modality for the following five outcomes—the value of per capita food consumption, per capita caloric intake, household dietary diversity score (HDDS), dietary diversity index (DDI), and FCS. There are two key findings: (1) across all outcomes, food is always the most costly means of improving these outcomes by 15 percent; and (2) vouchers are usually the least costly means of improving these outcomes by 15 percent, although for increasing the value of food consumption, there is virtually no difference in the cost of vouchers versus cash.

Table 6.1—Modality-specific cost of improving outcomes by 15 percent

	Food	Cash	Voucher
Consumption	$10.78	$3.79	$3.81
Calories	$10.78	$7.58	$4.50
Household dietary diversity score	$28.75	$11.36	$8.25
Dietary diversity index	$15.68	$3.25	$2.91
Food consumption score	$17.25	$4.13	$3.09

Source: Authors' calculations.
Notes: Modality-specific costs per transfer are used to calculate the cost of increasing each outcome by 15 percent.

7. BENEFICIARIES' PREFERENCES AND COSTS

Other factors to take into account when assessing whether cash or in-kind transfers should be provided relates to beneficiaries' costs (time and money) associated with receiving payments and beneficiaries' preferences. Beneficiaries are asked how they would like to receive these transfers in the future. Table 7.1 shows that 55 percent of food beneficiaries prefer to receive transfers entirely in food, 77 percent of cash beneficiaries prefer to receive transfers entirely in cash, and 56 percent of voucher beneficiaries prefer to receive transfers entirely in vouchers. While these numbers suggest widespread satisfaction with these transfer modalities, they may be subject to bias toward what beneficiaries are receiving. More interesting are the proportions of those who having received one form of transfer do not wish to receive the same form in the future. Only 9 percent of cash beneficiaries do not wish to receive further transfers in the form of cash. In contrast, 28 percent of food beneficiaries do not wish to receive further transfers in the form of food, and 31 percent of voucher beneficiaries do not wish to receive further transfers in vouchers.[12] This is consistent with arguments in favor of cash over other transfer modalities in that beneficiaries appear to appreciate the autonomy that comes with cash.

In terms of beneficiaries' costs, cash and voucher recipients spend an average of $1.46 and $1.65 per month on transportation and other out-of-pocket expenses, respectively, to retrieve transfers. Food recipients spend slightly more, $2.12, as many had to use taxis to carry home the heavy loads of food given at the distribution points. In terms of opportunity costs from time spent traveling to the distribution point and waiting to receive their transfers, cash recipients spend 45 minutes traveling and waiting, while food and voucher beneficiaries spend, on average, 93 and 92 minutes, respectively. Consistent with beneficiaries' preferences, overall cash recipients incur the least costs in terms of time and money.

Table 7.1—Satisfaction with transfer modality, by treatment status

How would you like to receive your transfer	Food	Cash	Voucher
All in food	0.55	0.07	0.08
All in cash	0.07	0.77	0.20
All in voucher	0.18	0.02	0.56
None in food	0.28	0.83	0.86
None in cash	0.77	0.09	0.66
None in voucher	0.75	0.92	0.31
Number of observations	341	425	441

Source: Authors' calculations from follow-up survey.
Note: Sample consists of households who participated in the program.

[12] One main complaint from voucher recipients was that the prices from supermarkets were higher than those from central markets. While we find slightly higher prices on some items such as fruits or meat and chicken, for other items such as cereals, pulses, and tubers, we found virtually no difference.

8. CONCLUSION

The debate over the merits of food assistance and the form this assistance should take has a long history in economics. Despite this enduring debate, little rigorous evidence exists that compares food assistance in the form of cash versus in-kind. This paper uses a randomized evaluation to assess the impacts and cost-effectiveness of cash, food vouchers, and food transfers. We find that all three treatment arms significantly improve the quantity and quality of food consumed as measured by the value of per capita food consumption, per capita caloric intake, and dietary diversity measures—household dietary diversity score (HDDS), dietary diversity index (DDI), and food consumption score (FCS). Across treatment arms we find no differences in the amount of the transfer that is used on food versus nonfood expenditures. However, we do find significant differences in the types of food consumed. In particular, food leads to a significantly higher increase in calories, and vouchers lead to significantly larger improvements in dietary diversity.

