Nutrition-Sensitive Cash Transfers and Lean Season Food Insecurity *

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Abstract

Rural households in sub-Saharan Africa face high levels of poverty and annually recurring periods of lean season food insecurity. We conduct a randomized controlled trial in rural Malawi to assess the impact of coupling unconditional cash transfers of either $17/month or $43/month with a nutrition behavior change intervention on the diets and food security of households during the lean season. We find evidence of protective effects, but only when the intensity of treatment is high. When combined with the behavior change intervention, the large monthly cash transfer of $43/month improved food security by 15 percent, increased food consumption by 16 percent, and largely enabled households to smooth energy consumption between seasons. These effects are driven by a relative increase in consumption from own production. Households receiving the large cash transfer of $43/month invested in agricultural inputs and assets, allowing them to produce and store more maize in the preceding harvest and partially insulating them against negative food price shocks. We do not find evidence of similar effects of the nutrition behavior change intervention alone or in conjunction with a smaller transfer of $17/month.

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1 Introduction

Across sub-Saharan Africa, poor rural households experience intra-annual cycles of hunger. During these "lean seasons" between planting and harvest when crops are in the field but not ready for consumption, households deplete their grain stores, food prices rise, and income-generating opportunities decline, leading to widespread food insecurity (Anderson et al., 2018).[1] Seasonal fluctuations in consumption can have long-term consequences. If households engage in coping strategies that reduce future productive capacity, they can trap households in poverty and reduce the resources available to invest in children's human capital (Devereux, 2009, Stephens and Barrett, 2011, Webb, 2024).

In the case of investments in children's nutrition, the timing is critical: the first two years of life are characterized by rapid physical and cognitive development, and represent a period of particular sensitivity to nutritional deficiency (Doyle, 2020, Gilmore et al., 2018). The effects of even short-term, seasonal reductions in consumption and nutrition may lead to irreversible cognitive and physical impairments (Doyle, 2020). While parents may engage in compensatory behaviors to insulate children from the negative effects of seasonal consumption, several studies document seasonal patterns in child and height and growth faltering, suggesting insulation is partial at best (Abay and Hirvonen, 2017, Egata et al., 2013, Maleta et al., 2003, Webb, 2024). Recent evidence from Tanzania shows that these effects are persistent. Children are shorter and attain fewer years of education if their consumption is seasonal relative to a child with identical average consumption but no seasonality (Christian and Dillon, 2018). There is thus a clear economic case for investing in programs that enable households to smooth their consumption over periods of food insecurity. In the short term, these programs have the potential to keep households from falling into poverty traps. In the longer term, they may facilitate greater human capital attainment and a more skilled labor force.

In this paper, we study the degree to which providing households in rural Malawi with unconditional cash transfers and complementary nutrition behavior change programming

[1] This phenomena has been described as a "permanent world food crisis", a "cycle of quiet starvation" and the "father of famine" (Devereux et al., 2008).

can protect household consumption and food security during the lean season. A large body of evidence has shown that cash transfers can improve a host of outcomes for recipient households, including expenditures, education, and health (Bastagli et al., 2019, Davis et al., 2016, Egger et al., 2022, Haushofer and Shapiro, 2016). However, their impacts on food and nutrition security have been varied (Burchi et al., 2018, Manley et al., 2022, Tiwari et al., 2016). At the same time, nutrition behavior change programming has been shown to improve dietary diversity but to have limited effects on consumption and child growth (Gelli et al., 2017, 2018). There are potential complementarities between these two approaches. Nutrition behavior change interventions may ease knowledge constraints or shift preferences that, when combined with a cash transfer that simultaneously relaxes liquidity constraints, enable households to consume adequate diets.

Several recent studies suggest that such complementarities exist (Ahmed et al., 2024, Carneiro et al., 2021, Levere et al., 2024, Maffioli et al., 2024, Weaver et al., 2024). For instance, Maffioli et al. (2024) find that the combination of social behavior change communication and cash transfers significantly reduced child stunting in Myanmar, while neither intervention on its own had an appreciable impact. Their findings suggest that both information and resource constraints contribute to low income-elasticity of demand for calories. In Bangladesh, Ahmed et al. (2024) similarly find that only the combination of cash transfers and behavior change communication improved nutritional status via increased intake of animal source foods. We add to this growing literature by experimentally varying both exposure and intensity of cash transfers and social behaviour change programming and explicitly considering seasonality in our design.

We assess the lean season impacts on household food security of a cluster randomized controlled trial designed to evaluate the effectiveness of extending the Government of Malawi's early childhood nutrition and development approach to include more intensive social behavior change communication and unconditional cash transfers. Communities were randomly assigned to one of four treatment arms: 1) Standard of care (SOC), who received the Government of Malawi's maternal and child nutrition Care Group package, 2) nutrition-sensitive social behavior change (SBC), who received an extended bundle of

SBC interventions, in addition to the SOC package, 3) SBC+Low Cash, who received the SOC and SBC interventions and an unconditional cash transfer of MWK 17,204 (worth ∼22% of the average household's pre-intervention monthly expenditure), and 4) SBC+High Cash, who received the SOC and SBC interventions and a larger unconditional cash transfer of MWK 43,516 (worth ∼38% of average household pre-intervention monthly expenditure). The treatments are additive, allowing us to directly compare the additional benefit of each intervention component within the same experiment.

Our trial began in May 2022 and is scheduled to conclude in July 2025. This paper uses data from a lean season midline survey that was conducted between November and December 2023. We estimate intent-to-treat effects on 6 household-level food security measures: the Household Food Insecurity Access Scale (HFIAS), expenditures per adult equivalent (AE), consumption per AE, household dietary diversity, caloric availability per AE and micronutrient availability per AE. With the exception of the HFIAS score, measures are constructed from a household consumption and expenditure survey. We convert weekly household food consumption quantities to daily available per adult equivalent energy and micronutrient quantities. We use the term availability to distinguish from actual dietary intake, which we do not observe in our consumption data.

The effects we detect are concentrated in the SBC+High Cash intervention arm. Within this arm, households reported 14% lower food insecurity as measured by the HFIAS score, 16% higher food consumption per adult equivalent compared to the control (SOC) group, and largely maintained their baseline, post-harvest caloric availability in the lean season. The SBC+High Cash intervention also increased per-adult equivalent daily availability of calcium by 10%, of thiamin by 31%, of niacin by 11% and of folate by 15%. In contrast, households in the control, SBC-only and SBC+Low Cash arms experienced large reductions in caloric availability between survey rounds. Neither the SBC intervention on its own nor with the smaller-sized cash transfer had any detectable impact on food security, consumption, caloric availability or micronutrient availability at the household level.

In addition to our main findings, we show that the increase in caloric availability among households in the SBC+High Cash arm was driven by consumption of own-produced food. These households consumed an estimated 226 more calories per adult equivalent per day, of which 123 were from own production. We find that households in the SBC+High Cash arm harvested 26% (53 kg) more maize in the harvest preceding the lean season and had 150% (15 kg) more maize stored at the onset of the lean season. Our findings suggest that the large cash component of the intervention eased households' liquidity constraints, allowing them to purchase agricultural inputs and refrain from engaging in "sell low, buy high" behavior.

Our work adds to the existing literature in several ways. First, this paper is one of few rigorous evaluations of the effects of social protection programs during lean seasons. We explicitly account for seasonality in our study design and in the timing of our data collection. We evaluate the effect of providing cash transfers on household food insecurity and consumption during the months when chronic, cyclical food insecurity is at its highest. Although seasonality is a persistent contributor to global food insecurity, it is rarely accounted for in social protection schemes (Devereux, 2009). Rather, the typical humanitarian response to lean seasons is to provide support in the form of a cash or in-kind transfer once food insecurity reaches a critical peak. However, Pople et al. (2024a,b) show that early ("anticipatory") transfers may better support consumption smoothing in the face of slow-onset or predictable food insecurity shocks. As with Pople et al. (2024a), our findings suggest that sufficiently large and early transfers may enable households to take preemptive action to mitigate the effects of seasonality. In our case, households invested in inputs to increase maize production, thus insulating themselves against maize price increases.

Our second contribution relates to optimal design features of social protection programs. A large body of evidence shows that the choice of transfer modality and size affects the magnitude, persistence and cost-effectiveness of their impacts on outcomes such as asset accumulation, consumption and food security (Burchi et al., 2018, Haushofer and Shapiro, 2016, 2018, Kondylis et al., 2021). There is robust evidence that large temporary transfers, generally delivered as lump-sums, increase asset accumulation and productive investment (Aggarwal et al., 2024a, Egger et al., 2022, Haushofer and Shapiro, 2016), while transfers delivered over regular intervals (typically monthly) are more likely to improve food security and consumption (Burchi et al., 2018, Haushofer and Shapiro, 2016). However, few studies vary the size of transfers within the same experiment. Of those that do, the size of transfers tend to be orders of magnitudes larger than the size of a typical government-run social protection program in sub-Saharan Africa. Evidence from cross-country analyses of the effectiveness of government-run social protection programs suggests transfers should represent at least 20% of pre-intervention consumption (Burchi et al., 2018). We randomly vary the size of cash transfers that households receive, and include both a large transfer of comparable size to previous studies (∼$500 per year) and a smaller transfer closer in size to a government-run social protection program in the region (∼$200 per year).[2] Although both sized transfers are larger than 20% of pre-intervention consumption, we find that the smaller cash transfer of ∼ MWK 17,200 was insufficient to protect households' consumption levels during the lean season. That we find no evidence of an effect of the lower cash transfer on any of our outcomes of interest is in direct contrast to the findings of Brugh et al. (2018), who find that a smaller sized cash transfer increased caloric availability during the lean season for ultra-poor households in Malawi. This result has important policy implications. If the goal of the transfer is to improve household food insecurity, our findings suggest levels of support below a critical threshold may be ineffective.

Our third contribution is to show how data from a household consumption and expenditure survey can be used to provide more granular estimates of dietary quality. We estimate daily energy and micronutrient availability per adult equivalent by linking food quantities from our consumption survey to food composition tables. In contrast, previous studies examining the effects of social protection programs on the quality and quantity of diets have tended to limit their analyses to calories, calories broken down by relatively large food groups, and dietary diversity (Hoddinott et al., 2018, Hoddinott and Skoufias,

[2]The average recipient household of the Malawi Social Cash Transfer Program, the Government of Malawi's social safety net program, receives MWK 9,000 per month, equivalent to $130/year at our project's start.

2004). More broadly, we address the growing interest in using data from consumption and expenditure surveys to construct a wider array of measures of diet quantity and quality (FAO and the World Bank, 2018, Zezza et al., 2017).

The remainder of the paper is structured as follows. Section 2 discusses the context of our study and interventions. Section 3 provides an overview of our methods, including the experimental design and empirical approach. In Section 4, we discuss our main results. In Section 5, we explore potential mechanisms to explain our main findings. Section 6 discusses the policy implications of our findings and concludes.

2 Program Design and Context

Malawi is one of the poorest countries in the world, with the share of the population living below the international poverty line remaining constant at ∼70% between 2010 and 2019. Despite rapid urbanization, Malawi remains largely rural, with 82% of its 20.4 million inhabitants residing in rural areas. Agriculture plays a central role in the country's economy, contributing nearly 30% of GDP and employing 90% of the working age population in rural areas (Baulch et al., 2019). The agricultural sector is dominated by smallholder farmers, with small, rainfed plots. There are two main seasons in Malawi: the rainy season spanning November to April, corresponding to the main growing season, and the dry season from May to October. The lean season in Malawi is typically from October to March, between planting and harvest of the main growing season.

Maize is the most important staple crop grown by nearly all farming households. Although households produce maize for their own consumption, the majority purchase maize from markets at some point during the year (Ellis and Manda, 2012). Malawi regularly experiences some of the most acute seasonal differences in maize prices in sub-Saharan Africa (Gilbert et al., 2017). Maize prices are typically at their lowest following the harvest period from April to June, after which they rise steadily until peaking in February or March. This rise and peak in prices corresponds to a period in which many households, having drawn down their stores of maize from own production, rely on market purchases and have few income-generating opportunities, resulting in widespread food insecurity (de Janvry et al., 2022, Ellis and Manda, 2012). Lean season food insecurity is further exacerbated by climate shocks such as droughts or floods that reduce yield and the food stores available for households to draw on until the next harvest.

