WHICH KINDS OF SOCIAL SAFETY NET TRANSFERS WORK BEST FOR THE ULTRA POOR IN BANGLADESH?

Operation and Impacts of the Transfer Modality Research Initiative

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
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1. INTRODUCTION

1.1 Background and Motivation

The foundation for poverty reduction is broad-based economic growth that generates employment alongside human development to empower the poor and strong social safety nets to protect the vulnerable from the worst effects of poverty. There may be scope for designing safety net programs that can actually contribute to human development through improvements in education, health, and nutrition of the poor.

Bangladesh's progress in economic growth has contributed to a reduction in the headcount poverty rate from 40 percent in 2005 to 31.5 percent in 2010, according to the official poverty estimates (BBS 2011). This progress is of little comfort, however, since the overall incidence of poverty persists at a high level, leaving about 28 million people unable to afford an adequate diet. Chronically underfed and highly vulnerable, this segment of the population remains largely without assets (other than its own labor power) to cushion "lean-season" hunger or the debilitating shock of illness, flooding, and other unexpected events. The need for targeted safety net interventions to improve the food security and livelihoods of the extreme poor therefore remains strong.

Bangladesh possesses significant experience in providing assistance to the poor through safety net or social protection programs; it also allocates a significant share of its budget to run the programs. In fiscal year 2014–15, for example, the Government of Bangladesh spent US$2.7 billion, accounting for about 12 percent of its budget and 2.3 percent of the gross domestic product (GDP), to cover around 100 safety net programs. The government has increased the budget allocation to US$3.4 billion for social protection in fiscal year 2015–16.

Although some of the current safety net programs were initially launched as far back as the mid-1970s, the administrative structure and implementation mechanisms have gone through substantive changes over the years. The most notable changes include transforming relief programs into development programs, converting ration price subsidies into targeted food distribution, and engaging other stakeholders—such as nongovernmental organizations (NGOs) and microfinance organizations—in implementation.

In fiscal year 2014–15, food-based safety nets accounted for about 60 percent (US$1.6 billion) of the total expenditure on safety net programs. Although the majority of Bangladesh's safety net programs are food-based, cash transfers have become increasingly important. However, comparative studies on cash and food transfers remain limited and the evidence that does exist is inconclusive because program features and contextual factors influence the effects of food and cash transfers on household income, household food security, and child nutrition.[1] Therefore the question remains: "What makes a more effective social safety net program: transfers of food or cash?"

[1] Research on cash and food transfers has increased considerably in recent years in a number of countries, particularly by IFPRI.

A study conducted by the International Food Policy Research Institute (IFPRI) examined the efficacy of food- and cash-based interventions in enhancing the food security and livelihoods of the ultra-poor in rural Bangladesh by evaluating four national programs (Ahmed et al. 2009). The evaluation assessed how well transfers were targeted and delivered; the impact of these transfers on food security, livelihoods, and gender-related outcomes; and their cost-effectiveness. However, as the authors noted, a limitation of the study design was that the four programs differed from each other along a number of dimensions: transfer size or quantity, participant qualification requirements, and the availability of complementary assistance such as savings and credit. These factors influence program impacts, thus confounding the impact of differences in transfer modality (that is, food or cash). While the evaluation demonstrated considerable positive impacts on income and food security, none of the programs showed any impact on child nutritional status.

Similarly, most existing evidence from safety nets in other countries (primarily conditional cash transfers in Latin America) show reduced household poverty and improved food security but few improvements in child nutritional status. This leads to two key questions: Are large-scale social protection interventions that increase resources sufficient to improve child nutrition? Are there constraints other than resources, such as nutrition knowledge, that also need to be addressed?

To provide definitive evidence on these and other "cash-versus-food" questions, IFPRI researchers designed and piloted the Transfer Modality Research Initiative (TMRI) together with the UN World Food Programme (WFP). We also added nutrition behavior change communications to cash and food transfers for some groups of program participants to assess whether or not nutrition knowledge combined with transfers makes a difference in achieving desired nutritional outcomes. By keeping all aspects of the intervention the same, the research ensured that any difference in outcomes is attributable to the modality—either (1) cash, (2) food, (3) a combination of cash and food, or (4) cash or food accompanied by a nutrition behavior change component.

Under the initiative, 4,000 ultra-poor women and their 21,600 family members in the northwestern and southern regions of Bangladesh received a monthly transfer for 24 months from May 2012 to April 2014. IFPRI designed the research and conducted the evaluation while WFP implemented the activities through Eco-Social Development Organization (ESDO), a national partner NGO. A Technical Committee comprised of various ministries of the Bangladesh government provided the necessary oversight and technical guidance.

This report presents the results of the TMRI evaluation. It is organized in ten sections. The rest of Section 1 presents the objectives of the study, conceptual issues and empirical evidence of the effects of food and cash transfers. Section 2 describes the salient features of the TMRI. Section 3 discusses the analytical methodology and the data used in the empirical work. Section 4 gives a profile of survey households. Section 5 provides the findings of evaluation of the TMRI implementation process, assesses various aspects of participation in the TMRI, and provides the cost analysis results. Section 6 presents the impact of the TMRI on household consumption. Section 7 shows impact of the TMRI on maternal knowledge and practices related to child nutrition. Section 8 provides the impact of the TMRI on child anthropometric status. Section 9 presents case studies

of TMRI participants from qualitative research. Section 10 summarizes the main findings and provides policy conclusions.

1.2 Objectives of the Research

The overall objective of the research is to provide evidence that can be used to streamline the social safety net system in Bangladesh, with the aim of cost-effectively improving food and nutrition security and livelihoods among the ultra-poor. The research will inform the policymakers on which type of program can best improve the income status and food and nutrition security of the poor and thus be a valuable tool to the government in implementing its recently developed National Social Security Strategy (GED 2015).

The research has two specific objectives:

1. Measure the efficacy and cost-effectiveness of transfer modalities on key outcomes:
   a. Household income,
   b. Household food security, and
   c. Child nutrition.
2. Evaluate both the transfer delivery process at the operational level and the perception of participants.

1.3 Cash and Food Transfers: Conceptual Issues and Empirical Evidence

1.3.1 Conceptual Issues

A number of conceptual issues arise in assessing the appropriateness of cash transfers and in-kind transfers. In theory, cash is preferable to in-kind transfers because it is economically more efficient (Tabor 2002). Cash transfers provide recipients with freedom of choice and give them a higher level of satisfaction at any given level of income than is the case with food or another type of in-kind transfer. In other words, cash allows recipients to make their own decisions and buy what they determine they need most. Distributing cash is also likely to be cheaper than distributing food or other commodities. It can also stimulate agricultural production and other activities.

By contrast, in-kind transfers are often used as a means of controlling, modifying, or otherwise influencing the behavior of recipients (Tabor 2002). For example, a food-based program may provide a type of food to those who could otherwise not afford it or are unlikely to purchase an adequate quantity of that food, even if they could afford it.

The degree to which the food (or other in-kind) transfer influences actual household consumption behavior hinges on whether or not the food assistance is *inframarginal*—meaning, the ration is a smaller amount than what is normally consumed without the transfer. Economic theory holds that if the food (or other in-kind) transfer is inframarginal then the transfer will result in the same additional food purchases as would a cash transfer of equal value. In this case, the in-kind transfer has only the income effect (as in the case of any cash transfer), and the price incentive effect at the margin is lost.

The in-kind transfer is *extramarginal* if the transfer (for example, a food ration) is greater than the amount the recipient household would have consumed without the ration. In this case, the transfer may have two effects: an income effect and a substitution effect. The pure price effect of the ration is captured through the substitution effect. The net effect, which also includes the income effect, may lead to an increase in the consumption of the ration commodity, as well as increased consumption of complementary products and reduced consumption of substitutes (Kennedy and Alderman 1987).[2] The substitution effect, however, will take place only if resale of the ration is effectively prohibited or if resale entails a high transaction cost that decreases the implicit selling price for the ration recipient. If there is no transaction cost and the recipient has the option of selling the ration at market price, then the in-kind transfer is equivalent to the income effect only, even if the ration is extramarginal (Ahmed 1993). Thus, comparative effects of food and cash transfers on food consumption and nutrition will depend on the size of the ration, the price and the ease with which the ration can be resold, and the frequency of food or cash distribution, among other things (like intrahousehold control of cash and food resources).

Which type of transfer is better—cash or in-kind? The answer depends partly on the purpose of providing the benefit and partly on administrative and financial considerations (Grosh 1994).

Generally, a household will spend only a portion of its additional income on food. This pattern is referred to as the marginal propensity to consume food (MPCf), which ranges between zero and one. If, for example, 65 percent of any income increment is spent on food, then the value of the MPCf is 0.65 and MPC nonfood is 0.35. If a program's primary goal is to improve the nutritional status of the target group, and if an income transfer in food has a higher marginal propensity to consume food than that of a cash transfer, then a food-based program could be more effective in achieving the goal. If improving nutrition is not the primary goal, however, food distribution is not necessarily preferable to cash transfers. If the MPC for household essentials (such as expenses for health care, education, clothing, and shelter) from a cash transfer is higher than that of a food transfer, then a cash transfer program may be preferable if the program's primary goal is to improve overall livelihoods.

Furthermore, household welfare and the impact of the program on desired outcomes may depend on the preferences of the decision maker within the household. For example, conditional cash transfer programs have targeted transfers to women because of the growing evidence that resources in the hands of women are more likely to be spent on children. Traditional intrahousehold resource allocation models (Samuelson 1956) assume, however, that household members pool their income, including transfers, and make consumption decisions according to a single household preference structure. As such, the models predict that regardless of which household member receives a transfer, household consumption will be affected in the same way. More recent household models, which fall under the umbrella of "collective models" developed by

[2] If the in-kind ration is an inferior good (that is, has a negative income elasticity), then the income effect of the ration will actually reduce its consumption.

[3] If program participants or their household members sell a large proportion of the ration received, however, then the value of the food transfer will fluctuate with the market price of the food.

Chiappori (1988, 1992), suggest that household income is treated differently depending on which household member receives the income. Household bargaining models (Manser and Brown 1980; McElroy and Horney 1981) are a type of collective model in which specific assumptions about the intrahousehold resource-sharing rules are made.

For cash transfers, the real value to the beneficiaries may erode with inflation, but the government's nominal budget is fixed and predictable. If benefits and real budgets are to keep pace with inflation, the government must make explicit decisions to raise benefit levels. In contrast, for food transfers, the real value of benefits to consumers is constant and the cost to the government (or food aid donors) rises and falls with the price of the commodity (Grosh 1994).[3]

1.3.2 Empirical Evidence

As mentioned above, an IFPRI study evaluated four national programs to examine the efficacy of food- and cash-based interventions in enhancing the food security and livelihoods of the ultra poor in rural Bangladesh (Ahmed et al. 2009). Another study compared the relative impacts of food versus cash for education programs. The results demonstrated that although both programs increased school enrollment rates, food rations increased families' food consumption and cash transfers did not. Therefore, if an education incentive program seeks to support nutrition in addition to increasing school enrollment, a food-based incentive system would appear to be the more effective option (Ahmed 2005).

The dilemma in cash and food transfer is the trade-off between providing choice and promoting a given externality (Gentilini 2014). Cash transfers empower and provide choice while food transfers are "paternalistic" as they constrain recipients. Gentilini examined a dozen of transfer performances and reported that the differences of effectiveness of modalities vary by indicator. In some cases the differences were pronounced, for example, a cash transfer being effective for improving food consumption, food transfers enhancing household caloric intake. However, in most cases the differences did not have statistical significance. Gentilini argued that a transfer's performance and difference are functions of interactions among factors such as, profile and initial conditions of beneficiaries, capacity of local markets, and program objectives and design. He reported from the review that cash transfer was half as costly as food transfer and suggested that efficiency measures of the modalities also vary in scope, breadth, and depth. The core argument that he put forward was that the center issues of debate around transfer modality should be robust and context specific, instead of based in ideology, political economy, and inference of evidence.

Using randomized designs in Ecuador, Hidrobo et al. (2014) compared the impact and cost-effectiveness of cash, food vouchers, and food transfers on both the quantity and quality of food consumed. The study found that the quality and quantity of food consumed—as measured by the value of per capita food consumption, per capita caloric intake, and dietary diversity measures—significantly improved by all three treatment arms. Nonetheless, significant differences were found

[3] If program participants or their household members sell a large proportion of the ration received, however, then the value of the food transfer will fluctuate with the market price of the food.

in types of food consumed. Food transfers significantly improved caloric intake while vouchers significantly contributed to enhanced dietary diversity. Analyzing the cost-effectiveness of different modalities, the study found food transfers to be the least cost-effective modality. If the objective of intervention is to increase value of food consumption, cash and vouchers have similar cost-effectiveness, while vouchers are most cost effective if the objective is to increase dietary diversity. It is noted that different conclusions regarding cost-effectiveness might not be generalized as the study was conducted in an urban setting with well-functioning markets. Change in such setting may lead to change in the cost of different modalities.

Hoddinott et al. (2014) looked into the impact differences between cash and food transfers in Niger using randomized designs. The study found that households receiving food transfers experienced positive impacts on food security and dietary diversity while households receiving cash transfers spent more on agricultural inputs. The study could not distinguish, however, between different mechanisms that underpin the results—for example, preferences for increasing diet quantity rather than quality, extra-marginality of components of the food basket, the decision to make bulk purchases in order to avoid future price shocks, or the decision to use some of the cash benefits received to repay debts. Additionally, it was noted that in the short term households receiving food transfers may see greater improvements in dietary quality but over the longer term households receiving cash transfers may achieve greater improvements because of their investment in agriculture inputs. It was also noted that the results were different from similar studies conducted in settings with higher incomes and lower food insecurity. The relative impact of food and cash transfers did not vary significantly by season despite seasonal dimensions to food insecurity. The transfers for both the modalities were made at similar frequencies, with food transfers proving 15 percent more expensive than cash transfers.

Schwab et al. (2013) used randomized control trials to look into the differential impacts of WFP's cash and food transfer program on food security issues in Yemen. It was reported that cash recipients experienced greater dietary diversity, spent more on both staple and nonstaple food items, and fed infants and young children wider variety of foods. Dietary diversity of the cash recipients was more pronounced where males were the heads of the households. Beneficiaries receiving food experienced more per person per day caloric consumption and spent more on food items than on nonfood items. The cost analysis indicated that cash transfers were cheaper than food. While the value of both transfers was the same, the cost of transferring cash was 8.3 percent of the transfer's value while the cost of transferring food was 21.1 percent of it.

A similar study conducted by Gilligan et al. (2013) in Uganda looked at impacts beyond food security, namely on child food consumption, child malnutrition, anemia prevalence, early childhood development participation, and child cognitive and noncognitive development. The study found food transfers to have an effect on very limited outcomes, and worsening effect on anemia status on some children. On the other hand, cash transfers substantially affected food security, frequency of child food consumption, early childhood development participation, anemia prevalence, and child cognitive and noncognitive development. The food beneficiary households did not use the additional resources provided in the form of food rations to augment consumption of other foods but the degree of variety was included in the measure of food security. Hence the composition of

food rations constituted the weak effect of food transfer. Poor targeting and the lag between transfers also may have caused these poor effects. The food ration program was 21.4 percent more expensive than cash transfer. Because food transfers had weak impacts on improving food security (and on other measures too), the cost effectiveness of food rations could not be identified. The cash transfer, nevertheless, was found quite cost-effective as it improved key outcomes on food security, child diet, health and development.

A number of studies compare cash versus food transfers, but they often take place in unique contexts or involve differences beyond modality type, which complicates the interpretation. For example, evidence from a three-month pilot in post-tsunami Sri Lanka (Sharma 2006) in which either cash or food transfers were randomly assigned to beneficiaries suggests that, relative to food, cash resulted in greater increases in dietary diversity from increased consumption of more expensive cereals, meat, dairy, and more processed foods (at the expense of rice, the country's staple food); increases in spending on clothing and footwear; increases in household liquidity; and decreases in work within casual labor markets (suggesting possible disincentives to work from cash transfers). There did not seem to be differences in expenditure on "social bads," such as liquor, and there were no significant differences in overall household indebtedness. Differences in impact between different modalities were particularly pronounced in areas that were poorer and where market transaction costs were higher. However, the short duration of the pilot makes the results hard to extrapolate to the long term, and the fact that food was distributed in only one or two lumpy installments while cash was distributed smoothly every two weeks makes it difficult to attribute the differences in impacts solely to the type of modality rather than also to its frequency of delivery.

A study of Programa de Apoyo Alimentario in Mexico (Leroy et al. 2010)—which provided some households with cash and others with food in a randomized controlled trial—found that both food and cash groups had higher consumption of energy and higher consumption of macro- and micronutrients than the control group, but the food group demonstrated a higher consumption of energy and all nutrients than the cash group. The value of the food basket in this study, however, was estimated to be 30 percent higher than the value of the cash basket, which makes it difficult to attribute the differences in consumption habits solely to the type of transfer received rather than also to its value.

Similar findings are suggested by studies that do not involve randomization, including a 2008 study (Devereux and Mhlanga) of the Cash and Food Transfers Pilot in Lesotho: some households were given a full food ration, some were given the cash equivalent of a full food ration, and some were given a combination of half a food ration and the cash equivalent of half a food ration. A 2006 study by Devereux, Mvula, and Solomon looks at the Food and Cash Transfers Project in Malawi by assessing all beneficiary households given a combination of food and cash. A 2008 case study in post-tsunami Indonesia (Kelaher and Dollery) involved some beneficiaries receiving a food transfer and others receiving a greater-value combination of food vouchers and cash.

Food transfers tend to be mostly consumed rather than shared or sold, and cash transfers tend to be spent on a wide range of uses including staple foods, nonstaple foods, investments in health and

education, investments in farming or business assets, and debt repayment; the evidence on use of cash for consumption of alcohol, tobacco, etc., is mixed. The particular types of foods in the food ration tend to be consumed more by households receiving the food ration, while other types of foods tend to be consumed more by households receiving cash. In the studies where one group receives a combination of both food and cash (Devereux and Mhlanga 2008; Kelaher and Dollery 2008), a complementarity between the modalities is suggested, in that both food needs and nonfood needs are well-protected.

In all of these examples, there is ambiguity in interpreting the results or extrapolating them to other contexts because (a) the studies focus on unique or unusual contexts (i.e., post-tsunami) and (b) the differences between the food and cash transfer groups go beyond modality differences (i.e., a lack of randomized control groups, limitations in market and mobility in a post-disaster context, different conditional requirements for certain types of transfers, and differences in transfer value). Moreover, many of the studies are short pilots spanning fewer than six months, so impacts are difficult to extrapolate for longer-term interventions, particularly as they relate to nutritional status and asset accumulation—each of which are more likely to benefit from transfers received over a longer period of time. The studies also suggest that, even within a country, differences in impact from different modalities depend on characteristics of the environment, including market conditions; this suggests that results may not generalize across different countries.

A synthesis paper that lays out key factors affecting the choice of cash and food transfers concludes that the appropriateness of one modality over another cannot be predetermined. Rather, program objectives, economic analysis, market assessments, administrative capacity requirements, and beneficiary preferences play important roles in the determination of transfer type (Gentilini 2007).

2. SALIENT FEATURES OF THE TRANSFER MODALITY RESEARCH INITIATIVE

This section describes the locations of the Transfer Modality Research Initiative (TMRI), the process of identifying households and assigning them to various intervention and comparison groups, and transfer modalities with and without nutrition behavior change communication (BCC) training. It then presents the TMRI implantation structure and the roles of various stakeholders.

2.1 Description of the TMRI

2.1.1 Selection of TMRI Locations, and Treatment and Control Groups

The TMRI was implemented in two distinct regions in Bangladesh, the northwest and the south. Poverty and food insecurity rates are high in the northwest. However, markets function well because they are physically accessible by reasonably good roads, offer a wide range of food and non-food goods, and are well-connected to each other. Poverty and food insecurity, while still widespread, are less prevalent in the south than the northwest. However, the topography of the south—flat, with multiple rivers and tributaries—leads to frequent flooding. With a coastline on the Bay of Bengal, the region is also prone to cyclones and saline water surge. Relative to the northwest, the physical infrastructure is poorer and markets—while widespread—function less well.

In both regions, three transfer modalities were tested: (1) cash only, (2) food only, and (3) a cash and food combination. In addition, in the northwest region, another modality—cash conditional on attending nutrition BCC training—was tested because infrastructure conditions (primarily access to markets) are better in that area, so cash was assumed to work well there. A final modality—food ration conditional on attending nutrition BCC training—was tested in the southern region, where access to markets is relatively poor.

During the sampling, upazilas with community nutrition programs by other stakeholders like BRAC, Save the Children, CARE, and WFP were dropped to avoid the likely "spillover effect" on villagers from other community-based programs, which could skew the findings from the TMRI interventions (namely, the BCC nutrition training sessions). [4]

For the northwest region, the selection process for the treatment and the control groups included the following steps:

- From the 35 upazilas in Rangpur and Kurigram Districts, five were randomly selected to receive all the four modalities being studied: (1) food only, (2) cash only, (3) a food and cash combination, and (4) cash conditional on attending nutrition BCC training. The upazilas in the

[4] The administrative structure of Bangladesh consists of divisions, districts, upazilas, and unions, in decreasing order by size. There are 7 divisions, 64 districts, 484 upazilas, and 4,498 unions (all rural). There are 87,320 villages in rural Bangladesh.

north included Gangachara, Pirgachha, and Pirganj in Rangpur District, and Phulbari and Rajarhat in Kurigram District.

- The team prepared a list of all villages (clusters) in the five selected upazilas. From the list, 250 villages (50 per upazila) were randomly selected. Treatment and control villages were randomly assigned among the 250 selected villages (50 per treatment arm and 50 as the control group for each of the four treatment arms).

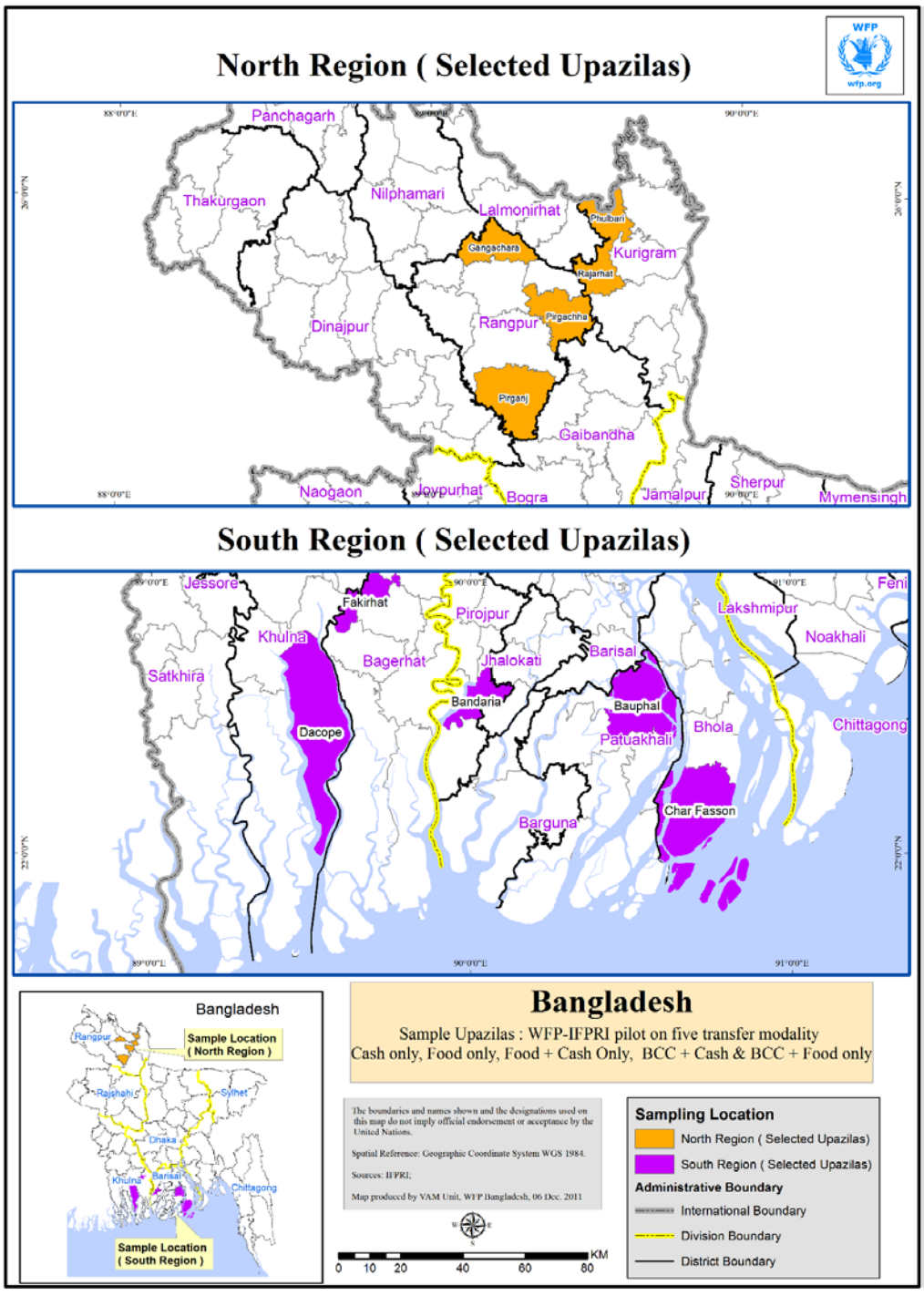
- A complete village census was carried out in each of the 250 selected villages, which collected information on household demographics (e.g., the age and sex of household members), a set of poverty indicators,[5] and whether households participate in safety nets and other targeted interventions.

- The census results were used to randomly select 10 households from each cluster for a total of 5,000 households. The selected households had to match the following criteria: (1) they are poor (determined by poverty indicators), (2) they have at least one child aged between 0–24 months, and (3) they are not receiving benefits from any other safety net interventions.

The same method described above was used for selecting the treatment and control groups in the southern region. The upazilas in the south included Bauphal in Patuakhali District, Bhandaria in Pirojpur District, Char Fasson in Bhola District, Dacope in Khulna District, and Fakirhat in Bagerhat District. Figure 2.1 shows the selected upazilas in the north and the south on the map of Bangladesh.

[5] IFPRI developed a poverty scoring mechanism based on age and education of the household head, housing characteristics, ownership of consumer durables, land ownership, and household livelihoods. The village census collected information on these indicators, which was used to construct a poverty score for each household.

Figure 2.1 Map of Bangladesh showing TMRI upazilas in the northwest and the southern regions



2.1.2 Description of Transfer Modalities and Nutrition BCC

Because the size of the transfer relative to household income is tremendously important in achieving sustainable food security or livelihood improvements, the value of transfer-per-household within the treatment group was fixed at 1,500 taka (US$18.66) per household per month during the design phase of the TMRI. [6] This is equivalent to around one-quarter of the average monthly household consumption expenditures of poor rural households in Bangladesh.[7] For cash transfers, the same value was used throughout the research period. For food transfers, the food ration value was fixed at 1,500 taka at the beginning of the research and the resulting food quantities were maintained throughout the research period.

Most social safety net programs in Bangladesh target women, so the transfers in the TMRI were also made to women only. The women who had at least one child aged 0-24 months were considered the program participants, and they and their household/family members were the beneficiaries. The transfer's overall impact was evaluated at the household level (with regard to income and food security) and the individual level (with regard to nutrition).

WFP was responsible for the implementation of the research initiative and for delivering the alternative benefits (described below) to the women and their households. WFP commissioned the Eco-Social Development Organization (ESDO), a partner NGO, for field implementation of the transfer modalities and the nutrition BCC training. Section 2.2 describes the TMRI implantation structure.

The transfer modalities and the nutrition BCC are described below.

- **Cash only (*Cash*):** Tk 1,500 cash was transferred to the women participants during the second week of every month via a new mobile phone cash-transfer system.
    - ***NOTE:*** *The mobile phone cash transfer system was enabled by the women's possession of a mobile phone handset and SIM card. Accordingly, WFP made the provision for the distribution of mobile telephone handsets to all women in the program—the recipients of cash, as well as food transfers—to ensure that the total value of program benefit is equal across all treatment arms. This strategy preserved the integrity of the experiment. In addition, mobile telephone handsets were distributed to the women in households of the*

[6] The official exchange rate for the taka (Tk), the currency of Bangladesh, was Tk 80.39 per US$1.00 in May 2012 on average at the start of the TMRI.

[7] The value of the transfer was approximately equal to 25 percent of the average monthly household consumption expenditures of poor rural households in Bangladesh. This level was chosen because it was approximately equivalent to the midpoint between transfer levels of two large government social safety net programs. An IFPRI study in Bangladesh (Ahmed et al. 2009) shows that transfers made as part of the Vulnerable Group Development (VGD) Program are worth approximately 16 percent of monthly household consumption expenditure. The VGD has historically been the dominant safety net program in Bangladesh. Transfers accounted for about 30 percent of total household consumption expenditure of participants of the Rural Maintenance Program (RMP), a former national safety net program targeted specifically to women. Transfers of this size also meant that it would be possible with reasonable sample sizes to have sufficient statistical power to detect impacts.

comparison (or control) group as well to avoid introducing any inadvertent bias. As described in Section 2.2, ESDO was involved in implementing the mobile phone cash transfer system.

- **Food ration only (*Food*):** Food rations were transferred to women participants during the second week of every month, which included rice, pulses, and cooking oil. Based on nutrition standards and current market prices, the composition and quantity of the monthly food ration are 30 kilograms (kg) of rice, 2 kg o*f mosoor* pulse (a type of lentil), and 2 liters of micronutrient-fortified cooking oil. ESDO distributed the ration to the women at the distribution site nearest to their homes once a month on the same designated week as the cash transfer.

- **Cash and food ration combination (*Cash+Food*):** The total transfer was a combination of 50 percent food and 50 percent cash. The monthly food ration consisted of 15 kg of rice, 1 kg of *mosoor* pulse, and 1 liter of cooking oil; the monthly cash transfer was Tk 750.

- **Cash conditional on attending nutrition BCC training (*Cash+BCC*):** A monthly cash transfer of Tk 1,500 per household was given to the selected women participants who regularly attended the nutrition BCC training sessions.

- **Food conditional on attending nutrition BCC training (*Food+BCC*):** This was similar to the previous benefit, except substituting a food ration instead of cash. A monthly food ration of 30 kg of rice, 2 kg o*f mosoor* pulse, and 2 liters of micronutrient-fortified cooking oil was provided to selected women who regularly attended the nutrition BCC training sessions.

- **Nutrition BCC training:** The nutrition BCC component of the initiative was designed specifically for the TMRI by WFP in consultation with IFPRI, local technical experts, guided by BCC training manuals used by various national and international organizations in Bangladesh. A broad communication strategy focused on education and behavior change (or support of behavior change) at the household and community levels was developed. The BCC strategy involved four different activities: (1) group BCC trainings with the participants (that is, in the *Food+BCC* or *Cash+BCC* groups), (2) group BCC trainings with participants and other influential family members, (3) group meetings for community members, and (4) household follow-up visits to the participants' homes.

  The nutrition BCC consists of six modules, which were delivered over seven sessions: (1) overall importance of nutrition and dietary diversity for health; (2) handwashing and hygiene for improving nutrition and health; (3) micronutrients: diversifying diets, Vitamin A; (4) micronutrients: diversifying diets, iron, iodine, and zinc; (5) feeding young children: breastfeeding (6) feeding young children: complementary feeding; and (7) maternal nutrition.

  BCC training was imparted by Community Nutrition Workers (CNW), engaged by ESDO. CNWs, all women, were from local communities and came from the same villages as TMRI participants. They were trained to educate participants on the BCC content using flashcards, real life

examples, food items, and interactive exercises during sessions (Section 5 provides details on the roles and performance of CNWs).

Three groups of people received BCC training in various frequencies: (1) once-per-month training session for participants only, held on the day of monthly distribution of food or cash; (2) three weekly group meetings per month with participants and their mother-in-laws, any other pregnant or lactating women in the household, their husbands, and any other influential family members in order to create a supportive household atmosphere and behavior change at the household level; and (3) monthly group meetings with influential community members like village heads, religious leaders, school teachers, community elected persons, and local health and family planning staff. Each group meeting was held for 45-60 minutes.

At the conclusion of the group training, individuals identified as needing further support received individual counseling from the CNWs on an as-needed basis. The CNWs delivering the BCC training also visited the participants in their homes twice per month in order to observe household level practice and encourage the adoption of positive behaviors.

On the transfer distribution day, the BCC training participants received their monthly predetermined transfer (i.e., food or cash) a few hours after the non-BCC participants. This served to minimize the "spillover effect" of the women sharing knowledge gained in the trainings with non-BCC participants.

The participants in the BCC transfer modalities received their food or cash on the condition that they attend the trainings. Each absence was treated on a case-by-case basis. In the case that participants were ill or otherwise unavailable, the community nutrition worker was advised to provide follow-up counseling at the household as soon as possible to ensure that all participants received that week's BCC messages.

2.2 Implementation Structure

WFP was responsible for planning, management, and implementation of the TMRI, including procurement and delivery of transfers and nutrition BCC training. Program monitoring was managed through the WFP-Bangladesh country office in Dhaka and field offices in Rangpur and Khulna. ESDO, an NGO contracted by WFP, was responsible for the field implementation of the transfers, including distributing monthly food and cash transfers, delivering nutrition BCC training sessions, and performing routine monitoring and reporting activities.

To maintain the integrity of the research, it is essential that participants receive their due transfers in a timely, error-free manner in accordance with the established distribution plan. The transfers and activities must remain standard across all TMRI participants, and the influence of external confounding factors must be minimized. To ensure this, WFP provided operational oversight and took measures to build local awareness of the program and sensitize government officials, participants, and other stakeholders about the TMRI, in order to ensure smooth implementation.

WFP has strong field presence and a dedicated TMRI team, which ensured that the activities were executed according to plan and expected standards. A detailed implementation plan ensured timely delivery of the food and cash transfers and nutrition BCC trainings to the participating women, each of whom were issued a participant card with her photograph and an identification number. A participant identification system existed to ensure that the correct person received the correct entitlement. The WFP field team closely monitored all activities, including food and cash distributions, nutrition BCC delivery, and verification of transfer receipt through household visits. These mechanisms ensured that the initiative was implemented in a controlled environment and the influence of external factors was minimized as much as possible.

The Government of Bangladesh established a Technical Committee to promote efficient research operation, encourage government ownership, and ensure that the findings from the research initiative are used for evidence-based reform of social safety nets. The committee, which consisted of representatives from relevant government agencies, provided technical guidance and advocacy. WFP facilitated several joint field visits and meetings with Technical Committee members.

Food Transfers: WFP was responsible for procuring the food commodities and ensuring their appropriate packaging, storage, and quality control. Food was packaged individually, with each entitlement including a 15 kg bag of rice, 1 kg bags of lentils, and 1 liter bottle of cooking oil. Individual packaging made for a more streamlined distribution process. The food (and cash) distribution sites had temporary string fences to encourage orderly lines, and each participant presented a photograph identification card to receive her entitlement.

Cash Transfers: For cash transfers, mobile phone technology was introduced with the expectation that it would provide a more secure, efficient, and transparent modality to distribute cash entitlements and reduce the opportunity for leakage. Via ESDO and Dutch-Bangla Bank Limited (DBBL), an authorized bank, WFP introduced this technology with a pilot sample of cash recipients. ESDO and DBBL collaboratively conducted training sessions on the use of the mobile phones to receive the cash transfers. Each individual participant established a bank account with DBBL, which provided a mobile-based banking service that allowed account holders to make transactions. To withdraw cash, an account holder visited a local and mobile DBBL cash-point agent and exchanged a series of messages, which effectively authorized the electronic transfer of money from the account holder to the cash-point agent's account, who then provided cash in hand to the account holder. The cash-point agents received Tk 10 as commission per transaction (paid by WFP) for their services.

The mobile phone cash transfer involved the following process:

1. WFP transferred the total monthly cash requirement to ESDO's account held with DBBL. ESDO then uploaded payment instructions for each TMRI cash-transfer participant's mobile to DBBL, authorizing the individual transfers as per the distribution date.
2. As per the payment instructions, DBBL credited all the individual accounts by debiting ESDO's account at the central level through a batch-process system.
3. The participant received an SMS notification upon credit of her account. The participant collected her cash on the set distribution date from the DBBL cash-point agent at the ESDO

designated distribution site. At the time of collection, the participant had to bring: (1) her mobile phone, (2) her account number (i.e., her phone number plus a check digit displayed on the ID card), and (3) her four-digit personal identification number (PIN).

4. A DBBL agent was present at the distribution site. The agent initiated the transactions by entering the participant's mobile account number and selected the "cash out" option from a menu available on the participant's mobile phone. This sent a request to DBBL's server via SMS.
5. The DBBL server sent an SMS prompt to the participant's mobile phone, requesting verification through a four-digit PIN.
6. If the PIN was entered correctly, the DBBL system debited the participant's mobile account for the requested amount. The agent was notified by SMS that the transaction was successful.
7. The agent's account was credited, and the agent handed over the cash amount to the participant.
8. The participant's mobile received an SMS confirmation of the cash out and a balance update from the DBBL server.
9. ESDO was present at each distribution point. The distribution was randomly cross-monitored by WFP and often attended by local government representatives. Members of the IFPRI research team were also present at some distributions.

Nutrition Behavior Change Communication (BCC) Trainings: The nutrition BCC component of the TMRI provided a holistic approach to the promotion of positive nutrition behaviors in the household. It targeted participating women, their family members, and influential community members through group and one-on-one counseling sessions. To ensure the quality of its delivery, WFP ensured a low ratio of community nutrition workers to participants and regularly monitored delivery services. A timely feedback mechanism and organization of refresher training sessions, which increasingly applied an interactive training approach, ensured that the nutrition BCC trainings met the standard expected.

2.2.1 Roles of the Research Initiative Partners

International Food Policy Research Institute (IFPRI): IFPRI conceptualized the safety net transfer modality research and was responsible for evaluating the research initiative using the randomized controlled trial design, which is considered the "gold standard" of impact evaluation. IFPRI research activities included designing the surveys (baseline survey, mid-term process evaluation survey, follow-up survey after the first year, and endline survey after the second year of transfer distributions), analyzing the survey data, preparing research-based reports, and disseminating research findings.

World Food Programme (WFP): WFP was responsible for the overall planning, management, and implementation of the operational component, including procurement and delivery of transfers, nutrition BCC trainings, and monitoring. WFP field offices (Rangpur in the northern region and Khulna in the southern region) coordinated activities at the ground level.

Data Analysis and Technical Assistance (DATA): DATA was responsible for collecting the field-level data for the research initiative under IFPRI's guidance and supervision. Their activities included conducting training of survey enumerators together with IFPRI researchers, conducting village census for selecting beneficiary and control households, administering baseline, mid-term, and endline surveys, entering and cleaning data, and delivering datasets to IFPRI for analysis.

Eco-Social Development Organization (ESDO): ESDO was the partner NGO responsible for the field implementation of the transfer modalities, including undertaking monthly food and cash distributions, and regularly delivering the nutrition BCC training sessions according to the research initiative's design specifications. ESDO had an agreement with an authorized bank (Dutch-Bangla Bank Limited) for the transfer of cash through mobile phones. The NGO also performed monitoring and reporting activities as per the field-level agreement with WFP, which provided necessary guidance and supervision.

Technical Committee: The Technical Committee provided guidance on the research initiative and was chaired by the Secretary of the Ministry of Disaster Management and Relief (MDMR). The rest of the committee consisted of representatives from the Economic Relations Division of the Ministry of Finance, the Food Planning and Monitoring Unit of the Ministry of Food, the Department of Women Affairs of the Ministry of Women and Children Affairs, the Institute of Public Health and Nutrition of the Ministry of Health and Family Planning, the Department of Primary Education, the Local Government Engineering Department of the Local Government Division, the Bangladesh Bureau of Statistics, IFPRI, and WFP.

The overall management and coordination of the research initiative were undertaken by WFP in close coordination with IFPRI.

3. IMPACT EVALUATION DESIGN AND DATA

IFPRI researchers designed the Transfer Modality Research Initiative (TMRI) using a randomized controlled trial method of impact evaluation. The design includes a sample of program villages belonging to each of the five alternative transfer modalities (the treatment group) and a sample of non-program villages (the control or comparison group). This section first presents an overview of designing impact evaluations. It then describes the information collection approach used to evaluate the TMRI.

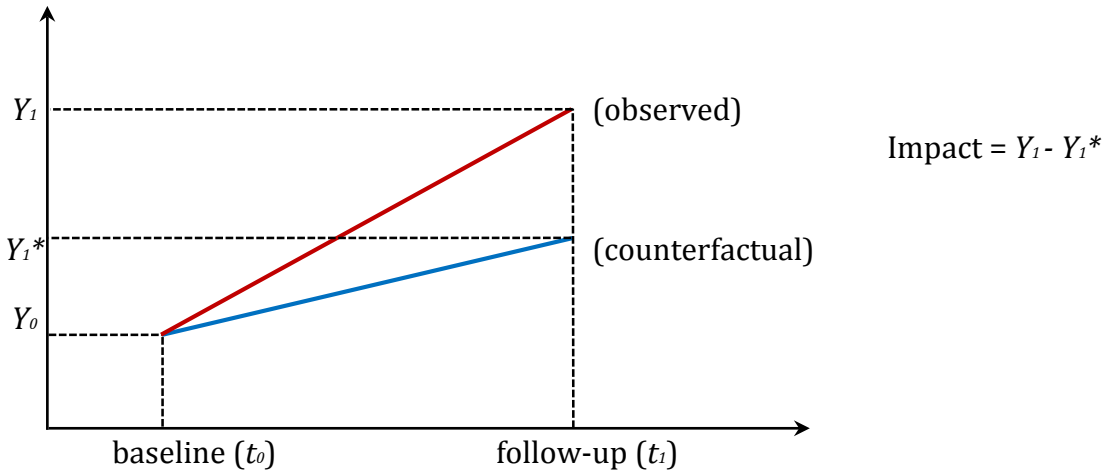
3.1 Designing an Impact Evaluation: An Overview

In order to design an effective impact evaluation, it is necessary to understand how the evaluation demonstrates impact. The purpose of an impact evaluation is to compare outcomes for beneficiaries in a particular program (observed outcomes) with the beneficiaries' outcomes had they not participated in the program (counterfactual outcomes). The difference between the observed outcomes for beneficiaries and the counterfactual outcomes represent the causal impact of the program. The fundamental challenge of an impact evaluation is that it is not possible to observe the exact same beneficiaries both participating in the program and not participating in the program at the exact same time; therefore, the counterfactual outcomes for beneficiaries are unknown. All evaluation strategies are designed to find a method for constructing a proxy for these counterfactual outcomes.

Most evaluations measure counterfactual outcomes for beneficiaries by constructing a comparison group of similar households from among non-beneficiaries. Collecting data on this comparison group makes it possible to observe changes in outcomes for people not participating in the program and to control for some other factors that affect outcomes, which reduces bias in the impact estimates.

Figure 3.1 shows how information on a comparison group can be used to measure program impact by removing the counterfactual from the observed outcome for beneficiaries. In the figure, the outcome variable is represented on the Y axis, and time is represented on the X axis. A household survey is conducted to measure the outcome in two periods: the baseline at t_0 and the follow-up at t_1. In the figure, at baseline the average outcome for both the households benefiting from the program and those in the comparison group is at the level of Y_0. After the program is completed, the follow-up survey (t_1), demonstrates that the group participating in the program has an outcome level of Y_1 while the comparison group has an outcome level of Y_1^*. The impact of the program is measured as $Y_1 - Y_1^*$. If a comparison group had not been included, the impact might have been misrepresented (and overstated) as the observed change in the outcome for the beneficiary group: $Y_1 - Y_0$.

Figure 3.1 Measuring impact based on outcomes from beneficiary and comparison groups



In constructing a comparison group for the evaluation, it is important to ensure that the group is as similar as possible to the program group *before the start of the program*. To understand why, consider estimating the impact of introducing a new agricultural technology among smallholder farmers on rice yields as the difference in average rice yields between beneficiaries and a random sample of non-beneficiary farmers. The problem with this approach is that non-beneficiaries are different from program beneficiaries in ways that make them an ineffective comparison group. If the evaluation does not control for these differences prior to initiating the program, impact estimates will be biased. The most common sources of bias are targeting or program placement bias and bias due to self-selection by beneficiaries concerning the decision to participate.

3.1.1 Evaluation Methods

The major difference between impact evaluation methodologies concerns their method for developing a comparison group to construct the counterfactual outcomes needed for the impact estimates. The most commonly used methodologies include randomized controlled trial (RCT), propensity score matching (PSM) or covariate matching, and regression discontinuity design (RDD). We will discuss only the RCT method because it is the design used by the TMRI study for evaluating impacts.

RCT is widely considered the most convincing approach to constructing a comparison group for an evaluation. The method involves designing a field experiment by randomly assigning participants in the program among comparably eligible communities or households. Those that are randomly selected out of the program form a control group, while those selected for the program are the treatment group. When RCT is properly implemented, differences in outcomes between the treatment and control groups should be free of bias and can reliably be interpreted as causal impacts of the program. The logic is as follows: because assignment into the treatment or control

groups is randomly determined and not correlated with the outcome variables, differences in outcomes over time must be a result of the program.

With the RCT, estimates can be improved by measuring outcomes for treatment and comparison groups before and after the program begins. This makes it possible to construct "difference-in-differences" (DID) estimates of program impact. DID estimates are defined as the average change in the outcome in the treatment group (*T*) minus the average change in the outcome in the comparison group (*C*). Mathematically, this is expressed as:

$$\Delta_{DID}^{ATT} = \left(Y_1^T - Y_0^T\right) - \left(Y_1^C - Y_0^C\right) \quad (3.1)$$

The main strength of DID estimates for program impact is that they remove the effect of any unobserved variables that represent persistent (time-invariant) differences between the treatment and comparison groups. This helps to control for the fixed component of various contextual differences between treatment and comparison groups, including depth of markets, agro-climatic conditions, and any persistent differences in infrastructure development. As a result, DID estimates can lead to a substantial reduction in selection bias of estimated program impacts.

3.2 Impact Evaluation Design for the TMRI

For the TMRI evaluation, a cluster-randomized evaluation method was followed using villages as clusters. The evaluation includes a sample of program villages belonging to each of the transfer modalities (the treatment group, *T*) and a sample of non-program villages (the comparison group, *C*). This design enabled us to measure the impact of each transfer modality in absolute terms (by comparing *T* with *C*), as well as in relative terms (by comparing T_1 with T_2, and so on).

3.2.1 Sample Size Calculations

One important facet of designing an impact evaluation is to ensure that the sample size is sufficiently large for treatment impacts to be feasibly detected in the outcomes of interest. While increasing sample size requires devoting additional resources, having too small a sample is a serious danger that can undermine the purpose of undertaking the evaluation in the first place. In particular, if the sample is too small, even a substantial treatment impact in a key outcome may be indistinguishable from inherent variability in the outcome. In effect, the analysis may erroneously conclude there were no impacts when, in fact, there were.

Sample size calculations allow for formal analysis of which program design elements are strongest in detecting a specified minimum change in a given outcome. These calculations can also be used to consider implications of known limitations in study design. For example, if there are specific constraints on sample size (for practical/logistical reasons), the minimum detectable effect in each outcome can be calculated, given the constraints. If the minimum detectable effect in a particular outcome is unreasonably large to expect as a treatment impact, this insight can then guide the choice of outcomes considered to be the focus of the study, which can in turn guide the research questions that are posed and shape the design of the survey questionnaire. To summarize—and to

be clear on this point—sample size calculations do not indicate what the sample size must be. Rather, they indicate what magnitude of effects we can reasonably expect to observe, given the design of the intervention.

3.2.1.1 Sample Size Calculations for the TMRI Evaluation

How large should the sample be? The answer depends on several factors including: (i) the outcomes that are of the greatest interest to program managers and policymakers; (ii) the minimum size of change in those outcomes that program managers would like to observe; (iii) the degree of variability in those outcomes; (iv) the extent to which there is correlation in outcomes within localities; (v) the desired level of statistical power; and (vi) the level of desired statistical significance. Sample sizes increase inversely with the size of change that the evaluation is attempting to uncover; greater variability in outcomes; increased correlation of outcomes; and higher statistical power.

In the context of the transfer modality research evaluation, the calculations must take into account that treatment modality is randomized, not at the level of households, but at the village (cluster) level. In sample size calculations for cluster-randomized studies, not only the number of households and the number of clusters matter, but also the inherent similarity of households within a cluster. The measure that captures this similarity for each outcome is referred to as its "intracluster correlation": that is, in the absence of any treatment, a measure of the extent to which the outcome varies across households within a cluster relative to how much it varies across clusters.