When we decompose food consumption into food groups, underlying patterns explaining these differences emerge. The larger increase in calories from the food arm is mainly due to significantly larger increases in consumption of cereals, which represent 41 percent of a household's caloric intake. The larger increase in dietary diversity from the voucher arm is mainly due to significantly larger increases in the number of days households consume vegetables, eggs, and milk and dairy. These differences in impacts across transfer modalities indicate that transfers of equivalent value and frequency are used differently on food. While food transfers increase food consumption, the increase is concentrated mainly on the food items that make up the food basket. Cash and vouchers also increase food consumption but are used on food items that have fewer calories compared to the food items from the food transfer. The difference in food consumption between cash and vouchers is a little more subtle, and most likely due to the limits placed on vouchers toward nutritious food, and to the flyers on how to spend the vouchers that were posted on supermarket windows. Differences in types of food available at the supermarkets versus central markets may be another reason for the differences in food consumption between cash and voucher recipients.

Differences across treatment arms also emerge when we investigate the impacts on the poorest households compared to those that are better off. In particular, food leads to significantly larger improvements for households in the poorest wealth tertile compared to households in the top two wealth tertiles. On the other hand, cash and vouchers lead to similar impacts across the wealth distribution. Consequently, food is more targeted to the poorest households and leads to larger increases in the value of food consumption and caloric intake than vouchers.

Especially for policymakers, an important component of our analysis is related to costs and the cost-effectiveness of implementing the different transfer modalities. We find that the marginal cost is $11.50 to provide a food transfer, $3.03 to provide a cash transfer, and $3.30 to provide a voucher. Given these costs and impacts, food is the *least* cost-effective means of improving all food consumption and dietary diversity outcomes. However, the direct comparison of cash versus vouchers is not as straightforward and ultimately depends on the specific objectives of policymakers. If the objective is to increase the value of food consumption, then there is not a difference between cash or food vouchers. However, if the objective is to increase dietary diversity or caloric intake, then vouchers are more cost-effective than cash.

Although we find that the food voucher is the most cost-effective modality across most indicators, this conclusion may not apply to other settings. In particular, our findings are specific to urban populations with well-functioning markets and supermarkets. Our findings may not hold in areas where supermarkets do not have the capacity to receive more clients or where they do not have a consistent supply of various food items. Moreover, the caloric intake of the targeted population is relatively high and not as vulnerable to weather shocks. Thus, the way in which beneficiaries spend the transfer may be different from that of populations with low food-energy consumption or populations whose food-energy consumption is more vulnerable to weather shocks, such as rural farmers. For these populations,

increasing and smoothing their food-energy availability may be more of a priority than improving the diversity of their diet.

In the context considered here, choosing the winner among the different modalities depends on the objectives of the policymakers. If the objective of these transfers is simply to improve welfare, cash is preferable. Cash is the modality that beneficiaries are most satisfied with, and it is the cheapest means of making transfers. Given the budget available to the World Food Programme (WFP) for this project, shifting from food to cash could have increased the number of beneficiaries by 12 percent. Moreover, cash allows for savings, which helps households smooth their food and nonfood consumption. If the objective is to increase calories or dietary diversity, vouchers are the most cost-effective means of doing so, followed by cash. Although the voucher modality is the most cost-effective means of increasing caloric availability and dietary quality, it is the modality *least* preferred by beneficiaries. Thus, policymakers are faced with the trade-off of improving overall welfare or improving specific outcomes. The former gives aid recipients autonomy, while the latter restricts their choices in order to achieve specific objectives.

APPENDIX A: WORLD FOOD PROGRAMME POSTER

Figure A.1—World Food Programme poster for supermarkets

Source: World Food Programme.

APPENDIX B: FURTHER DATA CLEANING DETAILS

Cleaning of Food Consumption Variables

At baseline we had 2,357 households, of which 2,122 were resurveyed at follow-up. Food consumption values for households that reported consuming zero food were converted to missing. In addition we conducted an extra cleaning on the noisier baseline variables by converting to missing values on individual food groups (from the list of 12 food groups in the household dietary diversity score) that were more than 1.25 times the maximum value of the follow-up variable. Consequently of the 2,122 households at follow-up, 2,018 have non-missing food consumption values at baseline and follow-up. For the analysis, we also trim the top and bottom 0.5 percent of the distribution at baseline and follow-up, for a sample of 1,985. Similar steps were followed for creating the caloric intake variable. Of the 2,122 households, 2,043 had non-missing values at baseline and follow-up, and after trimming the top and bottom 0.5 percent at baseline and follow-up, we are left with 2,006 households for the analysis.