The Maziko trial (meaning "foundation" in Chichewa) is a three-year cluster randomized controlled trial (RCT) designed to evaluate the effectiveness of a cash+ intervention at improving the diets, nutrition, and development of young children and their mothers in rural districts of Balaka and Ntcheu in Malawi. Within these districts, clusters were defined around community-based childcare center (CBCC) catchment areas, corresponding roughly to villages. CBCCs are a core component of the Government of Malawi's National Policy of Early Childhood Development, under the Ministry of Gender, Community Development and Social Welfare. CBCCs are volunteer-operated childcare centers that provide stimulating environments and meals for children between the ages of 3 and 6, and training for caregivers and parents of children between 0 and 8 years of age (Gelli et al., 2018). Although CBCCs target children 3-6 years of age and parents of 0-8 year olds, CBCCs have also been shown to be an effective platform for improving the nutrition of younger children (Gelli et al., 2018).

The interventions delivered as part of the Maziko trial, discussed below, were designed in collaboration with the Government of Malawi, Save the Children, GiveDirectly and the International Food Policy Research Institute (IFPRI) to build on existing programs to improve child nutrition and development. The Government of Malawi's Multi-Sectoral Maternal, Infant and Young Child Nutrition Strategy (2019-2023), under the Ministry of Health's Department of Nutrition, HIV and AIDS, focuses on promoting optimal feeding during the first 1,000 days of life and provides recommendations on feeding, care and practices for pregnant and lactating women and children under two years of age (Government of Malawi, 2019). These recommendations are operationalized using an approach called Care Group. Care Group is the government of Malawi's community outreach approach to improving maternal, infant and young child nutrition through a combination of home visits, group sessions and cooking demonstrations. In this model, promoters and cluster leaders hold sessions with groups of 10-15 mothers, who then home visit neighbours and friends to share what they have learned. Care group sessions use the SUN 1,000 Special Days Community Counseling package, which includes topics related to maternal nutrition and infant and young child feeding practices such as breastfeeding, dietary diversity, micronutrients and growth monitoring.

Maziko Interventions

The Maziko intervention consists of two components: a social behavior change (SBC) component implemented by Save the Children and an unconditional cash transfer implemented by GiveDirectly.

SBC Interventions — The SBC component consists of three 'plus' interventions: Caring for the Caregiver, Male Champions and Nutrition Sensitive Livelihoods. Caring for the Caregiver and Male Champions extend the Government of Malawi's Care Group model to offer additional messaging related to maternal mental health and gender equality. Caring for the Caregiver is a training for Care Group promoters and cluster leaders that includes skill-building exercises and activities to better support the mental health and emotional well-being of mothers during home visits. Male Champions engages fathers and husbands in group and couple sessions that discuss topics such as sharing chores, decision-making and resources, and gender-based violence.

Nutrition Sensitive Livelihoods uses an adapted version of the Government of Malawi's Integrated Homestead Farming approach to promote the production of climate-resilient, nutrient-dense crops. It includes agricultural training offered by agricultural extension workers, CBCC-based demonstration plots and meal preparation demonstrations, seed distribution, and the establishment or strengthening of Village Savings and Loans Associations (VSLA) to help women save and borrow to invest in income-generating activities. The seed distribution includes groundnut seeds and innoculants for the main, rainfed harvest season and okra, Ethiopian mustard (*Kamganje*) and amararanthus seeds for winter cropping. In addition, CBCCs receive biofortified pro-vitamin A seeds and NPK and Urea fertilizer.

Cash Transfers — The cash component of the intervention provides pregnant women and mothers of young children below the age of 2 with unconditional cash transfers of either MWK 17,204 (low) or MWK 43,516 (high) delivered monthly for 30 months via mobile money. Upon registration, all participants were provided with a free mobile phone or SIM card, as needed. The size of the transfers was determined based on a cost of diet analysis to meet either the mother and child's (low) or household's (high) nutritional needs (Schneider, 2022). For an average household with 4.4 members, the cash transfer values represented 22% and 38% of estimated monthly expenditures at baseline. Following completion of the trial, communities assigned to the control and SBC arms will also receive a lump-sum cash transfer. Of note, the value of the transfers was not indexed to inflation, meaning the purchasing power of the transfer declined over time. Malawi experienced a period of high inflation coinciding with the duration of this study. Year-on-year inflation in average consumer prices increased from 9.3% in 2021 to 20.8% in 2022 and 30.3% in 2023 (International Monetary Fund, 2024). The Government of Malawi also devalued the kwacha against the dollar twice over the period of our study, by 25% in May 2022 and again by 44% in November 2023. The value of the higher cash transfer declined from $43 to $25, while the lower cash transfer declined from $17 to $10 between the baseline and midline survey.

This study targets pregnant women and mothers with children 0-2 years of age. All self-reported pregnant women and caregivers of young children were eligible to participate in the intervention activities. Households were eligible for inclusion in the study if they: included a woman aged 15-49 who was pregnant or had a child younger than 24 months of age; and resided permanently in the CBCC catchment area. Women were excluded from the study if they did not consent to participate or their pregnancies were not confirmed. In addition, children with major non-fatal disabilities are excluded from the analysis sample if the disability is likely to affect growth and development.

Related Studies of the Maziko Trial

The primary objective of the Maziko Trial is to determine the effect of the interventions on the adequacy of nutrient intake of mothers and on child motor, language and cognitive development. The focus of this paper is on secondary outcomes related to household food security estimated using household consumption and expenditure data. These data and outcomes convey important information about household vulnerability, but cannot speak to the diets of individual members within a household. In this section, we highlight findings from related analyses by collaborators on the Maziko Trial team on the impact of the Maziko intervention on the diets and nutritional status of mothers and children that provide important context for our own results.

Women's Diets — Gelli et al. (2024) find limited evidence that the Maziko interventions impacted mother's diets in the lean season. None of the interventions had any impact on the Global Diet Quality Score or on the risk of diet inadequacy at any level (low, moderate, and high). However, the SBC+Low Cash caused an 8.5% increase in women's dietary diversity, equivalent to 0.3 additional food groups out of 10, and the SBC+High Cash increased women's daily thiamine intake.

Children's Diets and Infant and Young Child Feeding Practices — There is some evidence that both the SBC+Low Cash and SBC+High Cash altered household's infant and young child feeding behaviors in the lean season. Children in the SBC+Low Cash arm consumed 0.21 additional food groups out of 10 (compared to 3.7 in the control group) and were 11 p.p. more likely to reach the minimum dietary diversity threshold for children 6-23 months of age (compared to 17% of children in the control group). Similarly, children in the SBC+High Cash arm consumed 0.28 additional food groups and were 15 p.p more likely to have achieved minimum dietary diversity. Children in both cash transfer arms were also more likely to have a minimum acceptable diet (18% and 21%, respectively, compared to 12% in the control and SBC arms), though the effect is only significant in the SBC+High Cash arm.

Child Anthropometry — As shown in Figure A.1 , despite increases in children's dietary diversity, there is no evidence at midline that either the SBC intervention on its own or in conjunction with either sized cash transfer had any impact on child growth indicators.

3 Data and Methods

Data Collection

A household census was conducted in February and March 2022 within CBCC clusters to collect basic demographic information, identify eligible households, and construct a listing of households for the survey sample. The listing identified an index dyad (a pregnant woman or a mother and her child) for each household. To construct the baseline survey sample, 20 households (dyads) were randomly selected from each CBCC cluster, stratifying by pregnancy status. Pregnant women were purposely over sampled.

The baseline survey for the trial was conducted between May and June 2022 with a total of 2,686 households. The realized sample includes 39 control clusters, 39 clusters assigned to SBC only, 39 clusters assigned to SBC and low cash, and 39 clusters assigned to SBC and high cash, with just over 17 households surveyed per cluster. Enrollment in the cash transfer component of the intervention began 3-4 months after the baseline survey was completed. The research team provided GiveDirectly with a list of eligible households in each community and the community's treatment status, but GiveDirectly staff followed their own community-based verification procedures to enroll households.

A midline follow-up survey and process evaluation was conducted with a subset of 1,307 households between November and December 2023, with just over 8 households per cluster. Selection for the midline survey prioritized women who were pregnant at baseline. Mothers with children at baseline were used as replacements until the budgeted sample size was reached. Importantly for this study, the follow-up survey took place during Malawi's lean season, allowing us to observe seasonal changes in household consumption. Our analysis sample consists of the 1,307 households for which we have repeat observations across the two survey waves.

Randomization and Treatments

The 156 CBCC clusters in our study were randomly assigned to one of four treatment arms: Control (standard of care, SOC), SBC, SBC+Low Cash, and SBC+High Cash. Women in the control arm received the government of Malawi's standard Care Group package. In the SBC arm, participants received the extended SBC package of interventions described previously, including Caring for the Caregiver, Male Champions and Nutrition Sensitive Livelihoods. Women assigned to the SBC+Low Cash and SBC+High Cash arms received the SOC package, the suite of SBC interventions and monthly cash transfers of 17,204 MWK ($\sim$ 17 USD at project start) or 43,516 MWK ($\sim$ 43 USD at project start), respectively. Note that the value of the cash transfers was set in MWK prior to implementation, and was not adjusted to reflect changes in the exchange rate nor indexed to inflation. Randomization was conducted in Stata using a restricted randomization procedure, with stratification at the district level.[3] A model was developed that regressed selection into the intervention arms on village-level variable. [4] An algorithm tested 5000 random allocations and selected the permutation that minimized the R^2 for the predicted selection. Additional information on the randomization procedure can be found in the published trial protocol (Maziko Trial Team, 2024).

Balance and Sample Characteristics

Table 1 presents baseline summary statistics and balance across the treatment arms. At baseline, the average household had just over 4 members, with one or no children below the age of 5. The average index woman was 25 years of age and poorly educated; two thirds of woman reported having no education. Household heads were 33 years of age on average, and most had received at least primary education. About 55% of household expenditures went towards food, and about half of all calories consumed came from

[3] The randomization assigned 39 clusters to each treatment arm

[4] Household data were aggregated to generate village-level variables used in the restricted randomization. Village-level variables included in the model are population size, total per capita household expenditure, household dwelling state, household drinking water source, women's empowerment, maternal caloric intake, maternal micronutrient intake, maternal age, pregnancy status, maternal weight, maternal education, maternal marital status, child age, child sex, child weight, child height, and child and total MDAT score

households' own production. As Table 1 shows, household characteristics were balanced across the treatment arms.

Empirical Methods and Measures

Our primary specification regresses outcomes Y_{ict} for household i in CBCC cluster c at time t on binary variables for assignment to treatment for each treatment arm, district (randomization strata) fixed effects and baseline values of the outcomes when available, giving us estimates of the intent-to-treat (ITT) effects. Specifically, we estimate:

$$Y_{ict} = \beta_1 SBC_{ict} + \beta_2 Low_{ict} + \beta_3 High_{ict} + \beta_4 Y_{ic,t-1} + \delta_c + \epsilon_{ict} \tag{1}$$

where the variable SBC is assignment to the SBC arm, Low is assignment to the SBC+Low Cash arm, High is assignment to the SBC+High Cash arm, and $Y_{ic,t-1}$ is the baseline value of the outcome of interest. The ITT estimates for assignment to the SBC, SBC+Low Cash and SBC+High Cash are β_1, β_2 and β_3, respectively. δ_c are strata dummies, and ϵ_{ict} is an error term. Standard errors are clustered at the CBCC cluster level; the level of treatment assignment. We are not only interested in the independent effect of each intervention, but also the marginal impact as our interventions become progressively more intensive. As such, we also report the differences between each treatment arm. $\beta_2 - \beta_1$ gives the estimated difference in the ITT effect between households assigned to the SBC+Low Cash arm and the SBC arm. Similarly, $\beta_3 - \beta_1$ gives the difference between the SBC+High Cash and SBC effects and $\beta_3 - \beta_2$ gives the difference between the SBC+High Cash and SBC+Low Cash effects.

We focus on outcomes related to household food security, which was a pre-specified secondary outcome of the Maziko trial. Food security *"exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"* (Food and Agriculture Organization, 1996). We focus on measures related to household access and utilization of food, and their stability over time, including the Household Dietary Diversity Score (HDDS), the Household Food Insecurity Access Scale (HFIAS) score, measures of household economic welfare including total expenditures and consumption per adult equivalent (AE) and food expenditures and consumption per AE, caloric availability per AE and micronutrient availability per AE. With the exception of the HFIAS score, all measures are constructed using data from an extensive expenditure and consumption module.