The value of the intracluster correlation for any outcome is likely to depend on the context of the data. Since it is necessary to conduct sample size calculations prior to collecting the data, the accepted approach to estimating intracluster correlations for sample size calculations is to use values calculated from existing comparable datasets.

For the TMRI evaluation, we used parameters derived from two IFPRI surveys in Bangladesh: (1) a 2006 household survey for the study *Relative Efficacy of Food and Cash Transfers to the Ultra Poor* (Ahmed et al. 2013), and (2) the Alive & Thrive household survey used in 2010. We use per capita monthly total expenditure (a proxy for income), per capita daily calorie intake, and weight-for-age Z-score for children aged 6-59 months as the outcome indicators.

We followed the standard practice of finding the sample size that gives an 80 percent chance (the "power of the test") of rejecting the null hypothesis of zero change in outcome indicators at the 0.05 level of significance.

The estimated necessary minimum sample size is reported in Table 3.1. For example, to detect a minimum, statistically significant increase in per capita consumption expenditure of 12 percent between treatment and control groups, a minimum sample size of 50 clusters (villages) and 413 households for each of the 5 treatment arms and the control are required. For improved child caring practices as an outcome indicator, 50 clusters and 386 households are required to detect a 19 percent increase in exclusive breastfeeding. For the transfer modality research initiative, we

used 50 clusters/villages and 500 households for each treatment arm and the control. Thus, each cluster included 10 households.

Table 3.1 Minimum sample size required for detecting changes in selected outcome indicators

Indicators	Minimum impact	Required sample size		
		Number of clusters	Number of treatment households	Number of control households
Calculated from the 2006 Cash-Food Study Survey data:				
Per capita total expenditure per month	An increase of 12%	50	413	413
Per capita calorie intake per day	An increase of 7%	50	322	322
Average height-for-age Z-score (children of 6-59 months)	An improvement of 16% (-1.96 to -1.65)	50	409	409
Calculated from the 2010 Alive & Thrive Survey data:				
Exclusive breastfeeding of children 0 to <6 months	An improvement of 19% (50.0% to 59.7%)	50	386	386
Average dietary diversity (of 7 food groups) of children 12 to 60 months	An improvement of 8% (3.67 to 3.96%)	50	350	350

Source: Calculated from the 2006 IFPRI survey data for the study, *Relative Efficacy of Food and Cash Transfers to the Ultra Poor in Bangladesh* and 2010 IFPRI Alive & Thrive survey data.

3.2.2 TMRI Sampling Design

The TMRI sampling design, presented in detail in Section 2.1.1, is summarized here as follows: In the northern region, 5 upazilas were purposively selected, and all villages in the selected upazilas were listed. From this list, randomly selected 250 villages. Villages were then randomly assigned to five groups of equal size (50 villages each)—one of the four treatment arms and the control group. A complete village census was carried out in each of the 250 selected villages, collecting information on household demographics, a set of poverty indicators, and whether households participate in safety nets and other targeted interventions. Using these data, constructed a list of households that: (1) were considered poor (based on the poverty indicators); (2) would have at least one child aged 0-24 months when the intervention began; and (3) were not receiving benefits from other safety net interventions. These households were eligible to participate in the study. Using simple random sampling, 10 eligible households were selected from each village. The total sample in the northwest included 250 clusters (villages) and 2,500 households. An identical process was used in the southern region to select upazilas, villages and households.

3.2.3 Total Sample Size

a) *Treatment for each of the four transfer modalities and one control in the northern region:* 250 clusters and 2,500 households (10 households per cluster; 2,000 treatment households + 500 control households)

b) *Treatment for each of the four transfer modalities and one control in the southern region:* 250 clusters and 2,500 households (10 households per cluster; 2,000 treatment households + 500 control households)

c) *Total sample size:* 500 clusters (400 treatment and 100 control) and 5,000 households (4,000 treatment and 1,000 control)

The quantitative impact evaluation involved three rounds of comprehensive household surveys of TMRI participants in treatment villages and non-participants in control villages. The first survey established the baseline, conducted just before the start of transfers. The follow-up survey was conducted 12 months later, shortly after the first year of transfer distributions were completed. The third or the "endline" survey was conducted 24 months after the first transfer distributions took place in May 2012. Details of the data collection are presented in Section 3.3.

3.2.4 Estimating Impacts

IFPRI's impact estimation strategy for the TMRI relied on the RCT design of the evaluation. Random assignment of clusters (villages) assures that, on average, households would have similar baseline characteristics across treatment and control groups. Such a design eliminates systematic differences between treatment and control households and minimizes the risk of bias in the impact estimates due to "selection effects" (Hidrobo et al. 2014).

The IFPRI research took advantage of the longitudinal dataset that emerged from the three rounds of surveys, enabling researchers to construct DID (or double difference) impact estimates—meaning, they determined the difference between the change in the treatment group and the change in the control group.

Analysis of Covariance (ANCOVA) regression—a variant of difference-in-differences—was used to estimate impacts of the TMRI using the longitudinal data on treatment and control households. The ANCOVA specification allows a household's outcome at follow-up to depend on the same household's outcome at baseline as well as on the household's treatment status and what is called an "error term," which accounts for any omitted observable or unobservable factors. In case of high variability and low autocorrelation of the data at baseline and follow-up, ANCOVA estimates are preferred over DID estimates (McKenzie 2012). Intuitively, if autocorrelation is low, then DID estimates will overcorrect for baseline imbalances. ANCOVA estimates, on the other hand, will adjust for baseline imbalances according to the degree of correlation between baseline and follow-up, as the specification allows estimating autocorrelation rather than imposing it to be unity. The ANCOVA model used for impact estimation is the following:

$$Y_h = \propto + \beta T_h + \gamma Y_{h,base} + \varepsilon_h \,, \tag{3.2}$$

where Y_h is the outcome of interest for household h at follow-up and $Y_{h,base}$ is the outcome of interest at baseline. T is an indicator for whether household h is in the treatment group (treatment = 1, control = 0), and β is the ANCOVA impact estimator. In other words, β represents the amount of change in outcome (Y) that can be attributed to the household (h) being assigned to the treatment

group. To test whether the ANCOVA impact estimator is statistically different for the treatment group, we conducted Wald tests of equality and report the p-values.

3.3 Data for the Evaluation

The information collection approach used to evaluate the TMRI involved combining quantitative surveys and qualitative semi-structured key informant interviews and focus group discussions. This mixed method of data collection provided a rich pool of data and powerful analysis that would not have been available with any of these methods on their own. Gender disaggregated information was collected wherever it was meaningful.

The required quantitative data for impact evaluation mostly came from three household surveys. A baseline survey was carried out in March-April 2012, just before the start of transfers. A first follow-up survey was conducted June 2013, to assess the interim impacts of the transfers following the first 12 months of transfer distributions. A second follow-up (or endline) survey was conducted in April 2014 during the final month of transfer distributions for the final impact evaluation.

The surveys included TMRI participants and non-participant control households. IFPRI has extensive experience in the design and implementation of similar surveys in Bangladesh and many other countries.

3.3.1 Baseline Household Survey

3.3.1.1 Survey Questionnaires

The survey questionnaires included modules that together provided an integrated data platform to answer the research questions. The questionnaire had two parts—one for female respondents and the other for male respondents. The modules of the questionnaires are listed below:

- Household demographic composition, education attainment, occupation and employment, and dwelling characteristics
- Acquisition of productive and consumption assets
- Detailed food and nonfood expenditures
- Individual level dietary intake data from 24-hour recall
- Health and morbidity, child care, water and sanitation
- Anthropometric measurements of children <5 years of age and their mothers
- Savings and loans
- Household food security indicators
- Women's status (mobility; work, earnings and expenses decisions; reproductive decisions, domestic violence, abuse and threats; women's assets at marriage and ownership/control of current assets)
- Shocks and coping strategies
- Participation in the TMRI

3.3.1.2 Training

For implementing the household surveys, IFPRI contracted the Data Analysis and Technical Assistance (DATA), a Bangladeshi consulting firm with expertise in conducting complex surveys and data analysis. DATA worked under the supervision and guidance of senior IFPRI researchers. DATA's capacity to conduct surveys that collect high-quality data was largely built by IFPRI over the past two decades.[8]

IFPRI researchers prepared a draft baseline survey questionnaire. The draft questionnaire was peer-reviewed and revised to address comments and suggestions. After pre-testing in the field, the baseline survey questionnaire was finalized.

For the baseline household survey, DATA provided experienced survey enumerators and supervisors to administer the survey; most of them hold master's degrees in social science, nutrition, or home economics. IFPRI researchers and DATA experts trained 200 experienced enumerators (100 female and 100 male), 20 supervisors (5 female and 15 male), and 20 data editors (10 female and 10 male). The survey enumerators consisted of a formal classroom component as well as closely monitored practice fieldwork. The training was conducted by IFPRI researchers and senior DATA staff. In the formal training, IFPRI researchers briefed the enumerators and supervisors on the objectives and methods of the survey, the sampling design, and the responsibilities of the enumerators. They were trained in how to carry out the interviews, including line-by-line explanation and interpretation of the questionnaires, the flow and skip-patterns, definitions, and explanations of how to handle unusual cases and when to contact the supervisor for assistance.

Field supervisors and data editors received additional training related to their supervisory and editing role. In particular, they were trained on the quality control process, cross checking, editing and coding of the questions, security and confidentiality issues, and the delivery of the completed questionnaires to the DATA office in Dhaka for simultaneous data entry.

The questionnaires were field tested in five rural locations. The field testing determined the appropriate distribution of questionnaire modules among the male and female questionnaires, identified problems with the questionnaires or additional rules that were needed to address difficult cases. The field testing resembled the actual implementation of the survey in order to test the full range of survey activities, including questionnaire completion, delivery, and data entry. An additional function of the field testing was to provide practical training to the enumerators in administering the questionnaire.

[8] DATA carried out all IFPRI surveys in Bangladesh, including more than 40 household surveys and several market, school, and other institutional surveys. In addition, DATA has conducted numerous surveys for various international organizations, such as the World Food Programme (WFP)-Bangladesh, the World Bank, the European Union, the U.S. Department of Agriculture, CARE-Bangladesh, World Vision-Bangladesh, the Population Council–New York, Save the Children (USA), Tufts University School of Nutrition Science and Policy, and the IRIS Center at the University of Maryland.

3.3.1.3 Survey Administration

DATA carried out the baseline household survey under the supervision and guidance of IFPRI researchers. Going into the field, the teams of enumerators were equipped with a number of documents (such as the survey manual, serial numbered questionnaires, and identification cards), weight and height scales for anthropometric measurements, and GPS units for geo-referencing.[9] Letters of authorization to conduct the survey were issued by the Director General, Food Planning and Monitoring Unit (FPMU), Ministry of Food and Disaster Management, Government of Bangladesh.

The enumerators conducted the interviews one-by-one and face-to-face with the respondents assigned to him or her. The enumerators were supervised by the field supervisors who accompanied them to the village. Each field supervisor was responsible with his/her defined region. All field staff reported their activities to their supervisors using a standard progress report form. Completed questionnaires were delivered to the DATA central office on a regular basis for further quality control and validation during data entry.

3.3.1.4 Quality Control

IFPRI and DATA took much care to ensure the quality of the baseline household survey data. In the field, survey supervisors routinely oversaw interviews conducted by enumerators, and verified all questionnaires completed by enumerators on a daily basis. If inconsistencies in responses were detected in completed questionnaires, then the supervisors visited the relevant respondents to find out the reasons and corrected the responses as needed. In addition, the supervisors made random checks of about 10 percent of the completed questionnaires by revisiting the sample households. IFPRI researchers made frequent field visits to supervise the fieldwork.

3.3.1.5 Data Entry and Cleaning

The data entry was carried out at the DATA office in Dhaka simultaneously with data collection, with about a two-week lag. It is important to carry out the data entry as soon as possible after data collection in case there are errors that can only be addressed by returning to the village where the survey occurred.

DATA carried out data entry of the baseline survey using a specialized software (Microsoft Access) that was programmed to identify values that are out of range or inconsistent with other responses in the questionnaire. After cleaning, DATA delivered the baseline survey dataset to IFPRI.

3.3.2 Midline and Endline Surveys and Other Data Collection

IFPRI conducted the first follow-up (or midline) survey in June 2013, after the 12-month transfer distribution period. It was administered to all TMRI participating households and control households included in the baseline survey sample, which created a two-round panel survey. The

[9] Health O' Meter weighing scales and GPSs were imported from the USA for the household survey.

midline survey questionnaire included all modules of the baseline survey questionnaire and an additional module on program participation by the women who received the transfers and nutrition BCC training.

The second follow-up (or endline survey) was conducted in April 2014, during the 24th month of transfer distribution. As per the midline survey, the endline survey was administered to all participating households and control households included in the baseline survey sample, as part of a three-round panel survey. The endline survey questionnaire matched the midline survey questionnaire.

Besides the midline and the endline surveys for impact evaluation, IFPRI carried out a household survey for the TMRI process evaluation in October 2012. In this survey, 1,000 households (800 TMRI participants and 200 non-participant control households) were randomly selected from the baseline sample of 5,000 households. These 1,000 households came from 250 villages: 125 from the north and 125 from the southern region. As a component of the process evaluation, IFPRI also conducted a survey of community nutrition workers (CNWs) who delivered nutrition BCC training to participants of *Cash+BCC* arm in the north and *Food+BCC* arm in the south.

In addition to data from household surveys, the evaluation of TMRI was supplemented by monitoring data routinely collected by WFP and its implementing partners. Moreover, each of the three rounds of the household surveys were accompanied by community or village surveys.

3.3.3 Attrition

The baseline survey successfully completed interviews of 4,992 households out of a target of 5,000 households. Table 3.2 shows their interview status at endline.

Table 3.2 Household interview status, by region

	North	South	All
Number households interviewed, baseline	2,498	2,494	4,992
Number households interviewed, endline	2,410	2,438	4,848
Percentage of baseline households not interviewed at endline	3.5	2.2	2.9
Reason for attrition			
Migration	78 (3.1%)	49 (1.9%)	127 (2.5%)
Dropped out of study, refused to be interviewed, could not be found	10 (0.4%)	7 (0.3%)	17 (0.4%)

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Attrition in the TMRI studies over a two year period is low: 3.5 percent in the north and 2.2 percent in the south. Virtually all attrition is due to household migration. Only 17 households dropped out of the study, refused to be interviewed, or could not be found. Probit regressions were run on the impact of the treatment arms on attrition. The null hypothesis that participation in the treatment arms affected attrition was not rejected; further the coefficients on treatment status are small, typically less than one percentage point. Selective attrition is unlikely to affect the results.

3.3.4 Qualitative Field Research

IFPRI conducted qualitative field research in November 2012, six months after starting the transfers in May 2012. The qualitative research collected information on women's participation in the TMRI. Open-ended questions were asked in key informant interviews and focus group discussions to understand whether women and men prefer cash or food transfers and why; how they perceive their well-being; whether, how, or why the transfers have made any difference in their livelihoods; whether, how, and why the training component of the programs have made any difference in their livelihoods; and whether cash and food transfers affect the social/community relations between TMRI participants and non-participants within the communities. Further, key informant interviews were carried out with program administrators and service providers, local government officials, school teachers, community and religious leaders, and others.

The qualitative research enabled researchers to explore issues more suited to open-ended than closed questions, and those less obvious and unanticipated. It has the benefit of capturing informants' perceptions and knowledge in their own words. It enabled researchers to probe responses and gather respondents proposed solutions to problems. It also enabled researchers to consider the significance of local social context.

4. PROFILE OF SURVEY HOUSEHOLDS

Using the baseline household survey data collected for the TMRI evaluation, this section provides profiles of households belonging to the following treatment groups and the control group: (1) *Cash,* (2) *Food*, (3) *Cash+Food*, (4) *Cash+BCC training*, (5) *Food+BCC* training, and (6) the comparison (control) group.

The findings in this section portray the state of affairs of households just before they started participating in the TMRI in May 2012 and the control households. At the outset, it is important to note that a randomized controlled trial design was used to assign households to treatment and control groups, therefore similarity in household characteristics are expected across treatment and control groups at the baseline.

4.1 Household Characteristics

Disaggregated by the TMRI treatment arms and the control group, Table 4.1 shows the characteristics of the survey households in the north at the baseline. Although household size is quite similar across the treatment and control groups, the average households in the north (4.9 persons) are about 10 percent smaller than in the south (5.4 persons) (Table 4.2). Sample households in the south have about 19 percent higher income (measured by per capita consumption expenditure) than those in the north. On average, monthly income per household is about 31 percent higher in the south than in the north, as the household size in the south is relatively larger.

The following are some highlights of other results from Tables 4.1 (north) and 4.2 (south):

- About 11 percent of households in the north and 13 percent in the south with children of primary school age do not send their children to school; this percentage is quite small. However, the proportion of children ages 12–18 (secondary school) who do not attend school is high in general, and very high in the north.

- Overall, educational attainment of adult family members, although low in general, is higher for females than males in both the north and the south. This is probably a reflection of the success of the female secondary education stipend program—a conditional cash transfer program that has been in place since in rural Bangladesh since 1992. At the time of survey, the average age of women at their first marriage is around 17 in both north and south.

- A household with less than half an acre of cultivable land in rural Bangladesh is defined as "functionally landless." Survey results reveal that about 93 percent of all survey households in the north and about 87 percent of all survey households in the south are functionally landless.

- Although the majority of households are landless, farming is by far the most common occupation of the heads of households (mostly male) in the north (33 percent). The results of a recent nationally representative rural household survey conducted by IFPRI reveal that, 36

percent of the farm households in Rangpur division (north) do not own any cultivable land but rather access land through sharecropping or leasing arrangements (Ahmed et al. 2013). By contrast, agricultural day laborer is the dominant form of occupation of heads of households in the south (37 percent).

Table 4.1 Characteristics of survey households, north

	Treatment arms					
Characteristics	**Cash**	**Food**	**Cash + Food**	**Cash + BCC**	**Control**	**All**
Household size (persons)	4.9	4.9	4.9	4.9	4.9	4.9
Primary school-age children (6–11 years) who do not go to school (percentage of all households with primary school-age children)	8.8	10.0	11.8	14.2	9.5	10.9
Secondary school-age children (12–18 years) who do not go to school (percentage of all households with secondary school-age children)	30.7	33.7	37.6	26.0	31.6	31.8
Years of schooling, male household head	1.5	1.2	1.3	1.4	1.4	1.4
Years of schooling, wife of household head	2.3	2.1	2.0	2.1	2.4	2.2
Years of schooling, adult male, 15 years or older	2.1	1.8	1.9	2.2	2.2	2.0
Years of schooling, adult female, 15 years or older	2.6	2.5	2.4	2.5	2.7	2.6
No schooling, adult male (percent)	61.9	68.4	66.9	61.4	63.3	64.4
No schooling, adult female (percent)	55.4	56.6	57.8	56.5	55.5	56.4
Age at first marriage of men currently under 30	20.8	20.8	20.8	21.0	21.0	20.9
Age at first marriage of women currently under 25	16.6	16.5	16.4	16.4	16.5	16.5
Female-headed household (percent)	6.5	8.4	7.7	7.7	6.3	7.3
Average owned cultivable landholding size (decimal)	7.5	8.0	6.2	7.5	9.2	7.7
Less than 0.5 acres of land owned (percent)	93.7	91.9	94.6	92.3	92.2	92.9
Per capita monthly expenditure (taka)	1,264	1,257	1,211	1,229	1,271	1,246
	Principal occupation of household head (percent)					
Agricultural day laborer	17.4	19.2	16.1	18.8	18.3	18.0
Nonagricultural day laborer	15.5	14.2	16.3	18.2	19.1	16.7
Salaried position	2.3	1.9	2.5	3.7	1.9	2.5
Self-employed work	9.7	7.3	8.8	11.0	8.3	9.0
Rickshaw/tricycle van puller	10.1	9.6	8.4	5.6	6.4	8.0
Business/trade	7.4	7.1	10.4	5.0	4.6	6.9
Production business	0.6	0.4	0.4	0.6	0.0	0.4
Livestock-related work	0.0	0.2	0.2	0.0	0.0	0.1
Farming	32.9	34.2	33.2	29.4	37.6	33.4
Non-income-earning occupation	4.1	6.0	3.8	7.7	3.7	5.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 4.2 Characteristics of survey households, south

Characteristics	Treatment arms					
	Cash	Food	Cash + Food	Food + BCC	Control	All
Household size (persons)	5.4	5.5	5.4	5.3	5.6	5.4
Primary school-age children (6–11 years) who do not go to school (percentage of all households with primary school-age children)	13.2	10.9	11.7	15.3	15.8	13.4
Secondary school-age children (12–18 years) who do not go to school (percentage of all households with secondary school-age children)	33.6	38.3	34.4	31.5	40.9	36.0
Years of schooling, male household head	1.8	1.8	2.0	2.3	2.1	2.0
Years of schooling, wife of household head	2.5	2.5	2.8	3.0	3.1	2.8
Years of schooling, adult male, 15 years or older	2.4	2.6	2.8	2.8	2.9	2.7
Years of schooling, adult female, 15 years or older	2.9	3.0	3.2	3.0	3.3	3.1
No schooling, adult male (percent)	57.9	56.5	53.4	51.2	50.8	53.9
No schooling, adult female (percent)	48.5	48.9	45.1	47.2	45.4	47.0
Age at first marriage of men currently under 30	21.2	21.2	21.7	21.2	21.5	21.4
Age at first marriage of women currently under 25	16.5	16.6	16.9	16.8	16.9	16.7
Female-headed household (percent)	8.7	13.1	10.2	13.0	11.9	11.4
Average owned cultivable landholding size (decimal)	8.4	9.1	15.5	14.4	16.2	12.7
Less than 0.5 acres of land owned (percent)	92.6	89.8	84.3	85.7	84.4	87.4
Per capita monthly expenditure (taka)	1,453	1,460	1,543	1,496	1,438	1,478
	Principal occupation of household head (percent)					
Agricultural day laborer	37.0	33.2	39.5	38.5	36.9	37.0
Nonagricultural day laborer	9.8	7.7	8.6	8.5	11.2	9.2
Salaried position	1.9	2.5	2.3	1.5	0.8	1.8
Self-employed work	8.2	8.4	8.1	5.7	9.1	7.9
Rickshaw/tricycle van puller	13.4	12.9	13.6	13.6	11.6	13.0
Business/trade	6.9	9.0	6.9	4.7	6.3	6.8
Production business	0.0	0.4	0.0	0.0	0.2	0.1
Livestock-related work	0.0	0.0	0.0	0.0	0.2	0.0
Farming	20.3	23.4	17.8	24.3	20.9	21.3
Non-income-earning occupation	2.5	2.5	3.3	3.2	2.7	2.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Tables 4.3 and 4.4 show the household composition and dependency ratios of the baseline samples in the north and the south, respectively. Three types of dependency ratios are presented in the tables. The total dependency ratio is the ratio (expressed as a percentage) of the number of people in the household ages 0–14 and 60+ to the number of household members of working age (15–60 years). The total dependency ratio is considerably higher in the south (129 percent) than in the north (115 percent); this difference is primarily attributed to the difference in the child dependency

ratio rather than the dependency ratio for the aged. This indicates that adult members of working age in households in the south have more children to support than those in the north.

Table 4.3 Demography and dependency ratio of survey households, north

	Treatment arms						
Characteristics	**Cash**	**Food**	**Cash + Food**	**Cash + BCC**	**Food + BCC**	**Control**	**All**
Number of household members in the age group							
0–4 years	1.23	1.24	1.30	1.27	–	1.29	1.27
5–14 years	1.05	1.08	1.08	1.10	–	0.99	1.06
15–60 years	2.50	2.44	2.43	2.48	–	2.51	2.47
Over 60 years	0.15	0.15	0.11	0.12	–	0.14	0.13
Demographic composition (%)							
0–4 years	26.66	26.82	27.94	27.13	–	27.52	27.21
5–14 years	19.38	20.44	20.53	20.38	–	19.27	20.00
15–60 years	51.44	50.27	49.71	50.51	–	50.73	50.53
Over 60 years	2.52	2.48	1.82	1.99	–	2.47	2.26
Total	100.00	100.00	100.00	100.00	–	100.00	100.00
Dependency ratio (%)							
Child (0–14 years)	104.79	110.94	112.87	110.34	–	105.85	108.96
Aged (more than 60 years)	6.01	6.85	4.30	4.44	–	6.07	5.54
Total dependency ratio	110.81	117.79	117.17	114.78	–	111.91	114.50

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 4.4 Demography and dependency ratio of survey households, south

	Treatment Arms						
Characteristics	**Cash**	**Food**	**Cash + Food**	**Cash + BCC**	**Food + BCC**	**Control**	**All**
Number of household members in the age group							
0–4 years	1.29	1.27	1.31	–	1.25	1.28	1.28
5–14 years	1.32	1.39	1.17	–	1.16	1.30	1.27
15–60 years	2.57	2.59	2.68	–	2.65	2.71	2.64
Over 60 years	0.25	0.26	0.25	–	0.25	0.27	0.26
Demographic composition (%)							
0–4 years	24.89	24.43	25.86	–	25.19	24.59	24.99
5–14 years	23.11	24.05	19.94	–	20.52	22.10	21.95
15–60 years	47.77	47.18	49.94	–	50.19	49.06	48.83
Over 60 years	4.23	4.34	4.26	–	4.09	4.25	4.23
Total	100.00	100.00	100.00	–	100.00	100.00	100.00
Dependency ratio (%)							
Child (0–14 years)	122.29	126.64	110.84	–	112.39	117.38	117.91
Aged (more than 60 years)	11.24	11.85	10.67	–	10.78	10.53	11.01
Total dependency ratio	133.53	138.50	121.51	–	123.17	127.91	128.93

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

4.2 Budget Shares and Food Consumption

The measure of total consumption expenditures is extensive and draws upon responses to several sections of the household surveys. In brief, consumption is measured as the sum of total food consumption and total expenses for nonfood (nondurable and durable) goods. Expenditures on individual consumption items were aggregated to construct total expenditures. Quantities of goods produced by the household for home consumption and foods received from the TMRI other sources were valued at the average unit market prices of commodities.

Tables 4.5 and 4.6 show the shares of total household expenditures on major consumption items, in the north and the south, respectively. The differences between per capita consumption expenditures of households show that the sample households in the north are economically worse-off than those in the south.

The samples households spent 64 percent of total expenditures on food in both north and south. Expenditures on fuel and lighting represent the second-highest share of the budget (about 9 percent). Overall, transport and communication expenses constitute 4 percent of the total budget, which include mobile phone charges.

Table 4.5 Budget share of selected budget items, north

Characteristics	Treatment Arms					
	Cash	Food	Cash + Food	Cash + BCC	Control	All
Budget item						
Monthly per capita total expenditure (taka)	1,264	1,257	1,211	1,229	1,271	1,246
Monthly per capita food expenditure (taka)	805	797	769	789	811	794
Monthly per capita nonfood expenditure (taka)	459	460	442	440	459	452
Budget share of expenditures (%)						
Food	64.3	63.8	63.8	64.5	64.5	64.2
Fuel and lighting	8.5	8.9	8.7	8.5	8.3	8.6
Personal care	1.3	1.4	1.4	1.3	1.3	1.3
Cleaning materials	1.6	1.7	1.8	1.8	1.7	1.7
Transport and communication	4.8	4.3	4.0	4.4	4.3	4.4
Adult clothing	3.2	3.2	3.3	3.2	3.2	3.2
Children clothing	1.0	1.0	1.0	1.1	1.0	1.0
Other clothing	0.7	0.7	0.8	0.7	0.7	0.7
Footwear	0.4	0.4	0.4	0.4	0.4	0.4
Beddings	0.3	0.3	0.3	0.3	0.2	0.3
Other household expenses	0.1	0.1	0.2	0.1	0.0	0.1
Medical treatment for male	2.6	2.5	2.6	2.6	2.7	2.6
Medical treatment for females	2.9	2.6	3.0	3.0	2.7	2.8
Education for male	0.7	0.7	0.6	0.8	0.7	0.7
Education for female	0.8	0.8	0.8	0.7	0.8	0.8
Remittances sent	0.0	0.1	0.1	0.0	0.1	0.1
Gifts given	0.1	0.1	0.1	0.1	0.1	0.1
Kurbani/milad	0.4	0.6	0.3	0.4	0.6	0.5
Entertainment	0.1	0.2	0.2	0.1	0.2	0.2
Legal fees	0.1	0.4	0.3	0.1	0.1	0.2
Utensils	0.1	0.1	0.1	0.1	0.1	0.1
Furniture repair	0.0	0.0	0.1	0.1	0.1	0.1
Personal items (bag, watch, etc.)	0.7	0.5	0.5	0.6	0.6	0.6
Lighting (bulb, etc.)	0.0	0.0	0.0	0.0	0.0	0.0
House rent	3.8	4.1	4.2	3.9	4.1	4.0
Use value of household durables	2.0	2.1	2.0	2.2	2.2	2.1
Narcotics and tobacco	1.2	1.4	1.2	1.1	1.3	1.2
Miscellaneous	0.2	0.0	0.1	0.0	0.2	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 4.6 Budget share of selected budget items, south

Characteristics	Treatment arms					
	Cash	Food	Cash + Food	Food + BCC	Control	All
Budget item						
Monthly per capita total expenditure (taka)	1,453	1,460	1,543	1,496	1,438	1,478
Monthly per capita food expenditure (taka)	946	927	993	953	919	948
Monthly per capita nonfood expenditure (taka)	506	533	550	543	519	530
Budget share of expenditures (%)						
Food	65.4	63.5	64.3	64.4	64.2	64.4
Fuel and lighting	8.4	8.7	8.8	8.8	8.8	8.7
Personal care	1.2	1.2	1.1	1.2	1.3	1.2
Cleaning materials	1.3	1.2	1.3	1.2	1.3	1.2
Transport and communication	4.0	4.2	4.0	3.9	4.0	4.0
Adult clothing	3.1	3.2	3.2	3.0	3.2	3.2
Children clothing	1.2	1.1	1.1	1.1	1.2	1.2
Other clothing	0.6	0.6	0.6	0.6	0.5	0.6
Footwear	0.6	0.6	0.6	0.6	0.6	0.6
Beddings	0.3	0.2	0.3	0.3	0.3	0.3
Other household expenses	0.1	0.1	0.1	0.1	0.1	0.1
Medical treatment for male	2.8	3.1	2.7	3.2	2.4	2.8
Medical treatment for females	3.1	3.6	3.7	3.3	3.6	3.4
Education for male	0.6	1.0	0.8	0.8	1.0	0.8
Education for female	0.9	1.0	1.0	0.9	1.0	1.0
Remittances sent	0.1	0.1	0.1	0.1	0.0	0.1
Gifts given	0.1	0.1	0.1	0.1	0.1	0.1
Kurbani/milad	0.4	0.4	0.5	0.4	0.5	0.4
Entertainment	0.1	0.1	0.1	0.1	0.1	0.1
Legal fees	0.4	0.2	0.3	0.4	0.3	0.3
Utensils	0.1	0.1	0.1	0.1	0.1	0.1
Furniture repair	0.0	0.0	0.0	0.0	0.0	0.0
Personal items (bag, watch, etc.)	0.6	0.6	0.5	0.6	0.5	0.6
Lighting (bulb, etc.)	0.0	0.0	0.0	0.0	0.0	0.0
House rent	3.9	4.2	3.9	4.2	4.0	4.0
Use value of household durables	2.0	2.0	2.1	1.9	2.0	2.0
Narcotics and tobacco	0.7	0.8	0.6	0.7	0.7	0.7
Miscellaneous	0.0	0.0	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Tables 4.7 and 4.8 show the patterns of food expenditure in the north and the south, respectively. On average, rice accounts for 41 percent of total food expenditures in the north and 38 percent in the south. Rice is the preferred staple in Bangladesh—where "Have you eaten?" translates directly as "Have you taken rice?"

Table 4.7 Budget share of food, north

	Treatment arms					
Item	**Cash**	**Food**	**Cash + Food**	**Cash + BCC**	**Control**	**All**
Monthly per capita food expenditure (taka)	805	797	769	789	811	794
Food budget share						
Rice	40.8	40.4	40.7	41.0	40.1	40.6
Atta	0.4	0.4	0.6	0.5	0.4	0.5
Other cereal	1.3	1.2	1.4	1.3	1.1	1.3
Pulses	1.4	1.4	1.6	1.3	1.1	1.4
Oils	5.3	5.3	5.2	5.2	5.2	5.2
Vegetables	8.1	8.5	8.1	7.8	8.0	8.1
Potatoes	5.5	5.7	5.6	5.7	5.7	5.6
Leafy vegetables	1.7	1.5	1.6	1.4	1.4	1.5
Meats	3.4	3.2	3.2	3.5	3.4	3.3
Eggs	1.5	1.7	1.6	1.7	1.7	1.6
Milk and milk products	2.0	2.1	1.7	2.4	1.9	2.0
Fruits	1.6	1.3	1.3	1.7	1.5	1.5
Big Fish	3.4	3.9	3.8	3.7	3.7	3.7
Small Fish	2.6	2.2	2.8	2.5	2.3	2.5
Spices	3.4	3.3	3.1	3.2	3.3	3.3
Salt	0.8	0.8	0.7	0.8	0.7	0.8
Sugar and gur	1.0	1.0	0.8	1.0	0.8	0.9
Beverages	2.2	2.2	2.3	2.2	2.4	2.3
Betel leaf/nut	3.1	2.9	2.9	3.1	3.0	3.0
Other prepared foods	10.3	10.9	10.7	9.9	12.0	10.8
Other foods	0.1	0.1	0.1	0.1	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 4.8 Budget share of food, south

Item	Treatment arms						
	Cash	Food	Cash + Food	Cash + BCC	Food + BCC	Control	All
Monthly per capita food expenditure (taka)	946	927	993	–	953	919	948
Food budget share				–			
Rice	37.7	38.5	37.0	–	36.6	39.7	37.9
Atta	0.6	0.6	0.8	–	0.8	0.9	0.7
Other cereal	1.3	1.3	1.4	–	1.3	1.3	1.3
Pulses	2.5	2.8	2.7	–	3.0	2.4	2.7
Oils	6.0	6.0	6.1	–	6.4	5.7	6.0
Vegetables	8.0	7.7	8.5	–	8.5	8.0	8.2
Potatoes	4.3	4.0	4.3	–	4.1	3.9	4.1
Leafy vegetables	2.3	2.1	2.2	–	2.2	2.1	2.2
Meats	3.3	3.4	2.9	–	2.4	2.7	3.0
Eggs	1.2	1.2	1.4	–	1.4	1.2	1.3
Milk and milk products	1.9	1.8	1.6	–	2.2	1.8	1.9
Fruits	3.5	3.3	4.2	–	4.0	3.2	3.6
Big Fish	5.1	4.6	5.4	–	5.6	5.3	5.2
Small Fish	4.7	4.5	4.4	–	3.9	4.7	4.4
Spices	3.2	3.4	3.3	–	3.5	3.2	3.3
Salt	0.7	0.7	0.7	–	0.8	0.8	0.7
Sugar and gur	1.2	1.2	1.4	–	1.3	1.3	1.3
Beverages	2.3	2.4	2.3	–	2.1	2.1	2.2
Betel leaf/nut	2.8	2.6	2.6	–	2.9	2.5	2.7
Other prepared foods	7.2	7.6	6.7	–	6.8	7.1	7.0
Other foods	0.2	0.3	0.3	–	0.3	0.2	0.2
Total	100.0	100.0	100.0	–	100.0	100.0	100.0

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Tables 4.9 and 4.10 present the quantity of daily per capita food consumption. Average sample household members in the north consume 8 grams more rice per capita per day than households in the south.

Table 4.9 Quantity of daily per capita consumption of food items, north

	Treatment Arms						
Item	**Cash**	**Food**	**Cash + Food**	**Cash+ BCC**	**Food + BCC**	**Control**	**All**
	(grams/person/day)						
Rice	391.7	400.7	397.5	398.7	–	394.2	396.5
Atta	4.1	3.8	5.2	4.0	–	3.4	4.1
Other cereals	8.0	7.7	7.8	8.0	–	6.7	7.6
Lentils	1.8	2.5	2.7	1.9	–	1.4	2.1
Chickpeas	0.0	0.1	0.1	0.2	–	0.1	0.1
Khesari	1.3	1.2	0.9	1.0	–	1.0	1.1
Other pulses	2.1	1.7	2.3	2.0	–	2.0	2.0
Soybean oil	5.5	5.3	5.6	6.0	–	5.4	5.6
Mustard oil	3.6	3.6	3.2	3.3	–	3.6	3.5
Ghee	0.0	0.0	0.0	0.0	–	0.0	0.0
Other oils	0.0	0.4	0.3	0.0	–	0.1	0.2
Potatoes	123.5	132.4	132.0	140.2	–	139.7	133.5
Green leafy vegetables	36.1	31.1	33.3	31.9	–	29.4	32.4
Eggplants	38.6	37.4	35.7	36.1	–	39.9	37.6
Sweet gourds	6.3	7.3	6.0	6.0	–	7.1	6.5
Carrots	0.3	0.1	0.4	0.3	–	0.3	0.3
Other vegetables	105.5	106.3	104.3	106.3	–	109.8	106.4
Chicken	2.5	2.2	1.7	2.2	–	2.9	2.3
Beef	2.8	2.2	2.5	2.5	–	2.5	2.5
Goat meat	0.3	0.3	0.5	0.2	–	0.1	0.3
Other meats	0.3	0.5	0.3	0.3	–	0.2	0.4
Eggs	3.1	3.5	3.5	4.0	–	3.6	3.5
Milk	16.8	15.8	14.2	15.5	–	16.4	15.7
Milk products	0.0	0.1	0.1	0.4	–	0.0	0.1
Small fish	6.3	5.7	7.2	6.1	–	5.9	6.2
Big fish	10.7	11.5	10.9	10.6	–	11.1	11.0
Bananas	2.6	2.7	2.2	2.6	–	2.6	2.5
Oranges	0.4	0.1	0.1	0.5	–	0.3	0.3
Apples	1.1	0.4	0.5	0.9	–	0.7	0.7
Other fruits	5.1	5.5	4.5	6.2	–	5.4	5.3
Sugar	3.7	3.1	3.2	3.7	–	2.9	3.3
Gur	1.1	1.6	0.5	0.6	–	1.0	1.0
Salt	13.6	13.9	13.0	13.1	–	13.1	13.4
Spices	4.0	3.8	3.6	3.6	–	3.7	3.7
Prepared foods	0.0	0.0	0.0	0.0	–	0.0	0.0
Other foods	11.8	11.4	11.9	11.6	–	13.0	11.9

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.
Note: The *Food+BCC* transfer modality was only offered in the southern region so is not applicable here.

Table 4.10 Quantity of daily per capita consumption of food items, south

	Treatment arms						
Item	**Cash**	**Food**	**Cash + Food**	**Cash + BCC**	**Food + BCC**	**Control**	**All**
	(grams/person/day)						
Rice	386.1	388.6	385.0	–	373.1	408.9	388.3
Atta	7.5	6.2	8.8	–	8.8	9.1	8.1
Other cereals	7.9	7.4	9.8	–	7.3	7.9	8.0
Lentils	3.4	4.1	4.5	–	5.0	3.2	4.0
Chickpeas	0.5	0.3	0.3	–	0.3	0.5	0.4
Khesari	3.6	3.7	3.5	–	4.3	3.9	3.8
Other pulses	5.5	5.6	4.8	–	4.7	5.0	5.2
Soybean oil	10.4	10.3	10.5	–	10.8	9.8	10.3
Mustard oil	2.1	1.8	1.9	–	2.3	2.3	2.1
Ghee	0.0	0.0	0.0	–	0.0	0.0	0.0
Other oils	0.5	0.7	0.6	–	0.7	0.3	0.6
Potatoes	89.2	82.8	86.4	–	86.2	85.9	86.1
Green leafy vegetables	45.2	43.8	43.5	–	44.8	41.0	43.7
Eggplants	17.7	17.5	22.9	–	20.3	21.8	20.1
Sweet gourds	23.7	21.1	24.5	–	27.6	26.7	24.7
Carrots	0.1	0.1	0.1	–	0.0	0.0	0.1
Other vegetables	97.0	94.3	105.2	–	99.3	100.7	99.3
Chicken	5.1	6.0	4.4	–	4.0	4.7	4.8
Beef	1.5	0.8	1.2	–	0.9	0.8	1.0
Goat meat	0.0	0.3	0.2	–	0.1	0.1	0.1
Other meats	0.8	0.8	0.8	–	0.4	0.5	0.7
Eggs	2.9	2.8	3.4	–	3.2	2.9	3.0
Milk	12.2	13.8	9.6	–	15.8	11.8	12.6
Milk products	0.2	0.1	0.2	–	0.2	0.1	0.2
Small fish	16.3	14.7	14.4	–	12.7	15.5	14.7
Big fish	15.7	14.4	16.5	–	17.0	15.9	15.9
Bananas	4.1	3.1	4.1	–	3.5	2.9	3.5
Oranges	0.5	0.5	0.6	–	0.6	0.7	0.6
Apples	1.0	1.0	1.1	–	1.0	1.1	1.0
Other fruits	29.4	30.5	33.6	–	36.2	32.1	32.4
Sugar	4.9	4.9	5.4	–	4.9	5.4	5.1
Gur	1.4	1.2	1.6	–	1.5	1.6	1.4
Salt	12.7	12.3	12.9	–	13.3	13.2	12.9
Spices	5.0	5.1	4.9	–	5.2	4.8	5.0
Prepared foods	0.0	0.0	0.0	–	0.0	0.0	0.0
Other foods	12.0	13.2	13.1	–	11.3	11.3	12.2

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.
Note: The *Cash+BCC* transfer modality was only offered in the northern region so is not applicable here.

Tables 4.11 and 4.12 present per capita calorie consumption and calorie shares of food items in the north and the south, respectively. Average sample households in the south consume about 7 percent more calories than the sample households in the north. Rice accounts for 86 percent of total calorie consumption in the north and 80 percent in the south, implying very little diversity in diet. However, relatively higher calorie consumption and lower share of calorie from rice in the south indicate that diets are relatively more diverse in the south compared to the north.

Rice's share of the food budget, however, is only around 40 percent in the two regions (Tables 4.7 and 4.8), demonstrating that it is a relatively inexpensive source of energy.

Table 4.11 Calorie composition/share of food items, north

	Treatment arms						
Item	**Cash**	**Food**	**Cash + Food**	**Cash + BCC**	**Food + BCC**	**Control**	**All**
Daily per capita calorie intake (kcal/person/day)	1,829	1,856	1,788	1,830	–	1,826	1,826
Percent of total calorie intake (percent)							
Rice	85.2	85.8	85.6	85.5	–	85.8	85.6
Atta	0.8	0.7	0.9	0.8	–	0.7	0.8
Other cereals	0.5	0.3	0.4	0.4	–	0.3	0.4
Pulses	1.1	1.1	1.0	0.9	–	0.9	1.0
Oils	4.7	4.7	4.8	4.8	–	4.8	4.8
Leafy vegetables	0.4	0.4	0.4	0.4	–	0.4	0.4
Other vegetables	2.5	2.4	2.4	2.4	–	2.6	2.5
Meats	0.6	0.5	0.5	0.6	–	0.6	0.6
Eggs	0.2	0.3	0.2	0.3	–	0.3	0.2
Milk and milk products	0.6	0.6	0.5	0.7	–	0.6	0.6
Small fish	0.4	0.4	0.4	0.4	–	0.4	0.4
Big fish	0.5	0.6	0.6	0.6	–	0.6	0.6
Fruits	0.2	0.2	0.2	0.3	–	0.3	0.3
Spices	0.8	0.7	0.7	0.7	–	0.7	0.7
Sugar and gur	1.1	1.0	0.9	1.0	–	0.8	0.9
Beverages	0.4	0.4	0.4	0.4	–	0.4	0.4
Total	100.0	100.0	100.0	100.0	–	100.0	100.0

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.
Note: The *Food+BCC* transfer modality was only offered in the southern region so is not applicable here.

Table 4.12 Calorie composition/share of food items, south

Item	Treatment Arms						
	Cash	Food	Cash + Food	Cash + BCC	Food + BCC	Control	All
Daily per capita calorie intake (kcal/person/day)	1,924	1,889	2,013	–	1,927	1,970	1,945
Percent of total calorie intake (percent)							
Rice	80.6	80.2	79.5	–	79.3	81.1	80.1
Atta	1.3	1.2	1.6	–	1.5	1.5	1.4
Other cereals	0.2	0.2	0.2	–	0.2	0.2	0.2
Pulses	2.5	2.7	2.5	–	2.8	2.3	2.6
Oils	6.3	6.3	6.6	–	6.9	5.9	6.4
Leafy vegetables	0.7	0.7	0.7	–	0.7	0.6	0.7
Other vegetables	2.1	2.1	2.4	–	2.2	2.2	2.2
Meats	0.7	0.8	0.6	–	0.5	0.5	0.6
Eggs	0.2	0.2	0.2	–	0.2	0.2	0.2
Milk and milk products	0.5	0.5	0.4	–	0.6	0.4	0.5
Small fish	0.8	0.7	0.7	–	0.6	0.7	0.7
Big fish	0.7	0.7	0.8	–	0.8	0.7	0.7
Fruits	0.8	1.0	1.2	–	1.0	1.0	1.0
Spices	0.8	0.9	0.8	–	0.9	0.8	0.9
Sugar and gur	1.3	1.3	1.4	–	1.4	1.4	1.4
Beverages	0.3	0.4	0.4	–	0.3	0.3	0.4
Total	100.0	100.0	100.0	–	100.0	100.0	100.0

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.
Note: The *Cash+BCC* transfer modality was only offered in the northern region so is not applicable here.

4.3 Nutritional Status of Children and Women

Within households, some members are at greater nutritional risk than others. Various studies have documented that preschool children and women suffer from more severe undernutrition than do other household members. Indeed, a 1993 IFPRI study in Bangladesh assessing the food consumption and nutritional effects of targeted food-based programs found that preschoolers are at the greatest risk of undernutrition, followed by pregnant and lactating women (Ahmed 1993).

The current study also assessed the nutritional status of preschool children (aged 6–60 months) on the basis of anthropometric data for all preschool children in the sample households relative to child growth standards devised by the UN World Health Organization (WHO). The levels of nutritional status are expressed in Z-score values.

Tables 4.13 and 4.14 report Z-scores in the northern and the southern regions, respectively, for the following indicators: height-for-age, a measure of stunting; weight-for-age, a measure of underweight; and weight-for-height, a measure of wasting. Weight-for-height is a short-term measure (low weight-for-height indicates acute undernutrition), whereas height-for-age shows the long-term nutritional status of children (low height-for-age indicates chronic undernutrition). Low weight-for-age (indicating underweight) can be viewed as a medium-term indicator, which reflects both acute and chronic undernutrition.

The results show no remarkable difference in the nutritional status of preschoolers across the treatment arms and control groups and between the two regions.

Table 4.13 Prevalence of malnutrition among preschool children ages 6-60 months, north

Program participation of household	Number of children	Average HAZ	Percent HAZ<2	Average WAZ	Percent WAZ<2	Average WHZ	Percent WHZ<2
Cash	491	-1.92	49.90	-1.61	34.42	-0.79	11.81
Food	513	-2.00	50.88	-1.62	34.50	-0.76	12.48
Cash+Food	522	-1.91	50.00	-1.65	37.21	-0.85	14.94
Cash+BCC	479	-1.80	49.27	-1.59	36.38	-0.86	12.53
Control	521	-1.82	47.22	-1.60	33.91	-0.89	15.16
All	2,526	-1.89	49.45	-1.62	35.28	-0.83	13.42

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.
Note: HAZ = height-for-age Z-score; WAZ = weight-for-age Z-score; WHZ = weight-for-height Z-score. Z-scores were calculated using the child growth standards developed by the World Health Organization.

Table 4.14 Prevalence of malnutrition among preschool children aged 6-60 months, south

Program participation of household	Number of children	Average HAZ	Percent HAZ<2	Average WAZ	Percent WAZ<2	Average WHZ	Percent WHZ<2
Cash	549	-1.86	49.36	-1.76	40.80	-1.06	17.85
Food	493	-1.88	49.70	-1.65	38.13	-0.89	15.42
Cash+Food	529	-1.87	46.88	-1.63	37.81	-0.86	12.85
Food+BCC	503	-1.89	45.33	-1.66	36.78	-0.89	16.73
Control	520	-1.85	45.19	-1.63	37.04	-0.88	15.96
All	2,594	-1.87	47.30	-1.67	38.15	-0.92	15.77

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.
Note: HAZ = height-for-age Z-score; WAZ = weight-for-age Z-score; WHZ = weight-for-height Z-score. Z-scores were calculated using the child growth standards developed by the World Health Organization.