APPENDIX C: SUPPLEMENTARY TABLE

Table C.1—Modality-specific costs

	CASH		VOUCHER		FOOD	
	HR*	RF**	HR	RF	HR	RF
PROJECT IMPLEMENTATION						
2.1.2 Prepare contracts with supermarkets						
2.1.2.a. WFP staff			2,228			
2.1.3 Meetings and contracts with supermarkets						
2.1.3.1 Field visit Sucumbíos						
2.1.3.1.a. WFP staff			85			
2.1.3.1.b. Travel				884		
2.1.3.1.c. Legal consulting		250		250		250
2.1.3.1 Field visit Carchi						
2.1.3.1a. WFP staff			85			
2.1.3.1b. Transport						
2.1.4 Prepare contracts with bank						
2.1.4.a. WFP staff	912					
2.1.5 Meetings and contracts with bank						
2.1.5.a. WFP staff	271					
2.1.5.b. Contracting with bank						
2.2.2 Preparation of virtual bank accounts						
2.2.2a. Production of debit cards		13,219				
2.2.2.b. Transfer bank		215				
2.2.2.c. Bank staff						
2.2.2.d. WFP staff	3,799					
2.2.2.e. Travel		773				
2.2.3 Supermarket selection						
2.2.3.a. WFP staff			1,374			
2.2.4 Travel preparation				1,118		
2.2.4.a. WFP staff	74		85		53	
2.4 Voucher development						
2.4.1 Design of vouchers						
2.4.1.a. WFP staff			215			
2.4.1.b. Printing materials				582		
2.4.1.c. Voucher provided						
2.4.1.c.i. WFP staff			11,060			
2.4.2 Voucher liquidation						
2.4.2.a. WFP staff			6,857			
2.4.2.b Bank transfer to supermarkets						

Table C.1—Continued

	CASH		VOUCHER		FOOD	
	HR*	RF**	HR	RF	HR	RF
PROJECT IMPLEMENTATION						
2.5 Food handling						
2.5.1 Food storage						
2.5.1.a. WFP staff					2,341	
2.5.1.b. Bodega rental monthly						
2.5.1.b.i. WFP						19,506
2.5.1.b.ii. Partner B						1,200
2.5.1.b.iii. Partner A						1,813
2.5.1.c. Bodega repairs and investment						
2.5.1.c.i. WFP						
2.5.1.c.ii. Partner B						500
2.5.1.c.iii. Partner A						1,596
2.5.2 Rations preparation						
2.5.2.a. Ration preparation & packaging						18,764
2.5.2.b. WFP staff						
2.5.2.c. Other materials						
2.5.2.d. Cost of food ration						
2.5.3 Food distribution						
2.5.3.a. Transport (truck, gas, drivers, etc.)						
2.5.3.a.i. WFP					4,365	
2.5.3.a.ii. Partner B						900
2.5.3.a.iii. Partner A						600
2.5.3.b. Partners staff for distribution						
2.5.3.b.i. Partner B					4,800	
2.5.3.b.ii. Partner A					5,444	
2.9 Execution of payments						
2.9.a. WFP staff	2,794		2,604		282	
PROJECT MONITORING AND EVALUATION						
3.1 Monitoring data basic						
3.1.a. WFP staff	1,014		1,078		884	
TOTAL COST (TYPE):	8,863	14,457	25,672	2,834	18,169	45,129
TOTAL COST:		23,320		28,506		63,298
TOTAL COST PER TRANSFER:		$3.03		$3.30		$11.50
TOTAL COST PER BENEFICIARY:		**$18.16**		**$19.78**		**$69.03**

Source: World Food Programme.
Notes: *HR refers to human resources; **RF refers to physical resources.

REFERENCES

Basu, K. 1996. "Relief Programs: When It May Be Better to Give Food Instead of Cash." *World Development* 24 (1): 91–96.

Blackorby, C., and D. Donaldson. 1988. "Cash versus Kind, Self-Selection, and Efficient Transfers." *American Economic Review* 78 (4): 691–700.

Blank, R. M. 2002. "Evaluating Welfare Reform in the United States." *Journal of Economic Literature* 40 (4): 1105–1166.

Bruce, N., and M. Waldman. 1991. "Transfers in Kind: Why They Can Be Efficient and Nonpaternalistic." *American Economic Review* 81 (5): 1345–1351.

Coate, S. 1989. "Cash versus Direct Food Relief." *Journal of Development Economics* 30 (2): 199–224.

Cunha, J. M., G. De Giorgi, and S. Jayachandran. 2011. *The Price Effects of Cash versus In-Kind Transfers*. Working Paper No. 17456. Cambridge, MA, US: National Bureau of Economic Research.

Currie, J., and F. Gahvari. 2008. "Transfers in Cash and In-Kind: Theory Meets the Data." *Journal of Economic Literature* 46 (2): 333–383.

Deaton, A., and S. Zaidi. 2002. *Guidelines for Constructing Consumption Aggregates for Welfare Analysis*. Washington, DC: World Bank.

Devereux, S. 2006. "Cash Transfers and Social Protection." Paper presented at the regional workshop on Cash Transfer Activities in Southern Africa, Johannesburg, South Africa, October.