The HFIAS score is a measure from 0 to 27 that captures households' behavioral and psychological manifestations of insecure food access. Households are first asked whether they experienced different dimensions of insecure food access in the previous 30 days, such as reducing either the quantity or quality of food eaten in the household, and then the frequency with which they experienced them (Coates et al., 2007). A higher HFIAS score indicates higher food insecurity.

HDDS is a proxy measure of household's economic access to food, and can be used to estimate patterns in consumption of different food groups. Households are assigned one point for each food group they consumed from over a given reference period, up to a total of 12 (Swindale and Bilinsky, 2006).[5] We use a reference period of one week.

Expenditure measures are constructed using data from a one-month recall of household food and non-durable expenditures, while consumption measures are constructed using data from a one-week recall of household consumption, including from own production. Food items from the consumption and expenditure module are coded to match the closest corresponding food item in the Malawi Food Composition Table, where available, and the West African Food Composition Table otherwise. Reported consumption quantities are standardized by converting to grams or milliliters per adult equivalent per day, using non-standardized unit conversion factors from the Malawi Integrated Households Survey where applicable. Quantities are adjusted for edible portion and linked to the corresponding food composition table to obtain estimates of energy and micronutrient availability. Both total and per adult equivalent purchase and consumption quantities are screened (>3SD) and topcoded.

To account for household size and composition, we express our expenditures, consumption, calorie, and micronutrient measures in terms of adult equivalent units. Each person

[5] The 12 food groups are cereals; roots and tubers; vegetables; fruits; meat, poultry and offal; eggs; fish and seafood; pulses, legumes and nuts; milk and milk products; oils/fats; sugar/honey; miscellaneous.

in the household is assigned an adult equivalent factor that compares his/her estimated energy needs to the average energy needs of men and women aged 18 to 59.9 years. The total household energy requirement is then calculated by summing the adult equivalent factors across all household members. Due to the nutritional nature of the interventions and our analysis, we prefer the use of adult equivalent units to per capita measures as they account for meaningful differences in caloric requirements between household members of different ages and genders.

4 Results

Intervention uptake

Table 2 compares exposure to the different intervention activities across the treatment arms based on respondent's self-reported participation in these activities. In general, households in the SBC, SBC+Low Cash and SBC+High Cash treatment arms participated equally in the social behavior change activities. Exposure was highest for home visits and agricultural input distribution, and lowest for male engagement sessions. Of note, there is a discrepancy between the cash transfer arms in the proportion of households that report receiving a cash transfer from GiveDirectly. We anticipated that a proportion of pregnancies reported at baseline would not be confirmed at the time of enrollment in the cash transfer, either due to termination of the pregnancy or initial misreporting by women. However, we expected this occur at similar rates across the cash transfer arms. One concern this raises is that there may be systematic differences in selection into treatment between the treatment arms. We do not observe whether a women was excluded from the cash transfers due to pregnancy loss or misreport. However, we find that the discrepancy in compliance between the SBC+Low Cash and SBC+High Cash arms is due to implementation errors that caused a number of eligible women to be excluded from receiving the cash transfers, rather than self-selection.

Treatment Effects

We report intent-to-treat effects for our main outcomes of interest in Tables 3-6. Changes between our baseline post-harvest survey and midline lean season survey for our main outcomes of interest are illustrated in Figures 1 to 3. We first draw attention to the high level of food insecurity among households in our sample. In Figure 1, we see that households experienced a severe reduction in caloric availability in the lean season, equivalent to $\sim$400 kcal per adult equivalent per day. In Table A.1, we further see that 78% of households in the control group were considered severely food insecure at midline.

Table 3 shows ITT results for outcomes related to food access. Only the SBC+High Cash treatment has statistically significant impacts on any food access outcomes. The SBC+High Cash treatment reduced HFIAS scores by 14% and increased food consumption by 16%. In Table A.1, we see that the SBC+High Cash moved households from severe to moderate levels of food insecurity. The null hypotheses that the impacts of SBC and SBC+High Cash and SBC+Low Cash and SBC+High Cash on HFIAS and consumption are equal are rejected. We also see a small but significant increase in household dietary diversity, equivalent to households consuming foods from just under half an additional food group. Figure 2 shows that household dietary diversity increased across all treatment arms, reflecting substitution away from maize in the lean season, as shown in Figure 1.

We observe that the significantly higher level of food consumption in the SBC+High Cash arm is not accompanied by a corresponding relative increase in food expenditures. In Figure 3, we can see that nominal consumption and expenditures per adult equivalent increased across all treatment groups, reflecting both the typical lean season dynamics described in Section 2, as well as a period of high inflation coinciding with the duration of this study. We do not adjust for inflation due to the inherent price volatility during the lean season, which makes it unclear what consumer price index would be appropriate to use. The difference between our impact estimates for food consumption and food expenditures is explained in part by an increase in consumption of own-produced food, as shown in columns 3 and 4 of Table 4. In Table 4, we further see that SBC+High

Cash increased household caloric availability per adult equivalent by 10% and caloric availability from own production by 55%. As Figure 1 shows, the SBC+High Cash intervention had a protective effect against the decline in caloric availability experienced by households in all treatment arms. We reject the null hypothesis that the impact on caloric availability of SBC and SBC+High Cash are equal, but cannot reject the null hypothesis that SBC+Low Cash and SBC+High Cash are equal due to the noisiness of the estimates. In addition to aggregate effects on consumption and caloric availability, we are interested in understanding potential impacts of the interventions on the composition of foods available for household's consumption. Table A.2 shows that on the extensive margin, SBC+Cash increased availability of calorie-dense foods such as tubers, oils and sugars. On the intensive margin, the increase in caloric availability in the SBC+High Cash arm is explained by a large (but statistically insignificant) relative increase in caloric availability from cereals, and a statistically significant increase in calories from vegetables, legumes and oils. We reject the null hypotheses that the SBC+High Cash effects are equal to the other treatment arms for vegetables and oils. Contrary to findings from other studies, neither the SBC+Low Cash nor the SBC+High Cash arms increased household consumption of animal source foods (Ahmed et al., 2024, Hidrobo et al., 2018, Maffioli et al., 2024).

We explore implications of changes in food composition on micronutrient availability per adult equivalent in Table 6. SBC+High Cash increased per-adult equivalent daily availability of calcium by 10%, of thiamin by 31%, of niacin by 11% and of folate by 15%. For calcium, thiamin and folate, we reject the null hypotheses that the impacts of SBC+High Cash are equal to SBC alone and SBC+Low Cash. To contextualize the magnitudes of these impacts, we compare the per adult equivalent availability to adequacy cutoffs of adult males for each micronutrient in Table A.3. These findings suggest that increases in adequacy of micronutrient availability were in the range of 3% for folate to just under 9% for thiamin. These estimates should be interpreted with caution. Our adult equivalency scale is based on the age and gender distribution of caloric requirements, not of micronutrient requirements, and is therefore not suitable for comparing to micronutrient adequacy cutoffs. However, they give a general sense of the magnitudes of our micronutrient availability estimates.

Given the differential rates of non-compliance in the SBC+Low Cash and SBC+High Cash arms, we estimate the effects of receiving the different sized cash transfers among household that actually received the transfer. We use random assignment of treatment into the SBC+Low Cash and SBC+High Cash arms as instrumental variables for cash transfer receipt to estimate the local average treatment effects (LATE). For this analysis, we compare the additional benefit of the low versus high cash transfers compared to the SBC intervention on its own. We limit our sample to the 948 households in the SBC, SBC+Low Cash and SBC+High Cash arms that were surveyed at midline. Our reasons for doing so are twofold. First, we are interested in understanding the marginal contribution of the different cash transfers to the SBC interventions on their own. Second, given the multifaceted nature of the SBC intervention and varying stages of implementation of SBC activities by the midline survey, defining participation in the SBC activities is a somewhat arbitrary exercise.

Our LATE results are presented in Tables A.4, A.5 and A.6. Comparable ITT estimates are given by $\beta_2 - \beta_1$ (SBC+Low Cash), $\beta_3 - \beta_1$ (SBC+High Cash) and $\beta_3 - \beta_2$ (SBC+High Cash - SBC+Low Cash) in our main results tables. As expected, our LATE point estimates are larger than our ITT estimates. In contrast to our ITT estimates, we now see significant effects of SBC+Low Cash on households food insecurity and dietary diversity, of SBC+High Cash on household food expenditures, and a similar sized increase of nearly 100% on caloric availability from own production in the SBC+Low Cash and SBC+High Cash arms. As with our ITT estimates, we observe no effects on expenditures, consumption or micronutrient availability among SBC+Low Cash households.

Heterogeneous effects for poor households

Most cash transfer programs, and social protection programs more broadly, target ultra-poor beneficiaries. The Maziko trial, in contrast, targeted all pregnant women and mothers of young women regardless of income. We are interested in understanding whether the interventions impact poor versus non-poor households differently. We re-estimate equation (1) including separate binary treatment variables for poor and non-poor households and controlling separately for the poor household dummy. A household is classified as poor if its per capita baseline expenditures is below the $2.15 International Poverty Line. The results are presented in Figures 4 and 6.

In Figures 4 and 5, we examine household food access. We are underpowered with the midline sample and estimates are noisy. However, we see suggestive evidence that impacts on dietary diversity and food consumption are concentrated among poor households. Given the noise in the estimated coefficients, the hypothesis that the effects are equal cannot be rejected, though the difference is significant for the HFIAS score in the SBC arm and food consumption in the SBC+High Cash arm.

In Figure 6, we examine caloric availability and caloric availability from own consumption per adult equivalent. As with food access, we cannot reject the null hypothesis that the effects for poor and nonpoor households are equal.

5 Mechanisms

Our main results show clear evidence that the SBC+High Cash arm reduced household food insecurity in the lean season, while results from other working papers show that both the SBC+Low Cash and SBC+High Cash treatments increased the dietary diversity of mothers and children. Why do we see an improvement in dietary diversity in the SBC+Low Cash arm but no improvement in household food security? We explore two sets of potential mechanisms related to agricultural production and intrahousehold allocation of resources that may explain these findings.

Agricultural Production

Our main results suggest that the increase in household consumption observed in the SBC+High Cash arm is driven by households' consumption of own produced food. In theory, if markets functioned perfectly, households would make production and consumption decisions independently of each other (Singh et al., 1986). In practice, rural households in low-income countries face imperfect financial markets, and the assumption of separable production and consumption decisions has been largely rejected (Karlan et al., 2014, LaFave and Thomas, 2016). In Malawi, Boone et al. (2013) suggest credit and liquidity constraints are key barriers to productive investment among smallholder farmers. The combination of seasonal income and insufficient assets to use as collateral to borrow against may prevent households from purchasing inputs at appropriate times in the agricultural cycle. Post-harvest, liquidity and credit constraints may drive farmers to sell crops early to pay for expenditures like school fees, foregoing potential profit opportunities (Alderman and Shively, 1996, Dillon, 2021). In the face of food price risk and lacking alternate risk-coping mechanisms, agricultural households may decide their optimal strategy is to adopt low-risk, low-return production strategies that prioritize staple crop self-sufficiency (Fafchamps, 1992, 2003).

Cash transfers ease households' liquidity constraints and may have an indirect effect on food security through changes in agricultural production. There are three main channels through which cash transfers may affect agricultural production decisions: (1) productive investments, (2) labour supply, and (3) risk management strategies (Basu and Wong, 2015, Boone et al., 2013, Daidone et al., 2019, Fink et al., 2020, Prifti et al., 2019). We discuss the evidence for each of these channels below.

Productive Investments — Cash transfers may directly increase investments in agricultural inputs or technologies by providing liquidity and indirectly by relaxing credit constraints if households are able to save a portion of the resources transferred (Daidone et al., 2019). We explore evidence for impact on productive investments in Table 7. A clear story emerges. Households in the SBC+High Cash arm produced 26% more maize (52.5 kg) in the March-May 2023 harvest than control households, the majority of which they stored, and stocks of which remained at the time of the lean season midline survey in Nov-Dec 2023. To put these numbers in perspective, the average household consumed 56 kg of maize in the month prior to the baseline survey. Thus the additional 52 kg of maize produced by households in the SBC+High Cash arm is equivalent to about a one month supply of maize. We find no effect on revenue from the sale of crops, which may suggest that households stored maize for their own consumption, though estimates are very noisy. Although we cannot directly observe spending on inputs like fertilizer or the timing of maize purchases and sales in our midline data, we show in Table 8 that households in the SBC+High Cash arm are significantly more likely to report spending their cash transfers on agricultural inputs and livestock assets than those in the SBC+Low Cash arm.[6] Our results on maize production are consistent with liquidity and credit constraints being eased, allowing households to invest in agricultural inputs like fertilizer and reducing "sell low, buy high" behavior post-harvest.