Tables 4.15 and 4.16 show the nutritional status of women of childbearing age (15–49 years), the other high-risk group, in the north and the south, respectively. Body mass index (BMI) is used as the nutritional status indicator for this group.[10] A BMI of 18.5 is considered normal for adults (James, Ferro-Luzzi, and Waterlow 1988). The results show that women in the sample households in the north have somewhat better nutritional status than do those in the south, despite the fact that households in the north are poorer than those in the south.

Table 4.15 Body Mass Index (BMI) of women of childbearing age, 15-49 years old, north

Program participation of household	Number of women	Average BMI	Percent below 18.5 BMI
Cash	553	19.65	34.2
Food	542	19.75	34.5
Cash+Food	540	19.69	32.6
Cash+BCC	536	19.79	31.0
Control	540	19.75	35.4
All	2,711	19.73	33.5

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 4.16 Body Mass Index (BMI) of women of childbearing age, 15-49 years old, south

Program participation of household	Number of women	Average BMI	Percent below 18.5 BMI
Cash	576	19.68	35.1
Food	567	19.68	38.6
Cash+Food	567	19.76	37.9
Food+BCC	579	19.72	37.3
Control	578	19.53	39.8
All	2,867	19.67	37.7

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

[10] BMI is defined as weight (in kilograms)/height^2 in meters. Pregnant women are excluded from BMI calculations because weight gain during pregnancy could bias the results.

5. OPERATIONAL PERFORMANCE, PROGRAM PARTICIPATION, AND DELIVERY COSTS

This section presents an evaluation of how effectively transfers were delivered to program participants, an assessment of how the nutrition behavior change communication (BCC) component was improved, perspectives of the women participating in the TMRI, implications of the size of transfers on household consumption behavior, and an analysis of costs of delivering transfers and nutrition BCC training. It is based on information from IFPRI's quantitative household survey and community nutrition workers' survey for mid-term process evaluation, qualitative field research, and WFP's monitoring and progress reports.

5.1 Implementation Process

5.1.1 Findings from WFP's Monitoring

In October 2012, just prior to IFPRI's mid-term process evaluation of the TMRI, the sixth round of transfers was completed. At this time, WFP maintained monitoring coverage at a rate of 10–15 percent in order to cross-check the distributions and activities, and undertook additional post-distribution household level monitoring to confirm receipt of transfers. Monitoring was conducted carefully to avoid potentially influencing participant behaviors or entitlement use.

Food Transfers and Physical Cash Transfers

WFP's monitoring reports showed no incidence of leakage or loss of food or cash transfers. The risk of leakage for the food commodities was reduced through individual packaging, which ensured that each participant received her full entitlement and made for easier carrying. To minimize opportunity cost to the participants, the distribution and training sites were no more than 2 kilometers (km) from the participants' homes. Monitoring reports indicated that the women travelled 1.5 km on average to reach the sites and that participants tended to share a rickshaw van to facilitate transport of food transfers back home.

Mobile Phone Cash Transfers

To preserve the integrity of the research, all 4,000 participants, as well as those in the 1,000 control households under the TMRI, received a basic mobile phone handset (Nokia 1280) valued at approximately US$21 and a Banglalink SIM card, even though the mobile was only required for the participants receiving cash.

At the time of the mid-term process evaluation in October 2012, all TMRI participants (cash and non-cash) in the northern region had already received mobile sets. Households belonging to the control group in the northern region received their handsets in June 2013. In the south, cash participants received mobile phones in a phased approach from early October until the first week of December 2012: non-cash participants received their handsets from the end of October through December 2012, and the control group received theirs in June 2013.

The pilot of mobile phone cash transfers began in July 2012 with 230 participants in the north. Applying lessons learned, the number increased month by month, focusing first on the north then moving to the south. As of October 2012, four rounds of mobile cash transfers were undertaken to a total of 1,630 participants, according to WFP field monitoring reports. By December 2012, all 2,500 cash recipients in both regions received their cash transfers through their program-issued mobile phones. All participants successfully had their mobile accounts credited through electronic transfer and shortly thereafter withdrew their monthly transfer.

One of the main challenges faced in the mobile transfers is participants forgetting their PINs, which were necessary to initiate all transactions. Disruptions in network coverage also caused delays in cash-out transactions, and participant illiteracy, including numerical illiteracy, caused initial challenges in operating handsets. The dedication of the DBBL team in partnership with ESDO to help participants and WFP overcome these challenges is commendable.

Upon registering for the mobile account, participants were trained in orientation sessions tailored to the largely illiterate population to develop awareness on mobile cash transfers. The orientation sessions involved briefing participants on the mobile handset operation, orientation to banking systems, and a primary focus on keeping their PIN secret. This training was critical to ensuring a secure and efficient cash-out process. Key messages were repeated at every distribution site, and within 1–3 months the majority of participants were found to be acquainted with the system.

Some of the benefits of the mobile banking system include improved transparency and security and potentially lower implementation costs. The introduction of the mobile banking system also provided previously "un-banked" participants with the opportunity to access basic banking services. The transfer of the mobile phones to the participating women increased opportunities for communication with family and friends and also in accessing employment and other services.

Nutrition Behavior Change Communication (BCC)

The BCC component of the TMRI covered 1,000 participants in 100 villages in total—500 participants in 50 villages in the north for cash-and-BCC, 500 participants in 50 villages in the south for food-and-BCC. The BCC training sessions cover basic nutrition, control and prevention of micronutrient deficiencies, infant and young child feeding practices, health care, maternal nutrition, and hygiene. The training plan included sessions for the women participants (the target audience), as well as combined sessions with the participants' influential family/household members—for example, their mother-in-law. Monthly community level sessions were also held, where community leaders, teachers, religious leaders, and others were encouraged to attend.

The BCC training materials included manuals, flashcards, and posters. ESDO hired and trained female community nutrition workers (CNWs) to deliver BCC training to participants. CNWs were from the same villages as TMRI participants. They were trained to educate participants on the BCC content using flashcards, real life examples, food items, and interactive exercises during sessions. CNWs were graded on their performance. They had to help households to complete "right behaviors" checklists and provide counseling to households if they identified any incorrect

nutritional behaviors. In addition to conducting group meetings, CNWs also visited the participants in their homes twice per month to observe household level practice and encourage the adoption of positive behaviors. Moreover, CNWs assessed specific needs of different individuals, and provided individual counseling on an as-needed basis.

Field facilitating officers (FFOs) of ESDO supervised CNWs. If there was an issue of CNWs' knowledge, FFOs provided technical support. An FFO was required to be present for every BCC session, and they consulted with the CNWs after sessions. FFOs also visit households in conjunction with CNWs.

WFP made significant efforts to improve the content and delivery of the BCC training modules since their inception. To ensure that women's interests were maintained for the duration of the study, WFP reviewed the BCC delivery mechanism to avoid tiring the women of the training sessions and to ensure that they continued to absorb and apply the information they learned in each session.

IFPRI's mid-term process evaluation in October 2012 included a survey of CNWs, which gave a quiz on 14 key nutrition messages the CNWs were supposed to provide to beneficiaries. The mean scores out of 14 were 13.2 (94 percent correct answers) in the north and 13.5 (96 percent correct answers) in the south.

Positive behavior changes were seen in the participants' households, according to field monitoring reports and IFPRI's qualitative field research. Women's hygiene practices improved, including frequency of handwashing before cooking and eating meals, breastfeeding, and after using the washroom. When they could afford them, women also purchased—or influenced their husbands to purchase—more diverse foods, namely vegetables and proteins. Participants were aware that these practices are important for improved health and strength and to keep babies and young children growing properly. Mothers also reported that their children were less susceptible to illness, including diarrhea and colds.

To reinforce positive behavior change, the group training sessions involved real life examples, discussions, and role-playing. In addition, community nutrition workers visited participants' homes in the weeks following sessions.

In its initial weeks—during the first distribution of transfers and trainings in May 2012—the quality of the nutrition BCC was considered inadequate by a joint IFPRI-WFP team that visited the TMRI sites in the north. The quality of trainings was low because community nutrition workers were improperly trained, so a concerted effort was made to strengthen the way trainers presented the subject matter and interacted with the women participants. Initially, 59 CNWs were hired to cover 1,000 participants in 100 villages. In June 2012, more CNWs were employed and required to attend bimonthly refresher courses, with FFOs, to improve their own nutritional knowledge and facilitation skills. Monitoring and supervision tools were also revised. In response to the need, ultimately 100 CNWs were hired, changing the ratio to 10 participants to 1 CNW. These changes required a gradual increase in BCC training centers.

Feedback from the field demonstrated that the BCC training and materials must be made more simple, accessible, and practical for participants to absorb the messages and apply them. Based on this feedback, further revisions focused on refining the modules by avoiding jargon and technical terms and incorporating a simple, clear connection between improved nutritional behaviors and better health. In November and December 2012, a second round of refresher training for community nutrition workers covered these modifications and further sharpened their delivery skills to strengthen interaction with trainees.

Participants received a full cycle of modules by December 2012, at which point the training cycle was repeated, but incorporated new methods of delivery in order to keep the women interested. Subsequently, the knowledge transfer method moved towards a more interactive nutrition BCC training and participants were encouraged to lead the sessions. CNWs identified the successful or positive deviant mothers and involve them in the group meetings.

5.1.2 IFPRI Interviews with Officials of Implementing Agencies

As part of the TMRI mid-term process evaluation, IFPRI researchers interviewed WFP and ESDO officials. The interviews are summarized below.

Interviews with WFP Officials

WFP staff members were enthusiastic about the project from the beginning. WFP Representative Christa Räder was specifically interested in objective analysis because "an emphasis on the 'outcome' can lead to policies and programs based on evidence," she said. The WFP country team worked diligently to secure funds, and in June 2011, Germany pledged considerable resources. Switzerland and the UN Development Programme soon followed suit (see Box 5.1).

WFP-Bangladesh's Head of the Program Planning and Implementation Support Unit Rezaul Karim mentioned that WFP's involvement with programs as unique as TMRI has played a positive role in establishing a credible relationship with the government. He said that the program gave WFP the opportunity to expand their network to include the Ministries of Food; Disaster Management and Relief; Women and Children Affairs; Education; and Health and Family Planning. When asked about the choice of commodities, Karim said that WFP needed to strike a balance between price and quality, as per international standards. He explained that rice was procured locally from enlisted suppliers. The tender was floated, suppliers provided samples, and WFP's procurement committee made recommendations. Medium-sized mosoor, a popular variety of lentil, was chosen because IFPRI suggested that a less popular type might hamper acceptance and, hence, consumption, thereby skewing the study results.

Karim also mentioned that to select an implementing partner for the TMRI study, WFP reviewed proposals from five NGOs. The organizations were then evaluated by a WFP Technical Committee. Eco-Social Development Organization (ESDO) was selected to carry out the project in both the northern and the southern regions because it had an impressive track record in the field and its management had demonstrated efficiency and integrity.

Box 5.1 Evidence Creation for Social Safety Nets: Christa Räder, WFP Representative in Bangladesh

Christa Räder, World Food Programme (WFP) Country Representative in Bangladesh, is enthusiastic about objectivity. She worries that ideology dominates dialogue about social assistance programs and that too much emphasis is placed on the input side of safety nets and too little attention on outcomes. "An emphasis on the outcome can lead to policies and programs based on evidence," Räder said in an interview with the International Food Policy Research Institute (IFPRI), WFP's partner in a study of what makes safety net programs most effective at improving livelihoods, food security, and child nutrition. According to Räder, the Bangladesh Government spends about US$2.5 billion a year on social protection programs that have little emphasis—and subsequently little positive impact—on nutrition. Safety net programs, especially those which target families with small children, need to focus on achieving better nutrition results, she says, and the "Transfer Modality Research Initiative [the study co-led by IFPRI and WFP] is doing that."

Räder's keen interest in creating an evidence base on how to achieve nutrition outcomes through food and cash transfer programs led her to be supportive of the TMRI from the project's outset. Together with her WFP team, she worked diligently to secure funding for implementing the project. When she presented the Bangladesh Country Programme 2012–2016 to the WFP Executive Board, the representative of Germany made a strong intervention in favor of the TMRI and offered funding for it. Initially, however, most other donors were not as receptive. Ultimately, after an inception workshop was held to publicize the merits of the TMRI, the Swiss Government pledged substantive resources as well.

Collaboration with the Bangladesh Government, Räder pointed out, was of paramount importance in getting the TMRI off the ground because "all UN agencies operate within a national context." As the project's initial funding was uncertain, it took WFP a while to bring government officials on board. Once they did become involved, the government formed an interministerial Technical Committee to oversee the implementation of the TMRI. Räder happily acknowledged that the Bangladesh Government has typically been more open to discussing and developing new ideas than many other developing-country governments.

When asked about WFP's shift from food aid to cash transfers, Räder clarified that the shift has actually gone from food aid to food assistance, the latter covering a range of transfer modalities, including cash transfers. Therefore, she explained, TMRI is not a deviation from WFP's core strategic plan; in fact, it's particularly important here because WFP Bangladesh is one of WFP's largest development programs.

Other WFP-Bangladesh staffers are excited about TMRI as well, and Räder explained that her team is as enthusiastic about this research as she is: "They also believe that objective results can influence government policies." But, while decisions based on evidence have become a core aspect of the organization's culture, Räder adds that, in general, WFP also has a passionate workforce that is deeply committed to delivering effective programs.

Räder and her team are pleased to be working with IFPRI on the TMRI because the Institute has a solid reputation for producing high-quality, credible work that is not influenced by any external forces. "I get inspiration from research," Räder explained. "I don't want to state that we are doing great without showing the evidence. With TMRI, we are delivering innovative safety nets and conducting research."

Hafiza Khan, head of the WFP office in Khulna, told the IFPRI team that WFP was strict about maintaining storage standards. During the initial stage, they carefully supervised the conditions in warehouses and supplied wooden pallets and racks to put food bags on. There were stringent regulations on how to manage a food warehouse; regular fumigation, moisture control, and other basics were part of routine maintenance.

For two days, experts from the WFP-Dhaka office trained ESDO field officers on how to effectively manage a warehouse. Most importantly, they visited every single ESDO warehouse to assess suitability and suggest modifications whenever required.

Khan confirmed that, compared to other food-based programs that often distribute single commodities, resale of TMRI food entitlements was not an issue because the three commodities (rice, lentils, and cooking oil) were bundled together and individually packaged in a way that discouraged resale. Moreover, the quality of the products was high, so the participants did not want to sell their entitlements.

WFP-Bangladesh provided additional support for monitoring the BCC component since delivery at the beginning of the program was unsatisfactory, mainly due to issues with content of training materials and message delivery style of community nutrition workers (CNWs). Problems with training were frequently informed to the head office. The team collaborated with all parties involved to improve BCC standards.

When asked to comment on ESDO's performance, Khan said they were doing well. They were struggling a bit at the beginning to work efficiently with the government, probably because they did not have a strong presence in the southern areas of Bangladesh. However, their performance was brought up to expected standards.

Jakir Hossain, WFP Senior Program Assistant in Khulna, reported in an interview with IFPRI that the mobile phone networks used for some of the TMRI cash transfers were not always accessible during distribution times, so participants had to wait to receive their cash entitlement. Hossain was also concerned about the risk of participants selling the mobiles they were given for participation in the TMRI, primarily those receiving food transfers who did not need the mobile to receive their entitlement. At this point, both Hossain and Khan agreed with IFPRI's Akhter Ahmed that participants' mobile phones should not be replaced if stolen or lost to cut down on potential sale/replacement schemes. It was decided that if a cash participant loses her mobile phone or has it stolen and does not have a second handset in the household to avail, she should receive the remaining cash entitlements by hand.

Interviews with ESDO Officials

ESDO and WFP collaborated in the field to implement the TMRI. ESDO Executive Director Shahid Uz Zaman told IFPRI researchers that he faced difficulties in hiring competent CNWs to impart BCC training. After the IFPRI team observed the poor quality of BCC training sessions in the northern Gangachara upazila in May 2012, WFP and ESDO planned drastic improvements.

While discussing mobile technology adoption, Zaman described it as an amazing innovation in the development sector of Bangladesh. Managers at the Chars Livelihoods Project (CLP) asked him whether they could visit the field to see how this technology was implemented. “The idea that the very poor cannot adopt such technologies has been proven wrong through the TMRI,” said Zaman (see Box 5.2).

Shamsul Haque Mridha, ESDO’s project coordinator for TMRI, mentioned that his team was worried about beneficiary household selection because it can take a long time and they were working within strict time constraints. The ESDO team was relieved to learn that beneficiary households had already been selected jointly by IFPRI and DATA.

Mridha was also concerned after WFP and IFPRI’s first field visit in May 2012 revealed that cash and food distributions to both BCC and non-BCC participants were taking place at the same time. This simultaneous delivery was meant to be avoided because it can lead to spillover effects—meaning that TMRI participants not attending BCC training might learn nutritional interventions from participants attending BCC training given the overlap in timing. While sharing knowledge is ideal and a side benefit for the non-BCC individuals, it would likely distort the research results. WFP advised ESDO to revise their schedule so that distributions were done separately to minimize interaction.

Mridha said that ESDO was happy to take on the challenge and thought TMRI would be a good learning experience. Executive Director Zaman was so dedicated to the cause that he transferred employees from other active projects to TMRI. WFP notified ESDO relatively late in terms of the project’s schedule, so they had very little time to prepare before the first distribution. Although beneficiary households had already been selected by IFPRI and DATA, which saved ESDO valuable time in executing the operational plan, its staff still faced the time-consuming task of traveling long distances across disparate regions to reach these participants.

The first real issue on the ground was finding TMRI participants quickly enough to create their photo identity cards before distributions began. The major hurdle was actually convincing local officials to allow TMRI to operate in certain areas. Initially, union council chairmen as well as the upazila administration were not happy with the study because they had not been involved in its selection process. Additionally, while recruiting CNWs, ESDO faced pressure from local influential people, who wanted their friends or relatives to be hired. The problems were eventually overcome with WFP’s support. TMRI participants adopted the mobile phone cash transfer system well. Almost 97 percent can use the phone effectively,” said Mridha. “Those getting BCC were even more prompt with adapting, since they were used through the process of getting trained.”

Box 5.2 TMRI Implementation: Shahid Uz Zaman, ESDO Executive Director

Shahid Uz Zaman started the Eco-Social Development Organization (ESDO) as a community club called *Hojoborolo* in April 1988 during one of the worst floods ever to hit Bangladesh. People in the north were severely affected, so Zaman and some college students in Thakurgaon district helped families by giving them shelter at the school.

During a TMRI mid-term interview with IFPRI, Zaman explained that initially Hojoborolo used personal funds before transitioning into a formal NGO in November 1988. It continued to provide support to flood victims suffering the effects of malnutrition and illness, namely diarrhea. Oxfam assisted them by providing food relief, but there were no official donors until 1991 when the *Palli Karma Shahayak Foundation* (PKSF) sanctioned an official donation for microcredit purposes, which, at the time, was not yet a popular concept. In fact, the first few borrowers returned the money after some days, saying they could not afford the installments. The concept gained popularity over time, however, and, currently, the net profit from microfinance serves as the main source of operational funds for ESDO.

ESDO first collaborated with WFP in 1998 on the Integrated Food Security and Vulnerable Group Development programs. WFP has since involved ESDO in several projects, and reached out to them to submit a proposal for TMRI. ESDO was selected as the partner for both the north and the south. "We were excited about working with a reputed international research organization like IFPRI because we knew we'd be able to learn a lot from the experience," said Zaman. His team was relieved that they did not have to select the TMRI participants, given the project's time constraints.

Zaman recruited people from other food security related projects, and WFP provided tremendous support in the field, which made implementation on a condensed schedule easier. ESDO still faced challenges in the field, however, including dealing with local administrators, who wanted a more significant role in the project. Some influential local leaders were reluctant to allow the TMRI to proceed without their direct involvement. There was a point when some ESDO staffers were scared of physical assault in certain areas. Nevertheless, they persistently worked hard to convince local government officials and now feel positive about the project.

Another challenge revolved around setting up BCC training centers, which was difficult since no ready-made structure was available to rent. Around 27 centers in the south had to be changed due to water-logging issues. WFP worked to resolve the problem, especially when budget constraints surfaced for ESDO. ESDO put in a lot of effort to make the BCC component a success, especially for recruiting credible community nutrition workers and training them according to local needs. ESDO used feedback from participants to judge how well trainers were doing. Aklima Parvin, the lead TMRI nutritionist from WFP, worked diligently with ESDO to improve training quality.

Ainul Haque, the ESDO north zonal manager for TMRI in Rangpur, provided some insight into local perceptions of the project. He said:

> A religious leader in Radhakrishna village in Pirganj upazila tried to convince some TMRI participants that they were making a big mistake by taking the transfer. One participant started believing she would become Christian if she took the help. Her husband was also reluctant because someone had convinced him that his wife was selected because she is pretty. He said, 'This is why the other poor women were not chosen, but she was.' The participant had received transfers four times, but withdrew herself from the project thereafter. The religious leader suggested the whole process was suspicious since no government officials were involved, and everything was happening 'too easily,' so there had to be a catch. We were concerned that if the religious leader convinced the whole village, no one from that village would take the transfer. We collaborated with WFP to motivate the participant and her husband, but it didn't work.

There were a total of three dropouts motivated by fearful religious reasons, according to Haque, "One cash transfer participant refused to take the money for the fear of turning into a Christian," he said, "despite family pressure to continue to take project benefits. Her husband even physically abused her to convince her, but she was adamant. When she returned her card she asked us, 'Why would you give me money? One cannot get so much money so easily. This is Christian's money. I cannot take it.' We could not get her back into the program in any way." There were other rumors surrounding the repercussions of accepting transfers, including one that talked of dead bodies being removed from graves and stamped on the back if transfers were taken.

Haque reported that every single BCC session was monitored by ESDO, and CNWs were ranked every month to make sure they were performing up to the desired standards. WFP allowed ESDO to recruit more CNWs in unions with more BCC villages. Haque observed that, in general, it appeared that BCC trained groups were better at grasping the concepts in using their new mobile phones because they had the mentality of participating in BCC trainings and were used to the process. In certain training sessions, they were made team leaders.

Like their counterparts in the northern region, ESDO South Zonal Manager Moniruzzaman Sohail and his team were relieved that beneficiary households had already been selected by IFPRI and DATA. However, the team encountered some tough questions from residents who were not selected to participate in TMRI, wanting to know why they could not receive assistance despite being as poor as those who were selected.

Sohail also mentioned the misconception among TMRI participants and their neighbors that accepting transfers meant they would need to convert to Christianity. He did notice a stark difference between those participants who received the nutrition BCC training component and those who did not, stating that the former were less superstitious and the "doors to their brains were open."

Sohail shared some positive stories about the TMRI participants. "One participant's child was suffering from diarrhea," Sohail said, referring to a participant in Fakirhat upazila, Khulna. "She consulted a doctor who asked her to give zinc tablets and syrup to her child. She recalled learning

about it in BCC, so she didn't buy the medicine and instead fed her child food items containing zinc and it worked."

During IFPRI's midterm field visit in November 2012, the team noticed cases where a transfer-entitlement card was issued in a young woman's mother-in-law's name instead of her own, meaning the transfer went to the mother-in-law, not the young woman/mother. IFPRI immediately notified ESDO and WFP of this practice and asked that it be stopped. WFP later informed IFPRI that initially 717 cases (about 18 percent of all participants) turned out to be mother-in-laws (that is, not the actual selected participants), but they had reduced that number to 70 cases after IFPRI identified the problem. Eventually, ESDO rectified this issue.

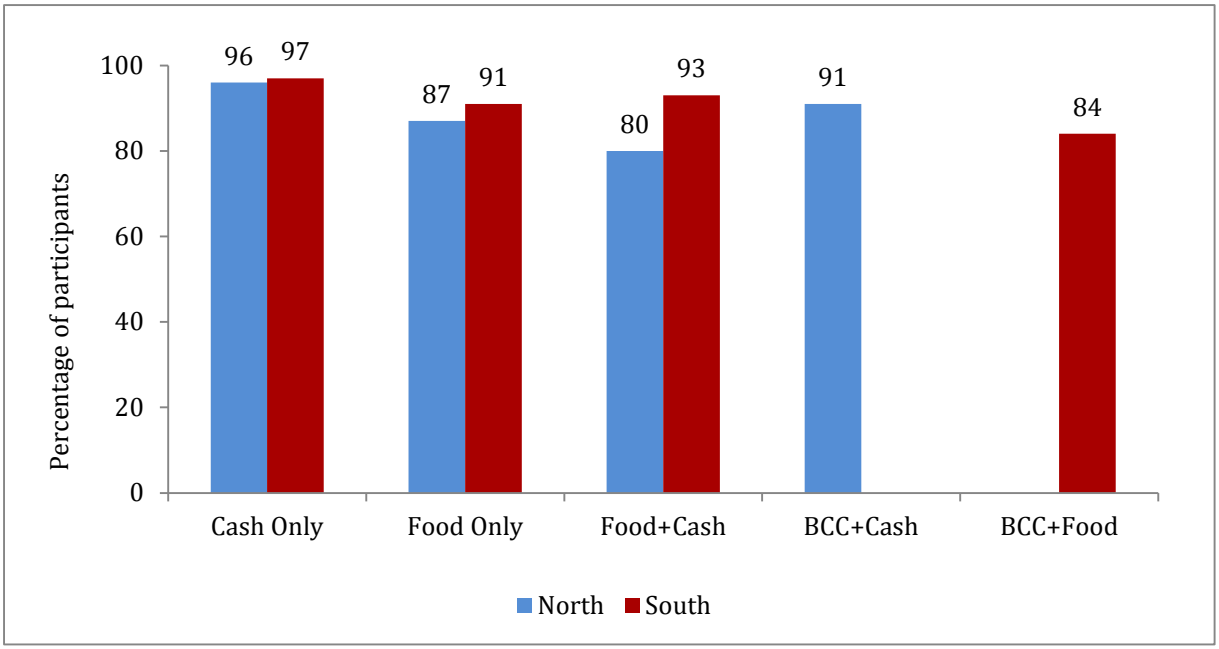
5.2 TMRI Participation

This section presents various aspects of the TMRI from the perspective of the women participating in the project, using quantitative information collected in the household survey for mid-term process evaluation.

5.2.1 Transfer Distribution Process

ESDO (in consultation with WFP) selected distribution centers in locations that would be convenient for most of the participants, and an overwhelming majority of them (both in the northern and southern zones) were satisfied with the locations (Figure 5.1). However, participants receiving food were found to be relatively less content with their distribution center's location. The survey results show that participants who were not satisfied with the location cited the difficulty of carrying food as their main reason for dissatisfaction.

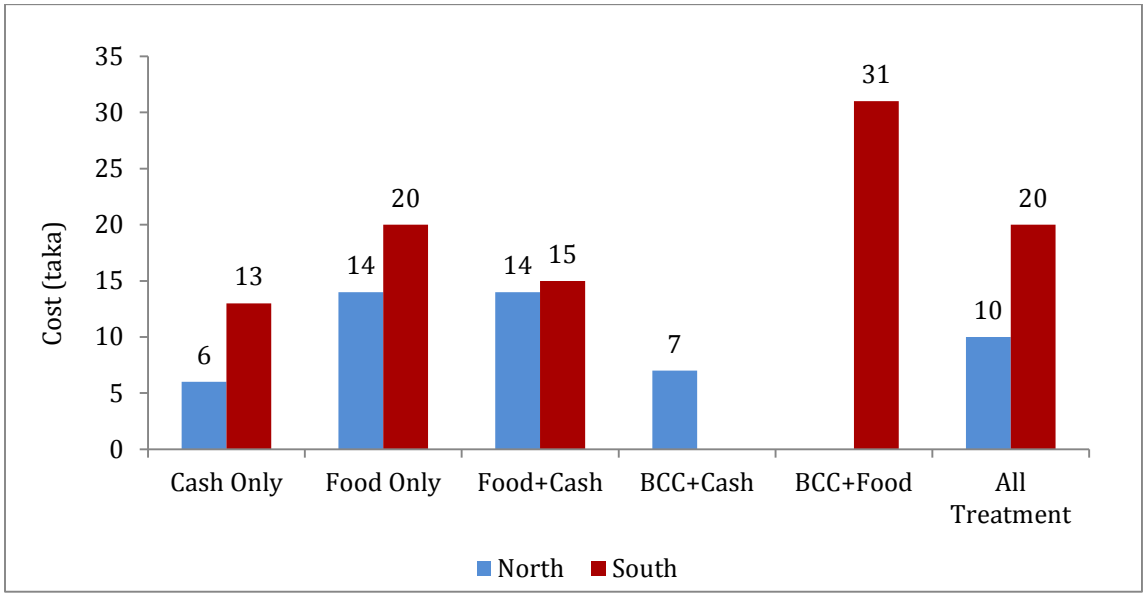
Figure 5.1 Percentage of participants satisfied with their distribution center's location



Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

In general, the cost of transportation to the distribution centers was higher in the south than in the north (Figure 5.2). The villages in the south are more widely dispersed, and rural road infrastructure is relatively less developed than it is in the north. The data presented in Figure 5.2 also shed light on why food receiving participants were more likely to be dissatisfied with the distribution center locations—namely because the cost of commuting from the distribution center back home was much higher for food recipients than it was for cash recipients because of the cost of carrying food. However, it was evident from the survey that transport costs were not so high as to discourage the participants from coming to collect the transfer.

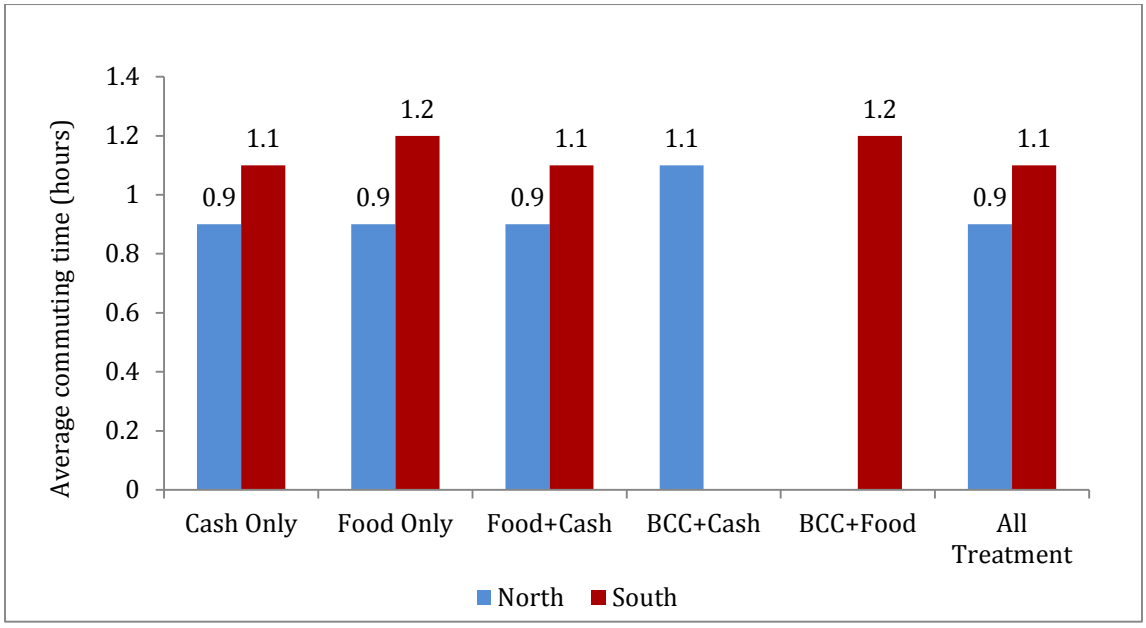
Figure 5.2 Transport costs to and from distribution center



Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

On average, commuting to and from the distribution centers took roughly half an hour each way, which indicates that the centers were quite conveniently located (Figure 5.3). Again, commuting in the south required more time because of village locations and poor rural infrastructure.

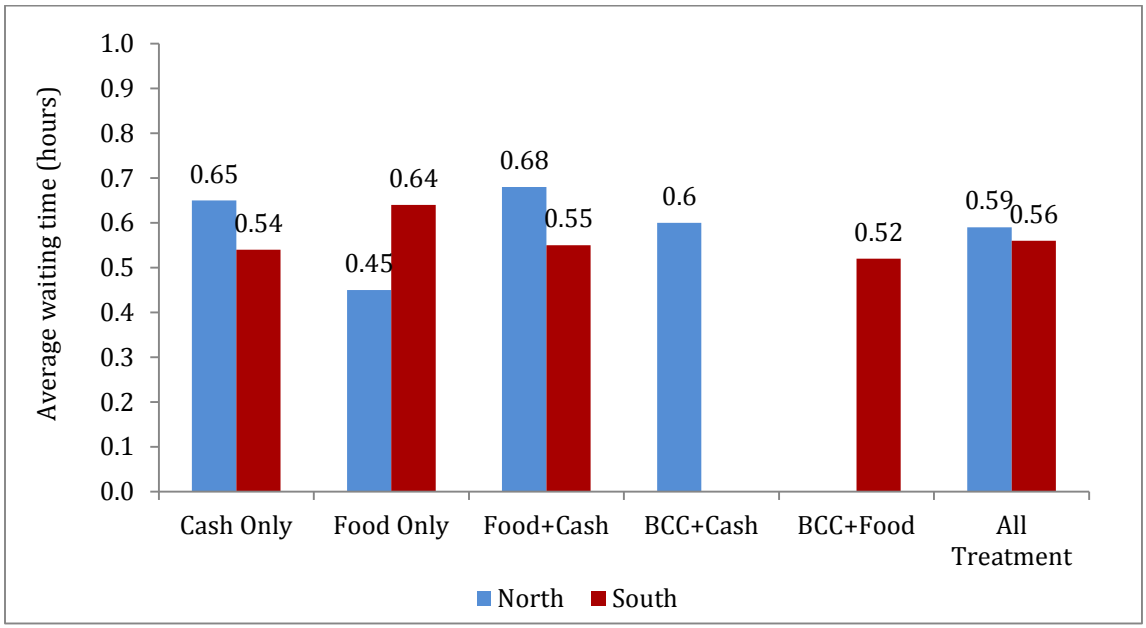
Figure 5.3 Average commuting time to and from distribution center



Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

Average waiting time to collect transfers was around half an hour (Figure 5.4).

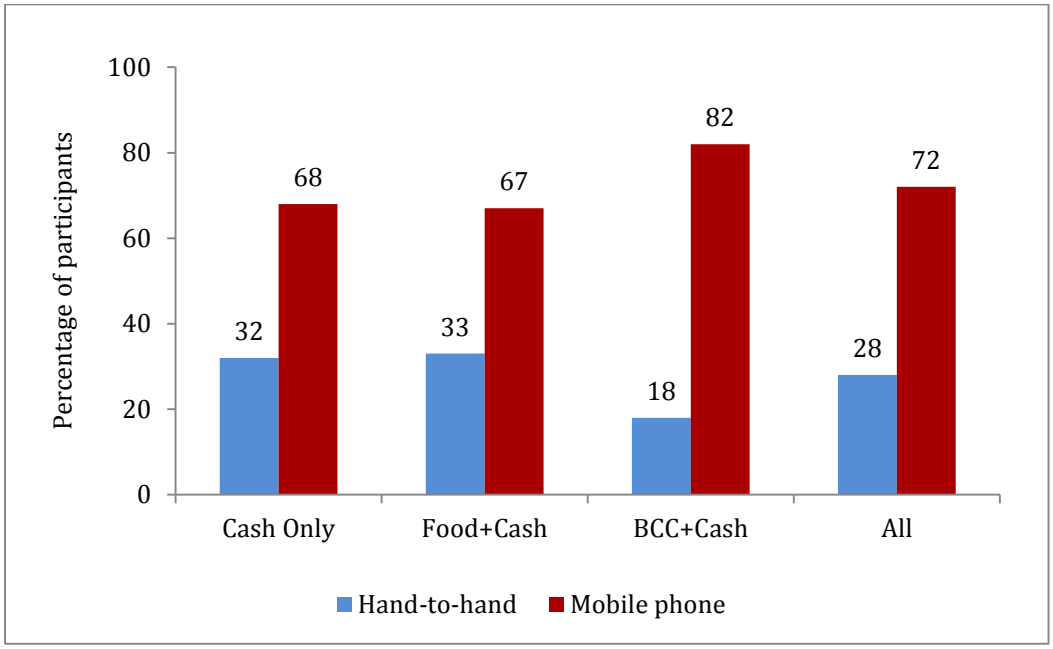
Figure 5.4 Average time waiting for transfers at the distribution center



Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

The majority of cash recipients in the north (72 percent) preferred receiving cash transfers via mobile phones than hand-to-hand (Figure 5.5). As the household survey results demonstrate, the main reason for this preference was that the participants got a free mobile phone in the process. Some others pointed out that with mobile phone transfer, the risk of money getting lost was reduced. Nearly all mobile phone users (98 percent) reported that they had not faced any difficulties using the technology to receive cash transfers. No TMRI participants in the south had received mobile phones at the time of the mid-term process evaluation, so their preference could not be meaningfully recorded.

Figure 5.5 Preference for cash transfer through mobile phones versus as hand-to-hand transfer (north only)



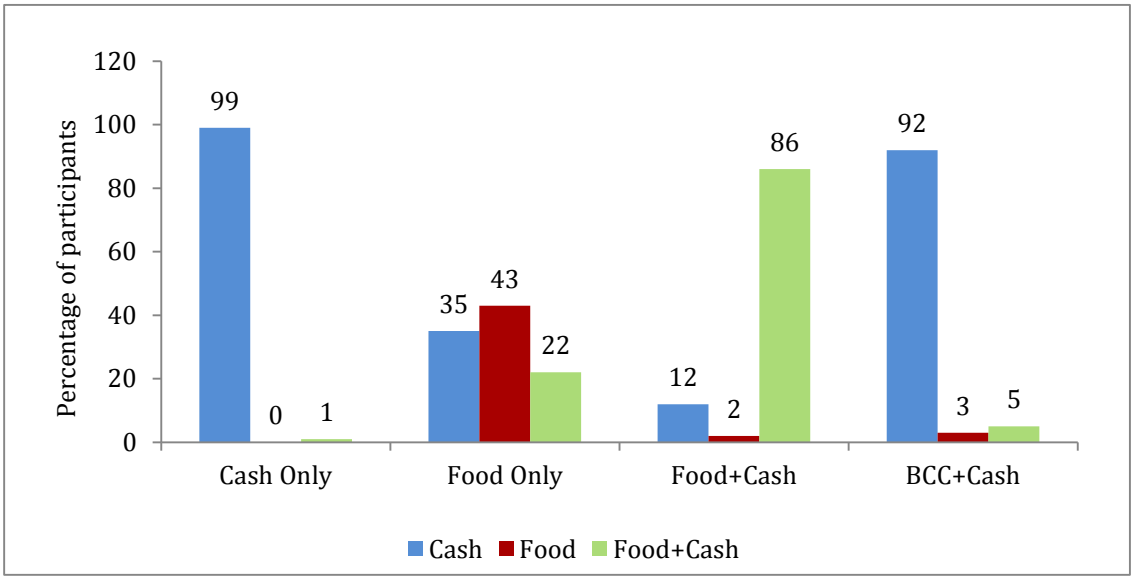
Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

5.2.2 Participants' Preferences for Type of Transfer Payment

The household survey asked program participants whether they preferred only food, only cash, or a combination of food and cash. Figures 5.6 and 5.7 show their preference patterns by region. Most participants expressed a preference for the transfer type they were currently receiving. In the north, 99 percent receiving cash preferred cash, 92 percent receiving BCC-training-and-cash preferred cash, and 86 percent receiving a combination of food and cash preferred both types. The exception to this adherence was the food-recipient group, in which only 43 percent reported a preference for food (Figure 5.6). In the south, 97 percent receiving cash preferred cash, 71 percent receiving food preferred food, 90 percent receiving BCC-training-and-food preferred food, and 75 percent receiving the combination of food and cash preferred both (Figure 5.7).

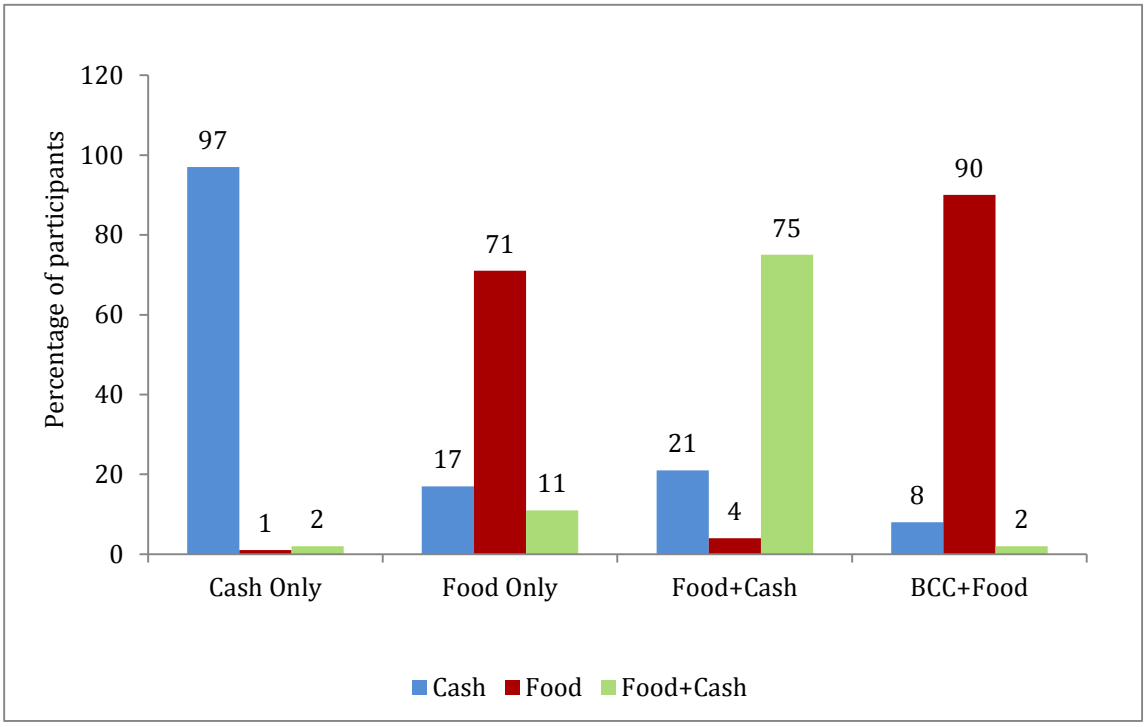
The household survey indicated the following reasons for these results: In both zones, those who mentioned a preference for a combination of food and cash wanted exactly half of each (as opposed to more or less of one over the other). In the north, about 42 percent of the people who preferred cash pointed out that if they received food instead of cash, they would have to sell a portion of the food ration to have money to buy nonfood items. Similarly in the south, 36 percent of the people who preferred cash claimed that cash is much more liquid and can be used easily. Around 40 percent of those who preferred food in both the north and south said the ration was better since it supported their family. Lastly, those who showed an affinity for a combination of food and cash stated that the ration was important for food security while cash was important for nonfood items.

Figure 5.6 Participants' preferences for type of transfer: North



Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

Figure 5.7 Participants' preferences for type of transfer: South



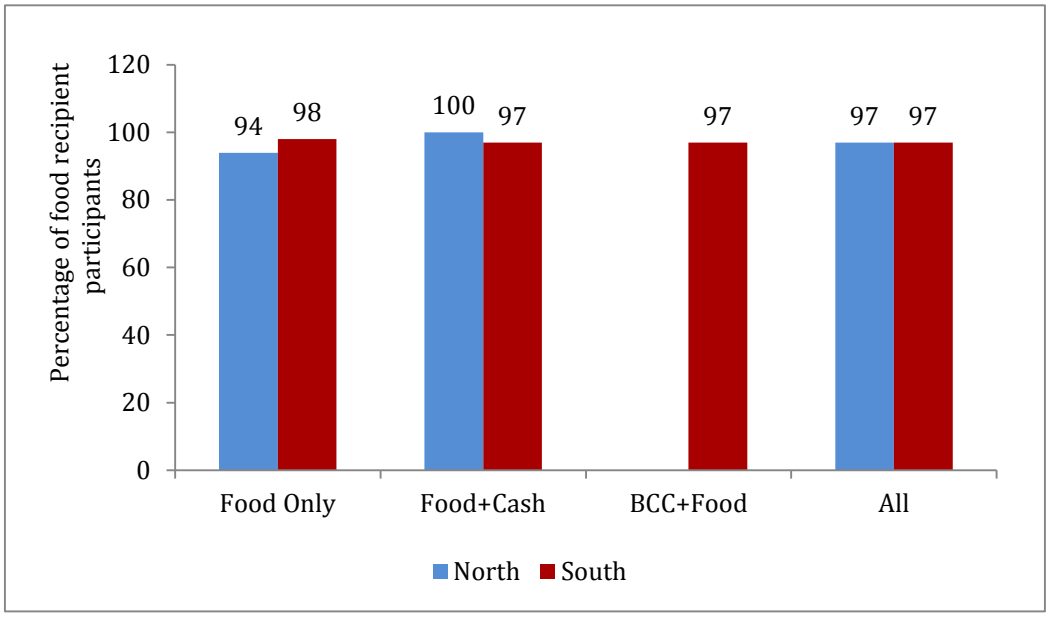
Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

5.2.3 Participants' Use of Transfer

In both regions, almost all participants receiving food transfers (97 percent) consumed the entire quantity of rice given to them (Figure 5.8). About 89 percent in the north and 92 percent in the south completely consumed the *mosoor* pulses (Figure 5.9). For cooking oil, the figures varied more across zones: 98 percent consumed it entirely in the south while the corresponding figure for the north is 91percent (Figure 5.10). The household survey results suggest that 8 percent of the food recipients in the north and 6 percent in the south gave a part of their pulse ration to relatives and neighbors. A minimal percentage of food recipients sold the food they received: in the south, about 2 percent of the people said they sold a portion of the pulses, but this was the highest figure reported.

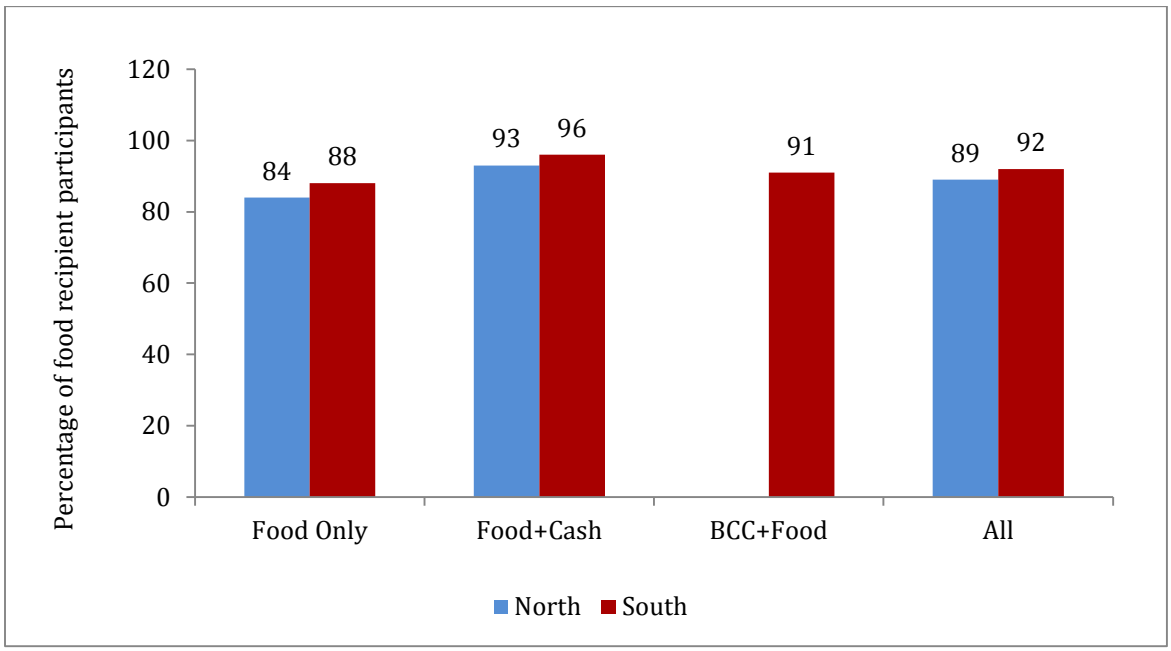
Figure 5.11 shows how the cash transfer recipients used the transfer money. In the north, 81 percent of the cash recipients spent the money on household food consumption; in the south, the corresponding figure is 84 percent. Around one-fifth of the cash transfer recipients in both zones saved a portion of the transfer. A significant percentage—20 percent in the north and 34 percent in the south—spent part of it on health care purposes. About 9 percent of the cash recipients in the north and 14 percent in the south used some of the money for their children's education.