Drèze, J. 1990. "Famine Prevention in India." In *The Political Economy of Hunger*, Volume II, edited by J. Drèze, A. Sen, and A. Hussain, 13–122. Oxford: Clarendon Press.

Edejer, T., R. Baltussen, T. Adam, R. Hutubessy, A. Acharya, D. Evans, and C. Murray, eds. 2003. *Making Choices in Health: WHO Guide to Cost-Effectiveness Analysis*. Geneva: World Health Organization.

Fiedler, J. L., C. A. Villalobos, and A. C. De Mattos. 2008. "An Activity-Based Cost Analysis of the Honduras Community-Based, Integrated Child Care (AIN-C) Programme." *Health Policy and Planning* 23 (6): 408–427.

Fiszbein, A., N. Schady, F. H. G. Ferreira, M. Grosh, N. Kelleher, P. Olinto, and E. Skoufias. 2009. *Conditional Cash Transfers: Reducing Present and Future Poverty*. Washington, DC: World Bank.

Fraker, T. M., A. P. Martini, and J. C. Ohls. 1995. "The Effect of Food Stamp Cashout on Food Expenditures: An Assessment of the Findings from Four Demonstrations." *Journal of Human Resources* 30 (4): 633–649.

Gentilini, U. 2007. *Cash and Food Transfers: A Primer.* Occasional Paper 18. Rome: World Food Programme.

Glaeser, E. 2012. "Cash Is Better Than Food Stamps in Helping Poor." *Bloomberg*. www.bloomberg.com/news/2012-02-28/cash-better-than-food-stamps-in-helping-poor-commentary-by-edward-glaeser.html.

Grosh, M., C. Del Ninno, E. Tesliuc, and A. Ouerghi. 2008. *For Protection and Promotion: The Design and Implementation of Effective Safety Nets*. Washington, DC: World Bank.

Hoddinott, J., and Y. Yohannes. 2002. *Dietary Diversity as a Food Security Indicator.* Food Consumption and Nutrition Division Discussion Paper 136. Washington, DC: International Food Policy Research Institute.

Kennedy, G., T. Ballard, and M. Dop. 2011. *Guidelines for Measuring Household and Individual Dietary Diversity*. Rome: Food and Agriculture Organization of the United Nations.

Manchu, M., and H. Mendez. 2007. *Tabla de Composicion de Alimentos de Centroamerica* (Segunda ed.). Guatemala: Instituto de Nutricion de Centro America y Panama (INCAP), Organizacion Panamericana de la Salud (OPS).

McKenzie, D. 2012. "Beyond Baseline and Follow-Up: The Case for More T in Experiments." *Journal of Development Economics* 99 (2): 210–221.

Schady, N., and J. Rosero. 2008. "Are Cash Transfers Made to Women Spent Like Other Sources of Income?" *Economics Letters* 101 (3): 246–248.

Senior, N. W. 1834. *Poor Law Commissioners' Report of 1834.* Copy of the report made in 1834 by the Commissioners for Inquiring into the Administration and Practical Operation of the Poor Laws. Presented to both Houses of Parliament by Command of His Majesty, 1905. London: H. M. Stationery Off. by Darling and Son. http://oll.libertyfund.org/title/1461/74122.

Sharma, M. 2006. "An Assessment of the Effects of the Cash Transfer Pilot Project on Household Consumption Patterns in Tsunami-Affected Areas of Sri Lanka." International Food Policy Research Institute, Washington, DC.

Smith, L. C., and A. Subandoro, eds. 2007. *Measuring Food Security Using Household Expenditure Surveys.* Food Security in Practice Technical Guide Series. Washington, DC: International Food Policy Research Institute.

USDA (U.S. Department of Agriculture). 2010. *National Nutrient Database for Standard Reference,* 23rd edition. Agricultural Resource Service. Beltsville, MD, US.

WFP (World Food Programme). 2008. *Food Consumption Analysis: Calculation and Use of the Food Consumption Score in Food Security Analysis*. Rome.

WFP (World Food Programme)—Ecuador. 2011. "Report on the Cash and Voucher Project: Quarterly Report of Monitoring, May–July 2011." Quito.

Wiesmann, D., L. Bassett, T. Benson, and J. Hoddinott, J. 2009. *Validation of the World Food Programme's Food Consumption Score and Alternative Indicators of Household Food Security.* Discussion Paper 00870. Washington, DC: International Food Policy Research Institute.

Yen, S. T. 2010. "The Effects of SNAP and WIC Programs on Nutrient Intakes of Children." *Food Policy* 35 (6): 576–583.

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