Labour Supply — Many households in Malawi diversify their income sources by engaging in casual low-wage (*ganyu*) labour. In the face of liquidity constraints, households may sell more labour off-farm than is optimal. Cash transfers may increase the amount of time households devote to their own farms, augmenting agricultural production (Boone et al., 2013). We do not have detailed data on time use or off-farm employment. However, in Table A.8 we show that there is no impact on the extensive margin of any of the interventions on whether households engaged in *ganyu* labour to cope with shocks. We further find no impacts on off-farm income in the month prior to the midline survey (October-November), a time when demand for *ganyu* labour typically peaks during planting. With the data available of us, we find no evidence to suggest that the cash transfers induced a change in households' supply of on or off-farm labour.

Risk Management Strategies — By providing households with a regular stream of income, cash transfers insure against risks and reduce reliance on detrimental risk-coping strategies (Daidone et al., 2019). As a result, households may be more willing to engage in riskier activities with higher expected rates of return, such as cash cropping (Boone et al., 2013, Karlan et al., 2014). We examine whether the interventions increased production of tobacco, groundnut, cotton and pigeon pea *nandolo*, common cash crops in Malawi. Our results are presented in Table A.9. We find no evidence that households increased production of cash crops in response to receiving a cash transfer.

[6] Table A.7 provides a full comparison of items households report spending their cash transfers on.

Intra-Household Allocation of Resources

Many unitary and collective household models assume household members make consumption, production and leisure decisions in ways that maximize their collective welfare and that are Pareto efficient (Becker, 1993, Chiappori and Mazzocco, 2017, Quisumbing and Maluccio, 2003). This assumption, does not, however, imply an equitable distribution of resources among household members. There are two implications of this for our analysis: first, that households can be food secure and individual members food insecure, and vice versa. Second, that the food security of individual members may be improved through a re-allocation of resources even if food security does not improve at the household level. This is implicitly acknowledged in the design of many cash transfer interventions, including our own, that target women under the assumption that increasing women's control over income will promote increased investment in maternal and child nutrition, health and/or education. This assumption is not unwarranted: a large body of research links increases in women's income share to increased expenditure on children (Bobonis, 2009).

There are two main channels through which our interventions may impact the intra-household allocation of resources. First, the cash transfer component is directed towards mothers via mobile money, increasing the woman's share of income and potentially changing her bargaining power within the household. Second, the behavior change component may shift preferences towards nutrient-dense and diverse foods by increasing the knowledge and salience of children's dietary requirements, on the one hand, and sensitizing households to issues of gender equality through the Male Champions trainings, on the other.

We explore evidence of whether the interventions shifted the allocation of food resources in the household by comparing the treatment effects on caloric availability per AE and treatment effects on women's actual caloric intake[7] The ITT point-estimates for kcal availability per adult equivalent per day are 2.77 for SBC, 55.8 for SBC+Low Cash and 226 for SBC+High Cash. The average adult equivalent factor for women in our sam-

[7]Caloric intake is estimated using data from a 24 hour dietary recall.

ple is 0.88. We would therefore expect the treatment effect for women to be around 2.4 kcal for SBC, 49 kcal for SBC+Low Cash and 199 for SBC+High Cash. Instead, what we find is that the effect on caloric intake per day for women is -110.5 for SBC, -57.8 for SBC+Low Cash and -122.9 for SBC+High Cash. Both the SBC and SBC+High Cash effects are significant at the 5% level.

What can explain this discrepancy? We explore two possible explanations. The first is that mothers may be allocating additional resources towards their children during this period of high food insecurity. We do not have dietary recall data at the child level at midline to confirm if this is indeed the case. However, we will have this data at endline. Consistent with this explanation, children in the SBC+Low Cash and SBC+High Cash arms have more diverse diets.

A second related explanation is that women may not have retained control over the additional income from the cash transfers. In Table A.10, we show that the SBC+Low Cash and SBC+High Cash had differential impacts on women's decision-making. Women receiving the larger cash transfer of ∼MWK 43,000/month were 16 p.p. less likely to report that they alone decided how the cash transfer got spent than women receiving the smaller cash transfer of ∼MWK 17,200/month. Rather, they were 13 p.p. more likely to make decisions with their husbands. This suggests that whereas the larger monthly transfers received by women in the SBC+High Cash arm were treated as household income, the smaller transfer received by women in the SBC+Low Cash arm were more likely to be treated as women's income.

6 Conclusion

In this paper, we examined the impact of combining nutrition-sensitive social behavior change interventions with different sized unconditional cash transfers on household food insecurity during the lean season in Malawi. We find that after one year, a large cash transfer of ∼ MWK 43,500 per month combined with the SBC intervention had consistent positive impacts on multiple dimensions of household food security, including food consumption, behavioral and psychological manifestations of insecure food access, and caloric availability. Small positive impacts on dietary diversity and intake of select micronutrients were also observed. We find no impact of either a behavior change intervention on its own nor in conjunction with a small cash transfer of $\sim$ MWK 17,200 per month. We explore mechanisms to explain our main results. We show that households increased food security by increasing production and storage of maize, the main staple food in Malawi. We do not find evidence that households changed their labor supply or adopted riskier activities like cash cropping. Our findings are consistent with households using cash transfers to maintain staple food self-sufficiency (Fafchamps, 2003).

Our study has several limitations. First, we do not evaluate the impact of the cash transfers on their own, so while we can estimate the marginal contribution of cash transfers to SBC programs, we cannot speak to the reverse (the marginal contribution of the SBC intervention to cash transfer programs). Second, our investigation of mechanisms suggests that households use cash receipts to invest in agricultural inputs, but we cannot directly observe or quantify this investment given our expenditure data. Third, although it appears that the SBC+High Cash treatment reduced household's reliance on "sell low, buy high" behavior in maize markets, we cannot confirm that this is indeed the case in the absence of high frequency data on maize purchases and sales. Finally, our heterogeneity analysis suggests that the Maziko interventions had differential impacts on poor and non-poor households. However, we are underpowered to identify these effects and therefore cannot make use of machine learning methods to conduct our heterogeneity analysis.

Our results have important implications for the design of social protection policies in Malawi and elsewhere. First, whether cash transfers lead to sustained improvements in consumption and food security is dependent on the extent to which they are channeled towards productive investment. Consistent with Aggarwal et al. (2024b), who find that the effects of cash transfers on productive investment for rural Malawian households are amplified by input fairs that reduce the transport costs of accessing inputs, our results suggest possible complementarities between cash transfers and other types of agricultural interventions. Second, due to the severity of food insecurity during the lean season, smaller cash transfers may be insufficient to protect the food consumption of households and their individual members during this period, leaving children vulnerable to consumption fluctuations and undermining gains in diet quality that may be achieved in the more plenteous harvest season. In Malawi, where the government is considering complementing its existing child nutrition policy with small unconditional cash transfers, this amounts to a trade-off between potential scalability and sustainability, on the one hand, and effectiveness, on the other.

Table 1. Baseline Balance Table

Variable	(1) SOC	(2) SBC	(3) SBC+ Low Cash	(4) SBC+ High Cash	(1)-(2)	(1)-(3)	(1)-(4)	(2)-(3)	(2)-(4)	(3)-(4)	F-test P-value
N	353	290	354	308							
Household Size	4.201	4.093	4.121	4.016	0.058	0.042	0.103	-0.015	0.044	0.058	0.734
	[0.108]	[0.164]	[0.114]	[0.127]							
Number of children under 5	0.620	0.652	0.636	0.591	-0.049	-0.023	0.045	0.025	0.097	0.068	0.794
	[0.039]	[0.048]	[0.038]	[0.044]							
Head age	33.688	32.024	33.350	33.006	0.147	0.029	0.060	-0.120	-0.092	0.031	0.396
	[0.644]	[0.781]	[0.582]	[0.586]							
Head no education	0.065	0.024	0.056	0.049	0.194	0.036	0.071	-0.161	-0.130	0.035	0.093*
	[0.015]	[0.010]	[0.018]	[0.015]							
Head primary edu	0.623	0.700	0.647	0.672	-0.162	-0.049	-0.102	0.113	0.060	-0.053	0.267
	[0.028]	[0.029]	[0.030]	[0.029]							
Head secondary edu	0.280	0.262	0.277	0.266	0.041	0.008	0.032	-0.033	-0.009	0.024	0.962
	[0.027]	[0.030]	[0.029]	[0.026]							
Index woman age (years)	25.260	25.323	25.487	24.868	-0.009	-0.032	0.058	-0.023	0.067	0.091	0.754
	[0.362]	[0.503]	[0.406]	[0.423]							
Index woman pregnant	0.875	0.900	0.895	0.903	-0.078	-0.063	-0.086	0.015	-0.009	-0.024	0.746
	[0.020]	[0.018]	[0.016]	[0.018]							
Index woman no education	0.606	0.555	0.695	0.575	0.103	-0.186	0.064	-0.290	-0.039	0.250	0.012**
	[0.037]	[0.041]	[0.028]	[0.037]							
Index woman primary edu	0.091	0.138	0.076	0.091	-0.150	0.052	-0.001	0.202	0.148	-0.053	0.236
	[0.022]	[0.026]	[0.015]	[0.023]							
Index child age (months)	9.355	9.310	8.745	10.225	0.006	0.082	-0.108	0.086	-0.124	-0.211	0.856
	[1.221]	[1.215]	[0.953]	[1.418]							
Index child stunted (LAZ <-2)	0.244	0.308	0.294	0.357	-0.143	-0.113	-0.248	0.029	-0.104	-0.134	0.743
	[0.056]	[0.091]	[0.080]	[0.092]							
LN(Per-AE food expenditures)	8.413	8.424	8.452	8.459	-0.013	-0.048	-0.058	-0.034	-0.044	-0.008	0.954
	[0.075]	[0.077]	[0.070]	[0.053]							
LN(Per-AE food consumption)	9.221	9.220	9.190	9.203	0.001	0.048	0.029	0.046	0.027	-0.021	0.976
	[0.047]	[0.057]	[0.063]	[0.046]							
Food expenditure share	0.551	0.534	0.543	0.554	0.091	0.042	-0.020	-0.052	-0.112	-0.064	0.658
	[0.012]	[0.013]	[0.009]	[0.012]							
Calories/AE/day	2585.632	2622.454	2544.135	2497.061	-0.026	0.028	0.066	0.052	0.091	0.033	0.734
	[84.299]	[96.024]	[113.479]	[73.272]							
Share calories own production	0.523	0.540	0.516	0.505	-0.046	0.019	0.052	0.065	0.099	0.033	0.909
	[0.031]	[0.038]	[0.028]	[0.032]							
HH dietary diversity score	7.321	7.117	6.814	7.046	0.103	0.244	0.139	0.147	0.036	-0.113	0.243
	[0.164]	[0.170]	[0.192]	[0.161]							

Notes: This table compares household characteristics at baseline across treatment arms. Standard errors are reported in square brackets and are clustered at the CBCC cluster level. Differences columns are normalized differences. ***, **, and * indicate significance at the 1, 5, and 10 percent level. Abbreviations: AE, adult equivalent; HH, household; LAZ, length-for-age z-score; SBC, social behaviour change; SOC, standard of care.