Figure 5.8 Percentage of participants who consumed all rice in transfer



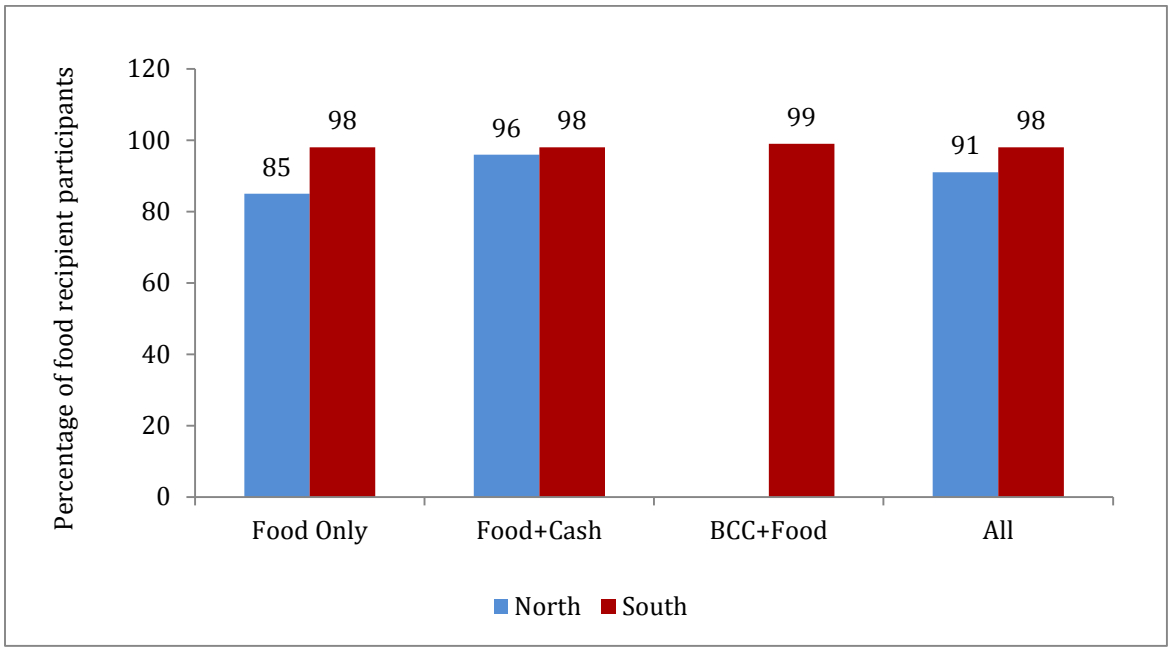
Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

Figure 5.9 Percentage of participants who consumed all pulses in transfer



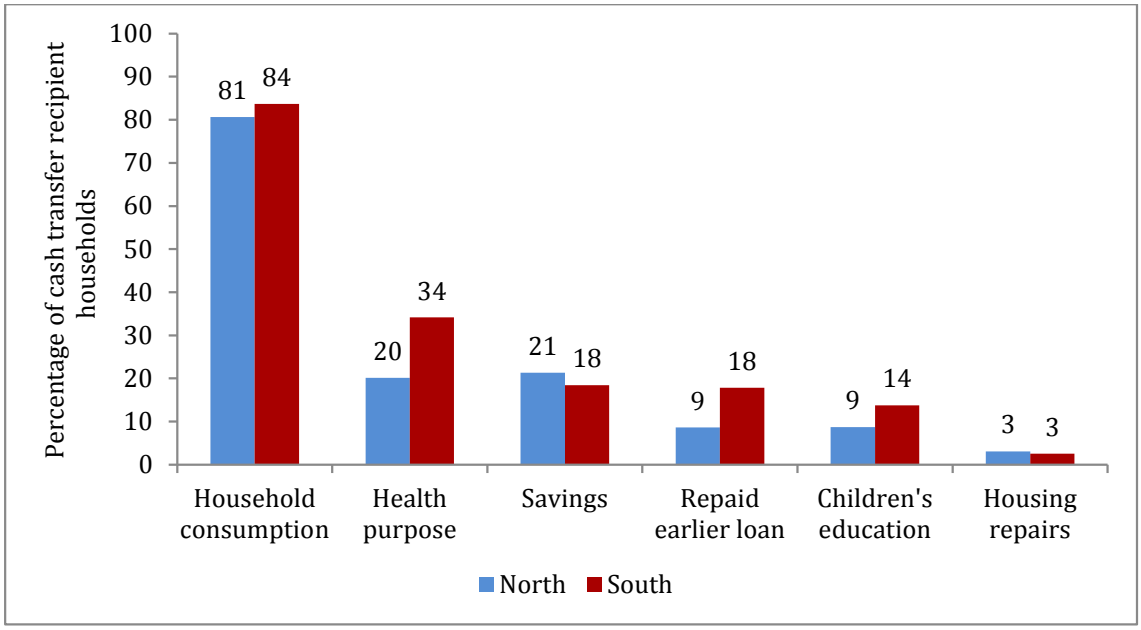
Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

Figure 5.10 Percentage of participants who consumed all cooking oil in transfer



Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

Figure 5.11 Use of money received by cash-only transfer participants for various purposes by region



Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

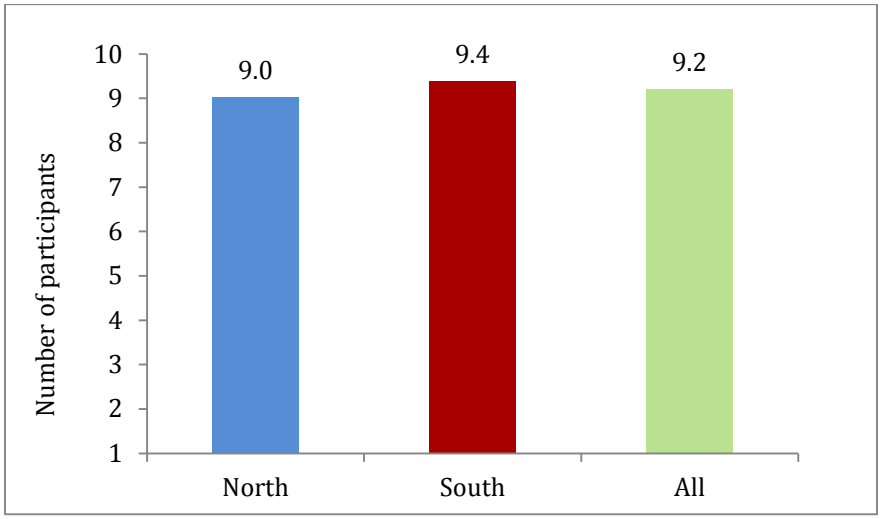
5.2.4 Participation in BCC Training

In the north, a majority of participants (89 percent) had attended all available nutrition BCC training sessions as of October 2012 (i.e., the time of the process evaluation household survey). The percentage in the south was considerably lower (70 percent). The household survey indicates that illness was a major reason participants in the south were unable to attend all sessions.

WFP training guidelines stipulate that the community nutrition worker should visit a participant's home if she misses a session. The household survey results indicate that this was adhered to more strictly in the south, where 92 percent of the respondents reported that a community nutrition worker had, in fact, visited them at home if they missed a session.

On average, 9.2 participants attended each training session (Figure 5.12).

Figure 5.12 Average number of participants attending each BCC training session



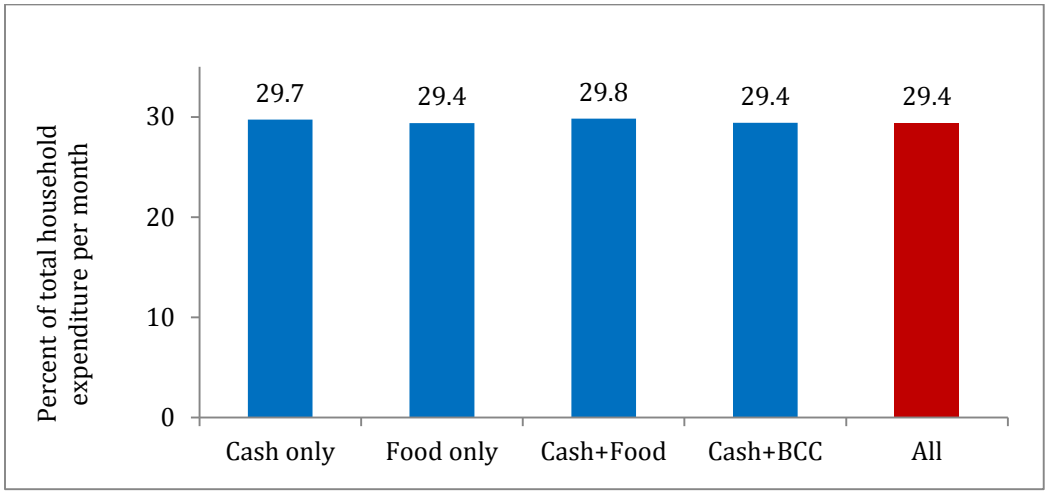
Source: IFPRI Household Survey for TMRI Process Evaluation, 2012.

5.3 Size of Transfers

5.3.1 Transfer as Percentage of Monthly Household Income

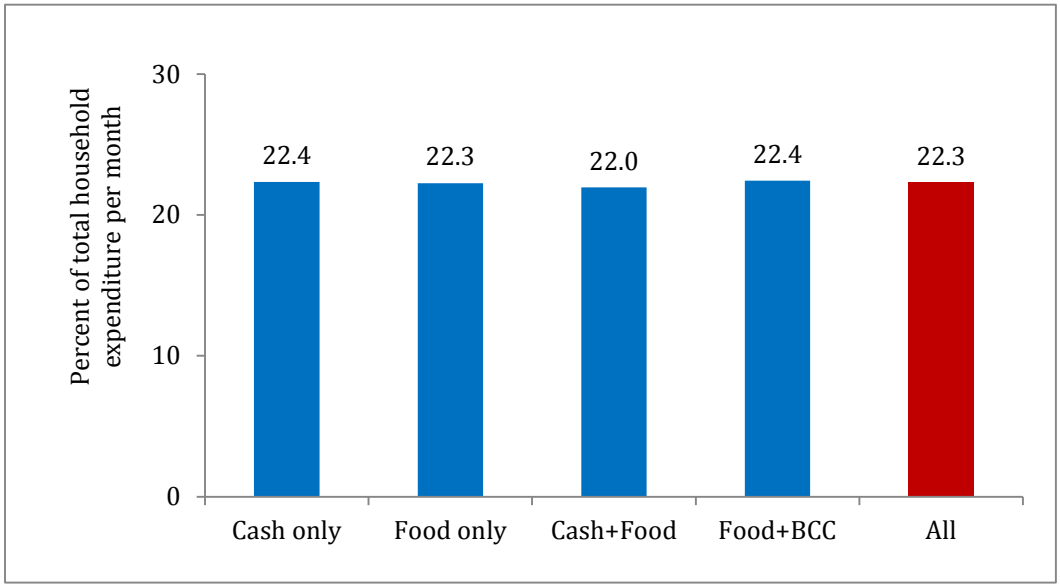
Figures 5.13 and 5.14 show average monthly transfers as the percentage of total monthly household income of participants of each of the TMRI interventions at baseline in the north and the south (measured in terms of consumption expenditure). On average, transfers accounted for about 29 percent of monthly household income in the north and about 22 percent in the south. Although the baseline value of transfer was the same for each of the transfer modalities in both regions (Tk 1,500 per month per household), the share of transfer in household income was higher in the north than in the south because the average monthly household income of TMRI participants at baseline was 31 percent higher in the south than in the north.

Figure 5.13 Transfers as percentages of total monthly household income at baseline: North



Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Figure 5.14 Transfers as percentages of total monthly household income: South



Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

5.3.2 Implications of the Size of Food Transfers on Household Consumption Behavior

As explained in Section 1.3.1, the size of food transfers has implications on household consumption behavior. A food ration is *inframarginal* if it is smaller amount than what is normally consumed without the transfer. If the quantity of a food ration is greater than the amount the recipient household would have consumed without the ration, then the transfer is *extramarginal.*

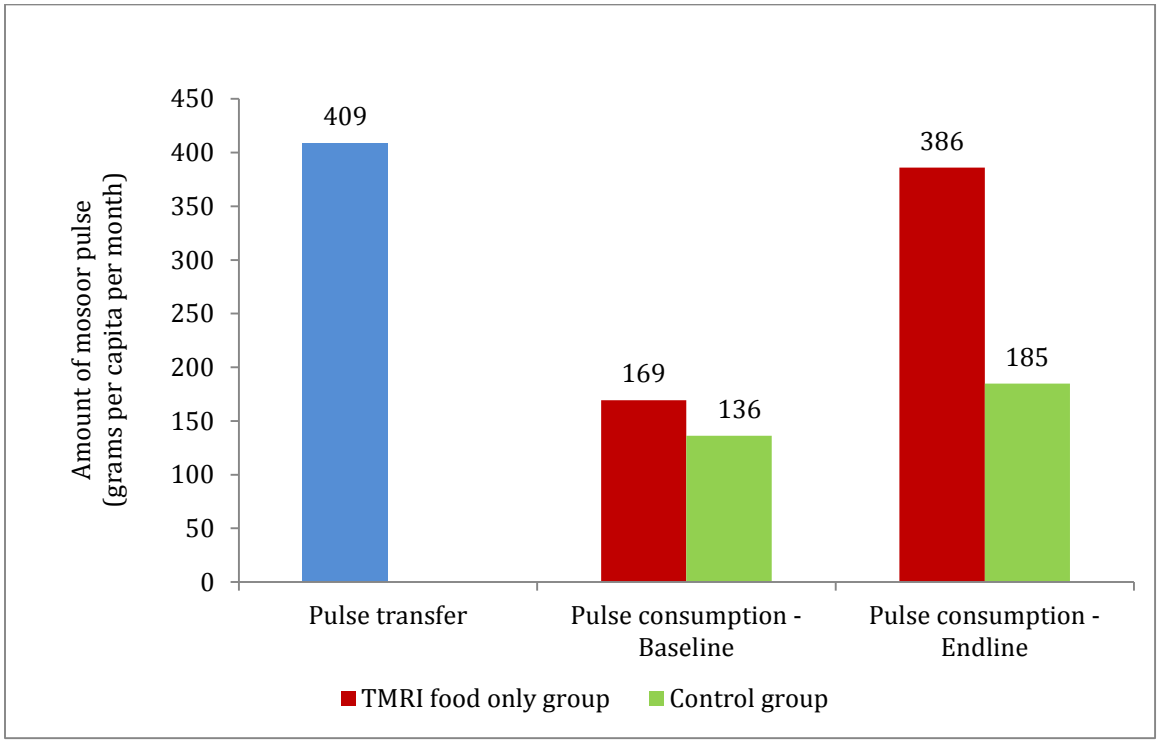
For example, the quantities of the monthly food transfers for the *Food only* participants are 30 kg of rice, 2 kg of mosoor (lentil) pulse, and 2 liters of cooking oil. The average household size at baseline was 4.9 persons for both the *Food only* group and the control group in the north. Thus, per capita monthly food transfers are 6.1 kg of rice, 409 grams of mosoor (lentil) pulse, and 409 milliliters of cooking oil in the north.

The 2012 TMRI baseline survey data show that households in the *Food only* group in the north consumed 12.4 kg of rice, 169 grams of pulses, and 283 milliliters of cooking oil per capita per month on average just before the intervention. Households in the control group consumed 12.1 kg of rice, 136 grams of pulses, and 276 milliliters of cooking oil per capita per month on average at baseline. A comparison of per capita monthly rice transfer amount with per capita monthly rice consumption without the rice ration indicates that the TMRI rice ration in the north is inframarginal—the amount of ration is 51 percent less than the amount of rice the *Food only* participants consumed without the TMRI ration, and 50 percent less than the amount of rice the control group consumed at baseline.

However, the per capita monthly pulse ration (409 grams) is 142 percent and 201 percent higher than the per capita monthly amount of pulses the *Food only* participants and the control group had consumed at baseline, respectively. The cooking oil transfer is 45 percent and 48 percent higher than the amount of cooking oil consumption by the *food only* group and the control group at baseline, respectively. Therefore, the pulse and the cooking oil transfers are clearly extramarginal.

The 2014 TMRI endline survey results indicate that, owing to the substitution and income effects of the extramarginal pulse transfer (shown in Appendix 1), the *Food only* participants consumed 128 percent more pulses (386 grams per capita per month on average) during the last month of their participation than the average amount of pulses they had consumed at baseline. Their pulse consumption was also 109 percent higher than households in the control group at endline (185 grams per capita per month on average). Similarly, the *Food only* participants consumed 54 percent more cooking oil (435 milliliters per capita per month on average) at endline compared to their average baseline consumption of cooking oil, and 42 percent more than the control group's consumption at endline (306 milliliters per capita per month). Figure 5.15 shows the amount of per capita monthly pulse transfer and pulse consumption at baseline and endline for the *Food only* participants and the control group in the north.

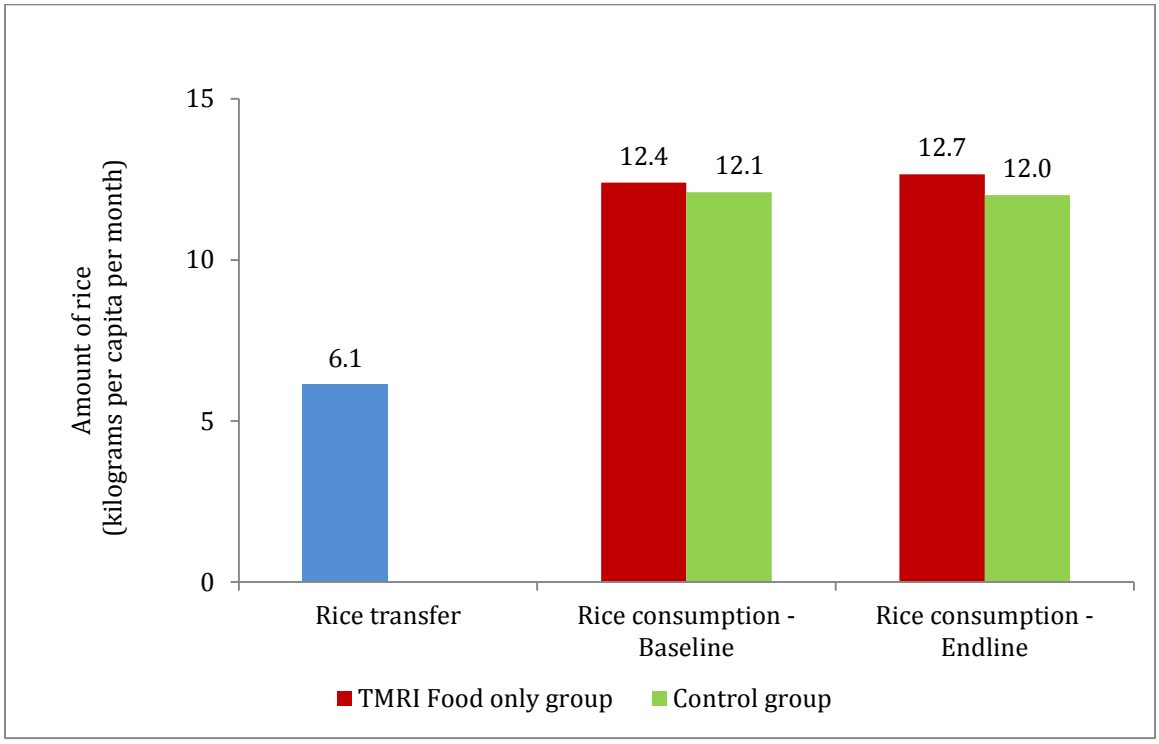
Figure 5.15 Amount of pulse transfer and pulse consumption for the Food only participants and control group: North



Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

By contrast, TMRI's inframarginal rice transfer had only an income effect, which resulted in an increase in rice consumption of the *Food only* participants by 2 percent from baseline to endline (12.4 kg to 12.7 kg per capita per month). Rice consumption of the *Food only* participants was about 6 percent higher than rice consumption by the control group at endline (Figure 5.16).

Figure 5.16 Amount of rice transfer and rice consumption for the Food only participants and control group: North



Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

5.4 Costs of Delivering Transfers and Nutrition BCC Training

5.4.1 Issues and Cost Components

WFP provided IFPRI with detailed cost data for the TMRI operation, which were used to determine the costs of delivering the food, cash, and food-and-cash combined transfers as well as to deliver the nutrition BCC training sessions. A unique element of this cost analysis is the complexity of the intervention design that includes combined-component treatment arms, such as food plus cash. The TMRI had multiple treatment arms with food components but with different amounts of food provided and food in different combinations (food with cash as well as food with nutrition BCC training). However, these food costs are not neatly separated in their cost categories and assigned to each specific treatment arm. Therefore, we made explicit assumptions to account for the overlap in costs between treatment arms.

5.4.1.1 Food Transfers

There were some start-up costs for food delivery: pre-checks of ESDO warehouses to ensure adequate standards and training of ESDO staff for warehouse management. ESDO built warehouses for program activities of the TMRI and had five storage facilities in the north and five in the south. WFP also has warehouses for commodity storage purposes (one in the south and the other in the

north). These warehouses are rented storage space and also incur maintenance costs. Commodities were delivered from the WFP warehouse to ESDO warehouses, which were then distributed directly to program participants. ESDO hired local transport to move commodities from WFP to ESDO warehouse and then to distribution sites.

The commodities in the TMRI food basket included foods procured on local as well as international markets. The rice and pulses were procured locally while vegetable oil was procured internationally from Malaysia. Local commodities were procured through a tendering process by WFP, which specified the variety, quality, and other characteristics required for each commodity. The packaging and transport costs were also included in the tender, and commodities were packaged into full-ration portions (30 kg) and half-ration portions (15 kg), for distribution to participants in the food-and-cash combined group. WFP bought directly from the local supplier, while the supplier purchased locally at a lower cost. The vegetable oil was procured through international tender by the WFP regional office in Bangkok. The oil was imported from Malaysia in large shipments of packaged 1 liter bottles.

The distribution of food commodities to participants by ESDO was part of the service agreement with WFP that included all costs for transportation and distribution activities. WFP tracked these costs, as well as the costs they incurred through their own TMRI-related activities through the electronic WFP Information Network and Global System (WINGS) and the WFP customized SAP, an enterprise application software. In the case of the food and cash combined treatment arm, Dutch-Bangla Bank (DBBL) agents disbursed cash on-site at the food distribution point, thereby allowing participants to acquire their cash at the same time and place they received their food. This is an important element to the program design, as those participants in the combined treatment arm did not incur "extra" transport costs to receive two different types of transfers.

5.4.1.2 Cash Transfers

The cash transfers of the TMRI were based on a WFP partnership with DBBL. This partnership was based on an agreement by which DBBL provided agents to travel to intervention sites to facilitate delivery of mobile money transactions. The bank had an interest in expanding its customer base from the enrollment of new TMRI participants. As the program design worked through pre-established mechanisms used by the bank, the financial institution reported negligible cost of set up for operations in the TMRI. The bank also had a pre-existing relationship with the telecommunication provider, Banglalink, for the mobile phones. The model was decentralized and functioned around a system of "super-agents," who dealt directly with the main bank, and agents, who distributed funds and were managed by the super-agents.

The super-agent received the cash for transfer purposes and oversaw a group of 100–150 agents each and received a commission of 3 taka per 1,000 taka. This commission charge was paid by WFP. The cash point agents from DBBL worked on a commission basis in which they received 10 taka per mobile money transaction. This commission was included in the WFP budget, so the amount was reimbursed by WFP.

The design of operations for the cash component was quite transparent as it was possible to have an instant "cash out" report as a record. Agents are businessmen and have shops with other products, and the TMRI component was only a small portion of their business. If any mistakes occurred during the transaction process, WFP also replaced any fees charged to participants to ensure that the full transfer was received. Each upazila had one supervising super-agent and six agents providing support for transfer delivery. The agents received calls from ESDO and DBBL to determine where and when to conduct the cash transfer delivery, although these locations generally remained the same for the duration of program.

5.4.1.3 Behavior Change Communications

As an additional component to the transfer intervention design, two arms of the TMRI included nutrition BCC trainings for TMRI participants. The actual BCC costs incurred by ESDO were charged to WFP. The costs of BCC educational content included the provision of a variety of didactic materials such as manuals, flashcards, and posters. Other costs necessary to the BCC delivery included salaries for community nutrition workers (CNWs) and Field facilitating officers (FFOs) of ESDO who supervised the CNWs, and their transport costs. Initially, 59 CNWs were hired to cover 1,000 participants in 100 villages (500 participants in 50 villages in the north for *Cash+BCC* and 500 participants in 50 villages in the south for *Food+BCC*), but in response to need, ultimately 100 CNWs were hired, changing the ratio to 10 participants to 1 CNW. These changes needed a gradual increase in BCC training centers. WFP subsequently revised its contract with ESDO to account for the costs of these changes.

Other costs necessary to the BCC delivery included the transport costs in addition to salaries for CNWs and FFOs.

5.4.1.4 Common Costs

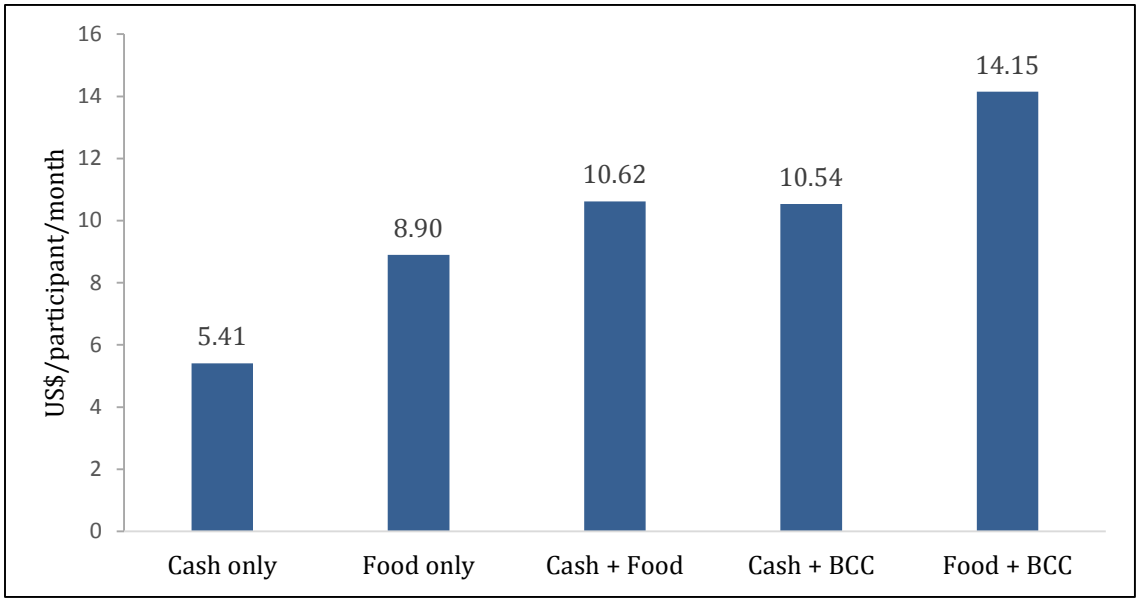
Some activity-based costs were applicable to all treatment arms. For example, the WFP distributed mobile phones to all TMRI participants as well as non-participants in the control group. Thus, the cost of mobile phones, each of which included a Banglalink SIM card, was distributed across all arms, including the control. Another example of a common cost was the initial start-up costs of participant identification and ID card production. In March 2012, WFP staff were deployed to collect participant lists, identify participant households, and implement a 30-day selection process. WFP provided ID card and finalized participant lists. The staff time incurred by WFP as well as the 30 digital cameras to take ID card photographs of participants were common activity costs across all treatment arms.

5.4.2 Results

At what cost did WFP transfer benefits to TMRI participants? Figure 5.17 presents the modality specific cost per transfer per month for the TMRI, excluding the value of transfer. Of the three modalities, cash is the least expensive followed by food, with cash plus food being most expensive.

The average difference between cash and *Cash+BCC*, and between food and *Food+BCC* gives us an estimate of the cost of providing the BCC. On a per participant basis, this difference is about $125 per month. Of this, about 20 percent are fixed costs and 80 percent are variable. Therefore, the variable cost of providing a beneficiary with BCC training is about $100 for two years or about $50 per year.

Figure 5.17 Modality-specific monthly cost per transfer for the TMRI

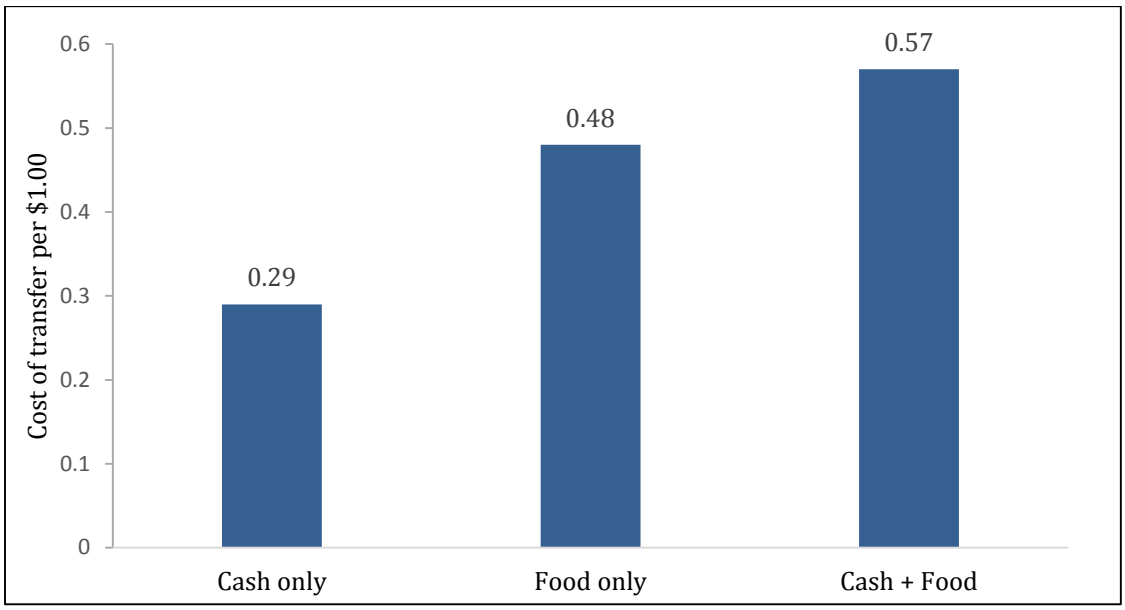


Source: Calculated by authors using data from WFP-Bangladesh

Total value of each monthly transfer is US$18.66,[11] and modality specific costs per transfer are: cash=$5.41; food=$8.90; cash and food=$10.62. Therefore, to transfer $1 to a safety net participant, it costs $0.29 through cash transfer, $0.48 through food transfer, and $0.57 through half cash and half food transfer (Figure 5.18).

[11]At the beginning of the TMRI in May 2012, the average official exchange rate was Tk 80.39 per US$1.00. However, at the end of the project in May 2014, the average exchange rate was Tk 76.54 per US$1.00. For consistency with the initial transfer value of Tk 1,500 (US$18.66) per month, we report the US$ value at the initial exchange rate throughout the report.

Figure 5.18 Cost of transferring US$1 to a TMRI participant by modality



Source: Calculated by authors using data from WFP-Bangladesh

5.5 Summary

- Transfers were provided in a timely and complete fashion.
- Most participants were happy with the location of the distribution center assigned to them.
- Distribution centers or cash pay-points were easily accessible with a median one-way travel time of about 30 minutes.
- Food distribution and cash payments were made efficiently with a median wait time of about 30 minutes.
- Fewer than 5 percent of respondents reported problems with use of mobile phones for cash transfers.
- Fewer than 2 percent of participants resold their food rations.
- The median participant receiving BCC trainings attended approximately 48 sessions per year; each session lasted about one hour.
- About 83 percent of respondents reported that if they missed a session, the community nutrition worker followed up with a home visit.
- Careful attention was paid to training of the CNWs.

- On average, transfers accounted for about 29 of monthly household income (measured in terms of consumption expenditures) of TMRI participants in the north and about 23 percent in the south.

- As theory predicts, the extramarginal pulse and cooking oil transfers led to large increase in consumption of these two food items by participants of the f*ood only* group, while the increase was minimal for the inframarginal rice ration.

- Excluding the value of the transfer, modality-specific costs per transfer were:
    - Cash: $5.41;
    - Food: $8.90; and
    - Cash plus food combined: $10.62.

- The total value of each monthly transfer is $18.66. So, to transfer $1 to a safety net participant, it costs $0.29 through cash transfer, $0.48 through food transfer, and $0.57 through half cash and half food transfer.

- Excluding fixed costs, the nutrition BCC trainings cost $50 per year per participant or $100 for the full two-year program.

6. THE IMPACT OF THE TMRI ON HOUSEHOLD CONSUMPTION

6.1 Introduction

In this chapter, we assess the impact of the TMRI interventions on household consumption. We consider several dimensions of consumption: self-assessed hunger; expenditures on food and nonfood consumption; caloric intake; and the World Food Programme's Food Consumption Score (FCS). We begin with a summary of how the indicators are measured then note observations regarding the study areas to provide context for the analysis that follows. Next, we show baseline statistics from sample households to demonstrate not only their starting point but also a successful randomization process that ensured households within each of the study's groups started in similar situations prior to intervention. We then present and discuss estimates of each TMRI treatment modality's impact on consumption in each zone. We conclude with remarks summarizing and interpreting the findings.

6.2 Background

6.2.1 Measurement of Consumption

There are two broad dimensions of consumption on which we focus in this chapter. One is households' subjective perception of their own consumption, measured in self-assessed hunger. The other is objective measurement of what households consume and how this translates to food security. Within this dimension, we consider households' expenditures on food and nonfood consumption items, the calories they consume, and the types of foods composing their diets.

The information we use to construct consumption measures comes from several different modules administered as part of the evaluation's household surveys at baseline, midline, and endline. Self-assessed hunger is measured using a question asked directly to the household's main female respondent: "In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?"

Other measures related to food consumption come primarily from a detailed food consumption module, which elicits information on all food consumed or purchased by the household in the seven days preceding the survey. From this module, we can construct measures of the various food groups consumed by the household (whether purchased or obtained from other sources), the frequency with which they were consumed, the total calories consumed by the household, and the total value of all food consumed. This last measure—the total value of food consumed—is referred to as "food expenditure," but it is important to note that it includes not only the out-of-pocket expenses outlaid on food consumed but also what would have been spent on any food that was obtained in some way other than purchase (for example, from the household's own stock or as a transfer or gift). A summary measure of food security that can be constructed from this information is the WFP Food Consumption Score (FCS) (WFP 2008). The FCS is an indicator combining information on the diversity of food consumed with respect to several different food groups, the frequency with which each of these food groups is consumed, and a weight on each food group

reflecting its nutritional importance. Thus, the FCS captures some dimensions of diet diversity, consumption frequency of specific foods, and nutritional value. Table 6.1 shows the weights by food group.

Table 6.1 Weights on food groups in the World Food Programme's Food Consumption Score

Group	Food items	Food group	Weight
1	Rice and other cereals	Staples	2
2	Beans, lentils, peas, and nuts	Pulses	3
3	Vegetables and leaves	Vegetables	1
4	Fruits	Fruits	1
5	Beef, goat, poultry, eggs, and fish	Meat, eggs, and fish	4
6	Milk, yogurt, and other dairies	Milk	4
7	Sugar, sugar products, and honey	Sugar	0.5
8	Oils, fats, and butter	Oil	0.5

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

In addition to the food consumption module collected at the household level, we also collect a detailed dietary intake module at the individual level for each household member regarding the 24 hours preceding the survey. This module allows for construction of another measure of caloric intake over a shorter recall period; it is likely more precise than the measure collected in the household food consumption module.

For information on consumption items other than food, we collect a separate nonfood expenditures module. This module includes questions on how much the household spent on a detailed list of nonfood consumption items over the past month or year, depending on the nature of the item. The list includes fuel, lighting, adult/child clothing, other cloth, footwear, bedding, household expenses, medical expenses, education expenses, remittances, entertainment, fines, utensils, personal care, cleaning, transport and telecommunication, personal items, tobacco, house rent, and miscellaneous expenses.

In our analysis, we focus on several specific measures using this information. We construct a simple indicator of self-assessed hunger, based on whether the main female respondent reported that anyone went to sleep hungry in the preceding four weeks. We construct food expenditures using information in the household food consumption module, and we construct nonfood consumption items using information in the nonfood module, scaling both to monthly expenses per capita. Summing the two, we construct total monthly consumption expenditures (a measure often considered a proxy for income, under the assumption that poor households are likely to hold minimal savings). When estimating impacts between baseline and endline, we report both on nominal expenditures and on real expenditures using the rural Consumer Price Index and taking 2005–2006 as a base. Using the individual 24-hour dietary intake data, we construct a measure of daily calories per capita, focusing on average intake only across household members who reported their 24-hour dietary intake (and, therefore, excluding household members who were away in the past 24 hours). Based on this intake, we also construct indicators for "food poverty" (daily calories

per capita < 2,122) and "food ultra poverty" (daily calories per capita < 1,805). Using the household food consumption module, we additionally construct the share of total household calories consumed from various food groups over the seven days preceding the survey. Finally, using the household food consumption module and the food group weights described above, we construct the FCS, as well as an indicator for "low FCS" (FCS < 35).

6.2.2 Contextual Features Relevant to Consumption

Our focus in this chapter is primarily on comparisons across the randomized treatment arms within each zone. Since the randomization of treatments was stratified by zone, we cannot directly compare treatment modalities across zones. For context, however, it is useful to note a few observations about each of the two zones, in order to help interpret how and why patterns of consumption behavior and impacts on consumption may differ between them.

First, the zones differ in terms of socioeconomic characteristics and market infrastructure. On average at baseline, sample households in the north have lower income than sample households in the south. However, the northern region tends to have better access to markets. The implications on consumption of these circumstances could affect patterns at baseline and responsiveness to the TMRI interventions at endline. For example, lower income in the north at baseline likely implies lower consumption at baseline; this may in turn lead to greater responsiveness to the transfers provided by TMRI due to greater propensity to consume, consistent with Engel's law. Better market access in the north may imply fewer transaction costs in converting income to items for consumption, also leading consumption to be more responsive to transfers.

A second observation is that household size is smaller on average in the north than in the south. The average household in the north has 5.23 members while the average household in the south has 5.77 members. Because the TMRI transfers (worth Tk 1,500 per month) do not depend on household size, the monthly transfer per household member is slightly larger in the north (Tk 287) than in the south (Tk 260), suggesting that some per capita consumption impacts may also be larger in the north than in the south.

A third point is that climatic conditions may lead to a stronger precautionary savings motive in the south than in the north. Many sample households in the south reside in disaster-prone coastal areas, susceptible to cyclones and flooding. This greater susceptibility to shocks in the South may result in a stronger propensity to save in order to self-insure against risk. Descriptive information in our endline survey supports this possibility. We ask TMRI participants how they allocated their previous month's transfer (cash, food, or both) across various uses. A notable difference between participating households in the north and those in the south is the share of the transfer they report already allocating (to either consumption items or other uses) rather than saved or kept unallocated at the time of the endline survey. On average, participating households in the south have either explicitly saved or kept still unallocated about 25 percent of their last cash transfer or about 30 percent of the rice in their last food transfer at the time of the endline survey; participating households in the north have either explicitly saved or kept still unallocated only about 20 percent of their last cash transfer or about 20 percent of the rice in their last food transfer.

This pattern of potentially self-insuring through a higher propensity to save in the south has implications for the relative expected magnitudes of consumption impacts across zones. If a larger portion of the transfer has been saved rather than consumed by endline in the south, it is natural to expect smaller impacts on consumption measures there.

A final relevant observation is that our data indicate private transfers were "crowded out" by the TMRI transfers in the south, but not in the north. In other words, households in the south were less likely to receive transfers from friends and family once they started receiving TMRI transfers, such that the "net" transfer they received was partially offset. In the north, this offsetting effect was not seen, and, in fact, private transfers even appeared to slightly increase. Specifically, we find that in the south, private transfers to treatment households on average fell by about 2,740 Taka per year or about 40 Taka per month (given average household size of 5.77). The implication is that, although the amount of resources transferred by TMRI was the same in the north and the south, the "net" transfer to households in the south was effectively smaller than to households in the north due to substantial crowding out of private transfers in the south.

The overall implication of these four points is that, given what we know about the zones, we might expect lower levels of consumption in the north and potentially larger impacts of the TMRI interventions on consumption in the north. With this in mind, we proceed to the analysis of our consumption data.

6.3 Consumption at Baseline

6.3.1 Self-assessed Hunger

Our starting point in assessing the TMRI consumption data is to consider the baseline situation of sample households. We focus first on self-assessed hunger. Table 6.2 shows, by zone and assigned intervention arm, the proportions of households in which the main female respondent reports at baseline that she or anyone else in the household went to sleep hungry at night in the preceding four weeks. More than a quarter of households report this across all arms and both zones, though reports are higher in the north, as expected (30–38 percent of households, compared with 26–35 percent in the south).

Table 6.3 shows that, within each zone, none of the differences in these proportions across intervention arms are statistically significant at the 5 percent level or lower. This baseline balance is demonstrated by an F-statistic that fails to statistically reject that the proportions are equal.

Table 6.2 Self-assessed hunger, baseline descriptives, by zone and intervention arm

TMRI Zone	Intervention Arm	Anyone in household who went to sleep at night hungry in past four weeks (proportion reporting)
North	Cash	0.33
	Food	0.30
	Cash and Food	0.33
	Cash + BCC	0.38
	Control	0.30
N		2,382
South	Cash	0.32
	Food	0.35
	Cash and Food	0.26
	Food + BCC	0.27
	Control	0.32
N		2,410

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 6.3 Self-assessed hunger, baseline balancing across intervention arms, by zone

	Anyone in household who went to sleep at night hungry in past four weeks (proportion reporting)	
Intervention arm (by zone)	F statistic	p value
North		
Cash = Control	0.43	0.51
Food = Control	0.00	0.95
Cash and Food = Control	0.43	0.51
Cash + BCC = Control	2.80	0.10
Cash = Food	0.43	0.51
Cash = Cash and Food	0.00	0.96
Cash = Cash + BCC	1.51	0.22
Food = Cash and Food	0.43	0.51
Food = Cash + BCC	3.02	0.08
Cash and Food = Cash + BCC	1.24	0.27
South		
Cash = Control	0.04	0.84
Food = Control	0.28	0.60
Cash and Food = Control	2.59	0.11
Food + BCC = Control	2.24	0.14
Cash = Food	0.50	0.48
Cash = Cash and Food	1.84	0.18
Cash = Food + BCC	1.56	0.21
Food = Cash and Food	4.11	0.04
Food = Food + BCC	3.69	0.06
Cash and Food = Food + BCC	0.01	0.91

Source: 2012 Baseline for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level.

6.3.2 Food and Nonfood Consumption Expenditures

We then turn to objective measures of consumption at baseline, starting with expenditures on food and nonfood consumption items. Table 6.4 shows, by zone and assigned intervention arm, the mean and standard deviation of monthly nominal expenditures per capita at baseline. In both zones, food expenditures constitute roughly two-thirds of total expenditures. However, as expected based on the discussion in 6.2.2, baseline total expenditures are considerably lower in the north than in the south—about Tk 1,250 per capita monthly compared to about Tk 1,500 per capita monthly. To put the TMRI transfer value into perspective, the Tk 1,500 constituted about 23 percent of monthly total expenditures in the north (given an average of 5.23 household members) and about 17 percent of monthly total expenditures in the south (given an average of 5.77 household members).

Table 6.4 Monthly nominal consumption expenditures (in Taka), baseline descriptives, by zone and intervention arm

	Monthly nominal household food expenditure per capita		Monthly nominal household nonfood expenditure per capita		Monthly nominal household total expenditure per capita	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
North						
Cash	804.97	335.01	458.76	273.04	1,263.73	503.88
Food	796.85	289.95	460.07	218.57	1,256.92	437.14
Cash+Food	769.05	290.38	442.07	215.72	1,211.12	432.21
Cash+BCC	788.64	298.28	440.40	217.34	1,229.04	443.48
Control	811.17	314.48	459.41	271.87	1,270.58	494.36
N	2,380		2,380		2,380	
South						
Cash	946.43	360.73	506.43	244.15	1,452.86	502.45
Food	926.68	377.78	533.18	255.74	1,459.86	537.86
Cash+Food	993.13	443.66	549.97	281.57	1,543.09	616.63
Food+BCC	953.02	325.94	542.80	299.15	1,495.82	511.83
Control	919.19	329.47	519.06	253.26	1,438.25	498.91
N	2,407		2,407		2,407	

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 6.5 shows that, within each zone, few of the differences in these values across intervention arms are statistically significant at the 5 percent level or lower, indicating baseline balance.

Table 6.5 Monthly nominal consumption expenditures (in Taka), baseline balancing across intervention arms, by zone

	Monthly nominal household food expense per capita		Monthly nominal household nonfood expense per capita		Monthly nominal household total expense per capita	
	F statistic	p value	F statistic	p value	F statistic	p value
North						
Cash = Control	0.06	0.81	0.00	0.98	0.02	0.88
Food = Control	0.28	0.60	0.00	0.98	0.09	0.76
Cash+Food = Control	2.66	0.10	0.66	0.42	2.06	0.15
Cash+BCC = Control	0.73	0.39	0.65	0.42	0.85	0.36
Cash = Food	0.09	0.77	0.00	0.95	0.02	0.88
Cash = Cash+Food	1.88	0.17	0.64	0.43	1.71	0.19
Cash = Cash+BCC	0.37	0.54	0.63	0.43	0.63	0.43
Food = Cash+Food	1.03	0.31	0.86	0.35	1.22	0.27
Food = Cash+BCC	0.09	0.77	0.81	0.37	0.39	0.54
Cash+Food = Cash+BCC	0.55	0.46	0.01	0.93	0.19	0.67
South						
Cash = Control	0.91	0.34	0.32	0.57	0.91	0.34
Food = Control	0.07	0.80	0.38	0.54	0.07	0.80
Cash+Food = Control	4.22	0.04	1.54	0.22	4.22	0.04
Food+BCC = Control	1.46	0.23	0.96	0.33	1.46	0.23
Cash = Food	0.44	0.51	1.59	0.21	0.44	0.51
Cash = Cash+Food	1.65	0.20	3.46	0.06	1.65	0.20
Cash = Food+BCC	0.05	0.82	2.59	0.11	0.05	0.82
Food = Cash+Food	3.23	0.07	0.49	0.48	3.23	.07
Food = Food+BCC	0.81	0.37	0.17	0.68	0.81	0.37
Cash+Food = Food+BCC	1.25	0.26	0.08	0.78	1.25	0.26

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level.

6.3.3 Caloric Intake

We next look at the details of food consumption corresponding to food expenditures, starting with per capita caloric intake at baseline. Table 6.6 shows, by zone and assigned intervention arm, the mean and standard deviation of daily caloric intake per capita based on individual intake information using 24-hour recall at baseline. It also shows the proportion of households in which the baseline falls below both the "food poverty" threshold (<2,122 calories) and "food ultra poverty" threshold (<1,805 calories). We see that average daily caloric intake per capita is about 1,830 calories in the north and slightly higher at roughly 1,870 in the south. To put the TMRI intervention in perspective, the monthly food transfer worth Tk 1,500 consisted of about 128,660 total calories (103,800 from rice; 6,860 from lentils; and 18,000 from oil). This translates to about 820 daily calories per capita or about 45 percent of baseline caloric intake in the north (given average household size of 5.23 and assuming 30 days per month); the same food transfer translates to about 743 daily calories per capita or about 40 percent of baseline caloric intake in the south (given average household size of 5.77 and assuming 30 days per month).