Table 2. Program Exposure Table

	(1) SOC	(2) SBC	(3) SBC+ Low-Cash	(4) SBC+ High-Cash	p-value (1)-(2)	p-value (1)-(3)	p-value (1)-(4)	p-value (2)-(3)	p-value (2)-(4)	p-value (3)-(4)
N	353	290	354	308						
Respondent is a promoter/cluster leader	0.102	0.132	0.102	0.127	0.198	0.907	0.567	0.237	0.903	0.596
	[0.014]	[0.019]	[0.016]	[0.041]						
Respondent belongs to a care group	0.170	0.388	0.392	0.450	0.000***	0.000***	0.000***	0.988	0.266	0.283
	[0.026]	[0.043]	[0.039]	[0.037]						
Received a home visit by a cluster leader	0.667	0.567	0.645	0.686	0.243	0.425	0.887	0.362	0.146	0.428
	[0.071]	[0.073]	[0.059]	[0.048]						
Participated in a cooking demonstration	0.195	0.279	0.294	0.224	0.078*	0.046**	0.494	0.773	0.292	0.178
	[0.032]	[0.038]	[0.039]	[0.035]						
Participated in compl feeding session	0.144	0.259	0.271	0.214	0.004***	0.000***	0.011**	0.735	0.311	0.111
	[0.021]	[0.036]	[0.030]	[0.024]						
Received seeds/vines/inputs in past 12mo	0.026	0.645	0.651	0.744	0.000***	0.000***	0.000***	0.916	0.266	0.253
	[0.017]	[0.076]	[0.070]	[0.058]						
Member of a VSLA	0.360	0.397	0.475	0.461	0.294	0.005***	0.045**	0.086*	0.262	0.743
	[0.039]	[0.044]	[0.050]	[0.055]						
Respondent is married	0.759	0.748	0.794	0.756	0.679	0.315	0.832	0.172	0.819	0.286
	[0.020]	[0.022]	[0.024]	[0.025]						
Husband participated in male engagement	0.037	0.111	0.139	0.124	0.009***	0.000***	0.008***	0.373	0.693	0.699
	[0.013]	[0.026]	[0.024]	[0.029]						
Registered in GD's CT program	0.003	0.000	0.556	0.672	0.315	0.000***	0.000***	0.000***	0.000***	0.018**
	[0.003]	[0.000]	[0.041]	[0.037]						
Cash received in last transfer	77.054	0.000	9190.319	27735.679	0.315	0.000***	0.000***	0.000***	0.000***	0.000***
	[76.959]	[0.000]	[731.700]	[1521.750]						

Notes: This table compares household exposure to different program elements across treatment arms. Standard errors are reported in square brackets and are clustered at the CBCC cluster level. P-values are from t-tests. ***, **, and * indicate significance at the 1, 5, and 10 percent levels. Abbreviations: CT, cash transfer; GD, GiveDirectly; VSLA, village savings and loans association.

Table 3. Impact on Food Access Dimensions of Food Security

	HFIAS	HDDS	Per-AE Expenditures	Per-AE Food Expenditures	Per-AE Consumption	Per-AE Food Consumption
	(1)	(2)	(3)	(4)	(5)	(6)
β_1: SBC only	0.20	0.028	0.055	0.028	0.037	0.015
	(0.85)	(0.21)	(0.067)	(0.054)	(0.066)	(0.056)
β_2: SBC + Low Cash	0.15	0.16	-0.0029	-0.039	0.041	0.029
	(0.76)	(0.19)	(0.068)	(0.058)	(0.062)	(0.059)
β_3: SBC + High Cash	-2.12***	0.40**	0.13*	0.086	0.17***	0.16***
	(0.71)	(0.20)	(0.067)	(0.057)	(0.060)	(0.056)
β_2 - β_1	-0.052	0.135	-0.058	-0.067	0.004	0.014
	(0.932)	(0.154)	(0.062)	(0.053)	(0.062)	(0.057)
β_3 - β_1	-2.323***	0.369**	0.075	0.058	0.133**	0.147***
	(0.881)	(0.161)	(0.060)	(0.052)	(0.061)	(0.053)
β_3 - β_2	-2.271***	0.234	0.132**	0.125**	0.129**	0.133**
	(0.793)	(0.146)	(0.061)	(0.055)	(0.055)	(0.056)
Control Mean	14.102	7.598	9.872	9.368	10.196	9.842
Control SD	7	2	1	1	1	1
N	1314	1297	1300	1300	1300	1300
Baseline Control?	N	Y	Y	Y	Y	Y

This table presents estimates of the ITT effects of the Maziko interventions on measures of household food access in the lean season. All models include district (strata) fixed effects and controls for baseline values of the outcomes when available. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: AE, adult equivalent; HDDS, Household Dietary Diversity Score; HFIAS, Household Food Insecurity Access Scale; SBC, social behaviour change.

Table 4. Impact on Caloric Availability

	Kcal/AE/day (1)	Min 1800 kcal/AE/day (2)	Kcal/AE/day own production (3)	Share kcal own production (4)
β_1: SBC only	2.77	-0.014	27.3	-0.000090
	(117.4)	(0.044)	(47.7)	(0.022)
β_2: SBC + Low Cash	55.8	0.029	48.0	0.0098
	(108.8)	(0.040)	(50.4)	(0.022)
β_3: SBC + High Cash	226.0*	0.070*	123.1**	0.036*
	(116.6)	(0.041)	(50.5)	(0.021)
β_2 - β_1	53.052	0.043	20.705	0.010
	(120.795)	(0.046)	(57.062)	(0.025)
β_3 - β_1	223.271*	0.084*	95.838*	0.036
	(127.673)	(0.047)	(56.801)	(0.025)
β_3 - β_2	170.219	0.041	75.134	0.027
	(118.982)	(0.044)	(58.909)	(0.024)
Control Mean	2200.135	0.537	222.986	0.112
Control SD	1299	0	435	0
N	1300	1300	1300	1300
Baseline Control?	Y	Y	Y	Y

This table presents estimates of the ITT effects of the Maziko interventions on household caloric availability in the lean season. All models include district (strata) fixed effects and controls for baseline values of the outcomes. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: AE, adult equivalent; kcal, kilocalorie; SBC, social behaviour change.

Table 5. Caloric Availability per AE by Food Group

	Cereals (1)	Tubers (2)	Veg (3)	Fruit (4)	Meat (5)	Eggs (6)	Fish (7)	Legumes (8)	Dairy (9)	Oils (10)	Sugars (11)	Misc (12)
β_1: SBC only	31.4	2.16	0.68	-4.50	-2.49	1.52	0.18	-7.26	0.18	-1.23	3.14	-0.68
	(112.5)	(8.74)	(1.73)	(9.81)	(3.19)	(1.37)	(4.33)	(33.2)	(0.33)	(7.57)	(6.42)	(0.51)
β_2: SBC + Low Cash	44.2	-5.85	0.30	5.23	-1.56	-0.068	-0.14	12.6	0.19	-2.48	-0.94	0.23
	(97.7)	(6.70)	(1.65)	(8.70)	(3.00)	(1.19)	(3.31)	(29.2)	(0.32)	(8.08)	(5.81)	(0.64)
β_3: SBC + High Cash	117.0	13.7	5.68***	-4.56	-2.01	1.54	-2.75	55.9*	-0.047	22.0**	9.16	0.00032
	(105.6)	(8.28)	(2.03)	(8.23)	(3.25)	(1.52)	(3.51)	(30.0)	(0.30)	(9.30)	(6.19)	(0.62)
β_2 - β_1	12.804	-8.010	-0.375	9.730	0.926	-1.592	-0.316	19.891	0.011	-1.249	-4.076	0.911
	(115.662)	(8.214)	(1.654)	(10.510)	(2.482)	(1.357)	(3.955)	(32.736)	(0.321)	(7.501)	(5.271)	(0.600)
β_3 - β_1	85.569	11.520	5.006**	-0.065	0.475	0.013	-2.929	63.206*	-0.231	23.230***	6.022	0.683
	(121.712)	(9.658)	(2.039)	(10.060)	(2.718)	(1.661)	(4.158)	(33.408)	(0.297)	(8.839)	(5.660)	(0.588)
β_3 - β_2	72.764	19.530**	5.381***	-9.795	-0.451	1.605	-2.614	43.315	-0.242	24.480***	10.098**	-0.228
	(106.541)	(7.752)	(1.982)	(9.002)	(2.569)	(1.518)	(3.077)	(29.458)	(0.299)	(9.277)	(4.969)	(0.706)
Control Mean	1586.284	24.367	27.693	83.025	15.828	7.137	35.480	315.241	0.689	67.953	43.180	2.425
Control SD	1211	60	20	77	35	15	44	325	4	78	68	7
N	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300
Baseline Control?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

This table presents estimates of the ITT effects of the Maziko interventions on household caloric availability broken down by food group in the lean season. All models include district (strata) fixed effects and controls for baseline values of the outcomes. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: AE, adult equivalent; SBC, social behaviour change.

Table 6. Impact on Per-AE Micronutrient Availability

	Ca (mg) (1)	Fe (mg) (2)	Zn (mg) (3)	Vit A (mcg) (4)	Thiamin (mg) (5)	Riboflavin (mg) (6)	Niacin (mg) (7)	Folate (mcg) (8)	Vit B12 (mcg) (9)	Vit C (mg) (10)
β_1: SBC only	-1.90	-0.14	-0.011	-0.38	0.058	0.010	0.19	-4.69	0.0069	-6.59
	(16.9)	(1.31)	(0.87)	(21.5)	(0.11)	(0.038)	(1.04)	(22.6)	(0.24)	(23.7)
β_2: SBC + Low Cash	-2.09	0.022	0.50	-0.92	-0.042	0.017	0.46	4.65	-0.070	24.1
	(16.8)	(1.16)	(0.76)	(20.8)	(0.100)	(0.034)	(0.79)	(24.1)	(0.19)	(22.0)
β_3: SBC + High Cash	34.1*	1.05	0.53	34.3	0.33***	0.041	1.44*	57.7**	-0.18	7.61
	(18.1)	(1.30)	(0.80)	(21.8)	(0.11)	(0.035)	(0.76)	(24.8)	(0.21)	(23.7)
β_2 - β_1	-0.191	0.167	0.506	-0.542	-0.100	0.006	0.262	9.339	-0.077	30.658
	(16.324)	(1.328)	(0.937)	(22.120)	(0.110)	(0.040)	(1.081)	(22.812)	(0.191)	(25.558)
β_3 - β_1	35.990**	1.200	0.541	34.701	0.268**	0.030	1.244	62.379***	-0.183	14.202
	(18.140)	(1.451)	(0.969)	(23.386)	(0.119)	(0.040)	(1.048)	(23.746)	(0.203)	(26.911)
β_3 - β_2	36.180**	1.033	0.035	35.243	0.368***	0.024	0.982	53.040**	-0.106	-16.456
	(17.980)	(1.318)	(0.849)	(22.757)	(0.107)	(0.036)	(0.791)	(25.058)	(0.150)	(24.946)
Control Mean	333.029	23.183	10.482	315.498	1.065	0.686	12.628	389.835	1.853	150.308
Control SD	193	13	8	240	1	0	10	246	2	232
N	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300
Baseline Control?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

This table presents estimates of the ITT effects of the Maziko interventions on household micronutrient availability in the lean season. All models include district (strata) fixed effects and controls for baseline values of the outcomes. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: AE, adult equivalent; mcg, micrograms; mg, milligrams; SBC, social behaviour change.

Table 7. Agricultural Production Mechanisms

	Maize kg (1)	Maize stores harvest (kg) (2)	Maize stores midline (kg) (3)	Crop Sales (4)	Seed Cost (5)
β_1: SBC only	34.5	18.6	1.10	11857.5	1715.0
	(32.6)	(27.4)	(5.55)	(10232.3)	(1817.3)
β_2: SBC + Low Cash	29.9	21.0	19.2	440.2	652.0
	(23.1)	(21.3)	(11.9)	(8747.8)	(1639.8)
β_3: SBC + High Cash	52.5**	46.1**	16.5**	-260.3	2001.8
	(25.8)	(21.8)	(7.89)	(9830.1)	(1787.4)
β_2 - β_1	-4.543	2.368	18.054	-11417.338	-1063.045
	(35.263)	(29.318)	(11.678)	(8724.816)	(1580.136)
β_3 - β_1	18.029	27.522	15.357*	-12117.831	286.778
	(36.925)	(29.884)	(8.003)	(9608.996)	(1734.712)
β_3 - β_2	22.572	25.155	-2.698	-700.493	1349.823
	(28.314)	(23.751)	(12.859)	(8015.322)	(1524.613)
Control Mean	197.860	41.839	10.133	41573.687	8152.950
Control SD	247	206	52	103294	14089
N	1273	1273	1273	1273	1273
Baseline Control?	Y	Y	Y	Y	N

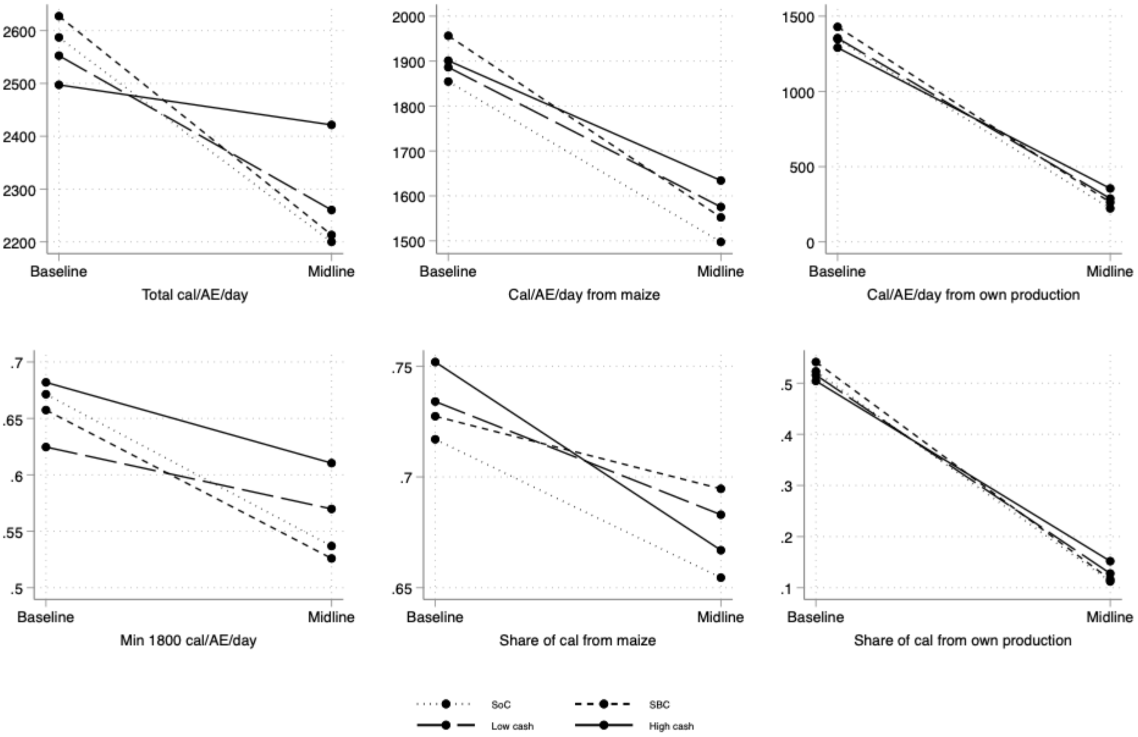
This table presents estimates of the ITT effects of the Maziko interventions on measures related to agricultural production in the Oct 2022 - May 2023 planting season. All models include district (strata) fixed effects and controls for baseline values of the outcomes when available. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: SBC, social behaviour change.

Table 8. Self-reported cash transfer spending

	SBC+Low Cash	SBC+High Cash	P-value
Seeds	.01	.043	0.041
	(.10)	(.20)	
Agricultural inputs	.062	.18	0.00
	(.24)	(.38)	
Large livestock	.01	.0048	0.529
	(.10)	(.07)	
Small livestock	.062	.12	0.04
	(.24)	(.33)	
Poultry	.036	.048	0.538
	(.19)	(.21)	
N	195	207	

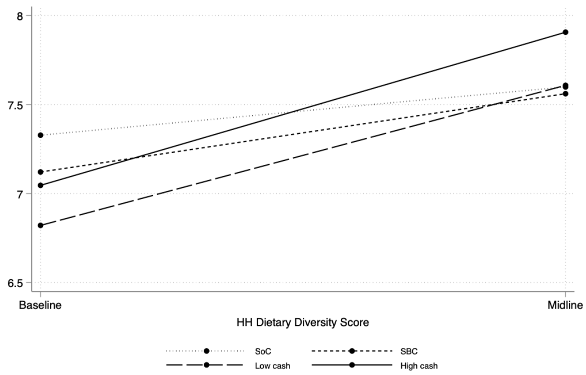
This table presents self-reports of what agricultural inputs and assets households spent their cash transfer income on. The p-values are from t-tests comparing responses from households in the SBC+Low Cash and SBC+High Cash treatment arms. Standard deviations are displayed in parentheses.

Figure 1. Caloric availability over time



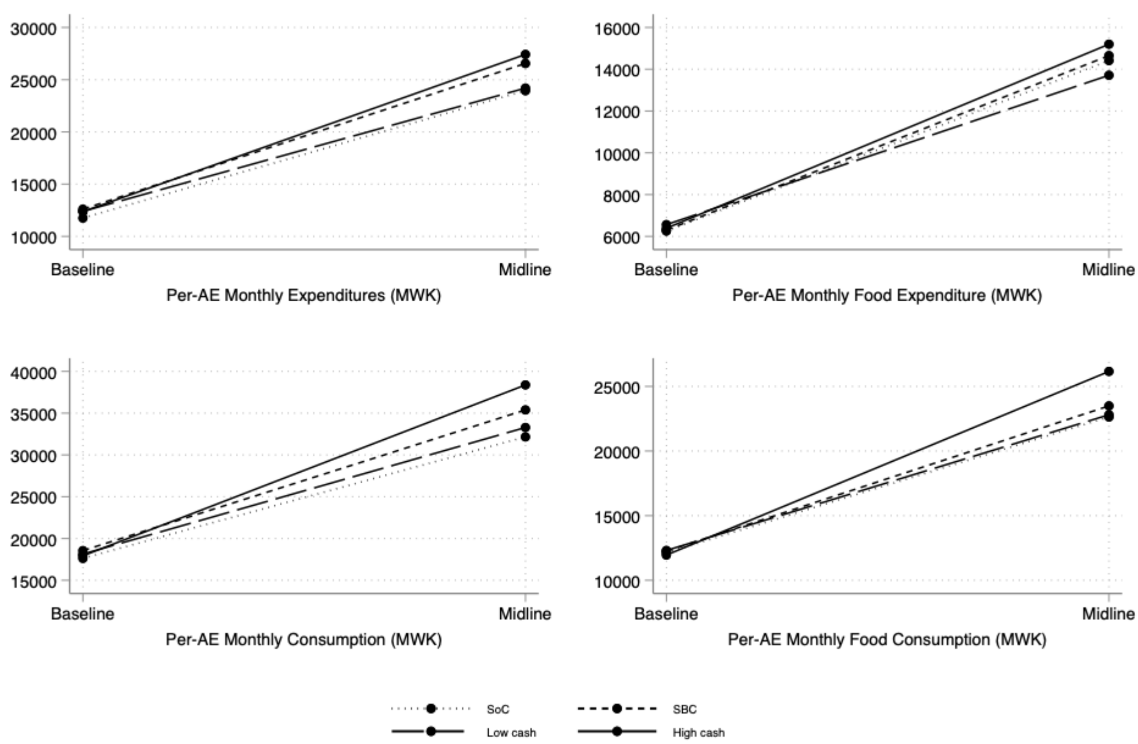
This figure presents changes in daily caloric availability (total, from maize and from own production) per adult equivalent between the baseline (May-June 2022) and midline (Nov-Dec 2023) surveys for each of the treatment arms. Note that the different panels do not have common axes. Abbreviations: AE, adult equivalent; cal, calories (referring to kilocalories); SBC, social behavior change; SoC, standard of care (control).

Figure 2. Dietary diversity over time



This figure presents changes in household dietary diversity between the baseline (May-June 2022) and midline (Nov-Dec 2023) surveys for each of the treatment arms. Dietary diversity is measured over a 7 day recall period using the Household Dietary Diversity Score (HDDS), and values range from 0 to 12. Abbreviations: AE, adult equivalent; SBC, social behavior change; SoC, standard of care (control).

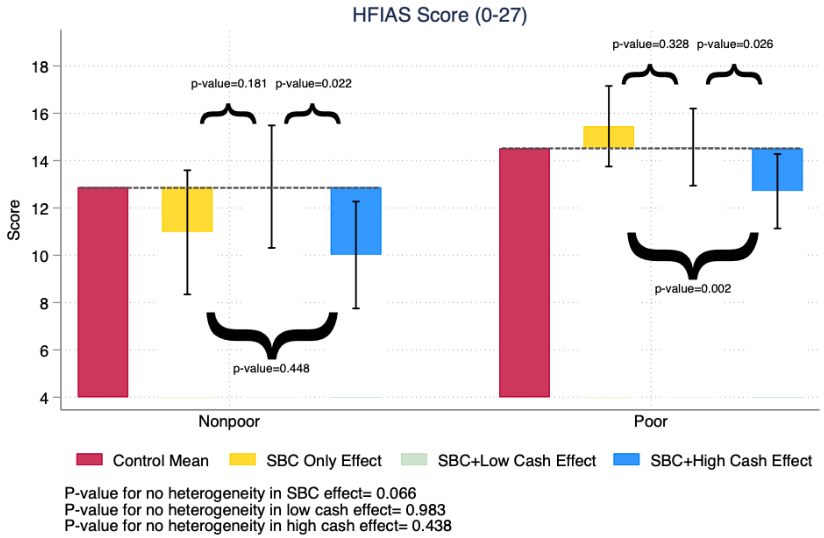
Figure 3. Expenditure and consumption over time



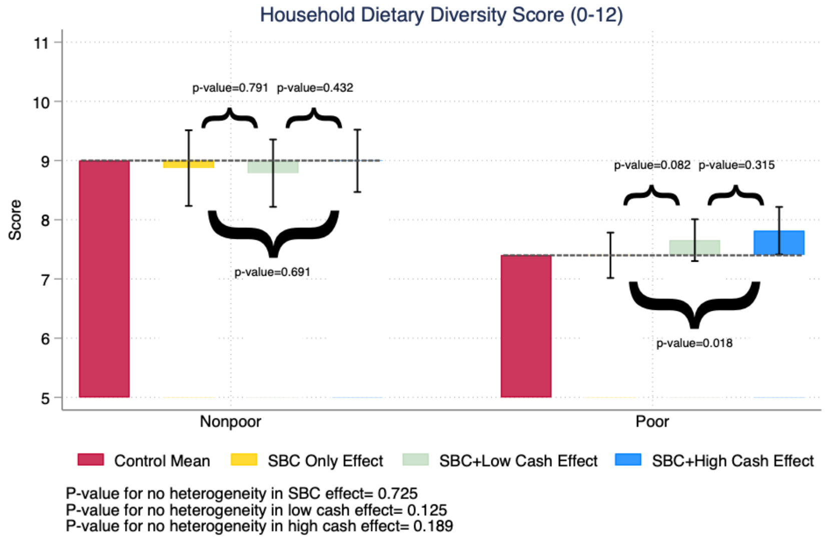
This figure presents changes in monthly expenditures and consumption per adult equivalent between the baseline (May-June 2022) and midline (Nov-Dec 2023) surveys for each of the treatment arms. All values are in nominal Malawian kwacha. Note that the different panels do not have common axes. Abbreviations: AE, adult equivalent; MWK, Malawian kwacha; SBC, social behavior change; SoC, standard of care (control).

Figure 4. Heterogeneity by poor versus non-poor households in HFIAS and HDDS

(a)



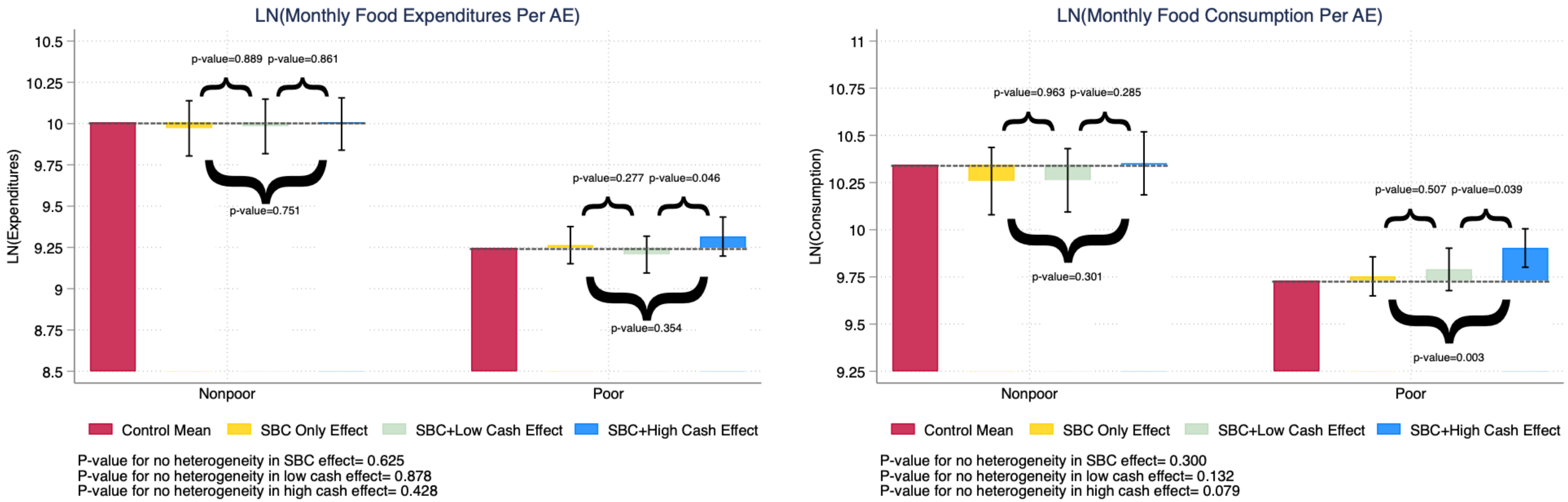
(b)



Each panel in this figure heterogeneous treatment effect estimates for households below (poor) and above (nonpoor) the $2.15/day International Poverty Line at baseline for HFIAS and HDDS (food access outcomes). To obtain estimates, we include separate binary treatment variables for poor and non-poor households and control separately for the poor household dummy in our regressions. We include p-values comparing the treatment arms within each subgroup, and across subgroups. Whiskers depict 95% confidence intervals. The horizontal dotted lines represent control group means. Abbreviations: HFIAS, Household Food Insecurity Access Scale; SBC, social behavior change.