Table 6.6 Daily caloric intake per capita (based on 24-hour individual intake data), baseline descriptives, by zone and intervention arm

	Calories daily per capita		Calories daily per capita <2,122	Calories daily per capita <1,805
	Mean	SD	Proportion	Proportion
North				
Cash	1,843.05	456.45	0.75	0.50
Food	1,803.67	435.04	0.78	0.53
Cash+Food	1,811.59	451.13	0.79	0.50
Cash+BCC	1,883.82	490.52	0.73	0.47
Control	1,816.98	448.10	0.77	0.51
N	2,380		2,380	2,380
South				
Cash	1,863.00	429.25	0.77	0.49
Food	1,875.66	454.95	0.75	0.44
Cash+Food	1,891.85	456.17	0.73	0.46
Food+BCC	1,900.03	477.09	0.72	0.47
Control	1,830.70	453.14	0.77	0.52
N	2,407		2,407	2,407

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 6.7 shows that, within each zone, very few of the differences in these values across intervention arms are statistically significant at the 5 percent level or lower, indicating baseline balance.

For further context, we also look at how caloric intake is distributed across various food categories at baseline. Figure 6.1 shows this by zone and assigned intervention arm. We see that in both zones, more than 80 percent of calories consumed come from staple foods (primarily rice). This share is even higher in the north than in the south (87 percent and 83 percent, respectively). Only about 1 percent of calories in the north and about 2 percent of calories in the south come from animal source foods, such as meat/eggs/fish. These patterns suggest considerable potential for transfers to induce reallocation toward more calories from nonstaple foods, particularly in the north.

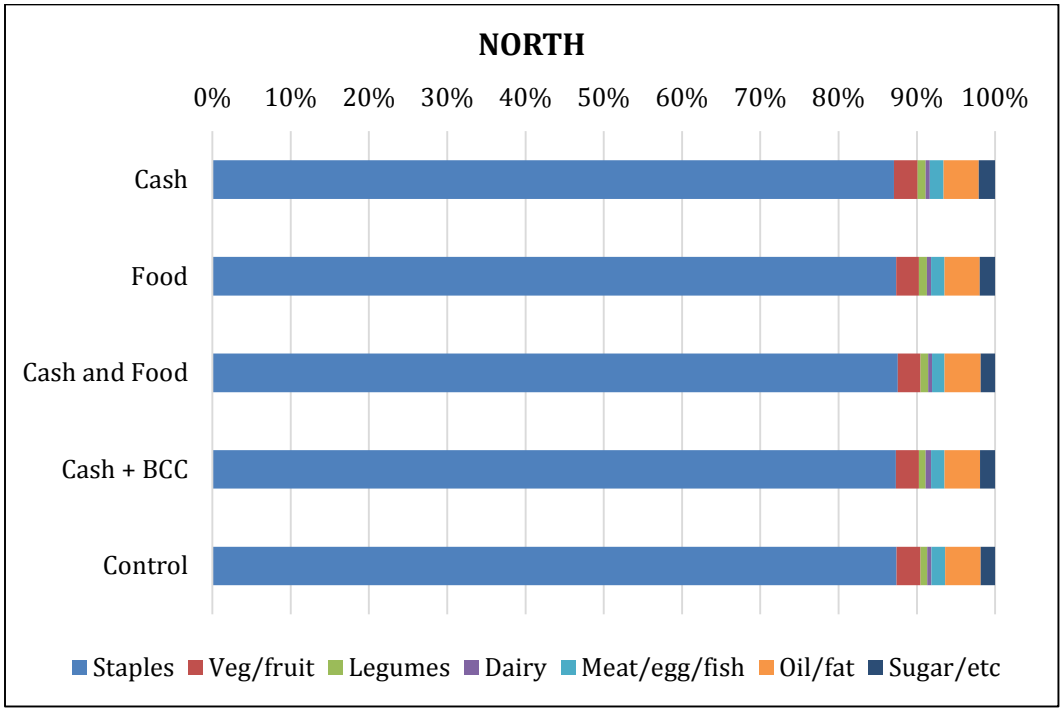
Figure 6.1 also highlights that the shares of calories by food group are very similar across intervention arms within zone at baseline, indicating good balance in this dimension.

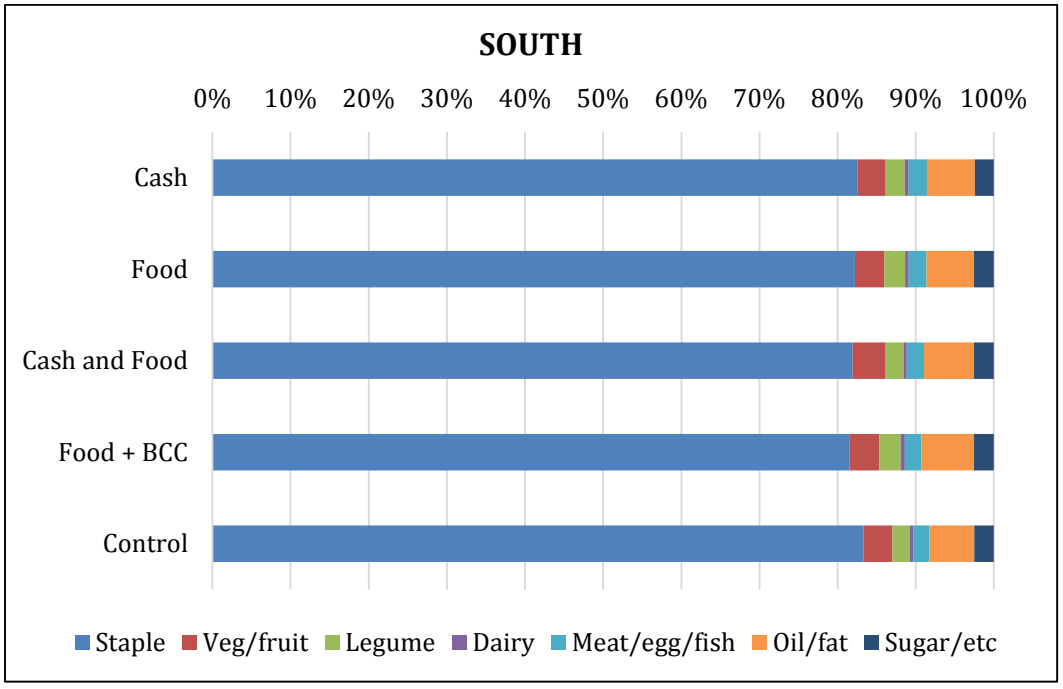
Table 6.7 Daily caloric intake per capita (based on 24-hour individual intake data), baseline balancing across intervention arms, by zone

	Calories daily per capita		Calories daily per capita <2,122		Calories daily per capita <1,805	
	F statistic	p value	F statistic	p value	F statistic	p value
North						
Cash = Control	0.50	0.48	0.42	0.52	0.16	0.69
Food = Control	0.14	0.71	0.02	0.89	0.13	0.72
Cash+Food = Control	0.02	0.89	0.30	0.59	0.06	0.81
Cash+BCC = Control	2.76	0.10	1.31	0.25	1.36	0.25
Cash = Food	1.28	0.26	0.70	0.40	0.59	0.44
Cash = Cash+Food	0.70	0.40	1.60	0.21	0.02	0.89
Cash = Cash+BCC	1.07	0.30	0.31	0.58	0.66	0.42
Food = Cash+Food	0.05	0.83	0.19	0.66	0.35	0.55
Food = Cash+BCC	4.40	0.04	1.81	0.18	2.28	0.13
Cash+Food = Cash+BCC	3.13	0.08	3.05	0.08	0.81	0.37
South						
Cash = Control	0.77	0.38	0.00	0.96	0.70	0.40
Food = Control	1.31	0.25	0.54	0.46	4.62	0.03
Cash+Food = Control	2.65	0.11	1.26	0.26	2.99	0.09
Food+BCC = Control	3.26	0.07	2.83	0.09	1.81	0.18
Cash = Food	0.13	0.72	0.75	0.39	1.61	0.21
Cash = Cash+Food	0.77	0.38	1.70	0.19	0.70	0.40
Cash = Food+BCC	1.21	0.27	3.67	0.06	0.17	0.68
Food = Cash+Food	0.21	0.65	0.12	0.73	0.22	0.64
Food = Food+BCC	0.45	0.50	0.81	0.37	0.95	0.33
Cash+Food = Food+BCC	0.06	0.81	0.34	0.56	0.24	0.63

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level.

Figure 6.1 Percentage of calories consumed from various food groups in past 7 days, baseline descriptives, by zone and intervention arm





Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

6.3.4 Food Consumption Score

The WFP Food Consumption Score (FCS) is a combined measurement of how many food groups are consumed, the frequency with which they are consumed, and the nutritional "importance" of each group (WFP 2008). Table 6.8 shows the mean and standard deviation of FCS as well as the proportion classified as "low FCS" (<35), by zone and assigned intervention arm. We see that the mean FCS in the north (43.8) is slightly lower than in the south (50.9), and the proportion of TMRI households with "low FCS" at baseline in the north (36 percent) is substantially higher than in the south (15 percent). These patterns suggest potential for the TMRI transfers to have greater impacts on FCS in the north than in the south.

Table 6.8 Food Consumption Score, baseline descriptives, by zone and intervention arm

	Food consumption score (0-112)		Food consumption score < 35
	Mean	Standard Deviation	Proportion
North			
Cash	43.69	16.47	0.36
Food	43.94	15.67	0.34
Cash+Food	42.21	14.74	0.37
Cash+BCC	44.27	15.59	0.32
Control	44.67	15.81	0.33
N	2,375		2,375
South			
Cash	50.20	15.32	0.15
Food	50.57	16.19	0.15
Cash+Food	51.44	15.77	0.13
Food+BCC	52.23	16.51	0.15
Control	49.96	16.40	0.18
N	2,401		2,401

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 6.9 shows that, within each zone, very few of the differences in these values across intervention arms are statistically significant at the 5 percent level or lower, indicating baseline balance.

Table 6.9 Food Consumption Score, baseline balancing across intervention arms, by zone

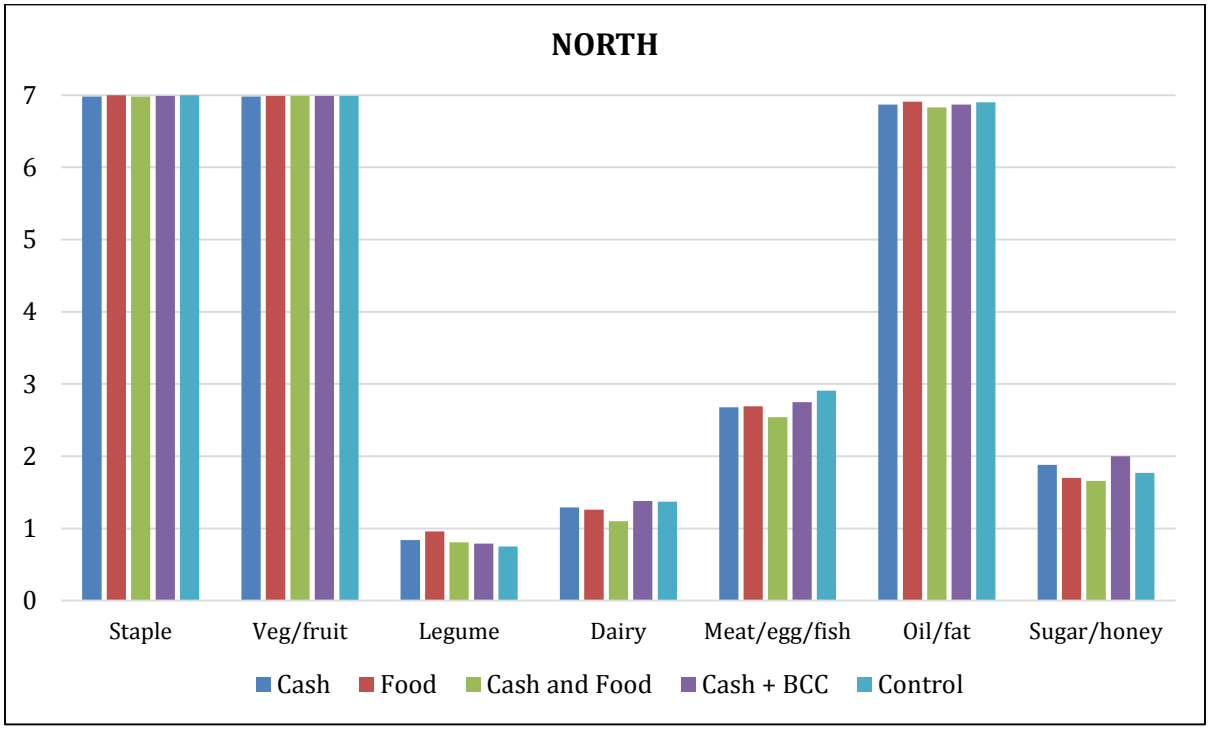
	Food Consumption Score		Food Consumption Score < 35	
	F statistic	p value	F statistic	p value
North				
Cash = Control	0.54	0.46	0.87	0.35
Food = Control	0.28	0.60	0.10	0.75
Cash+Food = Control	3.67	0.06	1.20	0.28
Cash +BCC = Control	0.10	0.76	0.01	0.94
Cash = Food	0.04	0.85	0.37	0.54
Cash = Cash+Food	1.52	0.22	0.02	0.88
Cash = Cash+BCC	0.22	0.64	1.09	0.30
Food = Cash+Food	1.87	0.17	0.58	0.45
Food = Cash+BCC	0.07	0.80	0.17	0.68
Cash+Food = Cash+BCC	3.11	0.08	1.48	0.23
South				
Cash = Control	0.03	0.85	1.18	0.28
Food = Control	0.22	0.64	0.75	0.39
Cash and Food = Control	1.43	0.23	3.46	0.06
Food+BCC = Control	3.11	0.08	1.13	0.29
Cash = Food	0.08	0.78	0.10	0.75
Cash = Cash+Food	0.94	0.33	0.78	0.38
Cash = Food+BCC	2.32	0.13	0.00	1.00
Food = Cash+Food	0.46	0.50	1.58	0.21
Food = Food+BCC	1.56	0.21	0.09	0.76
Cash+Food = Food+BCC	0.38	0.54	0.73	0.39

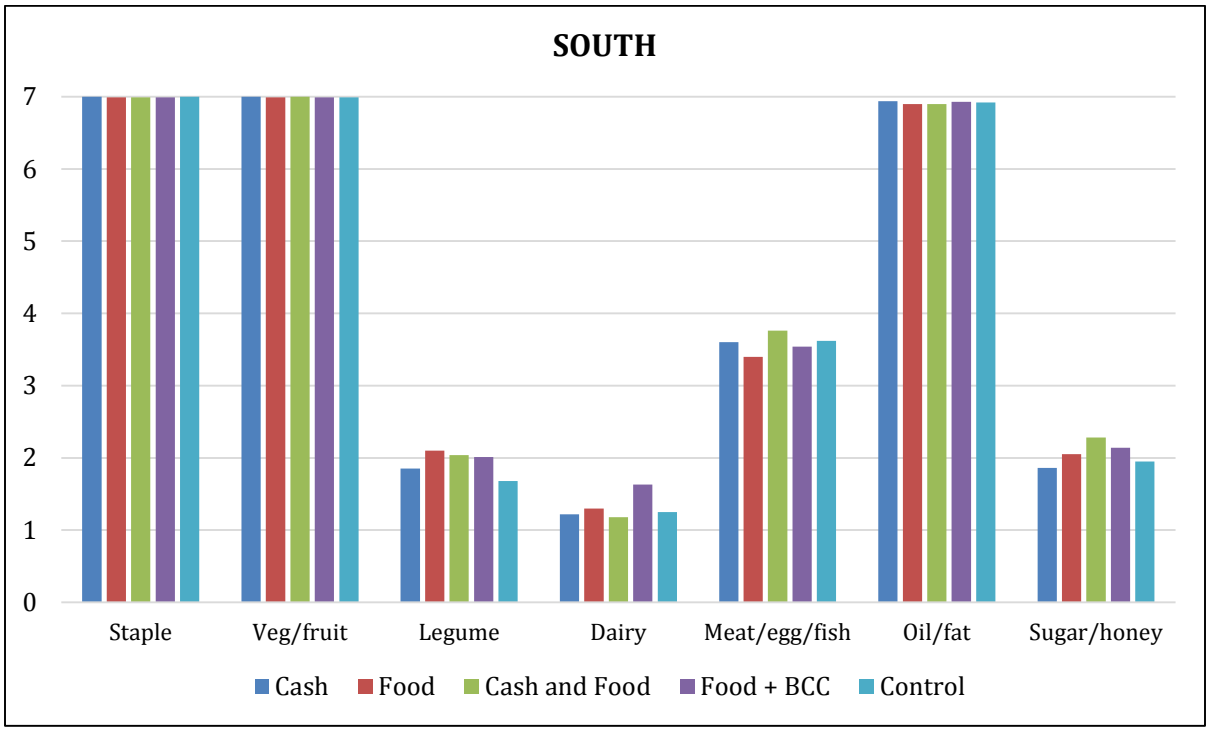
Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level.

Finally, for additional context on what underlies these regional differences, we assess the frequency with which each FCS food group was consumed within the 7 days preceding the baseline survey. Figure 6.2 shows patterns by intervention arm and zone. We see that the differences in FCS are not driven by frequency of consuming staples, vegetables/fruits, or oils/fats—all of which are consumed essentially every day in both zones. Rather the key difference is that there appears to be more frequent baseline consumption of highly weighted FCS food groups (legumes and meat/egg/fish) in the south.

Figure 6.2 also highlights that the frequency with which various food groups are consumed is very similar across intervention arms within zone at baseline, indicating good balance in this dimension as well.

Figure 6.2 Frequency of food groups consumed in past 7 days, baseline descriptives, by zone and intervention arm





Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

6.4 Impact Estimates

6.4.1 Estimation Methodology

Having established the baseline consumption patterns of sample households as well as demonstrated that these characteristics were balanced at baseline across intervention assignments by zone, we then turn to estimating how the TMRI interventions impacted consumption by endline.[12]

In all our estimations, we assess impacts separately for the interventions in the north and south, using the ANCOVA specification, which controls for any baseline differences when estimating endline impacts (similar to the alternate difference-in-differences specification often used in impact evaluation). However, ANCOVA yields greater statistical power and is therefore preferred over the difference-in-difference specification when autocorrelation in an outcome is fairly low (McKenzie 2012), which is the case for all outcomes we assess in this section. Functional form is linear for ANCOVA, such that results for binary outcomes can be interpreted as linear probability estimates. Our calculation of standard errors for all estimates accounts for the sample's design, stratified at the level of zone, and clustered at the level of village. For each zone, we estimate two regressions: one for the impact of the "pooled treatment" (meaning the average impact over all transfer modalities in that zone) and one for the impact of each transfer modality.

In the north, to calculate

the impact of the "pooled treatment," we estimate:

$$Consumption\ outcome_{endline} = Constant + \alpha_1{}^{p} \cdot Consumption\ outcome_{baseline} + \beta_1{}^{p} \cdot Treat + \varepsilon_{endline} \quad (6.1)$$

the impact of each transfer modality, we estimate:

$$Consumption\ outcome_{endline} = Constant + \alpha_1 \cdot Consumption\ outcome_{baseline} + \beta_1 \cdot Cash + \beta_2 \cdot Food + \beta_3 \cdot Cash\&Food + \beta_4 \cdot Cash\&BCC + \varepsilon_{endline} \quad (6.2)$$

Similarly, in the south, to calculate

the impact of the "pooled treatment," we estimate:

$$Consumption\ outcome_{endline} = Constant + \alpha_2{}^{p} \cdot Consumption\ outcome_{baseline} + \beta_2{}^{p} \cdot Treat + \varepsilon_{endline} \quad (6.3)$$

the impact of each transfer modality, we estimate:

$$Consumption\ outcome_{endline} = Constant + \alpha_2 \cdot Consumption\ outcome_{baseline} + \beta_5 \cdot Cash + \beta_6 \cdot Food + \beta_7 \cdot Cash\&Food + \beta_8 \cdot Food\&BCC + \varepsilon_{endline} \quad (6.4)$$

In these equations, *treat* refers to any treatment modality in the relevant zone; *Cash, Food, Cash-Food, Cash-BCC,* and *Food-BCC* refer respectively to the different treatment arms: cash, food, cash and food, cash and behavior change communication trainings, and food and behavior change communication trainings. The β's are the parameters to be estimated, which give the impact of exposure of the treatment arm on the consumption outcomes described above. The ε's are the

[12] We present only impacts at endline, but results are very similar for impacts at midline.

disturbance terms in each regression. Importantly, given the randomized nature of this intervention, they are uncorrelated with the treatments, and so the estimated β's are unbiased and consistent measures of impact.

In each case, we also run F-tests to determine whether the differences in impact between pairs of treatment modalities in a zone are statistically significant. These allow inferring whether different modalities have meaningfully different effects on the consumption measure, as opposed to differences in point estimates being primarily due to random variation within the sample.

6.4.2 Estimation Results

6.4.2.1 Self-assessed hunger

We begin with TMRI impacts on the subjective measure of self-assessed hunger, or the proportion of female participants who reported that they or someone else in the household went to sleep at night hungry sometime in the four weeks preceding the survey. Tables 6.10 and 6.11 show these estimates in the north and south; Table 6.12 shows F-tests for significance of differences.

In the north, the pooled treatment on average causes a statistically significant reduction in self-assessed hunger by 10 percentage points. By disaggregating, all treatment modalities in the north cause similar significant impacts, ranging from 8 to 12 percentage point reductions. F-tests indicate some significant differences in treatment impacts by modality; for example, the reduction caused by *Cash+BCC* is significantly larger than the reduction caused by *Cash* alone. However, the magnitudes are very similar. We conclude that in the north, all treatment modalities cause significant and meaningful reductions (about 10 percentage points) in self-assessed hunger.

Patterns are very similar in the south, although magnitudes are somewhat smaller. The pooled treatment on average causes a statistically significant reduction in self-assessed hunger by 7 percentage points. By disaggregating, all treatment modalities cause similar significant impacts of about 5 to 7 percentage point reductions, and here F-tests indicate no significant differences by modality at the 5 percent level. We conclude that in the south all treatment modalities also cause significant and meaningful reductions in self-assessed hunger (about 7 percentage points), which is slightly lower than in the north.

Across both zones, the consistent finding is that all treatment modalities significantly reduced rates of self-assessed hunger, with no meaningful differences by modality. Magnitudes of impact are slightly larger in the north (10 percentage points) than in the south (7 percentage points), consistent with our discussion in Section 6.2.2.

Table 6.10 Impact of the TMRI treatment arms on self-assessed hunger, north

	(1)
North	**If went to sleep hungry at any time in past 4 weeks**
Pooled treatment: Any TMRI transfer	-0.10***
	(0.02)
Observations	2,382
R-squared	0.046
Treatment: Cash only	-0.08***
	(0.02)
Treatment: Food only	-0.11***
	(0.02)
Treatment: Cash+Food	-0.08***
	(0.02)
Treatment: Cash+BCC	-0.12***
	(0.02)
Observations	2,382
R-squared	0.051

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Adjusted for survey design, stratified at zone level, and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.11 Impact of the TMRI treatment arms on self-assessed hunger, south

	(1)
South	**If went to sleep hungry at any time in past 4 weeks**
Pooled treatment: Any TMRI transfer	-0.07***
	(0.02)
Observations	2,410
R-squared	0.033
Treatment: Cash only	-0.05***
	(0.02)
Treatment: Food only	-0.07***
	(0.02)
Treatment: Cash+Food	-0.06***
	(0.02)
Treatment: Food+BCC	-0.07***
	(0.02)
Observations	2,410
R-squared	0.034

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Notes: Adjusted for survey design, stratified at zone level and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.12 Significant differences in TMRI treatment impacts on self-assessed hunger, by zone

	If went to sleep hungry at any time in past 4 weeks	
	F statistic	**p value**
North		
Cash = Food	4.59	0.03
Cash = Cash+Food	0.01	0.91
Cash = Cash+BCC	9.00	0.00
Food = Cash+Food	4.42	0.04
Food = Cash+BCC	1.07	0.30
Cash+Food = Cash+BCC	8.29	0.00
South		
Cash = Food	3.13	0.08
Cash = Cash+Food	1.05	0.31
Cash = Food+BCC	2.44	0.12
Food = Cash+Food	0.72	0.40
Food = Food+BCC	0.05	0.82
Cash+Food = Food+BCC	0.37	0.54

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level.

6.4.2.2 Food and nonfood consumption expenditures

We next consider TMRI impacts on the objective measures of consumption, starting with household expenditures on food and nonfood consumption items. Tables 6.13 and 6.14 show estimates on monthly per capita nominal expenditures in the north and south, and Tables 6.16 and 6.17 show analogous estimates on monthly per capita real expenditures (accounting for inflation by taking 2005–2006 as the base). Additionally, Tables 6.15 and 6.18 show respective F-tests for significance of differences.

In the north, the pooled treatment on average causes statistically significant increases in monthly per capita consumption expenditures on food (by about Tk 202 in nominal terms and Tk 101 in real terms), nonfood (by about Tk 44 in nominal terms and Tk 22 in real terms), and the total over both (by about Tk 250 in nominal terms and Tk 124 in real terms). Although all treatment modalities in the north cause significant increases in these expenditures and impacts on nonfood expenditures are similar across most treatment modalities, by far the largest increase in per capita food expenditures is caused by the *Cash+BCC* intervention arm (about Tk 423 compared with between Tk 103–157 from the other modalities in nominal terms, and about Tk 211 compared with between Tk 51–78 from the other modalities in real terms).

F-tests confirm that the treatment impact from *Cash+BCC* on food expenditures is significantly larger than from the other modalities. In particular, the difference between *Cash+BCC* and *Cash* is highly significant. The differences in treatment impact between *Cash* and *Food* modalities, however, tend not to be statistically significant. We conclude that in the north, all treatment modalities cause significant increases in per capita monthly expenditures and have similar modest impacts on

nonfood expenditures, but the impact on food expenditures (and therefore total expenditures) is considerably larger from the *Cash+BCC* treatment than from the other modalities. These results indicate that the difference between *Food* and *Cash* modalities does not cause meaningfully different expenditure patterns in the north, but BCC plays an important role in increasing food expenditures over and above the provision of cash alone.

In the south, we see a similar overall pattern, although with much smaller magnitudes. The pooled treatment on average causes a statistically significant increase in monthly per capita food expenditures (by about Tk 142 in nominal terms and Tk 71 in real terms) and total expenditures (by about Tk 163 in nominal terms and Tk 81 in real terms), with a positive but small imprecise change in nonfood expenditures that cannot be statistically distinguished from zero. By disaggregating, all treatment modalities in the south cause significant increases in food expenditures, and impacts on nonfood expenditures are insignificant across all treatment modalities. But by far the largest increase in per capita food expenditures is caused by the *Food+BCC* arm (about Tk 280 compared with between Tk 73–112 from the other modalities in nominal terms, and about Tk 140 compared with between Tk 36–56 from the other modalities in nominal terms).

F-tests confirm that the treatment impact from *Food+BCC* on food expenditures is significantly larger than from the other modalities. In particular, the difference between *Food+BCC* and *Food* is highly significant. The differences in treatment impact between *Cash* and *Food* modalities, however, again tend not to be statistically significant. We conclude that in the south, all treatment modalities cause significant increases in per capita monthly food expenditures and have similar insignificant impacts on nonfood expenditures, but the impact on food expenditures is considerably larger from the *Food+BCC* treatment than from the other modalities. Mirroring findings in the north, the results in the south indicate that the difference between *Food* and *Cash* modalities does not cause meaningfully different expenditure patterns, but BCC plays an important role in increasing food expenditures over and above the provision of food alone.

We note that the finding on the importance of BCC over and above transfers in increasing food expenditures is consistent across both north and south. Impacts being similar across food only or cash only is also consistent across both zones. The smaller magnitudes of all impacts in the south are as expected given the discussion in Section 6.2.2. In particular, we observed that private transfers were "crowded out" to treatment households in the south by about Tk 40 per capita per month in nominal terms while this did not occur in the north. This implied that the "net" transfer to treatment households in the south may have been lower by that amount on average. The findings here show pooled impacts on monthly nominal expenditures per capita that differ between the north and south by a very similar magnitude of about Tk 60.

Table 6.13 Impact of the TMRI treatment arms on monthly nominal consumption expenditures (in Taka), north

	(1)	(2)	(3)
North	**Monthly nominal household food expenditure per capita**	**Monthly nominal household nonfood expenditure per capita**	**Monthly nominal household total expenditure per capita**
Pooled treatment: Any			
TMRI transfer	202.02***	44.39**	249.67***
	(23.72)	(18.79)	(35.12)
Observations	2,377	2,377	2,377
R-squared	0.081	0.090	0.129
Treatment: Cash only	156.67***	45.64**	203.16***
	(29.69)	(22.37)	(42.16)
Treatment: Food only	129.01***	58.29**	189.13***
	(29.59)	(25.00)	(43.80)
Treatment: Cash+Food	103.36***	0.30	110.29***
	(27.77)	(23.85)	(41.89)
Treatment: Cash+BCC	423.19***	73.94***	501.12***
	(31.70)	(28.35)	(49.59)
Observations	2,377	2,377	2,377
R-squared	0.146	0.095	0.171

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Adjusted for survey design, stratified at zone level and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.14 Impact of the TMRI treatment arms on monthly nominal consumption expenditures (in Taka), south

	(1)	(2)	(3)
South	**Monthly nominal household food expenditure per capita**	**Monthly nominal household nonfood expenditure per capita**	**Monthly nominal household total expenditure per capita**
Pooled treatment: Any			
TMRI transfer	142.45***	25.69	162.86***
	(30.91)	(23.56)	(45.48)
Observations	2,405	2,405	2,405
R-squared	0.051	0.052	0.087
Treatment: Cash only	104.12**	2.05	103.37*
	(42.07)	(28.90)	(61.03)
Treatment: Food only	72.93*	20.94	92.21
	(42.27)	(30.37)	(59.59)
Treatment: Cash+Food	112.36***	53.54	155.04**
	(37.89)	(36.92)	(59.91)
Treatment: Food+BCC	280.19***	26.62	301.26***
	(39.16)	(27.73)	(54.81)
Observations	2,405	2,405	2,405
R-squared	0.067	0.054	0.095

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Adjusted for survey design, stratified at zone level and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.15 Significant differences in TMRI treatment impacts on monthly nominal consumption expenditures (in Taka), by zone

	Monthly nominal household food expenditure per capita		Monthly nominal household nonfood expenditure per capita		Monthly nominal household total expenditure per capita	
	F statistic	p value	F statistic	p value	F statistic	p value
North						
Cash = Food	0.73	0.39	0.26	0.61	0.10	0.76
Cash = Cash+Food	3.00	0.08	3.71	0.06	4.66	0.03
Cash = Cash+BCC	60.00	0.00	1.02	0.31	34.69	0.00
Food = Cash+Food	0.70	0.40	4.96	0.03	3.11	0.08
Food = Cash+BCC	73.05	0.00	0.27	0.61	35.99	0.00
Cash+Food = Cash+BCC	93.79	0.00	6.35	0.01	60.19	0.00
South						
Cash = Food	0.44	0.51	0.39	0.54	0.03	0.86
Cash = Cash+Food	0.04	0.85	1.95	0.16	0.64	0.43
Cash = Food+BCC	16.01	0.00	0.78	0.38	10.84	0.00
Food = Cash+Food	0.84	0.36	0.73	0.39	0.98	0.32
Food = Food+BCC	21.99	0.00	0.04	0.85	12.67	0.00
Cash+Food = Food+BCC	17.61	0.00	0.55	0.46	6.19	0.01

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level.

Table 6.16 Impact of the TMRI treatment arms on monthly real consumption expenditures (in Taka, base: 2005–2006), north

	(1)	(2)	(3)
North	Monthly real household food expenditure per capita	Monthly real household nonfood expenditure per capita	Monthly real household total expenditure per capita
Pooled treatment: Any TMRI transfer	100.60***	22.10**	124.33***
	(11.81)	(9.36)	(17.49)
Observations	2,377	2,377	2,377
R-squared	0.081	0.090	0.129
Treatment: Cash only	78.02***	22.73**	101.17***
	(14.78)	(11.14)	(20.99)
Treatment: Food only	64.24***	29.03**	94.18***
	(14.73)	(12.45)	(21.81)
Treatment: Cash+Food	51.47***	0.15	54.92***
	(13.83)	(11.88)	(20.86)
Treatment: Cash+BCC	210.73***	36.82***	249.54***
	(15.79)	(14.12)	(24.69)
Observations	2,377	2,377	2,377
R-squared	0.146	0.095	0.171

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.17 Impact of the TMRI treatment arms on monthly real consumption expenditures (in Taka, base: 2005–2006), south

South	(1) Monthly real household food expenditure per capita	(2) Monthly real household nonfood expenditure per capita	(3) Monthly real household total expenditure per capita
Pooled treatment: Any TMRI transfer	70.93***	12.79	81.10***
	(15.39)	(11.73)	(22.65)
Observations	2,405	2,405	2,405
R-squared	0.051	0.052	0.087
Treatment: Cash only	51.85**	1.02	51.47*
	(20.95)	(14.39)	(30.39)
Treatment: Food only	36.31*	10.43	45.92
	(21.05)	(15.12)	(29.67)
Treatment: Cash+Food	55.95***	26.66	77.20**
	(18.87)	(18.39)	(29.83)
Treatment: Food+BCC	139.53***	13.25	150.01***
	(19.50)	(13.81)	(27.29)
Observations	2,405	2,405	2,405
R-squared	0.067	0.054	0.095

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.18 Significant differences in TMRI treatment impacts on monthly real consumption expenditures (in taka, base: 2005–2006), by zone

	Monthly real household food expenditure per capita		Monthly real household nonfood expenditure per capita		Monthly real household total expenditure per capita	
	F statistic	p value	F statistic	p value	F statistic	p value
North						
Cash = Food	0.73	0.39	0.26	0.61	0.10	0.76
Cash = Cash+Food	3.00	0.08	3.71	0.06	4.66	0.03
Cash = Cash+BCC	60.00	0.00	1.02	0.31	34.69	0.00
Food = Cash+Food	0.70	0.40	4.96	0.03	3.11	0.08
Food = Cash+BCC	73.05	0.00	0.27	0.61	35.99	0.00
Cash+Food = Cash+BCC	93.79	0.00	6.35	0.01	60.19	0.00
South						
Cash = Food	0.44	0.51	0.39	0.54	0.03	0.86
Cash = Cash+Food	0.04	0.85	1.95	0.16	0.64	0.43
Cash = Food+BCC	16.01	0.00	0.78	0.38	10.84	0.00
Food = Cash+Food	0.84	0.36	0.73	0.39	0.98	0.32
Food = Food+BCC	21.99	0.00	0.04	0.85	12.67	0.00
Cash+Food = Food+BCC	17.61	0.00	0.55	0.46	6.19	0.01

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level and clustered at village level.

6.4.2.3 Caloric intake

To understand how the increases in food expenditure were allocated and how these map to changes in food security, we proceed to look at impacts on other measures of food consumption. We start with impacts on caloric intake (based on 24-hour individual intake data). Tables 6.19 and 6.20 show impact estimates on daily per capita caloric intake, as well as on the proportions of households in which this intake falls below the "food poverty" threshold (<2,122 daily calories per capita) or "food ultra poverty" threshold (<1,805 daily calories per capita) in the north and south. Table 6.21 shows F-tests for significance of differences.

In the north, the pooled treatment on average causes a statistically significant increase of about 145 daily calories consumed per capita, translating to an 11 percentage point reduction in food poverty and a 13 percentage point reduction in food ultra poverty. These results indicate that the transfers caused meaningful increases in caloric intake among the lower part of the distribution. Although all treatment modalities in the north cause significant increases in caloric intake, impacts differ by modality. F-tests confirm that increases from *Food* (about 143 calories) are slightly larger than increases from *Cash* (about 75 calories), but by far the largest increase in per capita caloric intake is caused by the *Cash+BCC* arm (about 282 calories). Only the *Food* intervention arm and the *Cash+BCC* arm cause significant reductions in the share of households classified as food poor or food ultra poor, with *Cash+BCC* again causing significantly larger reductions (26 percentage points) than Food (24 percentage points) or any other modality. We conclude that in the north, all treatment modalities cause significant increases in caloric intake, and the TMRI impacts found above on food expenditures appear to come at least partially from a greater quantity of calories purchased. However, while the impact on caloric intake is slightly larger from food transfers alone than from cash transfers alone, by far the largest increase comes from a combination of cash transfers and nutrition BCC trainings.

In the south, we see more limited impacts on caloric intake. The pooled treatment on average causes a statistically significant but modest increase of about 53 calories in daily calories consumed per capita, translating to a 7 percentage point reduction in food poverty and a 6 percentage point reduction in food ultra poverty. By disaggregating, we see that this average impact is driven by the *Food+BCC* treatment, which is the only modality that causes significant increases in caloric intake in the south (about 141 calories, corresponding to 16 percentage point and 13 percentage point reductions in food poverty and food ultra poverty, respectively). F-tests confirm that the impacts from *Food+BCC* are significantly different from all other treatment modalities in the south. We conclude that in the south, only the *Food+BCC* modality causes meaningful increases in caloric intake. While the increased food expenditure we found above from *Food+BCC* is likely to come at least partially from increased quantity of calories, greater caloric intake is unlikely to drive the increased food expenditure from other modalities in the south.

Across the north and south, we note that the addition of BCC trainings to transfers causes greater increases in caloric intake. While in the north the provision of transfers alone appears to cause some significant increase in caloric intake, it causes only modest insignificant impacts in the south. This pattern is consistent again with our discussion in Section 6.2.2, further demonstrated by Table

6.6, which shows higher average caloric intake at baseline in the south than in the north. These observations suggest that households in the north may have been more responsive in increasing calories using transfer income partially because they were more likely to be calorie deficient in the absence of transfers.

Table 6.19 Impact of the TMRI treatment arms on daily caloric intake per capita (based on 24-hour individual intake data), north

	(1)	(2)	(3)
North	**Calories daily per capita**	**Calories daily per capita < 2122**	**Calories daily per capita < 1805**
Pooled treatment: Any TMRI transfer	145.06***	-0.11***	-0.13***
	(25.54)	(0.03)	(0.03)
Observations	2,373	2,373	2,373
R-squared	0.051	0.018	0.028
Treatment: Cash only	74.81**	-0.05	-0.05
	(29.16)	(0.03)	(0.04)
Treatment: Food only	142.94***	-0.10***	-0.16***
	(31.02)	(0.03)	(0.04)
Treatment: Cash+Food	83.37***	-0.05	-0.08**
	(30.30)	(0.03)	(0.04)
Treatment: Cash+BCC	281.94***	-0.26***	-0.24***
	(34.35)	(0.04)	(0.04)
Observations	2,373	2,373	2,373
R-squared	0.083	0.048	0.045

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Adjusted for survey design, stratified at zone level and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.20 Impact of the TMRI treatment arms on daily caloric intake per capita (based on 24-hour individual intake data), south

	(1)	(2)	(3)
South	**Calories daily per capita**	**Calories daily per capita < 2122**	**Calories daily per capita < 1805**
Pooled treatment: Any TMRI transfer	52.91**	-0.07**	-0.06*
	(26.68)	(0.03)	(0.03)
Observations	2,401	2,401	2,401
R-squared	0.035	0.015	0.023
Treatment: Cash only	23.36	-0.03	-0.05
	(33.02)	(0.04)	(0.04)
Treatment: Food only	8.40	-0.02	-0.04
	(33.94)	(0.04)	(0.04)
Treatment: Cash+Food	38.47	-0.05	-0.04
	(36.49)	(0.03)	(0.04)
Treatment: Food+BCC	141.38***	-0.16***	-0.13***
	(40.01)	(0.04)	(0.04)
Observations	2,401	2,401	2,401
R-squared	0.046	0.025	0.028

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Adjusted for survey design, stratified at zone level and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.21 Significant differences in TMRI treatment impacts on daily caloric intake per capita (based on 24-hour individual intake data), by zone

	Calories daily per capita		Calories daily per capita <2,122		Calories daily per capita <1,805	
	F statistic	p value	F statistic	p value	F statistic	p value
North						
Cash = Food	5.70	0.02	2.36	0.13	9.60	0.00
Cash = Cash+Food	0.09	0.76	0.00	0.98	0.71	0.40
Cash = Cash+BCC	41.50	0.00	36.77	0.00	31.22	0.00
Food = Cash+Food	4.03	0.05	2.40	0.12	4.87	0.03
Food = Cash+BCC	16.88	0.00	19.70	0.00	5.07	0.03
Cash+Food = Cash+BCC	35.59	0.00	36.53	0.00	21.01	0.00
South						
Cash = Food	0.18	0.67	0.07	0.79	0.06	0.81
Cash = Cash+Food	0.16	0.69	0.11	0.74	0.08	0.78
Cash = Food+BCC	8.26	0.00	7.15	0.01	3.27	0.07
Food = Cash+Food	0.61	0.44	0.39	0.53	0.00	0.97
Food = Food+BCC	10.12	0.00	9.02	0.00	4.14	0.04
Cash+Food = Food+BCC	5.49	0.02	6.25	0.01	4.30	0.04

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level.

Another way to allocate higher food expenditures is to purchase more "expensive" calories rather than (or in addition to) a greater quantity of calories. Tables 6.22 and 6.23 show TMRI's impacts on food expenditure per 1,000 calories consumed at the household level in both regions, indicating how the transfers changed the "cost of each calorie consumed." Table 6.24 shows F-tests for significance of differences.

In the north, the pooled treatment causes a statistically significant average increase in spending of about Tk 2.1 per 1,000 calories consumed. Although all treatment modalities in the north cause significant increases in per-calorie expenditure, F-tests confirm that impacts are significantly larger from the *Cash+BCC* modality (increase of about Tk 4.4 per 1,000 calories) than from the other modalities, including *Cash* only (increase of about Tk 1.8 per 1,000 calories). Differences between other modalities are not meaningful; although F-tests show that the slightly larger impact of *Cash* than *Food* is significant at the 4 percent level, the magnitudes are fairly similar (Tk 1.8 and Tk 0.9 per 1,000 calories, respectively). We conclude that in the north, all treatment modalities cause households to purchase more "expensive" calories, but by far the largest increase comes from the *Cash+BCC* modality. The addition of nutrition BCC trainings to cash transfers appears to induce households to use the cash to purchase more expensive calories.

In the south, we see a very similar pattern. The pooled treatment causes a statistically significant average increase in spending of about Tk 2.2 per 1,000 calories consumed. Although all treatment modalities in the south cause significant increases in per-calorie expenditure, F-tests confirm that impacts are significantly larger from the *Food+BCC* modality (by about Tk 4.2 per 1,000 calories) than from the other modalities, including *Food* only (increase of about Tk 1.2 per 1,000 calories). Differences between other modalities are not statistically significant. We conclude that in the

south, all treatment modalities cause households to purchase more "expensive" calories, but by far the largest increase comes from the *Food+BCC* modality. The addition of nutrition BCC trainings to food transfers appears to cause households to allocate the transfer income toward more expensive calories.

In the case of per-calorie expenditures, the patterns across both regions are highly consistent. In both, adding nutrition BCC trainings to transfers causes a greater increase in per-calorie expenditure. While magnitudes of impact are quite similar in each region, they appear slightly larger for the south. Taken together with the previous findings on caloric intake, this suggests that in the north transfers are used to both increase quantity of calories consumed and cost per calorie (most strongly for *Cash+BCC*), while in the south transfers are used primarily to increase cost per calorie (with only *Food+BCC* meaningfully changing quantity of calories consumed as well). Again this is consistent with households in the south having slightly higher average caloric intake at baseline, and thus potentially having impetus to purchase "better" calories rather than more calories, while those in the north are more likely to do both.

Table 6.22 Impact of the TMRI treatment arms on per-calorie food expenditures (taka per 1,000 calories), north

North	Household food expenditure per 1,000 calories (Tk)
Pooled treatment: Any TMRI transfer	2.07***
	(0.29)
Observations	2,378
R-squared	0.076
Treatment: Cash only	1.80***
	(0.42)
Treatment: Food only	0.94***
	(0.33)
Treatment: Cash+Food	1.20***
	(0.37)
Treatment: Cash+BCC	4.35***
	(0.37)
Observations	2,378
R-squared	0.125

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Adjusted for survey design, stratified at zone level, and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.23 Impact of the TMRI treatment arms on per-calorie food expenditures (taka per 1,000 calories), south

South	Household food expenditure per 1,000 calories (Tk)
Pooled treatment: Any TMRI transfer	2.21***
	(0.41)
Observations	2,406
R-squared	0.065
Treatment: Cash only	1.68***
	(0.53)
Treatment: Food only	1.21**
	(0.60)
Treatment: Cash+Food	1.75***
	(0.49)
Treatment: Food+BCC	4.22***
	(0.52)
Observations	2,406
R-squared	0.090

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.24 Significant differences in TMRI treatment impacts on per-calorie food expenditures (taka per 1,000 calories), by zone

	Household food expenditure per 1,000 calories (Tk)	
	F statistic	p value
North		
Cash = Food	4.10	0.04
Cash = Cash+Food	1.73	0.19
Cash = Cash+BCC	30.41	0.00
Food = Cash+Food	0.49	0.48
Food = Cash+BCC	81.09	0.00
Cash+Food = Cash+BCC	58.17	0.00
South		
Cash = Food	0.55	0.46
Cash = Cash+Food	0.02	0.89
Cash = Food+BCC	21.14	0.00
Food = Cash+Food	0.81	0.37
Food = Food+BCC	23.75	0.00
Cash+Food = Food+BCC	22.26	0.00

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level.

Closely related to the cost per calorie are the types of food that contribute these calories. Tables 6.25 and 6.26 show TMRI's impacts on the percentages of household calories consumed from different food categories in both zones, focusing on the distinction between staples and various nonstaples.

In the north, the pooled treatment causes a small but statistically significant reallocation of the share of calories from staples (a reduction of about 3.3 percentage points) toward a range of nonstaple foods (split over small but significant increases in the shares of calories from legumes, oils/fats, vegetables/fruits, dairy, and meat/eggs/fish). By disaggregating, we see that all treatment modalities show this general pattern of inducing reallocation of calories from staples to nonstaples, but the magnitudes and type of nonstaples differ by modality. Cash only induces reallocation from staples (1.7 percentage point reduction) to legumes, vegetables/fruits, and meat/eggs/fish. Food only induces reallocation from staples (2.8 percentage point reduction) to legumes and oils/fats—consistent with the food transfer consisting of lentils and oil—as well as meat/eggs/fish. Cash and food induces reallocation from staples (2.0 percentage point reduction) to legumes, vegetables/fruits, and meat/eggs/fish. However, *Cash+BCC* induces the largest reallocation from staples (6.7 percentage point reduction) to all of the other food categories (legumes, oils/fats, vegetables/fruits, dairy, meat/eggs/fish, and sugars/etc.). Particularly notable are the substantial 1.6 percentage point increase in share of calories from vegetables/fruits and 2.2 percentage point increase in share from meat/eggs/fish. F-tests for each of these, though not shown here, confirm that the differences across modalities are statistically significant. We conclude that in the north, all treatment modalities cause households to reallocate the share of calories consumed from staples toward nonstaples, with all causing a significant increase in the share of calories from meat/eggs/fish. However, the largest reallocation to the most diverse set of food categories (including vegetables/fruits and a range of animal source foods such as dairy and meat/eggs/fish, as well as legumes, oils/fats, and sugars/etc.) comes from the *Cash+BCC* modality. Figure 6.3 highlights this pattern. The addition of BCC over and above cash transfers appears to cause households to choose a diet with a considerably larger share of nonstaple foods.

In the south, we see a very similar pattern. The pooled treatment causes a small but statistically significant reallocation of the share of calories from staples (a reduction of about 2.9 percentage points) toward a range of nonstaple foods (split over small but significant increases in the shares of calories from legumes, oils/fats, vegetables/fruits, dairy, meat/eggs/fish, and sugars/etc.). By disaggregating, we see again that all treatment modalities show this general pattern of inducing reallocation of calories from staples to nonstaples, but the magnitudes and type of nonstaples differ by modality. Cash only induces reallocation from staples (1.9 percentage point reduction) to only meat/eggs/fish. Food only induces reallocation from staples (1.9 percentage point reduction) to legumes and oils/fats, consistent with the food transfer consisting of lentils and oil. Cash and food induces reallocation from staples (2.8 percentage point reduction) to legumes, oils/fats, vegetables/fruits, and meat/eggs/fish, in some sense combining the effects of the cash only and food only modalities. *Food+BCC,* however, induces the largest reallocation from staples (4.9 percentage point reduction) to all of the other food categories (legumes, oils/fats, vegetables/fruits, dairy, meat/eggs/fish, and sugars/etc.); particularly notable are the substantial 1.2 percentage point increase in share from vegetables/fruits and 2.1 percentage point increase in share from

meat/eggs/fish. F-tests for each of these, though again not shown here for parsimony, confirm that the differences across modality impacts are statistically significant. We conclude that in the south, all treatment modalities cause households to reallocate the share of calories consumed from staples to nonstaples, but the largest reallocation to the most diverse set of food categories (including vegetables/fruits and a range of animal source foods such as dairy and meat/eggs/fish, as well as legumes, oils/fats, and sugars/etc.) comes from the *Food+BCC* modality. Figure 6.4 shows impact estimates in the south graphically, highlighting this pattern. Mirroring the results on cash transfers in the north, the addition of BCC over and above food transfers in the south appears to cause households to choose a considerably more diverse diet.