Figure 5. Heterogeneity by poor versus non-poor households in food consumption and expenditure

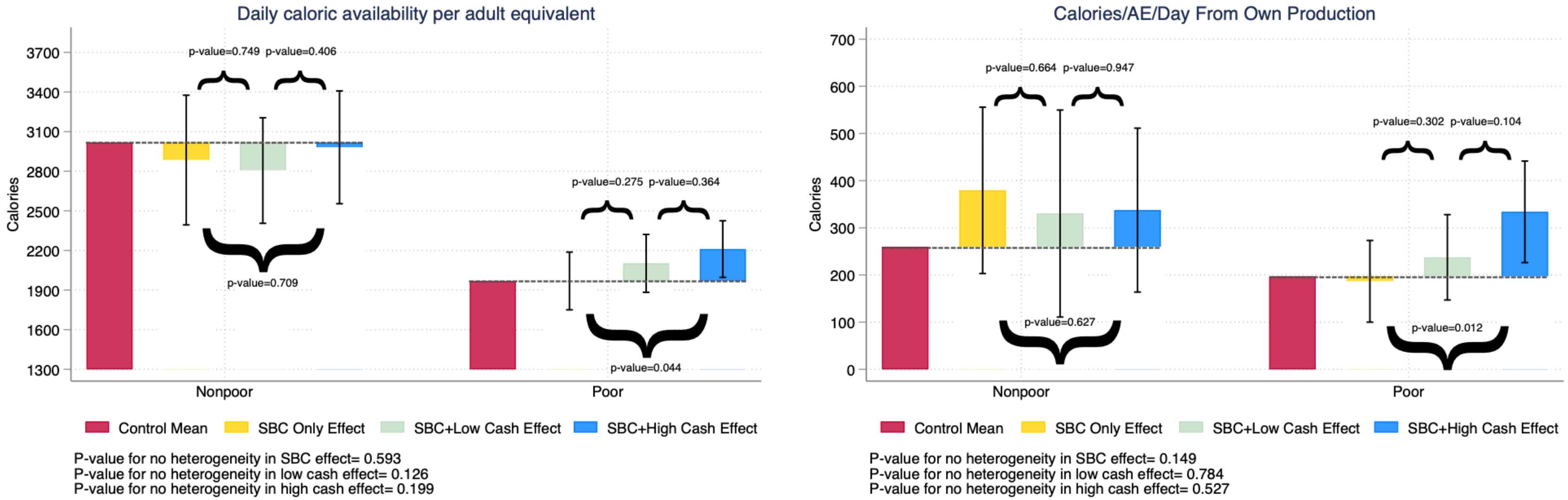
(a) (b)



Each panel in this figure heterogeneous treatment effect estimates for households below (poor) and above (nonpoor) the $2.15/day International Poverty Line at baseline for food consumption and expenditure (food access outcomes). To obtain estimates, we include separate binary treatment variables for poor and non-poor households and control separately for the poor household dummy in our regressions. We include p-values comparing the treatment arms within each subgroup, and across subgroups. Whiskers depict 95% confidence intervals. The horizontal dotted lines represent control group means. Abbreviations: AE, adult equivalent; SBC, social behavior change.

Figure 6. Heterogeneity by poor versus non-poor households in caloric availability

(a) (b)



Each panel in this figure heterogeneous treatment effect estimates for households below (poor) and above (nonpoor) the $2.15/day International Poverty Line at baseline for outcomes related to caloric availability. To obtain estimates, we include separate binary treatment variables for poor and non-poor households and control separately for the poor household dummy in our regressions. We include p-values comparing the treatment arms within each subgroup, and across subgroups. Whiskers depict 95% confidence intervals. The horizontal dotted lines represent control group means. Abbreviations: AE, adult equivalent; SBC, social behavior change.

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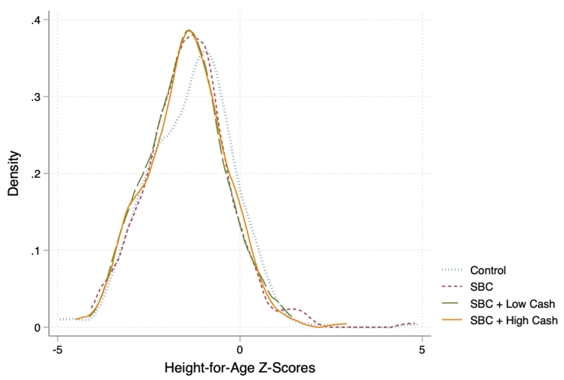
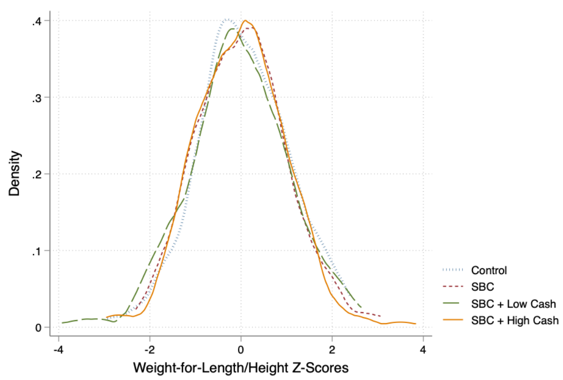
Appendix

Figure A.1. Impact on Child Anthropometry

(a)



(b)



Panel (a) shows the distribution of height-for-age z-scores (HAZ) for children in our midline sample. Panel (b) shows the distribution of weight-for-length z-scores (WLZ). A child is considered to be stunted if their HAZ score is below -2, and wasted if their WLZ is below -2.

Table A.1. Impact on HFIAS Categories

	Worried not enough food	Unable to eat preferred foods	Limited number of foods	Ate food did not want	Smaller meals	Fewer meals	No food at home	Went to sleep hungry	No food all day	Food secure	Mildly food insecure	Moderately food insecure	Severely food insecure
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
β_1: SBC only	0.045	0.14	0.066	0.010	-0.046	-0.025	0.011	0.056	-0.055	-0.019	0.020	-0.014	0.014
	(0.11)	(0.10)	(0.10)	(0.095)	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)	(0.018)	(0.013)	(0.039)	(0.052)
β_2: SBC + Low Cash	-0.11	0.11	0.035	0.031	-0.036	0.032	0.022	0.090	-0.028	-0.0047	0.0095	-0.040	0.035
	(0.095)	(0.096)	(0.087)	(0.084)	(0.10)	(0.094)	(0.12)	(0.12)	(0.13)	(0.017)	(0.011)	(0.036)	(0.045)
β_3: SBC + High Cash	-0.25***	-0.13	-0.15*	-0.18**	-0.27***	-0.28***	-0.33***	-0.24**	-0.28***	0.023	0.033**	0.044	-0.10*
	(0.094)	(0.092)	(0.089)	(0.079)	(0.10)	(0.096)	(0.12)	(0.11)	(0.098)	(0.024)	(0.014)	(0.042)	(0.053)
β_2 - β_1	-0.151	-0.031	-0.031	0.021	0.010	0.057	0.012	0.035	0.027	0.015	-0.010	-0.025	0.021
	(0.117)	(0.101)	(0.102)	(0.099)	(0.120)	(0.126)	(0.141)	(0.140)	(0.137)	(0.017)	(0.015)	(0.041)	(0.054)
β_3 - β_1	-0.297**	-0.272***	-0.217**	-0.191**	-0.227*	-0.259**	-0.339**	-0.294**	-0.227**	0.043*	0.014	0.058	-0.115*
	(0.116)	(0.096)	(0.103)	(0.095)	(0.121)	(0.127)	(0.138)	(0.124)	(0.111)	(0.024)	(0.018)	(0.047)	(0.060)
β_3 - β_2	-0.146	-0.242***	-0.186**	-0.211**	-0.237**	-0.317***	-0.350***	-0.329**	-0.254**	0.028	0.024	0.084*	-0.136**
	(0.099)	(0.091)	(0.089)	(0.083)	(0.108)	(0.107)	(0.126)	(0.128)	(0.123)	(0.023)	(0.016)	(0.045)	(0.054)
Control Mean	1.932	1.767	1.892	1.730	1.841	1.764	1.250	1.037	0.889	0.054	0.011	0.153	0.781
Control SD	1	1	1	1	1	1	1	1	1	0	0	0	0
N	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314

This table presents estimates of the ITT effects of the Maziko interventions on individual components of the HFIAS score and food security classifications of households in the lean season. All models include district (strata) fixed effects and controls for baseline values of the outcomes. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: AE, adult equivalent; kcal, kilocalorie; SBC, social behaviour change.

Table A.2. Impact on Household Dietary Diversity Categories

	Cereals (1)	Tubers (2)	Veg (3)	Fruits (4)	Meat (5)	Eggs (6)	Fish (7)	Pulses (8)	Dairy (9)	Oils (10)	Sugar (11)	Misc (12)
β_1: SBC only	0.011	0.014	0.00036	-0.046	0.0036	0.032	-0.074*	0.026	-0.00055	-0.00027	0.026	0.0078
	(0.0097)	(0.057)	(0.011)	(0.039)	(0.044)	(0.039)	(0.043)	(0.032)	(0.019)	(0.038)	(0.047)	(0.0076)
β_2: SBC + Low Cash	0.014	-0.029	-0.00036	0.038	0.036	-0.013	-0.022	-0.017	-0.0059	-0.0022	0.085**	0.0053
	(0.0089)	(0.053)	(0.0095)	(0.027)	(0.041)	(0.037)	(0.040)	(0.029)	(0.019)	(0.039)	(0.042)	(0.0078)
β_3: SBC + High Cash	0.014	0.10*	0.0075	-0.019	0.0088	0.039	-0.015	0.024	-0.0069	0.080**	0.12***	0.0046
	(0.0090)	(0.057)	(0.0083)	(0.033)	(0.044)	(0.045)	(0.040)	(0.031)	(0.018)	(0.035)	(0.043)	(0.0081)
β_2 - β_1	0.003	-0.043	-0.001	0.084**	0.033	-0.045	0.052	-0.043	-0.005	-0.002	0.059	-0.002
	(0.004)	(0.051)	(0.010)	(0.039)	(0.039)	(0.038)	(0.040)	(0.028)	(0.019)	(0.035)	(0.042)	(0.005)
β_3 - β_1	0.003	0.090	0.007	0.027	0.005	0.007	0.059	-0.002	-0.006	0.081***	0.094**	-0.003
	(0.004)	(0.055)	(0.009)	(0.043)	(0.042)	(0.047)	(0.041)	(0.030)	(0.018)	(0.030)	(0.044)	(0.006)
β_3 - β_2	0.000	0.134***	0.008	-0.057*	-0.028	0.052	0.007	0.041	-0.001	0.083**	0.035	-0.001
	(0.001)	(0.051)	(0.008)	(0.032)	(0.040)	(0.045)	(0.037)	(0.026)	(0.017)	(0.032)	(0.037)	(0.006)
Control Mean	0.986	0.302	0.986	0.915	0.251	0.265	0.670	0.846	0.048	0.761	0.581	0.989
Control SD	0	0	0	0	0	0	0	0	0	0	0	0
N	1297	1297	1297	1297	1297	1297	1297	1297	1297	1297	1297	1297
Baseline Control?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

This table presents estimates of the ITT effects of the Maziko interventions on individual components of the Household Dietary Diversity Score in the lean season. All models include district (strata) fixed effects and controls for baseline values of the outcomes. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: AE, adult equivalent; SBC, social behaviour change.