Across both zones, we see a consistent finding that all the transfer modalities cause households to reallocate a small but significant share of calories consumed from staples to nonstaples, but the addition of BCC over and above transfers causes the largest reallocation of calories away from staples and toward the most diverse set of nonstaples. In particular, in both zones, the addition of BCC induces a substantially larger reallocation toward calories from vegetables/fruits and animal source foods such as dairy and meat/eggs/fish, as well as other food categories (including legumes, oils/fats, sugars/etc.). We note that these findings are consistent with the impacts found on per-calorie food expenditure. Since the nonstaple food categories where we see increases tend to be more costly per calorie than staples, in addition to more nutritious, the pattern of impacts indicates that addition of BCC induces households to spend transfers on more expensive and "higher quality" foods. The implication is that in the north, food expenditures increase due to both a greater quantity and greater quality of calories consumed across all modalities, but most strongly in the *Cash+BCC* modality. In the south, food expenditures increase in all modalities due primarily to greater quality of calories consumed while quantity of calories does not change meaningfully except in the *Food+BCC* modality.

Table 6.25 Impact of the TMRI treatment arms on percentage of household calories consumed from various food categories (based on household 7-day recall data), north

	Percentage of household calories consumed from:						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
North	**Staples**	**Legumes**	**Oils/fats**	**Vegetables/fruits**	**Dairy**	**Meat/eggs/fish**	**Sugar/etc.**
Pooled treatment: Any TMRI transfer	-3.27***	0.86***	0.33**	0.57***	0.16***	1.04***	0.32
	(0.41)	(0.10)	(0.14)	(0.13)	(0.06)	(0.12)	(0.20)
Observations	2,378	2,378	2,378	2,378	2,378	2,378	2,378
R-squared	0.102	0.065	0.019	0.019	0.016	0.063	0.015
Treatment: Cash only	-1.66***	0.45***	-0.03	0.37**	0.04	0.87***	0.00
	(0.48)	(0.12)	(0.17)	(0.15)	(0.08)	(0.15)	(0.21)
Treatment: Food only	-2.79***	1.08***	0.76***	0.09	0.05	0.46***	0.37
	(0.47)	(0.11)	(0.24)	(0.14)	(0.07)	(0.16)	(0.23)
Treatment: Cash+Food	-2.02***	0.79***	0.24	0.25*	0.11	0.62***	-0.01
	(0.47)	(0.11)	(0.16)	(0.15)	(0.09)	(0.15)	(0.23)
Treatment: Cash+BCC	-6.66***	1.12***	0.34*	1.59***	0.46***	2.22***	0.94***
	(0.52)	(0.12)	(0.18)	(0.21)	(0.09)	(0.16)	(0.28)
Observations	2,378	2,378	2,378	2,378	2,378	2,378	2,378
R-squared	0.175	0.092	0.028	0.088	0.032	0.124	0.029

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Adjusted for survey design, stratified at zone level, and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

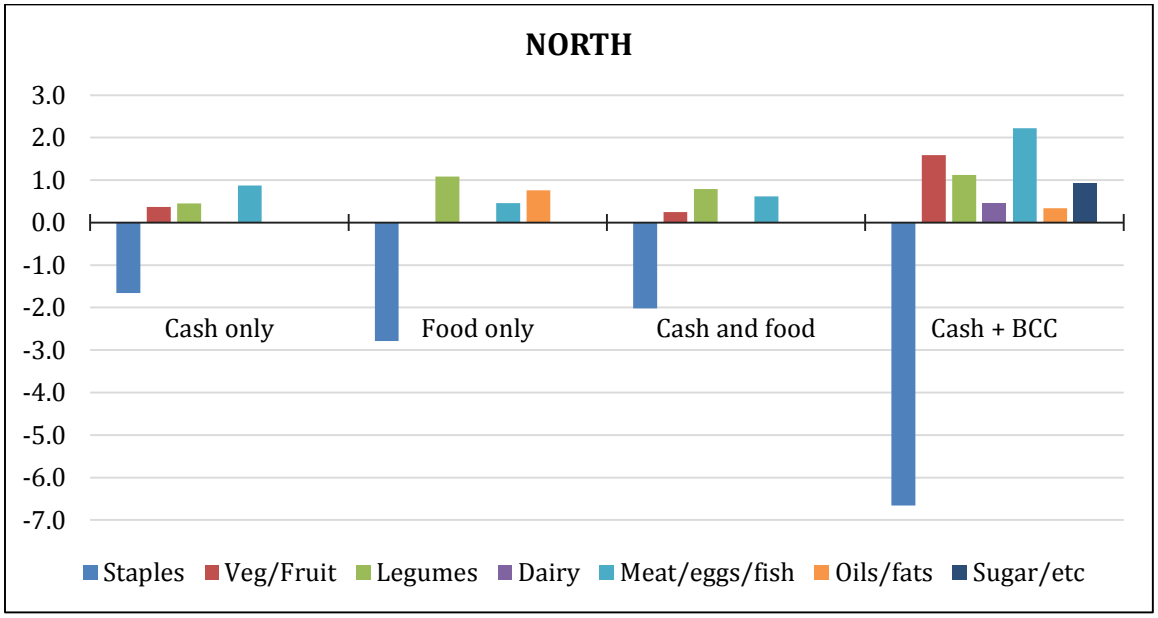
Table 6.26 Impact of the TMRI treatment arms on percentage of calories consumed from various food categories (based on household 7-day recall data), south

	Percentage of household calories consumed from:						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
South	**Staples**	**Legumes**	**Oils/fats**	**Vegetables/fruits**	**Dairy**	**Meat/eggs/fish**	**Sugar/etc.**
Pooled treatment: Any TMRI transfer	-2.88***	0.35**	0.56***	0.62**	0.08	1.01***	0.35**
	(0.49)	(0.16)	(0.20)	(0.25)	(0.07)	(0.18)	(0.17)
Observations	2,406	2,406	2,406	2,406	2,406	2,406	2,406
R-squared	0.078	0.036	0.031	0.016	0.011	0.036	0.031
Treatment: Cash only	-1.94***	-0.05	0.36	0.32	-0.00	1.05***	0.33
	(0.63)	(0.18)	(0.25)	(0.27)	(0.08)	(0.26)	(0.20)
Treatment: Food only	-1.91***	0.52***	0.55**	0.34	0.02	0.31	0.24
	(0.63)	(0.18)	(0.24)	(0.34)	(0.09)	(0.24)	(0.20)
Treatment: Cash+Food	-2.84***	0.38**	0.88***	0.66**	0.14	0.62***	0.26
	(0.61)	(0.19)	(0.27)	(0.31)	(0.11)	(0.22)	(0.20)
Treatment: Food+BCC	-4.85***	0.56***	0.47*	1.17***	0.18*	2.05***	0.57***
	(0.58)	(0.18)	(0.27)	(0.31)	(0.10)	(0.22)	(0.19)
Observations	2,406	2,406	2,406	2,406	2,406	2,406	2,406
R-squared	0.098	0.048	0.034	0.023	0.015	0.069	0.033

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

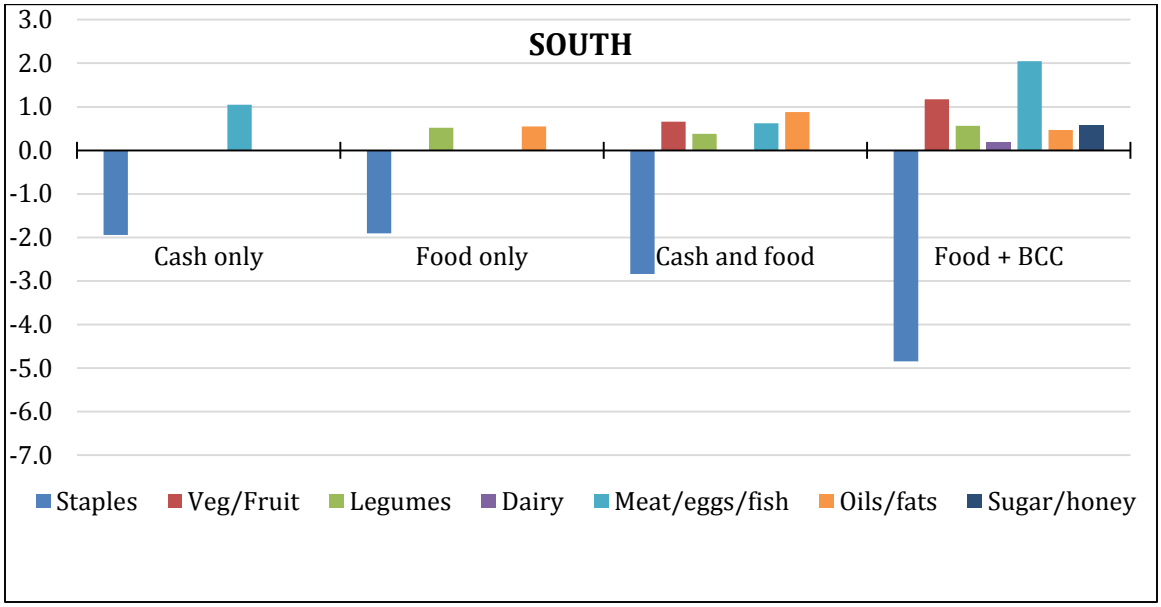
Note: Adjusted for survey design, stratified at zone level, and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Figure 6.3 Impact of the TMRI treatment arms on percentage of calories consumed from various food categories (based on household 7-day recall data), north



Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Relative to control, significant at the ≤10 percent level.

Figure 6.4 Impact of the TMRI treatment arms on percentage of calories consumed from various food categories (based on household 7-day recall data), south



Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

6.4.2.4 Food Consumption Score

We next assess TMRI's impacts on WFP's primary measure of food security—the Food Consumption Score (FCS)—which captures not only the types of foods consumed, but the frequency with which they are consumed and some notion of their nutritional importance. Tables 6.27 and 6.28 show impact estimates on the FCS as well as on the proportion of households classified as having "low FCS" (below 35) in both zones. Table 6.29 shows F-tests for significance of differences.

In the north, the pooled treatment causes a statistically significant increase of 11.6 points in the score, a substantial change given that the average baseline score was about 44. This corresponds to a statistically significant 20 percentage point reduction in low FCS, indicating that on average the transfers cause meaningful improvements in FCS in the lower part of the distribution. By disaggregating, we see that all the treatment modalities cause significant increases in FCS, but that by far the largest impact comes from the *Cash+BCC* modality (a substantial increase of about 24 points, compared to increases of about 7 to 9 points from other modalities). The reduction in low FCS from *Cash+BCC* is also the largest (25 percentage points, compared to 17–21 percentage points from other modalities). Differences between the impacts of *Food* and *Cash* are statistically significant at the 4 percent level, but magnitudes are very similar. Meanwhile, F-tests confirm that the differences in impact between the *Cash+BCC* modality and other modalities are highly statistically significant. To explore what is behind the differences in FCS impacts, Figure 6.5 shows TMRI's impacts by modality on how frequently each of the various FCS food groups was consumed. We see that although all the modalities cause some increase in days consuming highly weighted food groups such as legumes, dairy, or meat/eggs/fish, the largest increases in frequency consumed of all of these come from *Cash+BCC*. In particular, *Cash+BCC* significantly increases frequency of consuming legumes by 1.7 days, dairy by 1.6 days, and meat/eggs/fish by 2.9 days. We conclude that in the north, although all treatment modalities cause significant improvements in FCS and significant reductions in the proportion of households with low FCS, the largest impacts come from the *Cash+BCC* modality, due primarily to greater increases in frequency of consuming pulses and animal source foods (dairy and meat/eggs/fish).

In the south, a similar pattern emerges, but with considerably smaller magnitudes of impact. The pooled treatment causes a statistically significant increase of 6.4 points in the score, while the average baseline score in the south was about 51. This corresponds to a modest but statistically significant 3 percentage point reduction in low FCS. By disaggregating, we see that all the treatment modalities cause significant increases in FCS, but that the largest impact comes from the *Food+BCC* modality (an increase of about 13 points, compared to increases of 3–5 points from other modalities). The reduction in low FCS from *Food+BCC* is also the largest, although still modest (5 percentage points, compared to imprecise or smaller reductions from other modalities). Differences between the impacts of *Food*, *Cash*, and Cash and Food are statistically significant at the 2 percent or 3 percent level, but magnitudes are very similar. Meanwhile, F-tests confirm that the differences in impact between the *Food+BCC* modality and other modalities are highly statistically significant. To again explore what is behind the differences in FCS impacts, Figure 6.6 shows TMRI's impacts by modality on how frequently each of the various FCS food groups was consumed. We see that although all modalities cause some increase in days consuming at least one highly weighted food

group such as legumes or meat/eggs/fish, most of these increases are small. The largest increases in frequency consumed of a range of highly weighted food groups come from *Food+BCC*. In particular, *Food+BCC* significantly increases frequency of consuming legumes by 1.4 days, dairy by 0.6 days, and meat/eggs/fish by 1.5 days. We conclude that in the south, although all treatment modalities cause significant (if in some cases modest) improvements in FCS, the largest impacts come from the *Food+BCC* modality, again due primarily to greater increases in frequency of consuming pulses and animal source foods (dairy and meat/eggs/fish).

Across both zones, we see a consistent pattern that all treatment modalities significantly increase FCS, but the largest impacts come from the addition of nutrition BCC trainings over and above transfers. Adding BCC appears to induce greater frequency of consuming highly weighted FCS food groups, such as pulses, dairy, and meat/eggs/fish. It is notable that the magnitudes of these impacts are much larger in the north than in the south. This pattern is broadly consistent with our discussion in Section 6.2.2 regarding higher baseline consumption in the south. In particular, as shown in Section 6.3.4, average FCS was considerably higher in the south at baseline (51) than in the north (44), proportion of low FCS was considerably lower (0.15 compared with 0.35), and frequency of consumption of highly weighted FCS food groups was greater (two days compared with one day for pulses, about 3.5 days compared to 2.7 days for meat/eggs/fish). This would leave potentially greater scope for impact on FCS in the north. As noted in Section 6.2.2, markets for diverse foods may also have been better in the north than south, per capita transfers may have been effectively larger in the north, the precautionary savings motives may have been stronger in the south, and "net" transfers were likely larger in the north given evidence of crowding-out in the south. Although it is not possible to directly compare impacts from the *Cash+BCC* and *Food+BCC* intervention arms since they were randomized in different zones, an additional possibility is that cash transfers better allowed acting on the information from BCC than food transfers, in terms of more easily allowing purchases in markets of the food groups heavily weighted by FCS, including pulses and animal source foods (such as dairy and meat/eggs/fish).

Table 6.27 Impact of the TMRI treatment arms on Food Consumption Score, north

	(1)	(2)
North	**Food consumption score (0-112)**	**Food consumption score < 35**
Pooled treatment: Any TMRI transfer	11.60***	-0.20***
	(1.04)	(0.03)
Observations	2,373	2,373
R-squared	0.114	0.075
Treatment: Cash only	6.86***	-0.17***
	(1.12)	(0.03)
Treatment: Food only	9.09***	-0.21***
	(1.09)	(0.03)
Treatment: Cash+Food	6.92***	-0.17***
	(1.18)	(0.03)
Treatment: Cash+BCC	23.69***	-0.25***
	(1.35)	(0.03)
Observations	2,373	2,373
R-squared	0.251	0.085

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Adjusted for survey design, stratified at zone level, and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.28 Impact of the TMRI treatment arms on Food Consumption Score, south

South	(1) Food consumption score (0-112)	(2) Food consumption score < 35
Pooled treatment: Any TMRI transfer	6.37***	-0.03***
	(0.96)	(0.01)
Observations	2,401	2,401
R-squared	0.093	0.016
Treatment: Cash only	2.68**	-0.02
	(1.04)	(0.01)
Treatment: Food only	4.92***	-0.04***
	(1.11)	(0.01)
Treatment: Cash+Food	5.25***	-0.03*
	(1.29)	(0.01)
Treatment: Food+BCC	12.66***	-0.05***
	(1.25)	(0.01)
Observations	2,401	2,401
R-squared	0.140	0.019

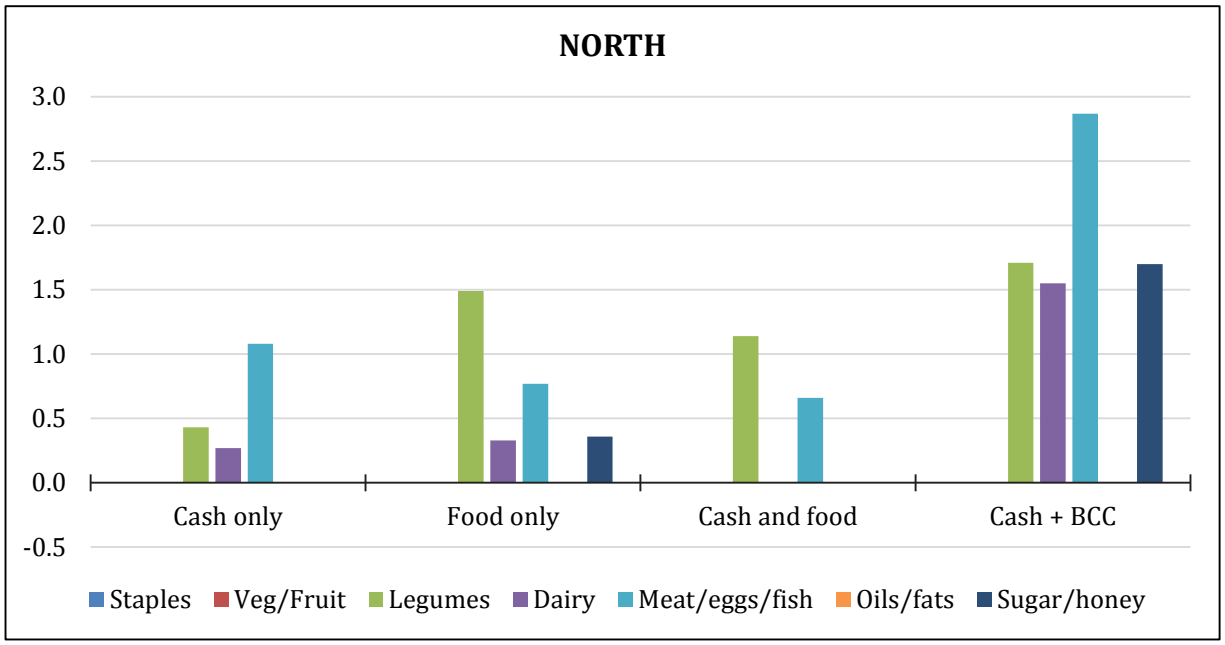
Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 6.29 Significant differences in TMRI treatment impacts on Food Consumption Score, by zone

	Food Consumption Score (0-112)		Food Consumption Score < 35	
	F statistic	p value	F statistic	p value
North				
Cash = Food	4.44	0.04	4.00	0.05
Cash = Cash+Food	0.00	0.96	0.00	0.99
Cash = Cash+BCC	163.59	0.00	29.82	0.00
Food = Cash+Food	3.71	0.06	3.75	0.05
Food = Cash+BCC	126.76	0.00	16.00	0.00
Cash+Food = Cash+BCC	149.56	0.00	27.91	0.00
South				
Cash = Food	5.27	0.02	3.74	0.05
Cash = Cash+Food	4.78	0.03	0.55	0.46
Cash = Food+BCC	77.68	0.00	10.76	0.00
Food = Cash+Food	0.08	0.78	1.59	0.21
Food = Food+BCC	42.40	0.00	1.33	0.25
Cash+Food = Food+BCC	29.74	0.00	6.99	0.01

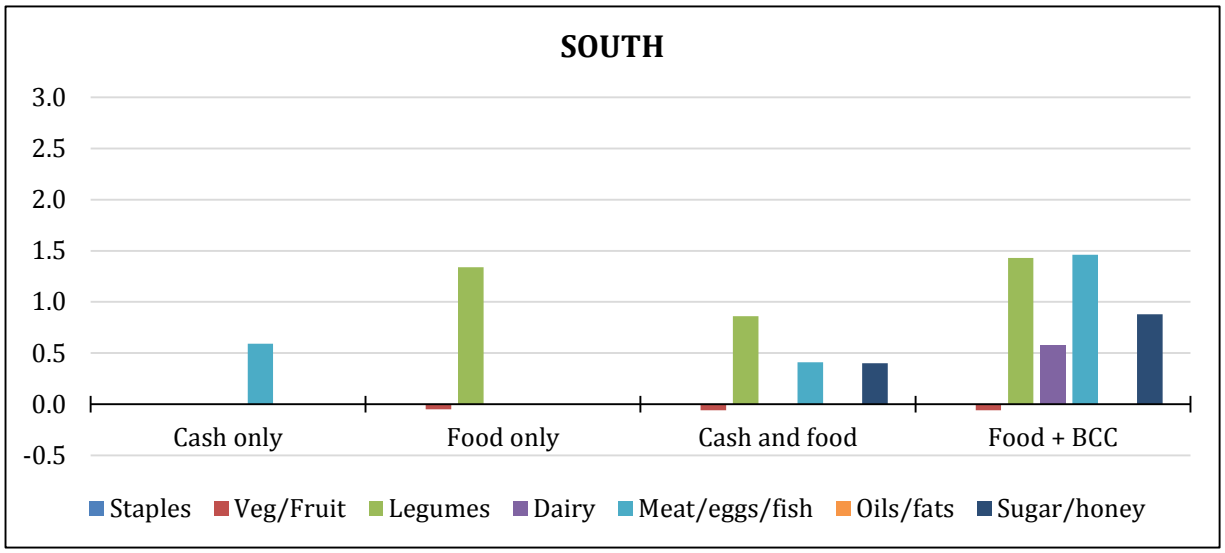
Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Adjusted for survey design, stratified at zone level, and clustered at village level.

Figure 6.5 Impact of the TMRI treatment arms on frequency of food groups consumed in past 7 days, north



Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Relative to control, significant at the ≤10% level.

Figure 6.6 Impact of the TMRI treatment arms on frequency of food groups consumed in past 7 days, south



Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Relative to control, significant at the ≤10% level.

6.5 Summary

In this chapter, we assessed the impact of the TMRI interventions on several measures of household consumption. These include self-assessed hunger, expenditures on food and nonfood consumption, caloric intake, and WFP's Food Consumption Score (FCS). The overall story that emerges is that all the treatment modalities in both zones cause meaningful improvements in nearly all of these measures of consumption. However, combining transfers with nutrition behavior change communication (BCC) trainings consistently causes considerably larger improvements than transfers alone. Adding BCC to transfers induces significantly greater expenditures on food, both through higher caloric intake and purchase of more expensive calories, with the latter corresponding to a reallocation of the diet from staples to more nonstaples, including animal source foods such as dairy and meat/eggs/fish. This is reflected in the addition of BCC also causing greater improvements in the FCS, which puts a high weight on these animal source foods. Since provision of BCC does not change the amount of transfer resources available to households, the implication is that it changes how households use the same amount of transfer resources. In particular, findings suggest that households are encouraged through the BCC to allocate their transfer resources toward a considerably more diverse diet, relying on fewer staples and more nutritious nonstaples.

Additionally, while patterns of impact are quite similar across both zones, magnitudes of impact tend to be consistently larger in the north than in the south. This pattern is as expected, given the observations noted in Section 6.2.2 regarding lower baseline consumption, better market access, and smaller average household size in the north as well as a likely larger precautionary savings motive and greater crowd-out of private transfers in the south. It is worth noting that another possibility raised by consistently larger consumption impacts from *Cash+BCC* in the north than *Food+BCC* in the south is that cash transfers may better allow acting on the information from BCC than food transfers, for example allowing for purchases in markets of diverse nonstaple food groups to occur more easily. Since impacts from the *Cash+BCC* and *Food+BCC* arms cannot be directly compared due to their being randomized in different zones, this explanation can only be suggestive rather than conclusive.

7. THE IMPACT OF THE TMRI ON MATERNAL KNOWLEDGE AND PRACTICES RELATED TO CHILD NUTRITION

7.1 Introduction

The TMRI nutrition behavior change communication (BCC) component focused on the following topics: (1) overall importance of nutrition and diet diversity for health; (2) hand-washing/hygiene for improving nutrition and health; (3) micronutrients: diversifying diets, Vitamin A; (4) micronutrients: diversifying diets, iron, iodine, and zinc; (5) feeding young children: breastfeeding (6) feeding young children: complementary feeding; and (7) maternal nutrition.

In this section, we assess whether mothers acquired knowledge of improved care practices via their participation in and whether they acted on this knowledge. We begin with an exploration of mothers' knowledge of good nutrition, health and hygiene practices. Improvements in these areas that are causally linked to the BCC component suggest a mechanism by which the TMRI can improve care practices. We focus on the following: child feeding and hygiene practices, child diet, and use of micronutrient powders.

7.2 Maternal Knowledge

At baseline, midline, and endline, mothers were asked questions regarding breastfeeding, complementary feeding, hygiene, and sanitation. These questions were based on material covered during the BCC sessions and were asked in an identical fashion in all survey rounds. An increase in the percentage of correct answers in the *Cash+BCC* and *Food+BCC* arms suggests that mothers learned and retained new knowledge regarding child care practices. However, it is important to note that information on breastfeeding and some other topics covered by the BCC were also being disseminated through other information campaigns. For this reason, we want to see how the change in knowledge in the BCC groups compares with similar understanding in the non-BCC treatment arms as well as control households. We do this in two ways: (1) with descriptive statistics showing the percentage of mothers who correctly answer questions, disaggregating by survey round, treatment arm, and region; and (2) by estimating ANCOVA models of the effect of TMRI treatment of maternal knowledge of breastfeeding, complementary feeding, hygiene, and sanitation.

7.2.1 Maternal Knowledge Regarding Correct Breastfeeding Practices

Based on responses to the TMRI survey's seven questions on correct breastfeeding practices, several trends emerge. (See Tables 7.1 and 7.2 for the percentage of women who answered these questions correctly.)[13]

[13] Answers are as follows: 1) How long after birth should a baby start breastfeeding? Ans: Immediately or within one hour of giving birth. 2) What should a mother do with colostrum? Ans: Give it to baby by breastfeeding soon after birth. 3) How often should a baby breastfeed? Ans: Whenever baby wants; when mother sees baby is hungry; when baby cries. 4) What to do if baby not getting enough breastmilk. Ans:

1. Knowledge of correct breastfeeding practices rises over time for all treatment groups in both the north and the south zones.

2. The frequency of breastfeeding was already well understood by virtually all mothers at baseline in both zones. Given the high initial percentages of correct answers (96 percent), there was little change in this outcome.

3. There are a series of topics—for example, when to initiate breastfeeding, the age at which children can be given liquids, the age at which children should commence consumption of solid foods—where most (75 to 80 percent) women provided correct answers at baseline. For these questions, knowledge increases in the control and the non-BCC treatment groups but it increases slightly more in the BCC treatment groups in both zones. Other topics—what to do with colostrum, what to do if the baby is not consuming enough breastmilk, whether a child younger than six months can be given liquids to cool them during hot weather or conditions—where the majority of mothers did not know the correct practice at baseline. For these, modest increases in knowledge were seen in the control and the non-BCC treatment groups over time. Much larger increases were seen, however, in the BCC treatment groups. For example, in the control group in the south, there was no increase in the percentage of mothers that could correctly state what to do if their baby is not consuming enough breastmilk. By contrast, in the *Food+BCC* group, the percentage of mothers providing correct answers rose from 30 percent at baseline to 60 percent at endline. Similarly, in the north control group, the percentage of mothers stating that children younger than six months should not be given water even when it is hot outside rises from 31 to 45 percent. In the north *Cash+BCC* group, that percentage rises from 29 to 82 percent.

Breastfeed more often/more frequently; Mother needs to drink more water; Mother needs to eat more food. 5) Can you give baby < 6m water if it is hot? Ans. No. 6) Age at which you can start giving liquid in addition to breastmilk? Ans: Six months. 7) Age at which you can start giving food in addition to breastmilk? Ans: Six months.

Table 7.1 Maternal knowledge regarding breastfeeding by treatment arm and round, north

	Control	Cash	Food	Cash+Food	Cash+BCC
Mothers correctly state how frequently they should breastfeed					
Baseline	94.9	93.1	94.6	94.1	94.0
Endline	94.9	93.1	94.6	94.1	94.0
Mothers correctly state when to initiate breastfeeding					
Baseline	81.6	84.3	83.1	79.9	80.6
Endline	91.4	91.9	90.2	91.2	96.8
Mothers correctly state age at which baby can be given liquids					
Baseline	76.2	77.5	78.9	78.2	77.4
Endline	84.8	82.3	85.0	82.2	94.2
Mothers correctly state age at which baby can be given solid foods					
Baseline	74.3	82.3	80.8	73.8	76.8
Endline	83.8	86.2	87.5	83.3	88.5
Mothers correctly state what to do with colostrum					
Baseline	48.4	43.2	46.2	48.0	46.5
Endline	58.4	54.1	57.8	54.2	62.9
Mothers correctly state what to do if baby is not consuming enough breastmilk					
Baseline	25.5	32.4	28.6	27.8	28.6
Endline	36.3	34.9	40.3	43.7	56.1
Mothers know not to give baby <6m water when it is hot					
Baseline	31.8	30.7	28.7	27.7	28.8
Endline	45.8	46.1	40.9	48.1	81.9

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Table 7.2 Maternal knowledge regarding breastfeeding by treatment arm and round, south

	Control	Cash	Food	Cash+Food	Cash+BCC
Mothers correctly state how frequently they should breastfeed					
Baseline	97.1	94.0	96.0	96.0	96.1
Endline	97.1	94.0	96.0	96.0	96.1
Mothers correctly state when to initiate breastfeeding					
Baseline	85.9	87.9	87.9	89.1	87.8
Endline	92.9	90.2	92.3	87.9	97.1
Mothers correctly state age at which baby can be given liquids					
Baseline	71.9	68.4	68.4	66.1	64.6
Endline	82.5	82.3	83.7	79.9	91.1
Mothers correctly state age at which baby can be given solid foods					
Baseline	78.2	80.2	71.3	76.6	79.5
Endline	87.9	83.8	87.9	87.4	88.8
Mothers correctly state what to do with colostrum					
Baseline	52.0	44.8	49.6	49.3	45.1
Endline	53.8	48.2	56.7	49.8	61.9
Mothers correctly state what to do if baby is not consuming enough breastmilk					
Baseline	40.3	35.3	40.8	34.3	30.6
Endline	36.8	43.7	43.3	43.7	60.9
Mothers know not to give baby <6m water when it is hot					
Baseline	20.2	18.6	21.8	18.1	19.4
Endline	38.0	36.0	42.1	39.5	75.2

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

For the north, we estimate the following:

$$Know\_breastfeeding_{endline} = \alpha \cdot Know\_breastfeeding_{baseline} + \beta 1 \cdot Cash + \beta 2 \cdot food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Cash\&BCC + \gamma \cdot Controls + \varepsilon_{endline} \quad (7.1)$$

For the south, we estimate:

$$Know\_breastfeeding_{endline} = \alpha \cdot Know\_breastfeeding_{baseline} + \beta 1 \cdot Cash + \beta 2 \cdot food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Food\&BCC + \gamma \cdot Controls + \varepsilon_{endline} \quad (7.2)$$

To estimate the impact of the TMRI on maternal knowledge regarding breastfeeding practices, we sum the number of correct answers provided by mothers to these questions, which ranges in value from zero to seven. At baseline, across all treatment groups, the average number of correct answers was 4.4 in the north and 4.3 in the south. In both zones, at baseline only 19 percent of mothers could correctly answer six or seven of these questions. We estimate ANCOVA regressions for two outcomes: the number of correct responses and whether mothers could answer at least six questions correctly. (See Table 7.3 for results.)

For the north, we estimate the following:

$$Know\_breastfeeding_{endline} = \alpha \cdot Know\_breastfeeding_{baseline} + \beta 1 \cdot Cash + \beta 2 \cdot Food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Cash\&BCC + \gamma \cdot Controls + \varepsilon endline \quad (7.3)$$

For the south, we estimate:

$$Know\_breastfeeding_{endline} = \alpha \cdot Know\_breastfeeding_{baseline} + \beta 1 \cdot Cash + \beta 2 \cdot Food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Food\&BCC + \gamma \cdot Controls + \varepsilon_{endline} \quad (7.4)$$

We use ordinary least squares regressions for the number of correct answers and probits for the outcome: "Answered six or more questions correctly." The probit parameter estimates have been converted to their marginal effects. Calculation of the standard errors accounts for the clustered nature of the sample. We include mother age and schooling as additional control variables to improve the precision of our estimate; their inclusion has little effect on the impact estimates.

Only the BCC arms affect maternal knowledge of correct breastfeeding practices, and the impacts are comparable in both zones. The BCC training increases the number of correct answers by 0.8, which represents an 18 percent increase relative to baseline values. The likelihood that mothers can correctly describe all or nearly all of the seven breastfeeding practices being evaluated increases by 29 percentage points in the north and 32 percentage points in the south.

7.2.2 Maternal Knowledge Regarding Hygiene and Nutrition

In addition to questions on breastfeeding, mothers were asked a range of questions about sanitation, hygiene, food preparation, and the consumption of complementary foods. At baseline, a number of questions were correctly answered by nearly all respondents. These included questions about when hands should be washed, how to treat diarrhea, and why to cook vegetables with oil. Other questions focusing on hygiene practices, food preparation, and the nutrient content of foods showed more variation in maternal knowledge at baseline. Table 7.4 provides descriptive statistics for these.[14] While there are some questions where knowledge is widespread, on average mothers could answer only about 8 of the 16 questions accurately at baseline. In both zones, only 6 percent answered 75 percent or more of these questions correctly.

[14] Answers are: *Hygiene*: What do you use to wash your hands? Before feeding self and child? After using the toilet? After cleaning a child who has defecated? At other times? Soap. Ash. Mud. Water. Ans: Soap. *Food preparation:* How did you clean vegetables? Cut into small pieces and then wash in water? Wash the whole vegetable and the cut into pieces; Combination. Ans: Wash the whole vegetable and the cut into pieces. *Nutrient content of foods:* Which of these three foods is a rich source of Vitamin A: green leafy vegetables, rice, or pulses? Ans: Green leafy vegetables. Which of these three foods is a rich source of Vitamin A: wheat, cooking oil, or mangoes? Ans: Mango. Which of these three foods is a rich source of Vitamin A: maize, mola fish, or coriander? Ans: Mola fish. Which of these three foods is a rich source of iron: Liver, rice, or bananas? Ans: Liver. Which of these three foods is a rich source of iron: Amaranth, potato, or puti fish? Ans: Amaranth. Which of these three foods is a rich source of iron: Colocasia leaves, butter, or snake head fish? Ans: Colocasia leaves. Which of these three foods is a rich source of Vitamin C: Meat, guava, or fish? Ans: Guava. What seasoning (food item) is often fortified with iodine (a nutrient important for brain development)? Salt, other. Ans: Iodized salt. *Micronutrient deficiencies:* Have you heard of the disease goiter? Ans: Yes. Which food prevents you from having goiter? Iodized salt; Leafy vegetables; Guava. Ans: Iodized salt. What happens if children do not get enough iron? Impaired learning; Impaired development; Lower height; Weakened immune defense; Feel tired; Become anemic; Other (specify); Don't know. Ans: Impaired learning; Impaired development; Lower height; Weakened immune defense; Feel tired; Become anemic.

Table 7.3 Impact of TMRI on maternal knowledge of breastfeeding practices, by zone

	North		South	
	(1) Number of questions correctly answered	(2) Answered six or more questions correctly	(3) Number of questions correctly answered	(4) Answered six or more questions correctly
Baseline value	0.081***	0.001	0.065***	0.062**
	(0.022)	(0.029)	(0.021)	(0.027)
Treatment				
Cash only	-0.072	0.007	-0.107	-0.012
	(0.092)	(0.035)	(0.096)	(0.035)
Food only	-0.000	0.019	0.125	0.038
	(0.091)	(0.037)	(0.097)	(0.038)
Cash+Food	0.024	0.019	-0.038	0.008
	(0.092)	(0.034)	(0.108)	(0.040)
Cash+BCC	0.809***	0.295***	–	–
	(0.088)	(0.037)		
Food+BCC	–	–	0.826***	0.320***
			(0.093)	(0.037)
Controls				
Mother age (years)	0.001	-0.000	-0.003	-0.000
	(0.003)	(0.001)	(0.002)	(0.001)
Mother schooling (grades)	0.024**	0.007*	0.013	0.006*
	(0.010)	(0.004)	(0.010)	(0.004)
Constant	4.522***	–	4.651***	–
	(0.152)		(0.157)	
R-squared	0.071		0.072	
Number of observations	2,356	2,356	2,380	2,380

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 7.4 Maternal knowledge of selected hygiene practices and nutrition at baseline by zone

	North	South
	Percent of mothers who provide correct answer	
Hygiene: What do you use to wash your hands?		
Before feeding self and child	40.5	20.2
After using the toilet	45.2	49.2
After cleaning a child who has defecated	56.7	52.2
At other times	15.8	7.9
Food preparation		
How did you clean vegetables?	9.7	15.0
Nutrient content of foods		
Which of these three foods is a rich source of Vitamin A: green leafy vegetables, rice, or pulses?	89.6	89.5
Which of these three foods is a rich source of Vitamin A: wheat, cooking oil, or mangoes?	28.7	43.5
Which of these three foods is a rich source of Vitamin A: maize, mola fish, or coriander?	52.2	62.1
Which of these three foods is a rich source of iron: liver, rice, or bananas?	54.8	56.1
Which of these three foods is a rich source of iron: amaranth, potato, or puti fish?	22.5	26.4
Which of these three foods is a rich source of iron: colocasia leaves, butter, or snake head fish?	90.8	81.3
Which of these three foods is a rich source of Vitamin C: meat, guava, or fish?	65.1	64.6
What seasoning (food item) is often fortified with iodine (a nutrient important for brain development)?	46.3	47.2
Micronutrient deficiencies		
Have you heard of the disease goiter?	72.3	61.5
Which food prevents you from having goiter?	34.8	44.0
What happens if children do not get enough iron?	80.1	61.4
Summary		
Mean number of correct answers	7.9	7.6
Percent of mothers correctly answering 12 or more questions (75%)	6.6	5.9

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

To assess the impact of the TMRI on maternal knowledge of selected hygiene practices and nutrition, we use the same approach and methods used for the knowledge of breastfeeding practices. Again we have two outcome variables: the mean number of correct answers and whether mothers could accurately answer a "high" number of questions (in this instance, meaning at least 75 percent). Results are shown in Table 7.5.

Table 7.5 Impact of TMRI on maternal knowledge of selected hygiene practices and nutrition, by zone

	NORTH		SOUTH	
	(1) Number of questions correctly answered	(2) Answered 75% or more questions correctly	(3) Number of questions correctly answered	(4) Answered 75% or more questions correctly
Baseline value	0.135***	0.128***	0.145***	0.142***
	(0.025)	(0.047)	(0.026)	(0.049)
Treatment				
Cash only	0.453**	0.071*	0.436**	0.078**
	(0.192)	(0.042)	(0.185)	(0.034)
Food only	0.217	0.049	0.103	0.008
	(0.195)	(0.041)	(0.183)	(0.033)
Cash+Food	0.458**	0.053	0.373*	0.069*
	(0.202)	(0.041)	(0.202)	(0.039)
Cash+BCC	3.809***	0.678***	-	-
	(0.191)	(0.028)		
Food+BCC	-	-	3.302***	0.562***
			(0.211)	(0.033)
Controls				
Mother age (years)	0.007	0.001	0.008	0.003***
	(0.005)	(0.001)	(0.005)	(0.001)
Mother schooling (grades)	0.135***	0.023***	0.111***	0.024***
	(0.018)	(0.004)	(0.022)	(0.004)
Constant	7.228***	-	7.321***	-
	(0.283)		(0.316)	
R-squared	0.290		0.198	
Number of observations	2,356	2,356	2,380	2,380

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 7.5 shows unequivocally that the BCC component of the TMRI increased maternal knowledge of hygiene practices and nutrition. It increased the number of correct answers by 3.8 in the north and 3.3 in the south; these increases represent a 49 and 43 percent increase in knowledge, respectively. The percentage of women who could answer at least 75 percent of these questions correctly was 67.8 percentage points higher in the *Cash+BCC* group than the control group in the north and 56.2 percentage points higher in the *Food+BCC* group than the control group in the south. All these effects are statistically significant at the 1 percent level.

Summary

It is clear that the nutrition BCC components increased maternal knowledge of correct breastfeeding, selected hygiene practices, and nutrition in both the north and south. The effect sizes are large in magnitude and statistically significant. Further, the BCC treatment arms are the only component of the TMRI to have meaningful effects on these outcomes.

7.3 Maternal Practices: Child Feeding and Hygiene

Did the TMRI improve maternal practices with respect to child feeding and hygiene? Such improvements require additional resources—for example, the ability to purchase soap for hand-washing—as well as greater understanding, knowledge, and willingness to adopt new practices. In this section, we assess the impact of the TMRI on the appropriate introduction of liquids and complementary foods, selected hygiene practices, and meal frequency.

We begin with the appropriate introduction of liquids and complementary foods. Table 7.6 reports ANCOVA estimates for three self-reported measures: (1) the introduction of water before a child is six months old; (2) the introduction of other liquids before the child is six months old; and (3) the introduction of solids before age six months. As all of these outcome variables are dichotomous, the models were estimated as probits with the coefficients converted to marginal effects. In both the north and south, mothers exposed to the BCC component were less likely to report introducing water, other liquids, or foods early (before six months). The magnitudes of these effects are large and are all statistically significant at the 1 percent level. For example, mothers in the BCC arms were 29 percent (north) and 31 percent (south) less likely to report the early introduction of water.

Table 7.6 Impact of TMRI on the appropriate introduction of liquids and complementary foods, by zone

	North			South		
	(1)	(2)	(3)	(4)	(5)	(6)
	Mothers who reported the early introduction of:			Mothers who reported the early introduction of:		
	Water	Other liquids	Food	Water	Other liquids	Food
Baseline value	0.076***	0.086***	0.089***	0.160***	0.126***	0.111***
	(0.020)	(0.019)	(0.017)	(0.023)	(0.020)	(0.019)
Treatment						
Cash only	-0.014	-0.009	-0.006	0.054	-0.015	-0.008
	(0.035)	(0.026)	(0.021)	(0.040)	(0.034)	(0.024)
Food only	0.001	-0.029	-0.034*	-0.001	0.029	0.023
	(0.034)	(0.026)	(0.019)	(0.037)	(0.037)	(0.026)
Cash+Food	0.057	0.024	-0.026	0.018	0.058	0.011
	(0.036)	(0.029)	(0.019)	(0.040)	(0.038)	(0.031)
Cash+BCC	-0.289***	-0.170***	-0.124***	-	-	-
	(0.026)	(0.021)	(0.013)			
Food+BCC	-	-	-	-0.301***	-0.167***	-0.095***
				(0.032)	(0.028)	(0.021)
Controls						
Mother age (years)	0.000	-0.001	-0.000	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mother schooling (grades)	-0.003	-0.007**	-0.007**	-0.001	-0.007*	-0.005
	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)
Number of observations	2,054	1,826	1,873	2,152	1,702	1,811
Baseline mean	0.59	0.42	0.30	0.74	0.44	0.29

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Next we consider two hygiene practices: whether the child defecates in a latrine; and (2) whether the mother reports washing her hands with soap before feeding the child. (Results are shown in Table 7.7.) Note that because we do not have baseline data on these outcomes, we estimate single difference effects. That is, we estimate the following models for the north and south, respectively:

$$Hygiene\_practice_{endline} = \beta 1 \cdot Cash + \beta 2 \cdot Food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Cash\&BCC + \gamma \cdot Controls + \varepsilon_{endline} \quad (7.5)$$

$$Hygiene\_practice_{endline} = \beta 1 \cdot Cash + \beta 2 \cdot Food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Food\&BCC + \gamma \cdot Controls + \varepsilon_{endline} \quad (7.6)$$

Table 7.7 Impact of TMRI on selected hygiene practices by zone

	NORTH		SOUTH	
	(1)	(2)	(3)	(4)
	Child defecates in latrine	Mother washes hands with soap before feeding child	Child defecates in latrine	Mother washes hands with soap before feeding child
Treatment				
Cash only	0.081*	0.051	0.073*	0.142***
	(0.042)	(0.043)	(0.040)	(0.044)
Food only	0.056	-0.020	-0.018	0.052
	(0.045)	(0.040)	(0.044)	(0.047)
Cash+Food	0.046	0.029	0.012	0.139***
	(0.043)	(0.043)	(0.040)	(0.044)
Cash+BCC	0.332***	0.265***	-	-
	(0.039)	(0.034)		
Food+BCC	-	-	0.137***	0.383***
			(0.035)	(0.034)
Controls				
Mother age (years)	0.001	0.002**	0.004***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Mother schooling (grades)	0.002	0.014***	0.013***	0.013***
	(0.004)	(0.004)	(0.004)	(0.004)
Number of observations	2,334	2,334	2,349	2,349
Mean (control group, endline)	0.32	0.53	0.56	0.36

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 7.7 indicates that exposure to the BCC trainings in both zones improves these two hygiene practices. The effect sizes are large—from 13 to 38 percentage point increases—and statistically significant. Interestingly, participation in the *Cash* treatment arm also improves these practices, but the magnitude of effects are much smaller; we can reject the null hypothesis that the *Cash* and *Cash+BCC* treatments (north) and the *Cash* and *Food+BCC* treatments (south) have equal effects.[15]

Lastly, we look at the impact of the TMRI on meal frequency, specifically the number of times the youngest child (who is also younger than 42 months) consumed solid, semi-solid or soft foods other than liquids in the 24 hours prior to the interview. We can think of the TMRI working through two channels: (1) by increasing the amount of food available for consumption and thus creating the possibility that additional meals can be served to children; and (2) by improving maternal knowledge of the importance of frequent feeding of children. We again use the ANCOVA models described by equations (7.1) and (7.2); for this outcome, we also include child sex and age as additional controls. (Results are shown in Table 7.8.)

[15] In preliminary work, we assessed whether the TMRI reduced reported child illness, including diarrhea, cough, and fever, but found no evidence of impact.

The BCC treatments increase meal frequency, but the magnitudes of these effects are small, at less than 10 percent of the baseline mean. In the south, the *Cash and Food* treatment arm increases meal frequency by 0.3 meals per day, an impact equal to the *Food+BCC* treatment.

Table 7.8 Impact of TMRI on preschool child meal frequency, by zone

	North (1)	South (2)
Baseline value	-0.004	-0.010
	(0.019)	(0.027)
Treatment		
Cash only	-0.027	0.165
	(0.112)	(0.127)
Food only	0.034	0.125
	(0.110)	(0.126)
Cash+Food	-0.043	0.301**
	(0.121)	(0.139)
Cash+BCC	0.225*	-
	(0.123)	
Food+BCC	-	0.325**
		(0.127)
Controls		
Child age (months)	0.050	-0.079
	(0.049)	(0.062)
Girl	0.003	0.010
	(0.004)	(0.007)
Mother age (years)	0.004	0.007***
	(0.003)	(0.003)
Mother schooling (grades)	0.015	0.011
	(0.009)	(0.012)
Constant	3.390***	3.765***
	(0.192)	(0.306)
R squared	0.011	0.013
Observations	1,915	1,863

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Summary

In this section, we have assessed whether the TMRI affected the appropriate introduction of liquids and complementary foods, hygiene practices, and meal frequency. Across many of these outcomes, the nutrition BCC training had beneficial impacts on these behaviors. We find this in both the north and the south and, generally, the magnitudes of these effects are comparable in both zones. Further, with the exception of meal frequency in the south, the non-BCC treatments generally have little or no effect on these practices in both zones.