Table A.3. Impact on Minimum Micronutrient Availability

	Ca (1)	Fe (2)	Zn (3)	Vit A (4)	Thiamin (5)	Riboflavin (6)	Niacin (7)	Folate (8)	Vit B12 (9)	Vit C (10)
β_1: SBC only	-0.0065	-0.012	0.0017	0.0044	0.0050	-0.000084	0.0018	0.0032	-0.0070	-0.0089
	(0.020)	(0.019)	(0.026)	(0.029)	(0.039)	(0.022)	(0.025)	(0.018)	(0.045)	(0.028)
β_2: SBC + Low Cash	-0.0022	0.013	0.025	0.00030	0.0027	0.014	0.028	0.014	0.0085	0.028
	(0.020)	(0.018)	(0.020)	(0.029)	(0.037)	(0.022)	(0.022)	(0.020)	(0.037)	(0.026)
β_3: SBC + High Cash	0.040*	0.0086	0.026	0.049*	0.088**	0.026	0.062***	0.032*	0.012	0.029
	(0.022)	(0.021)	(0.025)	(0.027)	(0.035)	(0.023)	(0.022)	(0.019)	(0.043)	(0.024)
β_2 - β_1	0.004	0.025	0.024	-0.004	-0.002	0.015	0.027	0.011	0.015	0.037
	(0.019)	(0.019)	(0.026)	(0.032)	(0.039)	(0.023)	(0.023)	(0.018)	(0.040)	(0.031)
β_3 - β_1	0.047**	0.021	0.025	0.045	0.083**	0.026	0.060**	0.029*	0.019	0.038
	(0.022)	(0.022)	(0.030)	(0.030)	(0.038)	(0.024)	(0.024)	(0.017)	(0.045)	(0.029)
β_3 - β_2	0.043*	-0.004	0.001	0.049	0.085**	0.011	0.034	0.018	0.003	0.001
	(0.022)	(0.020)	(0.026)	(0.030)	(0.035)	(0.023)	(0.021)	(0.019)	(0.037)	(0.027)
Control Mean	0.436	0.848	0.658	0.503	0.644	0.511	0.742	0.878	0.506	0.724
Control SD	0	0	0	0	0	0	0	0	0	0
N	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300
Baseline Control?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

This table presents estimates of the ITT effects of the Maziko interventions on estimated minimum availability of micronutrients per adult equivalent in the lean season. All models include district (strata) fixed effects and baseline values of the outcomes. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: AE, adult equivalent; SBC, social behaviour change.

Table A.4. LATE, Food Access

	HFIAS (1)	HDDS (2)	Per-AE Expenditures (3)	Per-AE Food Expenditures (4)	Per-AE Consumption (5)	Per-AE Food Consumption (6)
SBC + Low Cash	-4.174***	0.896***	0.159	0.032	0.142	0.082
	(1.449)	(0.283)	(0.111)	(0.091)	(0.100)	(0.084)
SBC + High Cash	-6.499***	1.186***	0.252**	0.177*	0.237***	0.199***
	(1.261)	(0.259)	(0.106)	(0.091)	(0.090)	(0.073)
High Cash - Low Cash	-2.325**	0.291*	0.094	0.145**	0.095	0.117*
	(0.905)	(0.174)	(0.079)	(0.072)	(0.064)	(0.061)
N	961	947	949	949	949	949
K-P F	37.005	37.765	37.669	37.669	37.669	37.669
SBC Mean	14.148	7.561	9.947	9.401	10.250	9.864
SBC SD	(6.558)	(1.868)	(0.688)	(0.646)	(0.651)	(0.617)

Robust standard errors clustered at the CBCC cluster level in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively

Table A.5. LATE, Caloric Availability

	Kcal/AE/day (1)	Min 1800 kcal/AE/day (2)	Kcal/AE/day own production (3)	Share kcal own production (4)
SBC + Low Cash	-44.837	0.071	246.537**	0.094**
	(171.969)	(0.070)	(111.790)	(0.047)
SBC + High Cash	120.771	0.098*	264.379***	0.110***
	(152.721)	(0.059)	(93.144)	(0.040)
High Cash - Low Cash	165.607	0.027	17.842	0.016
	(123.197)	(0.050)	(81.339)	(0.035)
N	949	949	949	949
K-P F	37.669	37.669	37.669	37.669
SBC Mean	2213.216	0.526	262.931	0.116
SBC SD	(1336.895)	(0.500)	(479.586)	(0.186)

This table presents estimates of the LATE effects of the cash transfers on household caloric availability in the lean season. All models include district (strata) fixed effects and controls for baseline values of the outcomes. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: AE, adult equivalent; kcal, kilocalorie; K-P, Kleibergen-Paap; SBC, social behaviour change.

Table A.6. LATE Per-AE Micronutrient Availability

	Ca (mg) (1)	Fe (mg) (2)	Zn (mg) (3)	Vit A (mcg) (4)	Thiamin (mg) (5)	Riboflavin (mg) (6)	Niacin (mg) (7)	Folate (mcg) (8)	Vit B12 (mcg) (9)	Vit C (mg) (10)
Low Cash Low Cash	38.408	-1.026	-1.910	7.811	0.161	-0.039	0.181	53.253	0.358	-42.746
	(25.163)	(1.934)	(1.287)	(37.555)	(0.169)	(0.056)	(1.454)	(33.680)	(0.287)	(35.669)
High Cash	55.115**	-0.417	-2.131*	15.093	0.532***	-0.027	0.790	102.776***	0.121	-73.411**
	(24.868)	(1.902)	(1.210)	(31.398)	(0.156)	(0.050)	(1.326)	(39.062)	(0.288)	(33.466)
High Cash - Low Cash	16.708	0.610	-0.221	7.282	0.371***	0.012	0.609	49.523	-0.237	-30.664
	(20.826)	(1.486)	(0.772)	(26.946)	(0.123)	(0.040)	(0.856)	(31.447)	(0.177)	(19.179)
N	949	949	949	949	949	949	949	949	949	949
K-P F	37.669	37.669	37.669	37.669	37.669	37.669	37.669	37.669	37.669	37.669
SBC Mean	331.271	23.083	10.440	317.743	1.141	0.695	12.787	382.004	1.819	141.288
SBC SD	(206.984)	(13.955)	(8.263)	(246.576)	(1.206)	(0.410)	(10.525)	(275.147)	(2.224)	(228.310)

This table presents estimates of the LATE effects of the Maziko interventions on household micronutrient availability in the lean season. All models include district (strata) fixed effects and controls for baseline values of the outcomes. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: AE, adult equivalent; K-P F, Kleibergen-Paap F statistic; mcg, micrograms; mg, milligrams; SBC, social behaviour change.

Table A.7. What did households spend their cash transfers on?

	SBC+Low Cash	SBC+High Cash	P-value
N	195	207	
Food	.97	.93	0.09
	(.17)	(.25)	
Transport	.01	.03	0.11
	(.1)	(.18)	
Rent	0	.02	0.05
	(0)	(.14)	
Shelter materials	.04	.16	0
	(.2)	(.37)	
Seeds	.01	.04	0.04
	(.1)	(.2)	
Agricultural inputs	.06	.18	0
	(.24)	(.38)	
Large livestock	.01	0	0.53
	(.1)	(.07)	
Small livestock	.06	.12	0.04
	(.24)	(.33)	
Poultry	.04	.05	0.54
	(.19)	(.21)	
Business investment	.03	.06	0.13
	(.17)	(.24)	
Household items	.51	.54	0.64
	(.5)	(.5)	
Water	0	0	
	(0)	(0)	
Firewood	0	0	0.33
	(0)	(.07)	
Medical/health	.04	.1	0.01
	(.19)	(.3)	
Clothes/shoes	.33	.36	0.54
	(.47)	(.48)	
Toys/books for children	.01	.01	0.6
	(.07)	(.1)	
School fees	.09	.17	0.01
	(.28)	(.38)	
Savings	.06	.03	0.17
	(.23)	(.17)	
Debt repayment	.01	.01	0.6
	(.07)	(.1)	
VSLA	.11	.1	0.6
	(.32)	(.3)	
Other	.01	.01	0.95
	(.1)	(.1)	

This table presents compares responses to the question of what households spent their cash transfers on. The p-values are from t-tests comparing responses from households in the SBC+Low Cash and SBC+High Cash treatment arms. Standard deviations are displayed in parentheses.

Table A.8. Other Income Sources

	Other income (0/1)	Paid work last 30 days	Ganyu labour (0/1)
	(1)	(2)	(3)
β_1: SBC only	0.0042	-3245.9	0.018
	(0.053)	(2880.4)	(0.055)
β_2: SBC + Low Cash	0.011	-441.3	-0.020
	(0.045)	(3147.4)	(0.050)
β_3: SBC + High Cash	-0.0049	-1049.2	0.017
	(0.050)	(3350.8)	(0.053)
β_2 - β_1	0.006	2804.653	-0.038
	(0.048)	(2704.479)	(0.050)
β_3 - β_1	-0.009	2196.734	-0.001
	(0.053)	(2926.363)	(0.053)
β_3 - β_2	-0.015	-607.918	0.037
	(0.045)	(3170.035)	(0.048)
Control Mean	0.801	19432.081	0.574
Control SD	0	42693	0
N	1249	1299	1295
Baseline Control?	N	N	Y

This table presents estimates of the ITT effects of the Maziko interventions on income sources (other than own farming). In column 1, other income in a binary variable indicating whether households had nonfarm income in the previous 12 months. The dependent variable in column 2 is the income from paid work the household received in the previous 30 days (in MWK). In column 3, ganyu labour is a binary variable indicating whether households reported engaging in gangyu labour to cope with shocks. All models include district (strata) fixed effects and controls for baseline values of the outcomes when available. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: SBC, social behaviour change.

Table A.9. Production of Cash Crops

	Tobacco kg	Groundnut kg	Cotton kg	Pidgeonpea kg
	(1)	(2)	(3)	(4)
β_1: SBC only	1.38	2.46	1.26	-1.10
	(0.98)	(8.08)	(1.25)	(9.14)
β_2: SBC + Low Cash	1.24	10.2	-0.17	2.94
	(1.22)	(8.26)	(0.58)	(7.27)
β_3: SBC + High Cash	4.11	-3.96	0.86	-5.96
	(2.81)	(5.63)	(1.03)	(5.72)
β_2 - β_1	-0.134	7.748	-1.425	4.041
	(1.573)	(10.143)	(1.157)	(9.307)
β_3 - β_1	2.736	-6.417	-0.395	-4.855
	(2.977)	(8.070)	(1.433)	(8.204)
β_3 - β_2	2.870	-14.165*	1.031	-8.897
	(3.077)	(8.174)	(0.918)	(6.149)
Control Mean	0.000	17.844	0.537	22.628
Control SD	0	48	10	89
N	1273	1273	1273	1273

This table presents estimates of the ITT effects of the Maziko interventions on production of cash crops in the Oct 2022 - May 2023 planting season. All models include district (strata) fixed effects and controls for baseline values of the outcomes when available. Standard errors are clustered at the community-based childcare centre (CBCC) cluster level and are reported in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Abbreviations: SBC, social behaviour change.

Table A.10. Who decides how cash transfer gets spent?

	SBC+Low Cash	SBC+High Cash	P-value
N	195	207	
Woman alone	.52	.36	0.00
	(.5)	(.48)	
Husband alone	.09	.1	0.76
	(.29)	(.3)	
Woman and husband together	.35	.48	0.01
	(.48)	(.5)	
Woman and another male	.01	.01	0.95
	(.1)	(.1)	
Woman and another female	.02	.04	0.15
	(.12)	(.19)	
Another household member	.02	.01	0.61
	(.12)	(.1)	

This table presents compares responses to the question of who in the household decides how the cash transfer income gets spent. The p-values are from t-tests comparing responses from households in the SBC+Low Cash and SBC+High Cash treatment arms. Standard deviations are displayed in parentheses.