7.4 Complementary Feeding

After age six months, it is important that children begin to consume a diverse diet that meets their increasing energy needs as well as providing necessary micronutrients. There is growing evidence that the quality of children's diets—specifically the consumption of nutrient-rich legumes and animal source foods as well as vitamin-rich fruits and vegetables—is as important as the quantity of calories consumed. Arimond and Ruel (2004), Mallard et al. (2014), and others find that diverse diets are associated with reductions in chronic undernutrition. These complementary foods were an important focus of the BCC training. With this in mind, the TMRI questionnaire included 20 questions about food types consumed by young children in the 24 hours prior to their mothers' interviews. We aggregated these responses into the seven food groups recommended by the WHO as useful indicators of complementary feeding practices: (1) grains, roots, tubers; (2) legumes, nuts; (3) dairy products; (4) flesh foods (meat, poultry, fish); (5) eggs; (6) Vitamin A–rich fruits and vegetables; and (7) other fruits and vegetables (WHO 2008). We wanted to see if the TMRI treatment arms improve the quality of pre-school children's diets and whether adding the nutrition BCC increases the impact of the cash transfers (north) and the food transfers (south). Because we have a relatively large number of outcomes to consider, we first report results for the North, then separately for the South.

7.4.1 North

Table 7.9 demonstrates the percentage of children consuming these different types of foods in the previous 24 hours by survey round. The first three columns report baseline values for children 6–24 months disaggregated by sex. As noted above, the last three columns report endline percentages for children 6-42 months.

At baseline, nearly all children consumed grains (primarily rice), roots, or tubers. About 45 percent consumed fruits and vegetables rich in Vitamin A, primarily leafy green vegetables. But beyond these two food groups, children's diets were seen to be fairly monotonous. The average child consumed fewer than two different food groups and, in the seven days prior to being surveyed, only 8 percent of children consumed four or more different food groups—the number of food groups considered by WHO to provide minimum diet diversity. There are no meaningful differences in the consumption of different food groups by girls and boys.

At endline, all these percentages rose by varying amounts. All children consumed staples (again, primarily rice), and there are substantial increases in the percentage of children consuming legumes (22 percent), flesh foods (29 percent), fruits and vegetables rich in vitamin A (19 percent), and eggs (14 percent). Consumption of other food groups also rose but by smaller magnitudes. The mean number of food groups consumed increased to 2.97 and approximately 30 percent of children consumed a minimally diverse diet.

Table 7.9 Consumption of food groups, by sex and survey round, north

	Baseline			Endline		
	Children 6–24 months			Children 6–42 months		
	Girls	Boys	All	Girls	Boys	All
Grains, roots, tubers	85.9	88.7	87.3	99.4	99.0	99.2
Legumes, nuts	10.1	11.0	10.6	32.1	32.2	32.1
Dairy products	14.3	15.4	14.8	19.2	21.7	20.5
Flesh foods (meat, poultry, fish)	19.0	18.6	18.8	48.9	46.3	47.5
Eggs	7.2	8.7	8.0	22.2	22.2	22.2
Vitamin A–rich fruits and vegetables	45.2	44.9	45.0	65.1	64.4	64.7
Other fruits and vegetables	8.1	6.1	7.0	10.3	11.8	11.1
Mean number of food groups consumed	1.90	1.93	1.91	2.97	2.97	2.97
Percent children consuming 4+ food groups	8.0%	8.0%	8.0%	29.3%	30.4%	29.9%

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

These increases could reflect three factors: (1) increasing household incomes being used to purchase foods consumed by young children (among other uses); (2) children getting older, which is associated with the introduction of a greater variety of foods; or (3) the impact of the TMRI. To assess the impact of the TMRI, as we have done earlier, we estimate the following ANCOVA regression:

$$Food\ group_{endline} = \alpha \cdot Food\ group_{baseline} + \beta 1 \cdot Cash + \beta 2 \cdot Food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Cash\&BCC + \gamma \cdot Controls + \varepsilon_{endline} \quad (7.7)$$

We estimate (7.7) using probits as these outcomes are dichotomous, and we convert the parameter estimates to their marginal effects. Calculation of the standard errors accounts for the clustered nature of the sample. We include child age and sex, mother age and schooling, and additional control variables to improve the precision of our estimate; their inclusion has little effect on the impact estimates. Results are shown in Table 7.10.

Table 7.10 Impact of the TMRI on consumption of individual food groups, north

	(1) Grains, roots, tubers	(2) Legumes, nuts	(3) Dairy products	(4) Flesh foods	(5) Eggs	(6) Vitamin A-rich fruits and vegetables	(7) Other fruits and vegetables
Baseline value	0.001	0.116***	0.081***	0.109***	0.102**	0.039*	0.061*
	(0.001)	(0.039)	(0.031)	(0.031)	(0.041)	(0.023)	(0.032)
Treatment							
Cash only	-0.000	0.004	-0.025	0.070	0.061*	-0.017	0.072**
	(0.001)	(0.040)	(0.028)	(0.047)	(0.036)	(0.054)	(0.029)
Food only	-0.000	0.073*	-0.016	0.042	0.060	-0.003	0.016
	(0.001)	(0.043)	(0.027)	(0.045)	(0.039)	(0.054)	(0.026)
Cash+Food	0.000	0.117***	-0.023	0.049	0.064*	-0.061	0.007
	(0.001)	(0.042)	(0.032)	(0.040)	(0.037)	(0.054)	(0.027)
Cash+BCC	0.002	0.246***	0.109***	0.228***	0.360***	0.151***	0.192***
	(0.002)	(0.043)	(0.039)	(0.038)	(0.041)	(0.043)	(0.036)
Controls							
Child age (months)	0.000*	-0.001	0.001	0.002	0.001	0.003**	-0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Girl	0.001	-0.005	-0.032*	0.022	-0.006	0.002	-0.021*
	(0.001)	(0.022)	(0.018)	(0.022)	(0.019)	(0.022)	(0.013)
Mother age (years)	0.000	0.002	0.002**	0.000	0.002**	-0.000	0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mother schooling (grades)	0.000	0.004	0.011***	0.002	0.005	-0.001	0.007***
	(0.000)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.002)
Observations	2,080	2,080	2,080	2,080	2,078	2,080	2,080

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

In the north, the *Cash+BCC* treatment arm saw an increase in the consumption of all food groups except staples. Recall, however, that all children consume staples at endline, so there is no space for an impact to occur. The magnitudes of the effect sizes are large: 10.9 percent for dairy products; 15.1 percent for Vitamin A–rich fruits and vegetables; 19.2 percent for other fruits and vegetables; 22.8 percent for flesh foods (meats, poultry, fish); 24.6 percent for legumes and nuts; and 36.0 percent for eggs. All these impacts are precisely measured and statistically significant at the 1 percent level.

What about the other treatment arms, however? The *Food* and *Cash+Food* arms increased the likelihood that children consumed legumes, by 7.3 and 11.7 percent, respectively, but this is not especially surprising given that the food basket contained legumes (lentils). Beyond that, *Cash* and *Cash+Food* increased the likelihood of egg consumption, by 6 percentage points, and *Cash* increases the consumption of other fruits and vegetables by 7 percentage points. Apart from these, there are no other effects of the *non-Cash+BCC* arms on the consumption of other food groups.

These results suggest that only *Cash+BCC* will affect the total number of food groups consumed and whether a child consumes a minimum of four different groups. To assess whether this is true, we ran the model described in equation (7.7) but used two new outcome variables: (1) the number of food groups consumed in the previous 24 hours; and (2) a (0/1) variable that equals one if the child consumed at least four different food groups. As with Table 7.10, we estimated this model for children 6–42 months at endline and included controls for baseline values for these outcomes: child age and sex as well as mother age and education. The number of food groups is estimated using ordinary least squares regression. As this is a count variable, ranging in value from 0 to 7, we also estimated this model using a Poisson estimator. Doing so produced comparable results. The "consumes at least four food groups" outcome variable is estimated using a probit, and the coefficients have been converted to marginal effects. Calculation of the standard errors accounts for the clustered nature of the sample.

Table 7.11 Impact of TMRI on number of food groups and minimum diet diversity, north

	(1) Number of food groups consumed	(2) Child consumes at least four food groups
Baseline value	0.083***	0.108**
	(0.022)	(0.044)
Treatment		
Cash only	0.135	0.012
	(0.095)	(0.040)
Food only	0.143	0.069
	(0.103)	(0.045)
Cash+Food	0.132	0.042
	(0.102)	(0.043)
Cash+BCC	1.236***	0.443***
	(0.102)	(0.040)
Controls		
Child age (months)	0.006*	0.002*
	(0.004)	(0.001)
Girl	-0.027	-0.027
	(0.046)	(0.021)
Mother age (years)	0.006***	0.002**
	(0.002)	(0.001)
Mother schooling (grades)	0.030***	0.014***
	(0.009)	(0.004)
Constant	2.050***	
	(0.185)	
Observations	2,095	2,095
R-squared	0.169	

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Notes: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 7.11 indicates that in the north, the *Cash+BCC* arm increased the number of food groups consumed at endline by 1.2 groups. It also increased the likelihood that a child consumed a minimum of four different food groups by 44.3 percentage points. Both effects are statistically significant at the 1 percent level. No other treatment arm had a statistically significant impact on these outcomes.

Do these results differ by gender? To assess this, we re-estimate the results shown in Tables 7.10 and 7.11 disaggregating by gender. For brevity, we only show the parameter estimates for the *Cash+BCC* group, as there are no meaningful impacts from the other treatment arms in these disaggregated results. The first column of Table 7.12 reports the results from the full sample for the individual food groups followed by the total number of food groups and the four food group minimum. Columns 2 and 3 report results for girls and boys separately. As above, dichotomous (0/1) outcomes are estimated using probits, and the parameter estimates converted into marginal effects.

Table 7.12 Impact of the Cash + BCC treatment arm on child food consumption by sex, north

	(1) All	(2) Girls	(3) Boys
Grains, roots, tubers	0.002	0.000	0.002
	(0.002)	(0.00)	(0.002)
Legumes, nuts	0.246***	0.263***	0.225***
	(0.043)	(0.061)	(0.052)
Dairy products	0.109***	0.170***	0.055
	(0.039)	(0.052)	(0.045)
Flesh foods	0.228***	0.205***	0.251***
	(0.038)	(0.050)	(0.048)
Eggs	0.360***	0.332***	0.382***
	(0.041)	(0.055)	(0.055)
Vitamin A-rich fruit and vegetables	0.151***	0.190***	0.116**
	(0.043)	(0.050)	(0.054)
Other fruit and vegetables	0.192***	0.170***	0.211***
	(0.036)	(0.048)	(0.044)
Number of food groups consumed	1.236***	1.294***	1.181***
	(0.102)	(0.128)	(0.121)
Minimum Diet Diversity	0.443***	0.472***	0.365***
	(0.040)	(0.052)	(0.039)
Sample sizes (approx.)	2,095	1,000	1,095

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Generally, there are small differences in impact by child gender, which are not statistically significant. The one exception is the consumption of dairy, which is higher for girls than for boys with the impact of boys not being statistically significant. Possibly because of this exception, the *Cash+BCC* arms increased the likelihood that girls consumed a minimum of four food groups by a somewhat larger percentage when compared to boys: 47 percent versus 36 percent, respectively.

7.4.2 South

We now assess the impact of the TMRI in the south by first demonstrating the percentage of children consuming different types of foods in the 24 hours prior to their mothers completing the relevant survey round. In Table 7.13, the first three columns report baseline values for children 6–24 months, and the last three columns report endline percentages for children 6–42 months; data from both survey rounds are disaggregated by gender.

Table 7.13 Consumption of food groups, by sex and survey round, south

	Baseline: Children 6–24 months			Endline: Children 6–42 months		
	Girls	**Boys**	**All**	**Girls**	**Boys**	**All**
Grains, roots, tubers	82.7	82.6	82.6	98.0	98.1	98.1
Legumes, nuts	22.9	19.4	21.1	42.2	40.7	41.4
Dairy products	14.1	15.7	14.9	18.4	19.1	18.8
Flesh foods (meat, poultry, fish)	30.7	31.4	31.1	62.9	62.3	62.6
Eggs	7.9	7.5	7.7	14.4	15.1	14.7
Vitamin A-rich fruits and vegetables	42.5	44.3	43.4	54.4	56.0	55.2
Other fruits and vegetables	15.0	14.9	15.0	24.8	24.8	24.8
Mean number of food groups consumed	2.16	2.15	2.15	3.14	3.15	3.14
Percent children consuming 4+ food groups	14.3%	15.3%	14.8%	36.7%	36.9%	36.8%

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

At baseline, the average child in the south consumed 2.15 different food groups, an amount slightly higher than the average child in the north. Just under 15 percent consumed four or more different food groups. As in the north, the most commonly consumed foods were staples (mostly rice) and Vitamin A–rich fruits and vegetables. Children at baseline in the south were also more likely to consume legumes and nuts (21 percent in the south versus 11 percent in the north) and flesh foods (31 percent in the south versus 19 percent in the north). At baseline, there are no meaningful differences by child gender. At endline, consumption of all food groups rises with this being especially pronounced for legumes and nuts (which increase by 21 percentage points) and flesh foods (which increase by 31 percentage points).

To assess the impact of the TMRI in the south, we estimated the following ANCOVA regression:

$$Food\ group_{endline} = \alpha \cdot Food\ group_{baseline} + \beta 1 \cdot Cash + \beta 2 \cdot Food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Food\&BCC + \gamma \cdot Controls + \varepsilon_{endline} \quad (7.8)$$

We estimated equation (7.8) using probits, and we convert the parameter estimates to their marginal effects. Calculation of the standard errors accounts for the clustered nature of the sample. We include child age and sex as well as mother age and schooling as additional control variables to improve the precision of our estimate, although we again note that their inclusion has little effect on the impact estimates. Results are shown in Table 7.14.

Table 7.14 Impact of the TMRI on consumption of individual food groups, south

Variables	(1) Grains, roots, tubers	(2) Legumes, nuts	(3) Dairy products	(4) Flesh foods	(5) Eggs	(6) Vitamin A-rich fruits and vegetables	(7) Other fruits and vegetables
Baseline value	0.001	0.057*	0.170***	-0.014	0.043	0.030	0.082***
	(0.002)	(0.031)	(0.030)	(0.023)	(0.034)	(0.024)	(0.027)
Treatment							
Cash only	0.001	-0.022	-0.000	0.040	0.073**	-0.018	0.005
	(0.004)	(0.042)	(0.031)	(0.037)	(0.030)	(0.057)	(0.038)
Food only	0.000	0.108**	-0.021	0.014	0.036	0.013	0.040
	(0.004)	(0.045)	(0.033)	(0.038)	(0.027)	(0.054)	(0.039)
Cash+Food	-0.002	0.080*	0.046	0.022	0.041	0.001	0.067
	(0.004)	(0.043)	(0.035)	(0.037)	(0.030)	(0.054)	(0.042)
Food+BCC	0.007**	0.251***	0.030	0.127***	0.151***	0.200***	0.134***
	(0.003)	(0.042)	(0.031)	(0.037)	(0.036)	(0.048)	(0.045)
Controls							
Child age (months)	0.001***	0.004***	-0.000	0.007***	0.002*	0.004***	0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Girl	0.000	0.022	-0.008	0.001	-0.011	-0.011	0.002
	(0.002)	(0.020)	(0.017)	(0.020)	(0.015)	(0.022)	(0.019)
Mother age (years)	0.000	0.000	0.001	0.000	-0.001	0.001	0.001*
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mother schooling (grades)	0.001*	0.003	0.007**	-0.000	0.006**	-0.005	0.003
	(0.001)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Observations	2,115	2,115	2,115	2,115	2,112	2,115	2,115

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Notes: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

The dominant pattern of results found in Table 7.14 mirrors what we see in the north (Table 7.10). The *Food* treatment arm increased the likelihood that children consumed pulses as did the *Food+Cash* treatment, but neither affected the consumption of other food groups. The *Cash* treatment increased the likelihood of egg consumption by 7.3 percentage points, but had no other effects. Only the *Food+BCC* treatment affected a wide range of food groups consumed by young children, increasing the likelihood that a child consumed pulses (25 percentage points), flesh foods (13 percentage points), eggs (15 percentage points), fruits and vegetables rich in vitamin A (20 percentage points), and other fruits and vegetables (13 percentage points). These impacts are statistically significant at the 1 percent level. Table 7.15 shows the impact of the TMRI on food groups and minimum diet diversity in the south.

The *Cash+Food* arm led to an increase in the number of foods consumed by 0.23 and the likelihood that the child had a minimally diverse diet by 10.9 percentage points, largely through the impact on pulses. *The Food+BCC* arm had the largest effect, increasing the number of food groups by 0.90 and the likelihood of a minimally diverse diet by 35 percentage points. Neither the *Cash* only nor the *Food* only treatments had a statistically significant impact on these outcomes.

Table 7.15 Impact of TMRI on number of food groups and minimum diet diversity, south

	(1) Number of food groups consumed	(2) Child consumes at least four food groups
Baseline value	-0.019	0.054*
	(0.019)	(0.032)
Treatment		
Cash only	0.063	0.040
	(0.111)	(0.049)
Food only	0.169	0.072
	(0.112)	(0.048)
Cash+Food	0.235**	0.109**
	(0.112)	(0.047)
Food+BCC	0.903***	0.352***
	(0.113)	(0.049)
Controls		
Child age (months)	0.024***	0.005***
	(0.004)	(0.001)
Girl	0.007	0.003
	(0.050)	(0.022)
Mother age (years)	0.004*	0.001
	(0.002)	(0.001)
Mother schooling (grades)	0.016*	0.003
	(0.010)	(0.004)
Constant	1.900***	
	(0.184)	
Observations	2,151	2,151
R-squared	0.099	

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Notes: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Lastly, we assess whether these impacts differ by gender. Results for the impact of *Food+BCC* on child food consumption by gender are shown in Table 7.16. As with our results from the north, there is little evidence of gendered differences in impact.

Table 7.16 Impact of the Food+BCC treatment arm on child food consumption, by sex, south

	(1) All	(2) Girls	(3) Boys
Grains, roots, tubers	0.007**	0.005	0.007
	(0.003)	(0.003)	(0.005)
Legumes, nuts	0.251***	0.234***	0.266***
	(0.042)	(0.050)	(0.055)
Dairy products	0.030	0.056	0.008
	(0.031)	(0.043)	(0.043)
Flesh foods	0.127***	0.126***	0.128***
	(0.037)	(0.047)	(0.043)
Eggs	0.151***	0.204***	0.103**
	(0.036)	(0.049)	(0.045)
Vitamin A-rich fruits and vegetables	0.200***	0.204***	0.196***
	(0.048)	(0.060)	(0.053)
Other fruits and vegetables	0.134***	0.154***	0.116**
	(0.045)	(0.058)	(0.055)
Number of food groups consumed	0.903***	0.972***	0.841***
	(0.113)	(0.127)	(0.139)
Minimum Diet Diversity	0.352***	0.422***	0.293***
	(0.049)	(0.056)	(0.058)
Sample sizes (approx.)	2,151	1,004	1,147

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Notes: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Summary

In this section, we have assessed whether the TMRI improved the quality of preschool children's diets and whether adding the nutrition BCC component increased the impact of the cash transfers (in the north) and the food transfers (in the south). Apart from legumes (which were included in the food ration basket), *Food* only, *Cash* only, and *Food+Cash* transfers generally had little impacts on the diversity of children's diets. Only when transfers were combined with nutrition BCC training sessions did we observe impacts on the consumption of nonstaple foods. These impacts are large and statistically significant. They do not differ by child sex, however.

In the north, *Cash+BCC* increased the likelihood that preschool children consumed flesh foods (meat, poultry, fish) by 22 percentage points, eggs by 36 percentage points, and dairy by 10 percentage points. *Cash+BCC* also increased the likelihood that children consumed four or more different food groups by 44 percentage points. In the south, *Food+BCC* increased the likelihood that preschool children consumed flesh foods (meat, poultry, fish) by 12 percentage points and eggs by 15 percentage points. Unlike in the north, however, there was no impact on the likelihood of dairy

consumption. *Food+BCC* increased the likelihood that children consumed four or more different food groups by 35 percentage points.

7.5 Knowledge and Use of Micronutrient Powders

Micronutrient deficiencies are widespread in rural Bangladesh. There are several ways in which these can be addressed (as was discussed in the previous section), including through the consumption of micronutrient-rich foods. Another means of addressing these is through home fortification by using micronutrient powders. These powders, called either Sprinkles or Monimix, contain iron as well as smaller amounts of Vitamins A and C, zinc, and folic acid. Sachets of the powders were available for purchase at the TMRI study sites, and should be added to children's prepared foods to increase micronutrient intake. The TMRI provides transfer resources for households to buy them, and the nutrition BCC includes a discussion on how to use them.

In the baseline and endline surveys, mothers were asked if they had ever heard of Sprinkles, whether they had ever given Sprinkles to their children (under 60 months), and whether they had used Sprinkles in the previous month. (See Table 7.17.) Enumerators carried sample packets so that mothers would know exactly what the questions were referring to.

Table 7.17 Awareness and use of micronutrient powders, by region and survey round

	Baseline		Endline	
	North	South	North	South
Survey Question	(percent of respondents responding yes)			
Have you ever heard of a powder called Sprinkles for putting in the food of young children?	26.2	16.4	56.4	43.4
Have you ever given these to your preschool children?	6.1	4.0	32.7	16.4
Have you used these in the last month?	2.6	1.6	4.5	2.3

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

At baseline, just over one-quarter of households in the north and 16 percent of households in the south had heard about micronutrient powders. There was little reported use of the powders, with the highest percentage being 6.1 percent of northern households. At endline, however, knowledge of these had increased substantially, by 30 percentage points in the north and 27 in the south. There had been a major increase in their use, with the percentage of northern households reporting use of Sprinkles at least once jumping up to 33 percent, a five-fold increase over the baseline. Use of the micronutrient powder increased in the south, although the magnitude of this change was smaller than in the north. Usage in the last month rose relative to baseline, but the percentages remained low.

As noted elsewhere in this chapter, these increases could be a result of the TMRI or they could reflect increasing household incomes used to purchase the powders, among other things. To assess the impact of the TMRI, we again estimate the following ANCOVA regression for the north and south, respectively:

$$Micronutrient\ Powders_{endline} = \alpha \cdot Micronutrient\ Powders_{baseline} + \beta 1 \cdot Cash + \beta 2 \cdot Food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Cash\&BCC + \gamma \cdot Controls + \varepsilon_{endline} \quad (7.9)$$

$$Micronutrient\ Powders_{endline} = \alpha \cdot Micronutrient\ Powders_{baseline} + \beta 1 \cdot Cash + \beta 2 \cdot Food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Food\&BCC + \gamma \cdot Controls + \varepsilon_{endline} \quad (7.10)$$

We estimate (7.9) and (7.10) using probits, as these outcomes are dichotomous, and we convert the parameter estimates to their marginal effects. Calculation of the standard errors accounts for the clustered nature of the sample. We include mother age and schooling, as additional control variables to improve the precision of our estimate; their inclusion has little effect on the impact estimates. Results are shown in Tables 7.18 and 7.19.

In the north, mothers receiving cash transfers were 12 percentage points more likely to know about micronutrient powders relative to control households. They were 14 percentage points more likely to have ever used them and 6 percentage points more likely to have used them in the past month. All these impacts are statistically significant. Neither *Food* nor the combination of *Food+Cash* transfers affect knowledge or use of these powders. By contrast, *Cash+BCC* has a positive impact, which is considerably larger than the impact of *Cash* alone. Mothers in the *Cash+BCC* treatment arm were 30 percentage points more likely to know about micronutrient powders, 33 percentage points more likely to have ever used them, and 18 percentage points more likely to have used them in the past month. These impact estimates are all statistically significant at the 1 percent level. We tested, and rejected, the null hypothesis that the *Cash* and *Cash+BCC* impacts were equal.

Table 7.18 Impact of the TMRI on knowledge and use of micronutrient powders, north

	(1) Mother has heard of Sprinkles	(2) Mother has ever used Sprinkles	(3) Mother has used Sprinkles in past month
Baseline value	0.154***	0.285***	0.076*
	(0.024)	(0.041)	(0.042)
Treatment			
Cash only	0.120***	0.143***	0.056**
	(0.045)	(0.047)	(0.027)
Food only	0.068	0.059	0.032
	(0.045)	(0.051)	(0.022)
Cash+Food	0.076	0.048	0.045*
	(0.047)	(0.049)	(0.026)
Cash+BCC	0.298***	0.331***	0.177***
	(0.037)	(0.046)	(0.038)
Controls			
Mother age (years)	0.000	-0.000	0.000
	(0.001)	(0.001)	(0.000)
Mother schooling (grades)	0.015***	0.004	0.000
	(0.004)	(0.004)	(0.001)
Observations	2,321	2,335	2,335

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 7.19 Impact of the TMRI on knowledge and use of micronutrient powders, south

	(1) Mother has heard of Sprinkles	(2) Mother has ever used Sprinkles	(3) Mother has used Sprinkles in last month
Baseline value	0.098***	0.221***	0.029
	(0.031)	(0.060)	(0.049)
Treatment			
Cash only	0.022	0.020	0.002
	(0.037)	(0.032)	(0.011)
Food only	-0.004	0.033	0.005
	(0.038)	(0.032)	(0.011)
Cash+Food	-0.003	0.021	0.005
	(0.039)	(0.034)	(0.011)
Food+BCC	0.234***	0.103***	0.044**
	(0.040)	(0.037)	(0.018)
Controls			
Mother age (years)	0.002*	0.001	0.000
	(0.001)	(0.001)	(0.000)
Mother schooling (grades)	0.019***	0.013***	0.001
	(0.004)	(0.003)	(0.001)
Observations	2,325	2,338	2,338

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

In the south, the only treatment arm that affected knowledge or use of micronutrient powders was the *Food+BCC* arm. Mothers in the *Food+BCC* treatment arm were 23 percentage points more likely to know about micronutrient powders, an impact comparable to that observed in the north. However, while they were more likely to have ever used them (10 percentage points) and 4 percentage points more likely to have used them in the past month, these effects are considerably smaller than those observed in the north.

7.6 Summary

Our analysis demonstrated that the BCC components of the TMRI had large, statistically significant impacts on maternal knowledge regarding nutrition and related care practices. In the north, *Cash+BCC* increased by 29 percentage points the likelihood that mothers master much of the information provided by the BCC sessions on breastfeeding. In the south, *Food+BCC* increased this by 32 percentage points. *Cash+BCC* increased the likelihood that mothers mastered much of the information provided by the BCC sessions on hygiene and nutrition topics by 67 percentage points; in the *Food+BCC* arm, understanding increased by 56 percentage points in the south. Since neither the cash treatment in the north nor the food treatment in the south affected these outcomes, these increases in maternal knowledge are due to the BCC.

Are mothers able to act on this knowledge? We found that the two BCC treatment arms improve hygiene practices and the appropriate introduction of liquids and complementary foods. There is also an effect on meal frequency, but the magnitude of this is small. The impacts in both zones are generally comparable, and, across most of the outcomes, the non-BCC treatments had no impacts on these behaviors.

Apart from legumes (which were included in the food basket), *Food only*, *Cash only*, and *Food+Cash* transfers generally had little impacts on the diversity of children's diets. Only when transfers are combined with nutrition BCC do we observe impacts on the consumption of nonstaple foods. These impacts are large and statistically significant. They do not differ by child sex. In the north, *Cash+BCC* increases the likelihood that preschool children consume flesh foods by 22 percentage points, eggs by 36 percentage points, and dairy by 10 percentage points. This intervention arm increases the likelihood that children consume four or more different food groups by 44 percentage points. In the south, *Food+BCC* increases the likelihood that preschool children consume flesh foods by 12 percentage points and eggs by 15 percentage points. Unlike the north, however, there is no impact on the likelihood of dairy consumption. Similarly, the BCC treatments increase maternal knowledge and use of micronutrient powders but again these effects are larger in the north, where the BCC is twinned with cash, than in the South where it was twinned with food.

8. THE IMPACT OF THE TMRI ON CHILD ANTHROPOMETRIC STATUS

8.1 Introduction

Assessing the impact of the TMRI on child anthropometric status is not straightforward, so we begin by providing some background information on the data available and how they influence our approach to this topic. We provide data on baseline child anthropometric status before providing our estimates of program impact. We disaggregate these results by child sex before providing some concluding remarks.

8.2 Background

There are four important features related to the anthropometric data available to us:

1. The intervention is designed around providing resources to the same households for a two-year period.

2. The presence of a child aged 0–24 months at baseline was a precondition for participation in the intervention.

3. No new households were added after the intervention began.

4. In all survey rounds, enumerators were instructed to obtain anthropometric measurements of all children less than 60 months of age who were present in the household at the time of interview. Mindful of this, consider Tables 8.1 and 8.2.

Table 8.1 Number of children with anthropometric measurements, by zone, sex, and age at baseline

Number of:	North	South
Children 0–60 months	2,950	3,016
Children 0–60 months, girls	1,430	1,529
Children 0–60 months, boys	1,520	1,487
Children 0–24 months	2,254	2,321
Children 0–24 months, girls	1,056	1,152
Children 0–24 months, boys	1,178	1,169
Children 24–60 months	696	695
Children 24–60 months, girls	354	377
Children 24–60 months, boys	342	318

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 8.1 gives the number of children with baseline anthropometric data residing in households that appear in both the baseline and endline surveys. There are 5,966 children, essentially evenly divided between boys and girls and between the north and south zones. Reflecting the selection criteria for participation in the study, a vast majority (4,575) are aged 0–24 months.

Table 8.2 Number of children with anthropometric measurements, by zone, sex, and age at endline

Number of:	North	South
Children 0–60 months	2,650	2,734
Children 0–60 months, girls	1,274	1,309
Children 0–60 months, boys	1,376	1,415
Children 0–24 months	211	284
Children 0–24 months, girls	110	127
Children 0–24 months, boys	101	157
Children 24–60 months	2,439	2,450
Children 24–60 months, girls	1,164	1,192
Children 24–60 months, boys	1,275	1,258

Source: 2014 Endline Survey for TMRI Evaluation, IFPRI.

Table 8.2 gives the number of children with endline anthropometric data residing in households that appeared in both the baseline and endline surveys. The number of children found in the north and south remained roughly equal as did the number of boys and girls. The total number of children measured declined, as children aged out by the time of the endline survey and were replaced by a much smaller number of children (211 in the north, 284 in the south) who were born during the period of the intervention. Consequently, while mean child characteristics such as the sex and relationship to household head remained unchanged over the course of the intervention, as Table 8.3 shows, average age of children for whom we have anthropometric data increased between baseline and endline with the vast majority of children at endline ages 24–60 months.

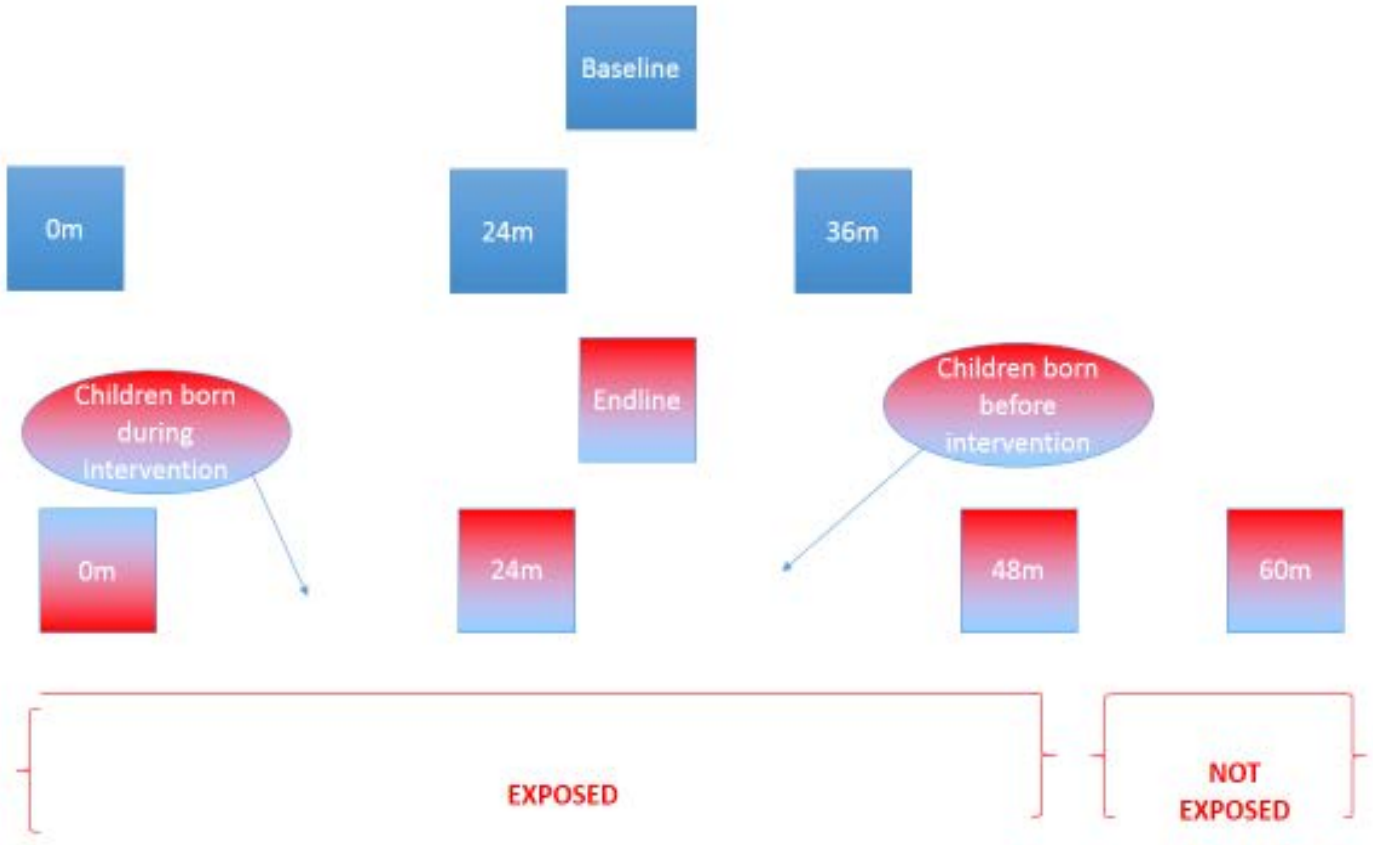
Table 8.3 Baseline child characteristics, by zone

	North		South	
	Baseline	Endline	Baseline	Endline
Mean child age	19.4	36.1	19.6	35.4
Percent children female	48.4	48.0	50.7	48.4
Percent children male	51.6	52.0	49.3	51.6
Percent children who are sons, daughters	84.3	87.1	78.3	82.3
Percent children who are grandchildren	15.3	12.3	20.5	16.8
Percent children who are other relatives of the head of household	0.4	0.6	1.2	0.9

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

These features have an important implication for our work assessing anthropometric outcomes. As is now well understood, the period between conception and age 24 months—the first 1,000 days of life—is a crucial "window of opportunity" for nourishing a child toward linear (length or height) growth (Black et al. 2013). To see how this window intersects with the duration of this intervention and the aging of children in this sample, consider Figure 8.1. The top panel notes that at baseline we have children 0–24 months in our sample. At endline, children initially aged 0–24 months have been exposed to the intervention for varying lengths of time, as are the small number of children born during the two-year intervention. Children who were older than 24 months at baseline are not exposed to the intervention during the "1,000 days."

Figure 8.1 Exposure to the TMRI intervention



Crucially, this means that the sample we use to estimate impact consists entirely of children younger than 48 months at the point in time when the endline survey was fielded. These children include the children younger than 24 months when the intervention began as well as children born during the intervention, who were exposed to the TMRI intervention both *in utero* and for some period of time after they were born. It also means that while the intervention lasted for 24 months—which is the duration of exposure for household-level outcomes—children in our sample were not necessarily exposed during the 1,000 day window of opportunity in its entirety. Instead, their duration of exposure varies based on how old they were when the intervention began. So, a child who was six months old when the TMRI intervention began was exposed for only 18 months of the 1,000 day window. Our results, therefore, reflect an averaging of impacts over all children who had different durations of exposure to the TMRI intervention during their first 1,000 days of life.

8.3 Anthropometry at Baseline

We use five anthropometric measures: (1) height-for-age z-scores; (2) stunting; (3) height-for-age difference; (4) weight-for-height z-scores; and (5) wasting. The z-score measures are calculated using the WHO child growth standards (WHO 2006). Mean values are given separately by region in Tables 7.4 (north) and 7.7 (south). In each table, we report mean baseline values and standard deviations by treatment arm as well as the overall mean for each region. Below each table are results of pairwise tests for equality of means across treatment groups (Tables 8.5 and 8.8) as well as joint tests for the equality of means (Tables 8.6 and 8.9).

At baseline, these children had poor nutritional status relative to the WHO standards for a well-nourished population. For height-for-age z-scores (HAZ), a value of -1 indicates that given sex and age, a child's height is one standard deviation below the median child in that age/sex group. A child with a HAZ below -2 is considered "stunted." Stunting is a measure of chronic undernutrition. It can be thought of as a summary indicator of all factors that influence growth and development during the first 1,000 days of life from conception to age two. Stunting is causally linked to a whole host of adverse consequences over the life course, including lowered final height, less schooling, poorer cognitive skills in adulthood and an increased likelihood of being poor in adulthood (Hoddinott et al. 2013). The mean values for the prevalence of stunting at baseline are 0.47 in the north and 0.43 in the south. The nationally representative 2011 DHS indicates that the prevalence of stunting in rural Bangladesh is 0.40 and mean HAZ is -1.67; these higher prevalences and lower mean HAZ are consistent with these study localities being relatively poorer when compared to other regions.

Weight-for-height z-scores (WHZ) assess a child's weight given her/his height relative to a well-nourished population. For WHZ, a value of -1 indicates that given sex and height, a child's weight is one standard deviation below the median child in that age/sex group. A child with a WHZ below -2 is considered "wasted." Wasting is an indicator of acute undernutrition, reflecting recent illness, inadequate nutrients, or both. Globally, wasting accounts for approximately 13 percent of child deaths annually (Black et al. 2013). Tables 8.4 and 8.7 show that the prevalence of wasting at baseline is 0.13 in the north and 0.15 in the south.

In a recent paper, Leroy et al. (2014) noted that the standard deviation underlying the WHO reference standards increases with age. Given this, in a population that ages over time—as is the case with the TMRI sample—and holding all other factors constant, HAZ will decline. This makes it difficult to interpret height trends in our data. Instead, Leroy et al. suggest using height-for-age difference (HAD), which is simply the absolute difference between the child's height and the reference height given that child's age and sex. Mean baseline HAD is -5.38 in the north and -5.21 in the south. On average, children in this sample are five centimeters shorter than the well-nourished children found in the WHO reference standard.

Lastly, the extensive battery of tests shown in Tables 8.5, 8.6, 8.8, and 8.9, show no evidence of differences in baseline means in these children across treatment arms.

Table 8.4 Mean anthropometric values, baseline, all children, north, by treatment arm

		Height-for-age Z-score (HAZ)	Proportion stunted	Height-for-age difference (HAD)	Weight-for-height Z-score	Proportion wasted	Sample size
Cash	Mean	-1.89	0.49	-5.52	-0.70	0.11	583
	SD	1.53	0.50	4.83	1.19	0.31	
Food	Mean	-1.91	0.48	-5.63	-0.73	0.12	583
	SD	1.47	0.50	4.54	1.16	0.33	
Food+Cash	Mean	-1.82	0.47	-5.39	-0.85	0.15	600
	SD	1.35	0.50	4.72	1.15	0.36	
Cash+BCC	Mean	-1.74	0.46	-5.20	-0.78	0.12	578
	SD	1.39	0.50	4.34	1.18	0.32	
Control	Mean	-1.76	0.46	-5.18	-0.82	0.15	606
	SD	1.37	0.50	4.28	1.18	0.35	
All	Mean	-1.82	0.47	-5.38	-0.78	0.13	2,950
	SD	1.42	0.50	4.55	1.17	0.34	

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 8.5 Prob values from pairwise tests of equality of baseline means, all children, north

		Height-for-age Z-score (HAZ)	Height-for-age difference (HAD)	Weight-for-height (Z-score)
Cash	Food	1.00	1.00	1.00
Cash	Food+Cash	1.00	1.00	0.36
Cash	Cash+BCC	0.66	1.00	1.00
Cash	Control	1.00	1.00	0.86
Food	Food+Cash	1.00	1.00	0.91
Food	Cash+BCC	0.46	1.00	1.00
Food	Control	0.84	0.87	1.00
Food+Cash	Cash+BCC	1.00	1.00	1.00
Food+Cash	Control	1.00	1.00	1.00
Cash+BCC	Control	1.00	1.00	1.00

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 8.6 Prob values from F tests of joint tests of equality of means, all children, north

	HAZ	HAD	WHZ
F test: Equality of means	0.17	0.35	0.19

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 8.7 Mean anthropometric values, baseline, all children, south, by treatment arm

		Height for Age Z-score	Proportion stunted	HAD	Weight for height Z-score	Proportion wasted	Sample size
Cash	Mean	-1.76	0.45	-5.44	-0.97	0.16	616
	SD	1.41	0.50	4.70	1.07	0.37	
Food	Mean	-1.71	0.45	-5.08	-0.82	0.14	596
	SD	1.60	0.50	4.94	1.23	0.35	
Food+Cash	Mean	-1.74	0.43	-5.28	-0.84	0.13	608
	SD	1.43	0.50	4.68	1.16	0.34	
Food+BCC	Mean	-1.74	0.43	-5.15	-0.85	0.16	590
	SD	1.44	0.49	4.64	1.22	0.37	
Control	Mean	-1.72	0.41	-5.12	-0.88	0.16	606
	SD	1.47	0.49	4.58	1.25	0.37	
All	Mean	-1.73	0.43	-5.21	-0.87	0.15	3,016
	SD	1.47	0.50	4.71	1.19	0.36	

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 8.8 Prob values from pairwise tests of equality of baseline means, all children, south

		HAZ	HAD	WHZ
Cash	Food	1.00	1.00	0.28
Cash	Food+Cash	1.00	1.00	0.43
Cash	Food+BCC	1.00	1.00	0.65
Cash	Control	1.00	1.00	1.00
Food	Food+Cash	1.00	1.00	1.00
Food	Food+BCC	1.00	1.00	1.00
Food	Control	1.00	1.00	1.00
Food+Cash	Food+BCC	1.00	1.00	1.00
Food+Cash	Control	1.00	1.00	1.00
Cash+BCC	Control	1.00	1.00	1.00

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

Table 8.9 Prob values from F tests of joint tests of equality of means, all children, south

	HAZ	HAD	WHZ
F test: Equality of means	0.97	0.66	0.18

Source: 2012 Baseline Survey for TMRI Evaluation, IFPRI.

8.4 Basic Results

We begin by examining the impact of exposure to the treatment arms on all children aged less than 48 months at endline who are offspring of the household head. As explained above, all these children had been exposed to these treatment arms at some point during the 1,000 days from conception to age two years. We estimate impact separately for the interventions in the north and south using linear regressions for the continuous outcomes (HAZ, HAD, and WHZ) and probits for the dichotomous outcomes (stunting and wasting). Results of the probit estimates are converted to marginal effects. Calculation of the standard errors accounts for the clustered nature of the sample.

For the north, we estimate:

$$Anthropometric\ outcome_{endline} = \beta 1 \cdot Cash + \beta 2 \cdot Food + \beta 3 \cdot Cash\&Food + \beta 4 \cdot Cash\&BCC + \varepsilon_{endline} \quad (8.1)$$

For the south, we estimate:

$$Anthropometric\ outcome_{endline} = \beta 5 \cdot Cash + \beta 6 \cdot Food + \beta 7 \cdot Cash\&Food + \beta 8 \cdot Food\&BCC + \varepsilon_{endline} \quad (8.2)$$

Cash, *Food, Cash+Food*, *Cash+BCC*, and *Food+BCC* refer to the cash, food, cash and food, cash and behavior change communication, and food and behavior change communication treatment arms. The β's are the parameters to be estimated; they give the impact of exposure of the treatment arm on the anthropometric outcomes described above. The ε's are the disturbance terms in each regression. Importantly, given the randomized nature of this intervention, they are uncorrelated with the treatments and so the estimated β's are unbiased and consistent measures of impact. Results are reported in Tables 8.10 (north) and 8.11 (south).

Table 8.10 indicates that in the north, three treatment arms—*Cash*, *Food*, and *Cash+Food*—have no statistically significant impact on any of the five anthropometric outcomes that we consider. However, *Cash+BCC* has a statistically significant impact on all three height outcomes. It increases HAZ by 0.24 standard deviations, reduces stunting by 7.3 percentage points, and reduces the deficit in heights by 0.92 centimeters. The impact on stunting is statistically significant at the 5 percent level, and the impact on HAZ and HAD is statistically significant at the 1 percent level.

Table 8.10 Basic results: Impact of the TMRI treatment arms on anthropometry: North

	(1) Height-for-age Z-score	(2) Stunting	(3) Height for age deviation	(4) Weight-for-height Z-score	(5) Wasting
Treatment: Cash only	0.031	-0.004	0.043	-0.028	0.009
	(0.08)	(0.04)	(0.30)	(0.07)	(0.03)
Treatment: Food only	0.043	-0.026	0.105	0.075	-0.029
	(0.08)	(0.03)	(0.30)	(0.07)	(0.02)
Treatment: Cash+Food	0.114	-0.034	0.445	-0.055	0.005
	(0.09)	(0.04)	(0.32)	(0.07)	(0.02)
Treatment: Cash+BCC	0.243***	-0.073**	0.926***	0.008	-0.008
	(0.08)	(0.03)	(0.29)	(0.07)	(0.02)
Constant	-2.034***		-7.484***	-1.045***	
	(0.06)		(0.21)	(0.05)	
Observations	2,197	2,197	2,197	2,197	2,197
R-squared	0.007		0.008	0.002	

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Notes: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 8.11 Basic results: Impact of the TMRI treatment arms on anthropometry: South

	(1) Height-for-age Z-score	(2) Stunting	(3) Height for age deviation	(4) Weight-for-height Z-score	(5) Wasting
Treatment: Cash only	-0.114	0.016	-0.372	-0.086	0.022
	(0.08)	(0.04)	(0.31)	(0.08)	(0.03)
Treatment: Food only	-0.118	0.021	-0.269	-0.042	-0.000
	(0.09)	(0.04)	(0.32)	(0.08)	(0.03)
Treatment: Cash+Food	0.007	-0.041	0.104	-0.016	0.008
	(0.08)	(0.04)	(0.31)	(0.08)	(0.03)
Treatment: Food+BCC	0.062	-0.042	0.320	-0.041	-0.003
	(0.08)	(0.03)	(0.30)	(0.08)	(0.03)
Constant	-1.931***		-7.190***	-0.873***	
	(0.06)		(0.22)	(0.06)	
Observations	2,152	2,152	2,152	2,152	2,152
R-squared	0.005		0.004	0.001	

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Notes: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 8.11 indicates that in the south, none of the treatment arms have a statistically significant impact on any of the five anthropometric outcomes that we consider.

Are the *Cash+BCC* results robust? Table 8.12 reports results for three additional specifications. The first column repeats, for reference, the impact estimates of the *Cash+BCC* parameter on HAZ, stunting and HAD. The second column adds controls for child sex and age at endline, with the age controls represented by 47 dummy variables. The third column adds controls for maternal

characteristics—age, schooling and height. The fourth column adds geographic controls, specifically union fixed effects— unions being the level of geographic aggregation above the level over which the intervention was randomized.[16] The striking feature of Table 8.12 is how little change we observe in these impact estimates across alternative model specifications. We estimated these alternative model specifications for WHZ and wasting in the north and for all outcomes in the south. Doing so did not change our findings of no statistically significant outcomes on these.

Lastly, as discussed in chapter 7, as well as in Tables 8.5 and 8.6, our sample is balanced across a wide range of baseline characteristics including baseline anthropometric status. Even so, and even though these results are robust to the inclusion of a wide range of control variables correlated with anthropometric status, suppose that we still harbored residual concerns about our results being driven by pre-existing differences in anthropometry. We can address these by adding baseline anthropometric values to our models. Note however that these baseline values are only available for children born before the intervention begins. This puts downward bias on our estimates because, on average, children born after the intervention began were exposed to it for a longer period during the 1,000 days window. It also reduces our sample size somewhat giving us less statistical power.

Table 8.12 Assessing robustness of Cash + BCC results to inclusion of additional controls

Outcome	(1) Base model (Table 7.10)	(2) Base model plus child characteristics	(3) Base model plus child and maternal characteristics	(4) Base model plus child and maternal characteristics and union fixed effects
Height-for-age Z-score	0.243***	0.268***	0.239***	0.248***
	(0.08)	(0.08)	(0.08)	(0.08)
Stunting	-0.073**	-0.089***	-0.080**	-0.067*
	(0.03)	(0.03)	(0.03)	(0.04)
Height-for-age difference	0.926***	1.035***	0.927***	0.967***
	(0.29)	(0.30)	(0.28)	(0.28)

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Notes: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

[16] Note that for stunting, the union fixed effects estimates are based on a linear probability model.

Table 8.13 Assessing robustness of Cash + BCC results to inclusion of additional controls and baseline anthropometric status

Outcome	(1) Base model (Table 7.10)	(2) Base model plus child and maternal characteristics and union fixed effects plus baseline anthropometric status
Height-for-age Z-score	0.243***	0.197***
	(0.08)	(0.06)
Stunting	-0.073**	-0.046
	(0.03)	(0.03)
Height-for-age difference	0.926***	0.805***
	(0.29)	(0.30)

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.
Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Results are reported in Table 8.13. While all parameter estimates are slightly smaller than those reported in Table 7.10, these differences are not statistically significant. The parameter estimates for HAZ and HAD remain statistically significant at the 1 percent level. The impact estimate on stunting, however, is now more imprecisely measured – possibly for the reasons described above—and is no longer statistically significant.

An alternative explanation for the loss of a statistically significant impact is that in this restricted sample, conditional on baseline stunting status, on average, children are no longer exposed to the *Cash+BCC* treatment arm for a sufficient length of time during the 1,000 days window (see the discussion in section 8.2 on this point.) Mindful of this, suppose we restrict our sample to children who were less than 12 months of age at baseline; these children were exposed to the *Cash+BCC* treatment arm for at least 12 months. When we do so, we find, as we might expect, that even after controlling for baseline stunting status and halving our sample size, there is a significant impact of *Cash+BCC* on stunting (Table 8.14).

8.5 Disaggregated Results

We disaggregate these estimates by child sex to assess whether these impacts are observed in both girls and boys. Note, however, for each model we are essentially dividing our sample in half and so a failure to reject the null hypothesis of no impact could reflect insufficient statistical power. Results are reported in Table 8.15.

Table 8.14 Assessing robustness of Cash + BCC results on stunting to inclusion of additional controls and baseline anthropometric status, by child age at endline

Outcome	(1) Base model (Table 7.10)	(2) Base model plus child and maternal characteristics and union fixed effects plus baseline anthropometric status (Table 7.13)	(3) Base model plus child and maternal characteristics and union fixed effects plus baseline anthropometric status, children < 12 months at baseline
Stunting	-0.073**	-0.046	-0.091*
	(0.03)	(0.03)	(0.05)
Sample size			954

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Note: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 8.15 Basic results: Impacts of the TMRI treatment arms on anthropometry, north, by sex

	(1) Height-for-age Z-score	(2) Stunting	(3) Height for age deviation	(4) Weight-for-height Z-score	(5) Wasting
Males					
Treatment: Cash only	0.017	-0.013	-0.022	-0.071	0.005
	(0.10)	(0.04)	(0.39)	(0.09)	(0.03)
Treatment: Food only	0.066	-0.034	0.166	0.006	-0.023
	(0.10)	(0.04)	(0.38)	(0.09)	(0.03)
Treatment: Cash+Food	0.165	-0.047	0.601	-0.044	-0.001
	(0.12)	(0.04)	(0.44)	(0.09)	(0.03)
Treatment: Cash+BCC	0.227**	-0.049	0.927**	0.028	-0.037
	(0.10)	(0.05)	(0.38)	(0.08)	(0.03)
Constant	-2.038***				
	(0.07)				
Observations	1,154	1,154	1,154	1,154	1,154
R-squared	0.007		0.009	0.001	
Female					
Treatment: Cash only	0.046	0.007	0.122	0.024	0.013
	(0.11)	(0.05)	(0.42)	(0.10)	(0.04)
Treatment: Food only	0.018	-0.018	0.045	0.154*	-0.035
	(0.11)	(0.05)	(0.43)	(0.09)	(0.03)
Treatment: Cash+Food	0.058	-0.020	0.282	-0.066	0.014
	(0.12)	(0.05)	(0.42)	(0.09)	(0.04)
Treatment: Cash+BCC	0.257**	-0.098*	0.946**	-0.008	0.023
	(0.11)	(0.05)	(0.43)	(0.10)	(0.04)
Constant	-2.030***				
	(0.08)				
Observations	1,043	1,043	1,043	1,043	1,043

Source: 2012 Baseline and 2014 Endline Surveys for TMRI Evaluation, IFPRI.

Notes: Standard errors clustered at the village level. *= significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

In the north, we observe statistically significant, and nearly identical, impact estimates of *Cash+BCC* for HAZ and HAD in both boys and girls (Table 8.15). For the two measures of acute undernutrition, there is no impact on either boys or girls. For stunting, the parameter estimate for boys is smaller than the pooled estimate and is not statistically significant. The parameter estimate for girls is larger and, consistent with our reduced statistical power, only significant at the 10 percent level. We constructed a statistical test of the equality of these impacts across boys and girls. For all outcomes, including stunting, we cannot reject the null hypothesis that these impacts are equal.

Table 8.15 contains one new result not found in the pooled estimates; the food treatment increases girls' WHZ by 0.15 standard deviations. However, when we test the robustness of this result to the inclusion of additional control variables, this effect fails to retain statistical significance.

We estimated these models for both boys and girls in the south. For boys, we find no evidence of impact. For girls, we find that the *Food+BCC* treatment arm reduces stunting. However, this effect is statistically significant only at the 10 percent level and loses significance when add additional control variables. Taken all together, these explorations suggest that generally there is no difference in impacts of these treatment arms on the anthropometric status of boys and girls. While there are some differences that suggest larger impacts on stunting for girls, these results are not strong enough to be conclusive.

8.6 Summary

In this chapter, we assess the impact of the TMRI on child anthropometric status. We find that in the north, the *Cash+BCC* arm has a statistically significant impact on reducing chronic undernutrition. The magnitudes are meaningful. Among children who were less than 48 months at endline, the *Cash+BCC* treatment increased height-for-age z scores by 0.24 standard deviations. It reduced stunting by 7.3 percentage points and reduced height deficits by 0.92 centimeters. These results are robust to a variety of alternative model specifications. However, *Cash+BCC* had no impact on measures of acute undernutrition (weight-for-height z scores and wasting). No other treatment arms—cash, food or the mixed cash and food ration—had a statistically significant impact on anthropometric status in the north. In the south, no treatment arm has any impact on any measure of anthropometric status. We estimated impacts separately for girls and boys. There is no difference in impacts across boys and girls. While there are some differences that suggest larger impacts on stunting for girls, these results are not strong enough to be conclusive.

9. THE PEOPLE BEHIND THE NUMBERS: QUALITATIVE FIELD RESEARCH

In this section, we present qualitative research findings depicting a sample of participant household members' views about the usefulness of their involvement in the TMRI, attending the BCC training sessions, and changes in their social relations arising from participation in the project. These are real stories from people behind the numbers, told in their own words.

9.1 Perspectives from TMRI Participants

9.1.1 On the Usefulness of the Transfer

Northern region

"I bought clothes for my children. I planted a couple of trees in my yard. My daughter-in-law bought a goat and gave it to others on lease."
—*Food+Cash* participant (Satakuti village, Kurigram upazila)

"We built a latrine with the cash. We could not build the latrine with one month's cash. At first we installed the ring, then we placed the slab, and finally we set up the bamboo walls around it."
—*Cash+BCC* participant (Majhitari village, Kurigram upazila)

"We consumed the food. We bought two goats with the income we could save. We have eight members in our family, but only one of them is the earning member. We have been receiving the rice [transfer]. It has been a great support for our family. Otherwise, we might have had to spend a lot of money to buy rice."
—*Food* participant (Rajballov village, Gangachhara upazila)

Southern region

"I do not have any words to explain how much this transfer means to me. Now I send my children to private tutors before their exams so they can score well. I bear the expenses of my brother-in-law's education as well."
—*Food+Cash* participant (Bahir Dashpara village, Bauphal upazila)

"We had so much hardship in the past. We could only afford to eat one square meal a day. Last winter, I went to work at the jetty on the other side of the river. I had to work all night. I had to carry sacks of sand into the boat. I would take a few breads with me from home. I worked there for three nights. Then I came back home. I was bedridden for 7 days. I did not have any strength. But now we can eat three square meals a day, and I got my strength back."
—*Food+BCC* participant (Pashorer Dhar village, Dacope upazila)

"In the past, we had to borrow money from others. But now we do not have to borrow money and instead lend money to others. It feels good to be able to help others in need."
—*Cash* participant (Char Manohar village, Char Fasson upazila)

9.1.2 On BCC Training

Northern region

"I have learned about nutritious food for babies. Now, I feed my baby potato mash, lentils, and rice. I keep a portion of curry [aside] before putting in chilies to give it to him."
—*Cash+BCC* participant (Mahindarkhandroketro village, Rajarhaat upazila)

"I wash my hands with soap after using the toilet. I wash my children's hands as well. We wash our hands before taking our meal. This [protects] us from diseases."
—*Cash+BCC* participant (Majhitari village, Kurigram upazila)

Southern region

"I have learned to keep my hands clean [by] attending those training sessions. In the past, I would feed my baby without washing my baby's or my hands. So, my baby often suffered from digestive problems and diarrhea. Now, after attending the training sessions, I know that I must wash my hands after cleaning the baby. Everyone must wash their hands before eating. Now we do not get sick so often."
—*Food+BCC* participant (Pashorer Dhar village, Dacope upazila)

9.1.3 On Social Relations

Northern region

"In the past, I did not visit my relatives or attend a party when invited, because we would never have any money in hand. It is embarrassing to visit someone empty-handed. But now I can go to someone's house when invited."
—*Food* participant (Rajballav village, Gangachhara upazila)

Southern region

"After collecting the cash, I give it to my husband. My husband asks me about what he should do with the money. We have a better understanding between us now."
—*Cash* participant (Barbak village, Dacope upazila)

"I could not give my opinion or say something [convincingly] in any family affairs before. But now I can express my opinions."
—*Food+Cash* participant (Bahir Dashpara village, Bauphal upazila)

9.2 Case Studies

Case Study 1

Espa Begum (*Food* only participant): *"My children did not have to starve during* Kartik *this year."*

Participant and her household: Espa Begum lives with her husband and four children in Pashchim Dhaniram village under Fulbari upazila of Kurigram district (in the north) in a home given to her by her father. She is 33 years old, and her family does not own any cultivable land. For about half the year, Espa's husband, Saifur (40), works as an agricultural laborer for other people and, when no work is available, he catches fish. Often, he is unable to catch enough fish to earn sufficient income, however, so he goes to Dhaka or Bogra seeking employment as a rickshaw-puller. Saifur regrets not having any land of his own, saying that, if he did, he could grow rice and other crops to make life less of a struggle for his family. The wage he receives is insufficient to properly maintain a family of six.

Espa's children are 14 (Kajuli), 11 (Ismail), 8 (Shorifa), and 1 (Ufeli). Kajuli was taken out of school when she was about 10 years old because her mother fell ill, and Kajuli had to take care of the household chores. She was not reenrolled because her parents could not afford her educational expenses.

Particular household challenges: *Kartik* (mid-October to mid-November) and *Chaitra* (mid-March to mid-April) are periods of extreme hardship for the family because of the lack of work available in the area during these months. In the past, the family has often been forced to go hungry during these lean seasons or switch to inexpensive food of poorer quality. Often, the couple had to buy groceries on credit or borrow money from neighbors for sustenance. There were times when Ismail (11) skipped classes in order to help his father catch fish. Espa recalls:

> We always went through a very hard time during *Kartik* and *Chaitra* and could only manage to eat one square meal ourselves and feed our children two meals a day. If we needed one and a half kilograms of rice, we cooked only one. Sometimes, even my children had only one instead of two meals a day.

TMRI participation: Since May 2012, Espa has been receiving 30 kg of rice, 2 liters of micronutrient-fortified cooking oil, and 2 kg of pulses each month from the IFPRI-WFP Transfer Modality Research Initiative (TMRI). Both Espa and her husband acknowledge the beneficial impacts the transfer has had on their lives. For example, they have been able to eat relatively more during the *Kartik* lean season. In addition, they can now afford to eat food of a much better quality. Previously, they ate inexpensive foods that they grew around their homestead, such as taro leaves, green bananas, radish, and Ceylon spinach. Eating fish or meat was out of question. Espa said, "There have been changes in our daily food menu. We consume *dal* throughout the week. We buy eggplants and red amaranth from the market and sometimes fish—large fish—too. The [transfer] has helped us a lot."

TMRI benefits: Espa happily points out that her children's health has improved because she can now feed them regularly. The kids are sick less frequently and Ufeli, who was extremely thin before, has gained some weight. While the major impact of the transfer has been on their diet, the household has benefited in other ways as well. It has allowed Espa and Saifur to save some of the money they would normally have spent on rice, pulses, and oil. Saifur bought a fishing net and some poultry with the money saved. Espa used some of the savings to pay her sons' private tutor, which

she previously did by borrowing money. In fact, after she started receiving the transfer, the household has rarely needed to borrow money, which is a big boost to the family's collective self-esteem.

Espa was delighted to also receive a mobile phone from the TMRI because now she can communicate with the staff of the transfer program, which was previously very difficult. The communication makes it easier for her to receive the food transfers at their appointed distribution times without any hassle. She can also communicate with her relatives and husband via the mobile phone. In the words of one of her neighbors, Espa describes her selection to be part of the TMRI food-transfer group this way: "Allah finally looked at [us] and gave the support [we] needed."

Case Study 2

Mina Khatun (*Cash* only participant): *"Everything has changed. There have been changes in our diet and clothing. There have been changes in how often we go to visit others. It has brought changes in everything."*

Participant and her household: Mina Khatun is 25 years old. She lives with her husband, two children, and father-in-law in Basuniatari village under Fulbaria upazila of Kurigram district (in the north). Mina's husband, Babul Hossain, is 32. He inherited his father's homestead but owns no farm land. He works as an agricultural laborer and migrates to Dhaka almost every year during the lean season to work as a rickshaw puller. Babul is the main earner in his family, but his father is a *Kabiraaj* (Ayurvedic practitioner), who occasionally makes some money from his practice. Mina and Babul have one son and one daughter.

TMRI participation: As a TMRI participant, Mina has been receiving Taka 1,500 in cash every month since May 2012, which is primarily used to buy food. From time to time, however, the cash has been put to other uses. For example, Babul recently bought two goats and repaired the roof of their house, which was damaged during the rainy season. He also bought some saplings, which he hopes will grow into large trees and, when sold in the future, fetch him a good price. Babul plans to use any income resulting from these investments to meet the marriage expenses of their daughter. Regarding this future marriage, he says: "We have been saving money in a bank [account]. We deposit 100 taka per month and plan to keep this account going till our daughter grows up and finishes her education…. We will keep the account active as long as we can. I have made a promise to Allah."

TMRI benefits: Mina says that the transfer has improved her relationship with community members and enabled her family to visit their relatives more often. She explains:

> In the past, my father and my *fupu* [paternal aunt] used to ask us to visit them, but we did not have proper outfits or money, so we felt embarrassed to go anywhere. You must at least take some biscuits, if nothing else, for the family you are going to visit, but we could not even afford to do that. That's why we would not visit anyone. But now we can go see our relatives and buy new clothes for our children.

Moreover, Mina feels that after she started receiving the transfer money, people in the village were more willing to interact with her. "People respect me now. In the past, when I tried to socialize with them, they were not too friendly. They acted as if they were worried I might ask them for a loan," said Babul.

He agrees with his wife about positive interactions with community members brought about by receiving cash transfers, he is also aware of gossip among some of his neighbors concerning the transfer. He believes the gossip is caused by resentment from people who were not selected to be transfer recipients and ignores it. Babul says:

> People say things, but we do not pay any heed to them. They say, 'Don't think that they are giving you the money for no reason. They will come to collect your body after your death and sell different body parts to other organizations.' I reply, 'If they have to, they will. I don't care.' I believe that people who help others during crisis, can never do such things.

Case Study 3

Laisu Begum (*Food+Cash* combination): *"It is better that my wife gets the money. If I received it, I would have spent it on things not important for us and our children."* —Laisu's husband

Participant and her household: Laisu Begum is 20 years old and has been married to her husband for about five years. They have two young children (five-year-old daughter, Shumi, and two-year-old son, Shumon) and live in extreme poverty in Satakuti village in Fulbari upazila of Kurigram district (in the north). Laisu and her 25-year-old husband, Shahidul, don't own any arable land. In fact, they do not even own their tiny one-room house, which was built on a small piece of land owned by Shahidul's uncle. Shahidul juggles a number of jobs, including agricultural laborer, sharecropper, and rickshaw-puller (depending on availability of work).

Particular household challenges: The family suffered most during the lean season of *Chaitra* when Shahidul was unable to find agricultural work. They could only manage to eat one square meal a day during that time.

TMRI participation: Laisu receives 15 kg of rice, 1 kg of pulses, 1 liter of oil, and Taka 750 each month through the TMRI program's *Food+Cash* transfers. She says the transfers have been a major boon to the family: "We had many hardships in our lives before—too much to bear. Now we are happy. We can live well. We can feed our children properly."

The transfers have benefited the household in a number of ways. The rice they receive lasts about two weeks; the oil and pulses last through the whole month. Thus, the couple is able to save some money, which, in addition to the cash transfers, has enabled them to build a kitchen, repair their one-room home, buy poultry, and lease some land to cultivate crops.

Laisu feels that their improved economic status has led to better relations between her and Shahidul. Previously, if she asked Shahidul to buy some food when there was none in the house, he would become angry and hit her. Now, she says, he is generally quite pleasant and does not fight

with her anymore. Laisu is also on better terms with her mother-in-law because she gives her some of the pulses received through the TMRI. Laisu believes relations with her neighbors have also improved because she sometimes lends them money or oil and lets them use her TMRI-assigned mobile phone upon request. She takes great pride and pleasure in being able to help other members of the community.

When Shahidul was asked about whether he had any reservations about his wife receiving the transfers rather than him, he said no, that instead he feels the cash is being judiciously used primarily because it is being given to his wife. "It is better that my wife gets the money. If I received it, I would have spent it on things not important for us and our children," he explained.

Case Study 4

Nurunnahar (*Cash+BCC* training): *"I have learned how many kinds of food there are and the benefits of eating different types."*

Participant and her household: Nurunnahar has been living in Mohidor Khondokhetro village under Rajarhat upazila of Kurigram district with her husband, two sons, and mother-in-law since her wedding. She is 25 and her husband, Mohammad Manju, is 32. He works as a wage laborer for other farmers since the couple owns now cultivable land.

Particular household challenges: Previously, during the lean seasons of *Aswin* and *Kartik*, when there are few agricultural activities, Manju would sometimes go to Dhaka to work as a rickshaw-puller; other times, he would just stay at home, unemployed. It was then that they had to borrow money to support their family and quite frequently skipped a meal or two every day to get by.

TMRI participation: Nurunnahar receives Taka 1,500 in cash each month from the TMRI and attends monthly training sessions on different aspects of nutrition as part of the IFPRI-WFP research initiative. She feels that the sessions have taught her much that she did not know: "I have learned about nutritious food for babies, [so] I feed my baby son mashed potato, lentils, and rice. I keep a portion of curry aside before adding chilies to it for him."

TMRI benefits: Nurunnahar says the cash transfers have helped her family in many ways. Not only can they spend more money on food, but they could also buy hens and ducks, make household repairs, and repay a number of debts. Nurunnahar herself bought two goats and has lent them out to another household on *Adhi* (an arrangement where someone buys the goat and gives it to a second party who raises it and shares profits with the owner). Furthermore, she has opened a savings account for her sons, where she deposits Taka 200 every month.

Manju agrees that the allowance has helped them improve their overall condition but would have preferred to receive the transfer in his own name, not his wife's. He explains:

> It would have been better if the money came in my name, so I could have kept it myself and bought groceries as I liked. For example, if I need to go to the market to buy something, I do not have money—I have to ask my wife for it. Sometimes it feels quite embarrassing.

Case Study 5

Shabita Biswash (*Food+BCC* training): *"[Before] the BCC training, we knew nothing about nutrition, the proper way of cooking, [our] child's health. Now, we keep our surroundings neat and clean. We use soap to wash hand before eating food and after using the toilet."*

Participant and her household: Shabita Biswash lives with her husband, Bikash, in a joint family in Laudubi Pasharerdhar village in Dacope upazila of Khulna district (in the south). They only have one child (a one-year old named Shuvo), but the household has eight members. Shabita's mother-in-law, Kobita, is the household head, but the principal earners are Bikash (a tricycle-van driver), father-in-law (a potter), and brother-in-law (also a van driver). Kobita formerly worked selling green coconut in the Tetulia River bank for roughly five years, but her absence caused problems in the household maintenance so she had to leave the job. Shuvash, Bikash's disabled elder brother, and Dipali, Bikash's sister who is a widow, cannot contribute to the family's income and are treated like a burden.

Particular household challenges: The family members, like most of the village residents, are converted Christians. In the past, this village had been inhabited by Hindus. But missionaries came here almost 20 years ago and were able to convert almost 90 percent of the local Hindu population to Christianity by offering much-needed financial support. Shabita learned of this after her marriage, that her husband's family was previously *Sanaton* Hindu. Her father-in-law, Pachu, said, "We lived in unbearable poverty and have left our intrinsic religion for survival."

> "We did not have adequate food and shelter," Kobita, Shabita's mother-in-law, explained. "All of us starved for days at a stretch. [The missionaries] induced us to become Christian with better shelter and food. At that time, existence was more important to us than religion."

The household is extremely poor and faces most hardships during the rainy season. They cannot go outside for work due to the heavy rainfall, which is so intense that people avoid going outside unnecessarily. To survive, they had no choice but to take out loans with high interest from a local money-lender.

TMRI participation: After being selected to participate in the TMRI, Shabita started receiving 30 kg rice, 2 kg pulses, and 2 liters of oil every month in addition to BCC training. She said that prior to the transfers, not all family members had adequate food and they lived in "unspeakable misery. Sometimes we ate only in the morning and evening." With the assistance from the TMRI, Shabita says, "Now we can eat at noon as well. This food helps us a lot."

TMRI benefits: Once she began receiving the TMRI transfers, Shabita started saving *musty* (about a handful of rice) every day, which, she hopes, will help during the lean season. She has participated in a local association for past year and managed to save Taka 300 per month. However, her mother-in-law is the one to spend the savings, according to the family's needs, because, Shabita says, "[Kobita] is wiser than me and will never misuse [the money]."

Although Shabita is illiterate, she attends the TMRI BCC training sessions, where she learns about hygiene and nutrition. Three of her family members attend the sessions with her, and they discuss what they've learned afterward. She said, "The BCC training helps us in various ways. [Before it,] we knew nothing about nutrition, the proper way of cooking, [our] child's health, and so on. Now, we keep our surroundings neat and clean. We use soap before and after toilet and taking food."

Shabita's sister-in-law, Dipali, said the BCC training boosted their family status within the community. The neighbors regularly come over to hear what the family learned in the latest training session; it has facilitated a position for them within the Hindu community. Dipali explained, "We were scruffy before BCC training, which is why Hindu families did not socialize with us. However, we are now quite clean, and Hindus welcome us cordially to their house."

The mobile phone Shabita received through the TMRI study has also been very useful to help the family keep in touch with relatives whom, Bikash said, they were previously unable to reach. Shabita, very emotional at the end of her interview with IFPRI researchers, repeatedly expressed her gratitude for the extraordinary support provided by the TMRI.

Case Study 6

Minara Begum (*Food* only): "*If men would get the food, they would have exercised power. Now, we [women] get it so we have the power. Women's calculation is different from men's. We care more about our children's present and future. We try to feed them well and take care of their education for their future."*

Participant and her household: Minara Begum is 40 years old and lives in Uttar Charmongol village in Char Fashion upazila of Bhola district (in the south) with her husband, Mohammad Yasin (age 50). The couple has three sons—Faruk (18), Furkan (12), and Alamin (8)—and two daughters—Lucky (5) and Romana (1). They have no arable land. Yasin, the main breadwinner of the family, works as a day laborer but also sometimes as a rickshaw-puller or a fisherman, depending on the season and availability of work. The eldest son, Faruk, works in a private clinic in Dhaka and sends money home every month.

TMRI participation: Minara is one of the TMRI food-transfer participants. She receives 30 kg rice, 2 kg oil, and 2 kg pulses every month and acknowledges that the transfer is a big boon to her family. "Now we are in a good condition. Because we get the rice, we saved some money and bought a goat, chickens, and ducks," she said.

Minara thinks that since receiving the transfers, her relationship with her husband has improved. He now gives her preferences priority and brings her the foods she likes from the village market. Minara is pleased by this new decision-making capacity and her ability to be involved in important matters with her husband. She believes that selecting women as transfer recipients instead of men was wise: "If men would get the food, they would have exercised power. Now, we [women] get it so we have the power. Women's calculation is different from men's. We care more about our children's present and future. We try to feed them well and take care of their education for their future."

Particular household challenges: Minara has to walk to and from the TMRI distribution center, which is quite far from her home. She does not mind the distance, however, because she is happy to receive the transfer. Often, if he is not working that day, her husband accompanies her to the distribution center to help carry the food. When asked about her selection into the program, Minara said, "I have been selected because of Allah's mercy."

10. SUMMARY AND CONCLUSIONS

Structure and Partners

The objective of the Transfer Modality Research Initiative (TMRI) was to evaluate the impacts of alternative safety net transfer modalities on household income, food security, and child nutrition. Under the initiative, 4,000 ultra-poor women (the participants) and their 21,600 family members (the beneficiaries) in the northern and southern regions of Bangladesh received a monthly transfer from May 2012 to April 2014. The transfer modalities, each valued initially at 1,500 Taka (US$18.66) per month, included the following: (1) cash only, (2) food only, (3) cash and food combined, (4) cash and nutrition behavior change communication (BCC) training (in the north), or (5) food and nutrition BCC training (in the south). The use of a randomized controlled trial design, together with efforts to ensure that all other aspects of implementation were comparable across treatment arms, meant that observed changes could be directly attributed to individual modalities.

IFPRI and WFP led the TMRI. IFPRI designed the research and conducted the evaluation while WFP implemented the activities through the Eco-Social Development Organization (ESDO), a national partner NGO. The Government of Bangladesh established a Technical Committee composed of various government ministries to promote efficient research operation, encourage government ownership, and ensure that the findings from the research initiative are used for evidence-based reform of social safety nets. The Technical Committee provided the necessary oversight and technical guidance.

TMRI Implementation

Transfers

IFPRI's quantitative household survey and qualitative field research, as well as WFP's monitoring and progress reports indicate that the TMRI was well-implemented. Participants received their monthly entitlements on time, and no incidences of leakage or loss occurred. Both participants and women in the control groups received mobile phones with SIM cards.

Food distribution centers and cash pay points were easily accessible. Distribution of food and cash payments were efficient, with an average wait time of approximately 30 minutes.

Generally, mobile transfers went smoothly. There were some instances when mobile phone networks used for the TMRI cash transfers were not accessible during distribution times; this delayed but did not prevent transfers from being made. Illiteracy, including numerical illiteracy, was initially problematic for some participants when operating the handset, but the dedication of the Dutch-Bangla Bank Limited Team, in partnership with ESDO, commendably helped participants and WFP overcome these issues. Less than 5 percent of respondents reported problems with use of mobile phones for cash transfers.

Behavior Change Communication

Participants receiving BCC training attended 48 sessions per year on average; each session lasted about one hour. About 83 percent of respondents reported that if they missed a BCC session, the community nutrition worker followed up with a home visit. There was careful attention to the training of community nutrition workers by ESDO, with technical guidance from WFP.

Although the delivery of nutrition BCC training sessions was initially weak, WFP and ESDO made substantial improvements as soon as the problem was identified. Concerted efforts were undertaken to address the way trainers presented the subject matter and interacted with the female participants. More community nutrition workers were hired and trained, supervision tools were revised, and refresher courses were mandated for existing community nutrition workers and field officers to improve their own nutritional knowledge and facilitation skills. Subsequently, the nutrition BCC component showed demonstrable improvement each month.

As a result, ESDO staff noticed a stark difference between participants who received nutrition BCC training and those who did not. Participants in training sessions tended to be more informed on nutritional concepts and the purpose of the overall TMRI study. They also adapted more readily to mobile phone cash transfers, presumably because they were more accustomed to training.

Impact

Methodology

IFPRI's impact estimation strategy relied on the randomized controlled trial design, which eliminates systematic differences between participants and non-participants, and minimizes the risk of "selection bias." As a result, average differences in outcomes across the groups after the intervention can be interpreted as being caused by, rather than simply correlated with, the receipt of transfers and transfers with nutrition education. The analysis took advantage of the baseline survey and estimated the treatment effect using Analysis of Covariance (ANCOVA) regression, which was preferred over difference-in-differences estimation due to statistical power.

Impacts on Household Consumption

IFPRI assessed the impact of the TMRI interventions on several measures of household consumption. These included self-assessed hunger, expenditures on food and non-food consumption, caloric intake, and diet quality as measured by WFP's Food Consumption Score.

All the treatment modalities in the north and south caused meaningful improvements in nearly all of these measures of consumption. In both regions, all TMRI modalities allowed households to consume more expensive and diverse calories than the control group. However, the addition of BCC to transfers consistently caused significantly larger improvements than transfers alone. In particular, findings suggest that households participating in BCC were more likely to allocate their transfer resources toward a considerably more diverse diet, relying on fewer staples and more nutritious non-staples, such as animal source foods, fruits, and vegetables.

Specifically, in the north—which is the poorest region in Bangladesh but with relatively better market access than the south—all four modalities had statistically significant positive impacts on (1) self-assessed hunger, (2) income (proxied by per capita total expenditure), (3) food expenditure, (4) caloric intake, and (5) household diet quality. The fourth modality—cash transfers and nutrition BCC training (*Cash+BCC*)—had the most substantial impact on all five measures of household consumption.

In the south, which is disaster-prone but has relatively higher incomes than the north, all or nearly all four modalities had positive impacts on (1) self-assessed hunger, (2) income, (3) food expenditure, and (4) diet quality, with food transfers and nutrition BCC training (*Food+BCC*) having the most substantial impact on all of these categories. Only *Food+BCC* had statistically significant impacts on caloric intake in the south.

Magnitudes of impact from a given modality tended to be consistently larger in the north than in the south. Better market access in the north, a larger precautionary savings motive in the south, and greater crowding-out of private transfers in the south are possible reasons for the differences in impact levels.

Impacts on Maternal Knowledge and Practices Related to Child Nutrition

In both the north and the south, the TMRI modalities with BCC components had large, significant impacts on maternal knowledge regarding nutrition and related care practices. Both *Cash+BCC* in the north and *Food+BCC* in the south significantly increased the likelihood that mothers correctly answered questions on breastfeeding, hygiene, and nutrition topics. Given that neither the cash treatment in the north nor the food treatment in the south showed comparable effects, these increases in maternal knowledge are attributable to the BCC.

Moreover, in both zones, mothers acted on this increased knowledge. The two BCC treatment arms improved hygiene practices and the appropriate introduction of liquids and complementary foods, while the non-BCC treatments had no significant impacts on most of these behaviors.

These patterns are also reflected in child diets. The predominant effect on child diets from non-BCC treatments was an increase in legumes, which were included in the food basket. Meanwhile, transfers combined with BCC led to large impacts on children's consumption of non-staple foods. In the north, *Cash+BCC* increased the likelihood that pre-school age children consumed flesh foods by 22 percentage points, eggs by 36 percentage points, and dairy by 10 percentage points. In the south, *Food+BCC* increased the likelihood that pre-school age children consumed flesh foods by 12 percentage points and eggs by 15 percentage points. The BCC trainings also increased women's use of micronutrient powders in both zones, with effects again larger in the north (where BCC was paired with cash) than in the south (where it was paired with food).

Impacts on Child Nutrition

In the north, cash transfers combined with nutrition BCC trainings led to a significant reduction in chronic undernutrition. Among children that were less than 48 months old at endline, *Cash+BCC*

increased height-for-age z-scores by 0.24 standard deviations. It reduced stunting by 7.3 percentage points over the duration of the project (two years)—an achievement almost three times the national average over the same time period.

No other modality in the north and no modality in the south had any impact on chronic undernutrition. Moreover, no modality in the north or south had any significant impact on measures of acute undernutrition in children (including weight-for-height z-scores and wasting).

Costing

Excluding the value of the transfer itself, modality-specific costs per monthly transfer were: cash, $5.41; food, $8.90; and cash and food, $10.62. Total value of each monthly transfer was $18.66. Thus, to transfer $1.00 to a safety net participant, it cost $0.29 through cash transfer, $0.48 through food transfer, and $0.57 through half-cash and half-food transfer.

Excluding fixed costs, nutrition BCC cost $50 per year per participating household. However, per household costs would fall if these interventions were scaled up.

Policy Implications

The analysis of TMRI provides rigorous evidence that if an intervention's policy objective is to improve the diets of poor households, both cash transfers and food transfers can be effective. However, if the policy objective is to improve the nutritional status of children from the poorest households, transfers alone are inadequate.

A key finding from the TMRI is the importance of linking cash transfers with behavior change communication (BCC) to improve child nutrition. Adding high-quality BCC to transfers—in particular, cash transfers—can deliver large reductions in chronic undernutrition, as measured by height-for-age z-scores and stunting. BCC with a well-developed curriculum on breastfeeding, nutrition, and hygiene substantially improves maternal knowledge and practices. Pairing BCC with transfers empowers mothers to act on this knowledge, in particular by adding non-staple foods such as flesh foods and dairy to their children's diets.

The design of TMRI does not allow conclusively determining whether combining BCC with cash is more effective in improving child nutritional status than combining BCC with food. It is possible that the context in the north (where *Cash+BCC* was provided and led to significant reductions in stunting) is simply different than the context in the south (where *Food+BCC* was provided and led to no significant changes in stunting). However, results within zones show that cash transfers were more readily used to diversify diets than food transfers, suggesting that cash may be uniquely positioned to leverage the knowledge from BCC.

A final insight comes from the costing. The consumption and child nutrition impacts of cash transfers were either the same or better than those of food transfers. Also, the delivery cost of cash transfers is considerably lower than that of food transfers. Therefore, cash transfers appear to be more cost-effective than food transfers. Put another way, in the contexts within which TMRI

operated, results indicate that with the same amount of resources, cash transfers could reach significantly more participating households than food transfers, with similar or better outcomes on household and child well-being.

APPENDIX 1: CONSUMPTION EFFECTS OF FOOD TRANSFERS

The effects of a free or subsidized rationed food on household consumption of goods (food and nonfood items) will depend on the relative size of the ration and its resale status. If the size of the ration is less than what a household would have consumed without the ration, then the ration is *inframarginal*. The ration is *extramarginal* if the ration quantity is greater than the amount of that commodity the household would have consumed without the ration.

If the ration is extramarginal, and if resale of the ration is prohibited or entails a high transaction cost, then the income transfer through such a ration may have two effects—an income effect and a substitution effect. On the other hand, the effect of an inframarginal ration is equivalent to the income effect only (that is, the value of the income transfer from ration), regardless of its resale status.

Extramarginal Ration: Pulses and Cooking Oil

The likely household-level consumption effects of an extramarginal ration are illustrated in Figure A1, using the example of the mosoor (lentil) pulse ration given to the participants of the Food only group of the TMRI. The quantity of pulses (Q) is shown on the horizontal axis, and the aggregate quantity of all other goods (Y) is shown on the vertical axis. Each indifference curve (I_1, I_2, and I_3) identifies the various combinations of Q and Y that would give the household equal satisfaction. The budget line AB represents the maximum quantities of Q and Y that the household could purchase with its given budget before participating in the TMRI program. The optimum choice of the household before entering the program is denoted by the point m where the household selects the combination of OQ_0 amount of pulses and OY_0 amount of all other goods for consumption. This is the point at which the budget line AB just touches the indifference curve I_1—that is, the point of tangency m.

The TMRI program provides a fixed monthly free ration of 2 kilograms of mosoor pulses per participating household in the Food only group. If the resale of rationed pulses is absolutely prohibited, then the recipient household would consume the entire amount of the ration, denoted by OQ_1. This would lead to two types of movement in the budget line: it would rotate around the vertical intercept A and would become a horizontal line up to the point R, corresponding to the OQ_1, quantity of rationed pulses. This portion of the budget line would be horizontal because the price of the OQ_1 quantity of rationed pulses is zero. The point R represents an endowment bundle that allows the recipient household to consume OQ_1 quantity of pulses and OA quantity of all other goods. Beyond point R, the movement represents an outward shift parallel to the original budget line from AB to RD. The new budget line is depicted by ARD, with a kink at point R.

The resale of TMRI pulse ration is, however, not prohibited. If the recipient household could sell the entire ration at market price, then the budget line would shift outward in a parallel way, passing through the endowment bundle R. Here, the effect of income transfer in pulses is equivalent to the income effect only. Since pulses are a normal good (that is, the income elasticity of demand for

pulses is positive), an increase in income would lead the households to consume more pulses. Thus, the household consumption bundle would be, say, at point n where the budget line *CD* just touches the highest indifference curve I_3. The household would consume OQ_2 amount of pulses and OY_1 amount of all other goods.

If the resale price of rationed pulses is lower than the market price, or if the resale entails a high transaction cost that decreases the implicit selling price, then the upward portion of the budget line from the endowment bundle (point *R*) would become flatter. Since the endowment bundle is always affordable, the budget line would rotate around the point *R*. The *RD* portion of the budget line, however, is unaffected as the market price of pulses remains unchanged. The resulting budget line is represented by the heavy line *ERD* with a kink at point *R*, as shown in Figure A1.

Data from the IFPRI household surveys conducted for TMRI suggest that, only about 3 percent of the Food only participants in the north sold a portion of their pulse ration at a price 29 percent lower than the market price of pulses. The quantity of pulses consumed at endline was 128 percent more than the quantity consumed at baseline (see Section 5.3.2). Two factors most likely prevented the pulse recipients from selling their extramarginal ration: (a) the resale price was lower than the market price; and (b) the resale involved transaction costs.

Since pulses is a normal good, the resale of a portion of the pulse ration at a lower price and the larger quantity consumed show that the household consumption bundle is located on the *FR* portion of the budget line (corresponding to Q_0Q_1 quantity). The optimum choice of the household is denoted by the consumption bundle at point *s*. The household indifference curve I_2 is tangent to the budget line at this point. The household would consume OQ_4 amount of pulses and OY_2 amount of all other goods.

To show the income and the substitution effects of OQ_4 amount of pulse consumption, the line *E'R'* is drawn parallel to line *ER*, which just touches the original indifference curve I_1 at point *t*. The movement along indifference curve I_1 from m to t is attributable to the substitution effect (SE) of lowering the price of rationed pulses. The substitution effect of a price change is always negative—that is, a fall in the price of a commodity will always increase the consumption of that commodity. Assuming that pulses is a normal good in rural Bangladesh, the income effect (IE) would be an addition to the substitution effect. The total effect (TE) would be an increase in pulse consumption (OQ_4–OQ_0). The household would increase its consumption of all other goods by the amount (OY_2–OY_0) because of the income and the cross-price effects of the extramarginal ration.

A digression: If the household can sell the entire pulse ration at market price, then the consumption effect would be exactly the same as that of the equivalent value of cash transfer. As microeconomic theory suggests, a household will be better-off if it can reach a higher indifference curve. Figure A1 shows that a cash transfer would enable the household to reach the highest feasible indifference curve I_3, where the household maximizes its satisfaction by selecting the consumption bundle at point n. This explains why a cash transfer should yield higher satisfaction than a food or other in-kind transfer in terms of program participants' own perception of welfare.

Inframarginal Ration: TMRI Rice Transfer

Figure A2 illustrates the consumption effects of an inframarginal food ration, such as the rice ration received by the Food only participants. The rationed quantity OQ_1 is less than the OQ_0 quantity consumed by the household before participating in the TMRI program. This leads the budget line to shift outward in a parallel way from the original budget line *AB*, which shows that the inframarginal ration has only the income effect. The new budget line is denoted by the heavy line *ARH*, with a kink at point *R*. Since rice is a normal good (that is, the income elasticity of demand for rice is positive), the subsequent consumption bundle would be, say, at point *z* where the *RH* portion of the budget line is tangent to the indifference curve I_2. The household would consume OQ_2 amount of rice and OY_1 amount of other goods. Thus the household would increase its rice consumption with an increase in income from the transfer, because rice is a normal good. The potential substitution effect on rice consumption from the free ration will be lost entirely because the size of the ration is less than the pre-intervention quantity consumed.

Figure A1 Consumption effects of an extramarginal mosoor pulse ration

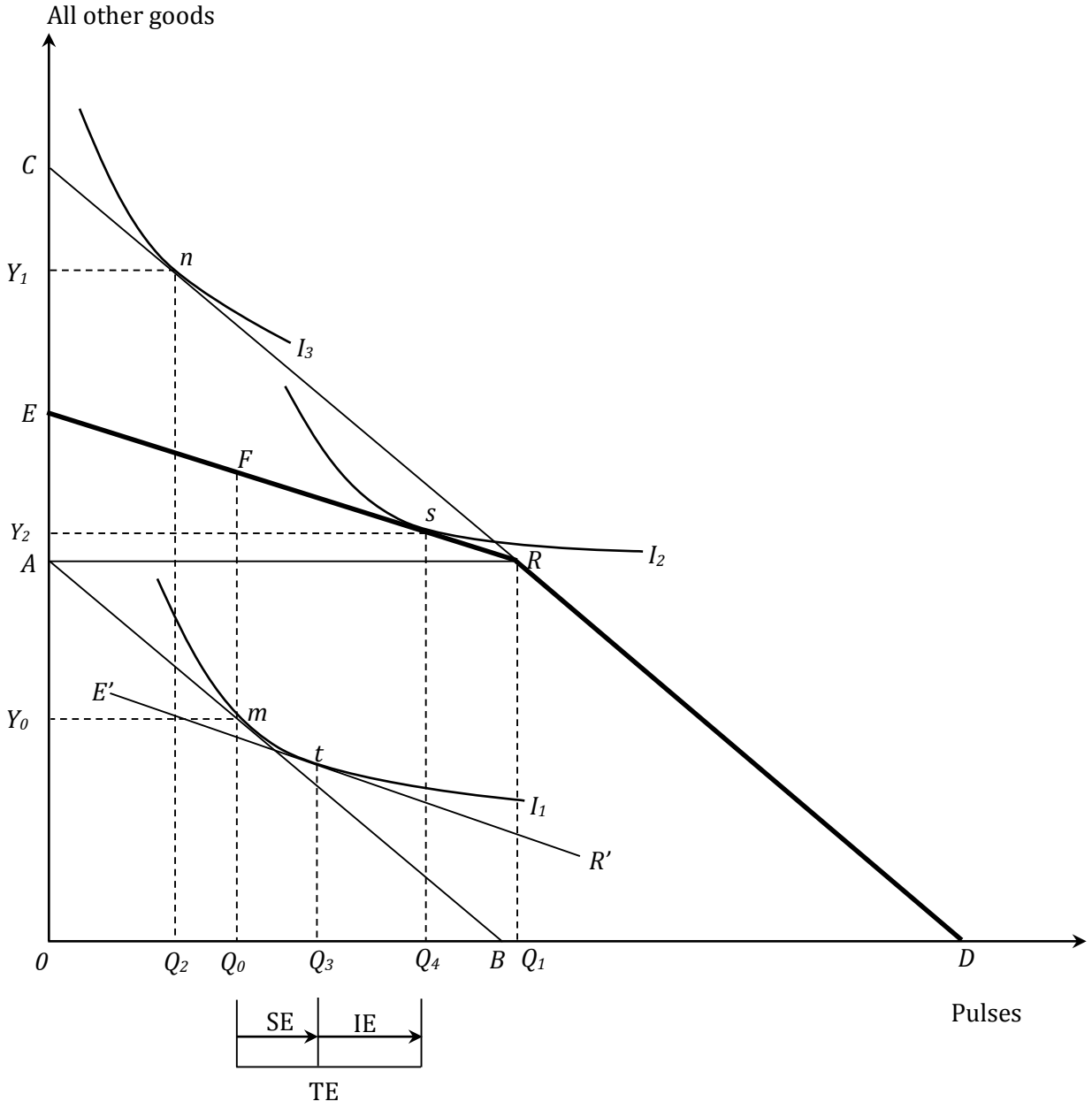
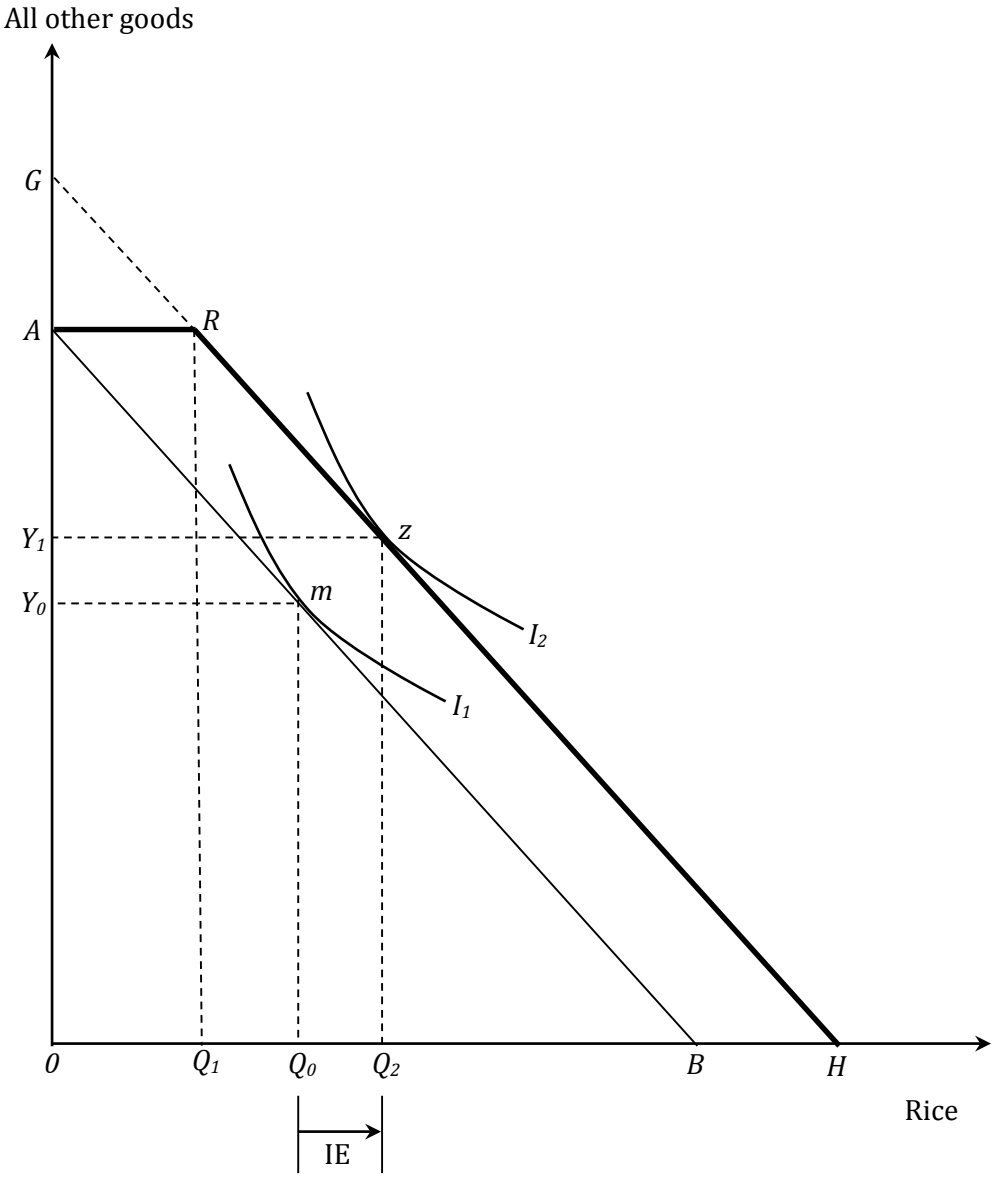


Figure A2 Consumption effects of an inframarginal rice ration



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